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EARLY MEDIEVAL SWORDS FROM MIKULČICE

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Editors' Foreword

In the tenth volume of the series of publications entitled *Studien zum Burgwall von Mikulčice* we return to the systematic publication of selected categories of the movable finds from excavations of the early mediaeval stronghold of Mikulčice. This time it is a particularly important category – swords. The set represents all the specimens found so far in Mikulčice – a total of 16 complete swords from grave units and 5 fragments from settlement contexts. As with other previously published systematic categories of movable finds, these are predominantly finds from the phases of large-scale excavations carried out between 1954 and 1992; the set has now been expanded to include one new find: the sword hilt found using a metal detector in 2011. All the finds were obtained during systematic archaeological excavation carried out at the site since 1954 by the Institute of Archaeology of the Academy of Sciences of the Czech Republic, Brno.

The swords from Mikulčice form a unique collection, the quality of which depends primarily on the find circumstances. The fact that all 16 swords belong to specific graves at particular burial sites in a single locality make this set a unique source for studying social and cultural relations in Mikulčice and Great Moravia. The sword is not only a weapon and a masterpiece of the metal-worker's craft, but is a particular symbol of the social status of the highest-ranking elites in early mediaeval society. The relatively narrow dating, limited to the 9th century, also makes this collection unique in terms of the comparative study of European weapons of the Early Middle Ages. The swords from Mikulčice are mostly products of foreign provenance, and therefore the study of these finds raises a number of questions concerning political, cultural, economic and social relations within Central Europe as it existed back them. They are excellent proof of contact with the Frankish environment.

The systematic evaluation of the swords from Mikulčice commenced back in 2002, when Jiří Košta began preparing his Master's thesis in Mikulčice. This meant that the basic documentation work was carried out before the tragic fire at the Mikulčice site in 2007, which seriously damaged most of the specimens. Prior to 2007 samples had also been taken for exact analysis, which later served as the basis for team work with Jiří Hošek. Both researchers – Jiří Košta as the archaeologist and Jiří Hošek as the metallographer and archaeometallurgist – then returned to the collection damaged in the fire, supplemented their work with further analyses, and prepared this comprehensive evaluation.

Around 50 years after the discovery of most of the Mikulčice swords, a fully-fledged assessment of these finds is now being published. Obviously, the information value of old finds is very limited considering the excavation methodology used at the time and the standard of documentation compiled. Information has also been lost due to the sheer amount of time that has passed.

This, however, is the fate of most of the archaeological sources from excavations carried out at the Mikulčice stronghold. On the other hand, this is still a valuable collection that requires processing in a comprehensive manner. This publication is the funded result of many years of detailed analytical work performed by both authors. It is also a good example of how 'old' material can be worked with and what results can be obtained, despite the limitations described above.

The editors of the *Studien zum Burgwall von Mikulčice* series have always striven to give each volume in the series a specific theme; these were initially in the form of anthologies. After anthology publications were degraded by the Czech system of evaluating science and research to less than fully-fledged scholarly publications, a change needed to be made to the form of the various volumes. They will now be increasingly published as monographs, and will be more frequently in English. However, the essence remains the same: *Studien zum Burgwall von Mikulčice* will continue to be primarily a critical source-based publication focusing on the topic of early mediaeval Mikulčice and intended for the international scholarly community.

Lumír Poláček, Pavel Kouřil

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Introduction

The Early Medieval stronghold of Mikulčice (Fig. 1) was one of the main centres of Great Moravia. This, the first Slavic state to the north of the Danube River, was established during the first two thirds of the 9th century and came to an end at the beginning of the 10th century as and a consequence of internal economic and political crises following the invasion of the Hungarians into the Carpathian Basin. Thanks to extensive archaeological excavations since 1954 within the fortified complex as well as within the settlement agglomeration have uncovered an area of more than 4.6 ha. Among others, approximately 2500 early medieval inhumations scattered over a number of cemeteries have been unearthed here. The Great Moravian stronghold consisted of an inner bailey (the so called *acropolis*) which covered an area of 7.7 ha and an outer bailey (2.4 ha). During the Great Moravian period, an extensive settlement agglomeration formed around the fortified area.

A total of 16 swords have been discovered in graves at the site, and parts of a further four swords were identified in the settlement material. The significance of this set of swords lies not only in the number of items, but also in the very informative archaeological context in which the swords were found. Within Frankish territory, a burial rite which included deposition of weapons into graves began to decline during the course of the 7th and 8th centuries and we generally know about swords from the 9th century only from riverbed finds or other finds without any detailed context. The finds from Moravia and Slovakia, together with those from other territories bordering the Frankish Empire – such as Croatia and Schleswig-Holstein – thus form the basic evidence for describing the development of swords within the territory of the Frankish state itself.

As a whole, the Mikulčice finds can be quite accurately dated to the Great Moravian period, which correlates with the course of the 9th century and the beginning of the 10th century. The latest Mikulčice swords were probably buried not later than the first decade of the 10th century, because the tragic events of that period in Moravia had fatal consequences for the Mikulčice settlement. In many cases, however, the stratigraphy of those graves with swords or other grave goods allow even more precise dating.

The main goal of the study presented here is to describe in detail the swords and sword-parts discovered in the Mikulčice settlement. For the assessment of the swords we focus on metric descriptions, typological determinations, and metallographic assessments as well as descriptions of the remains of scabbards, straps and wrappings preserved in the corrosion layers of swords. Especial emphasis is laid on the description of swords excavated from burial contexts, accompanied by detailed descriptions of the graves and their grave goods. A detailed investigation of individual swords is followed by an assessment of the Mikulčice set as a whole. This study also includes a presentation of the fundamental historical and archaeological frameworks, into which the swords may be ranked.

There are brief introductions to the archaeological site, early medieval Mikulčice, and the political unit known as Great Moravia. The issues of burial rituals and the ranking of burials with swords within the Mikulčice cemeteries are also briefly introduced here. An overview of the present state of research into early medieval swords is carried out in this study, including the state of publication of finds from the territory of the Czech Republic and a brief characterisation of the early medieval swords discovered in Moravia. The third, synthetic part of the study includes an assessment of the Mikulčice set as a whole. There is some space devoted to the typology of the swords as well as to the dating of the archaeological contexts in which the swords were found. Similarly, in the chapter devoted to the construction of the Mikulčice swords there is a synthesis of all the findings from research into both blades and hilts, as well as a brief summary about the scabbard, wrappings and straps of swords. At the end of this chapter we comment on the issues of provenance of the Mikulčice swords. In the last chapter we present a basic outline of the social status of the men buried with swords in Mikulčice.

1. Mikulčice in the Early Middle Ages

1.1 Mikulčice, the power centre of the Great Moravia

The Early Medieval stronghold, situated by the Morava River on the cadastre of the village of Mikulčice (Fig. 1), was one of the main centres of an early state, which is conventionally known as Great Moravia.[1] The term 'Great Moravia' comes from the treatise *On the Governance of the Empire* written by the Byzantine Emperor Constantine VII Porphyrogennetos around the mid-10th century (ή μεγάλη Μοραβία, in a Latin translation *Magna Moravia*; for more details see e.g. Třeštík 1997, 263; Wolfram 1989). The Byzantine ruler was describing a polity unit which no longer existed and referred to the period of its greatest fame during the reign of Svatopluk. The adjective '*megalé*', however, in Byzantium determined neither the extent nor the power of a political unit but its location beyond the territory of the Empire or as a part of a bigger formation situated outside its nucleus (e.g. Great Greece in southern Italy and Sicily). In this respect, the location of the unit described by Porphyrogennetos to the south of the Hungarian settlements, and thus probably in the northern Balkans, is also questionable. Some scholars therefore have preferred other designations such as 'Old Moravia, Principality of Moravia', etc.). In our opinion, any unambiguous designation is problematic, considering the dynamic nature of the development of this polity as well as the great diversity in terms of both its designations in contemporary sources (of the 9th and early 10th centuries) and the titles used by its rulers. There were very different traditions in the Greek (Byzantine), Old Church Slavonic, Arabic and Latin (both Frankish and papal) written sources (see Měřínský 2006, 95–102 for the comprehensive publication on this issue). For this reason we will keep the traditional designation 'Great Moravia' for both the political unit and the archaeologically evidenced material culture.

The Great Moravian polity was constituted during the first two-thirds of the 9th century in the area north of the middle Danube. The geographical nucleus of Great Moravia most likely lay in the relatively small area of the Morava River basin, where the most important centres of power and economy were situated. It was from this area, that Moravian representatives came to participate in the council of Louis the Pious in Frankfurt in 822. It was in this area that the Dynasty of Great Moravian rulers, which modern historiography has designated (according to the first ruler known by name) as the 'Mojmir (Moymar) Dynasty', was established, and this area is also associated with the later (831) report, about the 'baptism of the all Moravians' by Reginhar, bishop of Passau (Třeštík 2001, 106–126). There is still some question about the degree of involvement of the Nitra Region, which is situated on the territory of today's western Slovakia east of the Little and White Carpathian Mountains, in the Great Moravian polity. From written sources we learn that the Moravian ruler Mojmir I ousted the Nitra

1 Comprehensively for the history of Great Moravia in world languages refer to further literature e.g. Poláček 1999; 2008c, 11–18; Třeštík 2000; Štefan 2011; for comprehensive studies in the Czech language see e.g. Havlík 1978; 1985; Třeštík 1997, 263–296; 1999; 2001; Měřínský 2006, the original wording of the written sources mentioned was published in *Magnae Moraviae Fontes Historici* (MMFH I–VII).

ruler Pribina sometime in the early 830s, but we cannot be certain whether Pribina had reigned in Nitra as an exponent of Mojmir's power or not. In any case, the Nitra Region had a special status within Great Moravia as an *appanage* principality kept by secondary members of the Mojmir Dynasty (compare with Třeštík 2001, 127–135; Steinhübel 2004; Měřínský 2006, 134–150).

The beginnings of an increasing complexity in the societies living on the periphery of the Avar Khaganate can be found as early as the 8th century, but a major impetus in this respect was the series of Frankish campaign against the Avars in the 790s and the beginning of the 9th century, which led to total collapse of the Khaganate and to the extinction of the Avar political identity (Pohl 1988; 2002). The Franks succeeded in overrunning only a small part of the former Khaganate. However, advantage of these political changes were taken by the rulers of the Slavic lands surrounding the Khaganate, such as Moravia, the Nitra Region, Dalmatian Croatia and Slavonia (Třeštík 2001, 53–126). We do not know to what extent the activities of Franks had a direct impact on their social rise; but in any case, Slavic elites began to be inspired by the Frankish culture and to imitate it, so that they could move fully into the political discourse of the Christian West. The most distinctive result of these changes was the adoption of Christianity (summarized by Měřínský 2006, 368–564), but one of its expressions was also an acceptance of elements of Frankish fashion and weaponry, which includes Frankish swords. However, the process of consolidation did not stop in Moravia at this level. Great Moravia was developing further into a unique society that adopted the cultural patterns of various areas and transformed them into its own distinctive culture (summarized by Poulík 1985; 1986; Poláček 1999; 2008c, 14–18; Měřínský 2006). Despite repeated attempts by Franks to intervene in the situation in Moravia, Great Moravia never actually became a part of the Frankish empire. On the contrary, Great Moravia steadily resisted the Frankish power and Great Moravian rulers achieved recognition of both their secular and ecclesiastical independence by the third quarter of the 9th century, through their international political activities and military achievements (Třeštík 2001, 136–201). Important evidence of the integrity of Great Moravia is the continuity of the ruling dynasty, despite two Frankish interventions, when Rastislav came to power in 846 and when he was displaced by Svatopluk (870–71). This was based on traditional religious legitimacy associated from the early 830s with Christian ideology (Štefan 2011, 334).

When attempting to reconstruct the social structure of Great Moravia, we face a number of difficult problems arising from ambiguity in both the written and archaeological sources. Similarly, the nature of the economy of Great Moravia is also still the subject of scholarly dispute (Třeštík 1973; 1997, 287–296; Havlík 1978; Macháček 2009; Štefan 2011, 333–344). Great Moravia, in any case, appears to have been a unit, which went through a rapid social development from chiefdom towards a state society (compare Štefan 2011, 348–349; Macháček 2012). Historical developments, however, did not allow Great Moravia enough time to fully complete this complex transformation. Great Moravia came to an end at the beginning of the 10th century as a consequence of an internal economic and political crisis, and the invasion of the Hungarians into the Carpathian Basin. The groups of the population, which organized the redistribution of commodities and presumably acquired their resources mainly from trade, were concentrated in a few large centres, connected through the old Amber Trail with the Venetian markets as well as by the Danube branch of the Silk Road. It was this very dense concentration of wealth within a few centres, spread across the land at a small distance from each other and surrounded by large settlement agglomerations (evidenced by archaeological excavations in the centres of Mikulčice and Staré Město – Uherské Hradiště) which were typical of Great Moravia. From the 870s to the early 890s (during the reign of Svatopluk), the prosperity of Great Moravia was supported by a territorial expansion (summarized by Havlík 1964; Měřínský 2006, 717–724), whose primary objective was to multiply the supply of trade commodities, and especially of the most important one – slaves coming from the Slavic regions that were not yet Christianised (Třeštík 1997; Štefan 2011).

The enlargement of Great Moravian power was not accompanied by appropriate enlargement of the administrative structures, which remained confined to the very centre of Great Moravia and even here probably did not successfully control the internal resources, whose systematic supply would have the responsibility of the landed nobility and perhaps the sovereign's servants. This was not necessary at a time of expansion, as the prosperity of the upper layers of society was secured by participation in military campaigns and by the gains that stemmed from those campaigns. Their readiness to face difficulties and overcome them was checked by the crisis that arose after the death of Svatopluk (894), when due to internal disputes a number of loosely affiliated territories did separate from Moravia (Štefan 2011).

Apparently, it seems that Moravian society was able to withstand these difficulties – written sources informs us about the reforms and stabilization of the Moravian archbishopric at the turn of the 10th century and Prince Mojmir II managed to defend his position against the East-Frankish Empire. It was an external factor that caused the reversal. Nomadic Hungarians, who started from the end of the 9th century to penetrate into the Carpathian Basin, interrupted the eastern branch the Silk Road, the southern branch of the Amber Road leading towards the Adriatic and, in 907, crushingly defeated an East-Frankish army in the battle near Brezalauspurc (equated either with today's Bratislava or Pannonian Mosaburg/Zalavár; compare Zehetmayer 2007 and Bowlus 1995, 258–259) which caused the disconnection of Moravia from the western branch of the Danube Road leading to Bavaria (Štefan 2011, 344–348). Probably sometime shortly before that date (in 905/906?) the Hungarians made a decisive attack on Great Moravia, which then disappears from history as a political unit. We deduce this on the basis of the absence of any Great Moravian troops in the battle of Brezalauspurc and also thanks to the information about the devastation of Moravia by the Hungarians 'to the ground', as recorded by Regino of Prüm, who completed his chronicle in the year 908 (Třeštík 1987; 1991; Štefan 2011, 344).

The course of the campaign in Moravia is unknown; military clashes are evidenced by the concentrations of Hungarian arrowheads recorded at strongholds in Moravia and Slovakia (Kouřil 2008; Ungerman 2011b, 138–142). An example of these events is the situation evidenced by archaeological excavations at Mikulčice. The heavy fights which took place there are evidenced by the numbers of abnormally deposited and shallowly buried bodies, which were found scattered over the area around the suburbs, in some parts of the central fortified area of the stronghold (*acropolis*) as well as on the fortifications themselves (Hladík/Mazuch 2010).

The disintegration of the Great Moravian early state was caused by a combination of several factors, in which – in addition to the killing or flight of much of the elite and the disruption of key centres – a vital role was played by the pauperisation caused by lost access to trade routes (Štefan 2011, 344–348). Unlike the Nitra Region, Moravia in the 10th century did not become a territory controlled directly by the Hungarians. The continuity of the Moravian identity, as well as the foundations of church organization survived the 'dark' 10th century, especially in the north-western part of the former centre of Great Moravia, in the strongholds of Olomouc and Staré Zámky in Brno-Líšeň (Měřínský 1986; 2008; Kouřil 2003; 2008; Jan 2005; Wihoda 2005).

The Mikulčice stronghold was surrounded by a large settlement agglomeration, whose south-eastern part extended into the territory of modern Slovakia, in the cadastral of Kopčany (Poláček/Mazuch/Baxa 2006; Poláček 2008b; 2008c, 18–39), and along with the settlement agglomeration in Staré Město near Uherské Hradiště (Galuška 1998; 2005; 2008), which is situated not far away from Mikulčice up the Morava River, this represented the most important centre of Great Moravia (Fig. 1). Some other settlement agglomerations such as Bratislava or Nitra in the past might have been of similar importance, but they were in the course of time disrupted by civic development and traces of the Great Moravian settlement were only preserved sporadically.

Although contemporary written sources may have mentioned centre, which is in present-days known like the Great Moravian Mikulčice, we cannot unequivocally identify the unearthed remains with any of the locations mentioned. Therefore our knowledge of Mikulčice depends solely upon the evidence of archaeological sources. The rapid decline in the post-Great Moravian period brought about the loss of the whole historical tradition associated with Mikulčice, but – on the other hand – caused whatever had remained to be preserved as an archaeological site left almost intact by later human activities. In this respect Mikulčice clearly differs from the much larger Staré Město – Uherské Hradiště settlement agglomeration.

The extensive archaeological excavations, conducted from 1954, revealed the foundations of at least 10 churches, approximately 2500 inhumations scattered over a number of cemeteries and in settlement complexes beyond the cemeteries, the remains of many residential and utility structures, the fortifications of both the acropolis and outer bailey including gates and the remains of wooden bridges. The importance of Mikulčice, as one of the main centres of Great Moravia, is well demonstrated archaeologically by the extent of the centre, the number of churches uncovered as well as evidence of a concentration in the social elite, who were accompanied by both unique imported artefacts and ostentatious products from Moravian workshops, many of which were found on the Mikulčice site. Interpretation of the results from the extensive excavations is complicated by the unsatisfactory state of their analytical processing and critical evaluation. Much information is so far available only from preliminary studies, in which stratigraphic relationships have not been adequately evaluated (summarized Poláček/Marek 2005). Unfortunately, this also includes the burial grounds and settlements in which these swords have been found.

The central fortified area of the Mikulčice stronghold is situated in the middle of the wide floodplain of the Morava River, approximately halfway between today's villages of Mikulčice and Kopčany, near the present-day border between the Czech Republic and Slovakia. The basic topography of the locality was determined by several sandy islands within the floodplain, surrounded by river branches and bays (Havlíček/Poláček/Vachek 2003). Pre-Great Moravian settlement activity was concentrated in these somewhat elevated areas. In the Great Moravian period the earlier settlement was partially replaced by various buildings including a large masonry building, which might be interpreted as a princely palace, and several churches[2] surrounded by extensive burial grounds. Partially as a result of these transformations, the settlement gradually extended to the floodplain, where a large suburb emerged having both a residential and a utility function. While only a single-phase settlement was archaeologically evidenced in the suburban areas, a dynamic development characterized by multiple changes of activities within individual areas and repeated overlapping of burial and settlement components took place on the sandy islands. In later medieval periods only sporadic settlement and burial activities are evidenced in several places of the non-floodplain area, which strongly indicates that Mikulčice had lost its central function (Poláček 2008b; 2008c; 2010; Hladík/Mazuch/Poláček 2008).

In the pre-Great Moravian period, corresponding approximately to the later stage of the Avar culture, an important central settlement, apparently fortified, emerged on the distinctive crescent-shaped island in the location of 'Horní Valy' and the outer bailey. There is currently a debate about the duration of the pre-Great Moravian settlement and about the dynamics of its development (Zábojník 2005; Poláček 2008c), but at least there was an early settlement in the

2 They are designated as II[nd] church, III[rd] church etc., where the Roman numerals correspond to the order in which the churches have been excavated.

second half of the 8th century. In course of the Great Moravian period a massive fortification on the acropolis and bailey was built and the area of 'Dolní Valy', situated in the floodplain, was included into the fortified acropolis. The extent of the fortified area was about 10 hectares, but the area of the whole settlement agglomeration, including the fortified parts, had an extent of approximately 30 to 50 hectares (Hladík/Mazuch/Poláček 2008).

In the central part of the acropolis, south of the road connecting the western and north-eastern gates, the earlier settlement was gradually replaced by a prestigious complex consisting of several churches (Poláček 2008a; 2010), among which the largest Great Moravian church had three aisles and was provided with a narthex and an atrium, as well as a palatial masonry building, whose symbolic function is demonstrated by the material used and by the presence of a large hall (newly Konečný 2011). The timing of these significant transformations cannot be precisely established; however, according to some indirect indications we can put them sometime at the turn of the first and second thirds of the 9th century (Poláček 2010, 45–46). The dynamic development of intra mural and extra mural areas continued throughout the Great Moravian period. All or at least most of the churches, documented within the suburbs, come from the Late Moravian Horizon (see Chap. 4.3), when some churches on the acropolis were also built or rebuilt (Košta 2008; Kouřil 2010; summarized by Poláček 2010). The number of permanent residents of the agglomeration in its heyday was probably between one and two thousand. Further development of the Mikulčice agglomeration was most likely prevented by a massive and devastating attack, whose evidence can be seen in a huge number of human remains buried abnormally and often shallowly and scattered over areas of both the settlement and fortifications, dated to the latest phase of the Great-Moravian period. If we take into account unexcavated areas of the settlement agglomeration, we can assume that the number of casualties reached several hundreds (Hladík/Mazuch 2010). The identity of the aggressor is clearly revealed by a significant number of Old-Hungarian rhombic arrowheads, which were found among weaponry that can be related to this event (Kouřil 2008). The dating of archaeological sources, of course, does not allow for such accuracy as written sources, but the overall character of the finds enables us to put the fall of Mikulčice into direct connection with the events that happened in the second half of the first decade of the 10th century. Life somehow continued here even after this event (although likely after a short hiatus) and a reduced, probably agrarian, settlement emerged there. Limited settlement and burial activities took place in some parts approximately until the Late Middle Ages. However, Mikulčice forever lost its central function and so its corresponding importance was never recovered.

1.2 Topography of the contexts in which the Mikulčice swords and sword-parts were found

1.2.1 The burial grounds and the grave-finds of swords

The number of swords coming from graves (sixteen) compared with that from settlement contexts (four fragments of sword hilts and one fragment of a sabre crossguard) clearly shows the importance of a burial rite in the study of this category of artefacts (Fig. 2). So far, there is no evidence of burial activities in the pre-Great Moravian period, when intensive settlement was documented. This means that the inhabitants of Mikulčice buried their dead in a way that left no archaeological traces. A change occurred in the earlier phase of the Great Moravian period, when the oldest skeletal burials appeared in the settlement agglomeration (Klanica 1985b; Poláček 2008c). At that time, the interred were buried along with grave goods consisting of items of clothing, jewellery, weapons and even food, which is most frequently documented by vessels. The oldest graves with swords also come from this earliest stage of skeletal burials (see Chap. 4.3).

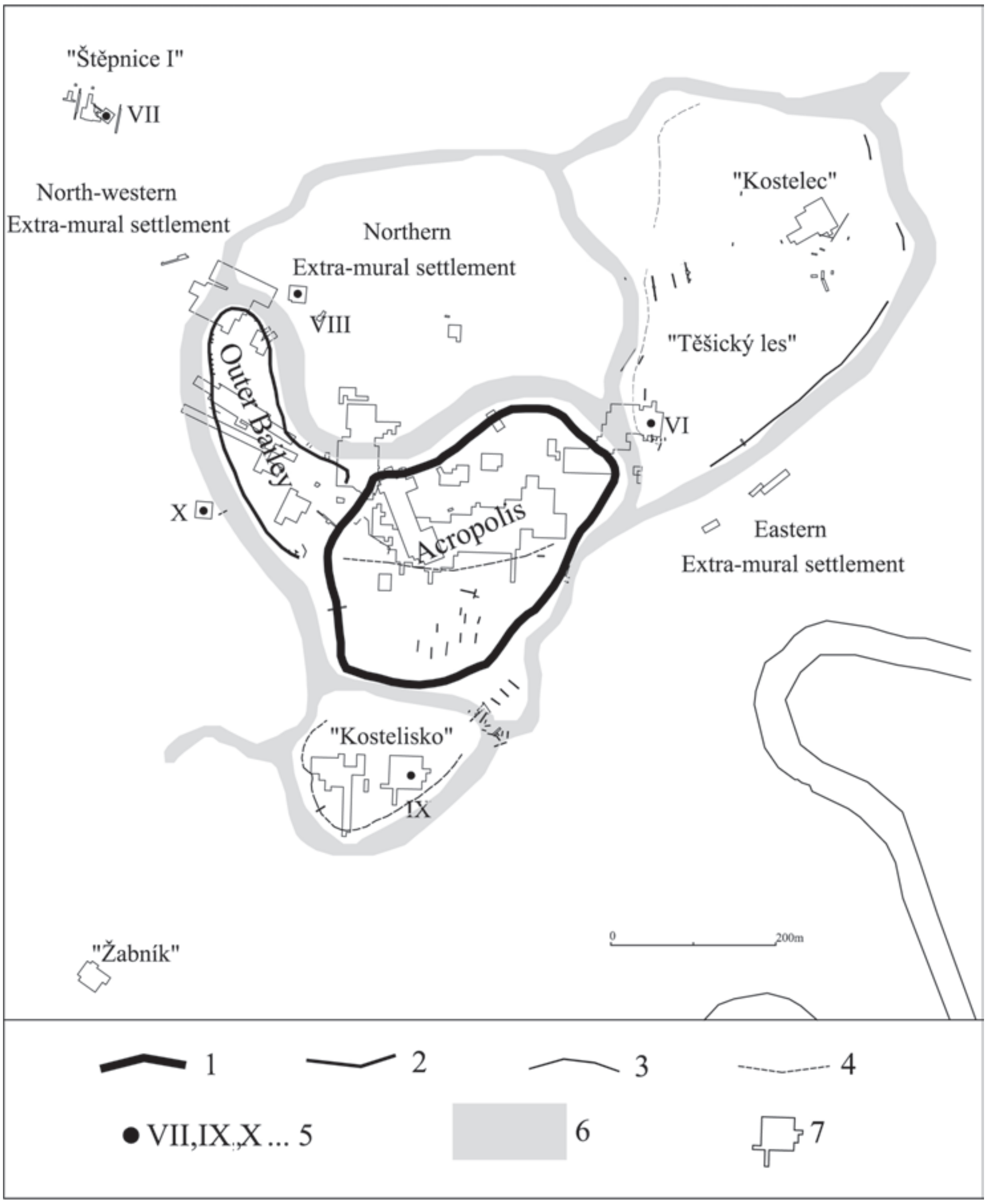

Fig. 1. The settlement complex of Mikulčice: 1 – fortification of the acropolis; 2 – fortification of the outer bailey; 3 – earth wall; 4 – field edge; 5 – numbering of churches in suburbia; 6 – water channels; 7 – excavated area. Background map by O. Marek and P. Čáp.

The burial rite in Great Moravia was not uniform but varied in time and place on a basis of local customs (DOSTÁL 1966; POULÍK 1985; KLANICA 1985b). It seems that grave goods in Mikulčice, at least in the church cemeteries, were gradually reduced by not including vessels (with food) and weapons. The social status of the male population was then demonstrated mainly by spurs and characteristic globular buttons, the so-called *gombíks*. This tendency, however, was not universal and significant differences between burial grounds may reflect their chronology and/or differences between communities that used them. Furthermore, archaeological evidence of rich burials may have been affected by the robbing of Great Moravian graves during the post-Great Moravian period.

Contrary to some other sites[3] the current state of processing information about the Mikulčice

3 E.g. the burial ground 'Na Valách' in Staré Město (HRUBÝ 1955) or the burial ground 'U Libuše' in Kouřim-Stará Kouřim in middle-east Bohemia (ŠOLLE 1959; 1966).

cemeteries does not allow us to decide whether the skeletal burials preceded the construction of the oldest churches in the settlement agglomeration. First of all, the pre-church phase was not evidenced in any of the surrounding cemeteries and at least graves from the earlier phase of the II[nd] church in Mikulčice as well as the oldest graves from cemeteries where no church was archaeologically evidenced (burying at this phase is proved by the vast cemetery of 'Kostelisko' that is situated south of the acropolis) can be reliably associated with the Early Great Moravian Horizon (see Chap. 4.3).

Graves from the Great Moravian period were usually grouped into cemeteries varying in size, although separate graves or small groups of graves are also known from the settlement areas (Poláček 2008c; Hladík/Mazuch 2010). Burials took place on the acropolis as well as in other parts of the settlement agglomeration. Based on evidence from the year 2008 (Poláček 2008c), out of 2339 graves coming from cemeteries and larger groups of graves, 1114 burials were found on the acropolis and 1225 in suburbia on the Moravian side of the settlement agglomeration (and further graves come from the cadastre of Kopčany; see Kraskovská 1965; Baxa et al. 2005; Baxa 2010). More extensive cemeteries were always founded in the somewhat elevated sandy islands (Poláček 2010, 37–38). The extent of church and non-church cemeteries in terms of the number of graves differs significantly between the acropolis and the suburbs. On the acropolis the majority of graves were found in cemeteries of the II[nd], III[rd] and IV[th] churches, but in the suburbs only two churches (VI[th] and IX[th]) were surrounded by medium sized cemeteries. There is no archaeological evidence of churches in the large burial grounds situated in 'Kostelisko' or in 'Kostelec'. The swords found on the acropolis came from church cemeteries as well as some grave groups without any relation to a church, but swords found beyond the acropolis come only from non-church burial grounds.

Burial at the site persisted residually in the post-Great Moravian period and even longer, when new smaller burial grounds were used (e.g. east of the II[nd] church; Poulík 1957; Poláček/Marek 2005, 41–42). The later burials took place also by the IX[th] church in the smaller cemetery in 'Kostelisko' (Měřínský 2005). Development of the burial rite in the post-Great Moravian period is characterized by a significant decline or even total dissaperance of richly furnished graves. The grave goods usually consisted of simple and chronologically indeterminate components of jewellery (see Ungerman 2007). Unequivocal evidence for dating in the post-Great Moravian period cannot be obtained from the presence of stones with pieces of mortar used in the construction of grave pits because such graves could also indicate rebuilding activities of the Great Moravian period. Determination of the dates of graves from the post-Great Moravian period is therefore very difficult and usually must be supported by stratigraphy. Despite these difficulties it can be stated that burials with swords from the post-Great Moravian period cannot be completely ruled out, but they are extremely unlikely.

The largest and most important cemetery of the acropolis surrounded the III[rd] church – the three-aisled temple that is the largest known Great Moravian building. This church was located in the heart of the acropolis on one of the two most prominent elevations, to the south-east of the II[nd] church and west of the 'palace'. The cemetery has been previously only published in brief studies; a catalogue and detailed analytical studies are still lacking (Poulík 1967, 105–139; 1975, 73–88; Klanica 1985b, 117–120; Poláček/Marek 2005, 50–80, 199–212; Kavánová/Šmerda 2010; Ungerman/Kavánová 2010). The almost completely excavated cemetery included 564 graves in which 571 individuals were identified; few graves of which were buried in the interior of the church building (Schulze-Dörrlamm 1993; Kavánová 2005). The area of the necropolis was very extensive, therefore superpositions were not frequent except in the immediate vicinity of the southern, eastern and northern walls of the church. In comparison with other Great Moravian burial grounds, this cemetery included a relatively high number of burials with grave goods.

According to Č. Staňa (2001, 92), who was involved with the analysis of 471 graves from an earlier phase of the excavation, 46.1% of burials contained some grave goods. If we included all burials (thus including graves more remote from the church, which were uncovered later), this number would be presumably a little lower. The grave equipment was in many cases exceptionally rich. Ostentatious jewellery of the Veligrad-type was represented by hundreds of pieces. A large number of men and boys were buried with spurs (in total 59) that indicated horse riders and thus individuals from a higher social level. Nearly 20 deceased had been buried in coffins with iron fittings and a similar number of tombs were lined with stones. In contrast, the number of ceramic vessels was small. Regarding the wealthy of the burial ground, fourteen axes, several of which came from graves with swords, do not represent a high number. The presence of Danube-type jewellery was marginal, although it is present in high numbers in rural Moravian burial grounds as well as in the suburban necropolises of Mikulčice.

The cemetery surrounding the III[rd] church was used by several social levels. We encounter here a significant proportion of the elite, probably including the ruling dynasty, whose members were apparently buried in tombs in the church interior (Schulze-Dörrlamm 1993), and representatives of the ecclesiastical hierarchy, whose burials unfortunately cannot be reliably identified within the Great Moravian cemeteries. Furthermore, servants of the elite and other free and unfree inhabitants of the stronghold were probably buried here.

The high number of burials of the elite is associated with the unusually high number of six graves with swords (341, 375, 425, 438, 500 and 580). Grave 580, equipped with extremely rich grave goods, was situated in the central nave of the church, i.e. in the most prestigious place within the church as well as the whole necropolis (summarized by Košta/Hošek 2008a). It may be assumed with some justification that this was the burial of an important representative of the Mojmir dynasty (see Chap. 6.3). We cannot comment on the age of the deceased because of the absence of anthropologically identifiable skeletal remains. We may assume that it was an adult because we do not know, so far, of any child burial with a sword within early medieval Moravia. Three other graves with swords (341, 438 and 500) were situated in the two rows of graves which extended from the major road of the acropolis to approximately halfway along the northern aisle of the church, where one of the entrances might have been situated. These two rows of graves, many of them richly furnished, probably lined the main road between the major road and the church. So this was a highly prestigious location within the necropolis. East of these graves (towards the apse) there was located grave 425 at a distance of about 4.5 meters north of the church. Besides the aforementioned grave 341, burial 433 with an opulent belt chape was found in its vicinity (Wieczorek/Hinz 2000, 200–202). The least prestigious location we would attribute to grave 375, which was located south of the foundations of the narthex of the church.

Before the church was built and the cemetery founded, the area had been used for settlement purposes. The beginning of the burial activity by the III[rd] church is – on the basis of a preliminary evaluation of the stratigraphy and inventory of graves – considered to lie in the course of the Early Great Moravian Horizon, i.e. either shortly before the middle or in the middle of the 9[th] century; see Ungerman/Kavánová 2010). At the same time, at least two stages of burial activity can be recognized there. An important means for dating of the turn of these two phases is the grave 480, in which a *solidus* of the Byzantine Emperor Michael III was found; the coin, minted in the years 856–867, dates the burial *post quem*. The archaeological context in the immediate vicinity of the grave 480 was recently analysed by B. Kavánová and J. Šmerda (2010). Although the *solidus* could theoretically have got into the grave 480 in the late 850s, according to Kavánová and Šmerda the period between the arrival of Cyril and Methodius (863) and the shambolic events at the turn of the 870s should be regarded as the most likely one (Kavánová/Šmerda 2010 159–161). But the alternative of a longer time interval between the minting and burying of the coin cannot be excluded either (see Košta/Lutovský 2014). Considering the present state of processing data from the burial ground, we cannot reliably determine to which phase of cemetery the majority of graves with swords belonged. The end of the later phase of burial activities might be indicated by the isolated find of an S-shaped temple-ring (in the grave 1183, which is situated close to the grave 375 with a sword; Ungerman/Kavánová 2010). However, the significance of this solitary find cannot be overstated; it could also be the sole case of a later burial in a place with an earlier burial tradition (examples of such graves are known, for example, from the surroundings of the IInd and IVth churches). The results of analyses of stones and mortar found in some graves might be of great benefit to us because we might determine from which phase of the building the stones originated (for further details see, e.g. Galuška 1996; 2013). The use of the burial ground during the later stages of the early medieval period cannot yet be clearly demonstrated.

Another cemetery of key importance extended around the IInd church. The cemetery was extended over relatively small area and consisted of little more than 200 graves, which could be dated to the Great Moravian period. The cemetery was bounded on the western and northern sides by the fortification of the acropolis, on the southern side by a road leading between the western and north-eastern gates and on the east side ended shortly behind the walls of the church. The area around the IInd church underwent a complex development during the Great Moravian period, which can only be described approximately due to the inadequate level of publication (Poulík 1957; 1967, 36–104; 1975, 49–72; Klanica 1985b, 123–124; Košta 2004; Poláček/Marek 2005; Poláček/Škojec 2009). For the situation by the IInd church there is certainly valid the statement of L. Poláček (2010) that, at the current state of documentation, Mikulčice represents in many places ‘a conglomerate of overlapping elements, which cannot be reliably dated or interpreted’.

In any case, the church and the related cemetery had two clearly distinct phases; the earlier phase, which was built in place of an earlier settlement, most likely represents the oldest known church building in Mikulčice. Later excavations of the church surroundings (see preliminary report Poláček/Škojec 2009) revealed, in contrast to the original interpretation (Poulík 1957; 1967, 36–104), the existence of an earlier phase of the church (probably a wooden building with a mortar floor; see e.g. Klanica 1985b; Schulze-Dörrlamm 1993; Košta 2004; Poláček 2010). This was probably used for a longer time and repaired. J. Poulík (1957) originally placed only four graves explicitly in the earlier phase of the cemetery. But in fact, a much larger number of graves was associated with this phase, although on the basis of published documentation we cannot reliably distinguish these graves. One may agree with the assumption of Z. Klanica that it included approximately 70 graves (Klanica 1985b, 124). According to Klanica and even to Poulík all the three graves with swords (90, 265, 280) came from the earlier phase of this cemetery. The grave 265 is exceptional among them, because it was the only burial found within the interior of the earlier phase of the church, directly in the central part of the nave (Schulze-Dörrlamm 1993; Košta 2004; 2005; Kavánová 2005; Poláček/Škojec 2009). The location of the two other graves within the burial ground cannot be defined precisely because graves belonging to the earlier phase have not yet been plotted on the map. The grave 90 could lie by the road leading towards the southern wall of the nave from the major road of the acropolis. It is also important that both the graves are in vertical stratigraphic relationship with two other significant male burials of the later phase of the cemetery – burial 44 with unique gilded spurs of bronze was found above the grave 90 and burial 100, whose grave goods included a belt-chape decorated with *Orans*, lay above the grave 280 (Poulík 1957, 292–299, 309–318). It seems that the importance of these two places continued, although the later phase of the necropolis was based on a levelling layer, which deeply buried the initial ground level, and which was probably related to a more general reconstruction of the area situated by the western gate of the acropolis. The church had in its later phase the appearance of a single-nave rectangular building with a rectangular apse, to which a square annex was later attached in the north-eastern corner, most likely representing a funerary chapel (summarized by Poláček/Škojec 2009; Poláček 2010). The later phase of the cemetery had a different character. While neither vessels nor weapons are found among grave goods, silver jewellery dominated (according to Č. Staňa, silver jewellery was found in 20 graves, out of which all or at least most of them come from the later phase of the cemetery; see Staňa 2001, 92). The variety of such artefacts and the burial rite of this phase have close analogies in the cemeteries beside the IVth, VIth and VIIth churches, which belong to the Late Great Moravian Horizon (see Kavánová 2001; Košta 2008; Kouřil 2010). As in the case of the cemetery by the VIth church, excavation of the later phase revealed richly furnished graves, which may be associated with the elite of Great Moravia.

The importance of the cemetery surrounding the IInd church thus survived from the earlier phase. The first burials appeared there during the Early Great Moravian Horizon, probably in the course of the second quarter of the 9th century. The beginning of the later phase may be dated approximately to the second half of the 9th century, though certainly not at the very end or the very beginning of this period. The cemetery beside the IInd church was apparently used by a rather small but very important community during the Great Moravian period. The dating of the earlier phase of the church and the exceptional location of grave 265 suggest that leading representatives of the stronghold (and perhaps even members of the ruling dynasty) were buried here before the three aisled temple (the IIIrd church) was built.

An important, but difficult to interpret, group of three graves with swords (715, 717 and 723) was found in a small burial ground located north-west of the palace. These graves were dug in the place of a former settlement and some of them (e.g. grave 715 with a sword of early Carolingian construction) were sunk distinctly into the levelling layers. In the wider surrounding area of this building, which was situated in the central part of the acropolis in a somewhat elevated position, several groups of graves and several individual graves , without a direct relation to any of the churches identified, were also found (Poulík 1975, 90–91; Poláček 2006, 8–9; Poláček/Marek 2005); some of these graves were in a such relationship with the palace that they could not be contemporary with the building. This part of excavation has been published only in brief synthesizing studies, and there are in this case several chronologically distinct phases, which we cannot distinguish. In the current state of knowledge we cannot precisely determine the relationship of the graves from the north-western group with the palace. The period of use of the cemetery located NW from the palace is also uncertain, but it seems that a small group of high-ranking people used it for a longer time during the Great Moravian period (as suggested by the variability of grave goods; in addition to this study see e.g. Poulík 1975, Poláček 2005).

Near the south-eastern border of the acropolis, east of the palace and in the eastern part of the large complex bounded by a palisade, several groups of graves have been excavated. These can probably be grouped with other burials into a burial ground with a rectangular ground plan (Klanica 1966; 1967b; Poláček 2006, 10–11; Poláček/Marek 2005). This burial ground, consisting of 81 graves (Poláček 2008c, 37, tab. 2), has been referred to as 'the burial ground by the hypothetical XIth church' (Poláček/Marek 2005). Among others, grave 805 with a sword was uncovered there. The current state of processing information about this location does not allow us to reconstruct either the horizontal or the vertical stratigraphy satisfactorily. The stratigraphy was very complicated there and only fragmentarily preserved due to terrain conditions. The existence of the hypothetical XIth church is evidenced by blocks of masonry that have sunk or collapsed into earlier features. However, the church foundations themselves have not been found. The burials associated with the hypothetical church buildings are not of a uniform character. Firstly, we can exclude a group of thirteen graves, which were located on the north-eastern edge of the area and lined up by a palisade leading from the north-eastern edge of the cemetery beside the IV[th] church. These burials were without grave goods and the superposition of graves 870, 877 and 880 indicates that these graves were stratigraphically earlier within the burial ground (Klanica 1967b, 42). Other burials, mostly richly furnished, were concentrated in three groups situated to the west, east and south of the remains of the hypothetical XI[th] church, which was probably disturbed by the abnormally oriented grave 829 (with a ceramic vessel) (Klanica 1967b, tab. 26). The eastern group consists of about 17 graves grouped into three north-south oriented rows. According to Z. Klanica the eastern group is distinctly older in character (Klanica 1967b, 42). Ceramic vessels and wooden buckets often appear among their grave goods and several of the graves were overlaid by younger ones in the course of the Great Moravian period. The group of graves located west of the church includes more than 20 burials unevenly distributed over a rectangular area. Several graves of this group had wooden linings to the burial pit and their grave goods consisted of such artefacts as sickles, ceramic vessels, buckets, *gombíks*, spurs, opulent necklaces and earrings, and an axe. The grave goods of burial 821 included, besides three vessels and one bucket, a late Avar fitting in the form of a horse's head; a harness bell was found in a layer above the grave (Klanica 1966, 57). However, the relation of these fittings to the grave was recently called into question (Mazuch 2009, 250). Lastly, the southern group of graves, which formed a strip that extended from the south-west towards the north-east, had a heterogeneous character. The graves have various orientations, but grave goods were found (with some exceptions) only in graves oriented from north-east or east to-west. Apart from grave 805, in which a sword and a ceramic vessel were found, there is grave 820 with small florally ornamented globular buttons (*gombíks*) and a vessel (Klanica 1966, 56) and grave 845 with a belt fitting. Before the processing of data from the burial ground by the hypothetical XI[th] church, and its publication, we cannot comment on its dating or function. We know, however, that it had a heterogeneous character and its individual parts may not in fact be related to each other.

Besides those cemeteries where graves with swords were unearthed, other necropolises are also known from the Mikulčice stronghold. The most notable of these was the burial site distributed over a relatively small quadrangle surrounding the IV[th] church, which was located in the north-eastern corner of an extensive district leading from the church towards the palace, not far from the burial site by the hypothetical XI[th] church (Klanica 1985b, 113–115; Kavánová 2001; Poláček/Marek 2005). This cemetery consisted of about 100 burials, but only 28% of them were furnished with grave goods. While gold and gilded jewellery was completely lacking, silver adornments have been found in eight graves (Staňa 2001, 92). Weapons and vessels have not been found among the grave goods at all. Burial activities certainly took place here in the late phase of the Great Moravian period. The archaeological situation of the so-called XII[th] church was analysed in detail by B. Kavánová (2003). The complex terrain situation at the north-eastern edge of the acropolis (by a gate) opens up the possibility of a multi-phase development of the burial ground with about 80 graves which had significantly poor grave goods without weapons or vessels. The church building was reconstructed from sporadically preserved fragments. In addition to the larger cemeteries, several small groups of graves or individual burials have been uncovered within the acropolis. One of the most important groups was a small burial ground from the 'Late Hillfort' period (late 10[th]–12[th] century) located east of the cemetery by the II[nd] church.

No graves with a sword were discovered in any of the suburban church cemeteries (see Poláček 2010). By the VII[th] (Poulík 1963, 76–87, 192–194; Klanica 1985b, 128; Kouřil 2010) and VIII[th] churches (Poulík, 1975, 111–112; Klanica 1985b, 124; Poláček 2006, 20–21) were found only small burial grounds with few graves with grave goods. These can be possibly dated to the last third of the 9th and the beginning of the 10th centuries. In the vicinity of the Xth church, eleven burials were found – all without grave goods (Poulík 1975, 117–119; Klanica 1985b, 125; Poláček 2006, 18–19). The interpretation of the function of these churches and their cemeteries is uncertain. Regarding the small number of graves we can assume that these burial grounds were used for only a short period of time, probably at the end of the Great Moravian period. A large cemetery was uncovered around the VIth church, (with the two-apse rotunda) – which was located on the opposite bank of the Morava River from the north-eastern gate of the acropolis. This burial ground with about 190 graves from the Great Moravian period, was published in detail (Poulík 1963; Profantová 2003; for the issue of chronology see Košta 2008). The overall character of the grave goods indicates a date in the Late Great Moravian Horizon (see Chap. 4.3). The IXth church was built, on the edge of the vast cemetery in the 'Kostelisko' location, sometime during the Great Moravian period. In the surroundings of this church a burial ground with approximately 80 graves from the Great Moravian period and another 80 graves from the post-Great Moravian periods was found (Poulík 1975; Měřínský 2005). Compared to other church cemeteries situated outside the acropolis, the grave goods from this cemetery were distinctively different. Grave goods were found in more than half the number of graves. Although none were discovered with any swords, several burials were accompanied by axes and vessels.

While archaeological excavations of the suburban church cemeteries revealed no graves with a sword, three swords have been discovered in non-church burial grounds. Besides the remote locations of 'Žabník' (Bartošková/Stloukal 1985) and 'Trapíkov' (Kostelníková 1958b), where only parts of cemeteries were uncovered, the archaeological excavations were primarily focused on a burial ground in the location 'Kostelec', situated in the north-eastern part of 'Těšický les', and a large burial ground in the location 'Kostelisko', extending westward from the IXth church.

The burial ground in 'Kostelec' consisted of 317 graves, and its research findings and grave inventories have been published (Klanica 1985a). The remains of a large ditch feature, interpreted as a pre-Christian cult enclosure (Klanica 1985a; 1985b, 131–133), were not contemporary with the burial activities, according to the results of the inspection survey (Hladík 2010; Hladík/Mazuch 2010), and at the time when burials started here the structure probably did not exist at all. There is also unclear relationship between this burial ground and the burials of horses uncovered here. In the Great Moravian period, some substitution of burial and settlement activities took place in parts of the area discussed, and so the burial ground does not form a homogeneous unit. Burial 1347 with a sword might have taken place during the first stage of the burial activities, which can be dated back to the Great Moravian period and which apparently ended before the end of Great Moravian period. The burial rituals were not so uniform as in most of the church cemeteries. There are frequent variations in the orientation of graves and body positions. We know grave goods from 37.5% of graves. The grave goods, unlike those from the cemeteries at the acropolis, were simpler and have a rather rural character. Gold jewellery is not present at all, silver adornments are rare and associated mainly with the later phase of the burials. On the other hand, bronze earrings of the Danube-type or beads (*gombíks*) of glass abound here. Apart from the grave with the sword, there were ten graves with axes, but only six graves with spurs. Also buckets frequently appear among the grave goods. 7.3% of graves were furnished with ceramic vessels. This burial ground differs from the other suburban church cemeteries in the frequent appearance of weapons and vessels.

The very interesting burial ground at 'Kostelisko' has, unfortunately, not yet been published and except for summary communications in the journal *Přehled výzkumů* only brief reports on individual graves have appeared so far (e.g. Klanica 1997a, 109–110; Košta 2004; Poláček 2006, 16–17). Only a part of the burial ground has been excavated and yet about 415

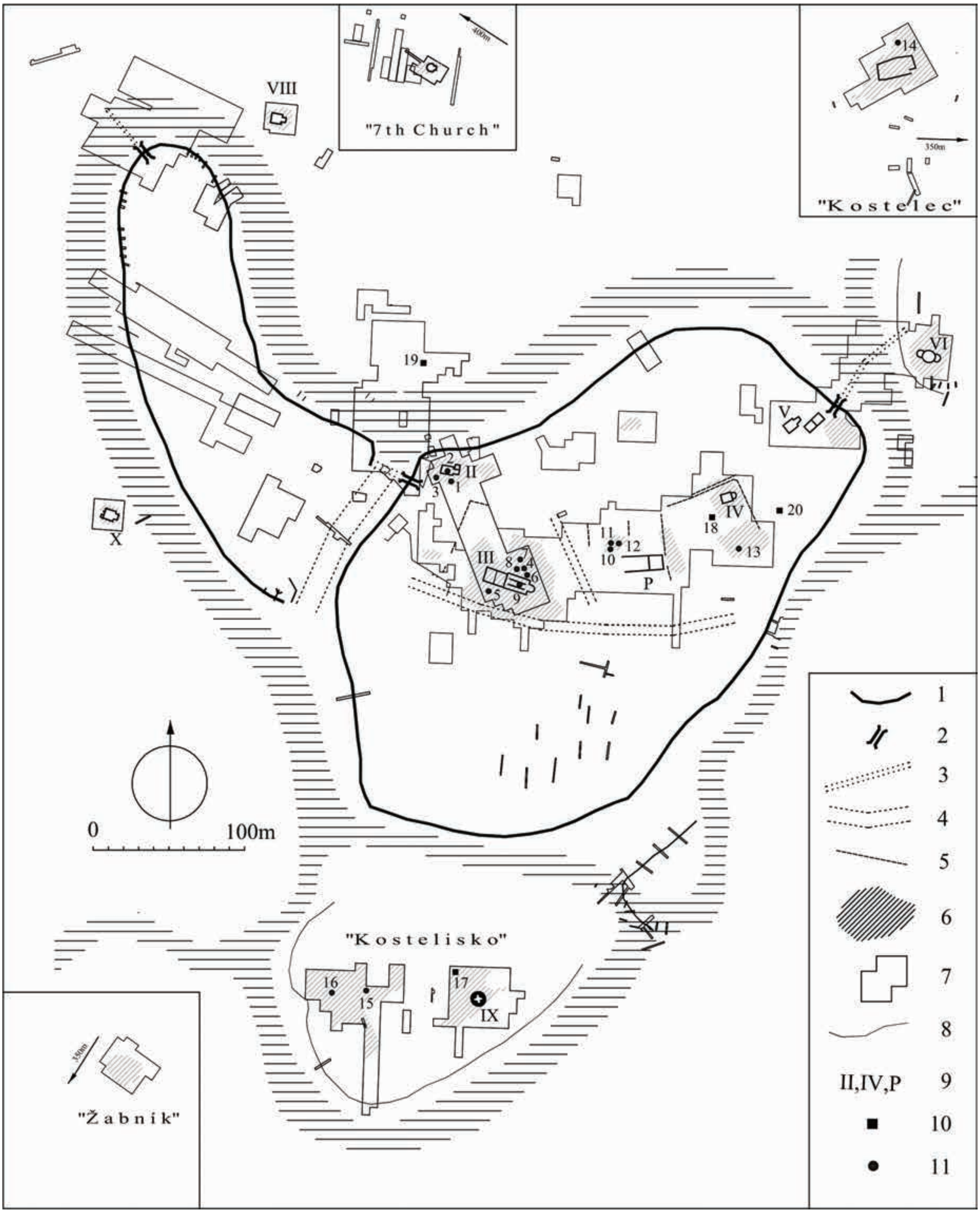

Fig. 2. The settlement complex of Mikulčice with marked positions of finds of swords or their parts: 1 – grave finds of swords (1: grave 90 (Type K), 2: grave 265 (Type H), 3: grave 280 (Type X), 4: grave 341 (Type X), 5: grave 375 (Type X), 6: grave 425 (Type N), 7: grave 438 (Type X), 8: grave 500 (Type X), 9: grave 580 (Type ?, early Carolingian), 10: grave 715 (Type H), 11: grave 717 (Type X), 12: grave 723 (Type N), 13: grave 805 (Type X), 14: grave 1347 (Type X), 15: grave 1665 (Type X), 16: grave 1750 (Type K); 2 – settlement finds of parts of swords (17: crossguard, 18: upper hilt (Type Y), 19: pommel (Type X), 20: pommel (Type X); 3 – fortification; 4 – gate; 5 – bridge; 6 – ditch; 7 – palisade, fence; 8 – cemetery, group of graves; 9 – excavated area; 10 – field edge; 11 – numbering of churches (II, III, …) and 'palace' (P). Background map by O. Marek and P. Čáp.

burials have been uncovered (Staňa 2001 indicated 413 graves). A very high percentage of the graves (59.8%) was furnished with grave goods, which in some cases included gold-plated, gold and mainly silver jewellery of high artistic value; male burials were frequently furnished with spurs and weapons, including two with swords (1655b and 1750). The burial 1750 may be assigned to the Early Great Moravian Horizon, due to the character of its grave goods. The archaeological context of the double grave 1665a-b is not clear, therefore it is difficult to determine the relation of the burial to the burial ground itself. A manifestation of the pre-Christian cult is evidenced by ritual burials of horses. The density of graves at each place is different and the empty space in the middle of the burial ground suggests the existence of a sacral building (Poláček 2010). The beginning of burials here can be reliably dated to the first half of the 9th century.

Actually, manifestations of various burial customs have been traced in Mikulčice. On the one hand, there were cemeteries beside Christian churches, on the other, graves of horses. On the one hand, there are cemeteries with numerous graves richly furnished, frequently with weapons and vessels, on the other, cemeteries with graves whose grave goods were reduced to the clothing and adornments of the deceased. The opulent inventory of numerous church cemeteries and of the cemetery at 'Kostelisko' contrasts sharply with the provincial character of the jewellery from the burial grounds of 'Kostelec', 'Žabník' and 'Trapíkov'. The small and even poor burial grounds beside the VIIth, VIIIth and Xth churches in the suburbs contrast sharply not merely with the large church cemeteries on the acropolis, but also with the medium-sized cemeteries beside the VIth and IXth churches. In the present state of the data processing it is too early to define the chronological relationships accurately. However, if we consider as relatively later the group of burial grounds around the IVth, VIth, VIIth, VIIIth, and Xth churches and cemetery surrounding the later phase of the IInd church, we cannot overlook the fact that in none of these cemeteries was a grave with a sword found.

1.2.2 Sword-parts from the settlement contexts

Parts of swords found in the settlement contexts do not reveal any particular concentration within the Mikulčice settlement agglomeration (Fig. 2). They were found in various places of the acropolis (numbered as 18 and 20 in this study) as well as within the suburbs (crossguard No. 17 came from 'Kostelisko' and pommel No. 19 was found in the northern extra-mural settlement). An upper hilt of the type-K sword (No. 20) was a metal detector find, and any specific vertical stratigraphy of the other fragments could not be verified within this study.

The causes of the loss of these fragments remain unknown. Any relationship of the pommel from the northern part of the suburbs (No. 19) to the smithy workshop (Klíma 1985, 441–442) is only hypothetical, as the pommel was found at a distance of 10 m from the smithy without any clear relationship to it. This pommel, as well as the Y-type upper hilt found south-west of the IVth church on the acropolis, belonged to swords of those types, which were used extensively at the beginning of the 10th century. Theoretically they could have been taken into the settlement together with the crossguard and other military artefacts in the last battle for the Mikulčice stronghold. This cannot be completely ruled out even for the pommel of the type-K sword, although its use in the continental Europe had gone out of fashion a long time before the end of the 9th century. A similar assumption has been expressed also in the case of a sabre fragment from Mikulčice (Kouřil 2008). In the case of the fragments Nos. 17, 18 and 20 a post-Great Moravian origin cannot be excluded.

2. The current state of knowledge of early medieval swords

2.1 A definition of terms

Precise definitions of sword terms may vary according to the period and geographical area being studied. In the traditional sense, the European sword can be defined as a personal cutting or cutting-and-thrusting weapon with a long double-edged blade that is symmetrical along its lengthwise axis. The length of the blade should facilitate the typical method for the use of the sword in battle (on the general definition of the sword, see, e.g., Schauer et al. 2004). The hilts of medieval swords are equipped with an upper hilt and a lower guard or crossguard (see, e.g., Nowakowski 1991, 448; Nilgen 1995, 1644). The blades of early medieval swords typically have a central fuller, and the upper hilts and lower guards (crossguards) are commonly made of metal (most frequently iron, in rare cases made from non-ferrous metals); they can also be made of other materials (e.g. bone or wood) or of a composition of parts made from metal and organic materials. Grips were made of organic materials (in some cases complemented with metal elements) covering the tang (the part of the blade connecting all sword components).[4]

In addition to swords, other types of cutting and cutting-and-thrusting weapons also appeared in the Early Middle Ages – sabres and (long) seaxes, which are sometimes included in the category of swords;[5] these however differ not only in terms of their construction but also in the manner and technique in which they were used in a combat, and which emerged from different cultural traditions. During the categorisation of bladed weapons, some examples may be found at the boundaries of well-defined groups; these examples amy combine the features of various types of weapons or may lack certain critical features. In some cases, the absence of some of these features may be the result of the material decay. Thus, the assignment of specific examples to any one of these polythetic categories should be based on a convincing majority of their attributes, rather than on their total presence (Clarke 1968). The description of weapons to be found at the boundaries of categories should be supplemented with the features that differ from those of the categories.[6]

2.2 A basic outline of the development of early medieval swords

The emergence of swords as a category of weapons is related to the development of the metallurgy of non-ferrous metals. The construction of a functional long blade required an adequate level

4 For a summary of the basic characteristics of early medieval swords, see Nowakowski 1991; Steuer 2004; Pedersen 2004.

5 Some of the German and Scandinavian early medieval experts label late antique and early medieval double-edged swords with a long blade as *spathas* and thus point to the continuity of the antique tradition in the blade construction of these weapons. By contrast, single-edged weapons with a straight blade reaching lengths of up to 70 cm in some cases, and which are called *seaxes* (or long *seaxes*), based on the Germanic linguistic tradition, are sometimes referred to as single-edged (Germanic) swords (e.g. Norgård-Jørgensen 1999a; 1999b; Wamers 2002; Westphal 2004). L. Niederle (1925, 526–537) used the term ‘sword’ in a similar manner in the context of describing the military activities of early Slavs.

6 For example, the term ‘single-edged sword’ can be used for a single-edged early medieval weapon with a developed upper hilt and a crossguard.

of casting technology and knowledge of certain types of copper alloys. From a formal perspective, swords were created by lengthening the blades of daggers. The oldest known artefacts that can be designated as swords based on their shape and size come from the Arslantepe site near Malatya (Meliténé in antiquity) in southeast Turkey (Caneva/Palmieri 1983; Palmieri et al. 1999).[7] The Arslantepe artefacts are evidence that attempts to produce the first weapons with a long double-edged blade appear at the very beginning of the processing of copper alloys; the earliest finds also indicate that these weapons were artefacts with a high symbolic status. The production of bronze and subsequent iron swords in the western part of Eurasia can be tracked from that period as a continuous history; swords with iron blades show a direct formal and functional connection to bronze swords.

The roots of medieval sword development can be traced back to the long iron swords used by certain Celtic tribes (e.g. the Norici) as a riding weapon. The tradition of the long sword was adopted from the Celts by Germanic cavalry and infantry warriors. Although the primary sword of the Roman legions was the short *gladius*, the long sword started becoming part of the arsenal of auxiliary units in early imperial times. It was at some time in this period that the long sword began to be referred to as a *spatha* (comprehensively in Lindken 2005). The use of long swords in the Roman Empire expanded from the 2nd century CE in connection with the rising importance of cavalry units; a major change occurred at the turn of the 3rd century, when spathas replaced the short sword as the primary weapon of the Roman infantry (comprehensively in Biborski 2004; Essig 2006; Miks 2007). During the course of the 4th century, blades were made with a single central fuller (earlier types of spathas had a central ridge or several parallel fullers). On the basis of their length and design, certain blade variations of the Straubing-Nydam and Ejsbøl-Sarry types can be regarded as the prototypes for the development of sword blades in the Early Middle Ages.

Early medieval swords were the most effective and also the most technologically complicated personal weapons of the period. In the 9th and 10th centuries they were in continental Europe used primarily by cavalry warriors (Ruttkay 1997, 183; 2002, 117; Choc 1967, 142–149). The sword was also a popular weapon for duels (Davidson 1962, 210, 213). The highest quality swords were undoubtedly the most complex smithy products (Pleiner 1962, 226–228, 230, 234; Williams 1977; 2007a; 2007b; 2009; Westphal 1999; 2002). The price of these weapons reflected the difficulty of their production and the consumption of a substantial amount of steel, if they were swords of quality. In order to create an impression of the wealth of the sword owners, we should take account of the link between the swords and a cavalry (that is frequently demonstrated, e.g., by common occurrence of swords and a rider's equipment in the 9th and 10th century warrior graves of Central-Eastern Europe). The rider might well have also had a saddled horse trained for the turmoil of battle, a substantial shield and a riding spear. Their importance in combat, complicated manufacturing technology and expense contributed to the sword becoming one of the most prominent attributes of the social elite in the Middle Ages. It was a key artefact defining males of the higher social classes; it symbolised the highest regal and judicial powers and, as the most effective personal weapon, was also understood as the physical means for implementing the law (e.g. trial by ordeal), or conquering the heathen. These attributes with

7 A hoard composed of nine swords and other artefacts was found on the grounds of the central town building. Dated to the final third of the 4th millennium BCE, the swords were cast from arsenical bronze. The shape and the decoration of the grips of these artefacts as well as the archaeological context suggest an interpretation that they were not functional weapons but rather objects of exclusively symbolic value. They could be an imitation of functional swords, or perhaps they represented 'enlarged' symbolic imitations of daggers. In any case, the sword that was part of the grave-goods of a rich grave from around the year 3000 BCE, discovered at the same site, and which was also made of arsenical bronze, was clearly already a functional weapon (Frangipane et al. 2001; Rüdiger 2003). The chronologically nearest sword finds are from the beginning of the second half of the third millennium BCE – and from the same territory (Alaca Höyük, Turkey; see Rüdiger 2003).

which the sword was endowed in the Middle Ages had a major impact on its broad social meaning, which in many respects far exceeded its primary practical function. Of critical importance in evaluating swords from the perspective of their use as a weapon is the quality of the blade, which might be indicated by the presence of marks, symbols or inscriptions on the blade. While for defining their value as a symbol of social status the decoration of the blade with pattern-welding as well as the treatment of the hilt, scabbard and straps of the sword-belt were important (Steuer 2004, 573).

The traditional terms 'Viking swords' or 'swords of the Viking Age' are still used in many published works about swords dating to the period between the 2nd half of the 8th century and the middle of the 11th century. The term 'Viking sword' has become standard in literature as the result of the remarkably rich assemblages found in Scandinavia (primarily in Norway) and thanks to the fact that northern European scholars were the first to address the systematic description of swords from this period (Rygh 1885; Lorange 1889; Petersen 1919). Nevertheless, from the very beginning the naming of the swords had more to do with their chronological connection with the Viking Age of Nordic history and was never taken as a designation of their origin. On the contrary, Scandinavian researchers in the 19th century took a very cautious approach to the northern European origin of Viking swords. O. Rygh (1885, 28) speculated that a considerable number of the swords found in Norway came from England or the Frankish Empire and that those manufactured locally imitated Frankish or Anglo-Saxon originals. A. Lorange (1889) even surmised that all Viking Age swords (or at least their blades) were imported to Norway. And while J. Petersen (1919, 200–212), who used the term 'Viking sword' directly in the title of his fundamental work *De norske vikingesvert*, utilised an analysis of Norwegian forgings to demonstrate the possibility of the domestic production of sword blades, he nevertheless presumed that some of the sword hilts and a significant number of blades found in Norway were western European imports.

The term Viking sword was not problematic for western European researchers, and they continue to use it to these days (Oakeshott 2002, 1; Jones 2002). Finds of swords from the 9th and 10th centuries on the British Isles and in France were often directly linked to the presence of the Vikings; sword finds from the beds of large western European rivers were interpreted as material evidence of Viking raids (e.g. Bjørn/Shetelig 1940, 101–131; Müller-Wille 1978), and graves with swords discovered in Britain and, to a significant extent, even in Ireland are typically put into context with Viking invasions. The original Anglo-Saxon and Celtic population as abandoned the practice of adding rich grave goods to burials as early as the 9th and 10th centuries (Davidson 1962; Härke 1992; Geake 1997). The term 'Viking Age' is therefore still regularly used for burials in the 9th century on the British Isles (in the context of swords, e.g., Peirce 2002).

However, the situation in central and eastern Europe was more complicated. Swords disappeared from material culture in those areas settled by the Slavs at the beginning of the Early Middle Ages, and did not begin to gradually appear again until the end of the 8th century. Although this fact is emphasised by the nature of early Slavic archaeological sources, it is clear even from written sources that long-bladed swords did not belong among traditional Slavic weapons (Grotowski 2005). According to the interpretive language of culture-historical archaeology, swords in territories settled by ethnic Slavs were therefore often linked to the existence of the Viking (or Germanic in general) social elite, warrior groups and household troops (e.g. Kossina 1929). These concepts had a rational base in the territory of early medieval Kievan Rus' (certain scholars in the Russian Federation continue to use the term 'Viking/Varangian sword'; see Izmajlov 1995; Androŝuk 2004). Such a linear relationship has proved to be invalid for Central-Eastern Europe.[8]

8 Within the discussions that took place in Czechoslovakia in the first half of the 20th century, the interpretations of

After Arbman's analysis of the archaeological evidence for contacts between Sweden in the Viking Age and the Carolingian Frankish Empire, a new term was coined for some types of swords, the origin of which was placed in the Frankish Empire (Arbman 1937, 215–235). Shortly after the publication of Arbman's work, H. Jankuhn (1939) used the term 'Carolingian sword' in connection with Mannheim type swords, which were not described in Petersen's typology. Naming the group of swords after the dynasty that ruled the territory, which had in the 8th and 9th centuries key role for the development of the design and construction of the contemporary swords, is for the conditions of central Europe more appropriate than their designation as 'Viking swords'. In the second half of the 20th century, the term 'Carolingian sword' caught on in a large part of continental Europe (e.g. Preidel 1959; Müller-Wille 1969; Vinski 1983a; Szameit 1986; in the Czech Republic Kliský 1964; recently in Russia Kirpičnikov/Izmajlov 2000), and is still prevalent in archaeological literature today. Carolingian swords can be described as those whose physical origin or at least design comes from the Frankish Empire in the period in which this was under the rule of the Carolingian Dynasty (Fig. 3–4).[9] Although certain types of Carolingian swords (e.g. Petersen types X and Y) developed after the end of the Carolingian Dynasty in the East Frankish Empire (911) their origins came earlier than this date.

Early medieval swords are traditionally classified into three basic chronological phases, with Carolingian, or Viking, swords falling into the middle phase. The previous phase, most commonly referred to as 'Merovingian', covers the development of swords from the 5th century to the middle of the 8th century, whereas 'Romanesque swords' (also known as 'Norman swords' in western Europe; e.g. Oakeshott 1964) form the third phase from the end of the 10th century to the beginning of the 13th century (comprehensively in Głosek 1984; Geibig 1991, 58–59, 62–90, 146–150). It is necessary to bear in mind that the definition of these three phases was not based upon any fundamental advances in the development of sword construction but rather changes in the regions and contexts in which the swords are found. Paradoxically, the basic criterion for the transition from Merovingian to Carolingian swords is their presence in the archaeological record but not their presumed historic use – specifically the decline of the occurrence of swords in Frankish Empire graves during the first half of the 8th century and the emergence of swords in Scandinavian graves. This could be connected to renewed exports of Frankish goods to Scandinavia around the middle of the 8th century, associated with the blossoming of Frankish emporia such as Quentovic and Dorestad (Willemsen 2009), and also, from the beginning of the 9th century, with the plundering raids of the Vikings.[10] The end of the middle phase of early medieval swords is regarded as the end of burials with rich grave goods in western Scandinavia.

In reality, the development of swords was essentially continuous for most of the Early Middle Ages. More substantial and dynamic changes to the construction of early medieval swords occurred during the first two thirds of the 9th century, i.e., during the course of development of Carolingian swords, not at its beginning or end. The basic trend at the time shifted from an emphasis on the ostentatiousness and the visual effect to an emphasis on combat effectiveness and maximum use of the advantages of the weapon at minimal cost. Simpler construction

H. Preidel (1936/7; 1938) and I. Borkovský (1939/46) are useful for comparing different model approaches.

9 Defining Carolingian (Viking) swords on the basis of morphological criteria is difficult. They can be defined in general as medieval swords with a fully developed upper hilt that is flat from the side view, and a central fuller on a blade with a length of more than 70 cm (Fig. 3, 4).

10 Although A. Stalsberg (2008; 2009b) takes a critical view toward the export of swords to Scandinavia, her arguments are mainly related to the period of the Viking raids. Trade with Frankish swords as a valuable commodity is possible mainly in the second half of the 8th century and at the very beginning of the 9th century.

made the swords more accessible. Although it cannot be claimed that decorative specimens no longer appeared,[11] their numbers in relation to overall production dropped. Decoration of hilts of complicated constructions and the use of pattern-welding on blades (as demonstrations of the quality of the weapon and the prestige of the holder) gave way to the signing of blades, which were may have been produced in large workshops using new technological procedures and high-quality steels. The best-known examples are blades (occurring from the beginning of the 9th century at the latest) bearing the inscription ULFBERHT or its derivatives.[12]

Earlier Carolingian swords (Fig. 3, left) are characterised by intricate upper hilts consisting of both the pommel and upper guard (Geibig's construction type I and II; Fig. 138; Geibig 1991, 90–95), a short lower guard and a more sturdy blade with a length between 75 cm and 83 cm. Complicated techniques for hilt decoration are often used on them at the expense of function (inlays on a short lower guards with a wooden core, upper and lower hilts of bones, etc.). In contrast, later Carolingian swords (Fig. 3, right) have a simple one-part upper hilts consisting only of pommels (Geibig's construction type III; Fig. 138; Geibig 1991, 95–97) and long crossguards (typically exceeding 11 cm). The blade, whose edges gradually taper toward the point, is longer in some cases; the use of pattern-welding fades and is replaced by marks and inscriptions in the fuller of the sword. A transitional group of weapons between early and late Carolingian swords include weapons with elements of both the development phases (for example two-part upper hilts are combined with long crossguards and long blades, etc.) The blades are later variants of Petersen type K swords or Petersen type N swords. The use and manufacture of swords with such an earlier Carolingian construction continued in northern and eastern Europe until the 10th and 11th centuries.

All the major transformations of swords follow several trends occurring throughout the entire Early Middle Ages. These include the lengthening of sword blades, the transition from blades with edges running parallel to the point to those that taper in a linear manner, the lengthening of crossguards, an adaptation of the hilt for easier control of the weapon, a simplification of the upper hilt construction, a reduction in the number of spectacularly decorated specimens, and an increase in the variability of blades accompanied by a simultaneous reduction in the variability of upper hilts.

2.3 The classification of early medieval swords

The sword as an attractive object and the most effective medieval personal weapon – one closely tied to the social elite – was already of professional interest to historians of material culture and archaeologists as early as in the 19th century. The best conditions for the systematic study of swords from the 9th to 11th century were provided by the numerous finds from northern Europe, primarily from Norway. Local graves from the Viking Age contain more swords than those known from all the other parts of Europe. Moreover, the assemblages makes it possible to evaluate swords in connection with other categories of grave goods. The first attempt at a classification of the find inventory was conducted by O. Rygh (1885, 489–495, 501–507), who described seventeen types of swords based on Norwegian finds. Although several researchers built on Rygh's

11 This, for example, includes a Petersen type X sword with a blade with the inscription of the Ulfberht group and an upper hilt decorated with Carolingian plant ornament in the collections of the Ashmolean Museum in Oxford (Peirce 2004). The upper hilt of a type X sword from the Essen Cathedral Treasury is gold-plated and set with precious stones; the surface is decorated with filigree (Pothman ed. 2005). The individual parts of the coronation sword of the French kings (said to be Charlemagne's 'Joyeuse') were made and supplemented in many various periods (Laking 1920, 90–91, fig. 120; Geibig 1992/3); the opulent golden and richly decorated upper hilt of the sword is classified as a Petersen type X.

12 E.g. Jankuhn 1951; Müller-Wille 1970; Menghin 1980; Stalsberg 2008; 2009a; 2009b; Geibig 1991, 116–122.

work (see Geibig 1991, 13), only the typology introduced by J. Petersen (1919) in his dissertation, and later published under the title *De norske vikingesverd – En typologisk-kronologisk studie over vikingetidens vaaben* [Norwegian Viking Swords – A Typological-Chronological Study of Viking Age Weapons], became generally respected.

Based on the design and decoration of hilts, Petersen distinguished twenty-six basic types of swords, designated with the letters A to Æ (Fig. 135); he also described another twenty special types of swords (*Særtyper*), including specimens for which he could not find a precise parallel in the Norwegian material (Fig. 136).[13] Petersen likewise described variants for several sword types (e.g. three variants of type O, two variants of type T, X and Y, etc.), pointing out the specific character of certain others. He divided the basic and special types of swords into seven groups, labelled with the Roman numerals I–VII based on chronological and design criteria. Group I contained sword types that appeared in the earliest Viking Age assemblages and for which he assumed, mostly based on a formal relationship with Merovingian swords and specimens known from the Vendel Period of Nordic history, an origin prior to the beginning of the Early Viking Age (types A, B and special type 1). Petersen's group II was made up of various forms of swords, whose emergence he dated to the period from the turn to the first third of the 9th century, with their occurrence not exceeding the Early Viking Age (i.e. not past the 9th century; types C to G, special type 2 and several other special types). Group III contained Viking Age swords with a triangular pommel; Petersen divided them into highly similar types H and I, and dated the swords to the period between the turn of the 9th century and the mid-10th century. Group IV was composed of 9th century swords with a pommel divided into at least five vertical lobes (type K) and several special types. Group V contained swords that were to have appeared in Norway in the second half of the 9th century, with some continuing to the middle half of the 10th century (types L, M and N). Group VI was made up of many prominent types of swords from the middle phase of the Viking Age. Petersen dated these swords to the course of the 10th century or the beginning of the 11th century (type O, developmentally linked to type K, as well as types P to Y). Although Petersen assumed the existence of sword types Q and X throughout the entire Middle Viking Age, sword types P, V and W were to have been used primarily up to the first half of the 10th century; sword types R, S and U were dated mainly to its middle phase around the middle of the 10th century, while sword types T and Y were tied more to the second half of the 10th century and the beginning of the 11th century. And finally, group VII was composed of swords of the Late Viking Age, designated as types Z to Æ, the occurrence of which Petersen dated to the late 10th century and the beginning of the 11th century.

The success of his typology, which remains popular to this day, was the result of three main factors. The first is that Petersen worked with an enormous set of artefacts – he collected information on 1773 single- and double-edged swords and long seaxes; he then used approximately one thousand swords to create his typology. The fact that the evaluated assemblage contained (besides the types with a local occurrence) types for which parallels are found throughout Europe, facilitated the application of Petersen's typology in other European regions. The second positive factor was the methodological foundation for the typological and chronological classification of the swords. As the subtitle indicates, Petersen's study contained a systematic classification of all Viking Age weapons, the mutual relationships of which the author assessed on the basis of their joint occurrence in

13 Some of Petersen's special sword types can be evaluated from a formal perspective as variants of some of his other types. Petersen separated them because their find context dated the swords to a different period than the types to which they were similar (e.g. special type 7 can be described as a variant of type L, but Petersen dated it to the first half of the 9th century; while special types 11 and 12 are formally identical to earlier variants of type X swords, Petersen linked them to type K swords based on their find context). Some of the special types of swords are inadequately described and documented in Petersen's publication.

grave units. This analysis produced a system in which individual types were not described and arranged mainly according to formal and decorative criteria, but based on the occurrence of the swords in combination with other artefacts. The key distinguishing elements in the description of individual types, therefore, change in connection with contexts of the discovery and Petersen's interpretation thereof. Although the variability of the criteria for differentiating Petersen types was an encumbrance for many later scholars, in the majority of cases their attempts to objectify the classification of swords took a more complicated path and actually confirmed Petersen's system, if their efforts were not in fact entirely misguided. The truth is that Petersen's typology has proved to be highly valid in practice, and a significant part of his results, especially with regard to relative chronology, are accepted to this day. The third advantage of Petersen's typology is the degree of detail, while maintaining substantial simplicity in determining individual types of swords. The fact that Petersen defined a large scale helped to create conditions for the use of his typology in various regions. Certain types remained limited to Norway or Scandinavia in general, while others were unified by later researchers (e.g. types H and I, or K and variant III of type O) or were, on the other hand, divided on the basis of new finds. By describing unique specimens as special types, and their precise publication, Petersen expanded the application of his typology to forms of swords, whose appearance in Nordic assemblages is only marginal. Special types 1 and 2 found application in particular.

H. Arbman played a major role in the application of Petersen's typology to swords from continental Europe, using them in his study entitled *Schweden und das Karolingische Reich* [Sweden and the Carolingian Empire] dealing with Frankish-Viking contacts (Arbman 1937, 215–235), a work that became a classic on early mediaeval archaeology. Arbman emphasised Petersen sword types using parallels in continental Europe. In addition to representatives of Petersen basic types (e.g. B, H, K, X, and Y), he also included a 'special type' that essentially combined the characteristics of Petersen special types 1 and 2 (despite the fact that he speaks only of the connection to special type 1). Thanks to the good accessibility of the study and the description of types in German, Arbman's selection from Petersen's typology became the main support for the typological determination of swords in areas outside of Scandinavia.

A number of researchers built on Petersen's work, either by modifying his typology for the conditions of their studied area, by adding new types, or by studying the types he had already described. R. E. M. Wheeler (1927, 31–37) created a typology used primarily on the British Isles by dividing swords into seven types designated with the Roman numerals I–VII. A simplified variation of Petersen's typology, Wheeler's typology was created on the basis of British finds from the period of Viking invasions.[14] R. E. Oakeshott (1960, 133–138; 1964; 1991; 2002) expanded Wheeler's typology to include later types of swords. Oakeshott's typology mainly describes the swords of the Romanesque and Gothic periods; types VIII and IX are important in connection with the period on which this study focuses. Type VIII includes swords with a single semicircular pommel (corresponding to Petersen's X type), including later variants with a curved base and an upper hilt in the shape of a Brazil nut (which is already beyond the framework of Petersen's typology and can be labelled as Nadolski type α; Nadolski 1954, 26–29). Oakeshott type IX corresponds to Petersen type Y.

C. A. Nordman (1943, 48–54) applied Petersen's typology to the whole of Scandinavia in his study of Nordic weapons, omitting types whose occurrence was recorded only in Norwegian territory. He joined formally similar types H and I, and introduced in the same way as H. Arbman (1937, 217) a special type, which, despite being

14 Wheeler type I corresponds to Petersen type M; type II includes types B and C, and type III contains types D and E. Type IV is parallel to Petersen type K, type V corresponds to type L, and type VI to Petersen type Z. Type VII contains swords with a semicircular upper hilt (with both pommel and upper guard) attributed to Petersen types N, V and U.

identified as Petersen special type 1, actually corresponds formally to special type 2. An excellent sketch of Nordman's selection of Petersen sword types (Nordman 1943, fig. 189–208) enjoyed widespread use; until that time only Arbman's (1937, Abb. 39) small selection had been available.

In her study *Middelalderens tveæggede sværd* [The Medieval Double-Edged Sword], the Danish scholar A. Bruhn Hoffmeyer (1954) focused on the development of medieval swords beginning in the 10th century and offered a new methodology for classifying Petersen sword types involving their division into three basic groups based on the shape of their upper hilts (with a triangular pommel, with a vertically lobed pommel and with an upper hilt composed only of an upper guard). She regarded sword types X and Y with one-part upper hilts (single pommels) as transitional forms moving toward Romanesque swords. Her concise work entitled *Introduction to the History of the European Sword* (Bruhn Hoffmeyer 1961) is one of the most important treatments of the development of the medieval European sword in the context of the preceding epochs and with the swords and sabres of neighbouring territories (the eastern European steppes, Persia and the Arab world).

An important milestone in thought on the formal development of early medieval swords, one that also had major significance in chronological issues, was the description of sword type α by A. Nadolski (1954, 26–29). Nadolski utilised the potential of Polish assemblages from the 10th to 12th centuries in an attempt to describe groups of swords that were to have developed directly from Petersen type X swords. They differ from these in the convex shape of the base of the upper hilt and in the broadening of its lower border to form the shape of a Brazil nut. Although A. Nadolski later downplayed his conclusions (Głosek/Nadolski 1970), his findings became the basis for additional research on the development of swords in the late phase of the Early Middle Ages (e.g. Głosek 1984; Geibig 1991; Kucypera/Kurasiński/Pudło 2011).

While processing weapons from the territory of early medieval Kievan Rus', Soviet researcher A. N. Kirpičnikov (1961; 1966a, 18–49) used Petersen's typology for swords from the 9th century to the first half of the 11th century, adding several types that can be classified as variants of Petersen types. Type 'A-local' contains weapons belonging formally to Petersen type T, characterised by rich plant ornamentation; a sword richly decorated with Scandinavian ornamentation and labelled by Kirpičnikov as 'Scandinavian' can be designated as a variant of the Petersen type Z or special type 16. Kirpičnikov's description of special types based on Petersen's typology is not entirely systematic. Special type U (U-особый) is closest to type N, while special type Z (Z-особый) is comparable to Petersen special type 16 (Petersen 1919, 124–126). Kirpičnikov (1966a, 49–60, ris. 10) used a separate typological scheme (types I–VII) for swords from the period between the second half of the 11th century and the 13th century. An important result of Kirpičnikov's work on typology is an understanding of the development of is closest swords with a three- or five-lobed pommel (Petersen types S, T and Z). In compiling information on type T swords he utilised Petersen's division in sub-types T-1 and T-2 based formerly only on decoration (Petersen 1919, 150–153); Kirpičnikov added observations on the formal differences between these variants. In his typology of swords from the period between the second half of the 11th century and the 13th century, Kirpičnikov described successors to type T and Z swords and designated them as type I, II and II-A.

Likewise, other researchers studying the early medieval swords of northeastern Europe respected Petersen's typology as the foundation for describing swords; when necessary, they only enhanced and expanded his typology with types and variants of swords for which there were no direct parallels in Petersen's system. Using assemblages from former East Prussia, B. von zur Mühlen (1975; the study was conducted prior to the Second World War) attempted to describe the Baltic form of type Y swords. Lithuanian scholars expanded several local groups of swords, including the type with an antenna-shaped upper hilt and a variant of the Petersen type T sword that corresponds to Kirpičnikov type I, naming it the T1-Courlandian, after the area where they occurred the most frequently. They then expanded Petersen's typology to include several chronologically later types occurring in the later phase of early medieval Baltic cemeteries (Volkaite-Kulikaustiene 1964; Kazakevičius 1994; 1996, 15–18, 53–58, 78–91; 1997).

German researchers between the 1930s and 1980s also used Petersen's typology as their foundation for describing swords. Swedish researcher H. Arbman played a major role in 'transmitting' Petersen's typology beyond Scandinavia; Arbman used the typology to describe swords from central and western Europe, and introduced European scholars to a selection of Petersen types in German (Arbman 1937, 215–235). The application of Petersen's typology in German territory was beneficial, as finds of German swords dated from the 9th century did not come from assemblages datable by archaeological methods (with the exception of Schleswig-Holstein and parts of northeast Germany). However, for the second half of the 8th century and the beginning of the 9th century, the only transfer of Petersen's typology to the conditions of central-western Europe was inadequate. H. Jankuhn (1939) described a new type of early Carolingian sword at the end of the 1930s and named it the Mannheim type after the find site of the characteristic specimen (Fig. 135).[15] More than two decades later, G. C. Dunning and V. I. Evison (1961) presented a detailed analysis of early Carolingian swords with a three-lobed pommel. On the basis of a closer specification of Petersen's definition of special types 1 and 2, the two researchers defined sword group 1 (swords with concave lateral pommel lobes) and group 2 (swords with convex lateral pommel lobes).[16] They regarded certain forms of group 1 swords as the predecessors of the Petersen type K. However, their basic justification for the typology did not gain much acceptance in professional literature.

The work by F. Stein (1967) on the rich graves in German territory, dating to the 8th century, was a major contribution to the issue of the development of swords at the end of the Merovingian period and the beginning of the Carolingian period. The study's main strength is the high-quality documentation of assemblages and an evaluation of the history of the burial rite and even individual categories of artefacts from grave units, which the author processed separately for southern and northern Germany. Regarding the development in south German territory, she defined two developmental forms of swords that can be designated as prototypes for the early Carolingian period – Niederramstadt-Dettingen-Schwabmühlhausen type swords had an upper hilt with a low triangular pommel, whereas Haldenegg type swords had a low pommel with a hint of three lobes; they are also typically decorated with parallel inlaid wires

15 The hilts of Mannheim type swords were composed of a two-part upper hilt with a low, less distinct three-lobed pommel, which sometimes has the shape of a compressed semicircle. A significant feature is decoration composed of strips of non-ferrous or precious metal forged into the lengthwise axis of both the upper and lower guard, or directly into the middle of the pommel lobes. The remaining parts of the upper hilt and lower guard were decorated with parallel inlaid non-ferrous wires, as was common on other early Carolingian swords. The decoration of the lower guard and upper guard with metal strips is the main criterion for differentiating Mannheim type swords from the Petersen special type 2 (Fig. 135,136).

16 Group 1 was broken down into sub-group 1a (swords with upper and lower guards without a rib along the lengthwise axis), 1b (swords with an undecorated hilt with an upper guard, and a lower guard with a rib along the lengthwise axis), 1c (swords with a hilt decorated with parallel inlaid non-ferrous wires, and with an upper guard and a lower guard with a rib along the lengthwise axis) and 1d (swords with a hilt decorated with hammered sheets and parallel inlaid non-ferrous wires, and with an upper guard and lower guard with a rib along the lengthwise axis). Some of the swords in sub-group 1c and 1d correspond to the Mannheim-Speyer type. Group 2 was divided into sub-group 2a (Mannheim type swords; for a description see previous footnote), 2b (with a hilt decorated within laid bands and with an upper guard and lower guard with a rib along the lengthwise axis) and 2c (swords with a hilt decorated with hammered sheets and parallel inlaid non-ferrous wires, and with an upper guard and lower guard with a rib along the lengthwise axis).

of non-ferrous or precious metal.[17] Both south German types occurred in graves in the first half of the 8th century, nevertheless Haldenegg type swords probably appeared a little later. The end of their occurrence is associated with the end of the ritual of rich grave furnishings in south Germany. According to F. Stein's conclusions, swords did not occur in graves in north German territories in the first half of the 8th century. Petersen type B and H swords, the Mannheim sword and special type 2 were to have appeared there during the second half of the 8th century, and in addition to these, F. Stein described two new types of swords with a triangular upper hilt in the assemblages from north Germany. Stein designated these as the Immenstedt and Altjührden types (according to the latest research results, these types of swords can be regarded as variants of type B swords with parallels in Scandinavia; see Androŝuk 2007, 154, fig. 1; 2013, 40–44).

Major advances in the study of the typology of early Carolingian swords occurred at the end of the 1970s and the beginning of the 1980s in connection with the debate that developed around the new evaluation of early Carolingian swords from Croatia (Vinski 1978; 1981). Studies by W. Menghin (1980) and M. Müller-Wille (1982) produced new evaluations of the development of swords from the second half of the 8th century and beginning of the 9th century. The researchers described three groups of early Carolingian swords. Swords in the earliest group developed from Haldenegg type swords after the middle of the 8th century and include Mannheim type swords and Petersen special type 2 swords;[18] at the conclusion of the given time sequence a sword from Steinsvik inaccurately designated as Petersen type 1 was also included.[19] The second group was composed of swords with a triangular pommel that were to have developed during the second half of the 8th century and at the beginning of the 9th century from Altjührden and Immenstedt type swords through Petersen type B to type H swords, whose development was to have continued further in the 9th century. The variant separated by W. Meghin from type B swords had a pommel that was connected to the upper guard by two rivets (the same as on the majority of type H swords); Meghin designated this variant as the Dunum type (Menghin 1980, 256). According to Menghin (1980, Abb. 35), the third group, synchronous with the Biskupija-Crkvina Horizon and identified on the basis of Croatian early Carolingian relics, was made up of swords with a five-lobed pommel of the Petersen type K and swords with a massive upper hilt with a three-lobed pommel, which Müller-Wille (1982) designated as the Mannheim-Speyer type.[20] Both researchers dated this group to the period between the turn of 8th–9th centuries and the middle of the 9th century. An attempt to resolve the typology of certain Croatian swords was less systematic. W. Menghin (1980, 246) and especially M. Müller-Wille (1982, 134–135) attempted to define the mixed group of early

17 Stein also placed Schlingen type swords with a low pommel and a quadratic shape or in the shape of a round lobe into the earliest phase of the studied period (end of the 7th to the first third of the 8th century).

18 G. C. Dunning and V. I. Evison (1961) regard Mannheim type swords as a sub-group of their own group 2, identical to the Petersen's special type 2.

19 J. Petersen designated a sword from Søndre Skjønne (Petersen 1919, fig. 55a–c), to which Mannheim-Speyer swords are formally similar, as special type 1. Based on accompanying grave goods, he dated a sword from Steinsvik (Petersen 1919, fig. 56) to the Late Vendel era and for that reason did not include it in his typology; Petersen regarded the formal relationship between this sword and the sword from Søndre Skjønne as support for the early dating of special type 1. G. C. Dunning and V. I. Evison (1961) placed the sword from Steinsvik in their group 1d, the sword from Søndre Skjønne in group 1b. The complexity of dating the swords from Steinsvik is underscored by the decorative animal motif on the metal sheets on the upper hilt, which some scholars attribute to the Early Viking Oseberg-Borre style; other researchers see a connection with the Anglo-Carolingian style of the late 8th century (cf. Müller-Wille 1982, 133 and Androŝuk 2007).

20 Mannheim-Speyer type swords formally correspond to the Petersen special type 1 sword from Søndre Skjønne (Petersen 1919, fig. 55a–c) and correspond (based on the type of decoration) to the group 1b–c swords established by G. C. Dunning and V. I. Evison (1961).

Carolingian weapons pointed out by Z. Vinski (1978) combining elements of swords with three- and five-lobed, and even triangular pommels as a uniform type (named Biskupija-Medvedička), which allegedly was to have been formally similar to the Petersen special type 1.[21] Defining a type solely on the basis of a negative differentiation from the classic variants of the Petersen type H or K soon met with criticism (Szameit 1986, 393–395). Further research also found efforts to form additional types of swords based on minor differences to be highly problematic. The practical value of differentiating Immenstedt, Altjührden and the Petersen type B sword was already questioned by A. Geibig (1991, 29–31, 42–44). The importance of these variants as independent types was dismissed recently by F. Androŝuk (2007, 154, Fig. 1; 2013, 40–44), after he demonstrated that the majority of type B swords found in Scandinavia meet the parameters corresponding to the Immenstedt and Altjührden types. The main reason for their determination – which was to describe the immediate predecessors of the swords appearing in Scandinavian find contexts – is irrelevant in this context.

The discussions regarding early Carolingian swords at the end of the 1970s and the beginning of the 1980s revealed the limits of acquiring knowledge through attempts to describe new types of swords in the traditional manner. In connection with a comprehensive transformation of the view of the nature of typology in archaeology (e.g. Clarke 1968), intensified calls came as early as the beginning of the 1970s for a deeper revision of Petersen's typology or even its complete reconstruction. These considerations were clearly formulated by S. Nordhagen (1972, 520–523), who emphasised the need to define separate descriptive criteria for individual sword-parts, separate analyses of form and decoration and greater emphasis on the metric and technological characteristics of swords. She also stressed the need for a separate evaluation of blades. Up to that time, only R. E. Oakeshott (1960, 142, 203–207; 1964) had attempted to create a systematically processed typology of blades, albeit with an emphasis on later medieval swords; the 'examples' of sword blade types (*Typenbeispielen*) published by H. Seitz (1965, 114, 145, Abb. 79) without professional annotation can be taken more as a call for a systematic description of the development of early medieval sword blades. In practice, however, the (largely justified) need to reform the existing classification scheme ran into problems that were difficult to surmount. These include the necessity of collecting precise data from vast areas (the status and method of publication of swords in individual regions was not balanced). The formal and technological complexity of swords led to time-consuming research and placed heavy demands on the specialised knowledge of the creators of the new systematic typology. The first (and for a long time the only) attempt to find a new method for classifying early medieval swords was the typology compiled by M. Maure (1977). The system based on an evaluation of the metric characteristics of the individual parts of swords suffered mainly from the incorrect selection of input data. Maure's sword typology, which ignored the formal development of upper hilts, did not take into account decoration and was based on a relatively small sample of analysed swords, had virtually no explanatory value for questions regarding the chronology, genesis and technological development of swords. Compared to Petersen's typology, it was clearly a step backwards. Maure's system was met with heavy criticism (Głosek/Kajzer 1978), and efforts to objectify the typology of early medieval swords were suspended for years.

For swords from the 9th to the turn of the 11th century, the typology created by A. Ruttkay (1976, 245–272) involved the application of Petersen's scheme on the specific conditions of a smaller assemblage of swords from Slovakia.[22]

21 In time, Z. Vinski (1983a; 1984) actually did designate these swords as Petersen special type 1.

22 Ruttkay type I swords correspond to Petersen type D, Ruttkay types II and III swords to Petersen types B or H, and Ruttkay type V corresponds to Petersen type T. Ruttkay type VI swords

It should be pointed out that the typological processing focused more on later swords from the 11th to the 14th centuries. A specific trait of Ruttkay's method, which was consistent with the period trend of introducing a separate description of the individual parts of composite artefacts, was the separate description of crossguards (lower guards) and pommels (upper guards). It should be borne in mind that valued blades might well have been rehilted by a contemporary smith, and so different parts of swords may fall into different groups when classified (e.g. French coronation sword, see Laking 1920, 90–91, fig. 120; Geibig 1992/3). Unfortunately, the fact that Ruttkay's typology is based on a small number of specimens (in some cases a defined type is represented by a single sword, e.g., types I to III) limits its application to areas outside the described region. Since it is possible to describe the vast majority of the blades and hilts of early medieval swords of Central-Eastern Europe using the typologies created on the basis of Nordic or western European assemblages (primarily Petersen 1919; Geibig 1991), Ruttkay's system did not even become a standard resource for the description of swords among Slovak and Czech researchers.

A. Geibig introduced an entirely new classification for the first time when he was processing swords from graves and settlement contexts from Hedeby (Geibig 1989). In time, Geibig elaborated his concept into his study *Beiträge zur morphologischen Entwicklung des Schwertes im Mittelalter* [On the Morphological Development of the Swords in the Middle Ages], in which he evaluated swords found in the former West Germany, dated to the period between the second half of the 8th century up to the beginning of the 13th century (Geibig 1991). Geibig perceived the sword as a composite artefact, whose individual parts – the blade, the shape of the hilt and the construction of the upper hilt – must be analysed separately. The formal description of hilts was based on four traits (front view, section and side view of upper hilts and the section of lower guards or crossguards), which were then synthesised into a single combined type. His description of hilts (Geibig 1991, 21–83) employed a combined visual and metric description of all nineteen types of front views, twenty-four types of side views and eleven types of section views of upper hilts and fifteen types of section views of crossguards (Fig. 137); as a result, the standardised record of Geibig's 'combination type' has a similar sequence of four numbers separated by a hyphen. Geibig ascribed major importance to the front view of the upper hilt as the basic element for the typological classification of a sword. Based on a comparison of the evaluation results of all defined hilt parameters on swords with the same front view of the upper hilt, Geibig separated individual variants with Roman numerals placed after the type of the front view of the upper hilt (e.g. type 12, I). Swords from the second half of the 8th century to the turn of the 11th century are described in the first thirteen types in Geibig's system. At the same time, types 1–2 and 5–13 correspond to the individual types of Petersen's typology that Geibig identified in the studied territory;[23] he labelled Mannheim type swords with the number 3 (Jankuhn 1939; Menghin 1980), while the Geibig type 4 includes Mannheim-Speyer type swords (Menghin 1980; Müller-Wille 1982). An important part of Geibig's typology is the description of the construction of the upper hilts of swords (Geibig 1991, 90–100),[24] which, due

correspond to Petersen type X, Ruttkay type VII to Petersen type N, and Ruttkay type VIII is the same as Petersen type Y. The sword that Ruttkay designated as type IV is probably a special (late) variant of the Mannheim type, or even a variant of Petersen type Y.

23 Geibig type 1 = Petersen type B; Geibig type 2 = Petersen special type 2; Geibig type 3 = Mannheim type; Geibig type 4 = Mannheim-Speyer type; Geibig type 5 = Petersen type H, I or B; Geibig type 6 = Petersen type K; Geibig type 7 = Petersen type L; Geibig type 8 = Petersen type N; Geibig type 9 = Petersen type O; Geibig type 10 = Petersen type R or S; Geibig type 11 = Petersen type U, V or W; Geibig type 12, var. I = Petersen type X; Geibig type 13, var. I = Petersen type Y.

24 A. Geibig (1991, 90–100) described three types: construction type I includes swords with a two-part upper hilt with a bulky pommel through which the tang runs to the very top; construction type II includes swords with a two-part upper

to the growing amount of X-ray images of upper hilts, has proven to be one of the most important elements in the evaluation of early medieval swords (Fig. 138). More problematic, yet equally important, was Geibig's classification of sword blades (see below; Geibig 1991, 83–90).

Instead of trying to create a new typology, Swedish researcher M. Jakobsson (1992) provided a certain systemisation and simplification of Petersen's scheme in his study entitled *Krigarideologi och vikingatida svärdstypologi* [Warrior Ideology and the Viking Sword Typology]. Based on the idea outlined earlier by A. Bruhn Hoffmeyer (1954; see above), Jakobsson defined six basic 'hilt design principles' for Viking Age swords: swords with a triangular pommel, with a three-lobed pommel, with a pommel with five or more lobes, with an upper hilt without a pommel, with a crossguard curved toward the blade, and with an upper hilt without an upper guard (i.e. consisting only of a pommel). Jakobsson continued to work with Petersen sword types in these basic groups. However, even when the methodological shortcomings are ignored (the inclusion of classification based on crossguards into the classification based on the design of upper hilts), the results of the application of Jakobsson's system to issues of chronology and distribution are poor. The problem was that Jakobsson had included in his 'principles' characteristics that swords had possessed for most of the Viking Age (with the exception of the last two groups, which were dominant in the later phase of Viking Age), and which are not even sensitive from the perspective of territorial distribution. The importance of Jakobsson's classification (besides the unsystematic inclusion of groups with an exclusive focus on the shape of crossguards) must be understood as a description of the variability of the hilts of Carolingian swords.

hilt with a hollow pommel attached to the upper guard by two rivets or a single rivet bent beneath the pommel into the shape of the letter U (in this type, the tang ends above the top part of the upper guard); construction type III features a one-part upper hilt consisting only of pommel through which the tang runs to the top (Fig. 138).

No attempts to introduce a new comprehensive typology of swords from the period between the second half of the 8th century to the turn of the 11th century have been published over the past two decades. Based on an analysis of graves with weapons from Gotland, Bornholm and several regions in Norway, Danish archaeologist A. Norgård-Jørgensen (1999a; 1999b) created a new typology and chronology of the Vendel Period and the Early Viking Age (6th to 9th centuries) in Scandinavia. Unfortunately, their importance for the typology and chronology of Viking Age swords is limited due to the small number of early Viking graves that she has studied. H. Westphal's (2002) work represented the first attempt to create a typology of swords on the basis of technological parameters and their separate chronological evaluation and is a valuable contribution to the systematic processing of the technological parameters of swords and seaxes from the period between the 6th century and the turn of the 10th century. S. Y. Kainov and F. Androŝuk (Kainov 2012, 19–21; Androŝuk 2013, 49–51, 71–72) conducted a similar analysis of swords decorated with geometrically arranged depressions on hilts classified by J. Petersen as type E or the first variant of type T. Likewise noteworthy is a study addressing the development of the single-part upper hilts of swords from between the 9th and the 12th centuries (Kucypera/Kurasiński/Pudło 2011). This development is presented as the gradual transformation of swords with semicircular upper hilts with a straight lower edge (Petersen type X) into swords with upper hilts with a lenticular front view, i.e., with a convex upper and lower edge (Nadolski type α), and finally into swords with an upper hilt with a straight upper edge and a convex lower edge. By analysing individual assemblages with swords that come from burials in Central-Eastern Europe and the Baltic region, the authors were able to confirm the aforementioned sequence of the defined variants and they also highlighted the gradual and continual process of their transformation as well as the long period of their occurrence.

Regarding the classification of swords in the period between the second half of the 8th century to the beginning of the 11th century according to their hilts, the significance of Petersen's typology is clear (Petersen 1919), having become an internationally recognised key for describing swords in the interwar period. The majority of later researchers have respected Petersen's typological system, despite the efforts to supplement and expand it with additional types distinguished during the study of swords in the particular area of their interest. New typologies typically created to describe swords from individual regions (e.g. Wheeler's and Oakeshott's typologies for the British Isles, Ruttkay's for Slovakia; see Wheeler 1927; Oakeshott 2002; Ruttkay 1976) often simply meant a simplification of Petersen's typology and, due to the fact that they contained a limited number of swords, are not applicable outside of the region for which they were created.

The positive side of the Petersen's typology, supplemented with additions of other scholars, who followed the Petersen's system, is the possibility to describe the vast majority of European swords dated from the mid-8th to the beginning of the 11th centuries. The long-term use of the typology has also proven its validity for creating the relative chronology of swords. The undisputed advantages of Petersen's typology include the fact that the determination of swords does not require detailed metric data; all that is necessary is a quality depiction. Likewise significant is the fact that Petersen's classification is still used by the majority of researchers to describe early medieval swords. And yet, despite its numerous advantages, Petersen's typology also has its drawbacks from a contemporary point of view. Petersen's classification is not methodologically balanced, and he did not have objective comparisons in continental finds. Petersen could not include information on the internal construction of hilts, and he also had very limited possibilities for utilising technical research into individual metallic parts (by radiography) and applied metals themselves (by metallography and chemical analyses). The shortcomings of the publication of Petersen's typology include the presence of only selected drawing and photographic documentation of swords and the absence of tables of the defined types. As a result (and also due to the poor availability of the study), many scholars have used the tables of H. Arbman (1937, Abb. 39) and C. A. Nordman (1943, fig. 189–208), which presented only some of the Petersen types in a simplified form. Another problem with Petersen's study is that it wasn't published in a major language and, therefore, many researchers preferred to work with the abbreviated descriptions of a selection of Petersen types presented by H. Arbman (1937) and other scholars. This practice introduced inaccuracies in the typological determination of swords from the very beginning. It can be said that Petersen's typology remains an unsurpassed resource for the description of hilts and the main guidepost for orientation in the broad scale of swords in the studied period.

Attempts to develop new approaches for classifying swords have diverged in two directions. One is the scheme proposed by A. Bruhn Hoffmeyer (1954) and elaborated by M. Jakobsson (1992), consisting in the primary definition of basic formal categories of sword hilts (triangular, three-lobed and five-lobed, or one-part upper hilts, long crossguards or those bent toward the blade, etc.); these categories were then evaluated separately. This method did not abandon Petersen's typology entirely; to a limited extent Petersen himself used a classification according to elementary formal traits for groups of individual types of swords (see above). The classification of swords based on the formal characteristics of hilts proved to be useful for the basic description of the formal range of upper hilts, although not for a complete typological description of swords; the occurrence of the majority of primary hilt variants was long-term and is not even valid in the discussion on the distribution or origin of swords.

Second approach for the classifying swords is a typology based on measurements, which was reflection of efforts at the objectification of swords description. But here researchers ran into a number of challenging problems. The failure of the typology based on measurements attempted by M. Maure (1977) was the result of a number of factors. However, a major role was played by the great formal complexity of swords, which are virtually impossible to describe on the basis of several categories of measurements. Although the combination of metric and written or graphic descriptions applied by A. Geibig (1989; 1991) produced better results, Geibig's more complicated description of swords led to the definition of types already known from Petersen or from German researchers working with Petersen's typology. It can therefore be said that Geibig's objectification of the formal classification of swords essentially confirmed the validity of Petersen's typology. A significant obstacle to the application of Geibig's typology to swords that a researcher can study only from literature lies in the demand for knowledge of a great amount of precise metric data, which is not available in published literature in many cases.

If Petersen's typology is designated as the best system for the description of the hilts of European swords from the period between the second half of the 8th century to the turn of the 11th century, this does not imply that it would be impossible to create a typological system based on a more systematic foundation, which would also evaluate those characteristics, which Petersen did not or could not include in his own typology for various reasons. Although the results of a new typology in terms of the objectivity of the overall description of swords and the depth of the testimony of the newly defined types would certainly be better, the burden on its creator would be enormous: the researcher who develops the new typology would have to base their system on newly conceived and digitally processed detailed analyses of individual components and characteristics of swords in a European-wide context. Still, even if the new typology could offer a better description of early medieval swords and include parameters that Petersen's typology does not take into consideration, it is likewise unclear whether it could break the long tradition of the use of Petersen's system.

Far less attention has been paid to the typology of blades based on an evaluation of forms than to the typological study of hilts. Two blade typologies are currently used – Oakeshott's and Geibig's (Oakeshott 1960, 142, 203–207; 1964; Geibig 1991, 83–90). Oakeshott's typology is useful primarily in the study of blades from the High Middle Ages; it is inadequate for the study of early medieval swords. Although Geibig's typology is more detailed, it places heavy demands on the preserved condition of blades; unfortunately, the condition of the majority of swords from graves is insufficient. The typology contains fourteen types of swords from the period between the 8th and the 12th centuries. The basic descriptive criteria for Geibig's type of blades are metric data such as the length and width of the central fuller and the length and width of the blade, the tapering of the blade on the first 60 cm of the length, the tapering of the fuller on the first 40 cm of the length of the blade and the ratio of the blade length to the fuller length. Criteria that can be determined by visual inspection include the course of the blade edge (parallel, convex tapering, linear tapering) and the length of the blade tip (short/long). As the author himself suggests, Geibig's blade typology must be taken as working material providing specialists with a guide to the possibilities for describing blades (Geibig 1991, 83–84). Unfortunately, the typology, especially for drawing chronological conclusions, is very imprecise (see Chap. 4.2; Košta 2004; 2005; Košta/Hošek 2009).

The creation of typological schemes for the construction elements of individual sword-parts was a major contribution to deepening the systematic description of swords. A. Geibig (1991, 90–100) elaborated three construction types of upper hilts using the conclusions of W. Menghin (1980; 1983a) and M. Müller-Wille (1982; 1984) from their work on swords of the Merovingian and early Carolingian periods. H. Westphal's (2002) attempt at describing the construction elements on the blades of early medieval swords was relatively successful.

Research into the construction of early medieval swords traditionally focused mainly on investigating production technology and a description of the varied range of iron pattern-welding.[25] Researchers also focused on a description of the technology of producing 'Damascus' steel (i.e. a specific type of crucible steel frequently referred to as Wootz steel).[26] Despite the fact that the metallographic study of early medieval swords also has a long tradition, there is still no generally recognised construction typology of blades, which would be based on the manufacture process and materials that were used. Unfortunately, synthesising studies presenting a metallographic-based categorisation of medieval blades are rare (e.g. Williams 2012). Information on the results of analyses is often presented in an isolated manner in separate published works[27] and seldom in a uniform format, thus complicating a broader synthesis.[28]

From the very beginning of research on early medieval swords intensive interest has been devoted to the study of the inscriptions and marks typically decorating the parts of blades below the lower guard (crossguard). The foundation for the study of inscriptions on sword blades is the classic work of A. L. Lorange (1889), in which the author systematically addressed the issue of blades with inscriptions in the ULFBERHT group. The development of the study of marks and inscriptions on blades is primarily connected to the use of X-ray images on archaeological artefacts. Radiography served to identify marks or inscriptions (or possible pattern-welding), although in many cases it was inadequate for reading them: marks and inscriptions were often present on both sides of the blades, and in such cases they mingle in X-ray images. Soviet researcher A. N. Kirpičnikov therefore applied a method in which he removed the corrosive layers from the blade up to the surface on which the remains of the inscription are preserved.[29] By employing this relatively invasive method, Kirpičnikov managed to show that a large number of swords from the 9th and 10th centuries – a period in which the pattern-welding of blades was in decline – were marked or inscribed.[30] Intensive research focused on detecting and understanding inscriptions, especially those that appear frequently on sword blades – the inscriptions from the ULFBERHT group (Jankuhn 1951; Müller-Wille 1970; Menghin 1980; Gorman 1999) and inscriptions from the INGELRII group (Arbman 1935/6; Geibig 1991, 123–126; Gorman 2005). Swords with the inscription of ULFBERHT group were newly evaluated by Norwegian researcher A. Stalsberg (2008; 2009a; 2009b), who attempted to divide them into several groups defined on the basis of formal similarities. In comparing these formal groups with the find contexts, Stalsberg determined that a majority of them were

25 The wealth of literature on this subject includes Maryon 1960; Anteins 1973; Ypey 1982b; Segebade 1997.

26 E.g. Panseri 1965; Sherby/Wadsworth 1985; Pertulla 2001; Feuerbach 2006.

27 The earliest literature presenting the results of metallographic analyses of early medieval swords is summarised, for example, in Pleiner/Plzák/Qadrat (1956) and more recently in the work of A. Williams (2012, 116–117). Noteworthy among the archaeometallurgical studies of the second half of the 20th century making a major contribution to knowledge of the production technology of early medieval swords are (to name but a few) works by B. A. Kolčin (1953), R. Pleiner, F. Plzák and O. Quadrat (1956), R. Tylecot and B. Gilmour (1986), J. Lang and B. Ager (1989) and A. Williams (1977; 2012). More recent studies include works by S. Mäder (2009), M. Mehofer (Szameit/Mehofer 2002; Mehofer 2005), M. Moilanen (2009), A. Williams (2007a; 2007b; 2009; 2012), Ľ. Mihok (Bialeková/Mihok/Pribuľová 1998a; 1998b), J. Hošek (e.g. Hošek 2003; Košta/Hošek 2009; 2012; Hošek/Košta/Bárta 2012; Hošek/Košta/Mařík 2012), etc.

28 Another serious complication for a synthesis is the fact that many of the published results of analyses are burdened by interpretative errors (as the result of the poor preservation of blades in the place of sampling, the difficulty of deducing the technological processes employed, the metallographer's lack of experience with the issues of archaeometallurgy, etc.)

29 E.g. Kirpičnikov 1966c; 1992; Kirpičnikov/Dubov 1982; in cooperation with museums in Norway, Sweden and Finland Kirpičnikov/Stalsberg 1995; 1998; Thålin-Bergman/Kirpičnikov 1998; Kirpičnikov/Tomanterä/Saksa 2004.

30 A remarkable sword with a magnificent hilt found at the Foščevataja site in the Poltava region of the Dnieper Valley, dated to the first half of the 11th century and bearing Cyrillic inscriptions (КОВАЛЬ and ЛЮДОТА or ЛЮДОША; Kirpičnikov 1966a, 41).

not overly chronologically sensitive and that they occurred in continental Europe, including Northern Europe, as early as from the 9th century. Blades with the ULFBERHT inscription were also recently studied by archaeometallurgist A. Williams (2007a; 2007b; 2012), who noticed that steel with a hypereutectoid composition (and free of slag inclusions) was used exclusively in blades with one specific inscription variant. Williams suggests that these blades form a specific group of weapons that might have been made from crucible steel imported from Central Asia.

Additional noteworthy works on blade inscriptions on early medieval swords include those by M. Głosek (1973), D. A. Drboglav (1984), A. Geibig (1991, 113–133) and L. Marek (2004, 43–52; 2005). The typological description of blades based on their form is in need of a major revision, while the existing typology of marks and inscriptions, and even blade constructions are useful primarily for orientation purposes. Two relatively new descriptive systems – Geibig's construction types of upper hilts (Geibig 1991, 90–100) and the description of certain blade construction parameters in the study by H. Westphal (2002) are of great value in the area of describing the construction of early medieval swords.

2.4 The collection of data concerning European swords from the period between the second half of the 8th century and the 11th century

An essential starting point for the analysis of the territorial distribution of each category of artefacts is to assess the state of their study and relevant publications. Early medieval swords are artefacts that should be assessed on a Europe-wide scale. Nowadays, there are many studies that deal with finds of swords from the second half of the 8th century to the 11th century in the context of present-day European states or the territory of early medieval political units. In addition to relevant data, the majority of these studies also contain inventory tables that open up possibilities for new, supra-regional analyses of swords. However, the varied qualities, levels of detail and dates of publication of these inventories suggest caution when synthesising the data.

One of the largest catalogues was compiled for the territory of the former West Germany by A. Geibig (1991) in connection with a comprehensive analysis of swords dating to the period between the second half of the 8th century and the turn of the 13th century, a large percentage of which he was able to study personally. At the same time, he also processed in simplified form additional European swords from the designated period, based on information obtained on these artefacts from scholarly literature. Geibig's catalogue contains detailed information on 347 swords and their parts from West Germany and concise entries on a further 1592 European swords. Approximately four-fifths of the swords from Geibig's inventory fall within the period studied in this work. The lone disadvantage is the method of publication (a microfiche appendix to his study), which limits access to the catalogue today. Noteworthy among more recent publications of West German material is a study of swords from the harbour at Hedeby (Geibig 1999); building on previous works and the study by H. Westphal (2002) from a methodological perspective. Geibig's study contains, in addition to information on other swords from German territory, valuable information on swords from Germany and Austria dating from the period between the 6th and the turn of the 10th centuries (Geibig 1991). In contrast, no synthesising works on early medieval swords from the territory of the former East Germany have been published. Important earlier studies included works by H. Preidel (1959; 1961; 1964) on swords from the entire western Slavic territory, which included brief inventories of individual specimens. Information on individual finds of early medieval swords, typically accompanied by drawings and references to additional sources, is contained in the individual parts of the catalogue entitled *Corpus archäologischer Quellen zur Frühgeschichte auf dem Gebiet der DDR* [Archaeological

Sources on the Early History of the Territory of East Germany].[31] In addition to this work, some researchers compiled concise inventories for the individual regions of East Germany (e.g. Schoknecht 1988; Volkmann 2008).[32] Important and well-described finds from the eastern part of Germany include the upper and lower hilt from the so-called 'goldsmith's hoard' found at the Rostock-Dierkow site (Warnke 1992/3; Geibig 1992/3; Richter 1992/3; Westphal 1992/3). New information on sword finds from the graves of the Slavic elite at the turn of the 11th /12th century from Western Pomerania can be found in the studies by F. Biermann (Biermann 2008; Bauer et al. 2009).

Swords from today's Netherlands have been systematically described in fine quality in many studies by J. Ypey (1959; 1960/1; 1962/3; 1964; 1980; 1982a; synthesised in Ypey 1984; Willems/Ypey 1985). E. Knol and X. Bardet (1998) compiled a concise inventory of early Carolingian swords found in graves in the northern Netherlands while describing the cemetery in Godlinze.

Of the small number of swords known from Austria, some were published in the catalogue by H. Freisinger (1972) and in the work by E. Szameit (1986) on early Carolingian swords. Later studies on additional specimens or those containing new information include Justová 1990; Szameit 1992; Szameit/Mehofer 2002; Preinfalk 2011). Worthy of special mention is a new publication of graves in Hohenberg with Mannheim type swords deposited along with belt fittings made in the late Avar style (Nowotny 2005; Mehofer 2005; Scheiblechner 2005), and the description of two graves with Petersen type Y swords found in the cemetery at Thunau-Obere Holzwiese (Nowotny 2011; in print).

Two suitable starting points for the study of early medieval swords in Slovakia are the work by M. Kliský (1964) and especially A. Ruttkay's comprehensive study and catalogue of weapons from the 9th to the 14th centuries found in Slovak territory (Ruttkay 1975; 1976). Noteworthy among finds published at a later date is the grave with a sword from Závada, the (inaccurate) chronological determination of which kindled a discussion on the early appearance of Petersen type X swords (Bialeková 1982; Bialeková/Mihok/Pribulová 1998a; 1998b). Several additional studies published in Slovakia in the 1980s and 1990s dealt with individual swords from the 9th century to the turn of the 11th century (e.g. Nevizánsky 1985; Točík 1992, 151–156, fig. 97; Thoma 1993; Turčan 1997). M. Hanuliak (2004) referred to several additional sword finds while describing Great Moravian cemeteries in Slovakia. The work by M. Comisso (2005) contains valuable documentation of several specimens. Despite the fact that it predates the period that is the focus of this work, the Late Merovingian Niederramstadt-Dettingen-Schwabmühlhausen type sword from the Avar Khaganate-period burial ground in Želovce (Čilinská 1973, 23, 57, tab. XXII) is important in that finds of Frankish swords are rare in Avar cemetery contexts.

The study of weapons has a long tradition in Polish archaeology and the knowledge of Polish archaeologists and specialists in military history and historical weapons is important mainly for the later years of the period addressed in this study. Weapons regularly appear in early medieval graves in Poland between the second half of the 10th century and the course of the 12th century. Nevertheless, sword finds from riverbeds and settlement situations are also relatively numerous in Poland. Classic Polish works today include the study by W. Sarnowska (1955) entitled *Miecze średniowieczne w Polsce* [Medieval Swords in Poland], especially the catalogue section, and the series of works by A. Nadolski and M. Głosek systematically describing early medieval weapons in Poland from archaeological and culture-historical perspectives (Nadolski 1954; 1978; Głosek/Nadolski 1970; Głosek 1973; 1984). The study entitled *Groby z mieczami na terenie*

31 Information on swords is provided in sections (Corpus 1973; 1979a; 1979b; 1985).

32 A. Hollnagel (1960, 145–168), for example, also pointed out graves with swords in his description of Mecklenburg cemeteries.

Polski wczesnopiastowskiej [Graves with Swords in the Territory of the Early Piast Dynasty] by J. Wrzesiński (1998) provided an analysis and catalogue of early medieval Polish graves containing swords. L. Marek (2004; 2005) addressed selected issues concerning early medieval swords, and his study also included a catalogue of swords found in Central Europe. Other researchers have recently studied early medieval swords in connection with the description of weapons from the individual regions of Poland, including P. Świątkiewicz (2002) for Western Pomerania and P. Strzyż (2006) for Lesser Poland. Likewise noteworthy are the recently published study containing a detailed analysis of swords from several fortified settlements in Greater Poland (Ostrów Lednicki and Giecz; see Głosek/Kirpičnikov 2000; Wyrwa et al. 2011) and a work in which the authors provide a detailed analysis of swords from the collections of the National Museum in Szczecin (Klimek et al. 2011). The dissertation by P. Pudło (2012) provided an overall description of swords from Poland.

Catalogues of swords from Hungary (or from the territory of the former Kingdom of Hungary) were compiled by K. Bakay (1967) and L. Kovács (1995) in studies addressing the transformation of the supra-tribal organisation of nomadic Hungarians into the early medieval Hungarian state and its reflection in archaeological sources. R. R. Heitel (1994/5) addressed finds of sabres and swords from parts of present-day Romania in connection with the invasions of the early Hungarians. The study by C. Cosma (2001) contains information on swords from cemeteries from the period between the 9th and the 11th centuries in western and northwestern Romania. Z. Pitner (1998a; 1998b; 1999; 2007) described medieval swords from Transylvania and the Banat region. A late Carolingian sword recently published by the Serbian scholar M. Aleksić (2004) comes from the Serbian Banat.

Important sword finds have been made in the territory of today's Croatia (primarily Dalmatia) and from the southern part of Bosnia and Herzegovina. Croatian and Bosnian assemblages with swords are of key importance for dating the later phase of early Carolingian swords. Although many swords from Croatian sites were known as far back as the beginning of the 20th century, Z. Vinski (1966; 1978; 1981; 1983a; 1983b; 1984; 1985) in particular is responsible for the systematic describing of swords from the end of the 8th century to the turn of the 11th century. The catalogue of Carolingian swords and spurs in the Archaeological Museum in Split was published by D. Jelovina (1986). In 1992, M. Zekan (1992) pointed out the erroneous identification of the finds sites for several swords from Croatia; two years later he published a new synthesis of Carolingian swords from Bosnia and Herzegovina (Zekan 1994). M. Sijarić (2004) built on Zekan's catalogue in describing Bosnian swords from the 10th to the 15th centuries. Two recently published studies provide a new evaluation of Dalmatian Petersen type H (Belošević 2007) and type K (Bilogrivić 2009) swords. Important information on Carolingian swords from grave contexts was provided by M. Petrinec (2009, 184–202) in an extensive monograph on cemeteries of the 8th to 11th centuries in the territory of the early medieval Croatian state.

The northeastern Balkans are among the regions with a sporadic occurrence of early medieval swords and scabbard chapes of a northern or western European character (Yotov 2003, 5–8; 2004). Significant finds of sword fragments come from the strategically located island of Păcuiul lui Soare in the Lower Danube in the southeastern part of Romania, where the ruins of a Byzantine fortress are located (Popa 1984; Yotov 2003, 6–7).

A work offering a detailed overview of early medieval weapons from eastern Europe is the voluminous study by A. N. Kirpičnikov (1966a; 1966b) on the territory of Kievan Rus'. This work includes an inventory of weapons from the period between the 9th and the 13th centuries, including, among other things, 108 swords dated to the period between the 9th and the first half of the 11th centuries (Kirpičnikov 1966a, 74–85, 90–91). Noteworthy among newer publications is the describing of swords of northwestern origin from the territory of Volga Bulgaria (today's Republic of Tatarstan; Izmajlov 1995; 1997; 2000; Kirpičnikov/Izmajlov 2000), from Mordovia (Šitov 1994) and from Karelia (Kirpičnikov/Saksa 2006). An important addition to our knowledge of swords in the territory of Kievan Rus' is the recent discovery of a grave in the historical centre of Kiev, dated to the 10th century and featuring a Petersen type X sword with a decorated grip (Kleingärtner/Müller-Wille 2008). Swords and scabbard chapes from western Ukraine have been published by R. Liwoch (2008). M. Plavinskij (2007; 2009) has recently published a synoptic work on early medieval swords found in the territory of today's Belarus.

Rich assemblages of early medieval swords from the eastern Baltic states have been published in detail. Swords from the territory of East Prussia were collected and described at the end of the 1930s by B. von zur Mühlen in his study *Die Kultur der Vikinger in Ostpreußen* [Viking Culture in East Prussia], which was finally published after more than thirty-five years (Mühlen 1975). M. Mandel (1991) compiled an inventory of early medieval swords from Estonia, while R. Volkaite-Kulikaustiene (1964) has produced a catalogue of Lithuanian swords. The most important work to date on swords from the eastern Baltic states is the monograph *IX–XIII a. baltų kalavijai* by Lithuanian archaeologist V. Kazakevičius (1996). This study contains a typological and chronological analysis, their territorial distribution and a catalogue of swords from the 9th to the 13th centuries from lands occupied by the early medieval Baltic cultural sphere. In addition to Lithuania and Latvia, Kazakevičius described swords from today's Kaliningrad region, parts of northeastern Poland and northwestern Belarus; on the other hand, he did not include Estonian specimens.

Breakthrough studies into Scandinavian swords are those published by F. Androŝuk (2013; 2014). They include catalogues of 764 swords coming from Sweden and 70 other Norwegian swords stored in the Nordiska Museum in Stockholm. These studies include also a brief inventory of 56 swords discovered in today's Denmark (Androŝuk 2013, 256–258; 2014). A great deal of substantial information about swords from Denmark is presented in studies by A. Pedersen (1997; 2002a; 2002b) on early medieval weapons. Despite the fact that a comprehensive description of assemblages from Norway[33] is underway, only certain preliminary results are available thus far. The renowned study by J. Petersen (1919) is a primary source of information on swords from Norway. Petersen mentions 1773 swords and long seaxes and typologically classifies approximately 1000 double- and single-edged swords from the Viking Age. Given the large number of swords, it was not possible for Petersen to state the place of discovery all of the specimens in his work. Location was primarily lacking among swords for which it was not possible to determine the type. Of the swords classified in the typology, Petersen located precisely those whose types were represented by fewer than approximately thirty specimens. In the case of more heavily represented sword types (e.g. C, H, M, X), Petersen located in the publication only those swords he used in the interpretation of the type in the text of the study. However, he separated the entire assemblage of swords into Norwegian regions and in this way evaluated both their quantitative representation and the occurrence of individual types. The recent Russian-language edition of Petersen's study was published with maps of individual regions of Norway showing precisely where the swords were found (this involved 378 specimens; see Petersen 2005, 232–238). A valuable complement to the work from 1919 is J. Petersen's study on Anglo-Saxon imports into Norway, which includes detailed documentation of Petersen type L swords (Petersen 1940).

33 The Norwegian scholar P. Hernæs has compiled a catalogue of 1770 swords from eastern Norway as part of his master's degree thesis; unfortunately, the study was not published (Vešnâkova 2005, 324). Norwegian sword specimens with Ulfberht group inscriptions on their blades were comprehensively described recently (Stalsberg 2008; 2009a; 2009b). The systematic description of all Viking Age swords from Norway is currently in progress – the overall number of specimens exceeds 3000 (the authors thanks A. Stalsberg for sharing this information).

Norwegian sword specimens with ULFBERHT group inscriptions on their blades were comprehensively described recently (Stalsberg 2008; 2009a; 2009b). Some Finnish sword finds from the 8th to the 13th century, mostly from graves, were published in detail in several compilations (Kivikoski 1939; 1947; 1951; 1973; Leppäaho 1964). The study by M. Jakobsson (1992) contains a brief listing of Petersen sword types in the individual regions of Sweden. A basic point of departure for the study of swords from Iceland is the study by K. Eldjárn (1956) on Icelandic graves and Viking Age cemeteries. An important addition to knowledge of Scandinavian swords was the project organised in the 1990s by A. N. Kirpičnikov to document numerous blades for the purpose of identifying inscriptions.[34]

The collection of data on swords from the period between the 9th century and the turn of the 11th century in Western Europe is inadequate. There are some detailed compilations from the first half of the 20th century. R. E. M. Wheeler (1927) presented an inventory of Viking Age swords from Great Britain in his publication *London and the Vikings*. A basic source of data on Viking artefacts in the British Isles is the multi-part catalogue *Viking Antiquities in Great Britain and Ireland,* which presents information on the majority of swords found in England (Bjørn/Shetelig 1940), Scotland (Grieg 1940) and Ireland (Bøe 1940) up until the time of publication. The volume devoted to Viking artefacts in England also contains a catalogue of swords from France and Belgium (Bjørn/Shetelig 1940, 101–131). V. I. Evison (1967) conducted a detailed analysis during the study of Petersen type L and Y swords from the British Isles and defined the Wallingford type on their basis. A. Walsh (1998) recently compiled a concise summary of information on Viking Age swords from Ireland. A new detailed analysis of Viking swords from Scotland was published by G. Żabiński (2007). And finally, the study by M. Müller-Wille (1978), analysing in detail the issue of Viking boat burials using the unique find of a grave with a sword from Île de Groix in Brittany, is also noteworthy.

In addition to works describing swords within states or individual regions, it is also necessary to draw attention to studies addressing the relatively numerous sword finds (i.e. dozens of specimens) from trading and political centres. The detailed publication of these key sites is a major contribution to an understanding of the development of swords in individual regions, and they have had enormous importance for elaborating their chronology. This primarily concerns the prominent centres in Northern Europe such as Birka (Arbman 1943; Gräslund 1998) on Lake Mälaren in southern Sweden; Kaupang (Blindheim/Heyerdahl-Larsen 1995; Skre 2007), which was located in southeastern Norway, and the trade centre of Hedeby (Müller-Wille 1976; 1984; Geibig 1989; 1991; 1999; Wamers 1994; 1995; Arents/Eisenschmidt 2010a; 2010b), whose remains are situated in today's Schleswig-Holstein. In eastern Europe it is necessary to mention Gnezdovo near today's Smolensk (Kainov 2012) with the greatest concentration of early medieval swords in present-day Russia, then Kiev, the most important centre of Kievan Rus' (Kirpičnikov 1966a; Tolotschko 1994/5; Kleingärtner/Müller-Wille 2008; Ivakin 2008); and Yaroslavl in the northeastern part of Kievan Rus' (Kirpičnikov 1966a; Kirpičnikov/Dubov 1982; Dubov 1999). Important sites with sword finds in western Europe include early medieval Dublin and the cemeteries of Killmainham and Islandbridge, which today are also within the city limits of Dublin (Bøe 1940; Walsh 1998; Halpin 2008). Other prominent cemeteries are Luistari in Finland, which has been published in detail (Pirkko/Lehtosalo 1982a; 1982b; 1982c), and the cemetery in Schortens in Friesland (synthesised in Geibig 1991, Kat.-Nr. 210–227; Westphal 2002).

34 The results of analyses of sword blades from Norwegian museums (Kirpičnikov/Stalsberg 1995; 1998), from the State Historical Museum in Stockholm (Thålin-Bergman/Kirpičnikov 1998) and from the National Museum of Finland in Helsinki (Kirpičnikov/Tomanterä/Saksa 2004) have been published.

2.5 The collection of data on early medieval swords in the Czech Republic

Interest among Czech researchers in the study of early medieval swords was not especially pronounced during the 19th century and the first half of the 20th century. This was related to the small number of known specimens and the low attractiveness of those that were discovered. One certain exception was the sword (preserved without a hilt and a blade-point) from a princely grave in Kolín, with a magnificently decorated sword-straps; along with the entire Kolín find, these artefacts became the subject of a heated debate in the last part of the 19th century (cat. 19; the subject is comprehensively addressed in Lutovský 1994; Košta/Lutovský 2014). Also of interest were two swords preserved in the Treasury of the cathedral of St. Vitus – the St. Wenceslaus sword[35] and the St. Stephen sword. The later has been preserved in its original form from the second half of the 10th century, but it was brought to Bohemia along with the Hungarian crown jewels upon Wenceslaus III's escape from Hungary in 1304 and therefore cannot be regarded as an early medieval Bohemian relic.

J. L. Píč (1909, 106–110) summarised knowledge of early medieval swords from Bohemia at the turn of the 20th century in his *Starožitnosti země české* [Antiquities of Bohemia]. Existing finds of swords from Moravia were recorded in a concise form at the end of the 1920s by I. L. Červinka (1928). L. Niederle (1925, 526–537) addressed the occurrence of swords among early Slavs in the chapter devoted to Early Slavic warfare, which was published in his several-volume study *Slovanské starožitnosti* [Slavic Antiquities]. The relatively short passage is one of the most important texts on European early medieval swords of its time. Obviously Niederle could not pursue a detailed study of swords, as he lacked sufficient specimens. The importance of the texts lies in the author's broad view and his ability to reach logical conclusions; for example, Niederle defined areas in the Slavic world with Frankish swords and with swords of a northern character.

Disregarding the princely grave from Kolín, where the sword itself was not the object of greatest scholarly interest, the earliest detailed archaeological works on early medieval swords from Bohemia are those by the Sudeten German scholars J. Kern (1935) on swords from Litoměřice-Staré Šance and H. Preidel (1936/7; 1938) on the find of a grave with a sword in Žatec. A study of a warrior grave found in the Third courtyard of the Prague Castle was published a few years later, after the Second World War (Borkovský 1939/46). The first scholarly evaluation of finds of early medieval swords in Moravia was attempted by J. Poulík in his monograph *Staroslovanská Morava* [Old Slavic Moravia] (Poulík 1948, 39–40), prior to the era of the major discoveries at Great Moravian sites. V. Hrubý (1950) wrote about the characteristics of graves with swords in a separate article and later produced a more detailed analysis in connection with his description of the cemetery at Staré Město – Na Valách (Hrubý 1955, 163–168). E. Soudská (1954) collected weapons from early medieval graves from Bohemia and Moravia in the 1950s, while M. Kliský (1964) addressed early medieval swords from the territory of former Czechoslovakia in a shorter study. B. Dostál (1966, 67–70) collected data on swords while analysing Moravian cemeteries from the 9th to the mid-10th century. The short overview of swords produced by Z. Klanica in an anthology on Great Moravia unfortunately contains numerous inaccuracies (Klanica 1967a). The catalogue of the early medieval burial grounds from Central Bohemia by J. Sláma (1977) is of great significance for swords from the Bohemian territory. The issue of Bohemian and Moravian swords was addressed in detail in the dissertation by R. Krajíc (1978). The publication of sword assemblages from central Great Moravian sites in Břeclav-Pohansko (Vignatiová 1993) and in Mikulčice (Košta 2005) was a great contribution to the understanding of swords in the Czech Republic. A concise overview of early

35 M. Bravermanová (2007) recalled the discussion on the possible early medieval origin of the blade of the preserved sword.

medieval swords found in the territory of the Czech Republic formed part of the dissertation by J. Košta (2004). The most recent attempts at a comprehensive description are those of N. Profantová (2011; 2012), which introduced new information and, due to the publication of one of them in English, may serve to spread the knowledge of early medieval swords from Bohemia.[36] It is unfortunately burdened by numerous imprecise evaluations and problematic interpretations. The technological study of swords based primarily on metallographic analysis has a long tradition in the Czech Republic and is recognised in a European-wide context.[37]

The summary presented makes clear that at least from the second half of the 20th century the subject of early medieval swords studies was not neglected by researchers. However, the main long-term problem is the absence of a truly comprehensive catalogue and a systematic evaluation of early medieval swords and the contexts in which they were discovered.

2.6 Brief overview on early medieval sword finds in the territory of Moravia

Up to now we know of 55 finds of double-edged swords from the territory of Moravia (Czech Republic). They can be dated from the mid-8th to the mid-11th centuries, according to their typological characteristics and/or archaeological contexts. Other grave finds of swords of the same period come from sites, which were directly related to the settlements near the Thaya River (Dyje) and the middle reaches of the River Morava (see below in this chapter), but which are nowadays situated in the neighbouring states of Austria and Slovakia. Four fragments of sword hilts from the period discussed come from settlement contexts of the early medieval Mikulčice agglomeration. A fragment of a sword blade with a central rib, whose find circumstances remain unknown (perhaps part of a hoard?), but whose form suggests a rather early Slavonic or pre-Great Moravian origin, is part of the early medieval set of iron objects from Lipník nad Bečvou (Eisner 1948, 372, 399, obr. 4:5; Bartošková 1986, 24–25, obr. 8:E). Hence, the blade from Lipník is, so far, the only find of a double-edged sword from the Czech Republic, which may be dated to the pre-Great Moravian period.

Besides double-edged swords, finds of single-edged weapons with long blades (long seaxes and sabres) appear in small numbers in Moravia. A seax and a scramaseax were discovered in grave 119/60 on the cemetery surrounding the church in Uherské Hradiště – Sady (Galuška 1996, 104, obr. 64, 92). According to other items of grave goods (presence of late Avarian artefacts) one can date the grave to the early stages of the Early Great Moravian Horizon. A long single-edged weapon with resembling those found in western Europe, was discovered within the Great Moravian phase on the burial ground in Čakajovce in Slovakia (Rejholcová 1995, 64–65, 184). Other single-edged weapons found in Vranovice (Skutil 1937, 19, obr. XIX:1; Poulík 1948, 166–171; Klanica 1986, 86–87) and Mikulčice-Panské (Košta 2004, 70, tab. XXV) bear features[38] related rather to the nomad (late Avar) environment and might be considered artefacts of local provenance. In this context, two single-edged swords lifted from the grave 11 in Dubovany and from the grave 72 in Borovce are worthy of mention (Slovakia; both these sites are mentioned by Staššíková-Štukovská 2001, 380, obr. 9:1). The weapon from Borovce was provided with

36 Until that time, only the imprecise and general inventory of Z. Klanica (1967a) existed in a major language.

37 E.g. Pleiner/Plzák/Qadrat 1956; Pleiner 1962; 1967; 2006; Ustohal/Stránský 1992; Krajíc/Kukla/Nekuda 1997; Kukla/Měchurová 2000; Galuška 2001; Selucká/Richtrová/Hložek 2002; Hošek 2003; 2007; Hošek/Mařík/Šilhová 2006; 2008; Hošek/Košta 2006; 2007; 2008; 2011; 2013; Košta/Hošek 2008a; 2008b; 2009; 2012; Hošek/Košta/Mařík 2012.

38 A socket of the upper part of grip with a loop on the Mikulčice sword and a fragment of a slender, extended in the middle (from the horizontal view) and lenticularly shaped crossguard (compare, e.g., Kirpičnikov 1966a, 61–70, ris. 13; Yotov 2004, 59–76).

an iron crossguard, the form of which resembles sabre crossguards (the Kirpičnikov type II or III; Kirpičnikov 1966a), and which was decorated with vertical wire inlays, which is a characteristic style of decoration applied on West European swords. The grave 72 from Borovce is dated to the earliest phase of the burial ground (according to the author approximately to the turn of the 9th century; Staššíková-Štukovská 2001, 374, 380). The information available from these single-edged weapons, which differ from west European scramaseaxes, can only be fully assessed when a good the individual specimens and assemblages have been published in detail.

The origin of the sabre from the burial ground in Olomouc-Nemilany was, in past, placed in an Early Hungarian environment (Kalábek 2001, obr. 105; Kouřil 2003, 133–134, obr. 13), but its typological features correspond with the so-called Khazar sabres, which are usually dated to the 8th–9th centuries (Yotov 2004, 59–76; Kouřil 2008, 127). A settlement find of a crossguard of an Early Hungarian sabre comes from the acropolis of the Mikulčice centre (Kouřil 2008, 119, obr. 2:4). A sabre preserved in fragments was discovered in a tumulus burial ground in Senica-Háje, which is situated on the Slovak territory near the border with Moravia (Budinský-Krička 1959, 27–28, 70–71).

Certain limitations in the interpretation of the early medieval swords from Moravia are caused by the fact that majority of them come from burial contexts. Besides the fragments of swords from Mikulčice, any other context might be considered only in the case of three swords that correspond typologically to the period discussed but whose find circumstances are not known in detail. The location of these valuable weapons within the material culture of the past tells us nothing about the extent of their use in society, but does tell us about the changes in burial customs. Therefore the circumstances of their preservation is closely linked to the development of the burial rite. This fact complicates the question of when these early medieval swords started to appear in Moravian territory. As far as we may conclude from written sources, the sword was not among the traditional weapons of the Slavs (summarized, e.g., by Grotowski 2005). Despite this fact, the people of Moravia undoubtedly encountered and used long-bladed weapons in the pre-Great Moravian period.

Since the last third of the 6th century until the end of the 8th century, the Moravian territory belonged within the cultural sphere of the Avar Khaganate. Therefore the knowledge and use of long-bladed weapons, which we know from Avar inhumation burials, can be assumed, although their extent may have been limited in both quantity and quality. Along with the growing importance of elites, increasing number of their military equipment can be found in the 8th century; archaeological excavations conducted on a number of Czech and Moravian settlements of that period revealed numerous finds of mountings from Avar warrior belts, which could have served for the attachment of long-bladed weapons (summarized, e.g., by Profantová 1992; Klanica 1986; 1995). Besides the Avar sabres, weapons of Frankish types are being found on cemeteries from the late phase of the Avar Khaganate; they are mainly single-edged seaxes, but late Merovingian double-edged swords also occasionally appear in such contexts. The sword found on the burial ground in Želovce in the southern part of middle Slovakia (Čilinská 1973, 23–24, 57, 199; 1992, 31–32), whose upper hilt bears a low triangle pommel, corresponds to some swords of Behmer type IX (Behmer 1939, 190–194), and especially to the late Merovingian swords of the Niederramstadt-Dettingen-Schwabmühlhausen type from the late 7th to the mid-8th centuries that are found in southern Germany (Stein 1967, 9–12, 104–110). The specimen from Želovce represents an import of a Frankish sword into a more eastern area than Moravia and, therefore, supports the hypothesis of the use of swords of a western provenance also in Moravian territory.

The fragment of the double-edged sword blade from Lipník nad Bečvou, mentioned above, was provided with a middle rib instead of fuller and was a part of an assemblage consisting of early medieval iron objects whose find circumstances are unclear (Eisner 1948, 372, 399, obr. 4:5; Bartošková 1986, 24–25, obr. 8:E). Blades with central ribs are typical of swords of the Roman period, but they were used in small numbers (as a manifestation of the Roman tradition) in western Europe up to the Migration period and the early Merovingian period (Menghin 1983, 17–18; Biborski 2004; Miks 2007). Blades with central ribs instead of fullers appear also on some nomadic swords (Brentjes 1993, 38–44; Botalov 2006, fig. 3). A lenticular or rhombic cross section, for example, characterised a number of Avar sword blades, dating from the last third of the 6th century to the second third of the 7th century. Its classification as a nomadic sword is also supported by the small blade width (Laszlo 1991). In addition to the sword blade, a fragment of a long seax also comes from this set (Bartošková 1986, fig. 8: E-8) but we lack any information about the circumstances of the find and hence it remains uncertain whether all the objects of the set were excavated together.

On the issue of continuity of use of long-bladed cutting weapons in the pre-Great Moravian period, it is important to recall the seax and scramaseax found in the grave 119/60 on the cemetery by the church in Uherské Hradiště – Sady and mentioned above (Galuška 1996, 104, obr. 64, 92).

A similar situation, as noted in the pre-Great Moravian period, although caused by different circumstances, began to be repeated in the course of the first half of the 10th century, when swords in Moravia ceased to be buried in graves with their owners. The 10th to 12th century swords are not entirely absent in Moravian assemblages, but they are very rare (Žákovský/Hošek/Sedláčková 2013). The vast majority of swords, which are known from archaeological contexts of the early medieval Moravia, were buried within a relatively short period of time between the 1st half of the 9th century and the early 10th century.

The concentration of the 9th and early 10th century swords from the Moravian territory largely exceeds in term of its significance the groups of contemporary swords known from the majority of neighbouring regions. The reason is not only the significant number of items (in relation to the size of the area), but also the highly informative value of the archaeological contexts. With a few exceptions, all swords were discovered in graves as a part of the grave goods. The exceptions are the four settlement finds of sword fragments from Mikulčice and three unclear finds from Vrchoslavice (Žákovský/Hošek/Sedláčková 2013, 221–224), Olomouc – Univerzitní ulice (Frait 2006; Hošek 2007), and the area between the Osová Bytýška and Ořechov on the Czech-Moravian Highlands.[39] However, the last two in particular probably come from settlement contexts.

Swords found in graves can be compared or put into a relation to other burial equipment, and so they are suitable for the study of the symbolic significance of swords in past societies, and for more precise dating. The 52 individuals, who were equipped with swords on their last journey, were buried in 27 cemeteries (or isolated graves) concentrated within 22 settlement areas in Moravia. The difference between the number of swords and the number of sites on which they were found is caused by the concentration of a significant number of graves with swords in several large settlement areas. These include the Great Moravian centres in Mikulčice, Břeclav-Pohansko, Staré Město – Uherské Hradiště and two burial grounds on the cadastre of Nechvalín. The early medieval Moravia differs from neighbouring areas (such as Bohemia, Slovakia, Hungary and Poland) in the existence of sites with a remarkable concentration of finds of early medieval swords.

Finds of early medieval swords are concentrated mainly in the south-eastern part of Moravia. The area with the greatest number of swords lies in the Lower Moravian Vale around the Great Moravian centres in Mikulčice and Břeclav-Pohansko. If we regard the Moravian region as a territory whose

39 We would like to thank Mgr. Petr Žákovský, who provided us with information about this newly discovered sword.

borders were determined by the character of the landscape, the settlement intensity, the cultural links at that time, and also by the concentration of the sword-finds themselves, we would have to include in the region also areas in the south and south-east beyond the borders of the modern Czech Republic. These are the regions consisting of the Austrian part of the Thaya River basin and the floodplain on the left bank of the middle reaches of the Morava River.[40] The tumulus burial ground at Skalica-Háje, where a sword of early Carolingian type with an upper hilt bearing a triangular pommel was found and which is situated in modern Slovakia, would in this case also belong to the Moravian region (Budinský-Krička 1959, 27, 88–91; Ruttkay 1975, 175–177).[41] Another burial from this tumulus necropolis contained a sabre in fragments (Budinský-Krička 1959, 27–28, 70–71). Not far from this site, a sword of Petersen type X was found in the burial ground located in Skalica-Vysoké pole (Budinský-Krička 1959, 70; Ruttkay 1975, 175–177). The Skalica sites with finds of swords are situated up the Morava River, approximately 10 km from the Great Moravian centre in Mikulčice. We should also mention a tumulus burial ground situated in the cadastre of Bernhardsthal in Austria, which is located in the hinterland of another Moravian centre in Břeclav-Pohansko; a part of a sword with a pattern-welded blade was found in a tumulus containing grave goods datable to the 9th century (Justová 1990, 207–208; Szameit 1993). A little sword with a short and wide blade (presumably a seax or scramaseax) is mentioned by I. L. Červinka in the context of the site of Altenmarkt im Thale (Červinka 1928, 189; Justová 1990, 208). J. Justová (1990, 208) mentions a single-edged sword, or rather a scramaseax, from Poysbrunn, now lost. Two graves with swords of the Petersen type Y were uncovered in the burial ground in Thunau-Obere Holzwiese (Nowotny 2011; in print). A fortified settlement of Gars-Thunau was situated on a bank of the Kamp River, on the boundary of the cultural and political sphere of the East Frankish state and the Moravian principality (Obenaus/Breibert/Szameit 2005).

Regarding the concentration of finds of early medieval swords, the Mikulčice centre unambiguously dominates the Moravian region, as there have been to date 16 graves containing swords uncovered and other four fragments coming from the settlement context. A detailed investigation of both the Mikulčice swords and contexts in which they were found is the subject of this study. But numerous other swords have been excavated in Moravia.

A male burial containing a coffin with iron fittings, spurs and a sword without a hilt, but accompanied with an iron garniture for sword straps with trefoil fittings, was unearthed in Prušánky (Klanica 2006a, 31–39, tab. 52–53; 2006b, 189–191), which is situated at a distance of about 10 km to the north-west from the Mikulčice stronghold.

Excavations conducted in the settlement complex of Břeclav-Pohansko revealed six swords coming from graves. Swords from Great Moravian graves 26 (Kalousek 1971, 39, obr. 26; Vignatiová 1993, 92, obr. 3, tab. 1:4) and 174 (Kalousek 1971, 111–114, obr. 174; Vignatiová 1993, 93–94, obr. 5, tab. 1:2), which were uncovered on the cemetery within the magnate's court in inner bailey, can be unambiguously described as Petersen type X swords. Grave 65 from the same burial ground contained an early Carolingian sword with an upper hilt bearing a sturdy triangular pommel, which corresponds to Geibig's combination type 5, variant VI and which is comparable with a less common variant of Petersen type H, whose pommel construction approaches type B (Kalousek 1971, 55, obr. 65; Vignatiová 1993, 92–93, obr. 4, tab.

40 In Austria, the southern border of this territory would be situated between the burial grounds having Great Moravian character and the burial grounds in the Danube Region (Justová 1990, 198–212).

41 According to the shape of the pommel, the sword belongs to an early form of Petersen type H or Geibig's type 5, I. Unfortunately, the upper-hilt construction is not known. Some exact analogies to the sword from Skalica-Háje are the swords 119/AZ and 223/51 from the cemetery in Staré Město – Na Valách (Hrubý 1955) and the sword from Medvedička in Croatia (Vinski 1983a, 470).

1:1). Sword from the grave 257, uncovered on the cemetery within the court in on the inner bailey, corresponds in shape with X-type swords, but its upper-hilt construction is typical of early Carolingian swords (Kalousek 1971, 149–152, obr. 257; Vignatiová 1993, 94, obr. 6, tab. 1:3). Another sword with a two-part upper hilt and a long crossguard was found in grave 118 in the eastern suburbium (Vignatiová 1980, 167, obr. 3; 1993, 94, obr. 7, tab. 1:5). Recently, in 2013, the grave of a warrior with a sword was discovered in the periphery of the settlement agglomeration of the stronghold of Pohansko.[42] Further graves with swords were found in the broader hinterland of Pohansko; sword of Petersen type X comes from Břeclav-Poštorná (Kavánová/Vitula 1990, 328–329, 340, obr. 9, 12, Tab. 1; Košta 2004, 71, tab. 26) and a sword of indeterminable type was discovered at the site of Bernhardsthal in Austria (Justová 1990, 207–208; Szameit 1993).

Another region with a significant concentration of sword finds is situated between the Great Moravian centre in Staré Město and the southeastern part of the Upper Moravian Vale. Four early Carolinian swords were discovered in rich burials in the burial ground Na valách in Staré Město (graves 119/AZ, 227/49, 116/51, 223/51; see Hrubý 1955, 163–168, 381, 454–455, 506–507, 524–525, obr. 27, tab. 8:1, 19, 33:3, 65, 76, 80; Ustohal/Stránský 1992; Galuška 2003); grave 190/50 included a Petersen type X sword (Hrubý 1955, 163–168, 491–492, obr. 27:4, tab. 8:2, 72). Important sites on which swords were found are concentrated in the area of Napajadla Gate and the southeastern end of the Upper Moravian Vale – An early Carolingian sword with an unpreserved upper hilt was found in a grave in Zlín-Louky (Dostál 1961a; 1966, 126, tab. 37:14). Swords, which had (according to the published descriptions) very long blades, comparable with some of the finds from Mikulčice, came from tumulus burial ground in Žlutava[43] (Hrubý 1950, 313; Dostál 1957, 41–43; 1966, 194–195, tab. 44:1) and Jarohněvice (Přikryl 1890, 14; Červinka 1928, 146, tab. 1; Hrubý 1950, 311–312; Dostál 1966, 130–132, tab. 17). While the sword from Jarohněvice belongs to Petersen type X, the find from Žlutava cannot be determined unambiguously. A sword of Petersen type N from Holešov (Dostál 1966, 67) and other specimens from Kurovice (Skutil 1963a; Skutil 1963b) are mentioned only briefly in the published literature. An unspecified sword was found along with an axe in the early medieval grave in Přerov (Červinka 1928, 155; Dostál, 1966, 159). Another sword, whose find circumstances remain unknown, also came from this area, specifically from Vrchoslavice near Němčice nad Hanou (Žákovský/Hošek/Sedláčková 2013, 221–224).

Several sites, on which swords were found, are concentrated in the lower basin of the Svratka River. A sword originally bearing a semicircular upper hilt (Petersen type X or N), though neither upper hilt nor crossguard has been preserved, was found in grave IV in Blučina (Poulík 1941; 1948, 143, tab. 47; Hrubý 1950, 313). Two swords came from the cemetery in Rajhradice;[44] one sword, without either an upper guard or a crossguard, was found in grave 316 (Staňa 2006, 161, obr. 67), another came from grave 71 and belongs to Petersen type Y (Král 1970; Staňa 2006, 145–146, obr. 54).[45] Another sword of this type came from a disrupted grave of the cemetery

42 We would like to thank prof. Mgr. Jiří Macháček, PhD. who kindly provided us with the information.

43 Presented also as Napajedla (Poulík 1948, 40).

44 The burial ground in Rajhradice is situated along with another large cemetery on the cadastre of Rajhrad in the vicinity of the Rajhrad monastery. A number of scholars suppose that a Great Moravian centre existed at the place before the Benedictine monastery was built, but it has not been unambiguously confirmed by archaeological excavations so far. Later building activities and widespread disruption of the monastery surroundings, caused by the regulation of the Svratka River in the 19th century, do not allow unambiguous conclusions (for discussion see Staňa 1985, 190; 1997; Unger 1997). The character of the two above mentioned burial grounds may testify to the interpretation of Rajhrad as a Great Moravian centre.

45 The sword from grave 76 is also presented as a find from Rebešovice (Král 1970).

in Vranovice-Závist (Galuška 2001, 185–190). The sword from grave 76 in Rajhradice and the sword from the cemetery in Vranovice are so far the only Moravian representatives of Y-type swords coming from burials. Part of a larger cemetery on the cadastre of Vranovice was disrupted as early as 1941; among other finds there was identified a damaged single-edged weapon with a crossguard (Skutil 1937, 19, obr. XIX:1). Some recently discovered swords, a splendid specimen of Petersen special type 2 and a sword of his type X, were found on the burial ground of Šlapanice, which is situated east of Brno, at a short distance from the Great Moravian settlement of Staré Zámky in Brno-Líšeň.[46]

Two finds of swords are known from the Znojmo district. They come from randomly discovered and disrupted graves from sites that are situated relatively close to each other, east of the Great Moravian fortified centre in Znojmo-Hradiště sv. Hypolita. One of these swords comes from Hodonice (Staňa 1960; Dostál 1961b, 100–101; 1966, 128), the other from Dobšice (Dostál 1961b, 100–101; 1966, 123); both of them are Petersen type X swords with semicircular pommels.

A sword without an upper guard or crossguard whose blade bears an +ULFBERHT+ inscription was found on the burial ground of Olomouc-Nemilany (Kalábek 2001; 2002; Selucká/Richtrová/Hložek 2002), which is situated less than 5 km from the centre on Martinský Vrch and approximately 2.5 km from the site of Povel. Also the grave with a sabre mentioned above was discovered in this cemetery. In the centre of the city of Olomouc there was discovered a fragment of a Petersen type V sword, whose archaeological context is unfortunately not known (Frait 2006; Hošek 2007). The sword most likely comes from the 10th century or, maybe, from the beginning of the 11th century, and presumably represents a non-grave find (Frait 2006).

Interesting finds of swords are concentrated in small burial grounds in individual microregions of the Ždánice Forest. In the western part of the Ždánice Forest two swords were found in burial grounds in the neighbouring cadastres of Boleradice and Morkůvky. While the specimen from Morkůvky represents a sturdy form of a Petersen type X (Měřínský/Unger 1990, 379–381, 393–395, obr. 5–6; Kouřil 2005, 87–89, Abb. 17), the find from Boleradice has only the upper guard preserved, and therefore was wrongly assigned to Petersen type M in the past (Poulík 1948, 150–151, tab. 58; Hrubý 1950, 313; Kliský 1964, 109–110). The overall construction of the sword with a short blade and a tang with holes for attaching handle panels by rivets indicate an atypical weapon. In the southeast part of the Ždánice Forest, close to roads which lead further to the north into Vyškov Furrow, there are two burial grounds close to each other on the cadastral territory of Nechvalín, on which four swords were found. An early Carolingian sword was discovered in the burial ground in Nechvalín-Homole, specifically in grave 36 (Klanica 2006a, 31–39, tab. 4; 2006b, 20–21). Three other graves with swords were uncovered in the neighbouring burial ground in Nechvalín-Klenča; a sword of Petersen type N was found in the grave 126 (Klanica 2006a, 31–39, tab. 18; 2006b, 48–49), two swords of Petersen type X were found in graves 124 and 125, (Klanica 2006a, 31–39, tab. 16–17; 2006b, 46–48). Another early Carolingian sword came from a disrupted grave in Ždánice (Červinka 1928, 159, obr. 38; Dostál 1966, 193, tab. 46:1; Klanica 1997b).

46 We are grateful to the director of the excavation PhDr. Martin Geisler (ÚAPP Brno) for the possibility to study the sword and provide brief information about the find in this publication.

3. Investigation of the Mikulčice swords

3.1 Methology and history of the investigation into the Mikulčice swords

The detailed analyses of the swords found during the long-term systematic excavation of the early medieval centre in Mikulčice include description of the archaeological contexts, graphic and written descriptions of the swords, their typological identification, descriptions of any organic remains (scabbards, straps and outer covers) adhering to the swords and the results of their metallographic examination. Descriptions of the archaeological contexts include the year of discovery, the designations of both the particular excavation area and the corresponding square that refers to that part of the checkerboard grid superimposed over the area in question. In the case of the IIIrd church and its immediate vicinity there is also the designation of the sector that refers to a part of another grid marked over the church area. Detailed information on the process and methodology of the archaeological excavations, their topography and basic descriptions of individual excavated areas are all presented in the publications by L. Poláček and O. Marek (1995; 2005). All intact swords were preserved among the grave goods, whereas only four fragments of hilts (a single pommel, a composed upper hilt, a pommel from a composed upper hilt and a crossguard) were found outside a grave context and these were not metallographically examined. In describing the archaeological contexts, special attention has therefore been paid to an analysis of those graves with a sword together with a brief description of the other grave goods and an anthropological identification of the deceased, based on published evaluations (Stloukal 1962; 1963; 1964; 1967; 1969; 1981; Bartošková/Stloukal 1985; Stloukal/Vyhnánek 1998; Velemínský 2000).

The swords were found during the course of the archaeological excavations in Mikulčice. The discovery of the first sword from grave 90 was made at the very beginning of the extensive excavations in 1955, while a large number of swords was found in the second half of the 1950s during the excavations of the IInd and IIIrd churches and the excavation of the large area between the IIIrd church and the foundations of a rectangular building, which was interpreted as a palace. Another sword was found in 1965 in the eastern part of the acropolis at the burial ground by the 'hypothetical XIth church'. The first discovery of a sword outside the acropolis at the centre of Mikulčice took place in the mid 1970s during the excavation of the burial ground uncovered in the location of 'Kostelec' ('Kláštěřisko') situated in the area of 'Těšický les'. Two other graves with swords were found in 1986 in the large burial ground at 'Kostelisko', south of the Mikulčice acropolis. The final find of a pommel (coming from a composed upper guard) was made during a metal detector survey in 2012.

Due in part to the long period of time between the discoveries of the swords, different methods of conservation were applied to individual specimens. Unfortunately, no records have been preserved on the methods of conservation and restoration, and only a small amount of documentation exists on the appearance of the swords when they were discovered, i.e. before their first conservation (although, for example, such documentation exists for the sword from grave 90).

A considerable amount of the remains of organic covering materials (scabbards, straps etc.) was left on the surface of some swords (e.g. those from graves 265, 341, 500 and 580), while the organic materials on other swords were partially removed (e.g. those from graves 805 and 1347), or virtually completely removed (e.g. the sword from grave 438, from which parts of the scabbard were deposited separately). During the course of restoration, some of the swords were reinforced or completed with a resin (e.g. those from graves 265, 580 and 1750) while an entire point was added to the sword from grave 280. The sword from grave 1665 was not conserved at all. The swords from graves 90 and 280 were conserved at least twice: organic materials were at first preserved on their surface, while during the second conservation one part of the pattern-welded blade was cleaned (see Fig. 11 and 22). The different methods of conservation were one of the causes of the varied state of preservation of the swords' iron parts (as corrosion had continued under the organic remains) and their organic covering materials. Brief information on the existence of the organic covering materials removed during conservation work is available for some of the swords (e.g. 717 and 1750), and the use of scabbards and possibly other organic covering materials must be assumed for the other swords found. Blades on which traces of symbols and inscriptions had been identified by X-radiography were ground down to the uncorroded metal core at the area of the symbols. Unfortunately, this method for the detection of symbols caused rather the loss of information and irreversible damage to the surviving parts of symbols and inscriptions in the case of the Mikulčice swords.

The recording of both swords and related grave goods in a systematic register was not performed thoroughly. Inventory numbers were not assigned to swords from graves 90, 265, 280, 715, 717, 723 or to other grave goods, and these artefacts were not even included in the inventory book from the archaeological excavations at Mikulčice. For this reason, their designation by the grave number is preferred in the description of these swords.

Information about the swords and the contexts in which they were found, which was published before the beginning of the 21st century, is of supplementary importance to their understanding. Only a small part of the inventory has ever been published, and never in an separate study. Issues relating to graves 90, 265 and 280, including a brief description of the swords, are touched upon in the preliminary assessment of the burial ground of the IInd church, which was conducted by its director J. Poulík shortly after the excavation was completed (Poulík 1957). This study contains invaluable information because of the later loss of archive materials as well as some of the artefacts from the grave goods. As part of the assessment of the burial ground at 'Kostelec' (called also 'Klášteřisko'), Z. Klanica (1985a) analysed also that sword within the context of other Petersen type X swords, but he did not have space for the detailed documentation of the weapon itself. Certain details of the find contexts of grave 580 are provided in three publications by the same author (Klanica 1993; 1994; 2002). He also briefly addressed grave 1750 in a study on the beginnings of inhumation burial rite in early medieval Moravia (Klanica 1997a). A mention of the discovery of an inlaid symbol on the blade of the sword from grave 580 appears in a study by L. Págo (1966). Valuable information on the broader archaeological contexts relating to certain graves with swords can be obtained from the essays published on a regular basis in the journal *'Přehled výzkumů'* [Owerview of Excavations] which has included brief preliminary reports on new archaeological excavations (e.g. Klanica 1966; 1967b). Casual mentions in popular science publications (Poulík 1967; 1975; Poláček 2006) are insufficient for academic publication.

Thanks to the helpfulness of the head of the research centre in Mikulčice, L. Poláček, one of the authors of this monograph, J. Košta, began, as a master's degree thesis topic, a detailed study of the Mikulčice swords with respect to the contexts in which they were found (Košta 2004). Key sources of information on the archaeological contexts, existing documentation of the swords and even a large part of the assemblages from the graves with swords, which he had the opportunity to assess, were deposited at the archaeological research centre in Mikulčice maintained by the Institute of Archaeology of the AS CR (Academy of Sciences of the Czech Republic) in Brno.

The most completely preserved source of information on the graves with swords appeared in the *'Description of the Grave Units'* (further in the text as *DGU* only), which typically provided a description of the relevant grave unit, with references to the descriptions of squares and to plan and photographic documentation, as well as a list of finds with inventory numbers (where assigned). The '*Inventory Lists of Finds*' (further in the text as *ILF* only) included only those artefacts that were recorded; in some cases, brief descriptions of artefacts were accompanied by sketches. High-quality photographic documentation of grave units and X-ray images of swords were an important source of information. *'Descriptions of Squares'* into which the excavation area was divided were not available in complete form during the study of this documentation in Mikulčice and therefore often had only a supplementary utility. Similarly, only some of the field plans documenting the graves containing swords were available. In 2002–2004, J. Košta produced a detailed description of all the swords, organised their drawing, reviewed all the available archive materials and prepared a preliminary documentation of the preserved finds from graves in which swords were found. He also had samples collected for the metallographic examination of eleven Mikulčice swords, but only a few preliminary assessments had been realised before his master's thesis was completed. The master's thesis also included an attempt at a basic evaluation of the swords and assemblages studied, primarily in the context of the Great Moravian culture. Certain conclusions were subsequently presented at a conference and published in a scholarly paper (Košta 2005). However, it was clear that the works mentioned were only the first step toward the creation of a detailed study.

Shortly after submitting his master's thesis, J. Košta started collaboration with the archaeometallurgist J. Hošek, co-author of this study, who took charge of the metallography. Together they began to review their knowledge of the Mikulčice swords and gradually published research results on individual specimens (Hošek/Košta 2006; 2007; 2008; Košta/Hošek 2008a; 2008b; 2009; Hošek/Košta/Bárta 2012; Hošek/Košta/Ottenwelter 2013). They realised that a full treatment of the Mikulčice swords would require a new detailed documentation and conservation of the weapons, with special attention being paid to the study of the organic covering materials preserved in the corrosion layers. Although J. Košta provided a detailed description of the individual layers of covers in his thesis and indentified their mutual relationships, he lacked the experience and the means to conduct their professional evaluation. The possibilities of photographic documentation were also limited; the digital photographs obtained in 2002–2003, have a resolution that is too low for an analysis of the surface of the swords. Moreover, the technical quality of the photographs is often inadequate for publishing.

A tragic event had a major effect on plans for further documentation of the swords. Around 2 a.m. on Tuesday, 25 September 2007, a fire broke out at the archaeological scientific centre in Mikulčice. In addition to taking the life of one person, the fire completely destroyed the main building of the archaeological centre including the archives, the workplaces of all the employees with the data stored on their computers and even the depository with part of the collection, including the swords, and the majority of finds discovered in contexts with the swords.

The majority of the swords damaged by the fire were salvaged from the wreckage. The swords were subsequently sent to the laboratory of restoration of the Institute of Archaeology of the AS CR in

Prague for conservation, and fifteen of the sixteen Mikulčice swords from graves were identified. The sword with the inscription from grave 438 and three sword fragments from settlement contexts could not be found. The fire destroyed the organic materials stuck to the surface of the swords, thus eliminating the possibility of conducting their planned examination; all the joints and fillers added from previous conservation measures were also destroyed. The degree of damage among the various swords varies significantly: some remained virtually in the same condition as before the fire, whereas others had fragmented into several pieces. In the majority of cases, the fire removed the corroded parts of the swords. In general, a higher degree of damage was found on swords on which the remains of scabbards and other wrappings from organic materials had been left during conservation work; the iron beneath these materials had apparently been more affected by corrosion.

Following the fire, chemical analyses of the symbols and other inlaid decoration by non-ferrous metals were conducted within the conservation and restoration treatments. Samples were collected for metallographic examination from the blades of five swords that had not been sampled in 2003–2004 (those from graves 90, 265, 280, 1665 and 1750). Nevertheless, there are only limited possibilities for interpretation of the metallographic results obtained as the original microstructures were altered by the high temperature of the fire. The conditions of the swords following the fire, before and after conservation, were documented with high-quality photographs which form part of this study. Due to the fact that the majority of the original X-ray images of the swords were destroyed in the fire, new X-ray images were obtained for all of the swords.

A monograph on the Mikulčice swords was to be prepared in 2012–2014 as one of the objectives of the Czech Science Foundation project entitled 'The Swords of Medieval Europe as a Technological, Archaeological, Cultural and Historical Source'. Compared to the original plans for the comprehensive evaluation of swords, the fire at the Mikulčice centre created a number of limitations. Above all, it was no longer possible to examine the organic materials on the swords. For the purposes of this study, the documentation of the condition of the swords prior to the fire relied on the use of photographs with that were taken for a basic archaeological documentation the full awareness that their quality in a number of cases fell short of contemporary publication standards. Certain sources of information, including part of the field documentation, were preserved only as photocopies, the quality of which is entirely unsuitable for publication. Some data was irretrievably lost in the fire, and the high-quality documentation of those artefacts found with swords has been conducted on only a few of them. These reasons explain why the documentation of individual swords and their archaeological contexts is not fully uniform in this study. The authors have made an effort to publish the maximum amount of data available for each specimen.

3.2 Typological evaluation of the swords

As part of the typological classification of swords based on their hilts, the Mikulčice swords were compared primarily with the typology created by J. Petersen (1919), as well as the revisions made to Petersen's typology by later researchers. The Mikulčice swords were also compared with the combination typology of A. Geibig (1991).

Petersen's typology represents the most widespread and applied typological system for the classification of sword hilts, while Geibig's system is the most detailed. Both classification systems capture relatively reliably all of the important characteristics of the hilts on the swords studied. There was likewise regularly monitored the relationship between the Mikulčice swords and A. Ruttkay's typology (1976) created for swords from neighbouring Slovakia. Attention is also drawn to the inclusion of swords in the 'design principle' according to M. Jakobsson (1992). In addition to comparisons with the aforementioned typologies, swords with a single semi-circular pommel are also compared with a new typology introduced by P. Kucypera, T. Kurasiński and P. Pudło (2011). References to the construction of upper hilts in the publication are always based on Geibig's construction types (Geibig 1991, 90–100). A comparison with the typological systems is summarised in Table 3.[47]

No existing typology could be fully utilised for a description of the blades of the Mikulčice swords. Based on the morphological analysis of blades on early medieval swords from the territory of the Czech Republic, the authors therefore propose a new method of classification as part of this study (see Chap. 4.2). The authors also regularly refer to the relationship to the classification of blades according to A. Geibig (1991, 83–90), as the detail and precision of Oakeshott's classification is insufficient for its application on the early medieval swords in this study.

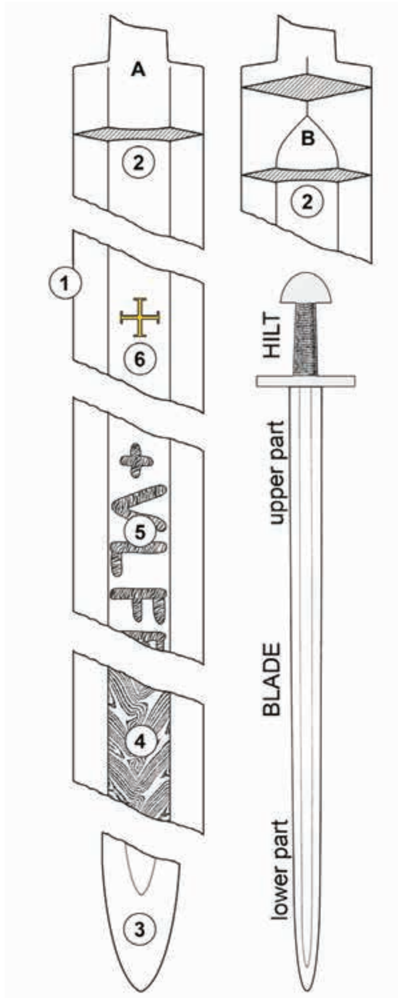

Fig. 3. Fundamental terminology used to describe the Mikulčice sword blades. 1 – cutting edge; 2 – fuller (A – standard fuller, which starts immediately below the crossguard; B – displaced fuller, which starts a few centimetres further down below the crossguard); 3 – point of blade; 4 – pattern-welding; 5 – iron or pattern-welded inlay (which may form various symbols or inscriptions); 6 – non-ferrous inlay (which may form various symbols). Drawing by J. Hošek.

3.3 Nomenclature and analytical methods used

Standard terminology (see e.g. Peirce 2002) was used to describe the individual parts of the Mikulčice swords. Blades have been described according to Fig. 3, hilts according to Figs. 4 and 5. In this study, those upper hilts consisting of two pieces (upper guard and pommel) are called 'upper-hilts' in the text, while those consisting of one piece are simply called 'pommels'.

Terminology applied to describe metallographic samples, detached from the swords for metallography, is based on the Fig. 3–6 (Williams 2012; Tylecote-Gilmour 1986; etc).

Sampling the swords for metallography was performed in two stages. In 2003–2004, first samples were detached from eleven swords by means of a waterjet on a CNC router. If possible, four samples were taken (one from a side of the pommel, one from an end of the crossguard, and one from each side of the blade at different distances from the crossguard) to obtain the most comprehensive possible information about the construction of the entire swords. The metallographic samples were then taken to the laboratory of the Institute of Archaeology of the AS CR in Prague (further as *IAP* only) to

47 For a more detailed evaluation of individual typological systems created for the purpose of classifying swords from the 10th to 11th centuries (see Chap. 2; Košta 2014).

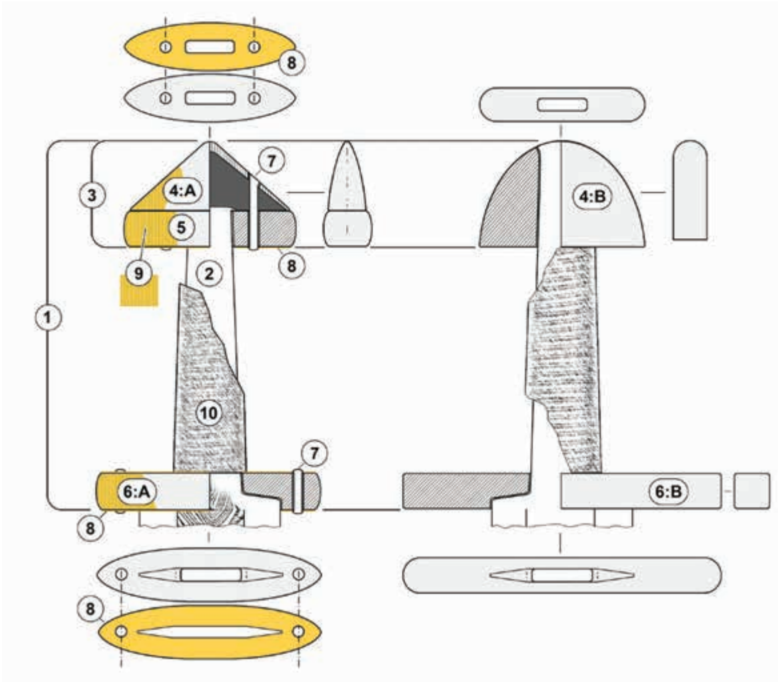

Fig. 4. Fundamental terminology used to describe the Mikulčice sword hilts: 1 – hilt of sword; 2 – tang of blade; 3 – upper hilt (composed of an upper guard and/or pommel) ; 4 – pommel (4:A– pommel as part of an upper hilt consisting of two pieces, 4:B – pommel as an upper hilt consisting of one piece); 5 – upper guard; 6:A – lower guard; 6:B – crossguard; 7 – rivets; 8 – nonferrous plates covering upper and/or lower sides of guards; 9 – wire inlay (applied onto pommels and guards); 10 – grip. (Profiles of upper hilt (3), pommel (4:B), and crossguard (6:B) are shown. Undersurfaces of upper guard (5), pommel (4:B), lower guard (6:A) and crossguard (6:B) are shown.) Drawing by J. Hošek.

be examined metallographically there. After a fire at the archaeological base in Mikulčice, where the swords were deposited, these were taken to the *IAP* to undergo both conservation and further research there.[48] At that time, additional samples were detached from some of the weapons using a water-cooled diamond disc and examined metallographically to complete the investigation of the whole set.

The metallographic specimens were observed in unetched condition to assess the content and distribution of slag inclusions. In accordance with the tradition of the laboratory (*IAP*), the Jernkontoret scale[49] was used for this purpose. The specimens were thereafter etched with 3% Nital to reveal their metallographic structure and with Oberhoffer's reagent to reveal the distribution of phosphorus. Grain size was determined according to ASTM E112-12[50] standard. The microhardness was measured according to the Vickers method with 0.2–0.5 kg loads.

The chemical composition of features within the microstructures (mainly of welds) was determined using energy dispersive X-ray microanalysis (furher in the text as EDXA) and the chemical composition of non-ferrous decoration observed

48 For this research new X-ray images were taken by an industrial X-ray generator ERESCO 42 (the X-rays from which can pass through 42 mm thicknes of iron with an exposure of 10 minutes).

49 Steel – Method for estimation of the content of non-metallic inclusions – Microscopic methods – Jernkontoret's inclusion chart II for the assessment of non-metallic inclusions. Swedish standard SS 111116.

50 ASTM Standard E112 – 2012, 'Test Methods for Determining Average Grain Size', ASTM International, West Conshohocken, PA, 2012, DOI: 10.1520/E0112-12, www.astm.org.

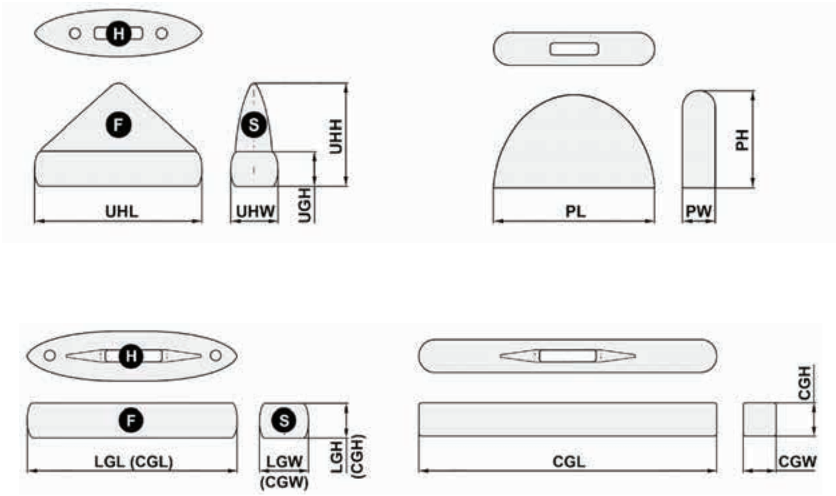

Fig. 5. Fundamental terminology used to describe upper/lower guards, pommels and crossguards of the Mikulčice swords: F – front view, S – side view, H – horizontal (undersurface) view; UHL – upper hilt length, UHW – upper hilt width, UGH – upper guard height, UHH – upper hilt height, LGL – lowerguard length, LGW – lower guard width, LGH – lower guard height, PL – pommel length, PW – pommel width, PH – pommel height, CGL – crossguard length, CGW – crossguard width, CGH – crossguard height. Drawing by J. Hošek.

on hilts was determined by X-ray fluorescence analysis (furher in the text as XRFA).[51]

A standard terminology according to ASTM E7-03 (2009)[52] standard was used in this study to describe the metallographic structures.

Besides of that, in accordance with the terminology used in archaeometallurgy, Fe alloys with a maximum of 0.2% carbon and less than 0.1% P are called 'iron' (or 'wrought iron'), alloys with a maximum of 0.2% carbon and more than 0.1% P are called 'phosphoric iron' and alloys with more than 0.2% C are called 'steel' in this study.

In order to obtain information on the distribution and content of carbon across a blade section, thin slices were cut off from several metallographic samples and annealed in a laboratory crucible furnace at a temperature of 950 °C for 5 minutes, followed by several minute controlled cooling to ambient temperature. This heat treatment resulted in a structure of ferrite and pearlite, whose ratio (determined by means of image analysis) allowed the determination of both content and distribution of carbon within the samples with reasonable accuracy.

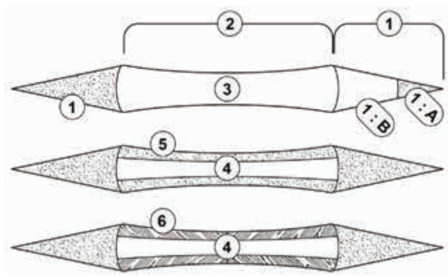

Fig. 6. Fundamental terminology used to describe blade structures of the swords from Mikulčice: 1 – cutting edge (1:A – tip of the cutting edge, 1:B – body of the cutting edge); 2 – body/middle portion of blade (in which the fuller as a rule appears); 3 – body/core of blade; 4 – core of blade; 5 – surface panels; 6 – pattern-welded surface panels. Drawing by J. Hošek.

51 A Philips XL30 scanning electron microscope was used for the EDX analysis (with ZAF correction system) and a NITON XL3t 950 GOLDD+ spectrometer (with beam size of 3 mm in diameter) was used for the XRF analysis.

52 ASTM Standard E7, 2003 (2009), 'Standard Terminology Relating to Metallography', ASTM International, West Conshohocken, PA, 2009, DOI: 10.1520/E0007-03R09, www.astm.org.

3.4 Individual swords and their archaeological contexts

3.4.1 Sword from the grave 90

Circumstances of the discovery

The grave was discovered in 1955 during the excavation directed by J. Poulík in the excavation area No. 2 'IInd church 1955–59' (POLÁČEK/MAREK 2005, 40–49, within the burial ground near the IInd church in the square B4, almost 5 m from the southern wall of the nave of the church (POULÍK 1957, 271–274, 369, obr. 59–62). The silhouette of the burial pit, 300 × 160 cm large, became recognizable when sandy subsoil was reached at a depth of 140 cm from the surface. The bottom of the pit lay 180 cm below the surface.[53] The pit followed the W-E orientation of the IInd church. A wooden lining of the burial pit was evidenced by a rusty-brown rectangular outline, 240 × 90 cm large, discovered roughly 10 cm above the skeleton. The longer sides of this outline extended beyond the shape of the rectangle and these extended parts then were continued vertically down below the pit lining and reached the bottom of the grave. A silhouette made up of rectangular wooden boards appeared under the skeleton. Such a wooden construction may be interpreted as a wooden lining or else as a bier. On the northern side of the grave the bottom formed a step, which was 40 cm wide and 10 cm high. South of the lining of the grave, on the same level as the bottom, there was a 60 cm wide area with stones, pieces of charcoal and animal bones, which was interpreted as the remain of a feature disrupted while excavating the burial pit (POULÍK 1957, 369).

Above the burial pit there was, according to J. Poulík, a thick layer of deposit (POULÍK 1957, 256, 271) related to the building of the structure A, and so to the later phase of the IInd church. Although the interpretation of some of the stratigraphy is, not unambiguous,[54] it is possible to say that the grave belongs to an earlier phase of the burial ground related to the earlier building phase of the church (structure B).

Superimposed above grave 90, at a depth of 45 cm, there lay a child's grave (45) with no grave goods and a man's grave (44), lying at a depth of 50 cm below the surface. Grave goods in the burial 44 consisted of gilded bronze spurs decorated with stylized human heads, an additional pair of iron spurs, an accompanying set of straps belonging to both pairs of spurs and two gilded bronze globular buttons (so-called *gombíks*) (POULÍK 1957, 292–299, 366–367). From the perspective of grave 90, the bottom layers of both the later burials lay in a tertiary fill (of a later soil deposit) and do not even reach the original level of the ground that existed when

53 J. Poulík (1957, 271) states that the depth of the bottom of the burial pit is 140 cm from the surface. In the *DGU* it is stated that the outline of the burial pit appeared at a depth of 140 cm and continued to a depth of a further 40 cm. The information from the *DGU* corresponds with the contour line plan 'Holešovský 1:500', which was created just before the excavation (POLÁČEK/MAREK 2005, Fig. 15).

54 On the basis of the sections depicted in Poulík's publication of the burial ground (POULÍK 1957, 266, 284) it seems, that the structure B, today interpreted as the earlier phase of the IInd church (POULÍK 1975; KLANICA 1985b; POLÁČEK 2006) was built on the levelling layer of sand, which is visible under the mortar floor in the interior of the church. This levelling layer is not distinct on the section plan from the levelling layer found under the later phase of the church (structure A) and it is not certain, whether it did not also extend into the exterior of the structure. The layer of the sandy landfill creates a wedge in the section B-C (POULÍK 1957, 284) nearer to the church than the grave 90 was situated, and it was replaced with sandy-loam and clayish-loam layers. Their relation with any of the building phases of the IInd church is not provable, on the basis of any documentation, at our disposal. The depth of the burial pit (40 cm) seems to be too shallow, according to the size of its outline and the existence of the wooden boards.

Due to the fact, that the burial pits, the bottom of which lay above the sandy subsoil, were not very distinct, we have assumed, that burial pit 90 was dug at least 50 to 60 cm below the level of the lower clayish-loam layer, and it was therefore around 120 to 130 cm deep.

the burial 90 took place. A child's grave (73) was parallel with grave 90, lying at the northern edge of the burial pit. This included an iron globular button (a so-called *gombík*) with an embossed cross on the bottom, hollow iron cylinder, possibly decorated by bronze inlay, and a knife. Grave 73 was situated at a depth of 160 cm below the surface (Poulík 1957, 368). Graves 90 and 73 belonged to the same phase of burial, even though their pits partially coincided.

In the grave there were found remains of an adult of robust figure and height above the average (167–170 cm according to Manouvrier) in the age of *senilis* (Stloukal 1962, 12, 29; Stloukal 1963, 123). The burial was extended inhumation, with the arms alongside the body, the fingers of the right hand on the pelvis and the head oriented to the west (see Fig. 7 and 8).

A sword (1) was put in the grave flat, at the right side of the skeleton. The pommel was at the same level as the top of the skull. The tip of the blade was at the same level as the upper joint of the femur. The blade of the sword lay just beside and partially over the bones of the right hand. A long knife (2) lay on the right arm. On the hip and under the left hand a belt chape was found with remains of a leather belt (3), a whetstone (4) and a rectangular iron object, probably a small knife (5). Iron spurs (6, 7) were found in the area of the feet. Iron buckles (8, 9) belonged to the straps of the spurs; the third buckle was assigned to the spur straps as well (Poulík 1957, 271–274, 369, obr. 61–62), but its position within the grave is not known (10). At the distance of 35 cm northwest from the head a wooden bucket with iron fittings was placed, perhaps by the bereaved (11).

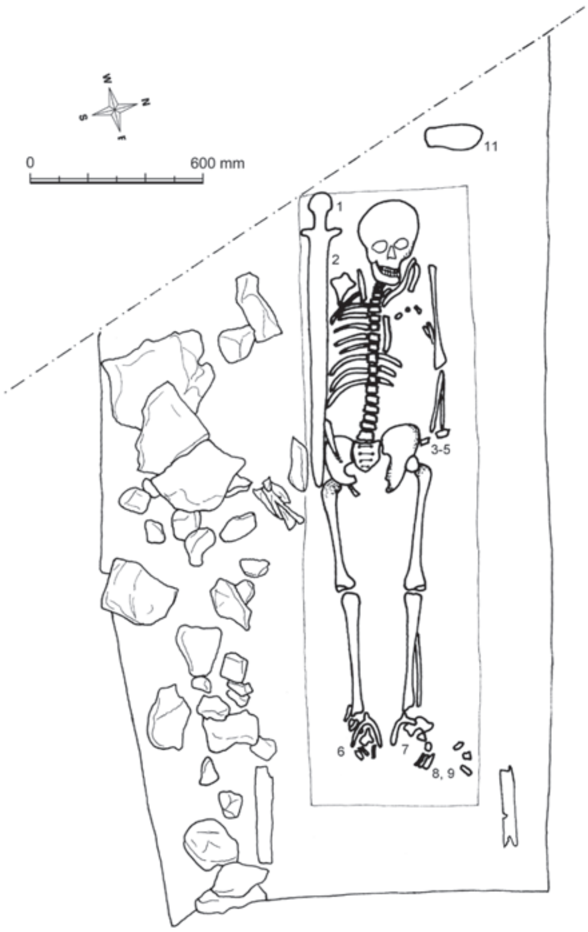

Fig. 7. Mikulčice-Valy, Hodonín County; grave No. 90; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

Finds

1) An iron sword with the remains of a scabbard (Fig. 9–12; Poulík 1957, obr. 59–60).
2) A long iron knife with straight back and a long whittle tang[55], sheathed in a wooden scabbard with iron ski-shaped fitting (227 × 37 mm in size, while the length of the blade was 143 mm; Poulík 1957, obr. 62:8). Not at a disposal in 2003.
3) The remains of a leather belt decorated with an iron fitting. Not at a disposal for the documentation in 2003.
4) A sandstone whetstone or touchstone of rectangular shape with sharp edges (104 × 24 × 13 mm). Not at a disposal in 2003.
5) A rectangular iron object (small knife, folding knife?) with the remains of leather, 100 mm long and 26 mm wide. Not at a disposal in 2003.

55 Whittle tang is a pointed tang, which is stuck into a one-piece handle of organic material. Scale tang is a flat tang on which scales of organic material are fastened, as rule by rivets, to create a composite handle (see Cowgill et al. 1987, Fig. 2).

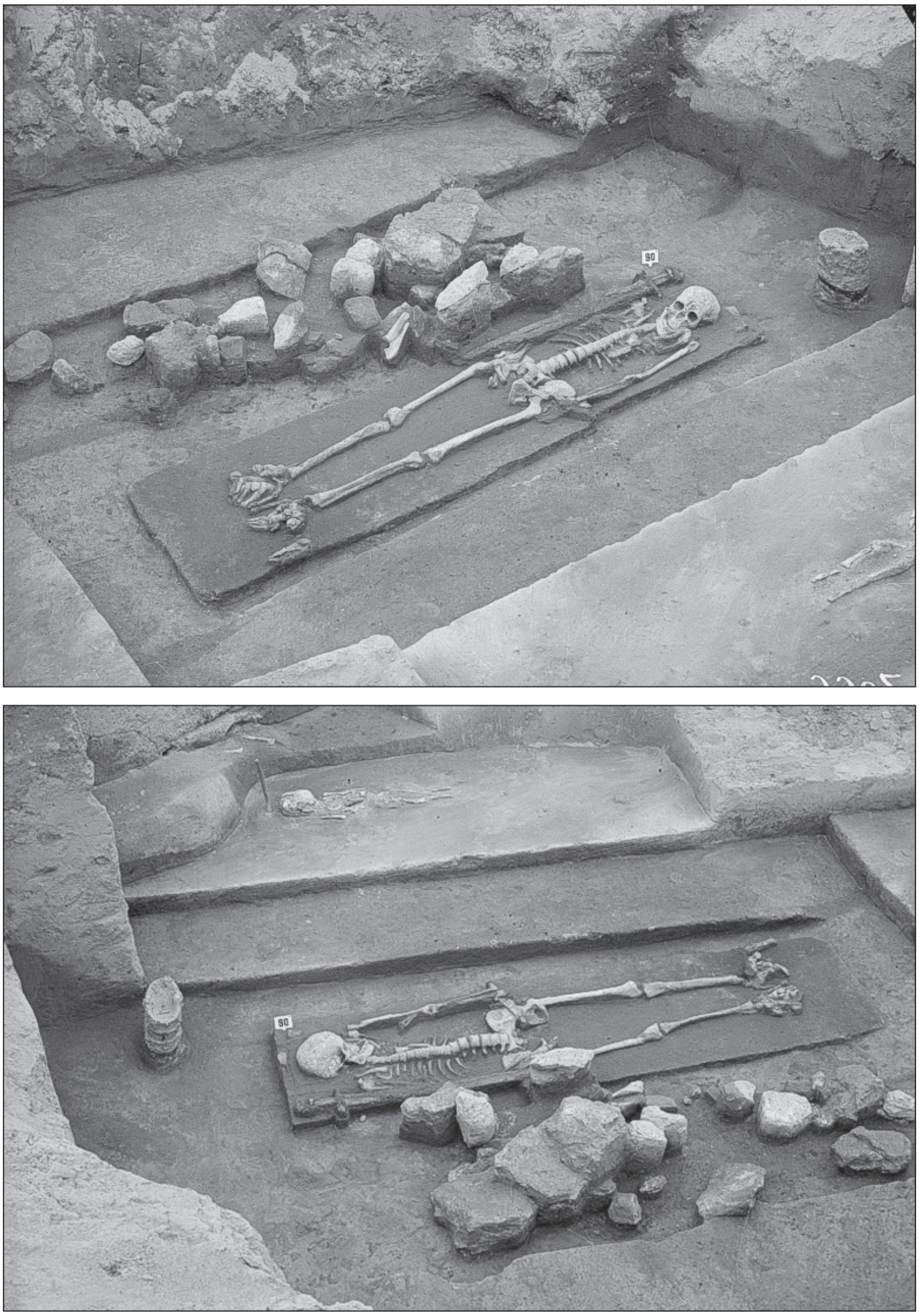

Fig. 8. Mikulčice-Valy, Hodonín County; photographs of the burial No. 90; (top): viewed from the NE; (below): viewed from the S. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

6) Iron spur with a short prick and tongue-shaped terminal plates with the rib and two rivets on each side of it (length 149 mm, length of the prick 15 mm). In fragments (Poulík 1957, obr. 61:3, 62:1,4; Kavánová 1976, Tab. III:5b). Not at a disposal in 2003.
7) Iron spur (the twin of spur 6) with partially broken-off prick. In fragments (Poulík 1957, obr. 62:2-3; Kavánová 1976, Tab. III:5a). Not at a disposal in 2003.
8) A small iron buckle with a semicircular frame, a prong and a buckle chape with the remains of leather (length 37 mm, width 24 mm; Poulík 1957, obr. 61:2, 62:5). Not at a disposal in 2003.
9) An iron buckle with a prong corroded to the arm of the spur (34 × 30 mm; Poulík 1957, obr. 62:6).

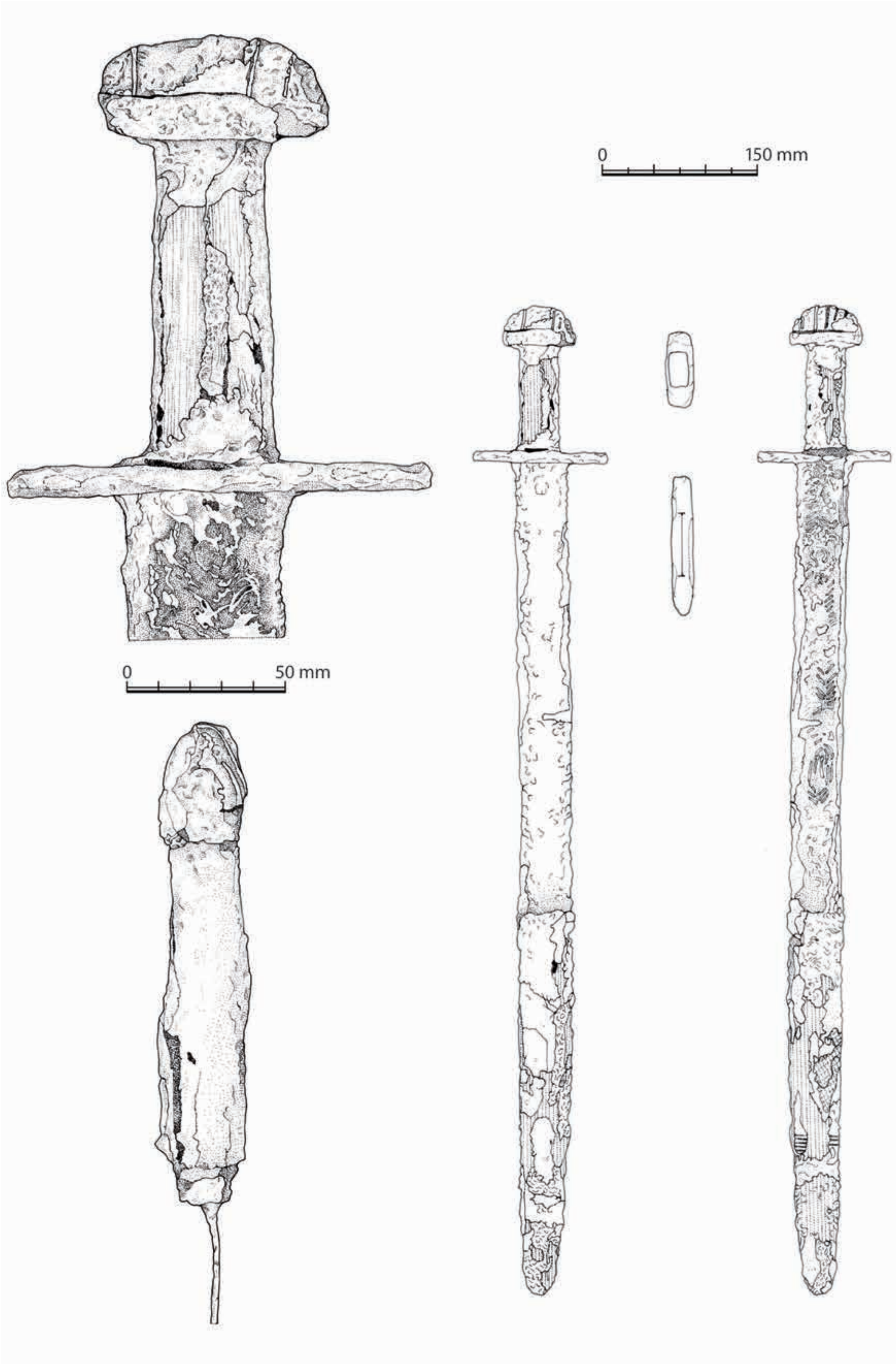

Fig. 9. Mikulčice-Valy, Hodonín County; sword from the grave No. 90 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

10) An oval iron buckle with a prong and remains of a buckle chape (width 40 × length 31 mm; Poulík 1957, obr. 61:1, 62:7).
11) A wooden bucket with iron fittings, slightly conical, with a narrow oval mouth, five broad horizontal hoops (whose width was more than 40 mm) with plastic ribs and with a tall elliptical handle. On the first (upper) hoop there are on both sides the remains of iron rings, the second hoop was decorated with semicircular ornaments. The height was 252 mm, the dimensions of the rim 197 × 118 mm, and the dimensions of the base 224 × 123 mm (Poulík 1957, obr. 62:9).

Note: The finds from the grave 90 were not registered in the *ILF* of the Mikulčice excavation.

Description of the sword

This is a double-edged sword (without evidence number; Fig. 9–11), which had at the time of the documentation of the sword in 2003 a length of 931 mm (but originally was approximately 10 mm longer) and had a weight of 1150 g, including the large remains of organic wrapping material, which was, after conservation, left on the lower half of the blade. Information about the point of balance of the weapon (apparently 250 mm below the crossguard) was distorted by these numerous remains of the wrappings. The fire at the archaeological base in Mikulčice significantly damaged the blade and entirely destroyed the remains of the wrappings; the upper hilt was broken off from the tang. The weight of the sword body is now 662 g.

The relatively long and low upper hilt (71 mm long, 31 mm high, 25 mm wide) has a rectangular upper guard, which is 10 mm high, upon which the pommel sits. The gap between the pommel and this upper guard is clearly distinguished. The pommel is hollow, has a semicircular shape when viewed from the front, and is vertically divided into six regular and slightly lobed segments. Into the depressions between the lobed segments of the pommel, five wires of brass[56] were inlaid at regular intervals. The wires were roughly 1.5 mm thick and they started and ended in the gap between the upper guard and the pommel base (Fig.11:e, f). From the side view the pommel looks high and rather sharply arched and it is attached to the rectangular upper guard. In the horizontal plan the upper guard is rectangular, its longer sides are slightly arched and short sides are slightly rounded. The pommel was fastened to the upper guard by two rivets that went through along the inner edge of the first and the sixth segments of the pommel. The tang of the blade ended on the top of the upper guard. The hilt of the sword was broken in two pieces after its excavation. The length of the grip was 101 mm after reconstruction. The tang of the blade bore the preserved remains of two wooden coverings wrapped in a fine textile of a plain weave; the overlying layer of the grip consisted of a flat leather band. The width of the grip (the tang with the preserved organic wrapping) was 36 mm by the pommel and 39 mm by the lower guard. After the conservation that followed the fire at the Mikulčice base, the width of the tang, measured without the organic components of the grip, was 26 mm below the upper guard and 34 mm above the crossguard.

The very long[57] crossguard, was extensively damaged by corrosion, and is 16 mm wide and 10 mm high. It is rectangular in horizontal as well as front view and it has somewhat rounded ends.

The double-edged blade of the sword is quite massive (its preserved length is 789 mm[58] and its width 58 mm). Any narrowing in first three quarters of its length is almost indistinct. The blade was pattern-welded within the wide central fuller, which begins right under the lower-guard. In the upper half of the fuller the pattern-welding

56 The results of XRFA of the wire: Fe 43.5%; Cu 42.1%; Zn 14.4%. After subtraction of elements represented in the iron base (Fe): Cu 74.5%; Zn 25.5%.

57 Preserved length is 128 mm, length reconstructed by counting up the arms of the crossguard to the axial symmetry is 144 mm. According to J. Poulík (1957, 271) the crossguard was before conservation 155 mm long.

58 Approximately 1 cm long part of the point was broken off of the blade.

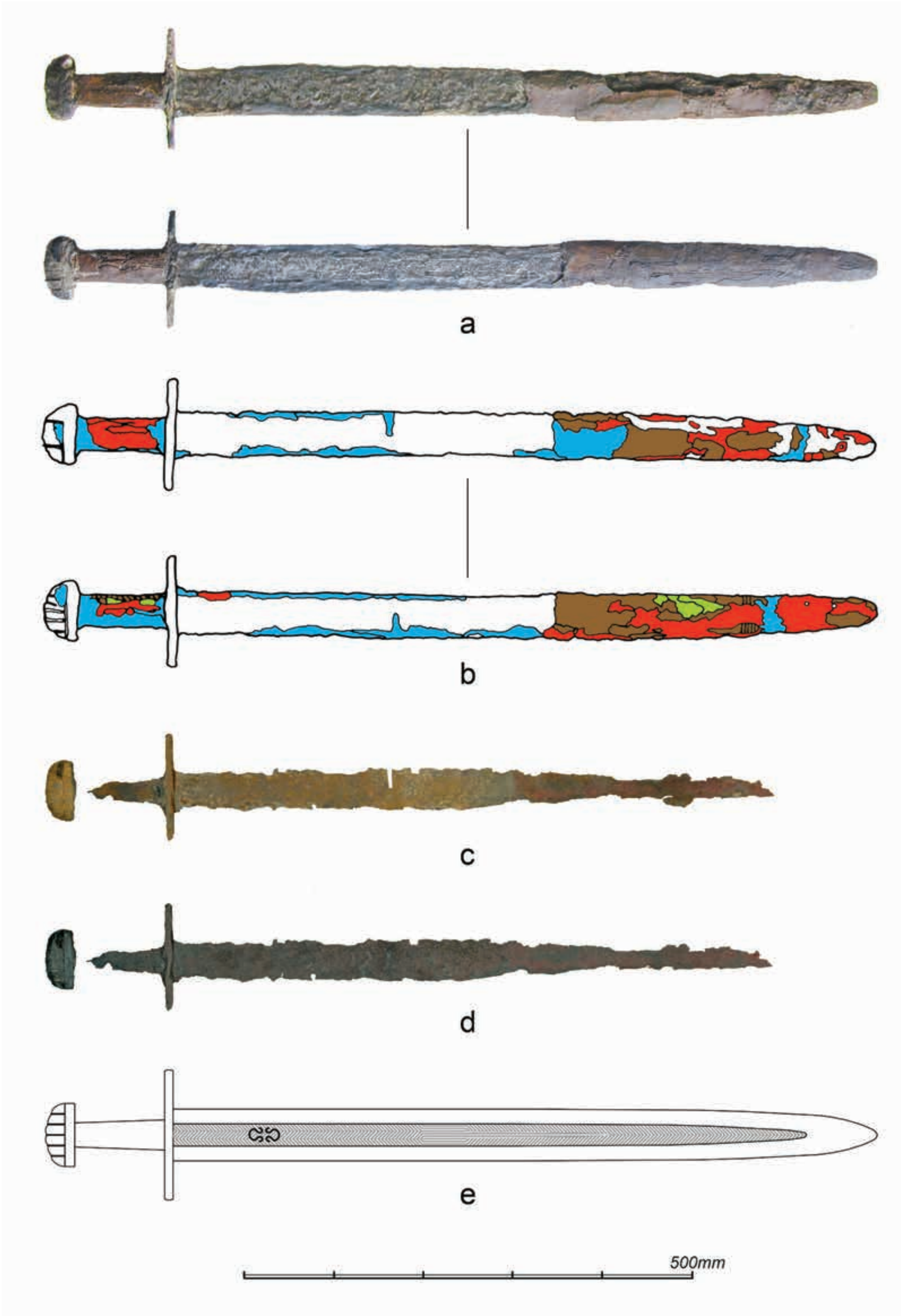

Fig. 10. Sword from grave No. 90; a – state before the depository fire; b – distribution of organic materials across the sword documented in 2003 /red: wood (corpus of the scabbard and covering of the tang); brown: leather (surface layer of the scabbard, strap wrapping the grip); green: fine textile (covering both the scabbard and hilt); blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword (depressions between the pommel lobes were inlaid by wire of brass; the pattern-welded blade bears symbols inlaid in iron (straight pattern-welded)). Photos and drawings by J. Hošek and J. Košta.

on both sides of the blade consists of three twisted bars that create a zig-zag pattern with ZSZ twist. This part of the blade also bears a pattern-welded inlay resembling two opposed omegas in form. The first omega appears in the fuller 80 mm below the crossguard, the second is now heavily worn away.

The ZSZ twist pattern was replaced in half of the blade by a straight pattern created by non-twisted bars (III pattern-welding). Further towards the point the two side bars were twisted again, while the middle bar remained straight. A SZ twist pattern appears near the point of the blade as the middle patterned rod was finished earlier than the two others. The fuller is on the X-ray image visible in the length of at least 710 mm and its width is circa 25 mm below the lower guard and 8 to 9 mm in the distance of 100 mm from the point.

Typological determination of the sword

The sword belongs to that group of swords with their pommels divided into more than four vertical segments, which are connected for most of their contact areas. This group corresponds, according to Jakobsson's classification, with the 'design principle 3' (swords with pommels having three or more lobes). The swords with five lobes were classified by J. Petersen as type K (Petersen 1919, 105–112) while other scholars also assigned to this group swords with pommels having a greater number of lobes (Müller-Wille 1976, 37). This widespread view of swords of Petersen's type K also corresponds with the typological classification of Geibig (1991, 44–47), who described the above mentioned upper hilts as type 6 (combination type: 6-7-6-11). Also Poulík (1957, 271–274) assigned the sword from the grave 90 to Petersen's type K. The sword discussed here differs from the classic variants of these types, whose pommels consist of five or seven lobes (Müller-Wille 1982, 137–149; Vinski 1983a, 477–487), by an even number of lobes (six). The strongly semicircular shape of the upper hilt together with the less distinct pommel lobes, the length of the crossguard and the absence of a surface wire inlay may be regarded as relatively later features within the development of swords of type Petersen K (Geibig 6), which tend to resemble the swords of type Petersen N (Geibig 8) with a semicircular upper hilt. Without vertically arranged wires of brass, the upper hilt would correspond to Petersen's type K (Geibig's type 8). The construction of the upper hilt (Geibig's construction type II; Geibig 1991, 90–100) fully corresponds to the above mentioned types of swords. The crossguard corresponds with the type 6, or else 7 in Ruttkay's typology (Ruttkay 1976, 249).

Close analogies to the sword from the grave 90 can be found e.g. in the sword from Hagenbach in Germany (Geibig 1991, Kat.-Nr. 100, Taf. 68), whose upper hilt is shaped in a similar way, or in the sword from Ludwigshaffen am Rhein-Oppau (Geibig 1991, Kat.-Nr. 102, Taf. 70) and also the upper hilt discovered in Rhine by Mainz (Geibig 1991, Kat.-Nr. 105, Taf. 70), which had the depressions between the lobes also decorated with wires.

In case of the sword from the grave 90, there are relatively good reasons for the classification of the blade type according to A. Geibig (1991, 83–90). The blade with its morphological features belongs unambiguously to the type 2 (compared to the type 3, the central fuller does not become narrower in the first 400 mm from the crossguard and some other data exceed the extent of this type). Most of the characteristics (length of the blade, width of the central fuller, ratio of length of the blade from the crossguard to a place 600 mm below the crossguard and other features compared with other variants of the type 2) correspond with the variant 2c, which means a medium robust blade of the type 2. The other features of the blade studied correspond with the type 2; e.g. surface pattern-welded panels welded onto a blade core. According to the morphological classification introduced in this study, the blade belongs to the group {a2} (see Chap. 4.2), as determined on the basis of lengths and widths of blades and their length/width ratios. In comparison with other 9th and 10th century swords, this group includes specimens

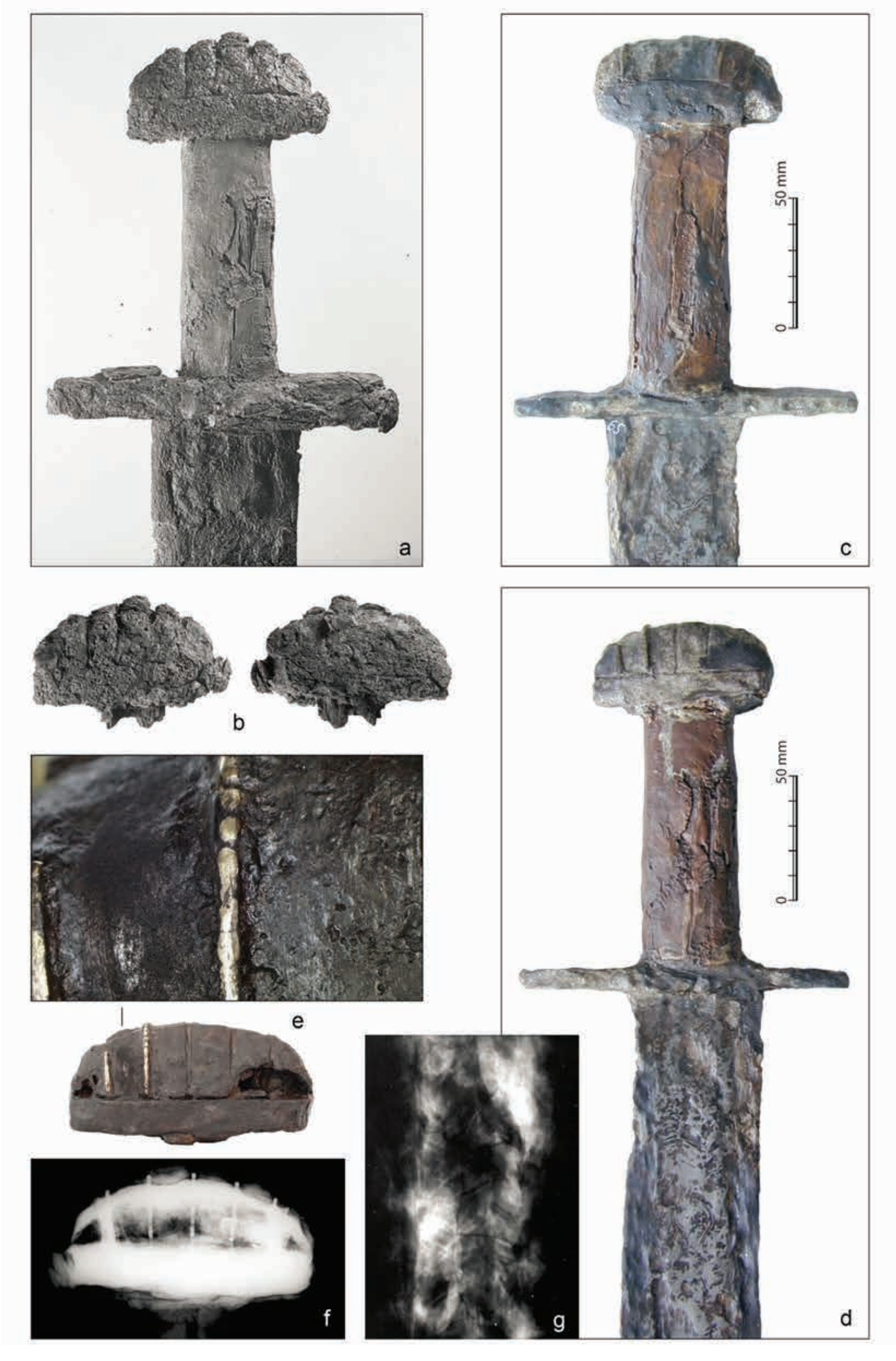

Fig. 11. Sword from the grave No. 90; a – hilt after the first conservation; b – upper hilt from both sides before the first conservation; c – hilt from the side A (documentation of the sword in 2003); d – hilt and upper part of the blade with visible pattern-welding and the inlaid sign of an omega (documented in 2003); e – upper hilt with inlaid wires of brass after the re-conservation; f – X-ray image of the upper hilt; g – X-ray image of the pattern-welded blade. Photos 'a-d' and 'f-g' by Institute of Archaeology of the AS CR, Brno; photos 'e' by E. Ottenwelter.

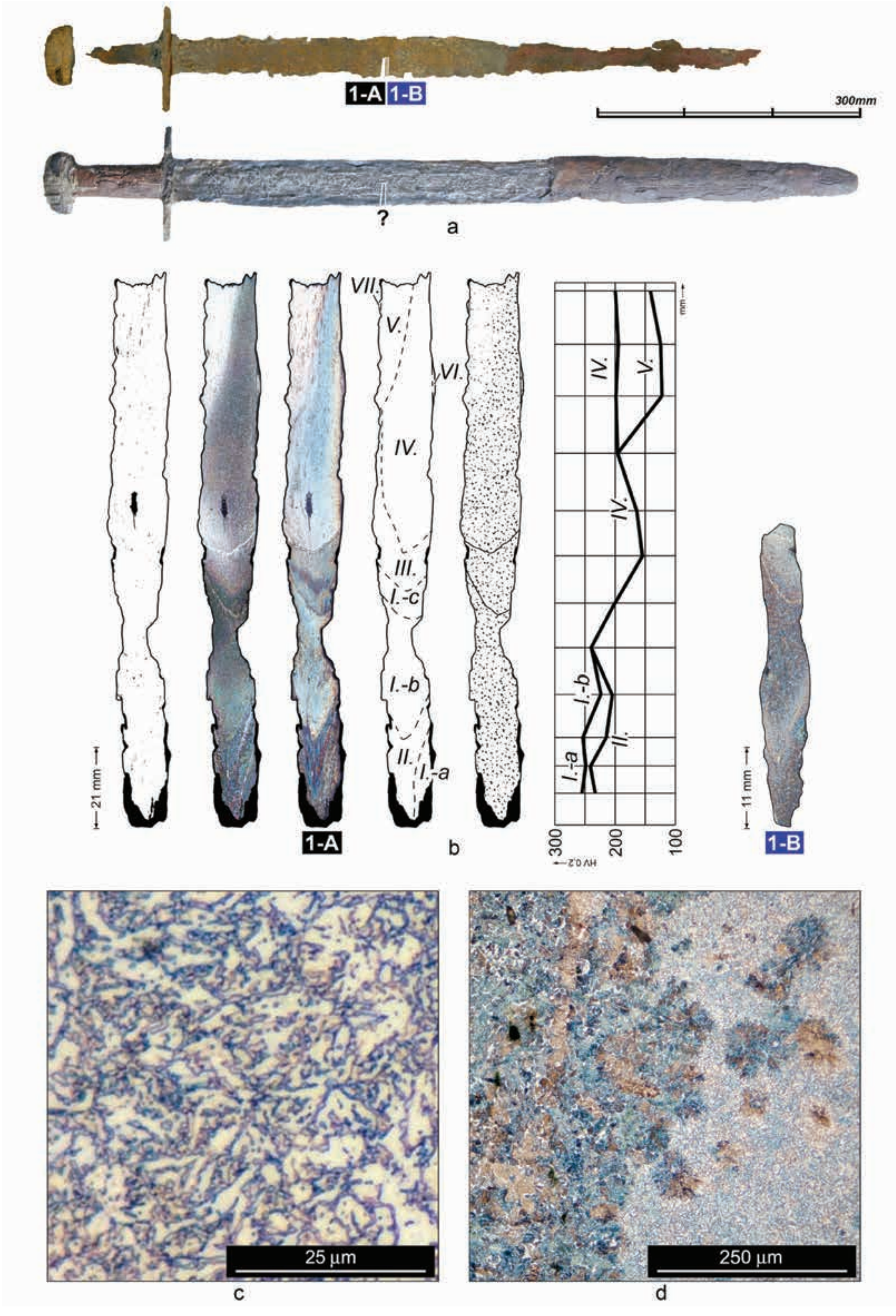

Fig. 12. Sword from the grave No. 90; a – the sword examined (above: after the fire and before the conservation; below: before the depository fire) and the sampling method utilized (black: the sample after the fire; blue: the sample after controlled annealing); b – schematic drawings and macro photo of the blade samples (from the left: sample [1-A]–unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the structures and of the main welds across the sample; hardness distribution chart), sample [1-B]–after etching with Nital (photo); c – particles of cementite dispersed in ferritic matrix of the sample [1-A], Areas I-a; d – general view of the transition between Areas II and I-a in sample [1-A]; Nital etched. Photos and drawings by J. Hošek and J. Košta.

with medium-robust and medium-long blades. late Carolingian swords prevail in this group.

Scabbard, straps and outer wrappings

On both sides of the sword there were preserved the remains of a wooden scabbard without any sign of its having been lined with a textile. These remains originally covered the whole surface of the blade, but during the conservation carried out before the fire in Mikulčice, all the wooden parts were removed from the upper half of the blade in order to reveal the pattern-welding. The body of the scabbard, was made of beech wood (Poulík 1957, 271–272), and covered in thin leather, which near the point of the blade (135 mm from the point) bore horizontal plastic bands (presumably impressed). The leather creating the surface of the scabbard was covered with a textile of a plain weave (Poulík 1957, 272; Březinová 1997, 159) with a thread count of 19-20/17-18. The textile was originally wrapped around the whole sword, the upper hilt including, in at least two layers. According to less clear evidence it seems that thin leather could have formed the uppermost layer adhering to the sword. In addition, several tiny rivets were found on the scabbard; on the right part of the side A of the sword there were two rivets in a distance of 80 mm and 50 mm from the point, another rivet was probably by the point of the blade on the side B.

Metallographic examination

Sampling: The blade of this sword was sampled at a distance of 240 mm from the crossguard during a survey performed prior to the fire in the Mikulčice depository, but neither the results of the metallographic examination nor the sample itself are now available. During the conservation of the fire-damaged body of the weapon, two new samples were removed from the previous cut in the blade (Fig. 12:a). The first sample [1-A] was examined directly and documents the state of the metallographic structure after the fire; the second (control) sample was annealed under controlled conditions to achieve structure consisting only of ferrite and pearlite.

Metallographic description of the blade:

SAMPLE [1-A]: The metal purity, assessed before etching, fluctuates between level 2 and 4 of the Jernkontoret standard (a metal of medium purity). Fine and middle-sized inclusions prevail with one exception (a large inclusion roughly in the centre of the sample). A chain of fine inclusions clearly defines a crosswise welding line. Individual microstructural areas were determined in the sample after etching (Fig. 12:b). Area I shows fine cementite particles dispersed in a ferritic matrix with fine nuances in individual zones (Fig. 12:c). Zone I-a contains a dark-etching microstructure with rather globular particles of cementite in a ferritic matrix and with hardness of around 250 HV0.2, zone I-b contains a similar microstructure with a hardness of about 230 HV0.2 and zone I-c consists mainly of cementite particles segregated at ferritic grain-boundaries with a hardness of about 200 HV0.2. Area II shows a pearlitic-ferritic microstructure with a hardness of 224 ± 17 HV0.2 (Fig. 12:d). The pearlite is mostly spheroidised and the proportion of structurally free ferrite reaches up to about 15%. Area III shows a fine-grained microstructure consisting of grains of ferrite and (probably) grains with a fine cementite dispersion in a ferritic matrix. Hardness of the microstructure is about 150 HV0.2. Area IV reveals a cementite dispersion in ferrite with variable density of the cementite particles and with a hardness of 190 ± 15 HV0.2 (Fig. 13:d). Area V contains a mixture of grains of ferrite and grains with a cementite dispersion in a ferritic matrix (with a higher proportion of ferritic grains); hardness is 129 ± 10 HV0.2 (Fig. 13:e). Area VI has a similar microstructure to Area V but is more fine-grained and has much less ferrite. Area VII shows ferrite (with some cementite dispersion along the weld), which appears significantly brighter when etched with Oberhoffer's reagent. EDXA confirmed the increased phosphorus content (about 0.8%). Two transverse welds are clearly visible in the structure of the sample (see Fig. 13:a), one of which (the upper weld) separates the middle part of the blade from the cutting edge. Two more clearly recognizable welds separate Areas IV and VI as well as Areas V and VII (Fig. 13: b, c).

SAMPLE [1-B]: Virtually the entire cutting edge consists either of pearlite (with hardness of 281 ± 13 HV0.2) or pearlite with traces of ferrite (Fig. 13:g); slight decarburization (0.65% C) is visible only in the proximity of one of the welds. The proportion of pearlite decreases near the blade body in which the carbon content reaches 0.5%.

Assessment: The results of the metallographic examination clearly show (despite the considerable fire-damage) that the blade originally had high-quality cutting edges of steel, which were heat-treated in some way. The blade core has revealed both steel and iron, but steel significantly predominates. Only the remains of pattern-welded surface panels were detected (although pattern welding is clearly visible on the blade) in Area VII (phosphoric iron) and probably also in Area VI (steel). The microstructures of the edges show that the blade was originally hardened by some form of heat-treatment, which cannot now be determined with certainty. It can be assumed that it was not only a visually impressive, but also functionally excellent weapon.

3.4.2 Sword from the grave 265

Circumstances of the discovery

The grave was discovered in 1956 in the excavation area No. 2 ‘II^nd church 1955–59’ (Poláček/Marek 2005, 40–49), within the excavation of the II^nd church, directed by J. Poulík.

The outline of the burial pit (250 × 150 cm) was found in the underlying level of sand, under the mortar floor of ‘building B’, which was interpreted as the earlier phase of the II^nd church (Klanica 1985b; Košta 2004; Poláček/Škojec 2009; Poláček 2010). The grave was situated on the boundaries of squares B2, B3 and C3 (Poulík 1957, 280–282, 373, obr. 65–69; Poláček/Marek 2005, 40–49), and is thus related to the earlier stages of the burial site of the II^nd church (the burial pit was apparently dug before the mortar floor of building B was created).

The floor of the church, together with a considerable number of stones and fragments of coloured mortar, sank into the burial pit nearly as deeply as the buried body. Dark sandy clay of the grave fill was apparent in the southern part of the grave. In the northern side of the pit, the iron band-shaped fittings of a wooden coffin were found at regular distances – near the areas of shoulder, hip and knee (594-2904/56). In the photograph published by Poulík (1957, obr. 66) there are similar fittings visible in the southern side of the pit as well, at least in the areas of skull and hip (Fig. 14).

The mortar floor of the earlier phase of the II^nd church continually overlapped the grave and no difference was found between the nature of its fragments above the grave (which were assumed to have been those fallen into the grave) and the fragments outside the burial pit of the grave 265. It is therefore possible to assume that the burial took place before the floor was made. The central location of the grave together with its uniqueness in the nave (and presbytery) of the earlier phase of the church, the fact that walls of the nave and the presbytery of the church did not impair this or any other graves, and that the W-E orientation of the grave is the very same as the orientation of the ‘building B’, means that this buried man is related to the church, under which his body was discovered. The bottom of the eastern area of the burial pit caved into the earlier settlement feature, so while the head lay in the depth of about 215 cm, his legs sank to a depth of 250 cm below the surface.

This was a supine burial, with the head pointing towards the west, and belonged to a robust man of middle height (164–170 cm according to Manouvrier), who died in the age of *adultus* (20–40 years) (Stloukal 1962, 22, 33; Stloukal 1963, 124). The arms were stretched along the body (Fig. 14).

The pommel of the sword (1) lay flat next to the left shoulder of the buried man and

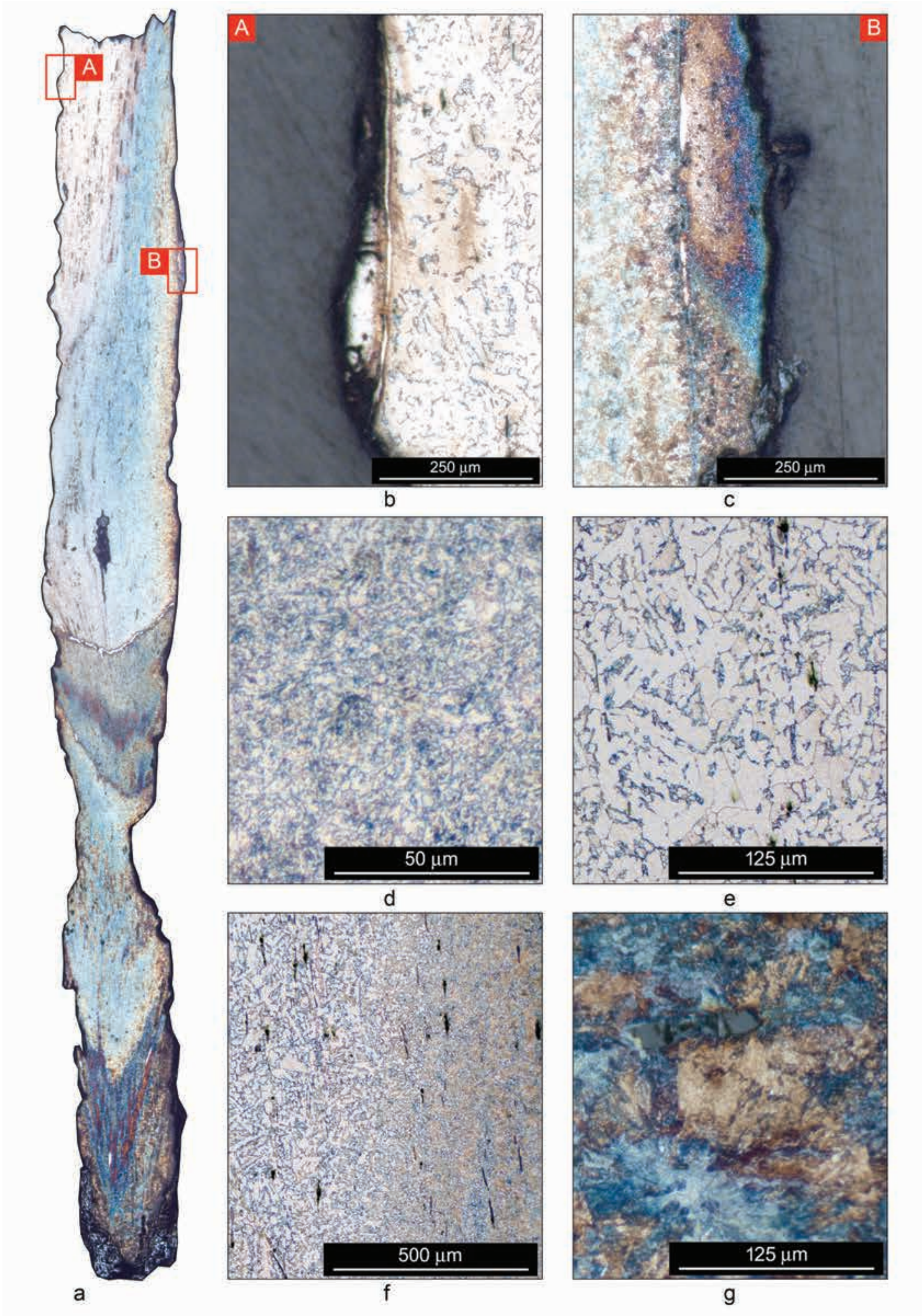

Fig. 13. Sword from the grave No. 90; a – sample [1-A]; b, c – overview micro-photographs showing the connection of Areas VII and VI (remains of pattern-welding) to the core of the middle portion of the blade (Areas IV and V); d – fine dispersion of cementite in ferritic matrix in the sample [1-A], Area IV; e – grains of ferrite with grains of fine dispersion of cementite in ferritic matrix in the sample [1-A], Area V; f – gradual transition of Areas V and IV in the sample [1-A]; g – pearlitic microstructure in the cutting edge of the sample [1-B]; etched with Oberhoffer's reagent (a–c) and Nital (d–g). Photos by J. Hošek.

Fig. 14. Mikulčice-Valy, Hodonín County; grave No. 265; photographs of the burial taken in the course of excavation; (left): northern part of the burial overlapped by a mortar floor related to the earlier phase of the II[nd] church (Poláček 2006, 5), view from the NE; (right): the burial entirely uncovered, viewed from the NE. Photo from the archive of the Institute of Archaeology of the AS CR, Brno.

the tip of the blade reached almost to the knee. The bottom part of the blade very likely lay over the arm from the elbow to the tips of the fingers. Remains of straps and an organic wrappings of the sword were preserved in number of tiny fragments (2). On the left side of the skeleton there was a belt chape with four rivets (3). By the sword there was the chape of a buckle (4), to which the wrappings of the sword belonged. The belt chape and the fragment of the buckle could have been part of the sword belt and strap set. Near the left hip there was a knife (5). Other finds from the grave include the remains of spurs (6), two oval buckles with a strap keeper (7, 8) and one double-buckle (9). At least some of the buckles (7-9) probably came from the spur straps (Poulík 1957, 373). Near the right elbow there lay a stone flake (perhaps a flint?) (10). In addition, there were fragments of iron items (11), which were not precisely localised. During the extraction of the skeleton, animal bones were discovered (12). They may have come from the earlier disturbed feature.

Finds

1) The iron sword with large remains of the scabbard and other wrappings (without evidence number; Fig. 15–19; Poulík 1957, obr. 67:1, 68.
2) The remains of organic materials (Fig. 17:d; Poulík 1957, obr. 67:1d-e), which were stuck to the sword and the metal parts of its straps (594-4438/56, 594-4440/56, 594-4441a-f/56).[59]

59 The description of layers of materials on the fragments (numbers in brackets marks kinds of textile used; see Fig 16:b and 'Scabbards, straps and outer wrappings'): 594-4438/56: little fragment of textile of indistinct structure (1) – wood – fine textile in plain weave, in three layers (2) – coarser textile (2a) – fine leather – fragments of bent textile or fine leather – thick porous leather (fur?; Fig. 17:d1); 594-4440/56: fine textile (twill weave?) – fur with well-preserved hair on the outer side (Fig. 17:d5); 594-4441a: wood – three layers of textile – two layers of thicker hide (Fig. 17:d6); 594-4441b: wood – several layers of textile in fine plain weave (2) – two layers of thicker leather, on one of them the rim is noticeable (Fig. 17:d7); 594-4441c: wood – fine textile in at least two layers (2), bent into a right angle – three layers of thicker leather, on two of them the rim is noticeable (Fig.

3) The iron tongue-shaped belt chape with four rivets aligned to its occipital side (594-4437/56). By the occipital side there were remains of a leather belt (43 × 32 mm; Poulík 1957, obr. 67:2).
4) The chape of a buckle with the remains of leather and fine textile of the same nature as the organic material preserved on the sword (594-4439/56; Fig. 17:d3). The chape consisted of a bent rectangular iron sheet with holes for rivets in the corners and larger hole for a prong in the middle. The bend create an elongated hole for a frame of the buckle. Size of the chape (30 × 30 mm) corresponds to the belt chape (3; 594-4437/56).
5) The iron knife with a distinctly indented back and long whittle tang (594-4436/56), was sheathed in the wooden scabbard with the imprint of a ski-shaped fitting (original total length 145 mm and width of the blade 85 mm; Poulík 1957, obr. 67:3). In 2003, it was preserved in fragments.
6) The massive iron spurs with terminal plates, highly fragmentary (length circa 155 mm, length of the prick 16 mm). The massive arms create a middle rib on the terminal plates. On both sides of the plates there are noticeable rows of two or three rivets. The large plates originally, at least in some examples, ended with a broad ogive (Poulík 1957, obr. 69:1-2). In 2003, the shape was already indistinct. The short prick had a cylindrical base with a conical tip (eleven fragments from both spurs were deposited under the evidence number 594-2903/56).
7) The iron buckle with an oval frame, prong and rectangular chape with integrated strap keeper bearing an oval disk (total length 60 mm, width of the frame 38 mm; Poulík 1957, obr. 69:4). Not at a disposal in 2003 (without evidence number).
8) The iron buckle with an oval frame, prong and rectangular chape with integrated strap keeper bearing an oval disk (total length 56 mm, width of the frame 35 mm; Poulík 1957, obr. 69:5). Not at a disposal in 2003 (without evidence number).
9) The double iron buckle (on a hinge or two corroded buckles?) with rectangular frames, prong and remains of leather (width 42 mm; Poulík 1957, obr. 69:3). Not at a disposal in 2003 (without evidence number).
10) The flint flake (594-2901/56). Not at a disposal in 2003.
11) 13 fragments of iron objects, among them corroded round fitting of a size of circa 30 mm and with centrally placed hole for a rivet (594-2904/54).
12) Undetermined animal bones (594-2902/56).

Description of the sword

This is a double-edged sword (without evidence number; Fig. 15–17) which weighed 1525 g, at the time of documentation of the sword in 2003. This included the massive remains of a scabbard and external wrapping. The preserved part of the sword was 926 mm long; when complete with a point, the sword was around 950 mm long (Poulík 1957, 280). The point of balance of the sword when all the organic wrapping was on the blade, was 165 mm from the crossguard. In 2007, only fragments of the sword were recovered from the burnt remains of the archaeological base in Mikulčice. Nowadays, the sword is in three pieces: 1) the upper hilt 2) the crossguard with the tang and upper part of the blade and 3) the very reduced middle and lower part of the blade. The sword originally bore an inlaid cross, but the inlaid part of the blade was completely destroyed in the fire. The total weight of the preserved fragments was 525 g.

The massive upper hilt, 81 mm long, 46 mm high and 28 mm wide, has a pommel in the shape of a triangle with a rounded top and slightly curved arms. From the front view the 16 mm high upper guard is rectangular, from the horizontal it is lenticular. From the side view the upper guard has the shape of a relatively wide rectangle with slightly arched sides, and the arch-shaped

17:d7); 594-4441d: fragment of leather with 8 mm long incision; 594-4441e: wood – three layers of fine textile (2) – coarser textile (2a) – fur (Fig. 17:d9); 594-4441f-g: fragments of leather (with fragments of corroded iron?); 594-4441h: fragment of S-bent fur; 594-4441i: fragment of iron – wood – fine textile (2); 594-4441j: slightly S-bent fragment of leather or fur; 594-4441k: wood – two layers of fabric (2) – leather (or textile?) on one side decorated with a band made of three narrow tubules – fur (Fig. 17:d2); 594-4441l: wood – two layers of textile (2?) – textile or leather – fur with traces of hair (Fig. 17:d4); 594-4441m: cloth (2) – fur – sparse net-like textile? (thick thread crossed by short thin threads).

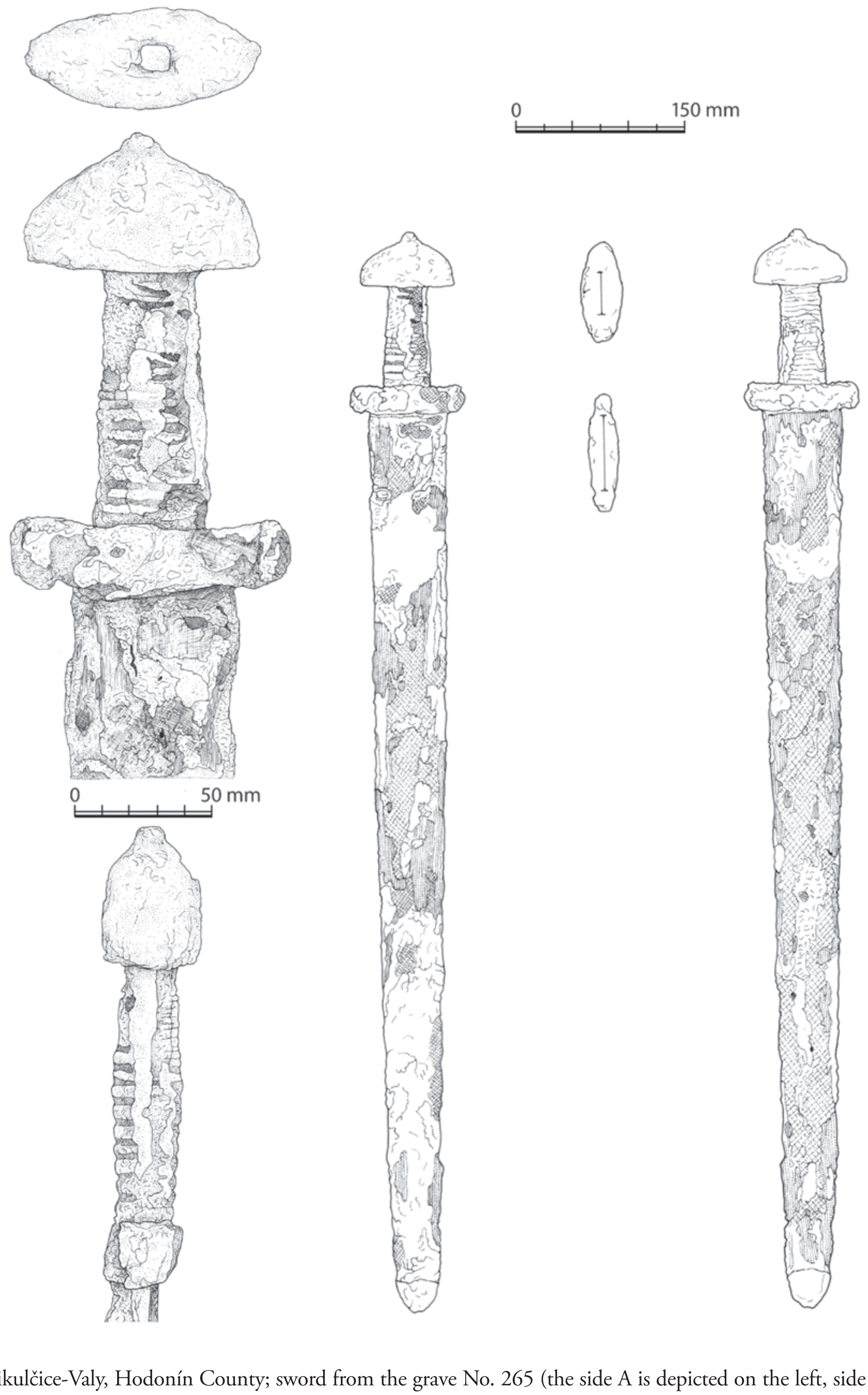

Fig. 15. Mikulčice-Valy, Hodonín County; sword from the grave No. 265 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

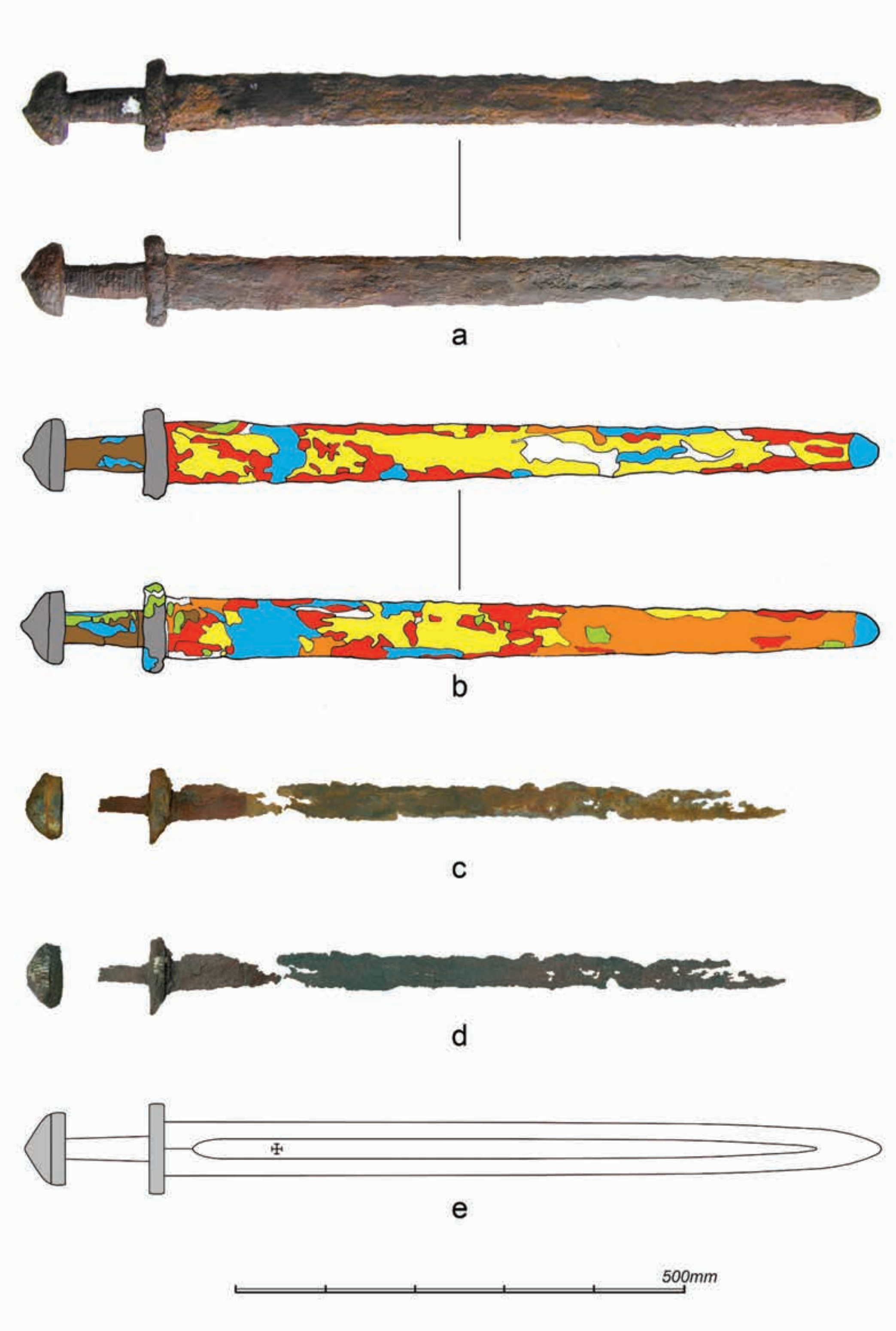

Fig. 16. Sword from grave No. 265; a – state before the depository fire; b – distribution of organic materials across the sword documented in 2003 /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard); orange: remnants of the wooden corpus of scabbard and a textile lining consolidated by synthetic resin; green: textile 2 (lower layer of the upper coat of the sheathed sword); brown: leather (remnant of a fine leather preserved on the textile 2 on the scabbard, strap wrapping the grip); gray: unidentified material that covers the pommel; blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword (the hilt was decorated by wire inlay of brass and silver, blade was provided with inlaid cross of metal of yellow colour). Photos and drawings by J. Hošek and J. Košta.

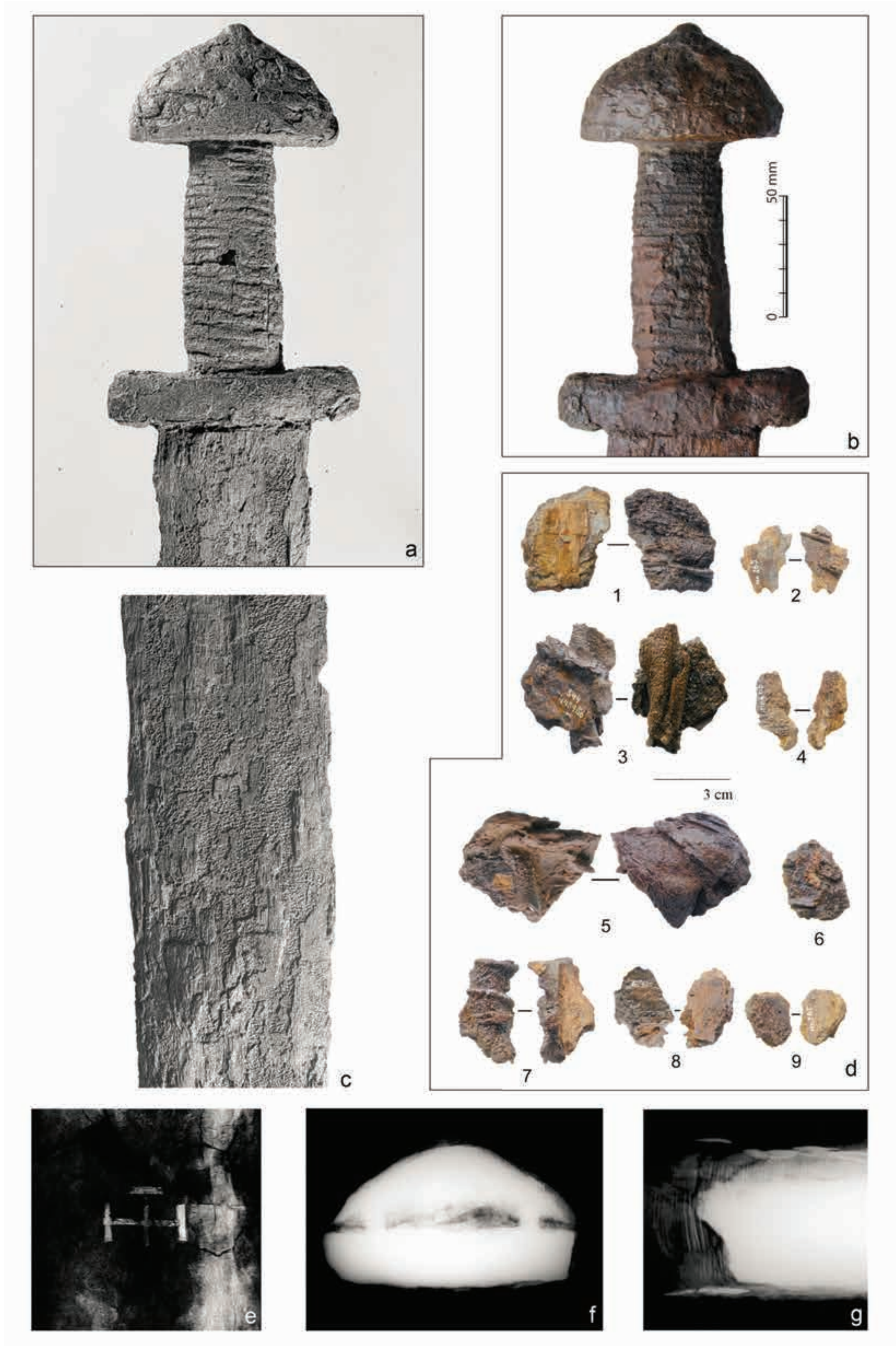

Fig. 17. Sword from grave No. 265; a – hilt from the side A after the first conservation; b – hilt from the side B (documentation of the sword in 2003); c – blade with remnants of organic materials; d – fragments of organic materials related to the sword (see 'Finds' in Chap. 3.4.3 for detail description 'd1-d9'); e – X-ray image of the blade with a non-ferrous inlay in the form of a cross; f – X-ray image of the upper hilt; g – X-ray image of one end of the cross-guard. Photos by Institute of Archaeology of the AS CR, Brno.

pommel narrows to the top. On the top of the pommel there was before the fire 5 mm high a square protrusion of unclear origin, which was not made of compacted iron. The hollow pommel is fastened to the upper guard by two rivets, while the hollow inside the pommel was probably infilled with organic material (Poulík 1957, 280 states, that it was probably a bone fill). The tang is visible on the X-ray image only in the upper guard; in the pommel the tang is indistinct. The surfaces of the upper hilt and the lower guard were decorated by a vertically oriented wire inlay (see Fig. 18). The decoration is distinct in the X-ray images and was discovered during conservation after the fire. The faces of the pommel were decorated by four vertical wires of silver[60] and four wires of brass[61] alternating on three different levels to create a chessboard pattern. In total, there are about twenty inlaid wires per cm. The sides of the pommel were decorated by a band of four inlaid wires of brass leading from the base of the pommel to its top. The upper guard was probably inlaid in the same manner but that is not preserved (except for two wires of brass).

The tang of the sword was completely covered with the organic parts of the hilt and/or in some places with restoring resin. The overlying layer consisted of a leather strap, up to 5 mm thick, while the bottom part of the wrapping (perhaps a wood covering) was not visible. The grip was 94 mm long, 34 mm wide at the upper hilt and 40 mm at the lower guard. Following conservation performed after the fire at the base in Mikulčice, a distinct hole was found on the bottom part of the upper guard. This was 24 mm wide and filled with the remains of the tang, the width of which is 22.5 mm here. The width of the tang by the lower guard was 28 mm.

The lower guard is relatively short and massive (101 mm long, 25 mm wide, 17 mm high), and from the front it is rectangular with slightly arched shorter sides while in the horizontal it is lenticular. It was provided on the top and bottom with plates of brass[62] (0.25 mm thick) and decorated on both sides by inlays of brass and silver like the pommel (Fig. 18). There are around 21 inlaid wires per cm. In the X-ray image there is a step-like broadening of the hole in the crossguard visible.

The blade was 61 mm wide below the crossguard and it was slightly narrowed to the point. At the short pointed part it was damaged. It was originally around 790 mm long (now 769 mm in the preserved part). The fuller showed in the X-ray images distinctly at 40 mm below the crossguard and ended about 50 mm before the point; its width was around 25 mm in the upper part of the blade. The blade was originally inlaid with an equilateral cross into the fuller at a distance of 122 mm below the lower guard (Poulík 1957, 280–282, 373, obr. 67:1). The cross was approximately 12 mm wide and made of a non-ferrous metal of yellow colour. Three arms of the cross were crooked, while the fourth was preserved straight (Fig. 17:e). This part of the blade, including the cross, was destroyed during the fire at the base in Mikulčice.

Typological determination of the sword

According to the triangular shape of the pommel it is possible to classify the sword as Geibig's type 5, variant I. When analysing individual parts, the hilt is very close to Geibig's combination type (5-3-2-2), the ratio of length to width is on the maximum limit of tolerance for this type (Geibig 1991, 38–44). The above mentioned Geibig's type corresponds with Petersen's type H (Petersen 1919, 89–101). The surface wire inlay and construction

60 The results of XRFA of the area with the silver inlay: Ag 71.5%; Fe 15.4%; Cu 6.9%; Si 4.9%; Pb 0.8%; Zn 0.5%. After subtraction of elements represented in the iron base and corrosion (Fe, Si): Ag 89.7%; Cu 8.7%; Pb 1%; Zn 0.6%.

61 The results of XRFA of the area with inlay of non-ferrous metal: Cu 77.4%; Zn 19.36%; S 2,2%; Fe 0,9%; Pb 0,1%. After subtraction of elements represented in the iron base and corrosion (Fe, S): Cu 79.9%; Zn 20.0%; Pb 0.1%.

62 The results of XRFA of the non-ferrous plate: Cu 56.4%; Fe 27.9%; Zn 13.4%; Pb 1.5%; Sn 0.7%. After subtraction of elements represented in the iron base (Fe): Cu 78.2%; Zn 18.6%; Pb 2.1%, Sn 1%.

of the upper hilt also corresponds with the classification as this type (Geibig's construction type II; Geibig 1991, 90–100). According to the Jakobsson's classification (Jakobsson 1992, 30–35) the sword belongs to the 'design principle 1' (swords with a triangular pommel). There is an exact analogy between the ornament made by the alternation of silver and brass inlaid wires found on the sword from the grave 265 and that on the sword found in the harbour of Hedeby (Geibig 1999, 16–18, 55, Taf. 2) as well as that on the sword from Huseby-Leikanger in the region Sogn og Fjordane in Norway (Petersen 1919, tab. II/1). Similar decoration was discovered on two swords of the type Mannheim-Speyer (Geibig's type 4), found in the central Rhineland, the production of which dates back to the first half of the 9th century.[63] There is also a very interesting comparison with the sword of Petersen's type H from Lithse Ham in the Netherlands (Ypey 1986, 139–143). The Lithse Ham sword is decorated with vertical bands consisting of wire inlay and it is also decorated with a brass crooked cross.

The lower guard corresponds with Ruttkay's type 4, although with its arched sides (when observed in the side-view) it resembles his type 1 (Ruttkay 1976, 249).

A difficulty in the classification of the blade according to Geibig's typology (Geibig 1991, 83–90) is the fact that the completely preserved remains of the wooden scabbard made it impossible to measure the width of the fuller before the sword was damaged in the fire.

Furthermore the missing point prevented the determination of the exact length of the blade. The exposure of the blade after the fire enabled us to measure the width of the fuller on the preserved fragments. Although it was impossible to observe if the fuller was narrowed or not, and this is the main discriminating feature between Geibig's blade types 2 and 3, we can on the basis of other characteristics (the width of the blade, the length and width of the fuller and the ratio of the length of the blade to the fuller) state that the sword belongs to his type 2. Most of the features studied are those of variant 2a (the width of the blade and the total massive appearance of the blade, considering the weight of the sword) while the length of the blade and the narrowing of the blade within the first 600 mm suggest variant 2c; other features are common to both variants. It is therefore possible to describe the blade as medium-robust to robust form of the type 2 (2a/c). An interesting phenomenon, which was not studied by Geibig, is the indentation of the central fuller, accompanied by a bundle of lines, visible in the X-ray image, which attest to a local thinning of the metal. There are several blades with displaced fullers within the Mikulčice collection. According to the morphological classification presented in this study, the blade belongs to the group {a1} (see Chap. 4.2), which was established on the basis of lengths and widths of blades. The group {a1} includes robust and short (to medium-long) blades that have been observed to date only on swords of early Carolingian construction.

Scabbard, straps and outer wrappings

The construction of the scabbard and its outer organic wrapping was investigated from both the material that was preserved on the sword as well as from the many fragments, deposited under evidence numbers 594-4438-40/56 and 594-4441/56a-m (Fig. 17:d). The scabbard of beech wood (Poulík 1957, 280), in which the sword was deposited in the grave, was lined with a coarse textile (1) in a plain-weave (thread count of 14/14). On the weave of the textile there are evident differences from place to place. The weave in some places resembles twill with a thread count of 16/7 (1a). The wooden scabbard was wrapped at least three times by another fine textile (Poulík 1957, 280) in a plain-weave with

63 One of the swords found in Rhine by the town of Speyer, was decorated with encrusted vertically oriented wires of silver and copper (Menghin 1980, 228–229, Abb. 5:2, 6:2). The other, the sword from the site at Mannheim-Friesenheimer Insel was decorated with a regular chessboard pattern created from silver and brass fields that were formed by vertically oriented bands (Menghin 1980, 226–227, Abb. 2, 5:1, 6:1).

Fig. 18. Sword from the grave No. 265; a – decorated hilt with details of the wire-inlay; b – X-ray of the lower guard with visible traces of the wire-inlay. Photos 'a' by E. Ottenwelter; photo 'b' by Institute of Archaeology of the AS CR, Brno.

a thread count of 24/24 (2). Traces of this textile are also visible on the lower guard and the grip. On top of the upper textile layer on the fragment 594-4441/56k there were three small and thin tube-like structures, probably the remains of decoration (Fig. 17:d2). Other layers of organic materials preserved within the corrosion products of the sword included a badly preserved coarse textile, fine leather, a fragment of thicker leather (on samples 594-4441/56a and 594-4441/56b placed in two layers, on the sample 594-4441/56c in three layers) and a fur with preserved hair on top. The suspension garniture of the sword consisted, among other parts, of an iron buckle (594-4439/56), whose frame was found preserved among fragments of organic remains (Fig. 17:d3),

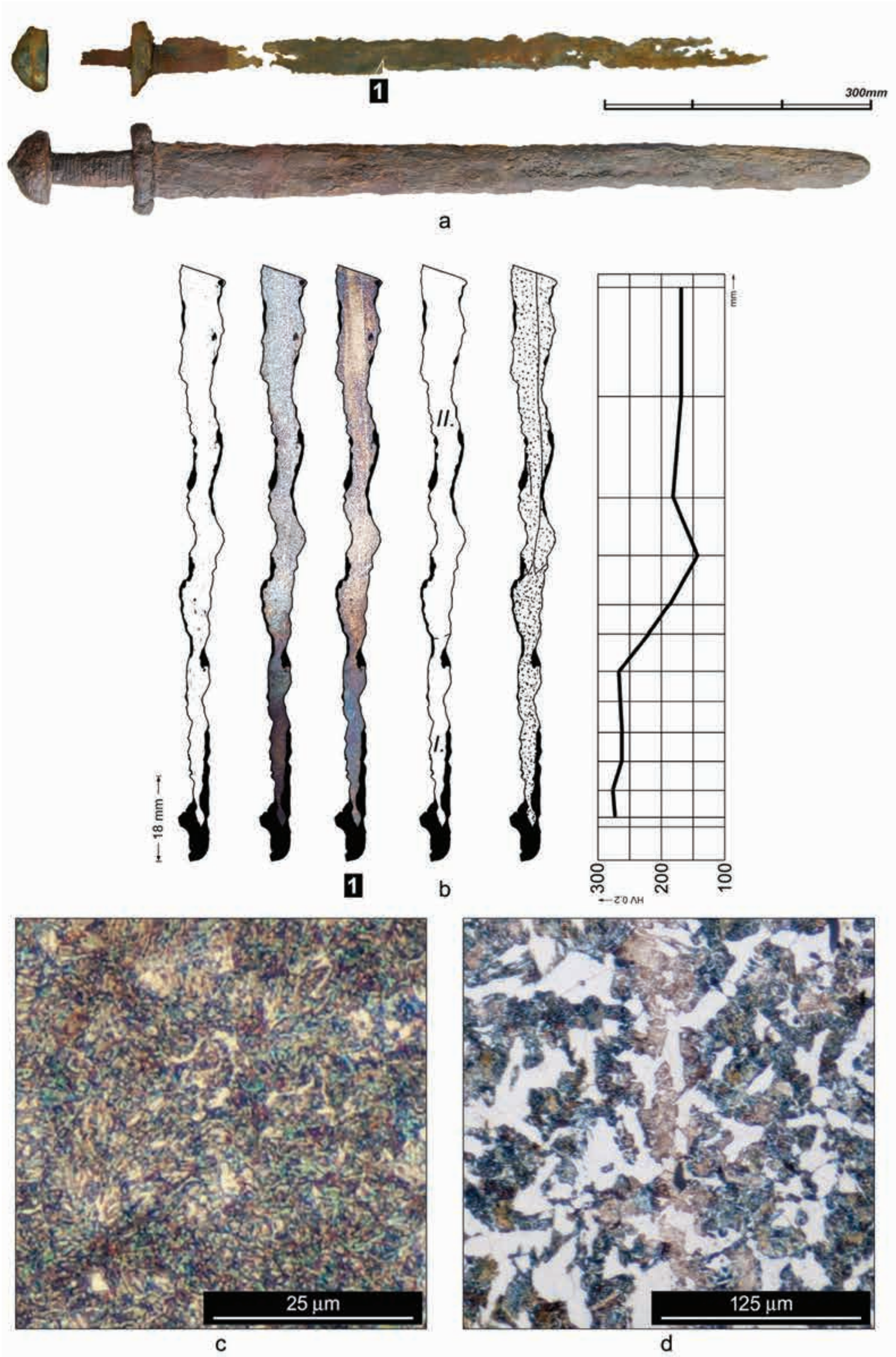

Fig. 19. Sword from the grave No. 265; a – the sword examined (above: after the fire and before the conservation; below: before the depository fire) and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart); c – pearlitic microstructure in the cutting edge, Area I; d – pearlitic-ferritic microstructure in the blade body, Area II; Nital etched. Photos and drawings by J. Hošek and J. Košta.

and an iron tongue-shaped belt chape of the same width (594-4437/56). Unidentifiable iron fragments were found also in other pieces (594-4440/56, 594-4441/56g and 594-4441/56i).

Metallographic examination

Sampling: The blade of this sword was sampled at a distance of 260 mm from the crossguard during a survey performed prior to the fire in the Mikulčice depository, but neither the results of the metallographic examination nor the sample itself are now available. During the conservation of the fire-damaged body of the weapon, a new sample [1] was detached from the previously made cut in the blade (see Fig. 19:a, b).

Metallographic description of the blade: SAMPLE [1]: The purity of the metal is relatively high and corresponds roughly to level 2 on the Jernkontoret scale. After etching, a fine pearlitic microstructure (with a hardness of 268 ± 6 HV0.2 can be observed in the cutting edge (Area I). Area II (Fig. 19:c; part of the cutting edge and the middle portion of the blade) contains a pearlitic-ferritic microstructure with a hardness of 170 ± 18 HV0.2 and carbon content varying between 0.5% and 0.6% (Fig. 19:d). Welding lines are hardly visible in the structure.

Assessment: The blade is composed of steel cutting edges welded onto a steel core and consists entirely of steel. The cutting edges have an eutectoid composition, but the core has a carbon content which was somewhat lower. It is not known for certain, whether the blade was initially hardened in the area sampled but it seems unlikely.

3.4.3 Sword from the grave 280

Circumstances of the discovery

The grave was found in 1956 within the excavation of the burial ground by the IInd church directed by J. Poulík, in the excavation area No. 2 ‘IInd church 1955–59’ (Poláček/Marek 2005, 40–49).

The burial was uncovered in the square A2, nearly 4 m in the S-W direction from the corner of the nave of the church (Poulík 1957, 282–283, 374, obr. 70–71), in a layer of clay with fragments of charcoal. The grave is related to the earlier phase of the burial ground (which is also the earlier phase of the church) and the burial itself had steeply caved into the earlier settlement feature to the west. The grave was discovered during the digging of foundations for the museum building, which ‘covered over’ the excavated church, and the grave was partially disrupted by the digger. This damaged parts of the burial at the lower limbs down from the knees and probably also part of the grave goods. The burial pit was indistinct, but the NWW-SEE orientation of the skeleton roughly followed the orientation of the IInd church. A fireplace, which was presumably part of a settlement feature, was found right above the west part of the grave. The fireplace was later covered by a sandy layer, which was most likely related to the later phase of the church and the burial ground.

The burial was extended supine inhumation with the arms alongside the body and the head pointing to the west. It belonged to a fairly robust man of medium height (164–170 cm according to Manouvrier), who died in the age of *maturus* (40–60 years) (Stloukal 1962, 23, 35; Stloukal 1963, 124).

A sword (1) lay flat under the left arm of the man down from the elbow, so that the metacarpals lay over the upper part of the blade. The blade, with the end broken off (probably because of the disruption of the grave during the excavation), lay alongside the pelvis and left femur down to below the knee. According to the description of the grave, the spurs (2) and a flat iron object (3) were found on the sword. J. Poulík located the spurs to the legs of the skeleton and in his drawing (Poulík 1957, 314) they are shown near the feet.

Finds

1) The iron sword with remains of the scabbard (see Fig. 20–23; Poulík 1957, obr. 71).
2) The slender iron spurs with short prick (the length of the prick 16 mm, width of the arms 8 mm). Not at a disposal in 2003.

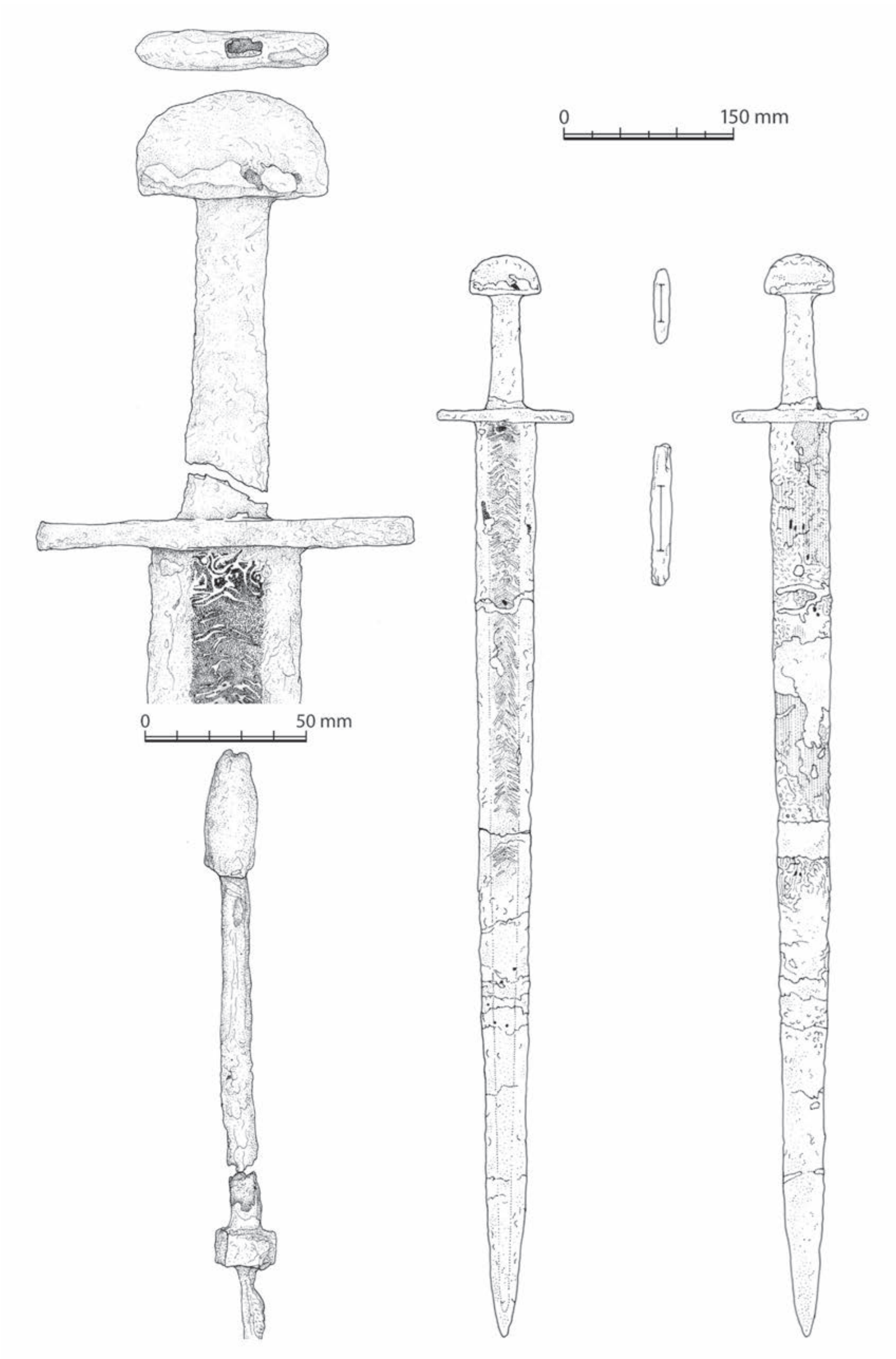

Fig. 20. Mikulčice-Valy, Hodonín County; sword from the grave No. 280 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

3) A flat iron object (knife?), extended on one side (99 × 21 mm). Not at a disposal in 2003.

Note: The finds from the grave 280 were not registered in the *ILF* of the Mikulčice excavation.

Description of the sword

This is a double-edged sword (without evidence number; Fig. 20–22), which was at the time of its documentation in 2003 preserved in a length of 835 mm (during conservation before the fire, the blade was completed by resin and extended to the length of 959 mm).[64] The lower part of the blade was broken into pieces during the excavation of the grave, and the point disappeared. In 2003, the sword weighed 810 g, which included a restoring resin and massive remains of wood from the scabbard. These remains were left on one side of the sword after conservation (before the fire). After the fire at the archaeological base in Mikulčice, four fragments of the sword were identified – the pommel, the crossguard with the upper part of the blade and two smaller parts of the blade. The total weight of the preserved fragments is 265 g.

The single pommel is semicircular and highly arched, and is 63 mm long, 32 mm high and 18 mm wide. The tang, which was almost completely corroded, reached through the pommel up to its top, where a rectangular hole is now visible. From the front view, the angle between the sides and the base of the pommel is almost perpendicular, while a distinct rounding is visible in the upper half of the pommel. From the side the pommel is of a narrow rectangular shape with slightly arched longer sides and a rounded top. From the horizontal the pommel is narrowly oval to rectangular, while the shorter sides are rounded.

The grip was extensively damaged by corrosion. Its original length before conservation was 100 mm, which can be reliably verified by the oldest photos of the sword (POULÍK 1957, Fig. 71). In 2003, when the sword was documented, almost the whole grip consisted of restoration materials, which were later damaged by the fire. The tang, now bared, is 28 mm wide by the crossguard.

The crossguard is 118 mm long, and from the front is very slender (8.5 mm high). It is shaped like a prism, and its ends are right-angled. From the horizontal the longer sides are slightly arched and at their widest they are 18 mm. The hole for the tang and blade broadens in a step-like fashion and is strongly profiled.

The body of the blade is 698 mm long, and narrows gradually (by the crossguard the blade is 52 mm wide and on the furthest preserved part it is 35 mm wide). It is impossible to reconstruct the original length of the blade. The central fuller, which begins right below the crossguard, is visible on the entire preserved part of the sword. The fuller is 24 mm wide at the crossguard and 14 mm wide at a distance of 690 mm. The fuller shows pattern-welding along its entire length, arranged into ZS twist pattern. The pattern-welding begins below the crossguard by a rosette pattern.

Typological determination of the sword

The sword belongs to that group of swords with a semicircular single pommel (Geibig's pommel construction type III; GEIBIG 1991, 90–100), with a flat base of the pommel and a long crossguard. It is possible to assign it to Geibig's type 12, variant I (specifically it may be described as Geibig's combination type 12-11-4-10; GEIBIG 1991 56–60) or Ruttkay's type VII (RUTTKAY 1976, 249–251).

According to Petersen's typology, the sword is a type X, and the pommel itself has features of its earlier variant (PETERSEN 1919, 158–167). The sword corresponds also to the description of Petersen's special type 11 (PETERSEN 1919, 112), which is almost analogous to Petersen's earlier variant of his type X.

Petersen set the 'special type 11' apart because swords of this type were discovered in archaeological contexts dated to an earlier

64 J. POULÍK (1957, 283) states 835 mm as the total length of the sword. He mentions the damage of neither the grave 280 nor the sword during the excavation.

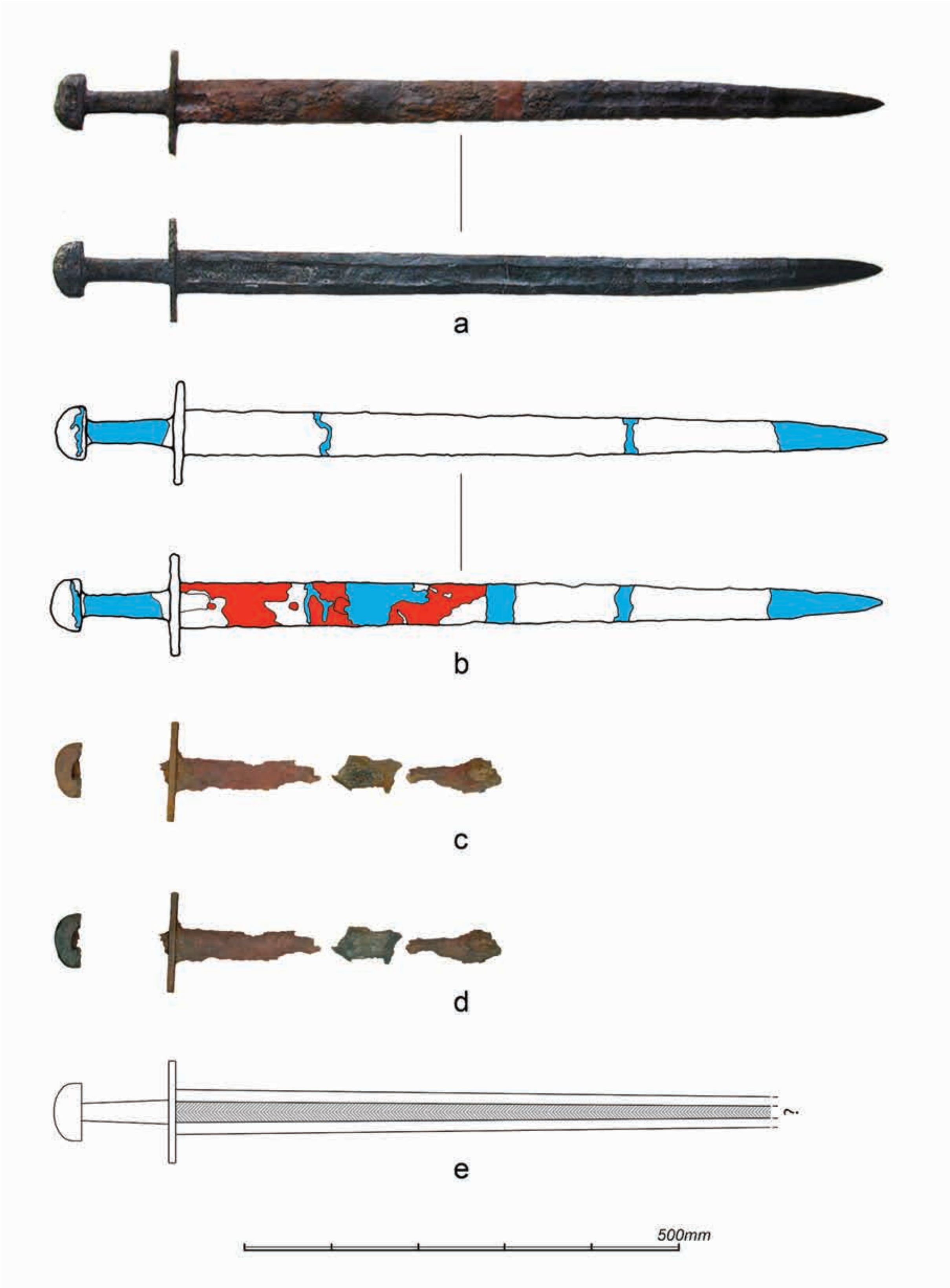

Fig. 21. Sword from grave No. 280; a – state before the depository fire; b – distribution of organic materials across the sword documented in 2003 / red: wooden scabbard; blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

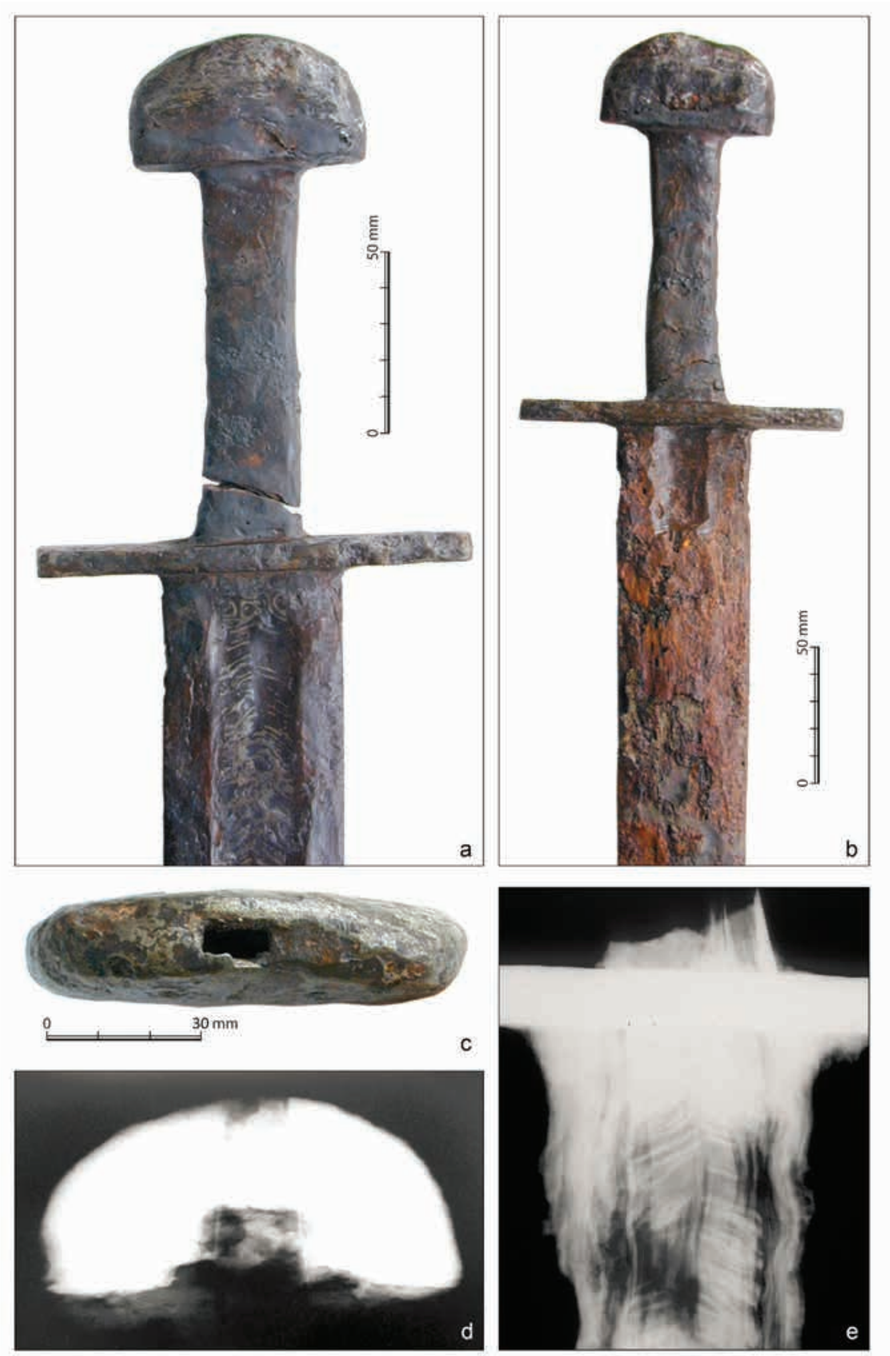

Fig. 22. Sword from grave No. 280; a – hilt and upper part of the pattern-welded blade from side A (documentation of the sword in 2003); b – hilt and upper part of the blade with remnants of the wooden scabbard from side B (documented in 2003); c – pommel from the horizontal view (documented in 2003); d – X-ray image of the pommel (documented prior to the depository fire); e – X-ray image of the crossguard and the upper part of the pattern-welded blade (documented after the depository fire). Photos by Institute of Archaeology of the AS CR, Brno.

phase of the Viking Culture (the 'special type 11' was, according to Petersen, contemporary with the type K). According to Jakobsson's classification (Jakobsson 1992, 55–57) the sword belongs to the 'design principle 6' (swords with an absent upper guard). The distinctively flat and wide pommel is shaped as a high arch; the lateral edges are almost straight for the first third of their length and they form right angle with the base.

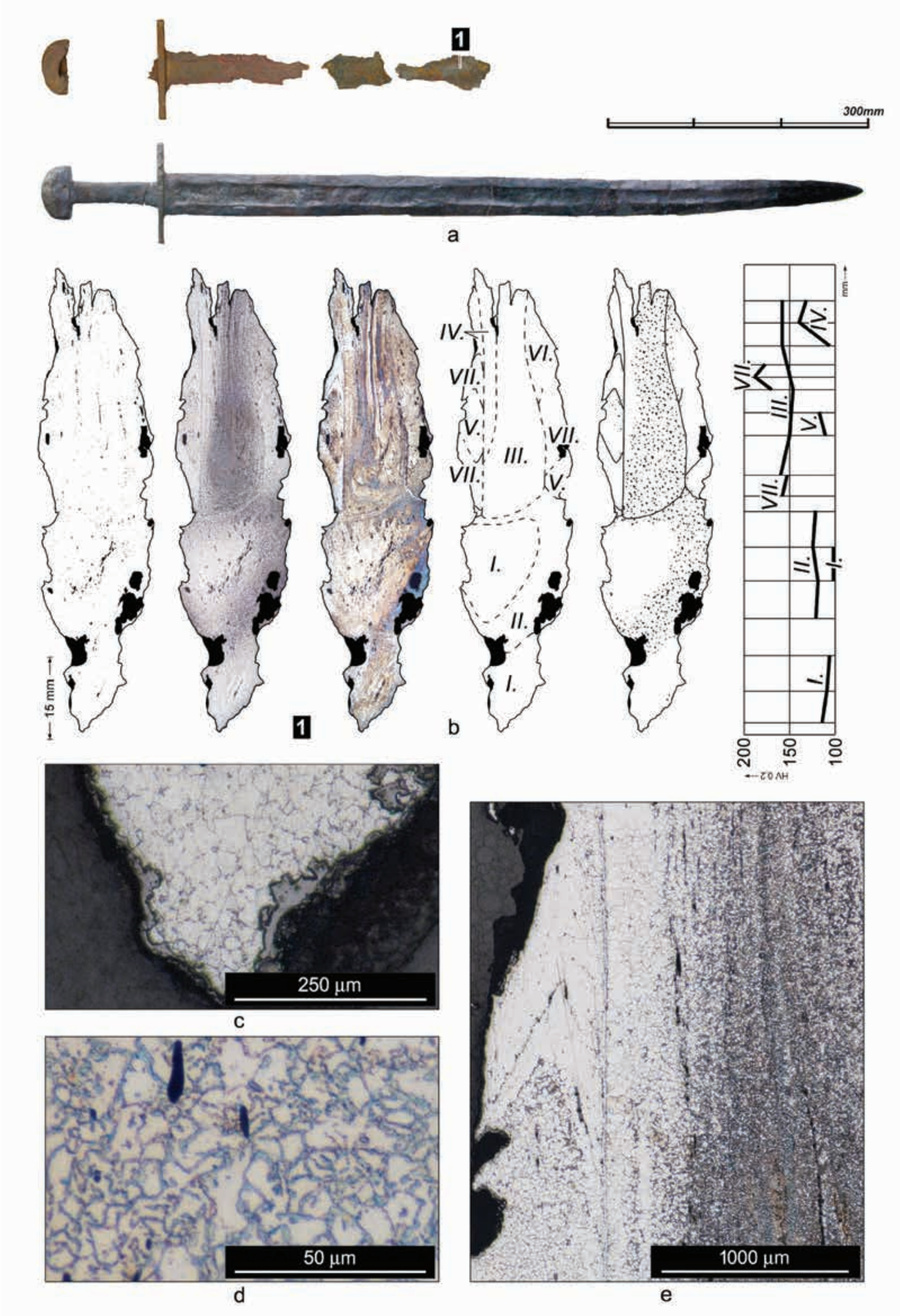

Fig. 23. Sword from the grave No. 280; a – the sword examined (above: after the fire and before the conservation; below: before the depository fire) and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the structures and of the main welds across the sample; hardness distribution chart); c – ferrite with traces of cementite in the cutting edge of the blade (Area I); d – ferritic-cementitic microstructure in the cutting edge (Area II); e – pattern-welded panel (left) attached to the blade core; Nital etched. Photos and drawings by J. Hošek and J. Košta.

The shape resembles the (structurally different) pommels of the sword types Petersen X/Geibig 12, I. The identically shaped semicircular pommels were described by P. Kucypera, T. Kurasiński and P. Pudło (2011) as the earlier variant of the type X. The shape of the crossguard may be described as Ruttkay's type 7 (Ruttkay 1976, 249).

The evaluation of the blade type by Geibig's classification (Geibig 1991, 83–90) is difficult, because its whole length was not preserved. The features studied mostly correspond to types 2c and 3. However, one crucial feature – the narrowing of the fuller measured over the first 400 mm of the length of the blade (1.2:1) – allows us to classify the sword as a type 3. The determination of any variant of type 3 is impossible because of the condition of preservation. According to the morphological classification presented in this study, the preserved part of the blade may be assessed only roughly; the sword most likely belongs to the group {b} (see Chap. 4.2).

Scabbard, straps and outer wrappings
The sword was sheathed in a wooden scabbard, which was not lined with a textile. Overlying wrapping was not evidenced.

Metallographic examination
Sampling: Sample [1] was taken from one of the cutting edges on one of the blade fragments (see Fig. 23:a, b). More precise determination of the position of sampling is impossible.
Metallographic description of the blade: SAMPLE [1]: The metal purity, assessed before etching, corresponds to level 4 to 5 on the Jernkontoret scale (metal of low purity). After etching, Area I consists of ferrite with traces of cementite (Fig. 23:c). The grain size varies from ASTM 5 to 7, the hardness of this area is 107 ± 6 HV0.2. Area II consists of a fine-grained ferritic-cementitic microstructure (the cementite occurs mainly in the form of enlarged particles at grain boundaries, but also in the form of a finer discontinuous network) with a hardness of 122 ± 3 HV0.2 (Fig. 23:d). Area III contains a fine-grained ferritic-cementitic microstructure with a hardness of 155 ± 6 HV0.2; the cementite occurs mainly in the form of particles forming discontinuous network at grain boundaries. Area IV consists of ferritic microstructure with grain size of ASTM 7-6 and with a hardness of 126 ± 17 HV0.2. Area V consists of a fine-grained microstructure of ferrite with some cementite; the hardness of this area is 115 HV0.2. Area VI contains a heterogeneous ferritic and ferritic-cementitic microstructure (the cementite occurs in the form of fine particles on the grain boundaries). Areas VII contain a ferritic microstructure with grain size of ASTM 4 and with a hardness of 169 ± 15 HV0.2; EDXA confirmed the enhanced phosphorus content 0.6 ± 0.1% in the ferrite. Welds are clearly visible in the sample, with exception of the pattern-welded surface panels.[65]
Assessment: A heterogeneous material fluctuating between iron and steel was used to manufacture both the cutting edges and the core of this blade. It is possible that this material, in combination with phosphoric iron, was also used in the pattern-welded panels. It is possible that the blade was originally hardened in some way. The original tip of the cutting edge was not preserved in the examined sample and thus cannot be commented upon. Compared to other swords from Mikulčice, this blade seems to be product of only mediocre quality, at least in terms of the achievable mechanical properties.

3.4.4 Sword from the grave 341

Circumstances of the discovery
This burial was discovered in 1957 during the excavations directed by J. Poulík, in area No. 4 'III[rd] church 1956–57' (Poláček/Marek 2005, 56–67). It was situated in the burial ground by the III[rd] church in the G/18 square, more precisely in sector 5 near the border

65 EDXA performed by Dr. Adam Thiele (Budapest University of Technology and Economics) on one of the corroded blade fragments confirmed that phosphoric iron with phosphorus content varying between 0.3 to 1.9 percent (0.8 ± 0.5% P) was used for the pattern welding.

Fig. 24. Mikulčice-Valy, Hodonín County; grave No. 341; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'; 'C' – child remains No. 342; 'K' – iron fittings of a coffin). Drawing by B. Vávrová.

with sector 3. It was placed together with child burials 340 and 342 in the large burial pit termed 'tomb IV'. The dimensions of this pit were 328 cm without including its western parts and about 450 cm when including them × 150 cm × more than 170 cm). The orientation of the skeleton and the burial pit followed the orientation of the IIIrd church (NWW-SEE). The first indication of the presence of a burial pit, which was situated circa 6.5 m from the northern wall of church, appeared roughly 35 cm below the surface. In the pit at a depth of 60 cm there appeared a layer of broken stone oval in outline, which contained large flat stones with some remains of mortar. The burial pit infringed the rim of the large settlement feature 106, the filling of which together with fragments of artefacts got into the fill of the grave. The bottom of the grave was sunk into the sandy subsoil (Kostelníková 1958a, 191). The grave was probably situated next to a road, which was identified by two parallel lines of graves, often elaborately arranged and richly equipped, heading northward for approximately half the length of the nave of the IIIrd church.[66] On the bottom of the burial pit, under the head and feet of the burial 341, there were several large flat stones, which underlay a coffin (circa 250 × 90 cm). The coffin was equipped with iron band-shaped fittings (594-3104/57); four fittings were probably in the upper part and four in the bottom part connecting the longer sides of the coffin, the shorter sides were connected by four fittings (i.e. each side by two fittings). The rim of the burial pit was lined on the bottom by a 15–20 cm high step. At this step, there were stones situated vertically and tiling the walls of the grave pit. In the burial-pit fill, among

66 See the plan of the burial ground (Poláček 2006, 6; Poulík 1975, 76). The corridor is noticeable for the length of 15 m from the IIIrd church and along it there were five large burial pits described as tombs (IV, VI, VII, VIII a XIV) out of the ten, which were identified in the exterior of the basilica (Poláček/Marek 2005, Fig. 42). There were also the burials 438 equipped with a sword, 439 with spurs and under that there was the female grave 440 with gold jewels.

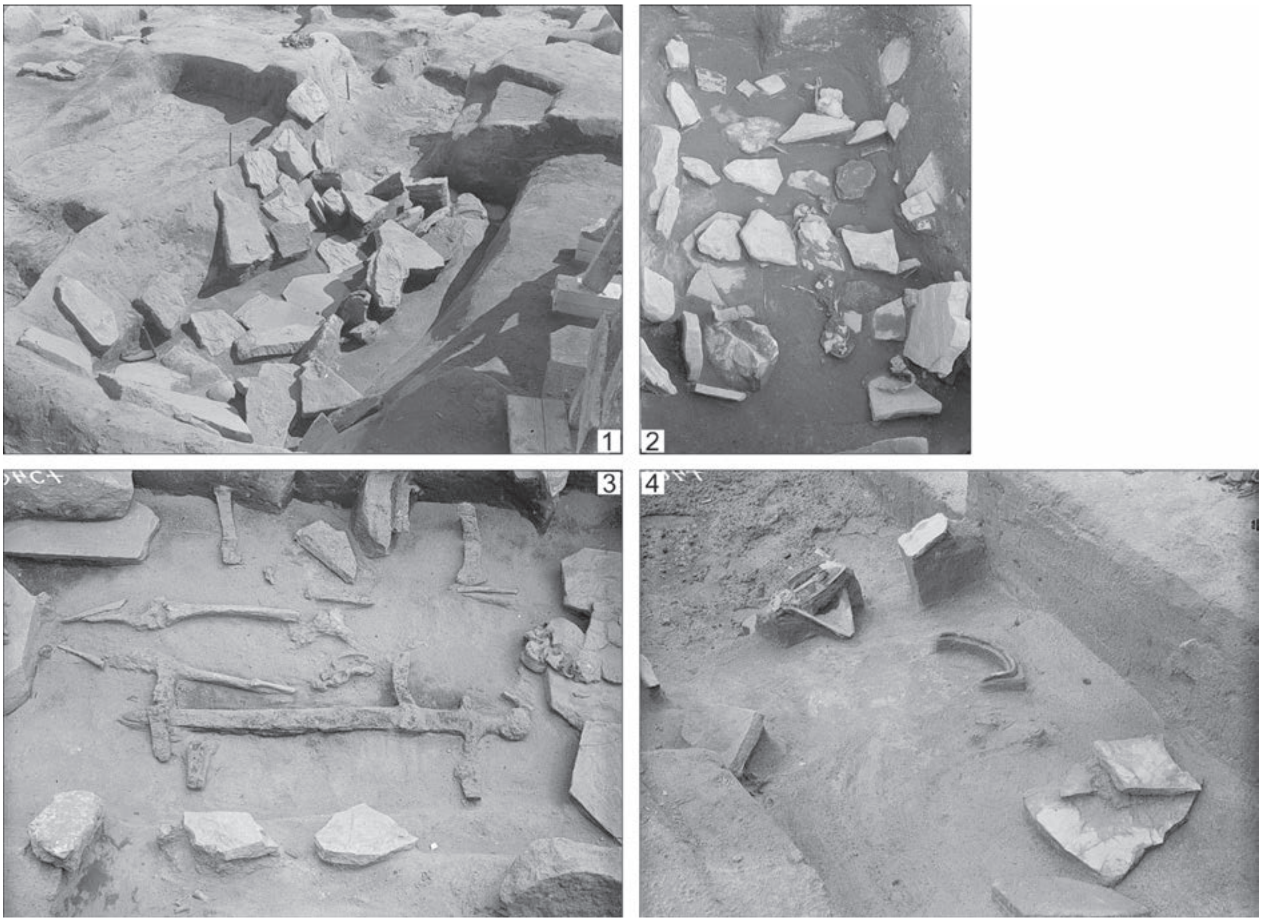

Fig. 25. Mikulčice-Valy, Hodonín County; grave No. 341; photographs of the burial taken in the course of excavation; 1 – the upper part of the backfill of 'tomb IV'; 2 – the lower part of the backfill of 'tomb IV' with children's burials 340 and 342; 3 – grave No. 341, viewed from the N; 4 – trapezoidal area to the west from the burial 341, viewed from the NE. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

three transverse bands of stones overlapping the coffin of burial 341, there lay a child burial 340. Another child burial 342 was documented partially on the same level as the burial 340 and partially on the level of the human remains of burial 341. No single item of grave goods was situated in the burial pit (341) in such a way that it might be from burials 340 and 342.

The skeleton of a man from the grave 341, who died in the age of *adultus I* (30–40 years) and who was placed on his back at a depth of 170 cm below the surface, was not well preserved (Fig. 24 and 25). The human remains in the grave were spread over a length of 160 cm. In both eye sockets *cribra orbitalia* was noticed (Stloukal 1967, 294), i.e. porous changes in the upper part of the eye socket, which are most frequently related to anemia (Velemínský 2000, 27).

The pommel of a sword (1) was placed beside the left shoulder and the blade extended down to the knee. A knife (2) lay on the right side of the hips. One or more iron objects (3) lay in the pelvic area, spurs (4) were placed by the feet and a bucket (5) was situated in the SW corner of the coffin. To the west of the coffin an irregular trapezoidal area with its bottom situated 40–50 cm higher than the bottom of the burial pit 34 was discovered after the excavation and documentation of the tomb. This feature was tiled with flat stones, which defined an area, about 130 × 80 cm, inside which there were unusual grave goods in a layout corresponding to the usual location around a skeleton, but without any human remains.

In the *Post-excavation report* it was not included in tomb IV (Kostelníková 1958a, 190–192), but it is described as part of the grave 341 in the *DGU*. The relation of this area to the grave 341 cannot be defined unambiguously (probably it is the remainder of another burial without a surviving skeleton). In the eastern part of the area there lay two or three bowls (6). 40 cm west from them there was dilapidated decorative object in the shape of a stick (7). Five beads (8–12) were found 10 cm further west.

Finds from the actual burial pit of grave 341:

1) The iron sword with massive remains of scabbard and outher wrappings (594-2981/57; Fig. 26–32)
2) The knife with a whittle tang, straight back and a cutting edge curved near the tip; broken into three fragments. Length of the preserved part is 142 mm. With remains of a wooden scabbard (594-3104/57a, b).
3) The unidentified iron object or several objects (without evidence number). Not at a disposal in 2003.
4) The iron spurs of undescribed appearance (without evidence number). Not at a disposal in 2003.
5) The oval bucket (594-3104/57) with a high parabolic iron handle (span between hinges 92 mm, height 81 mm), fragments of loops and both simple and doubled iron hoops.

Finds from the western area:

6) Two or three identical bowls, in ground plan with a spheric triangular shape, with rounded corners and collar rim, made of copper sheet (diameter circa 250 mm and height 48 mm (991/57). Preserved one almost whole bowl, the larger part of another bowl and many small fragments. On the outer side of some fragments there were remains of textile with plain weave.
7) Curved object with diameter of 10 mm, preserved in seven fragments. Its core is made of iron rod wrapped first in the organic material (leather?) and on its surface is a flat copper band (594-992/57). On one fragment there is preserved the ending of an iron rod, curved into a right angle. These are probably fragments of a neck-ring or of the decorative handle of a vessel made from organic material.

8–12) Five beads (594-998/57) with a patina on the surface: One oval bead made of a compact material of ambiguous origin (antler?) and decorated with fine ornament. The colour is pale tawny to dark brown. An oblong glass bead divided into two oval segments (18 × 8 mm). A larger disc-shaped glass bead (15 × 9 mm). Two small disc-shaped beads (6 × 3.5 and 5.5 × 3 mm).

Description of the sword

This is a double-edged sword (594-2981/57; Fig. 26–28), which had at the time of its documentation in 2003 a length of 986 mm and a weight of 1565 g, including the massive remains of organic wrapping that covered the whole blade. Any deduction about the point of balance (225 mm below the crossguard) is distorted by a number of wrapping remains on the sword. During the salvage operation after the fire at the archaeological base in Mikulčice, the sword blade and part of the hilt without the pommel were rescued; all the wrapping remains were damaged. The preserved body weighed 819 g.

The massive single pommel, 63 mm long, 35 mm high and 24 mm wide, has the shape of a regular full semicircle. From the side it is rectangular with slightly arched sides and the top of the pommel ends in a rounded arc. The horizontal plan is rectangular with rounded short sides. The tang goes through the bulky pommel up to its top, while the shape of the hole in the pommel does not correspond exactly with the shape of the tang (one of the chinks is slightly widened near the top; see Fig. 28:c).

The grip was 95 mm long. The tang of the blade narrows towards the pommel from 30 mm to 23 mm and was broken in the middle of its length. The tang was covered on both sides with wooden panels, which slightly exceeded the width of the tang. The surface layer of the grip was made of a leather strap twisted around in an S-thread, which was documented in parts under the pommel and above the crossguard.

The massive and very long crossguard is in a shape of prism, viewed horizontally it has rounded ends, otherwise it is sharp-edged (143 mm long, 14 mm high and 25 mm wide).

The double-edged blade, 842 mm long and by the crossguard 57 mm wide, narrows distinctly over the last third of its length and the point is in the shape of two intersecting arcs. The displaced

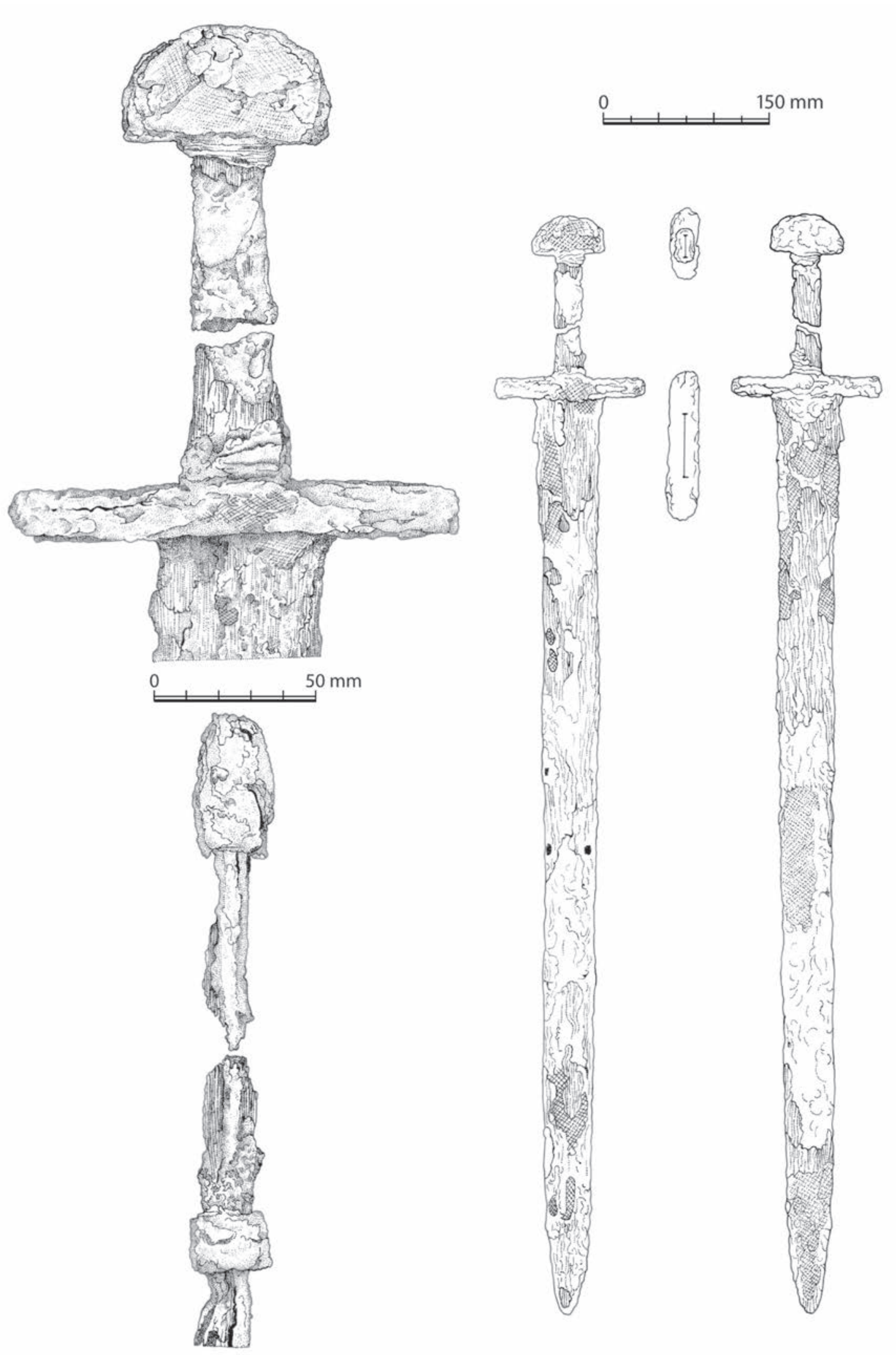

Fig. 26. Mikulčice-Valy, Hodonín County; sword from the grave No. 341 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

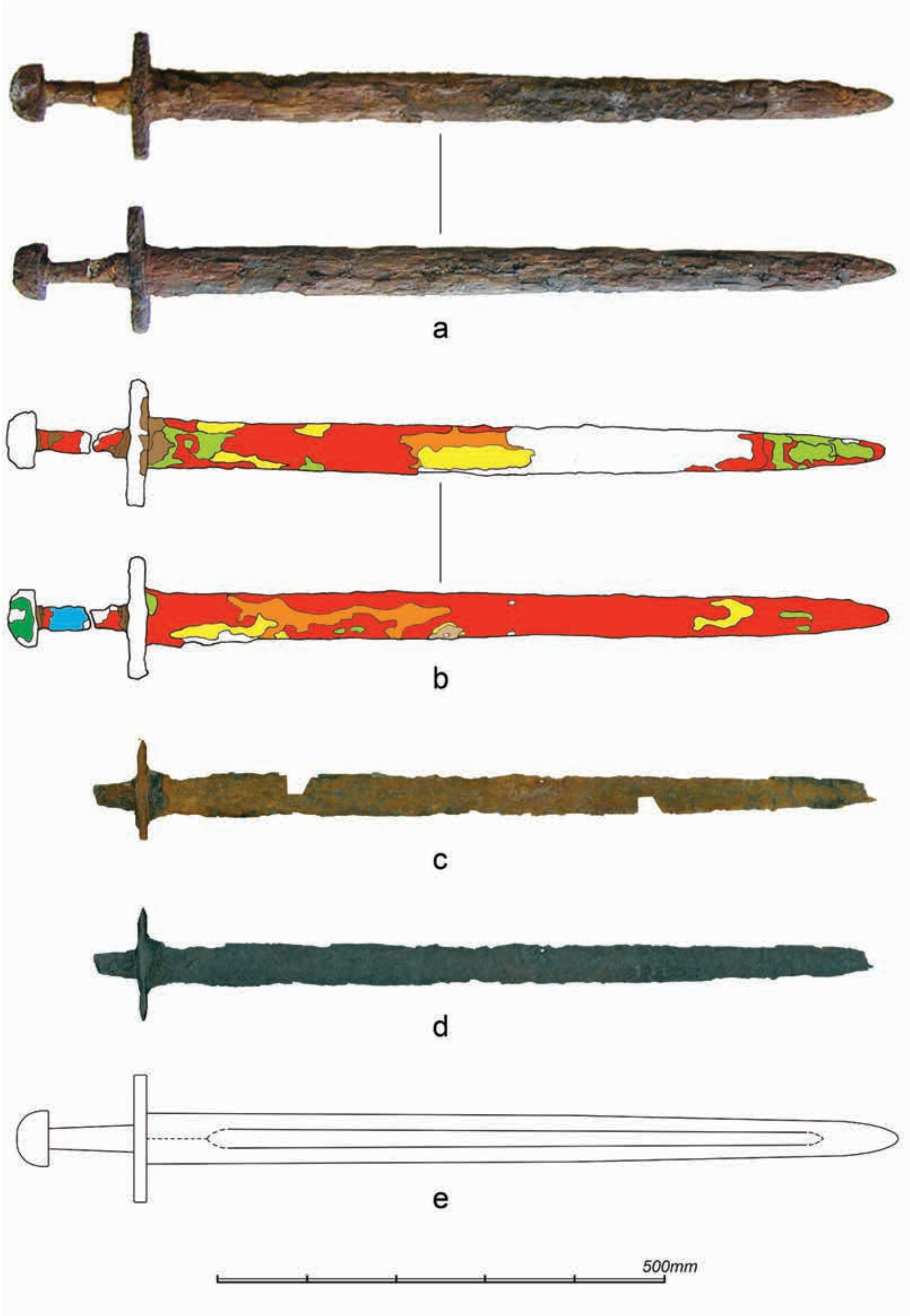

Fig. 27. Sword from grave No. 341; a – state before the depository fire; b – distribution of organic materials across the sword documented in year 2003 /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard a coverings of the tang); light green: textile 2 (upper layer of the scabbard); dark green: textile 3 and others organic materials preserved on the pommel; light brown: leather related to the scabbard (probably fragment of a collar for straps for the sword); dark brown: leather (two layers of fine leather that spreads from the blade surface on the guard), leather (surface layer of the scabbard, strap wrapping the grip); blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

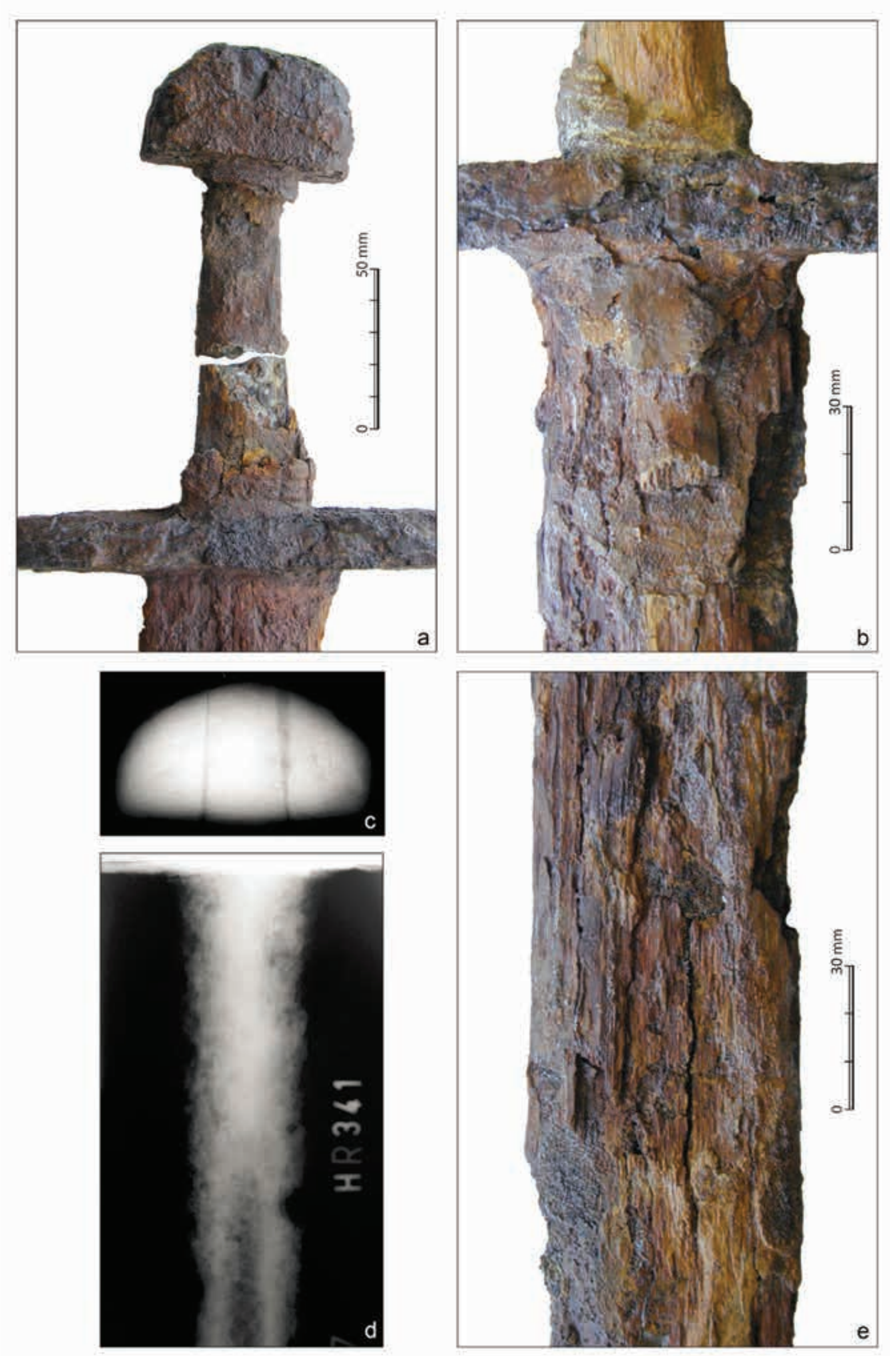

Fig. 28. Sword from the grave No. 341; a – hilt from the side A (documentation of the sword in 2003); b – lower part of the grip and upper part of the blade with remnants of organic materials from the side B (documented in 2003); c – X-ray image of the pommel (documented prior to the depository fire); d – X-ray image of the upper part of blade with an displaced fuller (documented prior to the depository fire); e – blade with remnants of organic materials (documented in 2003). Photos by Institute of Archaeology of the AS CR, Brno.

central fuller is almost indistinct but one can observe that it starts roughly 90 mm from the crossguard and ends about 70 mm before the point. Its width ranges between 21 mm and 14 mm.

Typological determination of the sword

This weapon ranks among those swords with a single semicircular pommel (Geibig's construction type III; Geibig 1991, 90–100), a flat base to the pommel, and a very long crossguard. It may be assigned to Geibig's type 12, variant I (specifically Geibig's construction type 12-12/10-6-11; Geibig 1991, 56–60), Petersen's type X (Petersen 1919, 158–167) and Ruttkay's type VII (Ruttkay 1976, 249–251). The sword ranks among other rather robust swords with massive crossguards, pommels in the shape of a full semicircle as well as massive blades, so this sword can also be classified as an earlier variant of type X, as it was defined by P. Kucypera, T. Kurasiński and P. Pudło (2011). Regarding the classification of type X according to Petersen (1919, 158–167), this sword's features belongs at the boundary of earlier and later variants. The crossguard belongs to type 6 according to A. Ruttkay (1976, 249).

It is impossible to describe the blade morphology from the characteristics of Geibig's typology (Geibig 1991, 83–90). A variant of the blade with an displaced central fuller is not mentioned at all in Geibig's typology. Since the fuller is not visible until almost 10 cm below the crossguard, it is impossible to measure the parameters of the fuller narrowing over the first 40 cm from the crossguard. This is, according to Geibig, the most important feature in distinguishing type 2 from type 3 blades, with which other features correspond. The length of the blade is at the maximum limit of these types. Their construction is fairly robust. According to the classification of blades presented in this study, this blade belongs to the group {d} (see Chap. 4.2), of which the blade length is characteristically over 830 mm. In comparison with other 9th and 10th century swords, this group includes slender to medium-robust but mainly very long blades. The group consists predominantly of later Carolingian swords.

Scabbard, straps and outer wrappings

The blade, the crossguard as well as the pommel bore several layers of wrappings. A coarser textile (1), woven probably in twill-weave and present in relatively large areas on both sides of the sword, was found in the surface layer of corrosion of the blade. On side B, near the right edge of the blade, 180 mm from the crossguard, there was a visible ornament. It was made of line of threads, which were circa 0.5 mm thick, and which crossed several other threads over a length of 3.7 mm, so that they created diagonal lines. These lines were the basis for the geometric pattern in a rhombus-formation. On the basis of the preserved documentation it is impossible to decide, whether it was a woven or an embroidered pattern. The textile described lined the wooden body of the scabbard, whose remnants covered the larger part of the blade. Two small square holes in the wood of the scabbard were observed at both edges on the side A at 260 mm from the point. The third hole was visible also on the side A, 80 mm closer to the crossguard by the left edge and it went through not only the wood, but the fine textile and leather as well – these were the materials creating the upper layers of the scabbard. On side B there is a slightly protruding wooden block about 50 mm from the crossguard. In several places on both sides of the blade there were the remains of a textile (2) in a plain weave with a thread count of 13/12. The textile was covered with a layer of thin leather on the block and around the hole in the scabbard on side A. On the protruding wooden block, this leather was covered with another layer of fine leather, which reached to the lower rim of the crossguard and therefore could not have been part of the scabbard. Another textile in a plain weave with a sparse thread count of 8/8 (3) was found on the pommel, with a few unclear signs of leather preserved on it. Both these layers also partially covered the crossguard.

Metallographic examination

Sampling: Sample [1] was taken from the left side of the blade 550 mm from the crossguard; sample [1-A] was subsequently detached from sample [1] and annealed in a controlled manner to obtain a microstructure consisting of ferrite and pearlite; sample [2] was cut out from the right side of the blade 155 mm from the crossguard; sample [2-A] was taken later from the same cut in the blade after it had withstood the fire; sample [3] was taken from the right side of the crossguard 30 mm from the tang (see Fig. 29:a).

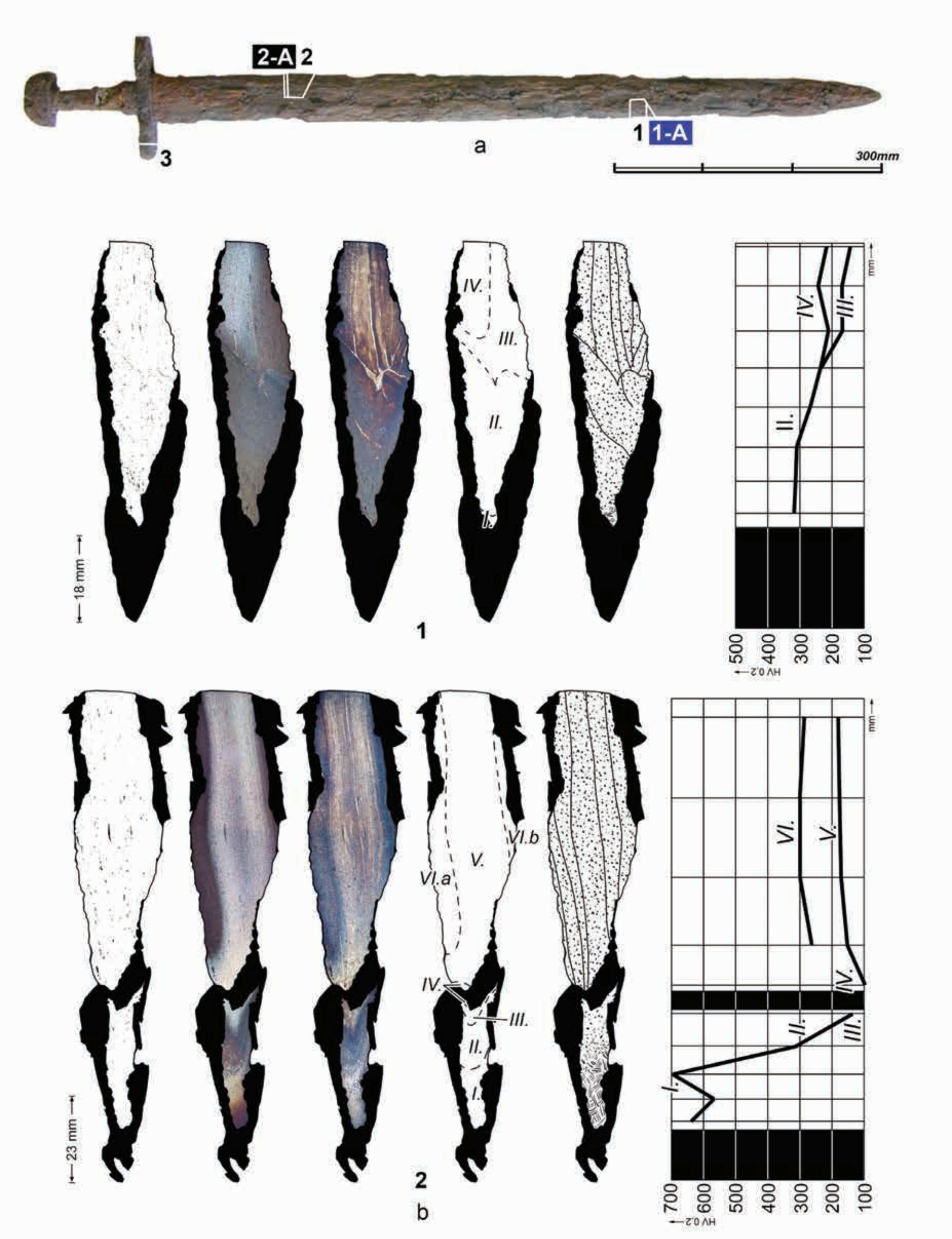

Fig. 29. Sword from the grave No. 341; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

Metallographic description of the blade: **SAMPLE [1]:** The metal purity generally corresponds to level 3 to 5 on the Jernkontoret scale. Area I (the closest to the original tip of the cutting edge) consists of a fine pearlite and tempered martensite microstructure (but pearlite dominates; see Fig. 30:a). Area II contains fine pearlite with a hardness of 305 ± 23 HV0.2. Area III, registered beyond a distinctive transverse weld, consists of a mostly pearlitic (locally with traces of ferrite) microstructure with a hardness of 227 ± 15 HV0.2 (Fig. 30:c). Area IV is ferritic-pearlitic with a hardness of 160 ± 15 HV0.2, grain size of ASTM 9 and a carbon content up to between 0.5 and 0.6% C (Fig. 30:d). Welds are clearly distinguishable as white lines (Fig. 30:b).

SAMPLE [2]: The metal purity roughly corresponds to level 3 to 5 on the Jernkontoret scale. The sample reveals, when etched, several microstructural areas (see Fig. 29:b), out of which Area I (representing the tip of the cutting edge) consists of tempered martensite (having a hardness of 635 ± 62 HV0.2) with scattered areas of fine pearlite (Fig. 30:e, f). Towards the centre of the blade the proportion of pearlite increases and the microstructure changes into a mixture of pearlite and martensite (Area II), with a gradually higher proportion of fine pearlite. Hardness of this area is about 300 HV0.2. Area III consists of a pearlitic-ferritic microstructure (ASTM 9; circa 140 HV0.2). Coarser grains of ferrite occur on both sides of the imperfect weld in Area IV (hardness of about 90 HV0.2; see Fig. 30:g). The adjoining Area V consists of a fine-grained pearlitic-ferritic microstructure (ASTM 9) with 0.25 to 0.55% C and a hardness of 173 ± 12 HV0.2. Area VI consists of fine pearlite with scattered particles of cementite in the zone VI-a, and with traces of ferrite in the zone VI-b. The hardness of the pearlite is 289 ± 17 HV0.2. Welds are distinguishable within the structure as white lines.

SAMPLE [1-A]: The cutting edge and the right side of the blade body contain pearlite with traces of ferrite (hardness 249 ± 17 HV0.2); the left side of the blade body contains a ferritic-pearlitic microstructure with circa 0.35% to 0.55% C (Fig. 32:f-h).

SAMPLE [2-A]: The microstructure of the cutting-edge tip consists of cementite particles dispersed in a matrix of ferrite; its hardness is 221 ± 3 HV0.2. The character of the microstructure changes from the cutting-edge towards the body. In the edge the cementite appears in the ferrite matrix in the form of both fine-dispersed particles and a network; but the cementite network prevails in the proximity of the blade body (Fig. 32: a-c). Ferritic grains gradually appear in the microstructure where it approaches a transversal weld (highlighted by iron oxides); the weld itself is surrounded by coarser grains of ferrite (Fig. 32:d). The middle portion of the blade consists of a mixture of grains of ferrite and an uneven dispersion of cementite in a ferritic matrix, though next to one of the specimen margins no ferrite is observed (Fig. 32:e).

Metallographic description of the crossguard: **SAMPLE [3]:** The metallic matrix is nearly free of inclusions (its purity corresponds to level 1 of the Jernkontoret standard), but a locally high density of fine to coarse inclusions appears in some areas (the metal purity corresponds to level 4–5 of the Jernkontoret standard). Area I contains a ferritic-pearlitic microstructure with circa 0.35% C. The grain size is ASTM 9, the hardness of this area is 158 ± 8 HV0.2 (Fig. 31:b). Area II contains a fine-grained ferritic-pearlitic microstructure with a carbon content varying between 0.05 and 0.25%. Area III is ferritic with grain size 6 to 5 ASTM and a hardness of 97 ± 2 HV0.2 (Fig. 31:c).

Assessment: The blade was made entirely of steel and consists of two cutting edges and one middle element of steel. A number of lengthwise welds in the middle of the body of the blade suggests that it was made by piling. A microstructure of tempered martensite mixed with pearlite is present only in the tips of cutting edges, suggesting that the blade was quenched in such a way that the edges were cooled faster than the centre. The coarse grains of ferrite adjacent to the weld between the cutting edge and the blade body

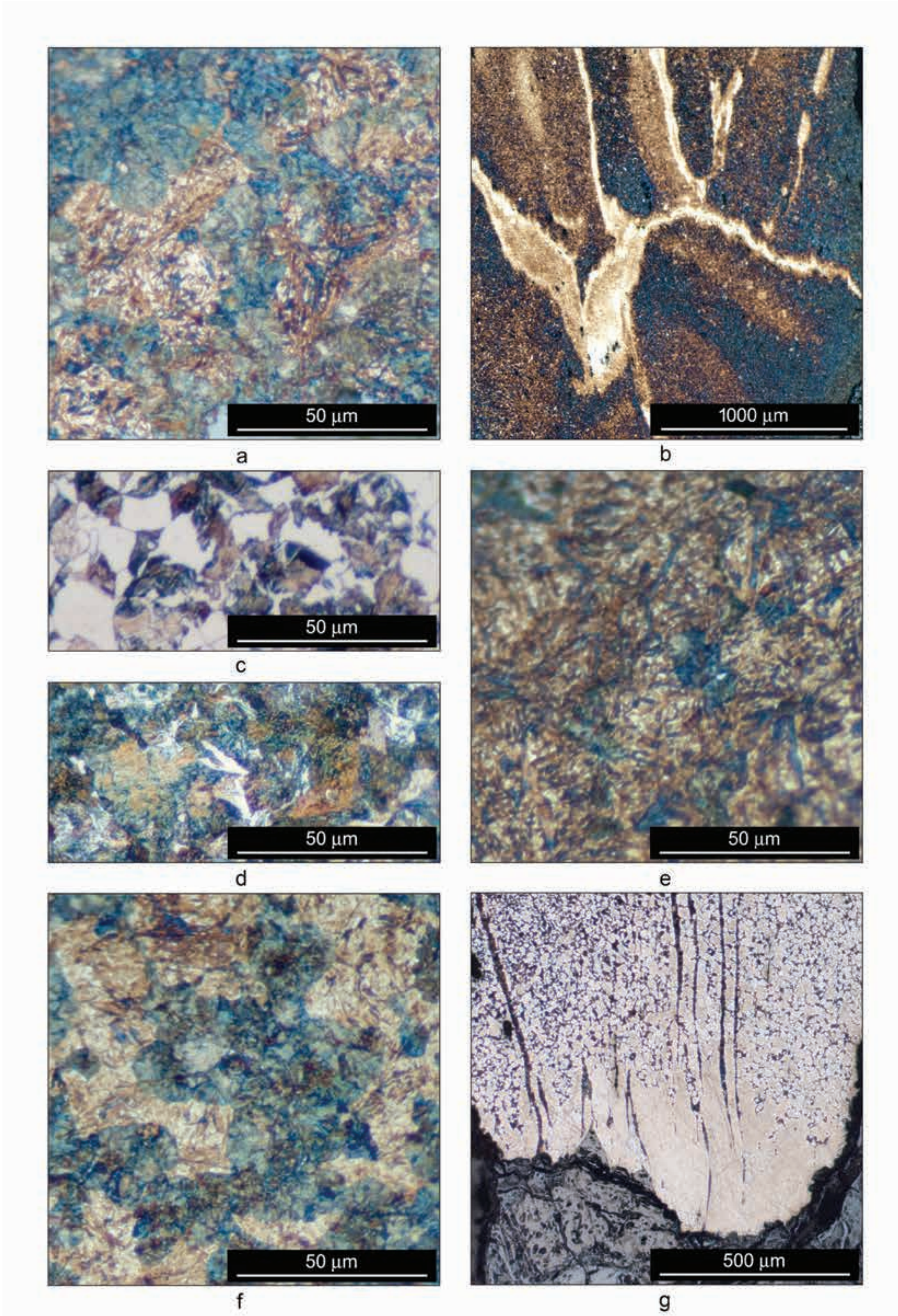

Fig. 30. Sword from the grave No. 341; a – tempered martensite with fine pearlite in Area I, sample [1]; b – a clearly distinguishable welding line between the cutting edge and middle portion of the blade in sample [1]; c – the ferritic-pearlitic microstructure of Area III, sample [1]; d – pearlite with traces of ferrite in Area IV, sample [1]; e – tempered martensite in Area I, sample [2]; f – tempered martensite with fine pearlite in Area I of sample [2]; g – coarse-grained ferrite adjacent to the weld (Area IV, sample [2]);etched with Nital (a, c–g) and Oberhoffer's reagent (b). Photos by J. Hošek.

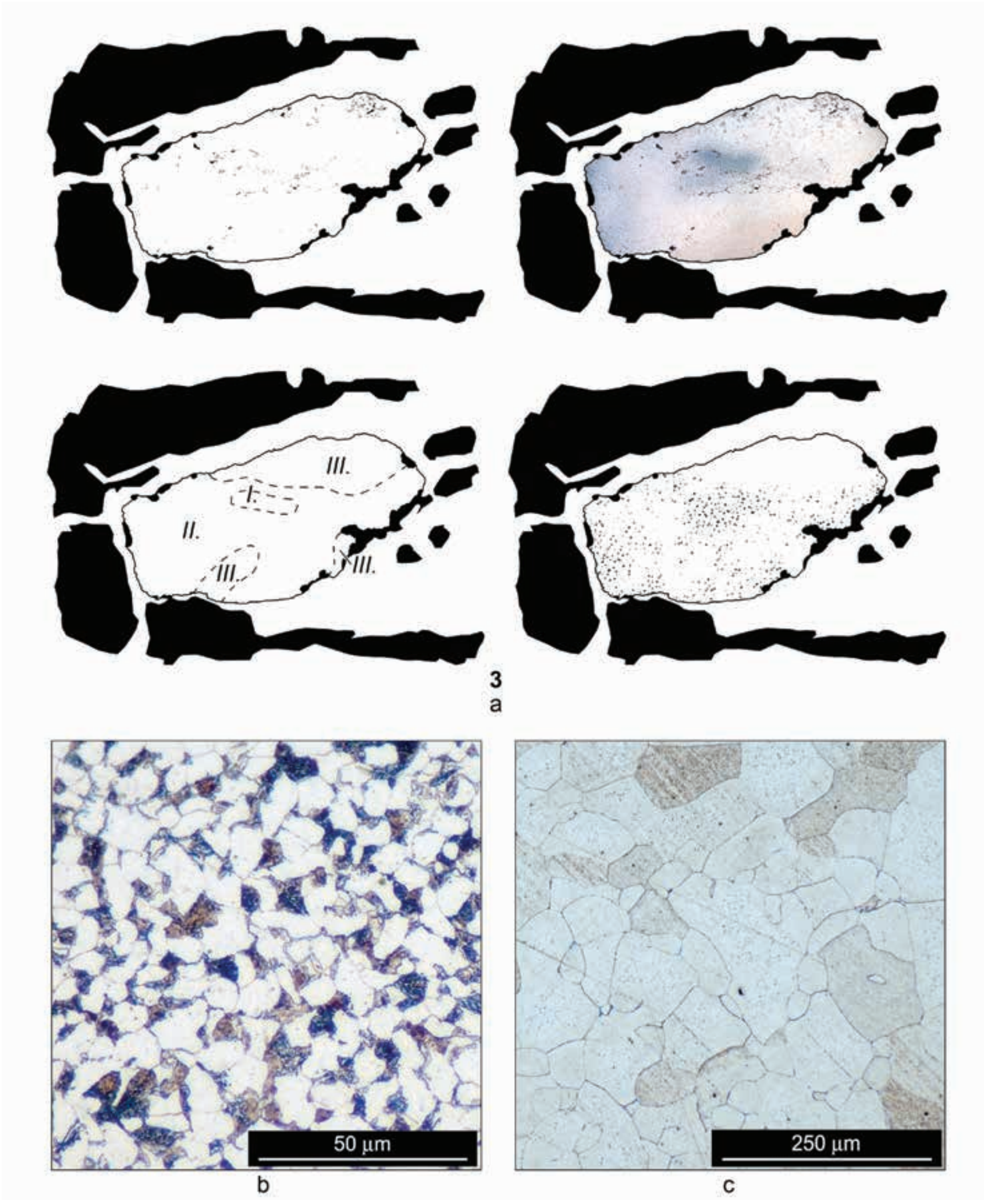

Fig. 31. Sword from the grave No. 341; a – schematic drawings and macro photo of the crossguard sample (from the left downwards: before etching, after Nital etching (photo), layout of areas described, distribution of the structures). b – ferritic-pearlitic microstructure of Area I, sample [3]; c – ferritic microstructure of Area III, sample [3]; Nital etched. Photos and drawing by J. Hošek.

in sample [2] suggest that the components of the blade were not welded together well. Iron oxides within the imperfect weld caused the local decarburisation of the microstructure. Still, the blade must be considered a product of fairly skilful blade construction and heat treatment. The sword was a functionally very good weapon. The crossguard of the sword was made of heterogeneous material fluctuating between iron and steel with no traces of welding. It was probably made from unsorted iron or, perhaps, from a partly processed bloomery iron.

3.4.5 Sword from the grave 375

Circumstances of the discovery

The burial pit, 260 cm long, 115 cm wide and at a depth of 140 cm below the surface, was discovered during the excavation directed by J. Poulík, in area No. 4 'IIIrd church 1956–57' (Poláček/

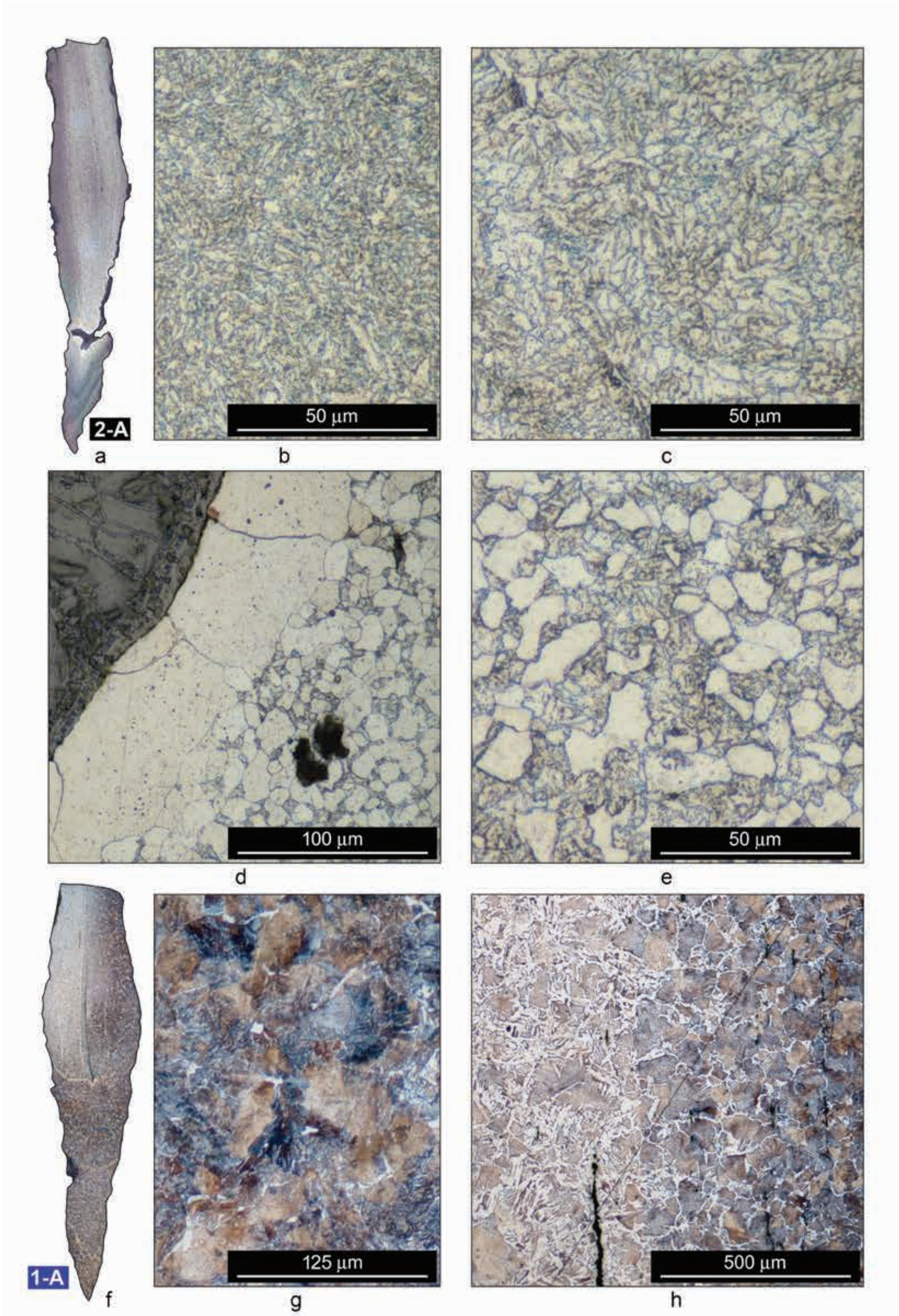

Fig. 32. Sword from the grave No. 341; a – sample [2-A]; b – a fine dispersion of cementite in a ferritic matrix in the preserved cutting edge; c – farther from the tip of the cutting edge is a microstructure consisting mainly of a cementite network at grain boundaries ; d – ferritic grains surrounding the imperfect weld; e – mixture of ferritic grains with a dispersion of cementite in ferrite in the middle portion of the blade; f – sample [1-A]; g – pearlite with some ferrite in sample [1-A]; h – transition between more and less carburized parts in the blade body (the weld line is indistinct at this point); Nital etched. Photos by J. Hošek.

Marek 2005, 56–67) in the square A19 (sector XII) about 5 m to the south of the southern side of the atrium of the III[rd] church. The orientation of the grave and the skeleton followed the orientation of the church (NWW-SEE). On the NW side the burial pit almost adjoined the grave 376 (with spurs) and on the western side the graves 486 (with spurs) and 362, which were in almost total superposition (the grave 486 was older). Nevertheless, the burial pit 375 followed the shape of the neighbouring burial pits. The pit was rectangular with rounded corners and had almost imperceptible walls. A dark grave-fill of sand and clay contained pottery shards, bones, iron fragments (594-457/57) and several fragments of mortar. At 10 cm above the skeleton the colour of the grave-fill darkened.

The very badly preserved remains of a full-grown man (Stloukal 1967, 296) lay spread on the bottom of the grave to a length of about 185 cm (Fig. 33).

Along the left side of the body, approximately from the (missing) elbow to halfway down the tibia a sword lay flat (1). On the hilt of the sword there lay an iron knife (or knives) (2) with the tip pointing to the head and the cutting edge to the body of the deceased. By the scabbard of the sword there was a trefoil fitting for the strap of the sword (3) covered with textile. In the angle between the crossguard and the grip there lay a rectangular roof-like fitting for a strap of the sword (4). By the right side of pelvis there was a firesteel (5) and an iron object, possibly a folding knife (6). On the right femur there was an axe (7), the cutting edge pointing away from the body, and the haft originally pointing to the head. The man had footwear with spurs (8) on his legs. Without a precise location within the grave there was a fragment of an iron object with a rivet (9). To the grave 375 belonged, according to the *DGU*, an iron bowl of the Silesian type (10?) described in the inventory as an iron fitting and a bucket (11?), to which there is no reference to the number of the grave in the inventory. The fragments of neither the bowl nor the bucket are visible in the photograph of the grave (Fig. 33), and so their affiliation with the grave 375 is uncertain. In the description of the A19 square there is a suggestion of a link between a silver cross with the relief of Crucified Christ with halo, dressed in long clothes (594-1022/56) and the grave 375. The cross was found 40 cm above the level of the man's legs before the burial pit silhouetted. The probability of the relocation of the cross to such relatively great distance from the chest of the buried man, where it would most likely have been placed, is very low, when there are no signs of disruption of the grave.

Finds

1) The iron sword with remains of the scabbard (594-2977/57; Fig. 34–40).
2) The iron knife with a whittle tang, which, according to the photographs of the grave, extended from the bottom part of the pommel to the beginning of the blade of the sword and was therefore at least 140 mm long. According to the *DGU* and the *ILF*, one fragment of the iron knife should have evidence number 594-2991/57. However, under this number remains of wrapping and straps of the sword with triangular fitting were found. A fragment of the tip of the blade, sheathed in a wooden scabbard and preserved to a length of 58 mm, which was recognized among the fragments of the scabbard of the sword and its organic wrappings (594-2994/57).
3) The trefoil fitting from the straps for the sword (594-2991/57). The middle triangular part is flat, decorated with three dimples (initially perhaps for decorative inserts) circled by engraved lines. On each side of the triangular middle part short slats protrude. They are filled with a row of three rivets with high heads. The slats create short arms of the fitting (29 × 28 mm, width of the arms cca 20 mm). On the back side there were remains of leather straps (Ungerman 2011a, 581, Abb. 6:2).
4) The iron rectangular arc-shaped fitting from the straps of the sword (594-2990/57), 49 mm long and about 20 mm wide. It is divided into three identical fields, each decorated by two dimples. Between the fields, where the fitting bends, two bands with three rivets each were inserted. On their back side there were remains of leather (Ungerman 2011a, 581, Abb. 6:1).

5) The firesteel of undescribed appearance (without evidence number). Not at a disposal in 2003.
6) The iron object, appointed as a folding knife (without evidence number). Not at a disposal in 2003.
7) The iron axe, according to the photographs of the grave in the shape of the bearded axe (without evidence number). Not at a disposal in 2003.
8) The pair of spurs (without evidence number). Not at a disposal in 2003.
9) The irregular iron fragment of an object with a rivet made of thicker arched sheet with recessed back (594-2993/57). It could be part of asymmetric fitting of straps of the sword.
10) Two fragments of a flat iron bowl (594-2992/57) with a diameter of about 180 mm.
11) The iron parts of a bucket; thin hoops, rectangular banded loop and a fragment of a handle with hook (594-2995/57).

Description of the sword

This is a double edged sword (evidence number 594-2977/57; Fig. 34–36), which is the longest within the whole set (1042 mm), and it had at the time of its documentation in 2003 a weight of 1120 g. The weight of the remains of a scabbard was negligible. The point of balance on the blade was at 220 mm from the crossguard. After the fire in Mikulčice the sword was preserved in one piece with a weight of 1045 g.

The bulky single pommel, 64 mm long, 32 mm high and 22 mm wide, is of semicircular shape with a distinct incline of the sides towards the base. From the side the pommel is rectangular, in the horizontal it has an oblong oval silhouette. The pommel is placed on the tang, which goes through the pommel regularly; both the parts fit tightly to each other.

The grip, which is 101 mm long, bore remnants of wood preserved below the pommel. The tang broadens towards the crossguard from 21 mm to 28 mm. The crossguard, 12 mm high and in maximum extent 30 mm wide, has one arm damaged. Assuming that the crossguard was axially symmetric, we can correct the measured length from 119 mm to 125 mm. From the front view the crossguard was rectangular with slightly rounded sides, in the horizontal view it was rectangular with slightly arched sides and flat ends. The hole for the tang and the blade in the crossguard has step-like broadening in its shape.

Fig. 33. Mikulčice-Valy, Hodonín County; grave No. 375; photograph of the burial viewed from SEE. Photo from the archive of the Institute of Archaeology of the AS CR, Brno.

The fairly robust and very long double-edged blade (897 mm long, 57 mm wide below the crossguard) narrows distinctly from halfway along its length towards the long, distinct point. The narrow fuller (maximum width is circa 18 mm) extends, according to the X-ray images, from the crossguard to about 160 mm from the point.

Typological determination of the sword

On the basis of the single semicircular pommel (Geibig's construction type III; Geibig 1991, 90–100), the flat base of the pommel and the crossguard whose length exceeds 110 mm, the sword may be classified as Geibig's type 12, variant

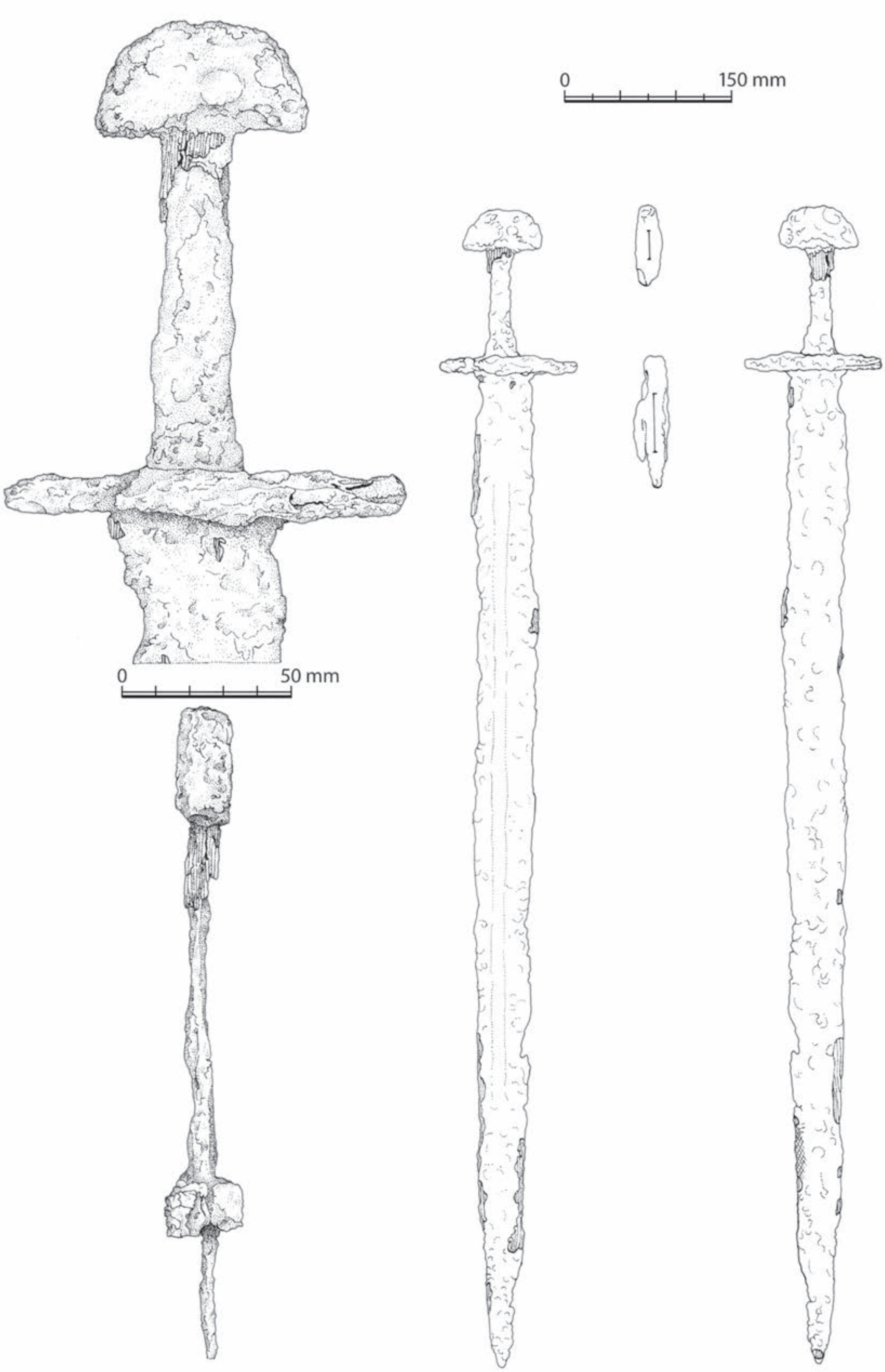

Fig. 34. Mikulčice-Valy, Hodonín County; sword from the grave No. 375 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

I (specifically it is Geibig's combination type 12-10-5-10; Geibig 1991, 56–60), as Petersen's type X (Petersen 1919, 158–167) and as Ruttkay's type VII (Ruttkay 1976, 249–251). The sword may be described as robust. The shape of the pommel corresponds with a later variant of type X according to Petersen's classification (1919, 158–167). Also according to the classification of semicircular single pommels presented by Kucypera, Kurasiński and Pudło (2011) it would be ranked among the later variants of type X. Swords with pommels (without an upper guard) correspond, with the 'design principle 6' according to Jakobsson's classification (Jakobsson 1992, 55–57). The crossguard may be described as Ruttkay's type 7 (Ruttkay 1976, 249).

Any attempt to describe blade of the sword 375 by Geibig's typology leads to ambiguous results. There is no Geibig's type that would meet all the blade parameters; on the contrary, some values are on the boundary of several types. The length of the blade is beyond those of Geibig's types 2 and 3, but it clearly corresponds with types 5b and 6a, together with the fuller/blade length ratio and the shape of the point. The width of the blade corresponds also to type 6a, but it is, however, acceptable also for types 2c and 3. On the boundary of all the above mentioned types (2, 3, 5, 6) is the width of the fuller, while the length of the fuller is acceptable for types 2a, 2c and 5b. Finally, the narrowing of the blade over the first 600 mm paradoxically oscillates about the minimum limits of types 2c and 3 (owing to the long blade). The blade from grave 375 has most features similar to Geibig's type 6a but is inclined somewhat towards types 2c and 5b. Owing to the impossibility of measuring the narrowing of the fuller it is also necessary to include type 3. While types 2 and 3 are generally dated by Geibig from the mid-8th to the mid-10th centuries, type 5 is dated from the mid-10th to the late 11th century and type 6 to from the mid-11th century to the mid-12th century (Geibig 1991, 150–154). It is, therefore, possible to conclude, that the blade from the grave 375 is indescribable according to the Geibig's typology. In fact, Geibig's typology does not fit other Mikulčice swords of Petersen's type X /(Geibig 12, I) and Petersen's type N /(Geibig 8). In the late 9th century and early in the 10th century there were blades made longer and of more slender construction than types 2 and 3, but at the same time more robust than the later types 5 and 6. According to the morphological classification introduced in this study, this blade belongs to the group {d} (see Chap. 4.2), for which the blade length exceeding 830 mm is typical. In comparison with other 9th and 10th century swords, this group includes specimens with slender to medium-robust shapes and mainly very long blades. Later Carolingian swords predominate in this group.

Scabbard, straps and outer wrappings

The scabbard of the sword was probably (at least partially) lined with a textile. The very unclear and indistinct structure of the textile is visible on the side B by the left cutting edge near the point. The textile is overlaid by remains of the wooden scabbard, which is preserved in little fragments on several places along the edges of the blade. The sword was equipped with an iron garniture consisting at least of a trefoil fitting (594-2991/57) and a rectangular arc-shaped fitting (594-2990/57).

Metallographic examination

Sampling: Sample [1] was cut out from the left side of the blade 405 mm from the crossguard; sample [1-A] was subsequently detached from sample [1] and annealed in a controlled manner; sample [2] was cut out from the right side of the blade 276 mm from the crossguard; sample [2-A] was taken later from the same cut in the blade after it had withstood the fire; sample [3] was removed from the left side of the crossguard 34 mm from the tang (see Fig. 37:a).

Metallographic description of the blade: SAMPLE [1]: The metal purity of the cutting-edge area is good (corresponding to level 2 to 3 on the Jernkontoret scale). Also the area in the middle portion of the blade is pure, but a distinct chain of fine inclusions (probably a weld) is present

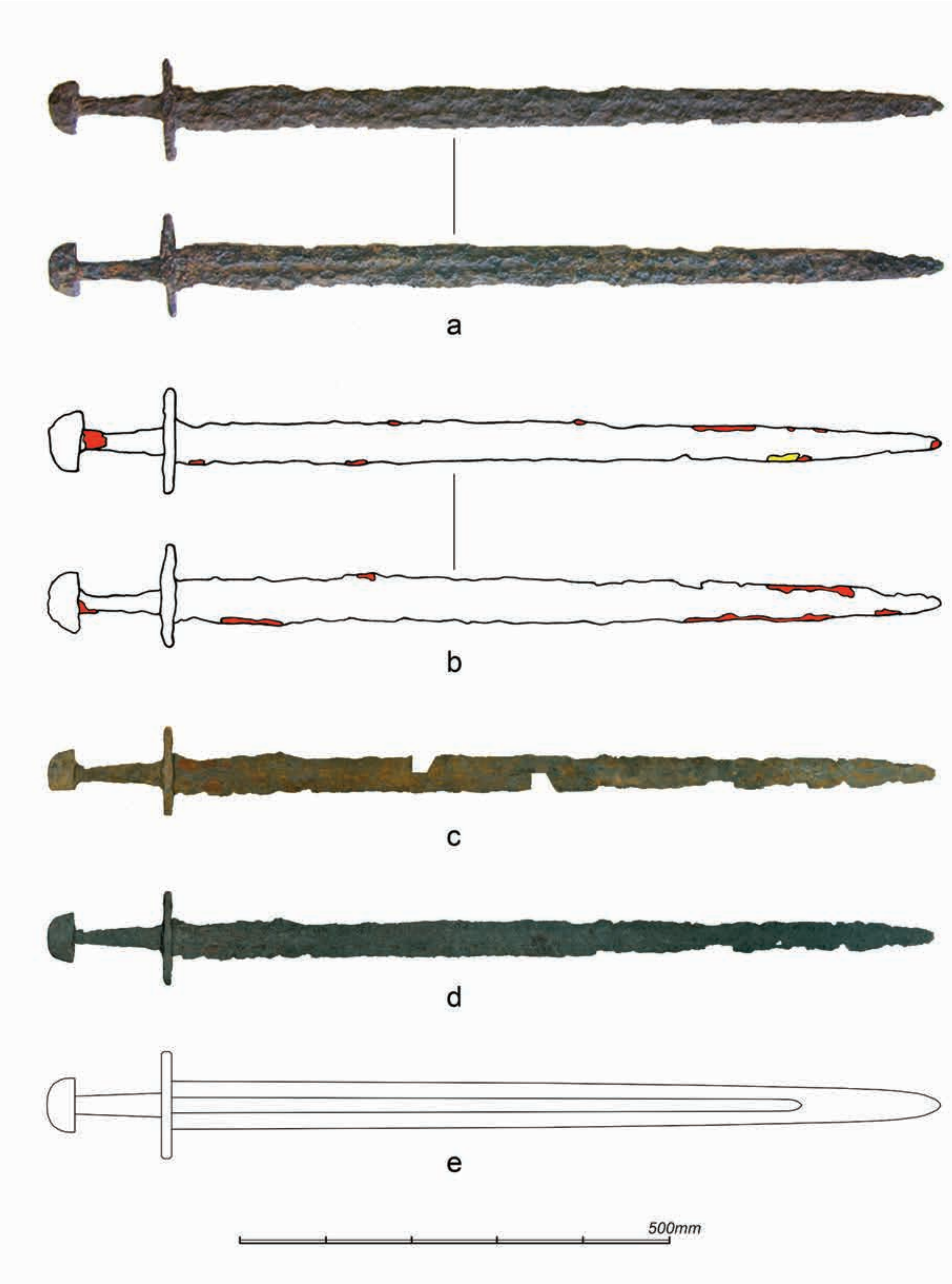

Fig. 35. Sword from grave No. 375; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard and covering of the tang); discoloured: metal surface of the weapons and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

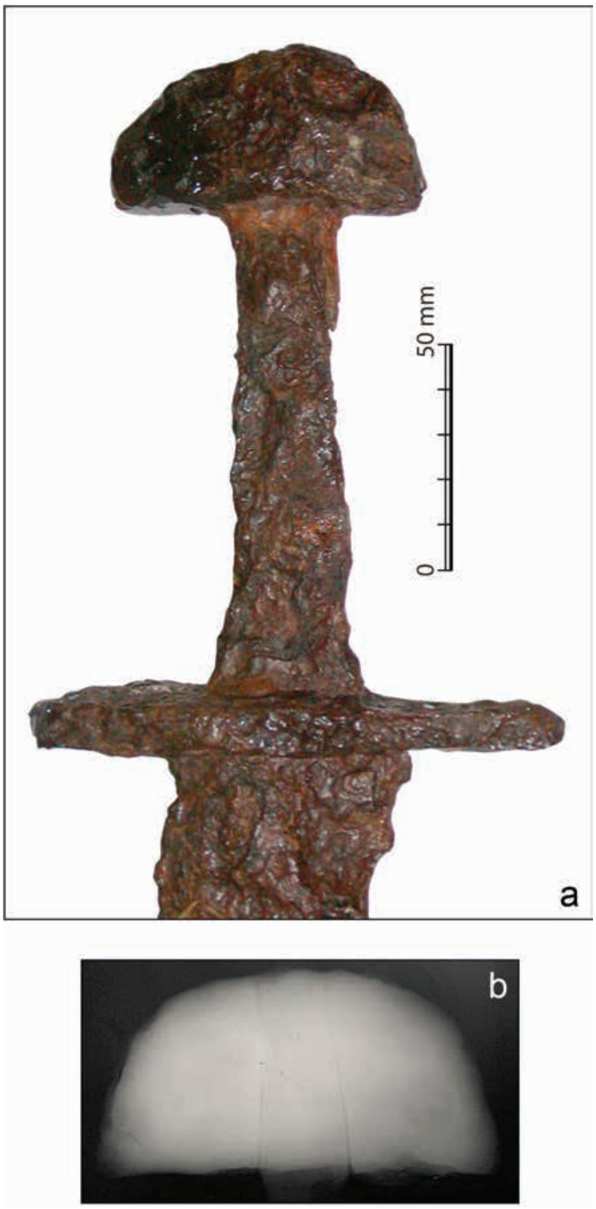

Fig. 36. Sword from the grave No. 375; a – hilt from the side B (documentation of the sword in 2003); b – X-ray image of the pommel (documented prior to the depository fire). Photo 'a' by R. Gronský; photo 'b' by Institute of Archaeology of the AS CR, Brno.

there. The junction of the cutting edge and the middle portion of the blade also contains an increased number of fine inclusions (level 4 on the Jernkontoret scale). The following microstructural areas were found in the cutting edge, which had been highly affected by corrosion (Fig. 37:b): Area I consists of martensite (hardness is 570 HV0.2), Area II consists of a mixture of martensite (slightly tempered or slack-quenched?) and fine-pearlite (hardness is 470 HV0.2; see Fig. 38:a). Area III consists of a microconstituent, which may be bainite or fine pearlite with a hardness of 357 ± 51 HV0.2 (the maximum is 400 and the minimum is 290 HV0.2, and it decreases towards the core of the blade). A partially discernible welding line is followed by Area IV, whose microstructure consists of fine pearlite (and locally some ferrite) with a hardness of 249 ± 14 HV0.2. Area V consists of a mixture of ferrite and pearlite with an unevenly distributed carbon content (between roughly max. 0.35 to 0.7% C). Area VI is very similar to Area V, however with

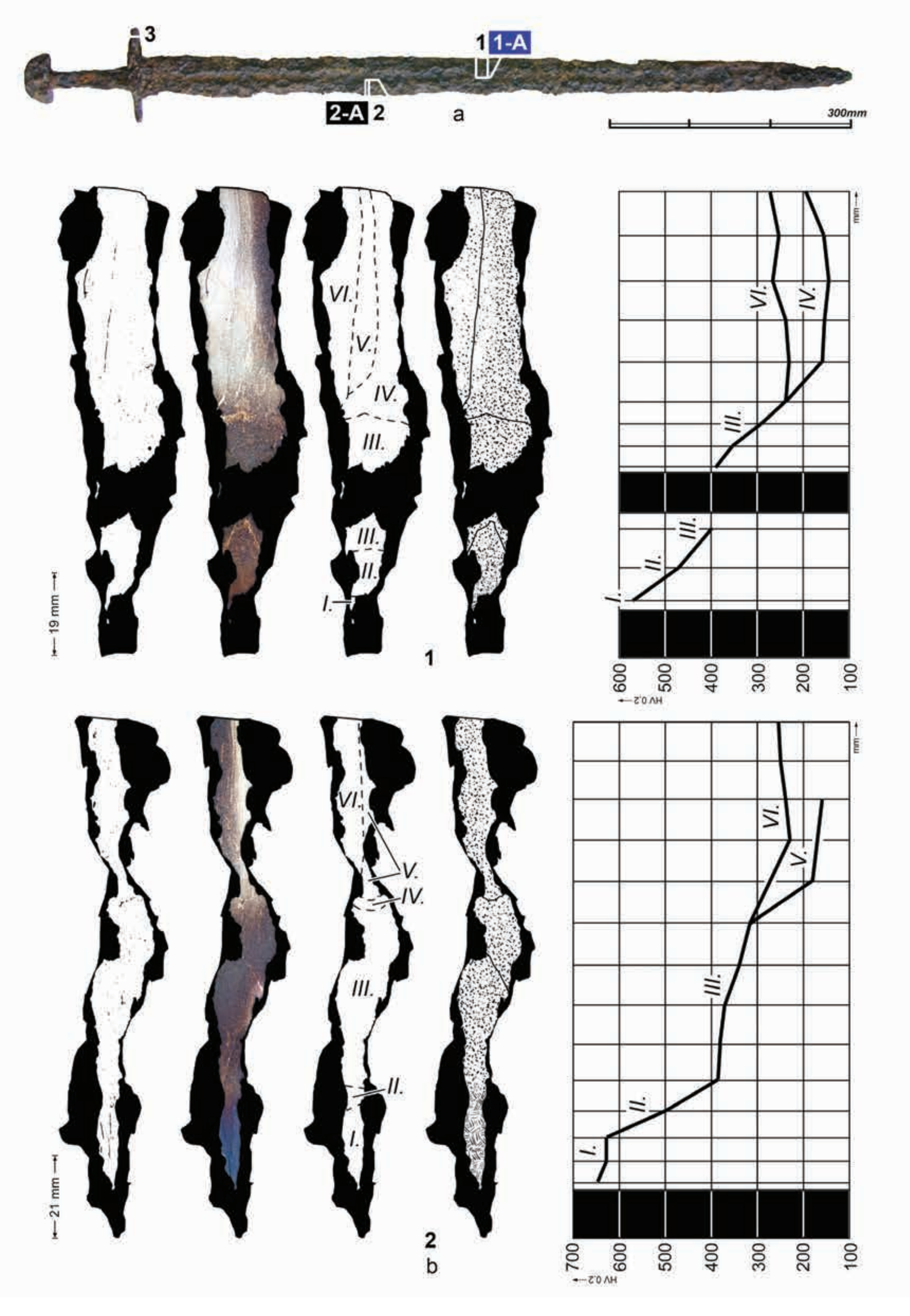

Fig. 37. Sword from the grave No. 375; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

a generally lower carbon content (less than 0.35% C in most of the area; in comparison with sample 2-B a maximum of 0.25 to 0.3% C could be expected) and it is less darkly-etching. The hardness of this area is 161 ± 19 HV0.2. There are three discernible welds: one in the cutting edge, second between the cutting edge and the body of the blade, which is rather indistinct, and third, this time clearly distinguishable dividing areas V and VI (Fig. 38:b).

SAMPLE [2]: The metal purity in the cutting edge area is rather low; there are some fine as well as a number of coarser inclusions appearing in the matrix (level 3 on the Jernkontoret scale). Compared to the cutting edge, the middle portion of the blade is relatively pure (level 2 on the Jernkontoret scale). The line of attachment of the cutting edge onto the middle portion of the blade can be located by a crosswise line of inclusions and some corrosion. The following microstructural areas can be found in the etched condition. Area I, located in the tip of the cutting edge, contains a martensitic microstructure with a hardness of 633 ± 10 HV0.2 (Fig. 38:c). Area II contains a mixture of martensite (slightly tempered?) and fine-pearlite with a hardness of 500 HV0.2 (Fig. 38:d). Area III consists of a microstructure, which might be bainite or fine pearlite with a hardness of 358 ± 30 HV0.2 (the hardness falls from 386 to 314 HV0.2 on moving towards the centre of the body; see Fig. 38:e). Area IV is a pearlitic-ferritic microstructure (with a maximum 20% of ferrite) with a fluctuating ferrite grain size. It is the last area belonging to the original cutting edge. Following a discernible weld line, an Area V (a, b) can be determined. Area V-a consists of a pearlitic-ferritic microstructure with less than 0.6% C and hardness about 180 HV0.2; Area V-b consists of a similar microstructure but with less than 0.5% C, and hardness of 160 HV0.2), but etches significantly less darkly. Area VI contains fine pearlite with traces of a ferritic network in places. The hardness of this area is 243 ± 12 HV0.2. Only two welding lines can be distinguished with certainty in the whole sample: one is in the cutting edge, the second divides the cutting edge from the middle portion of the blade (Fig. 38:f).

SAMPLE [1-A]: The cutting edge contains a pearlitic microstructure with a hardness of 282 ± 28 HV0.2 (Fig. 40:a, b). Pearlite with traces of ferrite is also present in one of the areas on the right side of the blade body, whose microstructure elsewhere consists mostly of ferrite and pearlite, with only around 0.25 to 0.3% C (Fig. 40:c). The carbon content is increased in the body near to the cutting edge due to carbon diffusion from the steel in the cutting-edge.

SAMPLE [2-A]: The cutting-edge tip contains a fine cementite dispersion, which is apparently highly tempered martensite with a hardness of 279 ± 11 HV0.2; towards the body of the blade the microstructure changes into zones of small ferrite grains with a cementite network on the grain boundaries and also zones with fine pearlite (Fig. 40:d, f). In the section of the sample corresponding to the middle portion of the blade, areas of very fine pearlite appear on the sides (the pearlite is apparently spheroidised) with some ferrite in places. An area with a light-etching ferritic-pearlitic microstructure appears in the middle. The welding lines are clearly distinguishable in the sample (Fig. 40:e).

Metallographic description of the crossguard:

SAMPLE [3]: The material is mostly fairly pure (the metal purity corresponds with level 2 on the Jernkontoret scale), but there are also some coarser slag inclusions (level 5 on the Jernkontoret scale), which appear here. Area I consists of a slightly hypoeutectoid to eutectoid microstructure with a hardness reaching 206 ± 3 HV0.2 (Fig. 39:c, d). Area II contains a ferritic-pearlitic microstructure with circa 0.3% C. Grain size corresponds to ASTM 9, and the hardness of this area is 137 ± 8 HV0.2. The carbon content falls to 0.2-0.1% in Area III, the grain size corresponds to ASTM 7, and the hardness is 113 ± 6 HV0.2. Area IV is ferritic with a grain size of 4 to 6 ASTM and a hardness of 115 ± 3 HV0.2.

Assessment: The cutting edges were made of good-quality high-carbon steel but the distribution of the present microstructures, together with

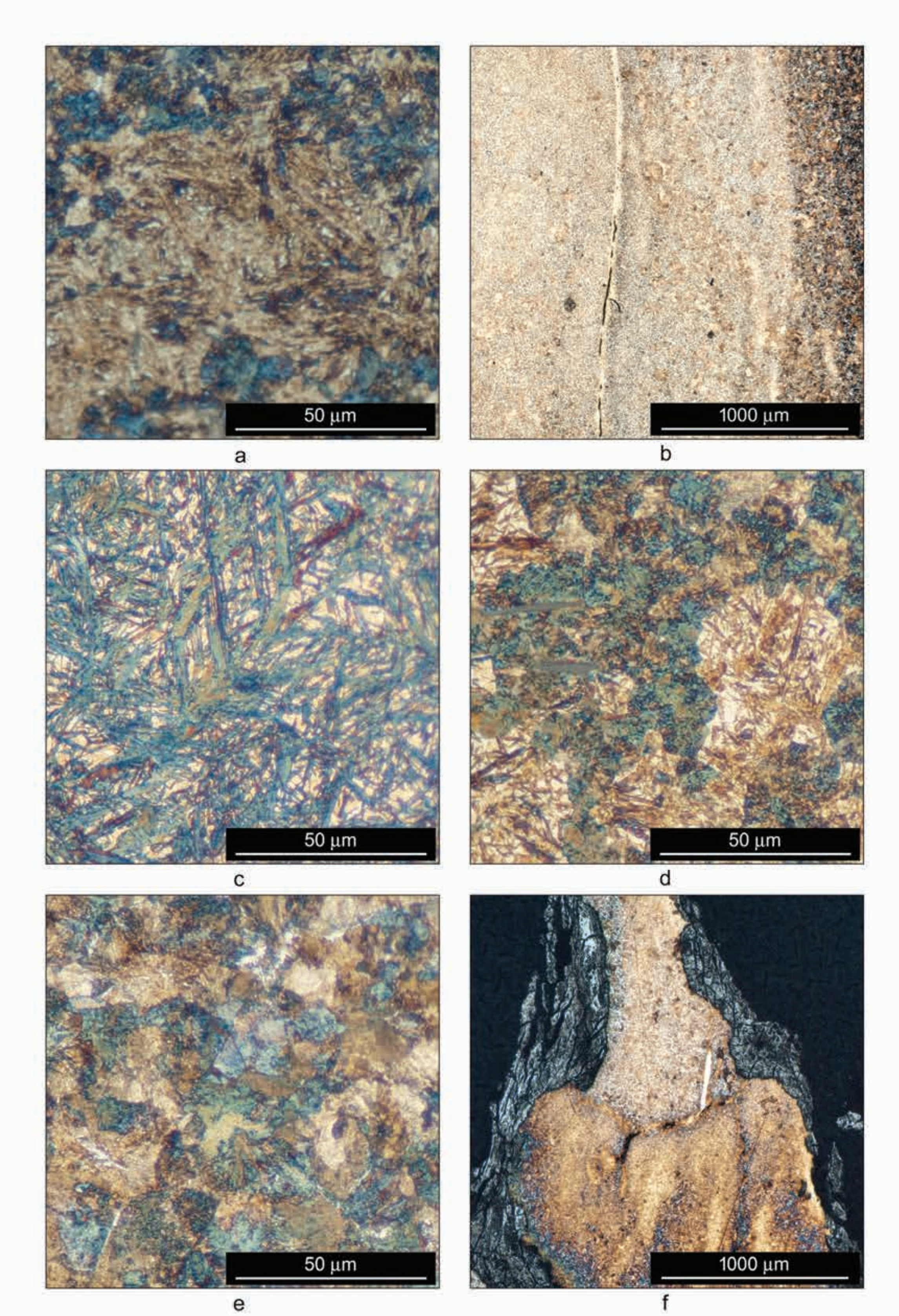

Fig. 38. Sword from the grave No. 375; a – a mixture of martensite and pearlite , sample [1]; b – visible weld in the central part of sample [1]; c – martensitic structure, sample [2]; d – a mixture of martensite and pearlite, sample [2]; e – fine pearlite, sample [2]; f – view of the joint between the cutting edge and the middle portion of the blade, sample [2]; etched with Nital (a–e) and Oberhoffer's reagent (f). Photos by J. Hošek.

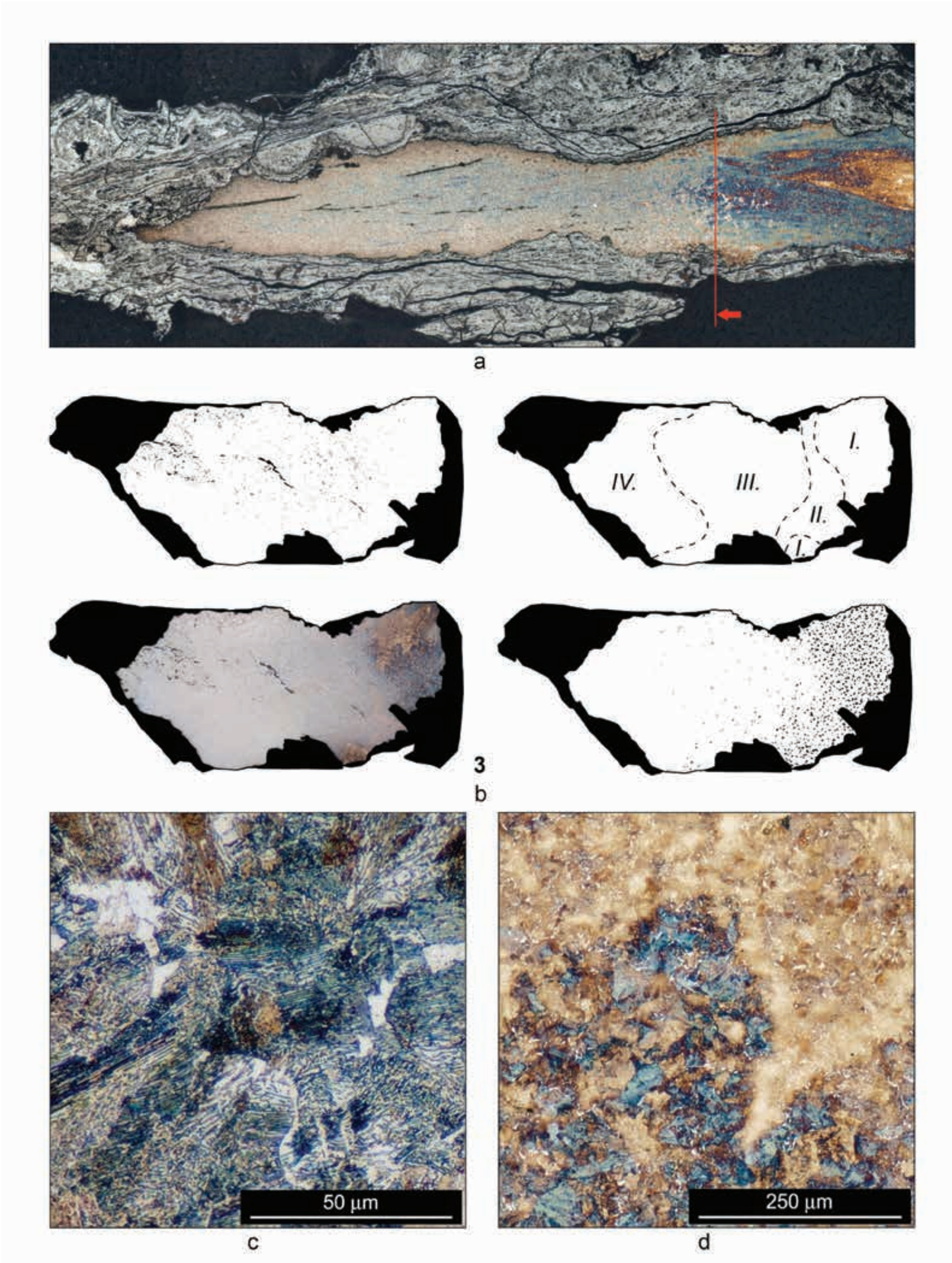

Fig. 39. Sword from the grave No. 375; a – the cutting edge in sample [2] with the border of the hardened part marked; b – schematic drawings and macro photo of the crossguard sample (from the left downwards: before etching, layout of described areas, after Nital etching (photo), illustration of the structure). c, d – pearlitic-ferritic microstructure of Area I, sample [3]; etched with Nital (c, d) and Oberhoffer's reagent (a). Photos and drawings by J. Hošek.

the variations in hardness, indicate that tempered martensite was only formed on the cutting edges. But since the middle portion of the blade is also entirely of steel, the blade cannot have been fully-quenched. Evidently some form of selective quenching was employed. Detected welds reveal that the cutting-edges were prepared by welding at least two individual parts together. The middle portion of the blade, to which the cutting edges were butt welded, has a very uneven carbon content and most likely was welded from three (or more) separate parts; the carbon content in the surface parts of the body

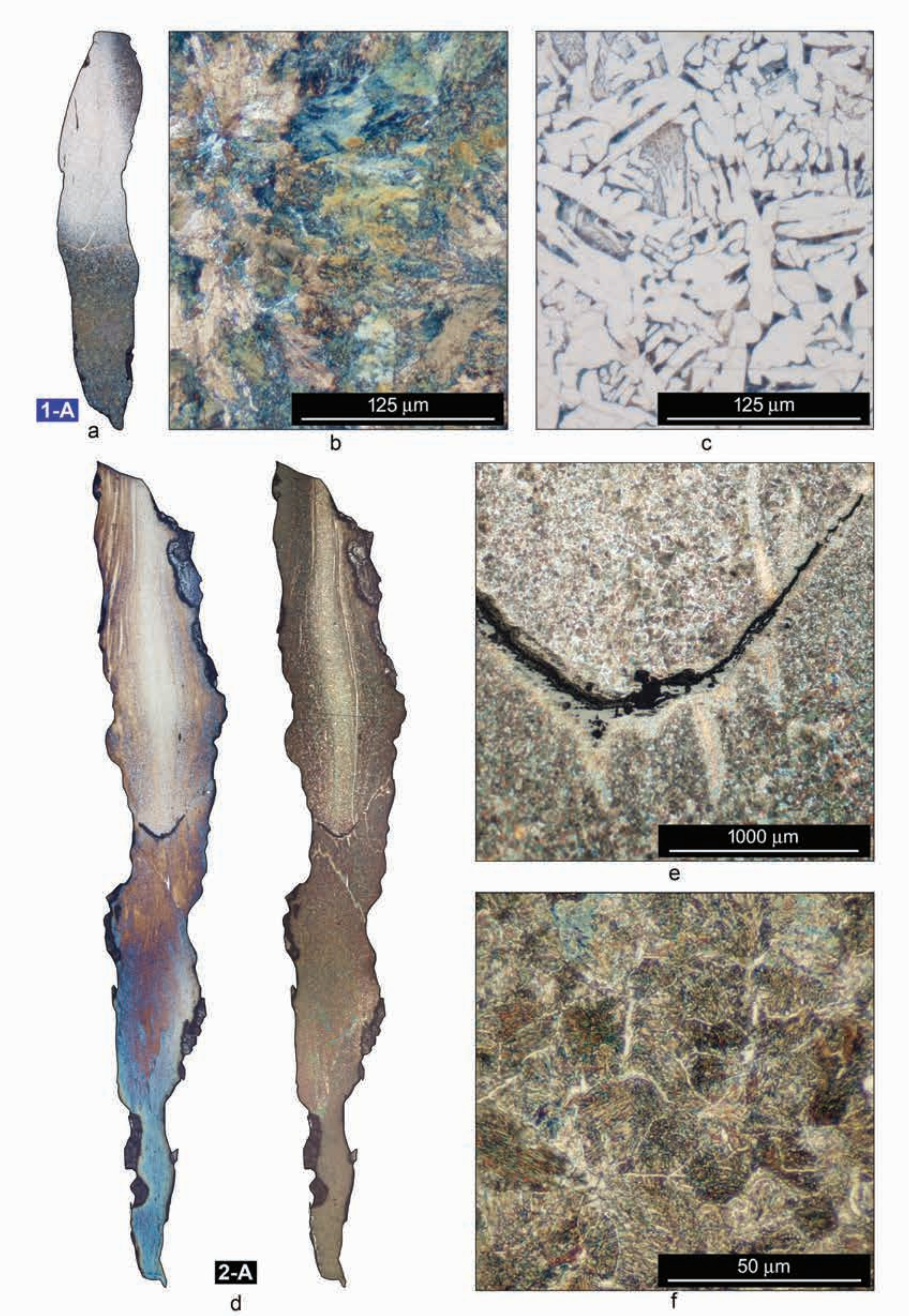

Fig. 40. Sword from the grave No. 375; a – sample [1-A]; b – pearlitic microstructure in the cutting edge of the sample [1-A]; c – ferritic-pearlitic microstructure in the blade body, sample [1-A]; d – sample [2-A]; e – view of the corrosion attacked weld between the cutting edge and the middle portion of the blade, sample [2-A]; f – pearlite with traces of ferrite in the cutting edge, sample [2-A]; etched with Nital (d /right/, b–f) and Oberhoffer's reagent (d /left/). Photos by J. Hošek.

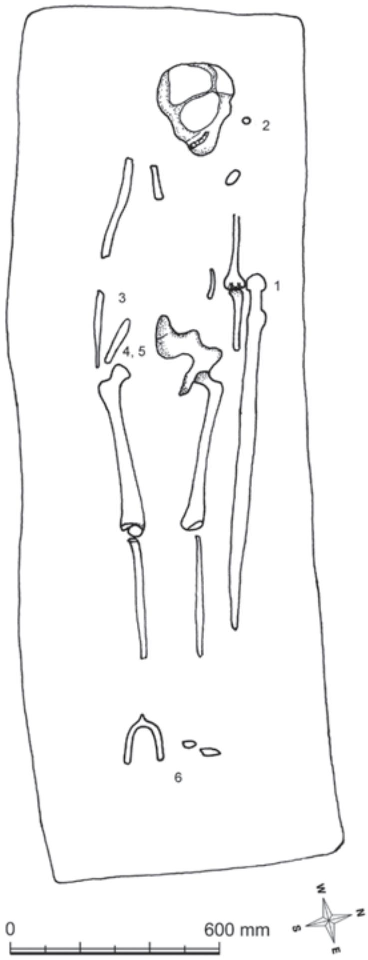

Fig. 41. Mikulčice-Valy, Hodonín County; grave No. 425; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

Fig. 42. Mikulčice-Valy, Hodonín County; grave No. 425; photograph of the burial viewed from the E. Photo from the archive of the Institute of Archaeology of the AS CR, Brno.

was high, but in the central part amounted to only 0.25 to 0.3% C. In terms of the construction of the blade and its heat treatment, the sword can be considered a high quality weapon. The crossguard shows uneven carburisation, which does not suggest a focused effort to increase the strength and hardness of some of its parts. The crossguard could have been made from a partly processed bloomery iron.

3.4.6 Sword from the grave 425

Circumstances of the discovery

The grave was discovered during the excavation directed by J. Poulík, in the excavation area No. 4 'III^rd^ church 1956–57' (Poláček/Marek 2005, 56–67) on the boundary of squares G19 and H19, in later defined sector III, about 4.5 m to the north from the foundations of the northern aisle of the III^rd^ church. The burial pit, with weakly distinct outline, was 235 cm long and 80 cm wide, its bottom lay 120 cm deep below the surface. The pit deviated from the WE orientation in almost 30° to the north, i.e. somewhat more than the III^rd^ church. It disturbed the eastern part of the settlement feature 106 and was sunk 70 cm deep into the sandy subsoil. The grave fill contained pottery shards, fragments of charcoal, bones and fragments of mortar.

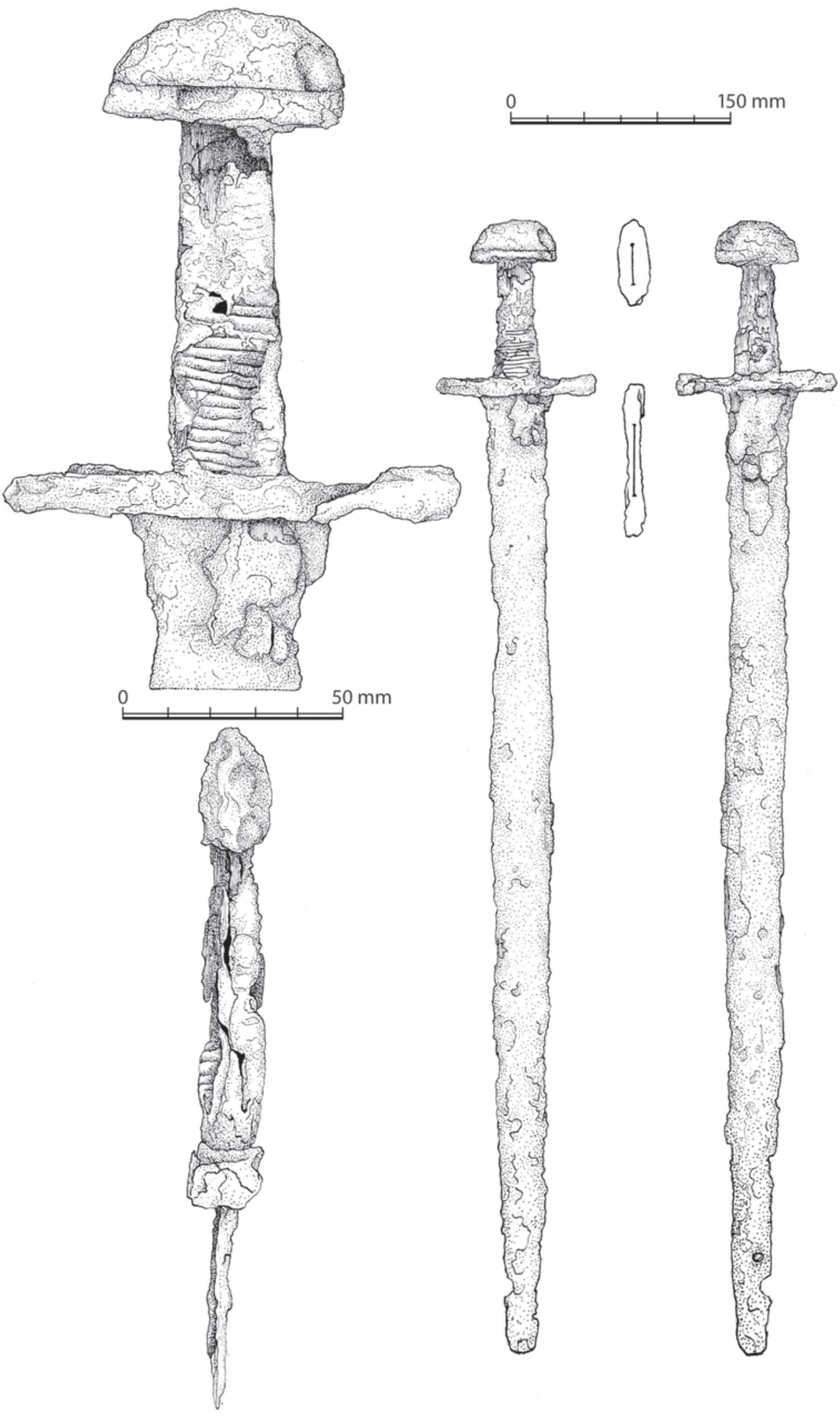

Fig. 43. Mikulčice-Valy, Hodonín County; sword from the grave No. 425 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

The skeleton of a man, whose height was (according to the extent of the bones in the grave) estimated at 175 cm, lay flat on his back and was very dilapidated (Fig. 41 and 42). Anthropological determination was impossible to accomplish (Stloukal 1967, 298). The arms were stretched alongside the body and the palms lay outside the pelvis.

On the left side of the skeleton a sword (1) lay with one cutting edge facing down and the other facing up. The pommel of the sword was just beside the arm near the elbow and the blade reached halfway down to the tibia; the sword, however, was somewhat removed from the legs. By the left side of the mandible there was a globular button (a so-called *gombík*) (2). A knife (3) lay on the right rim of the pelvis. Its blade pointed away from the wrist to the chest. Among the fragments of the knife there were found fragments of other iron objects (4, 5) in the depository. Spurs (6) were found in the area of the feet.

Finds

1) The iron sword with small fragments of a scabbard (594-2975/57; Fig. 44–50).
2) The small gold globular button (so-called *gombík*; diameter 16 mm, height with a loop 18 mm). The button was assembled from a small upper collar, decorated with radially arranged lines and a spherical body. A drop-like loop was embedded in the centre of the collar. Around the base of the loop a small wreath of twisted wire was wound. Under the collar there is a thin band with remains of engraved decoration, which separated the collar from a vertically ribbed body, divided into eight areas. The bottom of the button is provided with a small dimple encircled with a grooved wreath inserted into the imprint of an eight-pointed star (594-781/57; Kavánová 2009, 131–132, Fig. 2:9).
3) The iron knife with a whittle tang and the remains of a wooden scabbard, in several fragments. The larger part of the tang and the tip of the blade were broken off. The length of the preserved part 145 mm (594-2952/57; parts stored among the objects described in points 4 and 5).
4) Two fragments of blade, probably part of a smaller knife (without evidence number, described by number of the grave).
5) The fragment of an object (a folding knife?) put together from three layers of iron sheets (without evidence number, described by number of the grave).
6) The iron spurs of unknown type (without evidence number). Not at a disposal in 2003.

Description of the sword

This is a double-edged sword (evidence number 594-2975/57; Fig. 43–50) with a slightly damaged point. The sword was, at the time of its documentation in 2003, 945mm long (originally it was about 10 to 20 mm longer) and had a weight of 1060 g, while the weight of the scabbard remains was negligible. The point of balance on the blade was 190 mm from the crossguard. After the fire in Mikulčice, the sword was preserved as a whole in its original length, and its present weight is 836 g.

The relatively low upper hilt (68 mm long, 33 mm high and 25 mm wide) is from the front shaped like an asymmetrical semicircle. The hollow pommel was attached by two rivets to the rectangular upper guard, which was 11 mm high. The tang of the blade ended above the upper guard. Remains of verdigris were revealed in the joint between the upper guard and the pommel, particularly on the side A. The space between the hollow pommel and the upper guard was empty, at the time of investigation of the sword. From the front the upper guard is rectangular, the pommel has arched sides and a sharply rounded top; the changeover from the upper guard to the pommel is smooth. From a horizontal view the upper guard has a wide oval silhouette.

The short grip (95 mm long) was covered with layers of organic material and restoration materials before the fire in the base in Mikulčice. The tang of the blade was entirely covered with wood. It was 24 mm wide under the pommel and 35 mm above the lower guard. The top layer of the hilt was made of a flat leather strap, roughly

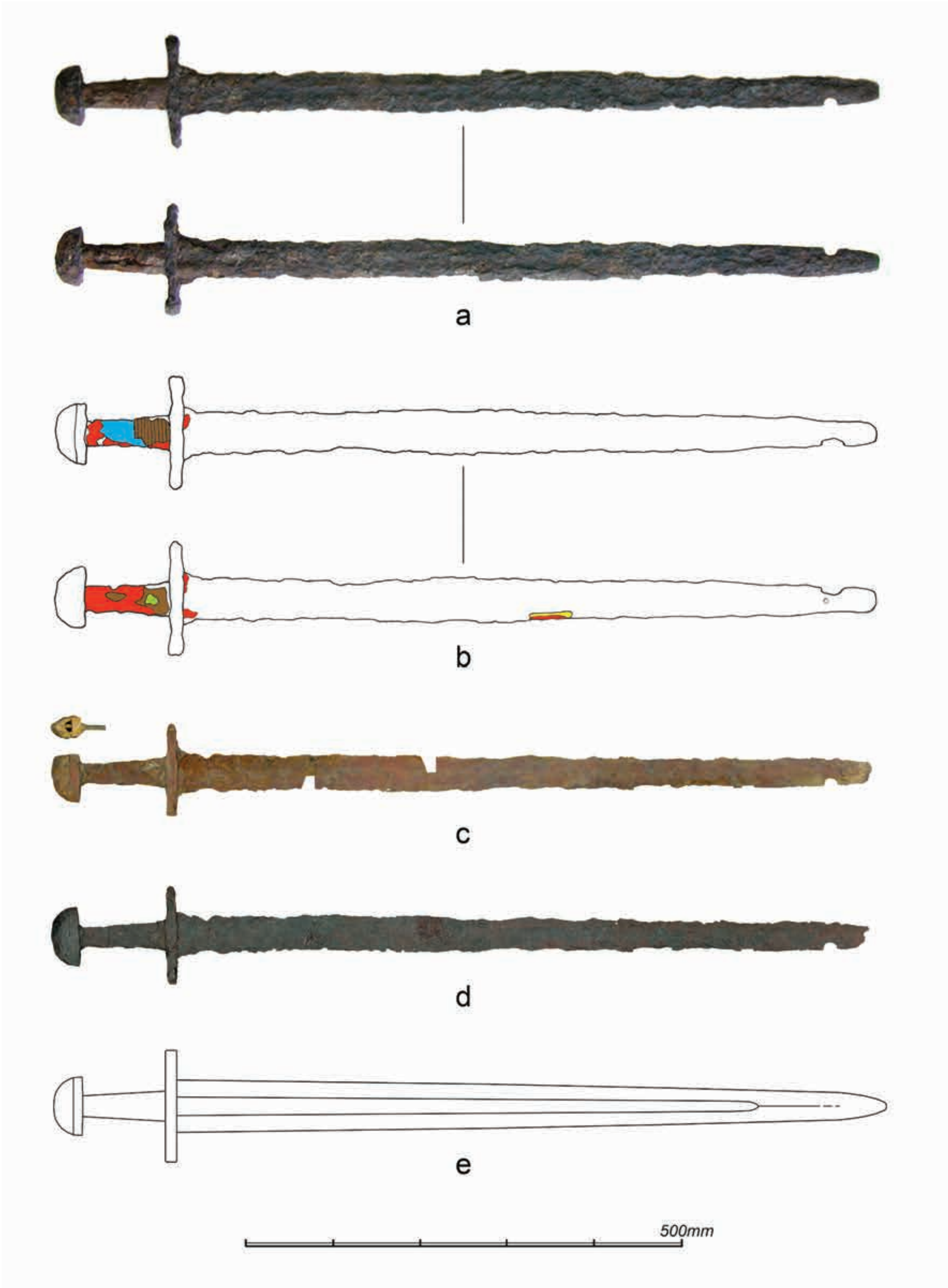

Fig. 44. Sword from grave No. 425; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard and covering of the tang); brown: leather (strap wrapping the grip); textile 2 (fragment of textile preserved on the strap of the grip); blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

4 mm wide, twisted around the wooden grip in S-thread.

The lower guard was relatively long and originally rectangular in shape when viewed from the front and side (129 mm long, 13 mm high and 20 mm wide). It was extensively damaged by corrosion. According to the X-ray image, the hole in the lower guard seems to have had a constant width, hence it is possible that the blade was not embedded into the guard.

The preserved blade a has a length of 806 mm (originally it was approximately 10 mm to 20 mm longer) and a width of 60 mm below the crossguard. It was heavily damaged by chipping in the upper half. A gradual narrowing towards the point is distinctly visible in the last third of the blade length, which converges to the relatively long point. The tip of the point itself is broken off. The fuller started in the base of the tang and ended 670 mm from the lower guard. Near the point it was replaced with a central rib. The fuller was about 21 mm wide below the lower guard and it narrowed to a width of about 11 mm towards the point.

Fig. 45. Sword from the grave No. 425; a – hilt from the side B (documentation of the sword in 2003). Photo by R. Gronský.

Typological determination of the sword

A sword with an upper hilt having a hollow pommel attached to the lower guard by a pair of rivets (Geibig's construction type II; Geibig 1991, 90–100) corresponds with Geibig's type 8, and specifically it may be classified as combination type 8-3-1-11 (Geibig 1991, 48–50). Petersen described swords with semicircular upper hilts as type N (Petersen 1919, 125–126). Within this type he saw forms whose upper guards were slightly longer than the pommels but he encountered also specimens with upper guards whose lateral sides showed a smooth transition into the pommel. Particularly he saw close analogies in these specimens to X-type swords (when X-ray images are not available, these upper hilts may be indistinguishable from the pommels of the X-type swords but decorated with horizontal lines). He regarded the forms of upper hilts with a pommel in the shape of a pentagon, or with a high, almost quadrate pommel, as special types 8 and 9. Jakobsson (1992, 58–60) classified the swords of type N beyond defined 'design principles'. It is also possible to classify the sword as Ruttkay's type VII (Ruttkay 1976, 249, 251). It is necessary to distinguish the type Petersen N (Geibig 8) from similar, but chronologically later swords with a shorter crossguard (less than 110 mm), or else with a relatively high, and in some cases with sharply rounded pommel[67] (for discussion about classification of swords with semicircular upper hilts see Chap. 4.1.3 and 4.1.4). The crossguard of the sword from grave 425 belongs to Ruttkay's type 7 (Ruttkay 1976, 249).

67 Swords that rank among these weapons are, for instance, swords of Kirpičnikovov's form U-osobyj /U-особый/ (Kirpičnikov 1966a, 32–33, 82–83) or some finds from Hungary (Bakay 1967), Slovak find from Čierná nad Tisou (Ruttkay 1975, 135–136, 153), or sword from Olomouc-Univerzitní ulice (Frait 2006; Hošek 2007).

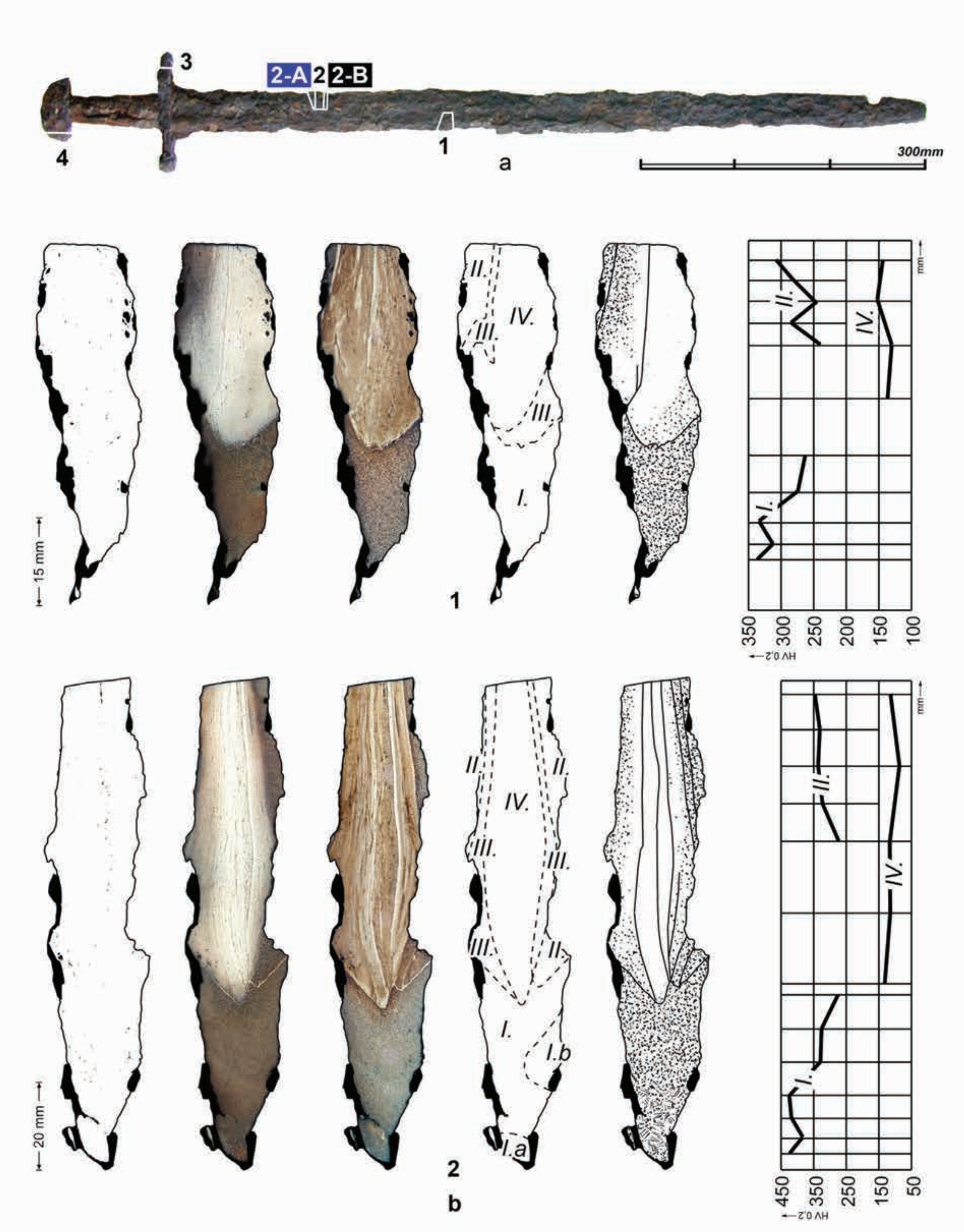

Fig. 46. Sword from the grave No. 425; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

The closest analogy to the sword from grave 425 is the sword from Angeln (Geibig 1991, 374, Kat.-Nr. 329) or the sword that was found in the port at Hedeby (Geibig 1999, 57, Taf. 5, 13). From the Moravian environment there is another sword with a semicircular upper hilt from grave 723 in Mikulčice (Chap. 3.4.12).

While the width of the blade below the crossguard corresponds with Geibig's type 2a (Geibig 1991, 83–90), the length of the fuller corresponds with type 2b, 2c or 3. A gradual narrowing of the fuller is the most characteristic feature of type 3. The blade/fuller length ratio originally oscillated about 1.2 or slightly more. Geibig regarded the ratio 1.2 as the maximum for swords dated roughly to the mid-10th century. Among swords of types 2 and 3, which were investigated by Geibig himself, the swords of type 3 had the minimal blade/fuller length ratio somewhat higher than swords of type 2. However, Geibig stated that for both these types the limit of tolerance was 1.2. A more distinct gradual narrowing of the blade, such as that visible on the sword studied, can be expected in type 3 rather than in type 2. The blade of the sword from grave 425 is most similar to type 3, while other features suggest a massive variant of type 2, but some parameters are just within or slightly beyond the bounds of Geibig's typology. According to the morphological classification of blades, which is presented in this study, the blade belongs to the group {a2} (see Chap. 4.2), that includes medium robust and medium long blades within the context of swords from the 9th and 10th centuries. Later Carolingian swords (mainly Petersen X) prevail in this group, however swords of transitional constructions are present as well.

Scabbard, straps and outer wrappings

Remains of a wooden scabbard were preserved in fragments, just below the crossguard of the sword, and on side B on the left edge, approximately in the middle of the blade length. Indistinct remains of textile of an unspecifiable weave (1?) were found in the corrosion layers and, in one case, evidently between the wood and the metal. Hence, the wooden scabbard was probably lined with the textile. A little iron rivet, found in corrosion layers at 90 mm from the point on side B, is most likely related to the construction of the scabbard. Decoratively arranged leather straps were found twisted around the grip and they most likely represented the original surface of it. These leather straps were overlaid by a textile (2) in a plain weave with a thread count of 16/14.5. The textile was either the only remainder of the outer sword wrapping, or it could be from a textile that was not directly connected to the deposition of the sword.

Metallographic examination

Sampling: Sample [1] was taken from the left side of the blade 294 mm from the lower guard; sample [2] was cut out from the right side of the blade 156 mm from the lower guard; sample [2-B] was taken later from the same cut in the blade after it had withstood the fire; sample [2-A] was detached from sample [2] and annealed in a controlled manner. Sample [3] was taken from the left side of the crossguard 32 mm from the tang and sample [4] from the right side of the upper hilt 10 mm from the tang (see Fig. 46:a).

Metallographic description of the blade: SAMPLE [1]: The metal purity in the cutting edge corresponds to level 2 on the Jernkontoret scale (occurence of fine single-phase inclusions) and to level 3 in the middle portion of the blade (occurence of fine to medium coarse single-phase inclusions). Several different microstructural areas can be distinguished after etching (Fig. 46:b). Area I consists of a fine pearlitic microstructure (Fig. 47:a) with a hardness of 305 ± 32 HV0.2 (with a hardness of 337 HV0.2 in the cutting edge). Area II contains a pearlitic microstructure (with some ferrite in places) with a hardness of 263 ± 25 HV0.2. Area III consists of a fine-grained ferritic-pearlitic microstructure with a maximum of 0.3% C. Area IV is also ferritic-pearlitic, fine-grained, with carbon

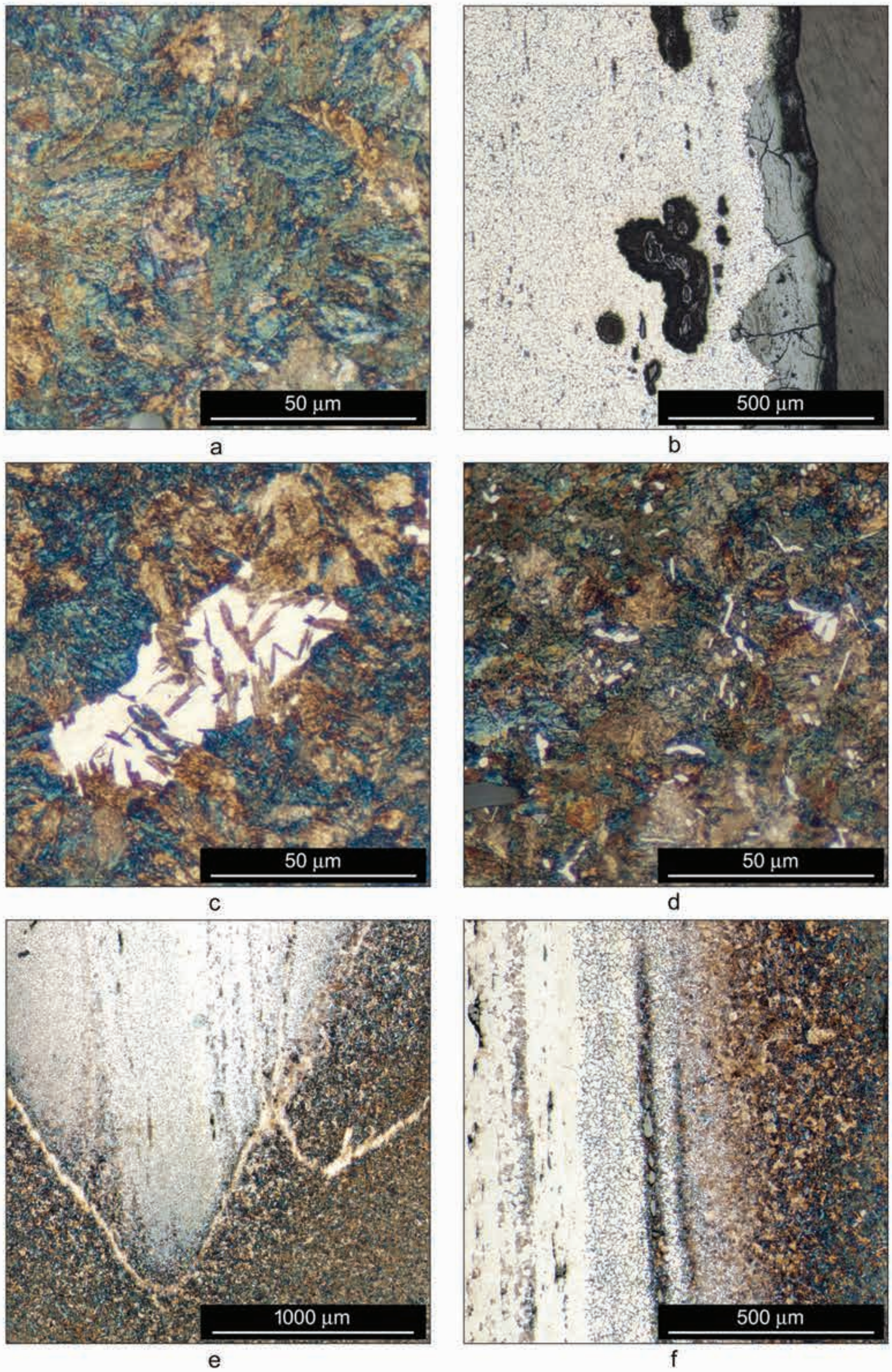

Fig. 47. Sword from the grave No. 425; a – fine pearlite in the cutting edge of the blade (Area I), sample [1]; b – ferrite with traces of pearlite near the edge of the middle part of sample [1] (Area IV); c – a island containing un-tempered martensite (or bainite?) in Area I-a, sample [2]; d – pearlite with particles of proeutectoid cementite in Area I-b, sample [2]; e – welding line between the cutting edge and the middle portion of the blade, sample [2]; f – transition of Areas II, III and IV in the central part of the blade, sample [2]; Nital etched. Photos by J. Hošek.

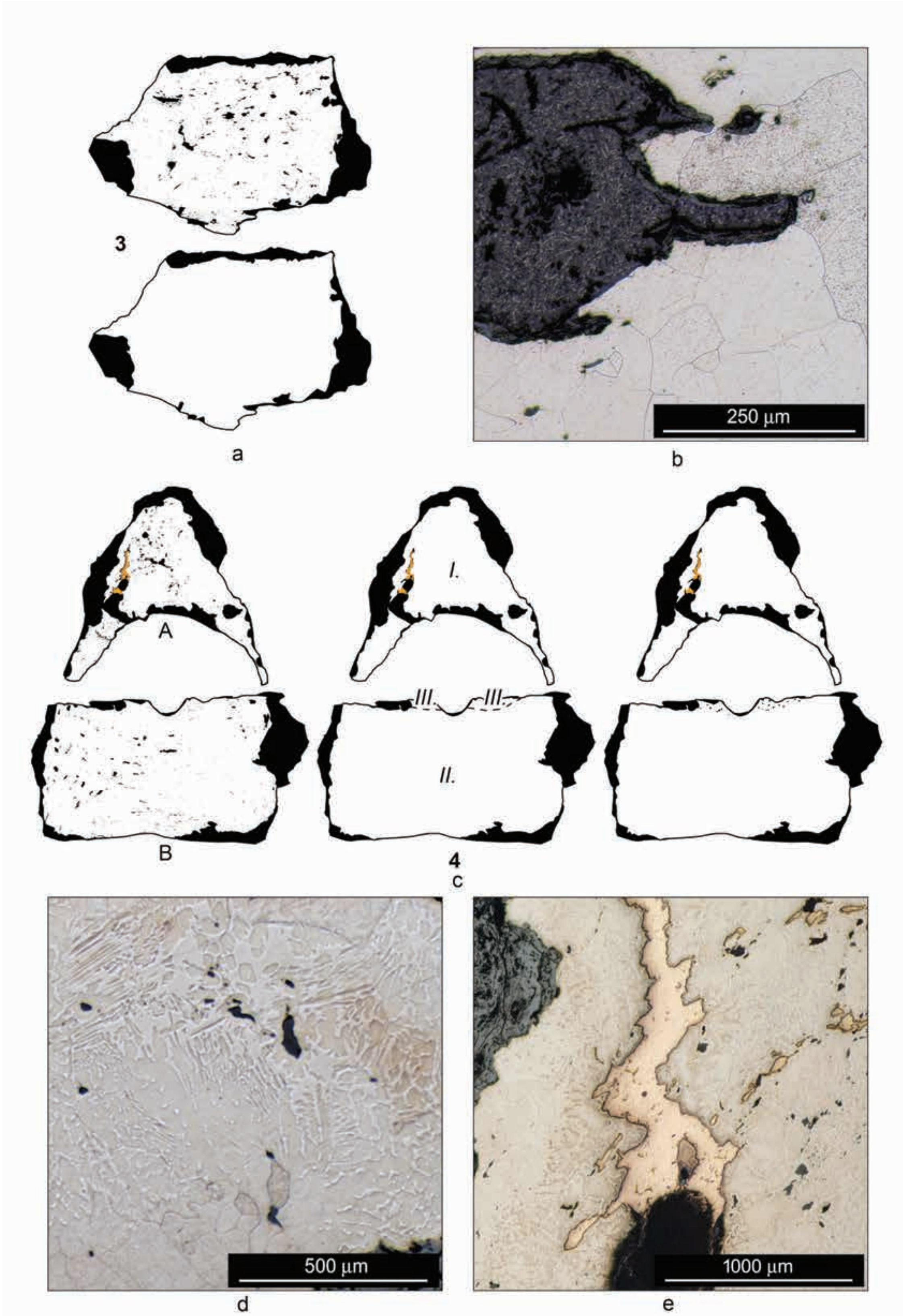

Fig. 48. Sword from the grave No. 425; a – schematic drawings of the lower guard sample (from the top downwards: before etching, distribution of the structures); b – a ferritic microstructure in the proximity of a large slag inclusion; c – schematic drawings of the upper-hilt sample (from the left: before etching, layout of described structural areas, illustration of the structure); d – a ferritic 'ghost' microstructure of the pommel (Area I); e – islands of brass in the matrix of the pommel, sample [4]; Nital etched. Photos and drawings by J. Hošek.

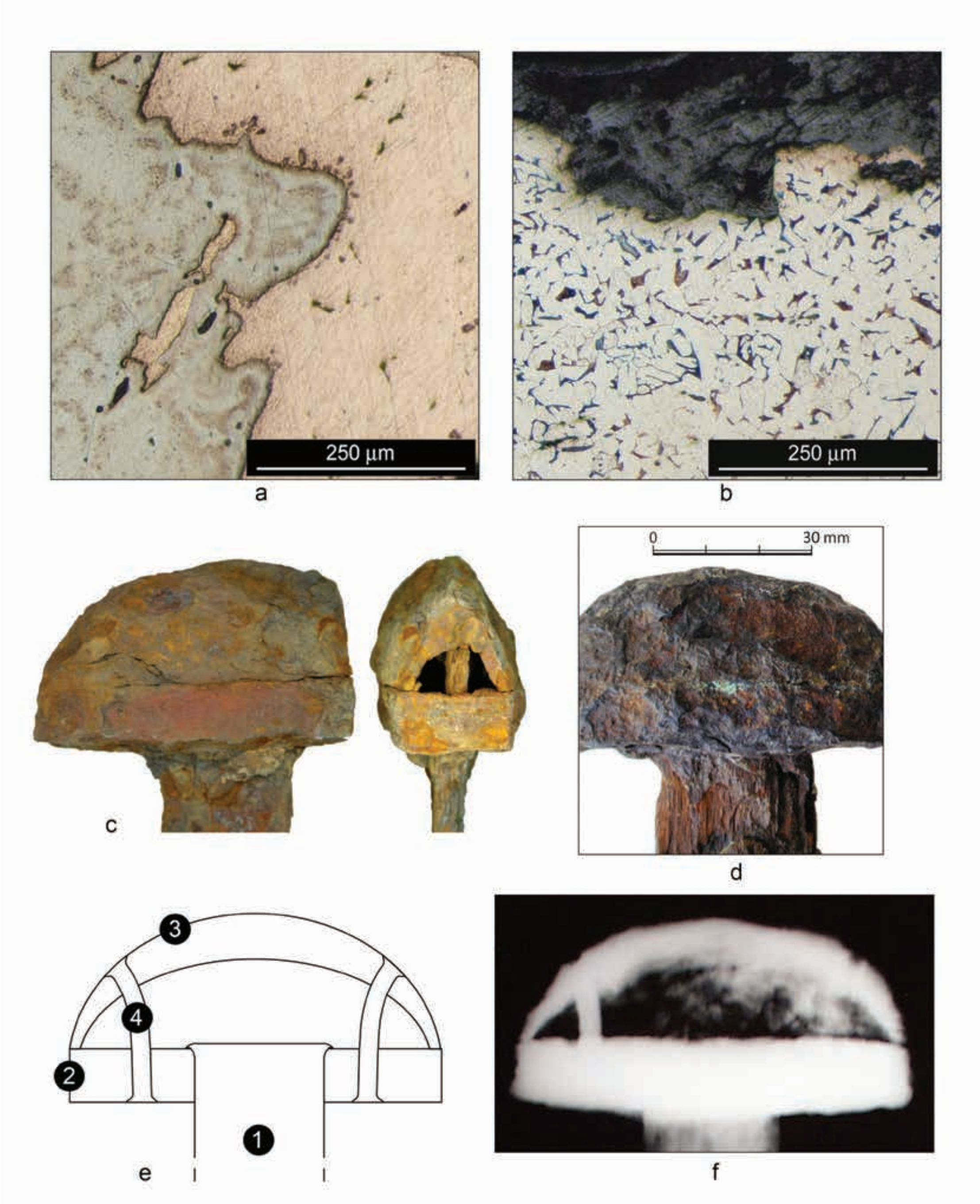

Fig. 49. Sword from the grave No. 425; a – islands of brass in the matrix of the pommel, sample [4]; b – a ferritic-pearlitic microstructure near the surface of the upper guard (Area III), sample [4]; c – upper hilt of the sword (in its condition after the depository fire – and before its conservation); d – central part of the upper hilt from the side A with traces of verdigris (documentation of the sword in 2003); e – schematic drawing of the upper hilt section (1 – tang; 2 – upper guard; 3 – pommel; 4 – rivets; documented after the depository fire); f – X-ray image of the upper hilt (prior to the fire). Photos and drawings by J. Hošek. Photos 'a-c' and drawing 'e' by J. Hošek; photos 'd' and 'f' by Institute of Archaeology of the AS CR, Brno.

content below 0.2% and hardness of 142 ± 10 HV0.2 (Fig. 47:b).

SAMPLE [2]: The purity of the metal is similar to that in sample [1]. Area I (delimiting the cutting edge) consists of tempered martensite or bainite with a hardness of 414 ± 14 HV0.2, which towards the middle of the blade gradually changes into very fine pearlite (314 ± 34 HV0.2). Zone

Fig. 50. Sword from the grave No. 425; a – sample [2-A]; b – pearlitic microstructure in the cutting edge, sample [2-A]; c – a pearlitic-ferritic structure in the right side of the blade body, sample [2-A]; d – pearlitic-ferritic microstructure of the surface panel of steel near the line of attachment of the cutting edge, sample [2-A]; e – the surface steel panel with a pearlitic-ferritic microstructure and with a visible area of carburisation of the blade core; f – sample [2-B]; g – ferritic-cementitic microstructure in the cutting edge of the sample [2-B]; h – a ferritic-cementitic microstructure near the blade core, sample [2-B]; Nital etched. Photos by J. Hošek.

I-a contains islands of non-tempered martensite (Fig. 47:c), zone I-b comprises a mixture of fine pearlite and fine particles of proeutectoid cementite (with carbon contents up to 0.95%; Fig. 47:d). Area II consists of fine pearlite with a hardness of 321 ± 32 HV0.2, locally accompanied with a discontinuous ferritic network (circa 0.7% C). Area III consists mainly of a fine-grained ferritic-pearlitic microstructure with a maximum of 0.25 to 0.4% C. Area IV consists of layers of ferritic (ASTM 6, hardness of 104 ± 9 HV0.2) and ferritic-pearlitic microstructures (up to 0.15% C, ASTM 8). Most of the welds in the structure of this sample are clearly visible in the form of white lines (Fig. 47:e).

SAMPLE [2-A]: The cutting edge contains a pearlitic microstructure with a hardness of 264 ± 20 HV0.2 (Fig. 50:a, b). The right side of the blade body, near the cutting-edge, contains pearlite with traces of ferrite; the same structure also occurs higher on the right side of the sample (Fig. 50:d, e). In the adjoining area nearer the middle of the body the carbon content falls towards the centre of the sample. The adjacent area contains a maximum of 0.2% C and then finally in the central area there is a ferritic microstructure. The left side of the sample is similar, being a mirror image of the right side, however the microstructure of the furthest surface layer was not determined (Fig. 50:c).

SAMPLE [2-B]: The microstructure of the cutting edge consists of a ferritic matrix with dispersed spheroidal particles, which transforms towards the blade body into fine cementite network (Fig. 50:g). In the margins of the central portion of the blade, the surviving surface areas contain carbides dispersed predominantly in the form of a cementite network, adjoined by ferritic-cementitic areas in which ferrite significantly predominates (Fig.50:h). The central area consists of ferrite with only traces of cementite.

Metallographic description of the crossguard:

SAMPLE [3]: The metal purity is approximately level 3 on the Jernkontoret scale, as the metal matrix contains numerous middle-coarse complex inclusions. The microstructure consists of ferrite with slight traces of 'ghosting', a grain size of ASTM 6 to 3 and a hardness of 120 ± 6 HV0.2 (Fig. 48:b). Fine-grained ferrite with traces of pearlite (ASTM 7, max. 0.15% C) occurs in two zones at the guard surface.

Metallographic description of the upper hilt:

SAMPLE [4]: Two basic parts of the upper hilt are distinguishable in the detached sample: pommel (A) and upper guard (B).

1) The pommel (A) is made of a metal of variable purity; a number of fine single-phase inclusions are found in some areas, while other areas contain only rough inclusions, and some areas are free from inclusions. The purity of the matrix corresponds to level 2 to 5 on the Jernkontoret scale. After etching, a ferritic 'ghost' microstructure predominates in Area I; the grain size corresponds to ASTM 4 in the areas with visible boundaries, and the hardness is 169 ± 20 HV0.2 (Fig. 48:d). The matrix contains areas of brass (92% Cu; 5.3% Zn; 2.7% Fe) which occupies about 1.1 to 1.2 mm^2 in the examined metallographic plane (Fig. 48:e and 49:a).

2) The upper guard (B) contains a number of both fine and coarse single- as well as multi-phase inclusions, the purity of the metal corresponds to level 4 to 5 on the Jernkontoret scale. The microstructure of the guard is almost entirely ferrite (Area II) with an extensive 'ghost' microstructure; the grain size is between ASTM 2 and 6. The hardness of this area is 143 ± 20 HV0.2. Area III contains a ferritic-pearlitic microstructure with a maximum of 0.2% C (Fig. 49:b).

Assessment: The blade was provided with steel cutting edges; the middle portion consists of an iron core with steel surface panels. The blade was hardened by some form of heat-treatment, however martensite appears only in the cutting edges, which suggest that, again, some form of selective quenching was employed. As for both the construction and heat treatment of the blade, the sword can be considered an excellent weapon. Both the hollow pommel and the upper guard were made of ferritic iron with an uneven phosphorus content, and with a high proportion of coarse slag inclusions. Carburization of some surface areas is so slight that it cannot be considered intentional. Islands of brass appear in the matrix of the pommel. Technological procedure based on the use of a brazing alloy for fixing the pommel to the guard is possible but association with the original surface decoration is unlikely. Naturally, one even cannot exclude a possibility that a piece of brazed iron was simply reutilized to make the pommel. The lower guard is also iron, heavily contaminated with coarse inclusions. The pommel, the upper-guard and the lower guard were most likely made from a partly processed bloomery iron.

3.4.7 Sword from the grave 438

Circumstances of the discovery

The grave was discovered within the excavation of the III^rd church, directed by J. Poulík between 1956 and 1957 (in excavation area No. 4 'III^rd church 1956–57' (Poláček/Marek 2005, 56–67)). It was found in square F18 (sector VII), approximately 9 m north from the northern wall of the nave of the three-aisled church. The burial pit disrupted a southern part of the earlier settlement feature 120, but it did not reach its end. Owing to the similar nature of the grave fill, the boundary of the pit was imperceptible. According to the position of the coffin fittings, it is possible to set the minimum size of the pit as 220 × 80 cm. The middle part of the skeleton sank to the fill of the feature 120 in such a way, that the skeleton bowed and the skull lay at a depth of 132 cm, the pelvis at a depth of 155 cm and the toes at a depth of 134 cm below the surface. The orientation of the skeleton was approximately W-E, the head pointing to the west. The grave lay together with other significant burials on the western side of the road, which was identified according to two parallel rows of graves, which extended from the North to approximately halfway along the northern aisle of the III^rd church.[68] A roughly 15 cm thick layer of debris, consisting of large stones with mortar, sank into the upper part of the grave fill. A quern-stone, whose upper side lay 37 cm above the skull, was found lying flat under a 50 cm large flat stone from the debris. The man was buried in a wooden coffin with iron band-shaped fittings, which were together with a 125 mm long iron cramp registered under inv. No. 594-4899/59. The fittings were probably placed in four pairs on two levels on each longitudinal side of the coffin.

The skeleton of a man, who died in the age of *maturus I* (40 to 50 years), was very badly preserved except for the skull (Fig. 51 and 52). The deceased lay on his back with his arms alongside the body. The height of the figure was impossible to measure by anthropological methods (Stloukal 1967, 298).

The pommel of a sword (1) was overlapped by left humerus and the sword, lying flat, extended down to the knee. By the side of the upper part of the sword there was an axe (2). The axedge lay on the sword blade and the butt lay towards the northern edge of the grave. On the right hip there lay a pair of iron shears (3) with blades lying towards the shoulder. In the mouth of the man there was a small rectangular golden sheet (4). Spurs (5, 6) lay by the toes. Without a precise location within the grave there was a small buckle with a strap keeper and other iron fragments (7) and two strap chapes (8, 9). Owing to a significant damage to one strap chape it is impossible to decide whether they came from one garniture. The buckles, other fragments and probably the strap chape could have been part of the spur garniture or a calf straps garniture. Among the set of coffin fittings there was a firesteel (10). Its position could have been among the unspecified iron objects, drawn in the plan to the right side of the skeleton. The position of a knife (11) is unclear; it could have been near the sword (according to the *DGU*) or among the above mentioned objects near the right hip of the man, where (according to the photograph; see Fig. 52) a knife was found (but it remains rather unclear if

68 See the plan of the burial ground (Poláček 2006, 6; Poulík 1975, 76). For more details see 'Circumstances of the discovery' in Chap. 4.3.3.

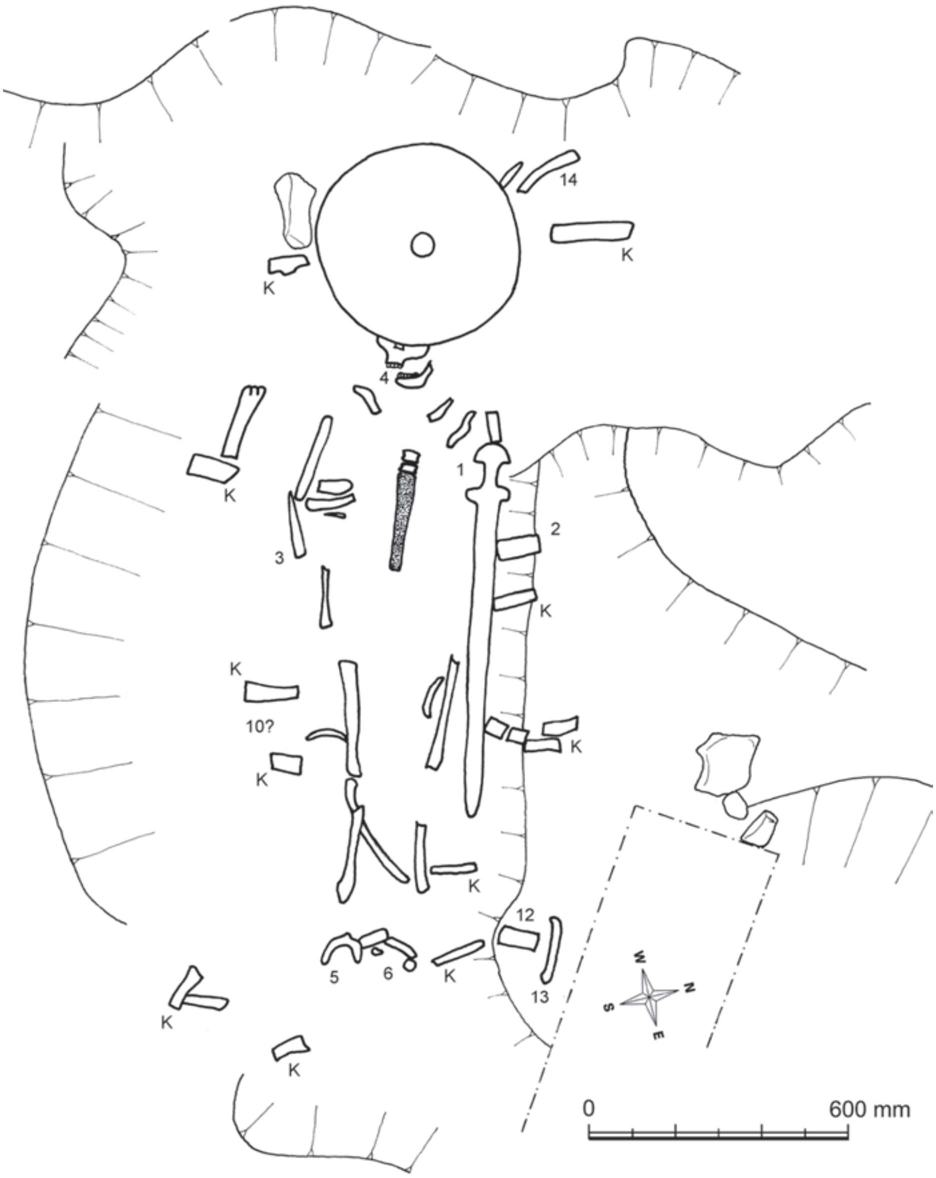

Fig. 51. Mikulčice-Valy, Hodonín County; grave No. 438; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'; 'K' - iron fittings of a coffin). Drawing by B. Vávrová.

it the knife visible on the photograph is the knife (11) or another knife (15?)). A socketed axe (12?) lay at a depth of 95 cm, above the NE corner of the grave, about 40–50 cm above the level of the other finds. Next to it there was a cramp (13?), very similar to those found among the coffin fittings (above mentioned). Both objects were found on the level of the quern-stone and a little higher than the coffin fittings. A mutual association between these artefacts and the grave goods is not provable. The axe (12) could have been a random part of the grave fill, relocated from the earlier feature or it could have been placed on the level of the upper part of the coffin intentionally. Without a precise location within the fill of the feature 120 and situated in the space of the grave pit 438, there are also the fragments of deformed thin fittings, probably coming from a bucket (14?). It is possible that they could have been placed under the quern-stone, above the head of the man; according to the photography and the plan the quern-stone overlapped


Fig. 52. Mikulčice-Valy, Hodonín County; grave No. 438; photographs of the burial; (left): viewed from the S; (right): viewed from the E. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

the level of the human remains from the grave 438 and in the drawing there are thin iron bands shown coming from the bottom of the NW side of the quern-stone. These bands could have been the deformed bucket hoops.

Also two knives (15?, 16?), a small phalera (17?), part of a spindle whorl (18?) and part of an iron spur (19?) were, according to the inventory, found within the space where the grave 438 disrupted the feature 120. The bucket fittings, phalera and the fragment of the spur were in the *DGU* mentioned as a part of the grave goods from the grave 439, to which were by mistake assigned all the finds from the grave 438. It is impossible to decide, whether the objects 14 to 19 were part of the grave 438.

Finds

1) The iron sword and fragments of the scabbard, which were deposited separately after the conservation of the sword (594-2978/57; Fig. 53–58).
2) The iron bearded axe with long lugs (594-4890/59), 160 mm long. The width of the blade and the width in the area of lugs reached about 60 mm.
3) The iron shears (594-4879/59) 210 mm long, with two opposite lugs on the handle.
4) The small rectangular gold plate (594-861/57), 15 mm long and 6 mm wide.
5) The iron spur (594-3017/57), completely preserved, in three fragments (135 × about 80 mm, and length of the prick 28 mm). On the rectangular terminal plates there were two lines of three copper rivets, arranged along the distinct middle rib, which turned into the arm of the spur. The massive cone-shaped prick was fastened into the ring, the arms were in the area of prick-base decorated with triangular engravings.
6) The fragments of the prick and arms of the iron spur (594-3018/57). The damaged cone-shaped prick was fastened into the ring, the arms were in the area of prick-base decorated with triangular engravings.
7) The iron fragments (594-4891/59), from which a small buckle with a strap keeper put into chape was reconstructed, and other fragments probably from the double-buckle.
8) The smaller tongue-shaped strap chape ended by arc (594-4889/59), broken into several fragments (36 × 21 mm). It was impossible to find out, whether it was cloven in the butt or whether it originally had a band with rivets in the butt.
9) The larger tongue-shaped strap chape with arc on the top (43 × 22 mm), on the front roof-like arched

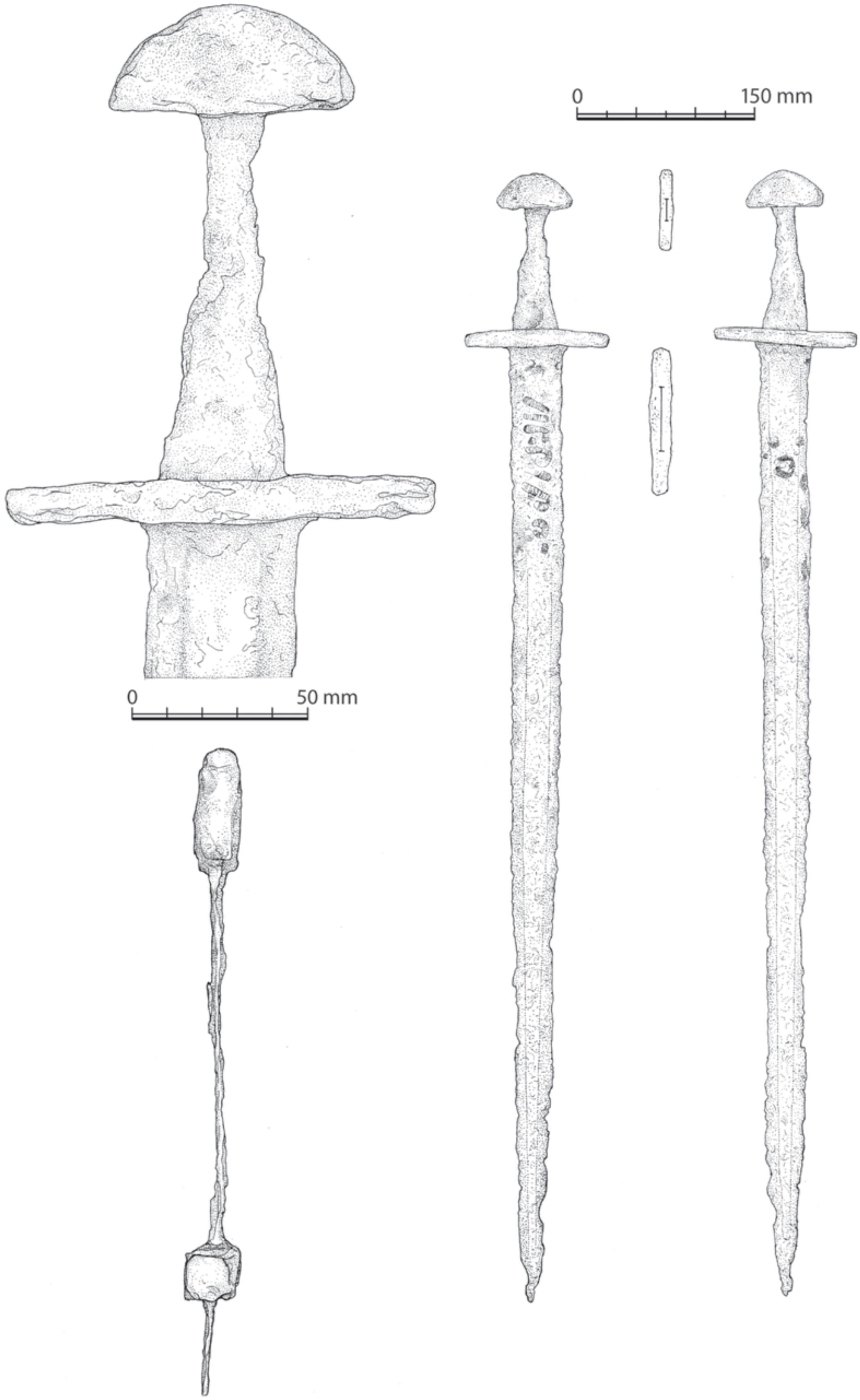

Fig. 53. Mikulčice-Valy, Hodonín County; sword from the grave No. 438 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

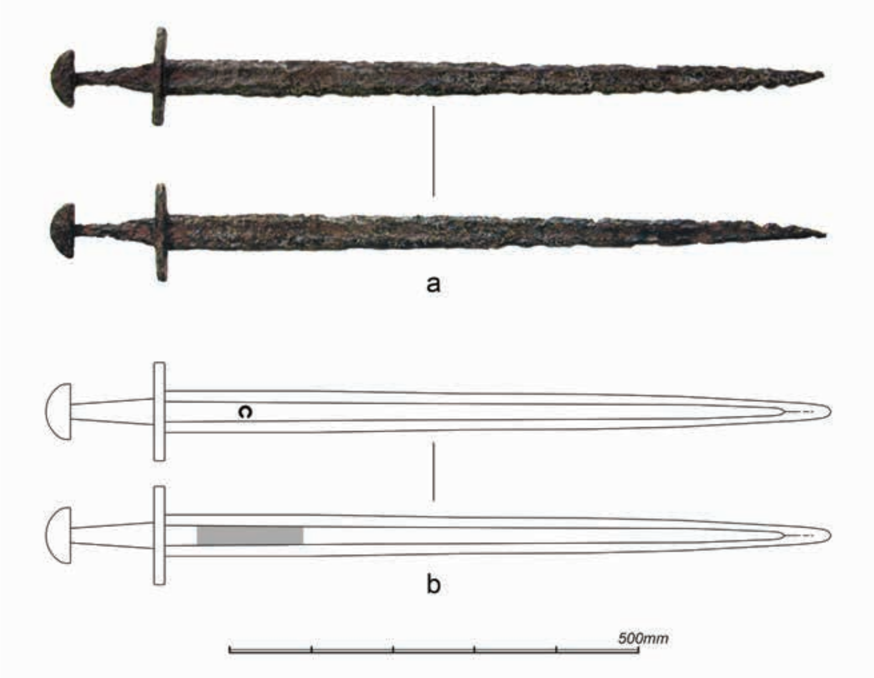

Fig. 54. Sword from grave No. 438; a – state before the depository fire /distribution of organic materials across the sword is unknown because all the organic remnants were removed from the sword in course of a conservation-restoration treatment; scabbard, however, was in 2003 identified on the basis of chipped fragments that preserved/; b – reconstruction of the sword (the blade bore pattern-welded iron-inlays, an inscription on one side and a sign on the other). Photos and drawings by J. Hošek and J. Košta.

(594-4888/59). In the rear there was a line of four rivets.

10) The lyre-shaped firesteel, 75 mm long, 30 mm high, with double S-bent arms (594-4899/59).
11) The blade of an iron knife with straight back and curved cutting edge (594-2998/57), sheathed in the wooden scabbard. In fragments, tang and part of the blade are missing.
12) The iron axe with open longitudinal socket and thin fan-shaped cutting edge, 95 mm long and 35 mm wide (594-4882/59).
13) The iron cramp, 169 mm long and 14 mm wide (594-4883/59).
14) Four iron thin misshapen sticks, most likely from the bucket fittings (594-2266/57–594-2269/57).
15) The knife with a scale tang, having the same thickness as the blade, provided with two rivets to fasten the scales (594-2365/57); preserved length 154 mm, length of the blade 95 mm. The end of the handle is missing.
16) The bent knife with a whittle tang (594-2364/57), total length 147 mm, length of the blade about 102 mm.
17) The small bronze phalera in the shape of round segment (or spherical cap of a round object), divided into seven radially arranged and roof-like arched areas and along the rim circled with a cordon. On the top there is an inserted rivet (594-2381/57).
18) Part of the stone whorl with a diameter of 20 mm (594-2366/57).
19) Part of the iron spur with two grooves in the place, where the arms are separated from the prick (594-2265/57). The ends of arms with terminals are missing.

Description of the sword

This is a double-edged sword (594-2978/57; Fig. 53–55) which was, at the time of its documentation in 2003, 950 mm long, and weighed 775 g. The weight of the scabbard remains was negligible. The point of balance on the blade was 170 mm from the crossguard. The sword was not found after the fire in Mikulčice in 2007 and is now considered lost.

The slender semicircular single-piece pommel was rather long (69 mm), low (30 mm) and

Fig. 55. Sword from the grave No. 438; a – hilt and upper part of the blade with remnants of an inscription from the side A (documentation of the sword in 2003); b – X-ray image of the pommel (documented prior to the depository fire); c – X-ray image of the upper part of blade with remnants of an inscription (documented prior to the fire). Photos by Institute of Archaeology of the AS CR, Brno.

distinctly narrow (9 mm). From the front view, the sides of the pommel formed a right angle with the base. The rounding of the sides was continuous and quite regular, so from the front the pommel seemed to be a circular segment. From the side view it was rectangular with a slightly rounded top, in the horizontal it was narrowly rectangular. The tang went through the bulky pommel up to the top.

The grip of standard length (102 mm) broadened distinctly towards the crossguard (from 18 mm to 31 mm). No remains of organic materials were preserved on the tang.

The long and slender crossguard (121 mm long, 13 mm high and 14 mm wide) was in the shape of a narrow, oblong block, somewhat wider where it surrounded the blade. An X-ray image revealed the hole for the tang and the blade that broadened into a funnel-like form and then, above the lower side of the crossguard, into a step-like form.

The blade, 805 mm long, narrowed gradually along the entire length of the sword, but a more distinct narrowing into a long and sharp point appeared on the lower half of the blade. The blade, however, preserved its original width (50 mm) only within the crossguard; below the guard it was reduced by corrosion to a width of 44 mm. The wide fuller (25 mm in the part closer to the crossguard) extended from the crossguard to a length of 758 mm; nearer to the point the fuller was replaced by a rib.

On one side of the blade, a depression (imprint?) in the form of an open circle was observed in the fuller 91 mm to 108 mm from the crossguard. It could represent the remains of a more complex symbol, perhaps an iron inlay which has fallen out or corroded away. The other side of the blade bore a damaged inlaid inscription made from twisted composite rods (pattern-welded inlay), see Fig. 55c. The inscription was along the entire width of the fuller, and placed 91 mm to 108 mm from the crossguard. About seven symbols or their parts were preserved. They were impossible to read even when analysing photographs and X-ray images. In most cases it is possible to recognize the remains of letters. The end of the inscription completely vanishes towards the point. The manufacturing technique employed and the size of the inscription, as well as design and dating of the weapon offer the possibility of identifying the piece as an ULFBERHT type sword or a imitation thereof; however, we cannot rule out other possibilities.

Typological determination of the sword

The sword with a single semicircular pommel (Geibig's construction type III; Geibig 1991, 90–100), the flat base of the pommel and the long crossguard belongs undoubtedly to Geibig's type 12, variant I (specifically it belongs to the combination type 12-11-6-11(10); Geibig 1991, 56–60), Petersen's type X (Petersen 1919, 158–167) and Ruttkay's type VII (Ruttkay 1976, 249–251). According to Petersen's description, the sword has some features typical for the early variant of his type X (specifically the width and length of the pommel), while other features are typical for later variants of this (for instance the height of the pommel). Single semicircular pommels of the same shape were described by Kucypera, Kurasiński and Pudło (2011) as the variant X-later, where the important feature is mainly the acute angle between the bottom and lateral edge of the pommel from the front view. According to Jakobsson's classification (Jakobsson 1992, 55–57), the pommel belongs to 'design principle 6' (swords with an absent upper guard). The shape of the crossguard corresponds with Geibig's type 11 with a slight inclination towards type 10 (the sides around the blade are slightly widened; Geibig 1991, 25), according to Ruttkay it is unequivocally crossguard type 7 (Ruttkay 1976, 249).

It was possible to classify the blade relatively easily due to the readily visible fuller. The blade corresponds with Geibig's type 3 (or variant 3c) in all its parameters, namely in the most significant feature – distinct narrowing during the first 400 mm. The only difference between this blade and classic forms of type 3 is the length of pointed part. On the basis of the classification of blades, which is presented in this study, the blade belongs to the group {b} (see Chap. 4.2), which was determined on the basis of lengths and widths of blades.

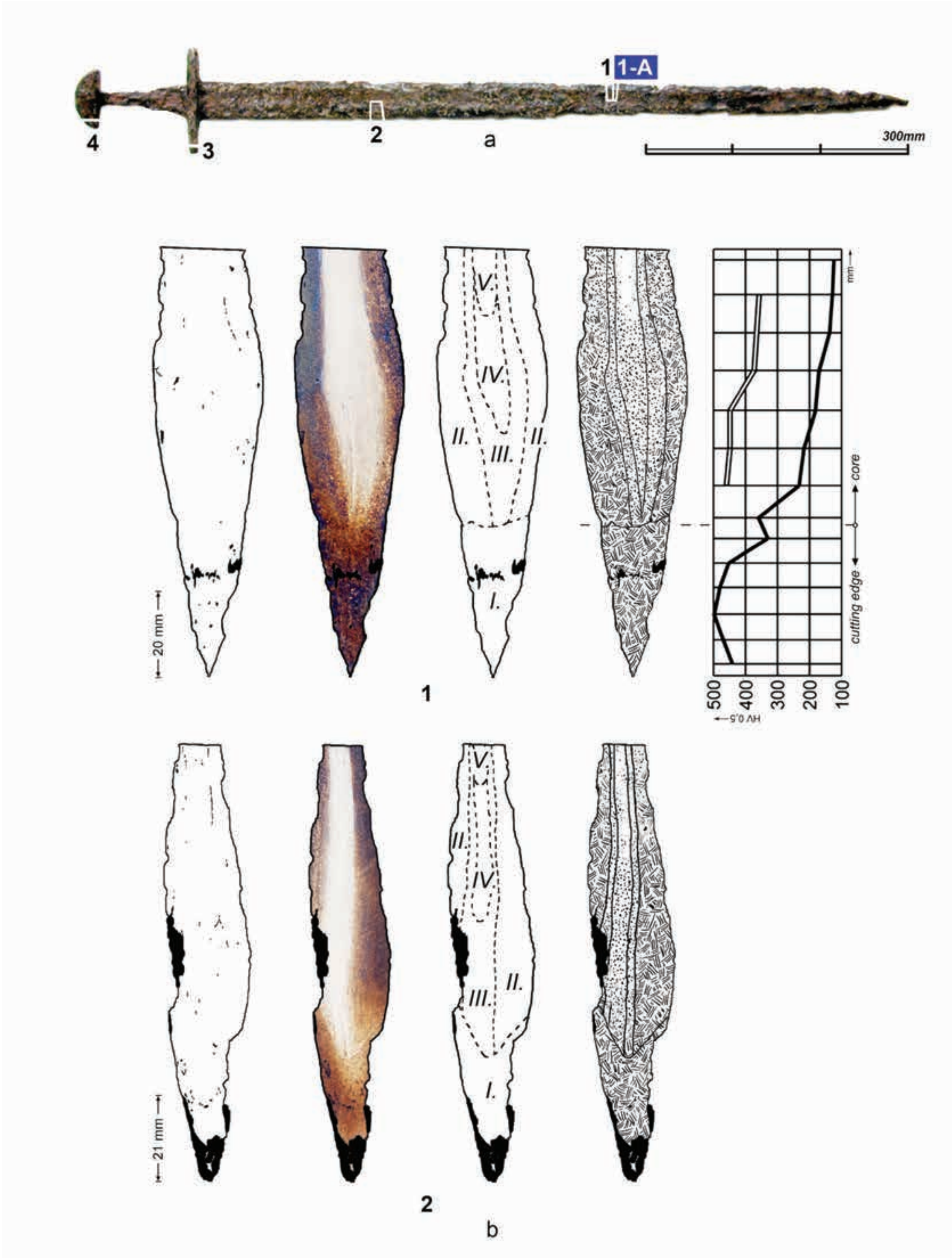

Fig. 56. Sword from the grave No. 438; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); layout of areas described; distribution of the structures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

In comparison with other 9th and 10th century swords, this group includes swords with slender and short (to medium long) blades. Both early and late Carolingian swords appear in this group.

Scabbard, straps and outer wrappings
Due to previous conservation, no attributable remains of organic materials were identified on the surface of the sword in 2003. Three fragments of a scabbard, separated from the body of the sword probably during conservation, were stored in the Mikulčice depository under the inventory number of the sword. The inner layer of organic material that originally fitted closely to the blade was made of a textile in an unspecified weave, while the top layer consisted of the remains of the wooden body of a scabbard. The textile served as a lining for the scabbard.

Metallographical examination
Sampling: Sample [1] was taken from the left side of the blade 325 mm from the crossguard; sample [1-A] was subsequently removed from sample [1] and annealed in a controlled manner. Sample [2] was taken from the right side of the blade 235 mm from the crossguard. Sample [3] was taken from the right side of the crossguard 31 mm from the tang and sample [4] from the right side of the pommel 14 mm from the tang (see Fig.56:a).
Metallographic description of the blade: **SAMPLES [1]** and **[2]:** Both samples taken from the blade ([1] and [2]) are very similar and they were documented together. The matrix contains numerous slag inclusions, both coarse and fine, and corresponds well to the stratified composition of many bloomery iron products. The line of attachment of the cutting edge, which also contains some slag, is well defined by a chain of fine inclusions. The slag content corresponds to a level of 3 to 4 on the Jernkontoret scale. After Nital etching one can observe that in Sample [1] Area I, covering cutting edges, consists probably of bainite with a hardness of 476 ± 18 HV0.5 (Fig. 57:a). Area II, representing the surface panels of the blade, is also bainitic (421 ± 45 HV0.5). Areas III, IV and V are located in the blade core. Area III is still bainitic where close to Area I but the microstructure gradually changes into a ferritic-pearlitic microstructure with a maximum of 0.5-0.6% C, with a grain size of ASTM 7-8 and a hardness of 205 ± 23 HV0.5 (Fig. 57:b). Area IV has a maximum of about 0.4% C and a grain size of ASTM 7, while Area V is only ferrite with traces of pearlite, with a grain size of ASTM 7 and a hardness of 123 ± 8 HV0.5 (Fig. 57:c).
SAMPLE [1-A]: The cutting edge consists of pearlite with a hardness of 276 ± 16 HV0.2. Surface areas of the middle portion of the blade contain pearlite with a little ferrite (Fig. 57:f), but fine-grained pearlitic-ferritic zones containing about 0.4% C appear here as well. Towards the core, areas with gradually decreasing carbon contents are found. The core itself consists of ferrite with traces of pearlite (maximum 0.1% C), however even in this part the carbon content becomes slightly elevated (to around 0.35%) on the side where the cutting edge is attached (Fig. 57:g). It is possible that some carbon has diffused from the steel edge.
Metallographic description of the crossguard: **SAMPLE [3]:** The material of the sample contains randomly distributed slag particles of various sizes; some areas are relatively pure (level 2 on the Jernkontoret scale), others show a large number of inclusions (level 4 to 5 on the Jernkontoret scale). After etching, Area I can be delimited containing coarser grains (ASTM 6), with circa 0.6% C and a hardness of 234 ± 10 HV0.3 (Fig. 58:b, c); towards its borders the microstructure becomes finer (ASTM 8) and the carbon content falls as low as 0.3%. Along the margins of Area I there is a gradual transition to ferrite in Area III. The carbon content in Area II is around 0.35%; the grain size is ASTM 8. The carbon content falls to around 0.2% (with a hardness of 125 ± 5 HV0.3) towards the margins of Area II (Fig. 58:d). The ferritic Area III with coarse grains of ASTM 4–2 and a hardness of 125 ± 5 HV0.3 is divided from Area II by a welding line which is marked out by chains of slag inclusions. Distribution of phosphorus-rich areas is random in this sample.
Metallographic description of the pommel: **SAMPLE [4]:** Roughly half of the sample contains a small number of fine slag inclusions

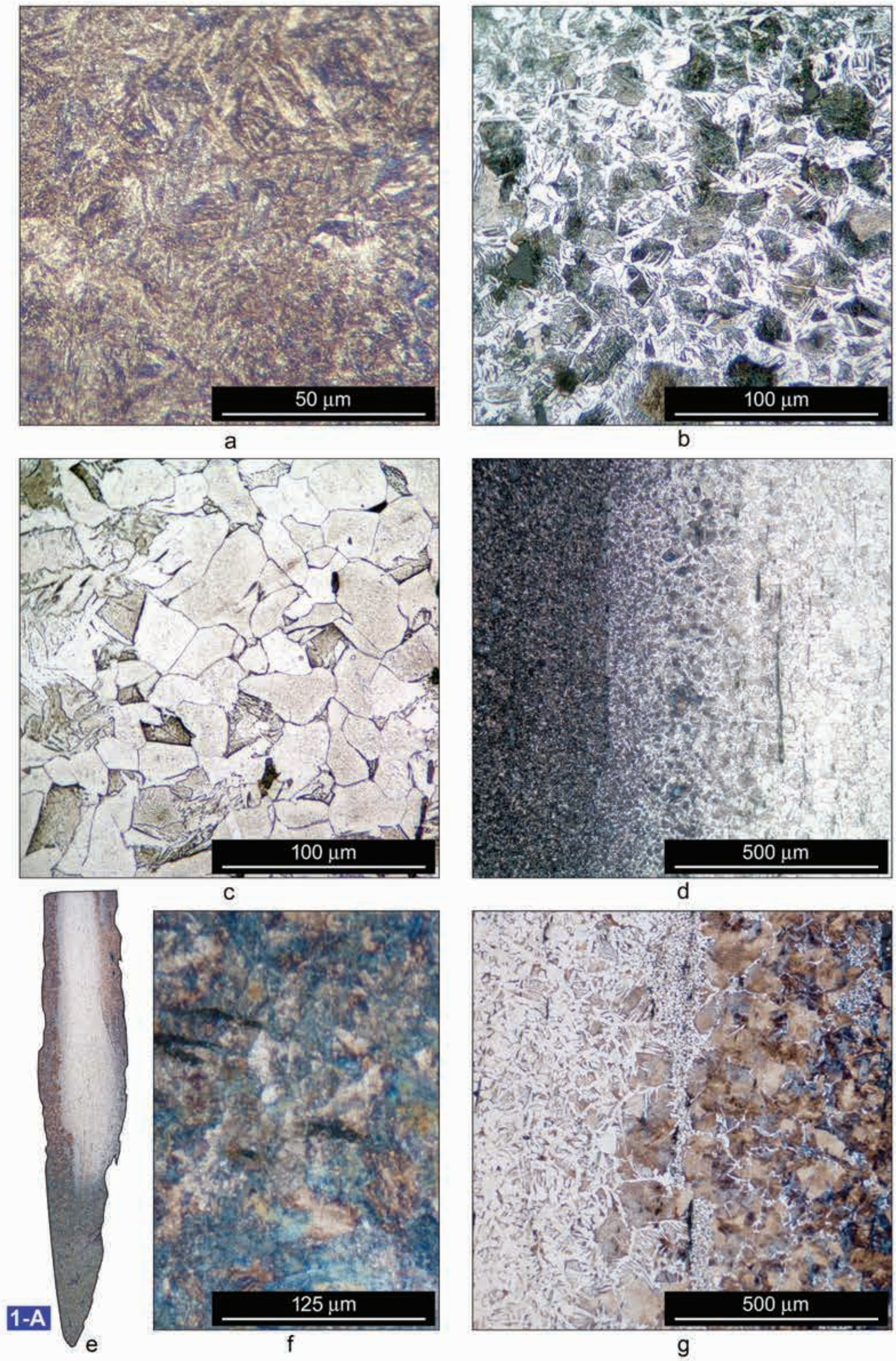

Fig. 57. Sword from the grave No. 438; a – bainite (probably) in the cutting edge of the blade (Area I), sample [1]; b – pearlitic-ferritic microstructure in Area III, sample [1]; c – ferritic-pearlitic Area V, sample[1]; d – the transition between areas II, III and V in sample [1]; e – sample [1-A]; f – pearlite in the cutting edge of the blade, sample [1-A]; g – change over the surface panel and core with a ferritic-pearlitic microstructure in the middle portion of the blade, sample [1-A]; etched with Nital. Photos by J. Hošek.

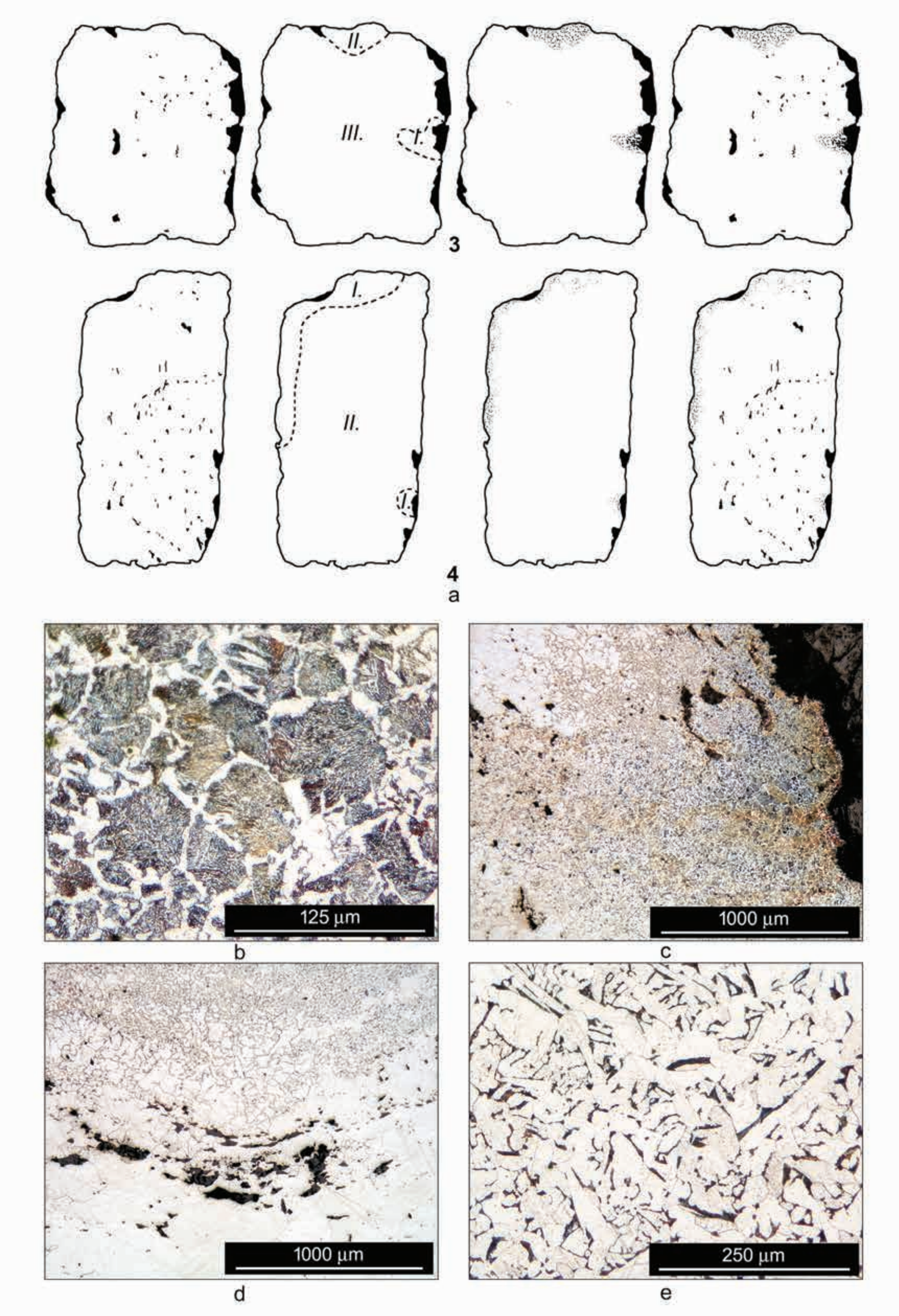

Fig. 58. Sword from the grave No. 438; a – schematic drawings of crossguard and pommel samples (from the left: before etching, layout of the described areas, illustration of the structure–without and with inclusions); b – a pearlitic-ferritic microstructure in Area I, sample [3]; c – overview of Area I, sample [3]; d – overview of Area II, sample [3]; e – ferritic-pearlitic zone (Area I), sample [4]; etched with Nital. Photos and drawings by J. Hošek.

Fig. 59. Mikulčice-Valy, Hodonín County; grave No. 500; photographs of the burial taken in the course of the excavation; (top): 'tomb XIV' with lateral and bottom stone lining; (below): the bottom of 'tomb XIV' after removal of the lateral stone lining. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

(level 2 on the Jernkontoret scale), the other half has a significant amount of coarse inclusions (level 4–5 on the Jernkontoret scale). When etched, the marginal areas of the sample (Area I) are found to be slightly carburised (Fig. 58:d). The carbon content does not exceed 0.2%; the grain size is ASTM 7–8, however the hardness is high (213 ± 17 HV0.3). The Area II is ferritic with a grain size of ASTM 4–6 (and a hardness of 130 ± 3 HV0.3), a 'ghost' microstructure also appears but less distinctly (hardness 165 ± 14 HV0.3). A number of randomly distributed areas containing greater or lesser amounts of phosphorus may be seen after etching with Oberhoffer's reagent.

Assessment: The central part of the blade has a low-carbon steel or even iron core to which surface panels of steel were attached. Steel cutting-edge elements were then welded onto the middle portion and the billet was afterwards shaped into a blade. The entire blade was hardened by some form of heat-treatment, probably a slack-quench of some sort, since the edges formed a hard micro-constituent which appears not be to martensite, but is probably bainite. The sword pommel and crossguard were made of virtually identical material: a highly heterogeneous iron showing no traces of deliberate assembly, and therefore the manufacture process probably involved the direct processing of a partly processed bloomery iron. The carburization of some surface areas is so slight that it cannot be considered intentional. On the whole, the weapon shows considerable competence in its forge work and heat treatment of the blade.

3.4.8 Sword from the grave 500

Circumstances of the discovery

The grave was discovered within the excavation of the III[rd] church, directed by J. Poulík, in excavation area No. 4 'III[rd] church 1956–57' (Poláček/Marek 2005, 56–67). It was found in the square F18 (sector VII), 3 m north from the middle part of the northern foundation of the nave, but rather closer to the narthex. A large rectangular pit with a stone lining was found with its bottom sunk into the sandy subsoil, and was named the 'tomb XIV'. It was 320 cm long, 160 cm wide and more than 165 cm deep from the surface. It deviated from the W-E orientation by circa 15°, so it almost followed the orientation of the III[rd] church. The pit was overlapped by the grave 450 and both graves disturbed the southern part of the settlement feature 124. Graves 450 and 500 were overlapped by a sandy gravel adjustment of the terrain and above this there was a layer of clay and debris from the destruction of the church. The grave 500 lay together with other significant burials on the western side of the road, which was identified by two parallel lines of graves. The burials extended northward to approximately half the length of the nave of the III[rd] church.[69] A wooden coffin with iron band-shaped fittings was surrounded by flat stones. This was deposited without an inventory number. The lateral stones sloped down like the sides of a funnel towards the bottom. The upper stones, which had originally created a continuous cover of the coffin, sank onto the buried body. The bottom of the burial pit was regularly covered with large stones, which covered an area of 310 × 140 cm. The only well-preserved part of the coffin was the garniture of band-shaped fittings, positioned on the top layer of stones and on the level of the skeleton. They were found on both sides of the skull, the pelvis, both tibias, the toes and also in the NE and SW corners of the burial pit. The burial pit had an ash-coloured backfill of sand and clay, which contained animal bones, pottery shards and a spindle whorl.

The skeleton of the man, who died in the age of *adultus II* (30–40 years), lay on his back (Stloukal 1967, 300). The bones were spread out on the bottom of the pit to a length of 185 cm. The arms were stretched alongside the body, and the fingers of both hands lay on the hips (Fig. 59).

A sword (1) lay alongside the right arm, the pommel was just below the shoulder and the tip was at the level of the knees. Under the blade near the crossguard there was a flint (2) together with a firesteel (3). Beside the right side of the sword there was a long knife (4). Under this there was a folding knife (5). Another knife was placed by the sword, about 20 cm to the south from the right hip (6). On the blade of the sword near the crossguard there was (according to the photograph of the grave) a trefoil fitting together with other fittings and a buckle from the garniture of the sword straps (7–12). All the parts of the garniture were uniformly decorated. Together with them there was (according to the note in the inventory), an oval buckle (13) with a different design from the garniture of sword straps. Owing to its size it could be a belt buckle. By the sword there was also found a set of iron fragments with wood and leather (14). By the toes there were spurs (15). The precise location of other strap chape (16) and a strap keeper (17) in the grave is unknown.

Finds

1) The iron sword with large remains of a scabbard and wrappings (594-2976/57; Fig. 60–65).
2) The small flint flake (33 × 15 mm; 594-1446/57).
3) The lyre-shaped firesteel with double S-bent arms (125 mm long, about 46 mm high); in fragments (594-1446/57).
4) The long knife with a whittle tang, a wide blade, a rather bent back and a curved cutting edge (175 mm long, length of the blade about 150 mm, width 25 mm). On the tang the remains of a wooden handle were preserved. The tang was put into a leather sheath (594-1444/57; the tip of the blade was deposited under the number 594-1448/57).
5) The iron folding knife of oblong trapezoidal shape with a sheetmetal case, which was folded. 85 mm long, 24 mm wide (594-1447/57).
6) The iron knife (160 mm long, length of the blade 120 mm) provided with straight blade-back, two shoulders and a whittle tang; sheathed in a wooden scabbard (594-1445/57).
7) The iron trefoil fitting (504-1437/57). It is made up of three arms, each shaped like a rectangle. The arms are 26–29 mm width and 23–28 mm long. The central part of the fitting is in the form of a triangle divided by three ridges from its centre to the three corners. Each of the arms bears four rivets arranged in a line perpendicular to the longest axis of the arm. Rivets

69 See the plan of the burial ground (Poláček 2006, 6; Poulík 1975, 76). For more details see 'Circumstances of the discovery' in Chap. 4.3.3.

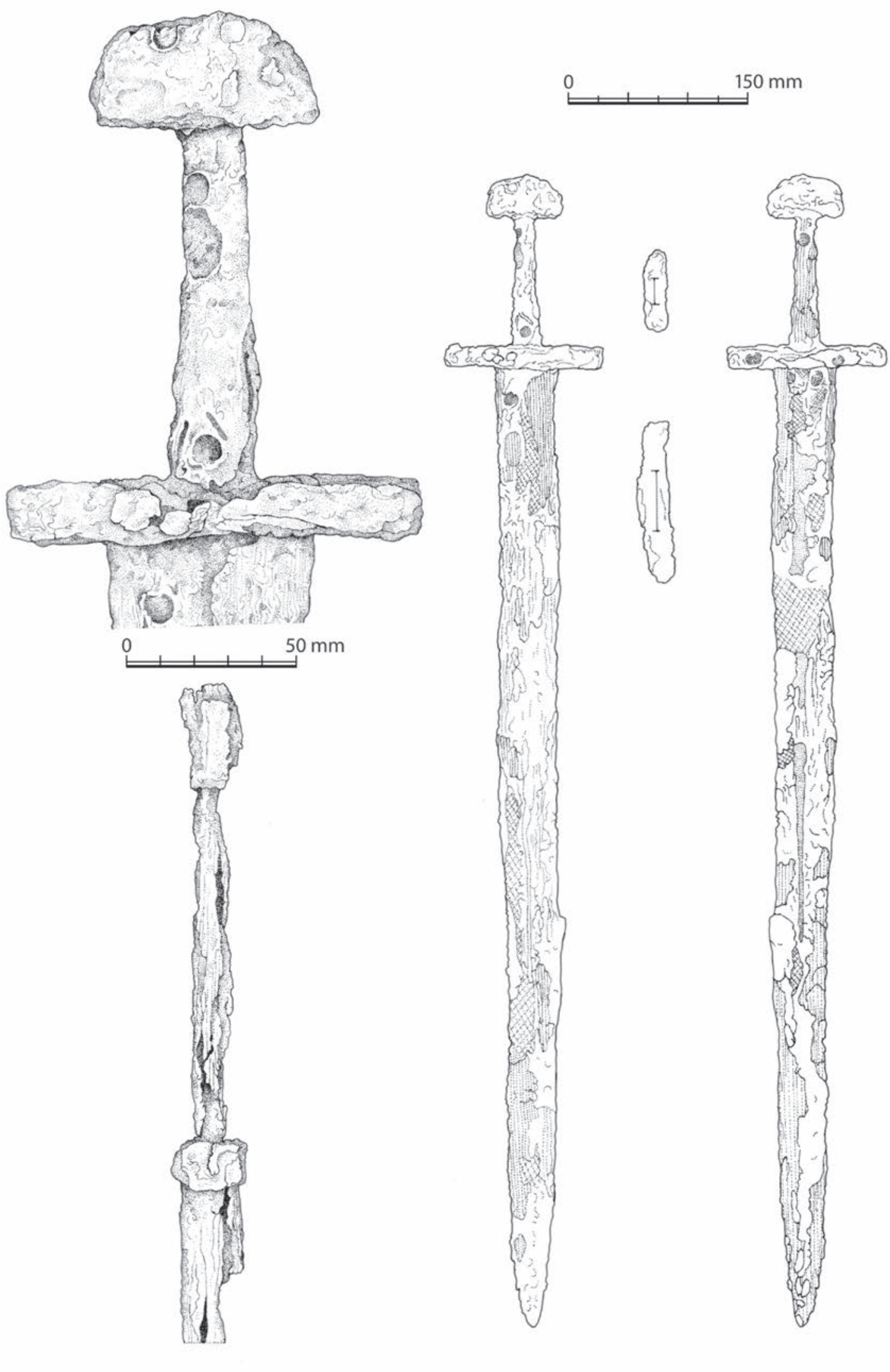

Fig. 60. Mikulčice-Valy, Hodonín County; sword from the grave No. 500 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

of two (longer) arms are underlain by a rectangular gilded sheet, and their heads are decorated with wreaths of gilded filigree. Rivets on the third (shortest) arm are not underlain by any decorative sheet and their heads are decorated only by wreaths of twisted wire (Ungerman 2011a, 581–582, Abb. 7:4). Each line of the rivets is separated from the terminal part of the arm by a straight groove. The rims of the arms are decorated on their front sides by five notches. On the back side there are remains of the terminal parts of leather straps, which were fastened to the fitting by the rivets, which were underlain on the longer arms with the gilded sheets.

8) The rectangular iron attaching fitting (31 × 25 mm) has a line of four rivets with greatly protruding round heads along its longitudinal axis (594-1438/57). The band with rivets is surrounded on both sides by a straight groove. The longer sides of the fitting are decorated on the front by notches, analogous to the rivets of the triangular fitting. Under the back side there are two leather straps with width of about 30 mm, fastened one under another by a line of rivets, underlain with a rectangular plate that substitutes washers. The straps head across to the line of rivets. The bottom strap is bent into a right angle under one longer side of the fitting (Ungerman 2011a, Abb. 7:1).

9) The iron attaching fitting (594-1438/57) of rectangular shape (32 × 25 mm), identical with the fittings described in points 8 and 10. On the back side there were originally fastened two leather straps. On the bottom, strap (which is now separated) there is an imprint of underlying rectangular plate and holes for rivets. The fragments of straps that were oriented across to the line of rivets were preserved in dimensions not exceeding the dimensions of the fitting (Ungerman 2011a, Abb. 7:2).

10) The partially damaged iron fitting (594-1438/57) of rectangular shape (32 × 24 mm), is identical with the fitting described in points 8 and 9. The back side of the object is not decorated, but is smooth, with neither straps nor underlying plates preserved (Ungerman 2011a, Abb. 7:3).

11) The iron rectangular belt chape (594-1439/57) is of a size 72 × 30 mm. By one of the shorter sides there is a line of four rivets with greatly protruding round heads, and the front of the opposite side is on the edge decorated by notches. A line of notches on the back side is bordered by a groove, which by the edges of the chape follows two longer grooves leading to the middle of the fitting so that they all together make an isosceles triangle with oblong legs. The main top of the triangle, situated about the middle of the chape, is followed by a thin straight band, which travels across its front side (Ungerman 2011a, 7:5).

12) The iron buckle with rectangular, transverse oriented frame (34 × 39 mm), is preserved in two fragments (594-1441/57). The outer edge of the front side of the frame is decorated by notches. On the butt there are preserved fragments of chape and a leather strap. A prong was not identified (Ungerman 2011a, Abb. 7:6).

13) The iron buckle (594-1439/57) with an oval frame, a prong and a square chape with two rivets in the rear corners (total length 50 mm, total width 40 mm, width of the frame 50 mm, length of the frame 25 mm). On the frame and the chape there were preserved remains of a leather belt.

14) Twelve fragments of iron objects and organic materials (594-1448/57). Nine fragments of wood, textile and leather, in some cases deposited in layers. Fragments of leather with remains of needlework. Fragment of decoratively carved wood (thin oblong cordon in a shape of shamrock). Fragment of a knife blade (belongs to evidence number 594-1444/57).

15) The iron spurs of unknown type (without evidence number). Not at a disposal in 2003.

16) The iron tongue-shaped strap chape (594-1443/57) ends with pointed arch. The chape is, in the cross section perpendicular to the longitudinal axis, slightly arched, but cloven in the rear (35 × 20 mm).

17) The iron strap keeper (594-1442/57) with a rectangular frame and small oval shield covered in remains of textile (27 × 16 mm).

Description of the sword

This is a double-edged sword (594-2976/57; Fig. 60–62) which was, at the time of its documentation in 2003, 960 mm long and weighed 1755 g (including the massive remains of the scabbard and other wrappings that covered the whole blade). Any deduction about

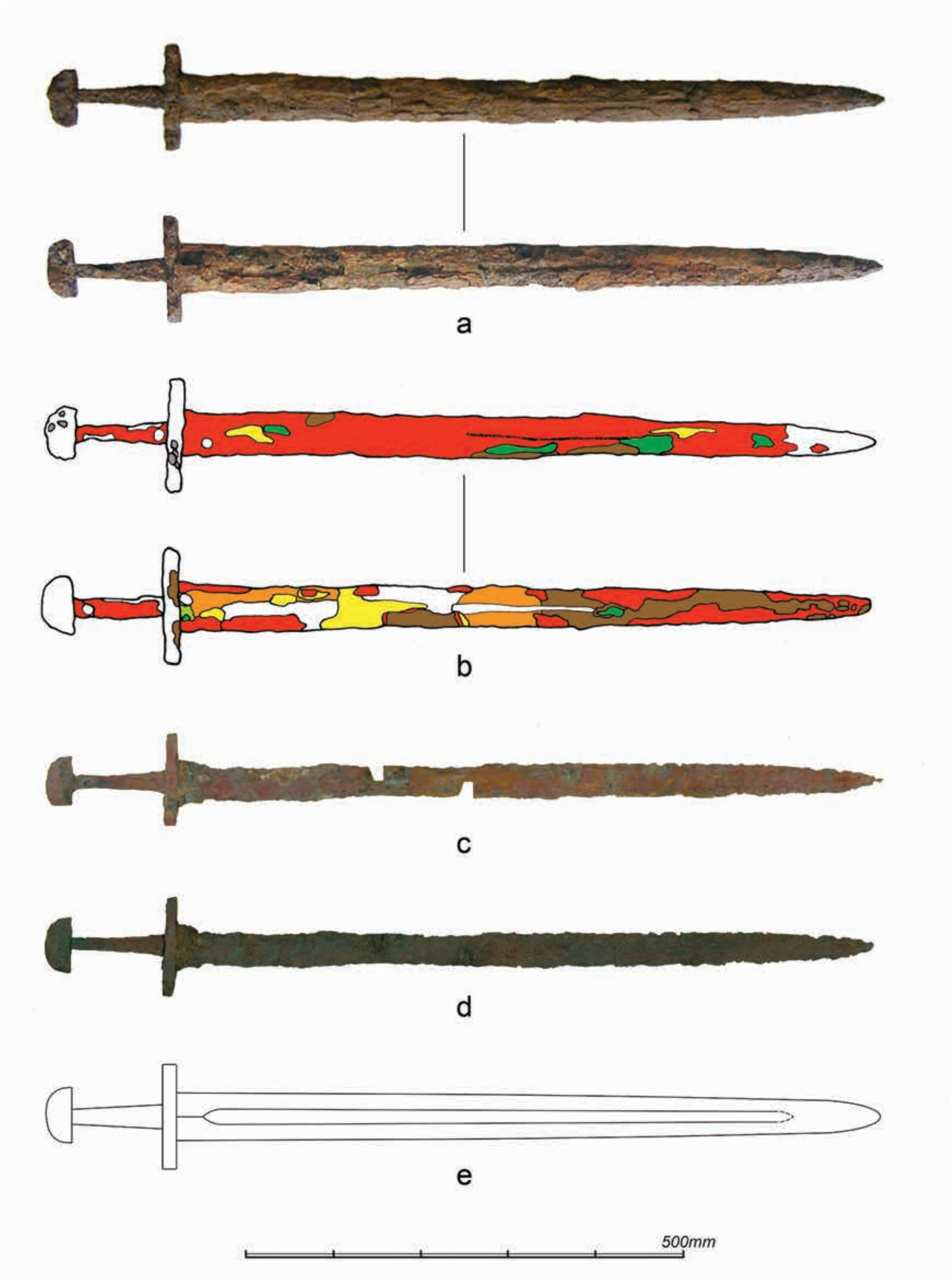

Fig. 61. Sword from grave No. 500; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard and coverings of the tang); light green: textile 2 (found between the wooden corpus of scabbard and the upper layer of textile 3 below the guard); dark green: textile 3 (except for the area below the guard, where the textile 3 lay on the textile 2, it covered the wooden corpus of the scabbard), brown: leather on the textile 3 on the scabbard and remnants of leather on the grip; orange: remnants of the wooden corpus of scabbard and a textile lining consolidated by synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

the point of balance of the sword (250 mm below the crossguard) is distorted by the number and position of the wrapping remains. After the fire in Mikulčice, the sword was preserved unbroken, but the organic materials, which were originally conserved within the corrosion layers, were destroyed. The present weight is 1060 g.

The single semicircular pommel (63 mm long, 30 mm high, circa 16 mm wide) is slightly flattened on the top. From the side it is a narrow rectangle, from the the horizontal it is rectangular with rounded ends. The tang of the blade went through the hole of the pommel up to its top; the connection between both these parts is tight and regular.

The grip is relatively long (106 mm) and narrow, and it broadens from the pommel (17 mm) towards the crossguard (27 mm). The tang bore remains of organic materials: wood on the side B and fragments of unidentified organic materials (the structure typical for wood was not found) on the side A. This thin layer of unidentified organic materials was, at a distance of 8 mm from the crossguard along the axis of the tang, perforated by a circular hole with a diameter of 8 mm that did not reach the metallic core. Roughly 20 mm below the pommel there was a similar hole, with a diameter of 7 mm. However, it was shifted to the left side of the tang. A wider and less distinct hole in the wood was observed also on the side B; although also about 20 mm below the pommel, this time it was situated in the axis of the sword. The interpretation of these holes is unclear, because the tang itself was not perforated.

The crossguard is straight, robust and relatively high (120 mm long, 16 mm high, max. width 19 mm). From the front view it has the shape of a block with sharp edges and in the horizontal it is slightly arched with moderately rounded ends. In the X-ray image there is a distinct hole for the blade in the crossguard in the form of a step-like broadening.

The blade is 808 mm long and is 58 mm wide below the crossguard. It narrows distinctly along the last third of its length and terminates in a moderately long point. A narrow fuller appears 30 mm below the crossguard and vanishes approximately 100 mm before the point. The width of the fuller cannot be measured, it oscillates around 15 mm.

Typological determination of the sword

The sword unequivocally belongs, due to the single semicircular pommel (Geibig's construction type III; Geibig 1991, 90–100), the flat base of the pommel and the long crossguard, to Geibig's type 12, variant I (specifically Geibig's combination type 12-11-6-10; Geibig 1991, 56–60), Petersen's type X (Petersen 1919, 158–167) and Ruttkay's type VII (Ruttkay 1976, 249–251). The sword is of robust construction, the lateral sides of pommel are almost at a right angle to the base, but the pommel is rather low, due to the flattened top. It has features of earlier as well as later variants of type X according to J. Petersen (1919, 158–167). According to the classification of Kucypera, Kurasiński and Pudło (2011) it has some features of the variant X-later; the most important features are the right angle between the base and top edge of the pommel from the front view and the 'quadrate' rather than 'triangular' shape of the horizontal view. According to Jakobsson's classification (Jakobsson 1992, 55–57), the pommel belongs to the 'design principle 6' (swords with an absent upper guard). The shape of the crossguard corresponds to type 7 of Ruttkay's classification (Ruttkay 1976, 249).

The sword from grave 500 had a very narrow and indistinct fuller, displaced from the crossguard, which is the reason why it is outside Geibig's classification (Geibig 1991, 83–90). Most of the features studied correspond to types 2c and 3c. The width of the fuller is compatible with those types that Geibig dated to the 2nd half of the 11th and 12th centuries. The exclusivity of the sword within the course of the 9th and the beginning of the 10th centuries is confirmed by the special rank of swords with displaced fullers. Within the classification of blades introduced in this study (see Chap. 4.2), the blade belongs to the group {a2}. This group has been defined especially by lengths and widths of blades and their length/width ratios. Later Carolingian swords predominate in this group.

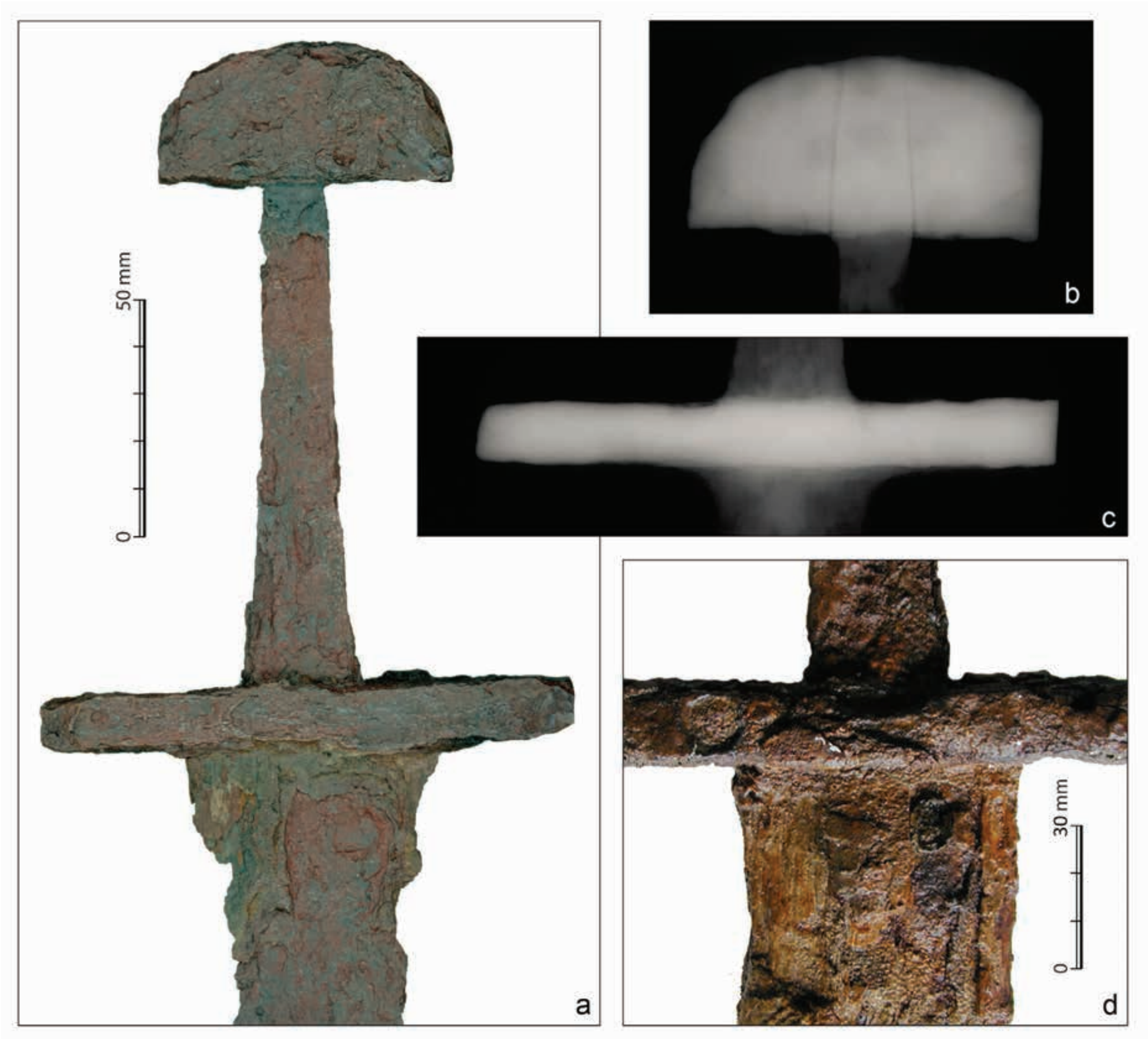

Fig. 62. Sword from the grave No. 500; a – hilt from the side B after the depository fire and second conservation; b – X-ray image of the pommel (documented after the fire); c – X-ray image of the crossguard (documented after the fire); d – detail of the upper part of the blade with remnants of organic materials from the side B (documentation of the sword in 2003). Photo 'a' by E. Ottenwelter; photos 'b-c' by I. Nacherová; photo 'd' by Institute of Archaeology of the AS CR, Brno.

Scabbard, straps and outer wrappings

The blade of the sword was almost entirely covered with the remains of organic materials. The lining of the wooden scabbard was made of a coarse patterned textile (1), which was found on both sides of the blade, especially in its upper third and extensively along the axis of the sword above the fuller. A geometric pattern was visible especially on the side B, approximately in the third of the length from the crossguard. In the centre of the hollow rhomboi, created by diagonal lines of threads crossing several upthreads over the length of 4 mm, there were smaller full rhomboi, also made of threads crossing several upthreads. On the basis of the preserved documentation it is impossible to decide, whether the pattern was woven or embroidered. The patterned textile was covered over almost the entire surface of the blade with remains from the wooden body of the scabbard. The scabbard consisted of two parts connected along the cutting edges, and was lined with this textile.

On the side B there was, just below the crossguard, approximately along the axis of the sword, a block of the scabbard preserved in its original width. This block bore another layer of a coarse textile (2), the parameters of which could not be measured on this small fragment. This textile (2) probably covered only a smaller part of the scabbard and continued up to the crossguard. A fragment of another fine textile (3) in a plain weave (with thread count of 16/16) clung on the textile (2), but in other places the textile (3) covered directly the wood of the scabbard. Remains of the textile (3) were frequently observed on both sides of the swords. The textile (3) was covered with thin leather on both sides of the blade and also passed up to the bottom part of the crossguard. A small corroded iron ring, which was apparently related to the construction of the scabbard and suspension garniture of the sword, was found near the right edge of the blade on the side B. The sword was accompanied by a suspension garniture, whose iron fittings were decorated with geometric patterns. The garniture consisted of a trefoil fitting (504-1437/57), three rectangular attaching fittings (594-1438/57), a rectangular chape (594-1439/57) and a buckle or two buckles (594-1441/57 and perhaps 594-1439/57) for leather straps.

Metallographic examination

Sampling: Sample [1] was cut out from the right side of the blade 334 mm from the crossguard; sample [2] was taken from the left side of the blade 236 mm from the crossguard. Sample [3] was taken from the right side of the crossguard 39 mm from the tang and sample [4] from the right side of the pommel 15 mm from the tang. Sample [5] was subsequently taken from the right side of the blade 390 mm from the crossguard after the weapon had withstood the depository fire (see Fig. 63:a).

Metallographic description of the blade: SAMPLE [1]: The metal purity fluctuates between level 3 and 5 on the Jernkontoret scale. Large complex slag inclusions appear in the central part of the sample, which contains the most slag. Area I, extending into the cutting edge, is ferritic, with a grain size of up to ASTM 4–6 and hardness of 146 ± 16 HV0.2 (Fig. 64:a). The adjoining Area II consists of finer-grained ferrite accompanied by traces of pearlite (grain size ASTM 7, a maximum carbon content of 0.15% C, hardness around 155 HV0.2). Area III shows fine-grained ferritic-pearlitic structure with a maximum carbon content of about 0.35% C and hardness of 175 ± 17 HV0.2. Area IV has a pearlitic-ferritic microstructure, which is more coarse-grained, with a maximum carbon content of 0.7% and hardness of about 190 HV0.2 (Fig. 64:b).

SAMPLE [2]: The metal is of mediocre purity over most of the section (level 3 on the Jernkontoret scale); at one side in the direction towards the central part of the blade, an area occurs with a higher proportion of complex slag inclusions (level 5 on the Jernkontoret scale; see Fig 64:c). After etching, the microstructure predominantly consists of a fine-grained mixture of ferritic and pearlitic-martensitic areas (Area II), the carbon content can be estimated to reach a maximum of 0.2%, the hardness is 187 ± 7 HV0.2 (Fig. 64:e). Area I, extending into the up-to-date preserved part of the cutting edge (Fig. 64:d), contains ferrite (6 to 4 ASTM) and traces of pearlite and/or martensite. The hardness of this area is 168 ± 15 HV0.2.

SAMPLE [5]: A miniature sample cut out from the preserved tip of the cutting edge revealed carbides dispersed in a ferritic matrix. Fine globular cementite particles predominate in the sample, but particles corresponding to the residue of pearlitic lamellae occur in several places as well. Some carbides are coarse and irregularly shaped (Fig. 64:f, g). Hardness not measured.

Metallographic description of the crossguard: SAMPLE [3]: The metal purity mostly corresponds to level 3 on the Jernkontoret scale. Complex small and medium sized inclusions predominate (Fig. 65:b). Area I contains a fine-grained pearlitic-ferritic microstructure with a carbon content around 0.55% C and hardness of 193 ± 10 HV0.2. Area II consists

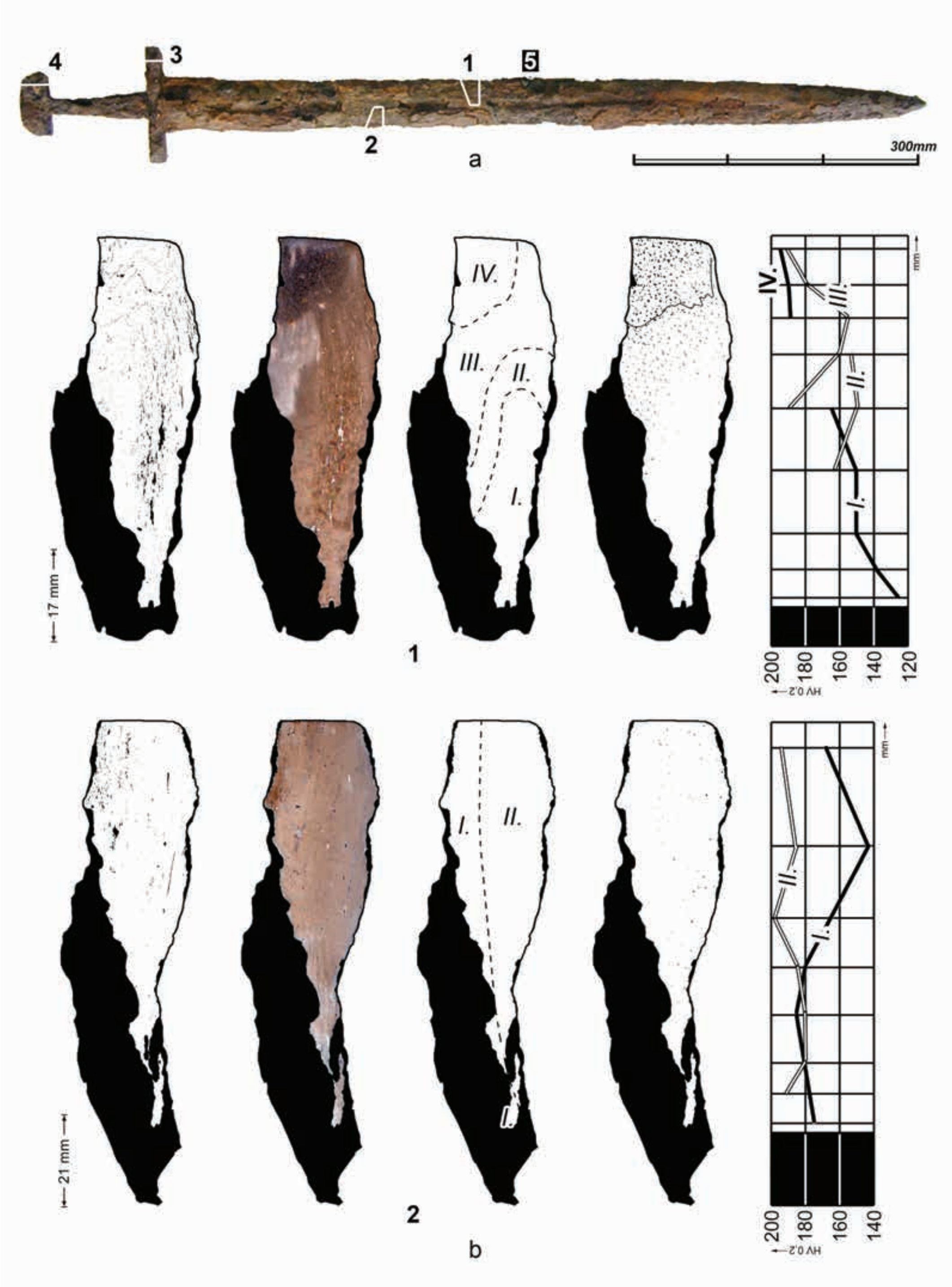

Fig. 63. Sword from the grave No. 500; a – the sword examined and the sampling method utilized; b – schematic drawings and scans of the blade samples (from the left: unetched state; after etching with Oberhoffer's reagent (scan); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

of a fine-grained ferritic-pearlitic microstructure with a carbon content around 0.3% C (hardness 142 ± 13 HV0.2). Area III consists of a ferritic-pearlitic microstructure with a maximum carbon content of around 0.2% C (Fig. 65:c). Area IV consists of ferrite, with a grain size of ASTM 4 and a hardness of 92 ± 5 HV0.2.

Metallographic description of the pommel: SAMPLE [4]: The metal is relatively pure in some places (level 2–3 on the Jernkontoret scale),

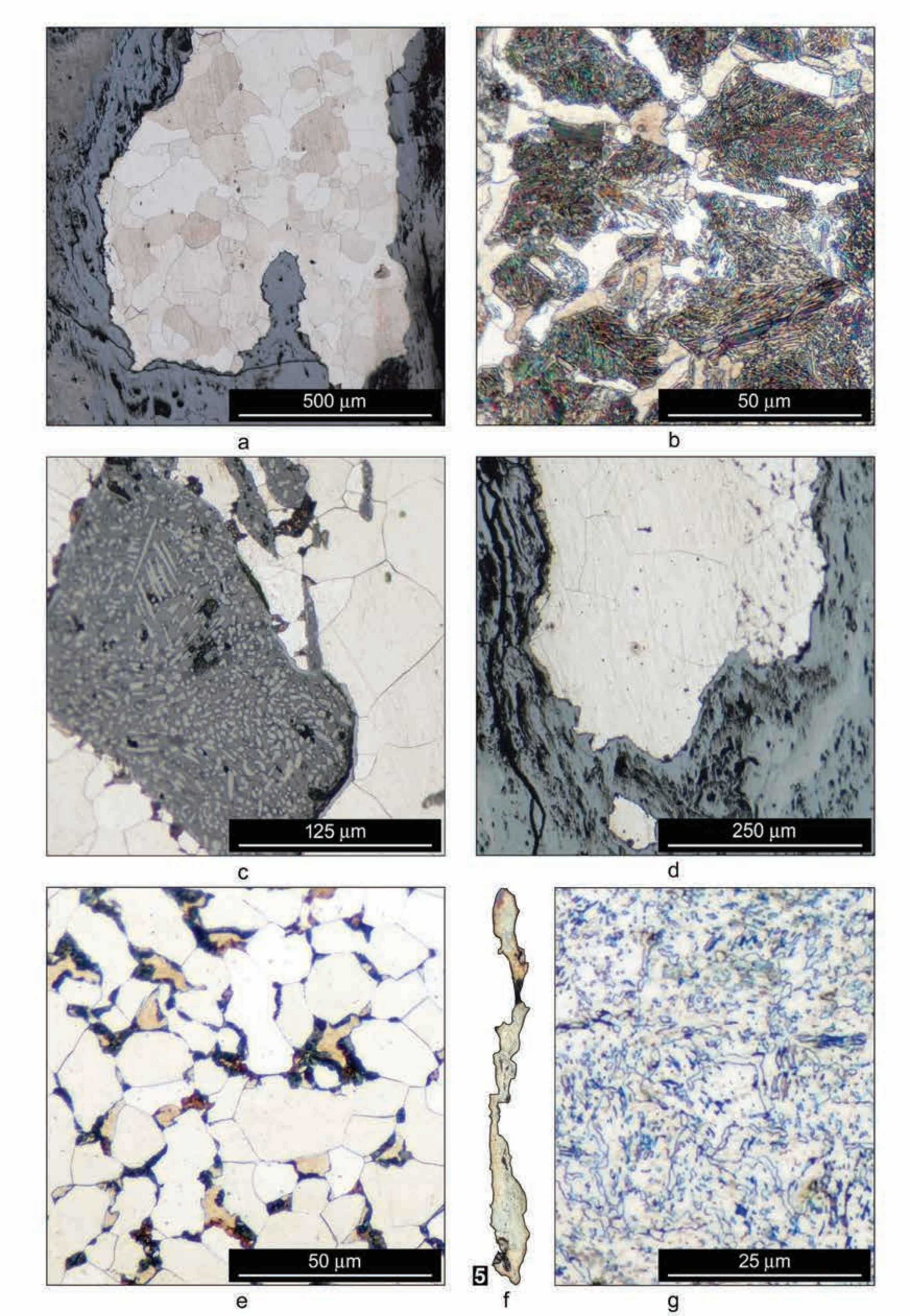

Fig. 64. Sword from the grave No. 500; a – ferrite in the cutting edge, sample [1] (Area I); b – pearlitic-ferritic structure, sample [1] (Area IV); c – coarse slag inclusion, sample [2]; d – ferrite in the cutting edge, sample [2] (Area I); e – grains of ferrite with areas of pearlite and martensite, sample [2] (Area II); f – sample [5]; g – carbides dispersed in a ferritic matrix, sample [5]; Nital etched. Photos by J. Hošek.

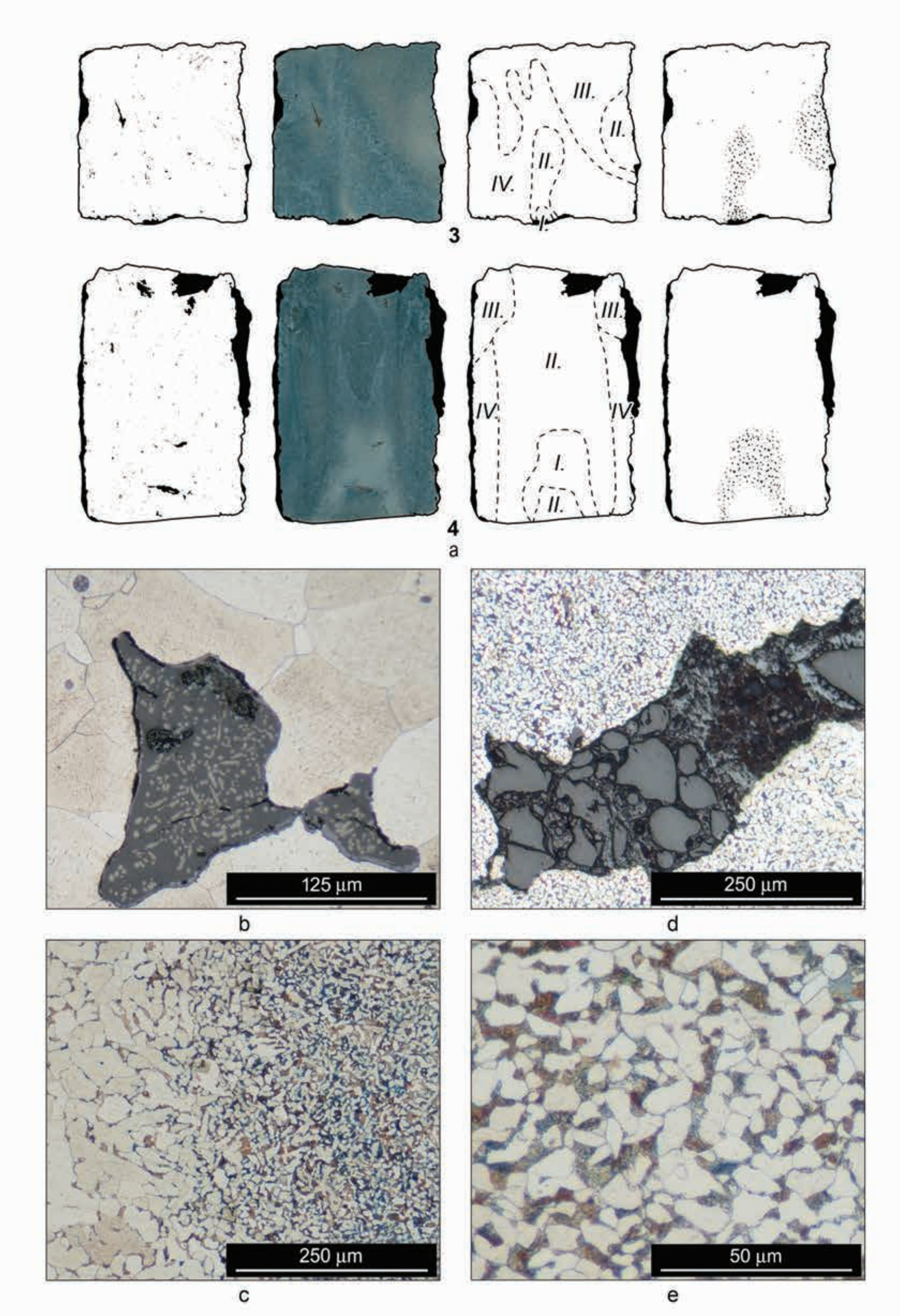

Fig. 65. Sword from the grave No. 500; a – schematic drawings and scans of the crossguard and pommel samples (from the left: before etching, after Nital etching (scan), layout of areas described, distribution of the microstructures); b – slag inclusion in matrix of the crossguard, sample [3]; c – changeover between Areas II and III with varying degree of carburization in the crossguard; d – slag inclusion in matrix of the pommel, sample [4]; e – ferritic-pearlitic microstructure in Area I in the pommel sample; Nital etched. Photos and drawings by J. Hošek.

however, in other areas it contains numerous fine and coarse inclusions (both single-phase and complex) which corresponds to level 4 to 5 on the Jernkontoret scale (see Fig. 65:d). Area I consists of a fine-grained ferritic-pearlitic microstructure with a carbon content of about 0.3% and a hardness of 150 ± 8 HV0.2 (Fig. 65:e). Area II consists of a ferritic-pearlitic microstructure with a maximum carbon content of 0.15%. Areas III and IV are both ferritic, with a grain size of ASTM 3 and hardness of 107 ± 9 HV0.2 in Area III, and with a grain size of ASTM 6 and hardness of 110 ± 13 HV0.2 in Area IV.

Assessment: The pommel and the crossguard are made of a heterogeneous material with an uneven distribution of both carbon and slag inclusions. Similar characteristics of this microstructure are often present in iron blooms, so it is probable that both components were made from a partly worked bloomery iron. It seems probable that the same material (i.e. a partly processed bloomery iron) could have been used for the blade body. Sample [2] shows no signs of intentional construction; sample [1] revealed a distribution of metallographic structures that corresponds to welding of 'cutting edge' elements onto the blade core. Carbon-rich areas were observed in sample [1], especially in the middle portion of the blade, however the cutting-edges surviving now of both analyzed samples are merely ferritic. Only the additional sample [5] contained steel. This sample was a little piece of the cutting-edge tip that was better preserved and cut out from the weapon after the depository fire, so it may therefore be assumed that the cutting edges of the blade originally contained some steel.

The original heat treatment cannot be deduced with certainty, although the surviving microstructures suggest slack-quenching of some sort. The weapon was thus presumably a relatively simply-forged blade having some steel in the cutting edges. Some attempt was made to harden it. It could have been the product of a less-experienced smith.

3.4.9 Sword from the grave 580

Circumstances of the discovery

Grave 580 was discovered within the excavation of the IIIrd church directed by J. Poulík, in area No. 4 'IIIrd church 1956–57' (Poláček/Marek 2005, 56–67), in the square F/20, more precisely in sector V, which was determined later after distinguishing the foundation trenches of the three-aisled church. This was almost in the middle of the length of the nave of the church, but somewhat closer to its northern foundations (Fig. 1). Among the burials found in the interior of the IIIrd church, grave 580 was the most significant in its position as it was, related to the presumptive main altar.

The spacious burial pit was oriented NWW-SEE, and was termed a 'tomb XVI' due to the presence of mortar – and stone debris in the upper part of the grave fill and the large stones covering the wooden coffin with iron fittings. According to the *DGU* the bottom of this burial pit (whose size was 270 × 130 cm) was at a depth of 170 cm from the surface, which meant about 155 cm from the top level of the preserved topsoil. This information about the size of the burial pit is slightly different from the report of Z. Klanica (1993, 99), who describes the size of a coffin: 'The probable length was 250 to 300 cm, the width was about 150 cm'. The level of the highest preserved topsoil was probably related to the terrain adjustment under the basilica floor (Klanica 1993, 98).

A complicated situation was noted in the upper part of the grave fill. In the photograph and in the rough drawing there is a terrain situation documented at a depth of about 80 cm to 100 cm below the original surface (Košta/Hošek 2008a, obr. 2, 3/A). Under the layer of the grave fill, which caved into the tomb after the collapse of the coffin which probably happened when the church fell into ruins, there was a quantity of mortar and masonry preserved in fragments. They mainly included a part of a wall, about 60 cm long, the northern side of which was covered in red plaster, and the remains of a black

Fig. 66. Mikulčice-Valy, Hodonín County; grave No. 580; photographs of the burial; (left): viewed from the E (POLÁČEK 2006, 7); (right): viewed from the W. Photo from the archive of the Institute of Archaeology of the AS CR, Brno.

mortar floor. Next to and under them there were other fragments of mortar, stones and red plaster (KOSTELNÍKOVÁ 1958a, 203). These fragments were, for the purpose of documentation, left on the plinths, while the materials around them were taken away. It is not clear from the documentation to what extent this was for the purpose of monitoring the natural stratigraphy, e.g. cones of debris filling the secondary encroachments of the burial. Z. KLANICA (1993, 98–99) assessed the terrain situation as follows: '...the tomb number XVI was opened several times at unspecified times. After the first disruption the surface was covered with a mortar layer and a red painted wall. The later encroachment is represented by a cone of debris in the eastern part of the backfill of the tomb, where one fitting of the disrupted coffin was found'. A record in the *DGU* is briefer: 'backfilling of the grave pit was finished in the upper part with stones, mortar, red plaster and mortar debris'. The fitting of the coffin (without reference to the evidence number) in the grave fill is mentioned even by M. KOSTELNÍKOVÁ (1958a, 203), who, unlike Z. Klanica locates it to the west corner, at a depth of 90 cm. According to the *ILF*, five atypical iron fragments (594-5798/58)[70] were found in unspecified part of the grave fill.

70 J. Košta did not manage to find these fragments in the depository before the fire.

The interpretation of the situation in the upper part of the interior of the burial pit is unfortunately contradictory in individual sources. The available documentation does not enable us to decide unequivocally. That is the reason why even our conclusions must remain open.

The level of remains of stones with mortar and plaster that was uncovered is probably related to the floor level of the church that caved deeply into the interior of the burial pit. A similar situation was found, in the upper part of the backfill of other tombs in the basilica interior, and which included remains of the red-coloured plaster (Poulík 1975, 76–77). Any further interpretation of these remains is not possible without some knowledge of the standard terrain documentation – a silhouette and section of the burial-pit fill. The question of later encroachments to the tomb and their chronology also remains unclear.

A large part of the space of the burial pit was originally filled by a wooden coffin with iron band-shaped fittings which had widened ends, each equipped with a pair of rivets. The coffin was equipped with four pairs of fittings on the longer side and one pair of fittings on the shorter side (under the legs and over the head of the deceased; see Poláček 2005, 144, Fig. 3, 5; evidence number 594-2232/57 to 594-2241/57, 594-2259/57). In the bottom part of the burial pit there were several regularly placed large stones. These stones, situated by the walls of the burial pit, originally faced the sides of the coffin. Two large flat stones situated in the middle part of the tomb were originally placed on the top board of the coffin (see Fig. 66).[71]

According to the information from the *DGU*, 'no bones from the skeleton were preserved' (see Fig. 66). However Z. Klanica (1993, 99, 108; 2002, 28, 36) states, on the contrary, that alongside the sword there was an ulna, which in his opinion was omitted during the intentional extraction of the human remains. J. Poulík (1975, 77) states in a general way, that the human remains were 'considerably decomposed'. There is no definite evidence that the ulna existed.[72] Despite the fact we do have human remains from the grave 580 – in the depository of the Anthropological department of the National museum there are several fragments of the skull of the deceased man.[73] The very bad state of preservation of the bones of the dead placed in coffins is a relatively common phenomenon in Mikulčice, particularly in case of burials in the IIIrd church interior.

Nearer to the northern wall of the burial pit, along the left side of the body, there lay a sword (1). Under the upper part of the blade of the sword there were fragments of a leather belt and other organic materials (2), a tongue-shaped belt chape (3) and a buckle (4). Together with the belt chape and the buckle, fragments of a small plate (5) were inventoried; the location of the fragments is unknown, but it is not possible to eliminate their connection with the sword or a seax garniture. Over the sword blade near the socket of the scabbard there was a silver belt keeper (6). Under the upper part of the sword there was in a position parallel to it an ostentatious long fighting knife or seax (7). The seax was preserved in a leather scabbard, decorated by a ski-shaped fitting, which was found under the bottom part of the sword blade (8). As a part of the scabbard there were fragments of a gilded sheet with transverse handle-ribs recorded in the *ILF* (9). Unfortunately, on the basis of the description it is not clear whether the fitting

71 According to the older interpretation the stones should have underlaid the coffin (Klanica 2002, 28), however, both of them lay slightly above the level of the burial finds and their southern edges overlap the bottom parts of the lateral stones, the eastern stone lay over the angular mounting of the coffin and under the large stone in the western part of the burial, which caved into the area of the head of the man, a globular button was found.

72 In case of object/objects visible along the sword in the photographs (Fig. 2/B, C) it is impossible to decide, whether they are the remains of an ulna or a seax and a garniture of straps, which was really found by the sword, according to the available descriptions.

73 The remains are deposited under the accession number P7p 9/91. We would like to thank RNDr. P. Velemínský, PhD. for the information.

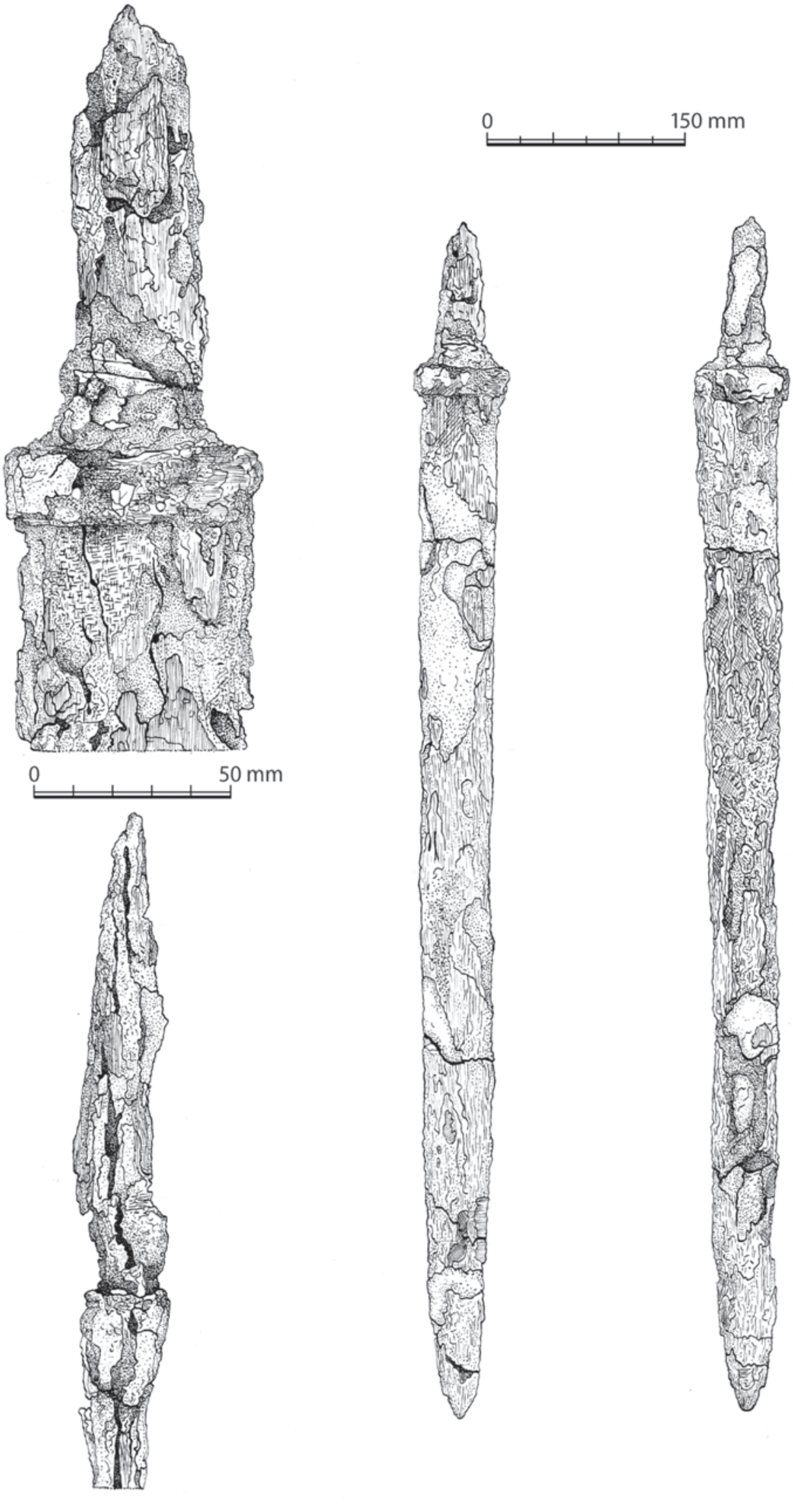

Fig. 67. Mikulčice-Valy, Hodonín County; sword from the grave No. 580 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

came from the scabbard of the seax or that of the sword. All the objects found on the supposed left side of the skeleton were part of an ostentatious garniture, consisting of the sword and the seax, deposited in their luxurious scabbards. The straps coiled around the weapons were equipped with a belt keeper, a buckle and a belt chape.[74] The garniture has the decorative motive of a lily-shaped cross or a cross with triple ending of the arms, an approximate analogy to which we find in the symbol chased on the sword blade. About 30 cm south of the belt chape, probably on the right side of the skeleton, there was a knife (10), a firesteel with remains of other iron objects (11) and a flint (12). Among these artefacts there might have been a folding knife (13), the location of which within the tomb is uncertain. By the group of iron objects there was an axe (14). Under the large flat stone in the area of the head or neck of the buried man there was a globular button (a so-called *gombík*) (15). To the SW corner of the tomb a small bucket (16) was found and in the SE corner there lay fragments of sheets with rivets (17).

Finds

1) The iron sword without an upper hilt but with massive remains of the scabbard (594-2979/57; Fig. 67–71).
2) Several fragments of leather and wood with the remains of textiles (594-2370/57).
3) The silver, partially gilded, tongue-shaped belt chape decorated with the engraved symbol of a cross with lily-shaped ending of the arms 594-3002/57). In the inventory it is recorded with a retaining butt area for three rivets, which is missing in the photograph (Klanica 2002, obr. 11; Košta/Hošek 2008a, obr. 10:C). The size without retaining butt area is 24 × 12 mm.
4) The silver buckle, partially gilded, with a prong and transverse oval frame (27 × 19 mm) was decorated with roof-like motives made by simple chip-carved decorations attached to each other, so that they create a motive of meander along the periphery of the frame (594-3002/57; Klanica 2002, obr. 9; Košta/Hošek 2008a, 10:A).
5) The fragments of borders from the silver (or bronze?) sheet with the holes for rivets (594-3001/57).75
6) The silver partially gilded belt keeper with oval shield (21 × 17 mm), to which a cross with triple (lily) ending of the arms was engraved (594-1617/57; Klanica 2002, obr. 9; Košta/Hošek 2008a, obr. 10:B).
7) The ostentatious long fighting knife/seax (594-2980/57) with a very long tang was provided on the end with a hemispherical cap made of gilded silver sheet fastened to the handle with rivets in the corners of the wider sides. On the sheet of the cap a floral decoration was embossed. It was in the shape of two stalks with several leaves, proceeding from the middle of the cap and ending in a trifoliated (lily) motive. The single-edged blade was sheathed in a well-preserved leather scabbard and had a lightening groove (fuller) along the straight blade-back, which was decorated with rosette-like pattern-welding Klanica 2002, obr. 11; Košta/Hošek 2008a, obr. 9, 10:F. The scabbard of the seax was originally decorated by ski-shaped fitting (594-398/59).
8) The silver (or bronze?) ski-shaped fitting of the scabbard of the long knife/seax was about 100 mm long and 17 mm wide. It consists (according to the *ILF*) of a pair of arched sheets with remains of leather between them. A raised band stretches across the middle of the fitting, which is provided with pairs

74 Z. Klanica (1993, 100) considers the belt chape and a buckle to be part of the footwear garniture. He assumes this on the basis of the size of the objects. The garnitures indicating to the narrow straps accompanied also other swords, for instance garniture from the grave 257 on the burial ground connected to the church in Břeclav-Pohansko (Kalousek 1971, 151) or mounting from the grave 375 in Mikulčice (Košta 2004, 39). At the same time it should be noted, that we do not certainly know, whether the sword was fastened to another strap or whether the strap behind the binding part widened like Late Roman military belts did and also the belts from graves 23/48 and 50/50 from the burial ground in location Na Valách in Staré Město (Hrubý 1955). The spatial relations, quantity and decoration of belt mountings show their connections with the seax and the sword.

75 In the inventory book it is stated as bronze, and in the *DGU* firstly as bronze, but later rewritten as silver.

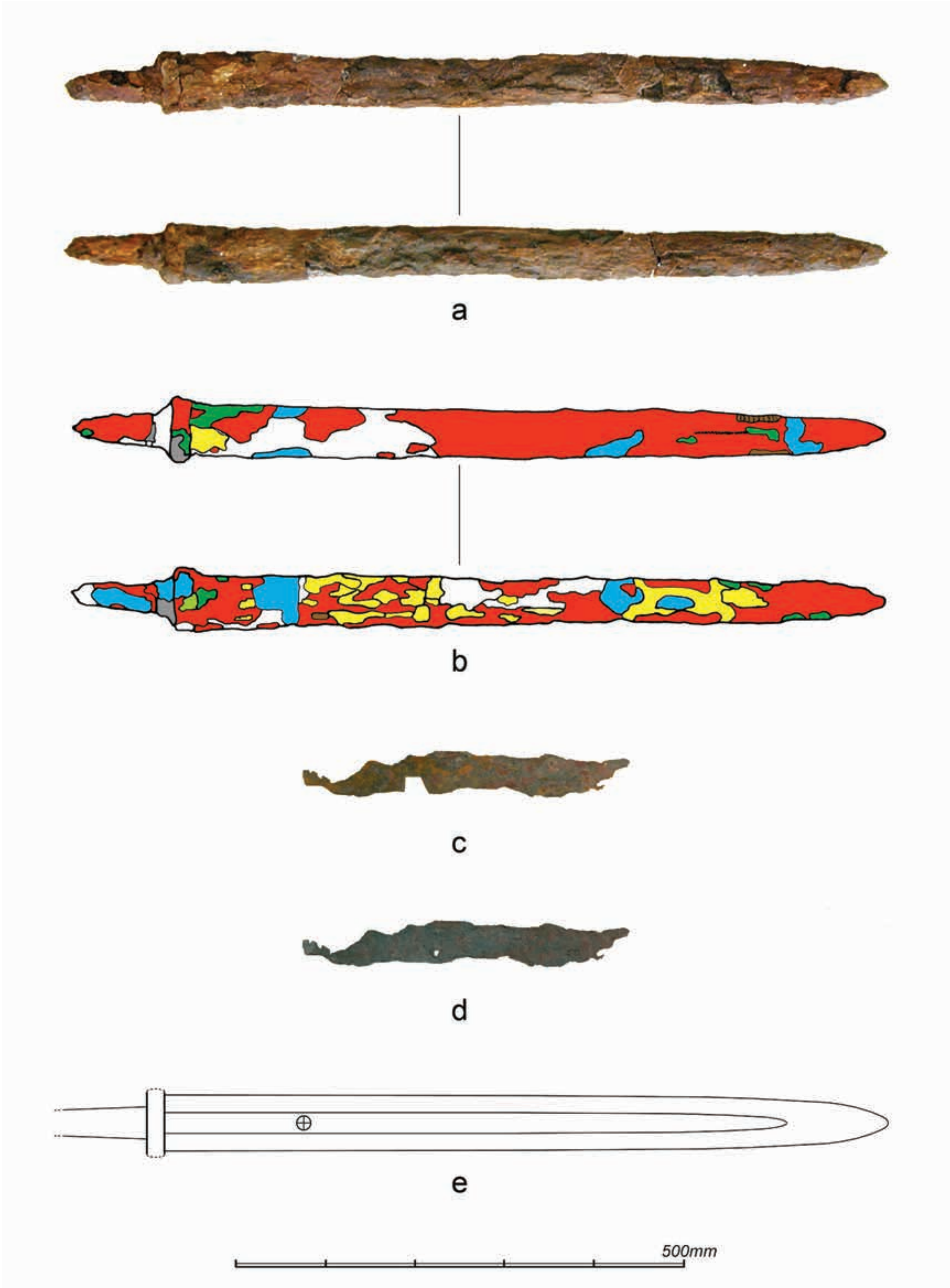

Fig. 68. Sword from grave No. 580; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile 1 (lining of the scabbard); red: wood (corpus of the scabbard and coverings of the tang); light green: textile 2 (preserved on wood in the area of scabbard mouth-band); dark green: textile 3 (found on the textile 2 and other areas right on the wooden corpus of the scabbard; textile situated on the grip); brown: leather on the textile 3, creating the upper layer of the scabbard; grey: remains of an organic material; blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products); c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword (the blade bore the inlay of silver alloy). Photos and drawings by J. Hošek and J. Košta.

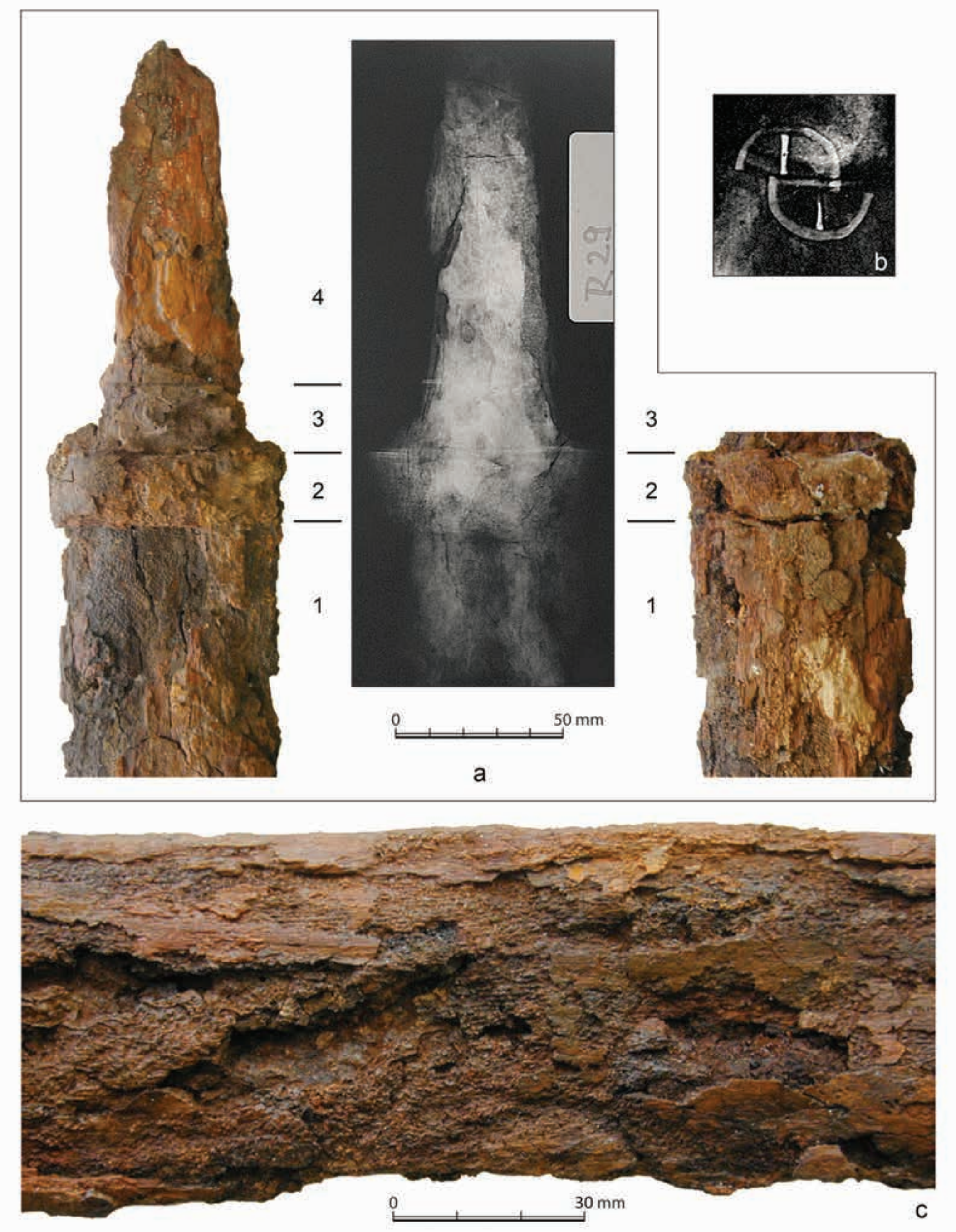

Fig. 69. Sword from the grave No. 580; a – hilt from the both sides (documentation of the sword in 2003) and X-ray image (prior to the depository fire): 1 – blade with remnants of scabbard, 2 – blade with remnants of upper end of the scabbard with iron mouth-band, 3 – remnants of crossguard, 4 – tang with remnants of grip; b – X-ray image of the broken blade with inlayed cross in circle (documented prior the fire); c – blade with remnants of organic materials (documented in 2003). Photos by Institute of Archaeology of the AS CR, Brno.

of holes placed opposite each other on both ends and in the middle. The surface is decorated by engraved or wrought motives of crosses with trifoliated (lily) endings of the arms (594-398/59; Galuška/Poláček 2006, 126; Košta/Hošek 2008a, obr. 10:G).

9) Fragments of a gilded fitting from the scabbard of the sword or long knife/seax, consisting of a sheet fastened with transversely laid sticks, the ends of which are widened, pierced and provided with small rivets (594-3044/57). According to the inventory, 13 fragments

of this fitting were found (Klanica 2002, obr. 9; Košta/Hošek 2008a, obr. 10:E).

10) The iron knife, from which only a fragment of the blade with a point and a tang was preserved (594-2352/57). Total length was 78 mm. To this knife a part of a knife-blade without a point (594-7256/59), which was later assigned to the finds from the grave 580, may be related. The width of both fragments is about 15 mm.
11) Eleven fragments of a firesteel and other unidentifiable iron objects (594-3071/57). The shape of the firesteel is impossible to restore.
12) The small flint flake (594-3072/57).
13) The iron folding knife (102 × 15 mm) with the remains of leather and fine textile on its surface (594-3066/57).
14) The iron bearded axe, 173 mm long, with 45 mm wide blade, long lugs and thin rectangular butt (594-2353/57; Košta/Hošek 2008a, obr. 10:H). Found with the remains of a wooden haft, on which there was a fragment of textile (594-2354/57).
15) The small golden globular button (so-called *gombík*; 17 mm in diameter, 21 mm in length with a loop). Body of the button is oblate spheroid, which is vertically segmented into eight concave parts. Upper part of the button consists of smooth collar and a drop-like loop with filigree wreath coiled around (594-1616/57; Klanica 2002, obr. 9; Hošek/Košta 2008, obr. 10:D; Kavánová 2009, obr. 2:8).
16) The forged oval bucket (without evidence number). Not at our disposal in 2003.
17) The fragments of gilded bronze sheet with rivets (594-2917/57).[76]

Description of the sword

This is a double-edged, greatly damaged sword (594-2979/57; Fig. 67–69) which was, at the time of its documentation in 2003, 920 mm long and weighed 1275 g (including the massive layer of wrapping remains). The blade was broken into four pieces. The point of balance was not measured because of the poor condition of preservation. Only the body of the middle part of the blade with remains of a non-ferrous inlay was rescued from the burned archaeological base in Mikulčice in 2007. Other parts of the sword are lost or unidentified. The weight of the preserved part of the sword is 203 g.

The sword, found without guard and upper hilt, was provided with a tang that has survived with a length of 93 mm, which corresponds to the usual lengths of early medieval sword hilts. A layer of wood was preserved on the tang with no traces of riveting. Such a construction of the grip would have required the fastening of the pieces of wood by a pommel or collar, which may have been made of organic material.

Close to the top of the tang there was a tiny fragment of a fine textile on one side of the sword. It is not clear, whether this was the topmost layer of the grip or else the textile wrapping of the sword, which was of similar structure.

Only a part of the crossguard was preserved; the guard had been made of organic material and was reinforced on both its upper and lower sides with iron plates. Remains of such a plate were visible between the crossguard and the grip, on the left part of the side A. Two grooves were observed running across the blade and tang (they may be more distinctly seen on the X-ray image). They are appear to coincide with the upper and lower surfaces of the former crossguard. The height of the crossguard (20 mm) was bounded by iron sheet about 1.5 mm thick, which was visible on the bottom of the guard. The documented length (42 mm) and width (23 mm) of the badly preserved crossguard do not allow us to identify the original shape of the guard. A broadening of the tang into the blade took place in the mid-height of the guard.

The massive blade was 807 mm long and 63 mm wide. It narrowed very slightly; noticeable narrowing is visible only near the point. The fuller started under the lower guard and ended roughly 115 mm before the point according to the X-ray images. The width of the fuller, measured on

76 These fragments were mistaken by Z. Klanica (1994, 32; 2002, Fig. 9:4) for a mounting of the scabbard of the seax or of the sword (594-3044/57). It was imposible to find them in the Mikulčice depository during the research of the swords and they were never drawn even in the inventory.

the blade fragment that was preserved after the fire, oscillated between 21 and 22 mm. The blade originally bore a silver inlay[77] in the form of an encircled equilateral cross, which was situated within the fuller at a distance of 147 mm from the crossguard (i.e. in the place where the blade was broken as one can see on the X-ray images.

This symbol may be related to other parts of the sword suspension garniture (belt keeper, chape, skid-shaped fitting of a seax), which were decorated with equilateral crosses with trefoil armterminals. In the upper part of the blade there were, according to the X-ray images, geometric structures, that might be interpreted as the remains of heavily damaged inlaid or engraved ornament or as a negative imprint of the seax sheath mounting, which was part of the grave goods.

Typological determination of the sword

Due to the absence of any pommel or upper guard it is impossible to determine the sword typologically. Swords without pommels and swords with both pommels and upper-guards made of organic materials are not usual finds from archaeological situations dated to the 9th century.[78] So their occurrence in time cannot be defined accurately. In the Viking cultural area bone hilts were produced up to the 11th century, as evidenced by, for example, the so-called St. Stephen's sword, which is deposited in the treasury of the Metropolitan Cathedral of St. Vitus and is dated between the 2nd half of the 10th and the mid-11th century (Merhautová 2000, 535).

A more significant chronological feature may be seen in the crossguard put together with a body of organic material. Such composed lower guards were made, in the case of West-European and Middle-European swords, during the Migration Period and Merovingian Era, but their use continues up to the 2nd half of the 8th century and they could also occur occasionally in the 1st half of the 9th century. Such a crossguard was found, for instance, on a sword from grave 116/51 in Staré Město by Uherské Hradiště, whose upper hilt was not preserved as well. Hrubý related this sword to Petersen's type H swords with vertical wire inlay, as he also described two other swords (119/AZ and 223/51) from the same site (Hrubý 1955, 63–68; Petersen 1919).

The archaic design of the construction of the sword from grave 580 is also indicated by the shape of the blade. The blade can be classified as a robust variant of Geibig's type 2 (2a; Geibig 1991, 85, Abb. 22); however, due to the poor preservation of the blade it was impossible to observe any narrowing of the fuller. The main occurrence of these blades lies between the 2nd half of the 8th and the 1st half of the 9th century, but they may appear up to the mid-10th century. They occur mainly on swords of early Carolingian design, which are on the territory of the Czech Republic and are most frequently represented by the Petersen's type H; however, they also appear, for example, on some swords with single semicircular pommels that belong to Petersen's type X (Košta 2005, tab. 1).

According to the classification of blades described in this study, the blade of the sword from grave 580 belongs to the group {a1}, which was created on the basis of lengths and widths of blades and their length/width ratios. The group {a1} includes robust and short (to medium-long) blades that have up to date been observed only on swords of early Carolingian construction.

Scabbard, straps and outer wrappings

The wooden scabbard was provided with an iron mouth-band, which was 23 mm high, 66 mm long, and roughly 24 mm wide,[79] and which was tightly stuck to the remains of the scab-

77 The results of XRF chemical analysis of the area with silver inlay: Fe 52.0%; Ag 36.2%; Cu 9.6%; Zn 1.7%; Sn 0.6%. After subtraction of elements represented in the iron base and corrosion (Fe): Ag 75.4%; Cu 20%; Zn 3.5%; Sn 1.2%.

78 For instance we may mention a sword from a grave H41 from Olomouc-Nemilany (Selucká/Richterová/Hložek 2002; Kalábek 2002).

79 Z. Klanica (2002, 28; 2005, 37) mentioned a mounth-band from a thin copper sheet. No traces of copper were observed during the research in 2003 on the mounth-band.

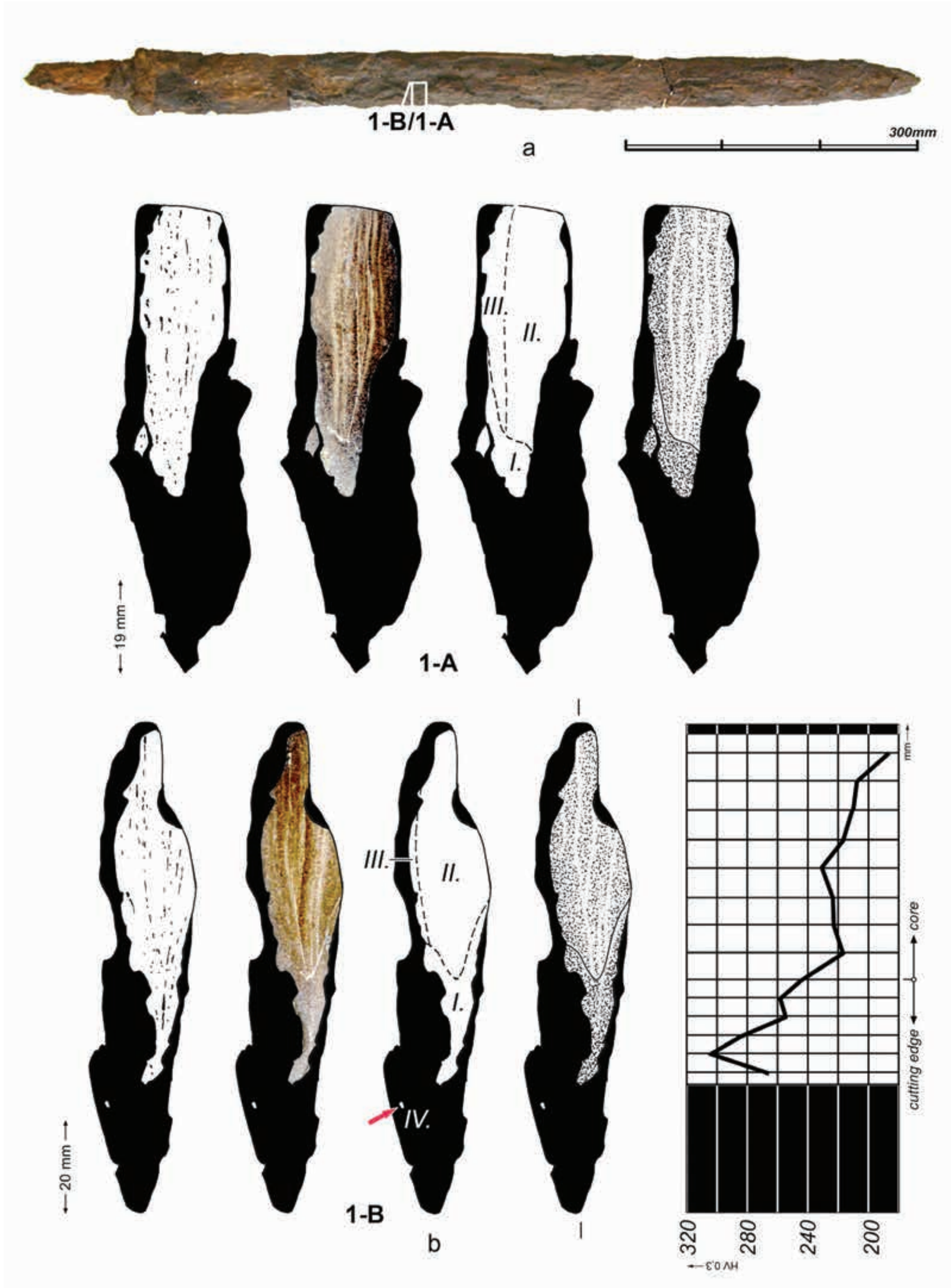

Fig. 70. Sword from the grave No. 580/3; a – the sword examined and the sampling method utilized; b – schematic drawings and scans of the blade samples (from the left: unetched state; after etching with Oberhoffer's reagent (scan); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

bard. The body of the scabbard consisted of two wooden scabbard plates that were preserved on both sides in a massive layer. The scabbard was lined with a coarse textile in a twill-weave (1), visible on the surface of the object, especially on the side B and below the month-band on the side A. The wooden scabbard was covered under the iron mouth-band with a coarse textile (2) of a very similar structure that served as a lining of the scabbard. The remains of a fine textile

(3) were found overlaying the textile (2), situated on the wood of the scabbard as well as in the area of the mouth-band (i.e. originally under the mouth-band) on the other side of the scabbard, where the textile (2) was absent. The textile (3) was made from thin threads in a plain weave. The surface of the scabbard was organic material, probably leather, that was preserved sporadically in the pointed part of the blade. This surface was decorated with plastic bands (probably impressed) perpendicular to the axis of the blade.

Metallographic examination

Sampling: Sample [1-A] was taken from the blade 380 mm from the tang, sample [1-B] was detached from sample [1-A] and used as a check sample (Fig. 70:a).

Metallographic description of the blade: SAMPLES [1-A] and [1-B]: The basic metallographic description is essentially identical for both samples. The only difference is in the sizes and shapes of the areas described, see Fig. 70:b. The material of both samples is full of fine inclusions, corresponding to level 3 to 4 on the Jernkontoret scale. The microstructure of Area I (the cutting edge) consists of very fine pearlite with ferrite on the grain boundaries; the carbon content is between 0.7 and 0.8% (eutectoid content), the grain size corresponds to ASTM 7–8, and the hardness is 273 ± 21 HV0.3 (Fig. 71:a, b). Area II in both samples has a pearlitic-ferritic microstructure with a maximum carbon content of 0.6 to 0.7% C, a grain size corresponding to ASTM 7 (in general, but locally also with coarser (ASTM 6) and finer (ASTM 8) grains) and hardness of 215 ± 14 HV0.3 (Fig. 71:e, f). Area II in both samples is longitudinally intersected with several welds containing about 1% Ni (determined in sample [1-B]). Area III in both samples is similar to Area I; it consists of pearlitic-ferritic microstructures with a maximum carbon content of 0.7% up to eutectoid concentration, grain size is 7–8 ASTM. Areas II and III are divided by islands of a very fine pearlitic-ferritic microstructure (9–10 ASTM). The last identifiable Area IV in sample [1-B] corresponds to the iron (verified by chemical microanalysis) with distinct traces of intensive cold working (hardness undetermined). Welding seams are in the structure of the whole sample clearly visible as white lines (Fig. 71:c, d).

Assessment: The blade of the sword had a steel core to which steel cutting edges were welded. The blade nearer to the edge showed signs of an accelerated cooling. The middle portion of the blade clearly consists of several layers that may have resulted either from the forge welding of several pieces of metal together or from the folding and forge-welding of a single billet several times; or even from a combination of both procedures. The carbon content in the middle portion is only a little lower than in the cutting edge. It is possible that some attempt was made to harden it by heat-treatment, but hardening of the middle portion (and maybe also of the whole upper part of the blade) was avoided. The iron shard in the corrosion has no relation to the blade itself. It is most likely a remnant of an iron part of the former original scabbard. It was probably a sword of fairly good quality.

3.4.10 Sword from the grave 715

Circumstances of the discovery

The grave was discovered in 1958 during the excavation directed by J. Poulík, in the eastern part of the excavation area No. 5 'Z 1957–59' (Poláček/Marek 2005, 68–80) and it was situated in the square 14/+1 about 9 m from the NW part of the preserved foundations of the structure described as a 'palace'. The grave was part of a group of graves spreading out to the NW from the stone foundations of the so-called palace. It lay in the central and most distinct line of graves.[80] The burial pit was dug into the fill

80 This small burial ground was remarkable for the high number of rich graves, which belonged mainly to the male representatives of the warrior elite. It seems that individual graves might have been deliberately arranged into rows, although this could be also the result of the arrangement of the space at the time of the burials.

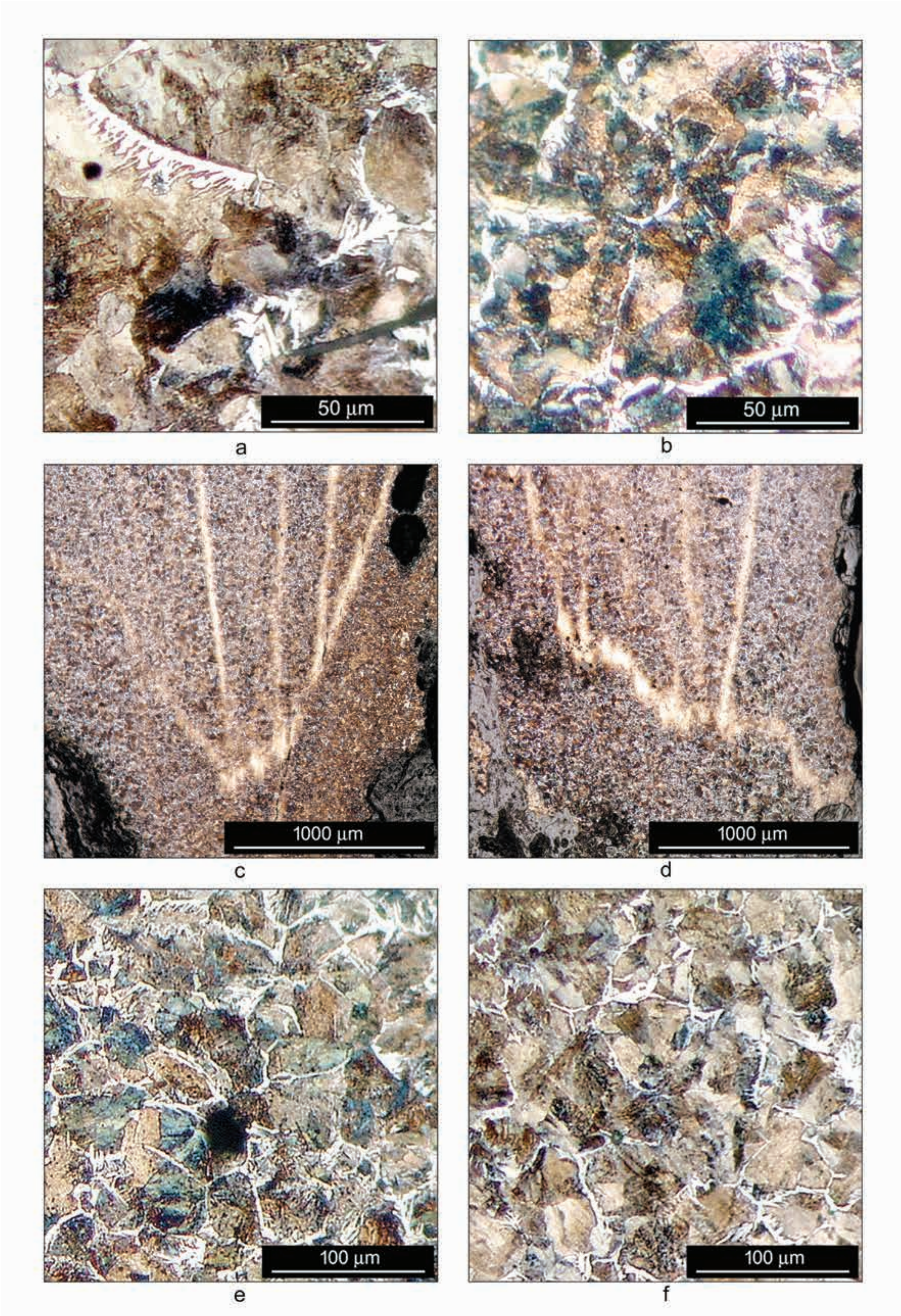

Fig. 71. Sword from the grave No. 580/3; a, b – very fine pearlite and ferrite in Area I (the cutting edge); c, d – weld visible between the cutting edge and the core of the blade; e, f – pearlitic-ferritic microstructure in Area II (core of the blade); Nital etched. Photos by J. Hošek.

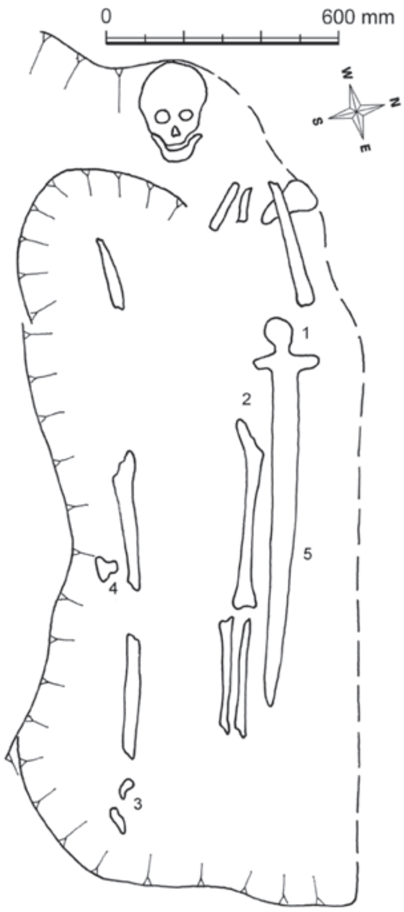

Fig. 72. Mikulčice-Valy, Hodonín County; grave No. 438; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

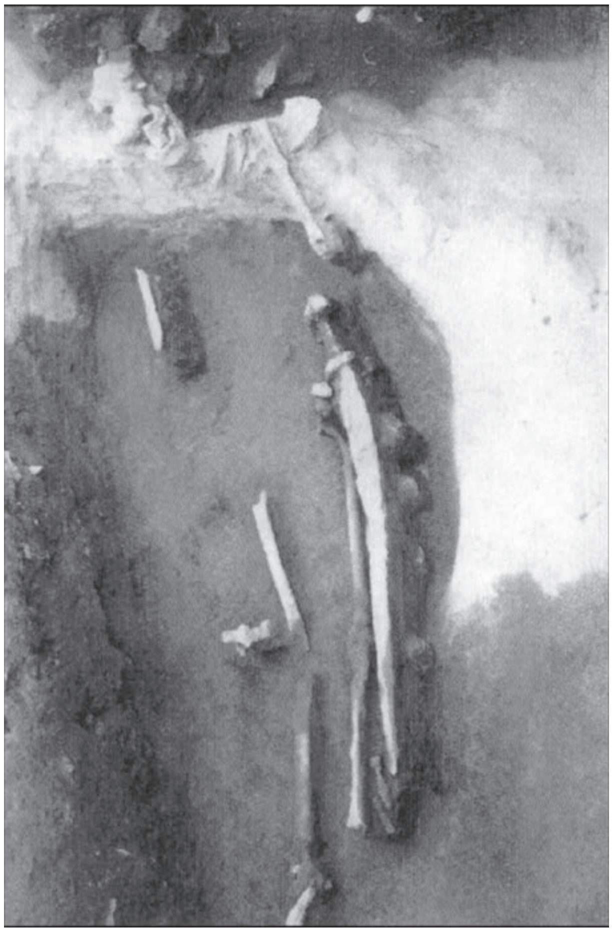

Fig. 73. Mikulčice-Valy, Hodonín County; grave No. 715; photograph of the burial taken in the course of the excavation, viewed from the E (Poláček 2006, 9).

of the feature 267. The character of the burial-pit fill was the very same as the feature-fill, so it was impossible to define its size. The skeleton was oriented almost exactly to the W-E direction and the middle part caved into the feature 267. The skull lay on the underlying sand at a depth of 125 cm, the middle of the body was bent 20 cm deeper and the legs rose back up to a depth of 135 cm.

Badly preserved human remains were lying flat on their back, with the head pointing almost to the west (Fig. 72 and 73). According to the anthropological analysis the deceased was male in the age of *maturus* (40–60 years); however, this result was not unequivocal (Stloukal 1967, 306).

Along the left leg, from the lumbar region to halfway down the tibia, there was a sword (1) and by the left hip a knife (2). Near the toes there were spurs (3), by the right knee there lay an axe (4) with a cutting edge pointing to the body. Fragments of a wooden grip-scale (5) were recognized among pieces of wood removed from a scabbard into which the sword was sheathed.

Finds

1) The iron sword with remains of the wooden scabbard (Fig. 74–80).
2) The iron knife, according to the note in the *DGU* provided with a scabbard and a fitting. Not at a disposal in 2003.

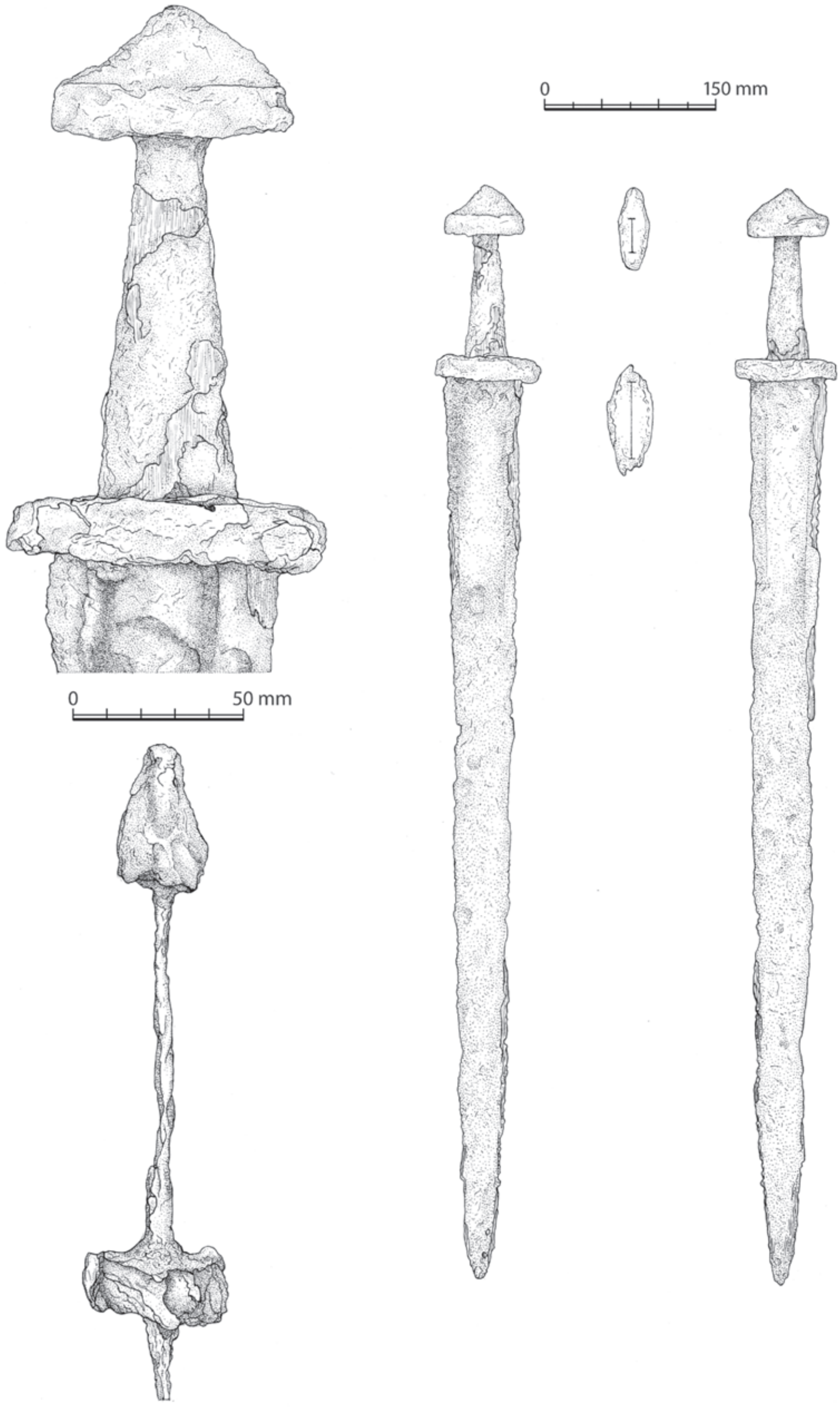

Fig. 74. Mikulčice-Valy, Hodonín County; sword from the grave No. 715 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

3) The spurs of unknown type, in fragments. Not at a disposal in 2003.
4) The iron bearded axe. Not at a disposal in 2003. It seems, according to the photographic documentation of the grave, that it had short to medium-long lugs.
5) Fragments of a grip-scale of wood, becoming strongly round on the outer side, with a rivet in nearly halfway along the preserved length (125× about 28 mm). On the inner side there were traces of iron corrosion and on the outer side there was a fragment of textile in a twill-weave. It may be related to the knife (2).

Note: Finds from the grave 715 were not registered in the *ILF* of the Mikulčice excavations.

Description of the sword

This is a double-edged sword (without evidence number; Fig. 74 and 75) with a massive hilt which was 953 mm long at the time of its documentation in 2003 and weighed 1150 g; the weight of the organic wrapping remains was negligible. The point of balance was situated on the blade, 135 mm below the crossguard. After the fire in Mikulčice the sword was preserved as a whole and its weight is now 1145 g.

A robust upper hilt, 70 mm long, 39 mm high and 26 mm wide, consisted of a triangular hollow pommel and a rectangular upper guard 17 mm high. The upper edges of the pommel are irregular, on one side convex, on the other concave. From the side view the upper guard is rectangular and the pommel has the shape of a triangle with a short base and slightly flattened top. In the horizontal the upper hilt is wide and lenticular. The upper guard itself is 14 mm high, the boundary between the pommel and upper guard is distinguished by a slight indention of the pommel. Both the upper guard and the pommel are bulky and made of iron. The tang goes through them up to the top of the pommel. As revealed by the X-ray image, a hole for the tang is situated somewhat off the centre of the upper hilt. In contrast to the joint between the pommel and the upper guard, the joint between the tang and both parts of the upper hilt seems to be tight and regular.

The grip with a usual length (104 mm) is distinctly broadened towards the lower guard (from 20 mm to 34 mm); the remains of a wooden covering were identified on the tang.

The lower guard is 18 mm high, 44 mm wide and its length originally was not much longer than the preserved 89 mm. It is of lenticular shape in the horizontal and from the front it has the shape of an elongated rectangle. Concerning the form, the crossguard is an enlarged analogy to the upper guard. According to the X-ray images, the funnel-like hole for the blade and the tang broadens towards the point.

The massive blade is 792 mm long and very wide below the lower guard (70 mm). The blade narrows slightly along its entire length and its pointed part is relatively short. A very wide fuller (whose width is about 30 mm at a distance of 50 mm from the crossguard) is distinct in the X-ray image and extends up to 85 mm above the point of the sword. The X-ray image revealed a herringbone pattern of ZS-twist, nearly filling the entire width of the fuller. The pattern-welding is visible on both sides of the blade and comes to an end of the fuller. The thin cutting edges are in some places completely corroded.

Typological determination of the sword

From the shape of the upper hilt, the sword belongs to the 'design number 1' (swords with a triangular pommel) according to Jakobsson (1992, 30–35). Owing to the external morphological parameters (a triangular pommel, a sharply oval and from the side rectangular upper guard and a short lenticular crossguard) it is possible to classify the sword as Geibig's type 5. However, it does not correspond with any of the six variants of this type. There is the most distinct concordance with variant IV (Geibig's construction type 5-5-2-4; see Geibig 1991, 38–44), with which the sword shares the principle of the upper hilt construction (Geibig's construction type I) as well as a few other features (especially the shape of the upper hilt from the side, the absence of roof-like ridge along the circumference of the crossguard and upper guard, and absence of non-ferrous inlay).

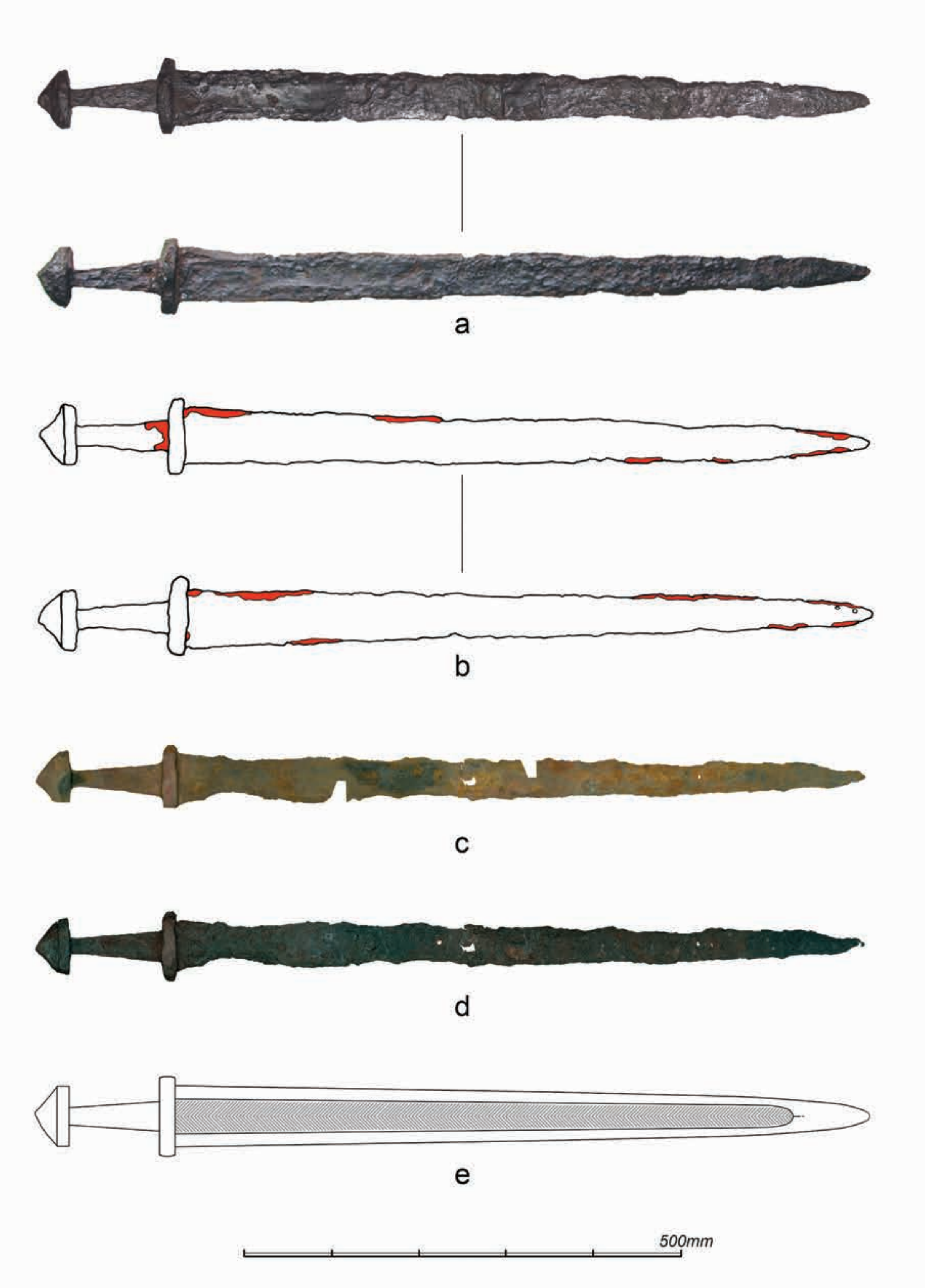

Fig. 75. Sword from grave No. 715; a – state before the depository fire; b – distribution of organic materials across the sword /red: wood (corpus of the scabbard and coverings of the tang); discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e–reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

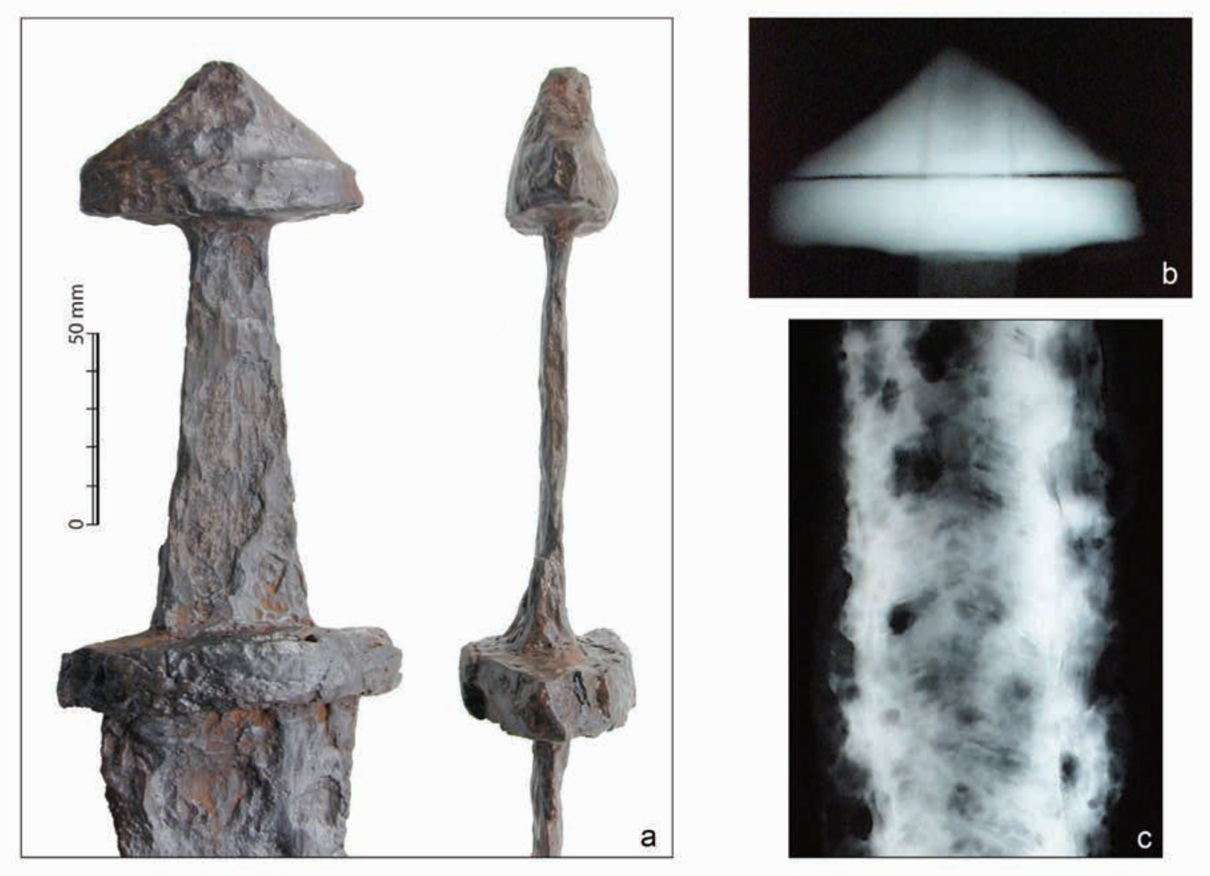

Fig. 76. Sword from grave No. 715; a – front view of the side A and lateral view of the hilt (documentation of the sword in 2003); b – X-ray image of the upper hilt (documented prior to the depository fire); c – X-ray image of the pattern-welded blade (documented prior to the fire). Photos by Institute of Archaeology of the AS CR, Brno.

The horizontal shape of the upper hilt as well as the regular transition between the pommel and the upper guard, however, correspond to variant I.

If we respect the definitions of Petersen's types of swords, as he presented them, the sword must be classified as an undecorated variant of type H with some features that incline to type I (especially the absence of rounded horizontal vaulting of both the crossguard and upper guard). However, Petersen himself considered the differentiation of type H from type I very difficult and scholars using Petersen's typology usually united both these types into one group.[81] The features that are not usual for the swords of Petersen's type H (nor I) are, among others, the absence of any characteristic decoration of the hilt as well as a different construction of the upper hilt, which connects the sword with the rather archaic Petersen's type B (Petersen 1919, 61–63).[82] The crossguard may be described as Ruttkay's type 4 (Ruttkay 1976, 249).

81 First done by C. A. Nordman (1943, 48–54), newly by F. Androŝuk (2013; 2014). See Chap. 4.1.1.

82 During the development of research into Early Medieval swords, the scholars included differently large group of swords into Petersen's type H. Some scholars classified nearly all swords with triangular upper hilt as the type H. Within the specific classification, which was presented on the basis of the research of W. Menghin and M. Müller-Wille by A. Geibig (Menghin 1980; Müller-Wille 1982; Geibig 1991), the swords of type H were understood as a small group of shape-related arms provided with upper hilts of Geibig's type II and decorated with vertical wire inlay. Within the concept of Petersen's classification, as it was understood by A. Geibig, it would be necessary to describe the sword from the grave 715 as Petersen's type B. However, in the Petersen's study itself there is described (besides prevailing variant with wire inlay) also undecorated variant of the type H and the way

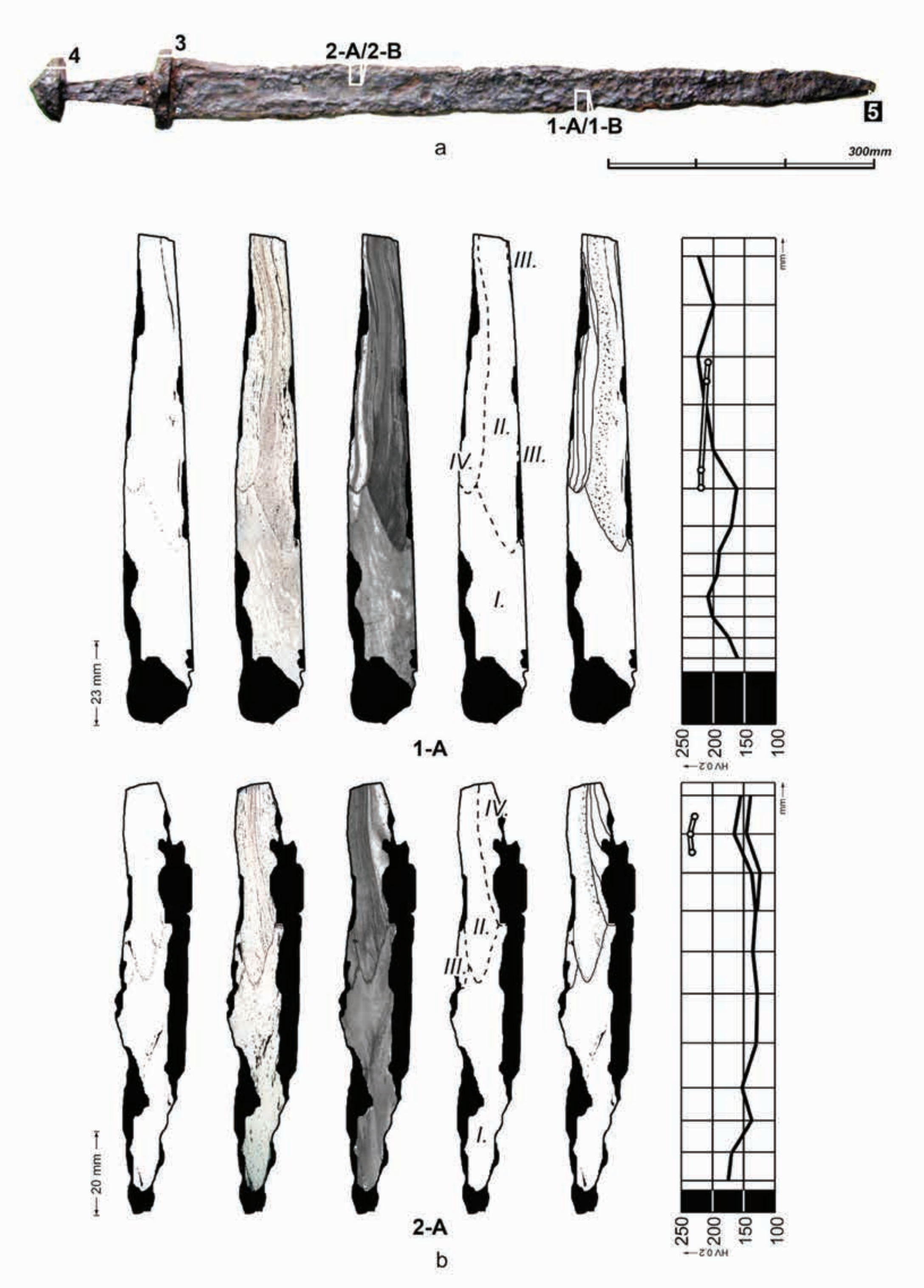

Fig. 77. Sword from the grave No. 715; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (scan); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

The blade has below the crossguard a typical robustness, which is far outside Geibig's typology (Geibig 1991, 83–90) and which is probably the cause of the significant narrowing of both the blade and the fuller. Concerning the individual features of the blade, the width of both the fuller and the blade exceeded Geibig's parameters, but they are closest to the robust variant of type 3 (3a), which was determined on the basis of the ratio of length to width of the blade. It includes robust and short (to medium long) blades and so far it was observed only among swords of early Carolingian construction. According to the classification that was introduced in this study, the blade from the grave 715 belongs to the group {c}, which is defined by lengths and widths of blades. The group {c} includes short and very robust blades. Swords of later Carolingian construction prevail in this group and the sword from the grave 715 is the only example of the early Carolingian sword that can be assigned to it so far.

Scabbard, straps and outer wrappings

The sword was sheathed in a wooden scabbard without a textile lining. Sporadic remains of the wood were after the conservation of the sword and before the fire preserved along the cutting edges and by the point. Thirteen fragments of a wooden object with imprints of iron on one side in the depository were assigned to grave 715; these are most likely remains of the wooden scabbard removed from the sword in the course of conservation.

Metallographic examination

Sampling: Sample [1-A] was cut out from the right side of the blade 414 mm from the lower guard; sample [1-B] was cut out from sample [1-A] and used as a check sample; sample [2-A] was taken from the left side of the blade 195 mm from the lower guard; sample [2-B] was detached from sample [2-A] and used as a check sample. Sample [3] was cut out from the left side of the crossguard 13 mm from the tang and sample [4] was taken from the left side of the upper hilt 16 mm from the tang. Sample [5] was taken from the tip of the blade after the depository fire (Fig. 77:a).

Metallographic description of the blade: SAMPLE [1-A]: The material of both the cutting edges and the core contains a low to moderate number of fine to coarse inclusions. The metal purity corresponds predominantly to level 2 on the Jernkontoret scale, but the zones with coarse inclusions (especially in the cutting edge) correspond to level 4. Area I (in the cutting edge) contains a ferritic 'ghost' microstructure with grain size ASTM 4 (Fig. 78:a), while a fine-grained ferrite microstructure with traces of pearlite appears in places (grain size ASTM 8, the carbon content does not exceed 0.2%). The hardness of this area is 190 ± 20 HV0.2. Area II (the core of the middle portion of the blade) consists of a banded microstructure with both ferritic (grain size about ASTM 5) and ferritic-pearlitic layers (scattered areas of martensite are present, a maximum carbon content is between 0.1 and 0.4%, grain size is ASTM 9 and hardness 198 ± 25 HV0.2; see Fig. 78:c, d). Both the ferritic and ferritic-pearlitic zones reveal 'ghost' microstructures in the ferrite. Area III (1st pattern-welded panel) consists of ferrite with indistinct grain borders, Area IV (2nd pattern-welded panel) contains zones of ferrite with grain size ASTM 6 and hardness of 151 ± 6. HV0.2. There are also zones with traces of pearlite, but the carbon content does not exceed 0.2%. The ferrite has indistinct grain boundaries and the hardness of this area is 216 ± 5 HV0.2. Distribution of phosphorus-rich areas across the sample is shown on Fig. 79:a-d.

SAMPLE [2-A]: The material purity is roughly the same as in sample [1-A]. Area I (the cutting edge) contains a ferritic microstructure with grain size ASTM 3 and hardness of 150 ± 19 HV0.2 (Fig. 78:e). Area II (the core of the middle portion of the blade) contains on the left side a ferritic microstructure with an irregular grain size of ASTM 3-6 and hardness of 138 ± 7 HV0.2, which gradually changes into a band of ferrite and pearlite with the hardness of 147 ± 18 HV0.2, grain size ASTM 6-7 and carbon content up to 0.25%. Area III (1st pattern-welded panel) consists of ferrite (4 ASTM; hardness of 169 ± 4 HV0.2), Area IV (2nd pattern-welded panel) consists of a ferritic microstructure with nearly invisible grain boundaries (est. 3-4 ASTM; hardness of 237 ± 5 HV0.2; phosphorus content of 0.9 ± 0.0% – determined by EDXA) in some

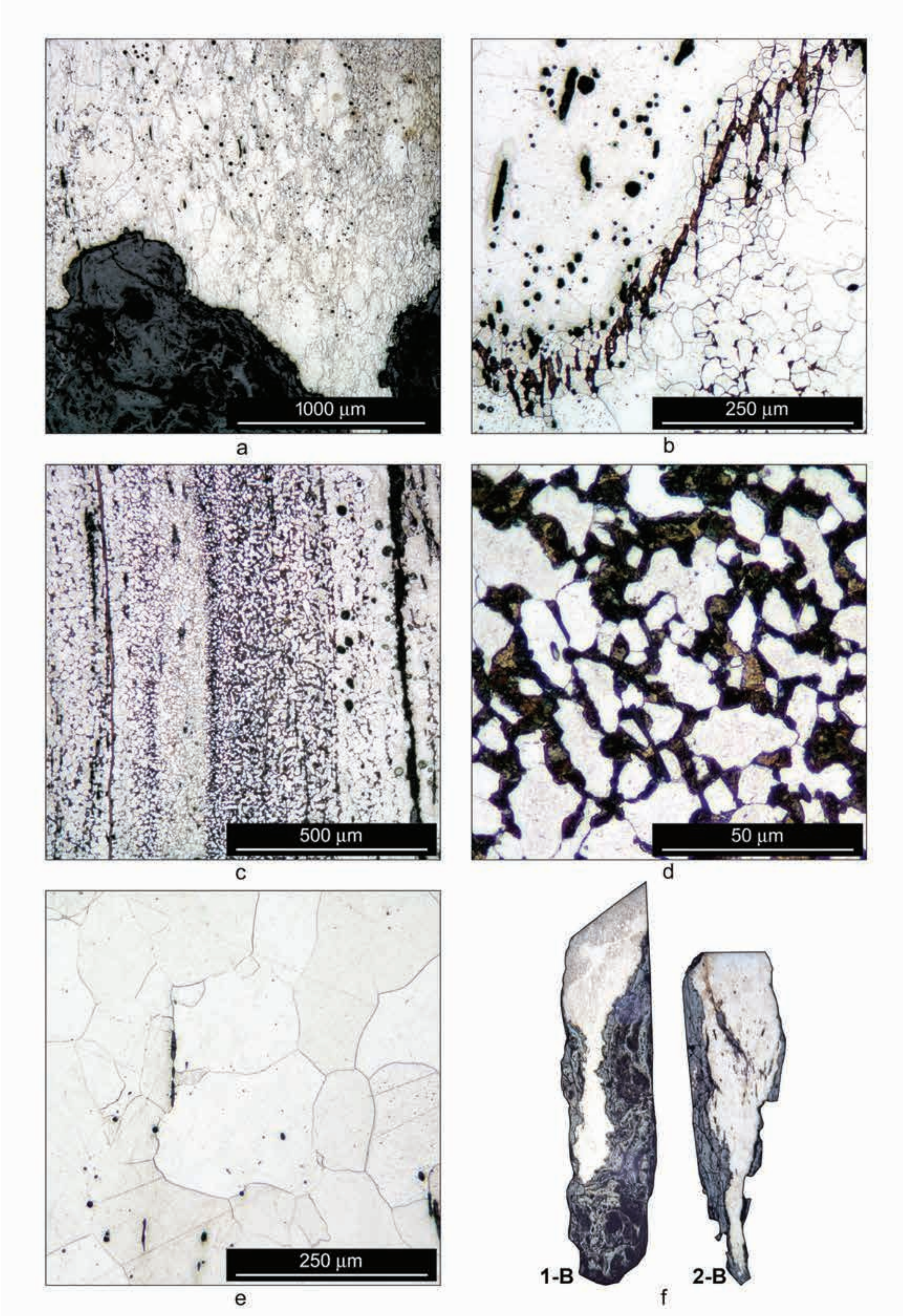

Fig. 78. Sword from the grave No. 715; a – ferritic structure in the cutting edge, sample [1-A]; b – the weld between the cutting edge and the pattern-welded panel, sample [1-A]; c – layered structure of the blade core, sample [1-A]; d – a zone with mixture of ferrite grains, nodular pearlite and martensite areas in the core of sample [1-A]; e – ferritic microstructure in the cutting edge, sample [2-A]; f – samples [1-B] and [2-B]; Nital etched. Photos by J. Hošek.

Fig. 79. Sword from the grave No. 715; a – macro photo, sample [1]; b – overview of sample [1-A], (top: polished and etched surface of the sample prior its mounting into resin; below: view on the examined cross-section /strongly etched with Oberhoffer's reagent/; 1 – area with the pattern-welded panel grinded through / core visible /, 2 – pattern-welded panel, 3 – preserved part of the cutting edge); c – detail view of the pattern-welded panel (on the left) and the blade core (on the right); d – detail view of the cutting edge (all in sample [1-A]); e – sample [5]; f – ferritic microstructure, sample [5]; etched with Oberhoffer's reagent (a–d) and Nital (e, f). Photos by J. Hošek.

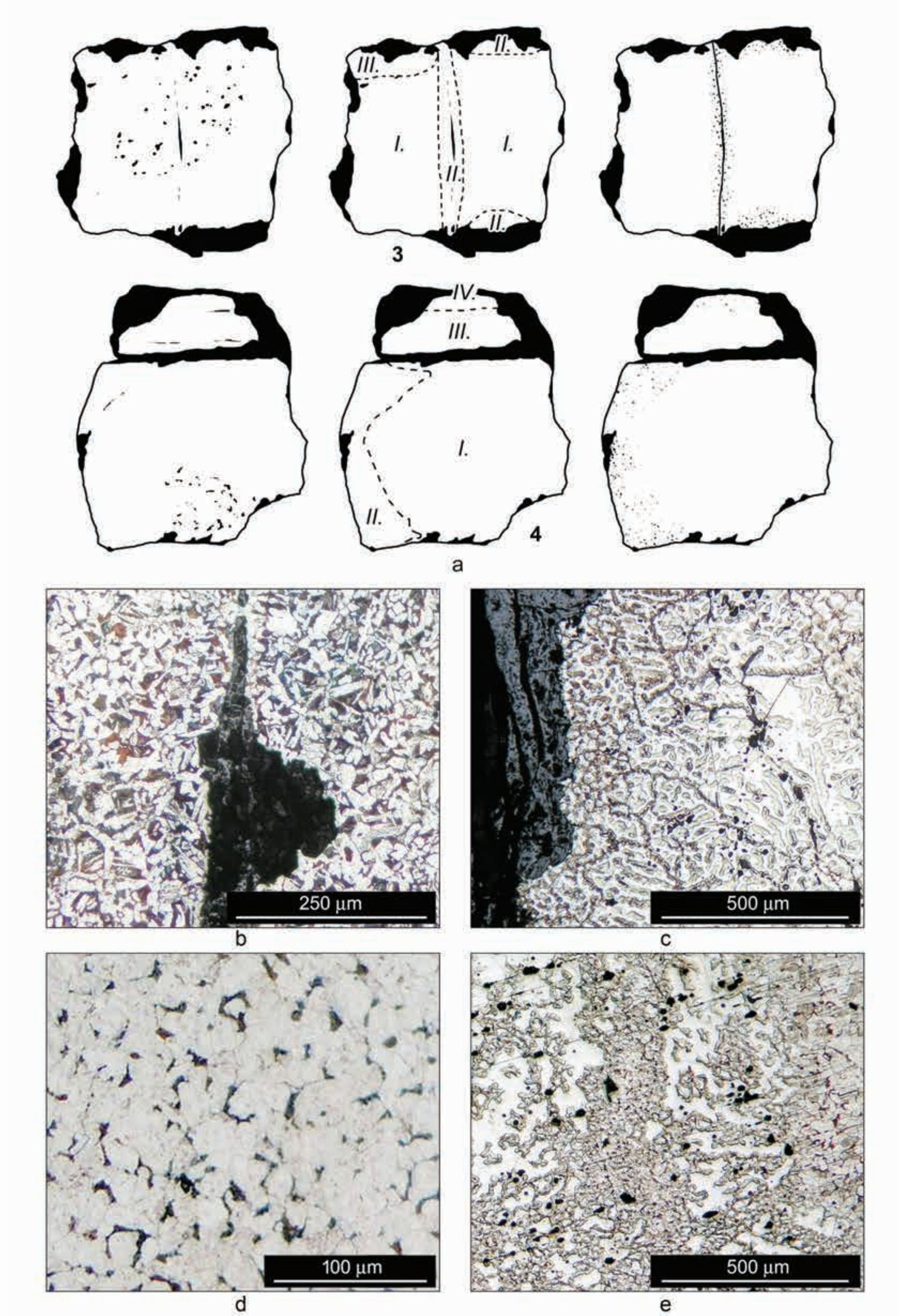

Fig. 80. Sword from the grave No. 715; a – schematic drawings of lower-guard and upper-hilt samples (from the left: unetched state, layout of the described areas, distribution of the microstructures and of the weld across the sample); b – ferritic-pearlitic microstructure in proximity of the weld, Area II, sample [3]; c – ferritic 'ghost' microstructure in Area III, sample [3]; d – ferritic-pearlitic microstructure of Area II, sample [4]; e – ferritic and ferritic-pearlitic microstructures with an elevated content of phosphorus in Area II, sample [4]; Nital etched. Photos by J. Hošek.

places, and in other places with finer-grained ferrite (about 6 ASTM). Individual welds may be clearly distinguished in both samples [1-A] and [2-A] because they are marked by areas of pearlitic or martensitic microstructures with elevated carbon contents (Fig. 78:b) and/or they become visible as white lines when etched with Oberhoffer's reagent.

SAMPLE [1-B]: The structure is almost entirely ferritic, while the cutting edge contains ferrite with traces of pearlite (Fig. 78:f).

SAMPLE [2-B]: The area further from the cutting-edge tip contains a ferritic microstructure with traces of pearlite, while the area closer to the former original cutting-edge tip contains only ferrite (Fig. 78:f).

SAMPLE [5]: Only a ferritic microstructure with a little tertiary cementite was found in the sample. Grains with traces of cold-working appear near one of the sample margins as a result of cutting the sample (Fig. 79:e, f).

Metallographic description of the crossguard:

SAMPLE [3]: The metal matrix contains some coarse slag particles (level 4 to 5 on the Jernkontoret standard); no finer inclusions were observed. Etching revealed that Area I consists mainly of a coarse ferritic microstructure with a grain size of ASTM 4 and hardness of 113 ± 7 HV0.2. Area II contain, ferritic-pearlitic zones with a carbon content of 0.25 to 0.35%, a grain size ASTM 7–8 and hardness of 129 ± 13 HV0.2 (Fig. 80:b). Area III consists of ferrite with traces of pearlite and an elevated content of phosphorus, which is suggested by a 'ghost' microstructure. The hardness of this area is 190 ± 11 HV0.2 (Fig. 80:c).

Metallographic description of the upper hilt:

SAMPLE [4]: The upper hilt consists of an upper guard (Areas I and II) and pommel (Areas III and IV). The material used in both these parts is free of finer inclusions (about level 2 on the Jernkontoret scale), however the upper guard contains an area with a high content of coarser slag particles (level 4 to 5 on the Jernkontoret scale). Area I is ferritic; grain size ASTM 5, with hardness of 109 ± 3 HV0.2. Area II is predominantly ferritic-pearlitic with a carbon content of up to 0.3%. The area shows a typical 'ghost' microstructure indicating a higher content of phosphorus. The grain size is 7 to 8 ASTM, and hardness is 168 ± 8 HV0.2 (Fig. 80: d, e). Area III is ferritic, partly with grains of size ASTM 5 and partly with a 'ghost' microstructure with indistinct grain boundaries. The hardness of the whole area is 140 ± 13 HV0.2. Area IV is ferritic-pearlitic with a carbon content probably not exceeding 0.3%. Grain size is about 6 to 7 ASTM, part of the area shows weaker etching; the hardness is 147 ± 18 HV0.2.

Assessment: The blade was decorated with two pattern-welded surface panels welded onto a core in the middle of blade to which two cutting edges were welded. The surviving cutting edges are only iron and all attempts to find any possible enhancement of the original cutting edge failed (see the examination of samples [1-B], [2-B] and [5]). The samples from both the cutting edges differ from each other in terms of their metal. Sample [2-A] contains an ordinary coarse-grained iron with a low metal purity (coarse slag particles), while sample [1-A] consists of iron with a partially elevated phosphorus content and relatively good purity. No apparent reason for the choice of these materials could be found. The core of the middle portion of the blade is structurally inhomogeneous; the layered structure suggests piling of different materials with locally elevated contents of phosphorus. The purity in terms of amount of inclusions is low. The martensitic areas associated with pearlite, which are scattered within the ferritic-pearlitic microstructure of the core, appear to be the result of slack-quenching a heterogenous low-carbon steel. The surface pattern-welded panels are entirely ferritic and the visibility of the pattern was achieved by significantly different phosphorus contents in the individual layers. The upper hilt and lower guard were forged from not very purified iron with local increases in carbon content (up to about 0.3% C) and also phosphorus content. The metal was apparently obtained by processing of a partly processed bloomery iron. There is no evidence that the use of such material was intentional. It is

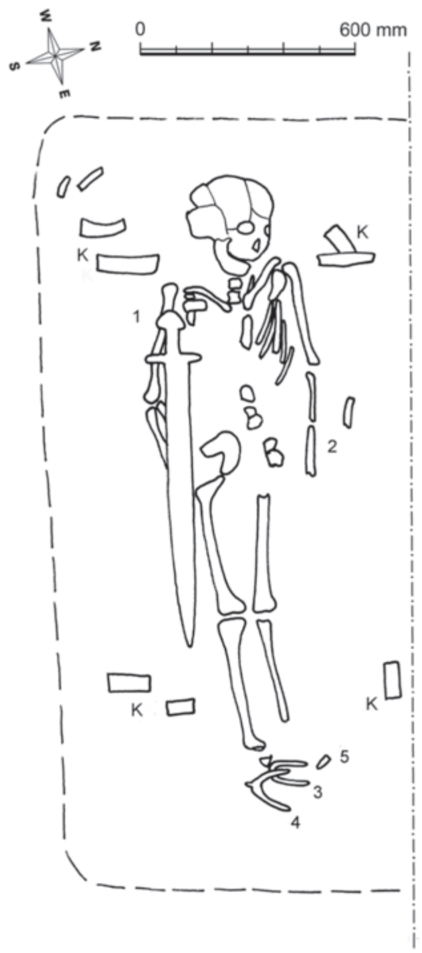

Fig. 81. Mikulčice-Valy, Hodonín County; grave No. 717; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'; 'K' – iron fittings of a coffin). Drawing by B. Vávrová.

Fig. 82. Mikulčice-Valy, Hodonín County; grave No. 717; photograph of the southern part of the burial taken in the course of the excavation (Poláček 2006, 9).

also possible that the same material was used for the blade core and cutting edges. The surviving cutting edges are soft iron and not hardenable, however it is just possible that since some form of heat-treatment seems to have been attempted, steel cutting-edges might have been fitted but have corroded away (Area I). On the whole, it seems that the sword could be made as both a visually impressive and functional weapon.

3.4.11 Sword from the grave 717

Circumstances of the discovery

The grave was discovered in 1958 in the eastern part of the excavation area No. 5 'Z 1957–59' (Poláček/Marek 2005, 68–80), within the excavations directed by J. Poulík. The grave was situated under the northern profile of the square 14/0, about 13 m from the NW part of the preserved foundations of the structure described as a 'palace'. The grave lay on the northern end of the middle and the most visible row of graves from the group located to the NW from the stone foundations of the so-called palace (see Chap. 1.2.1). The bottom of the burial pit of a size of 220 × 110 cm lay at a depth of 105 cm below the surface, the outlines of the pit were not visible until 25 cm above the bottom. The greyish sandy fill of the pit contained fragments of burnt lime and mortar. The skeleton was placed in

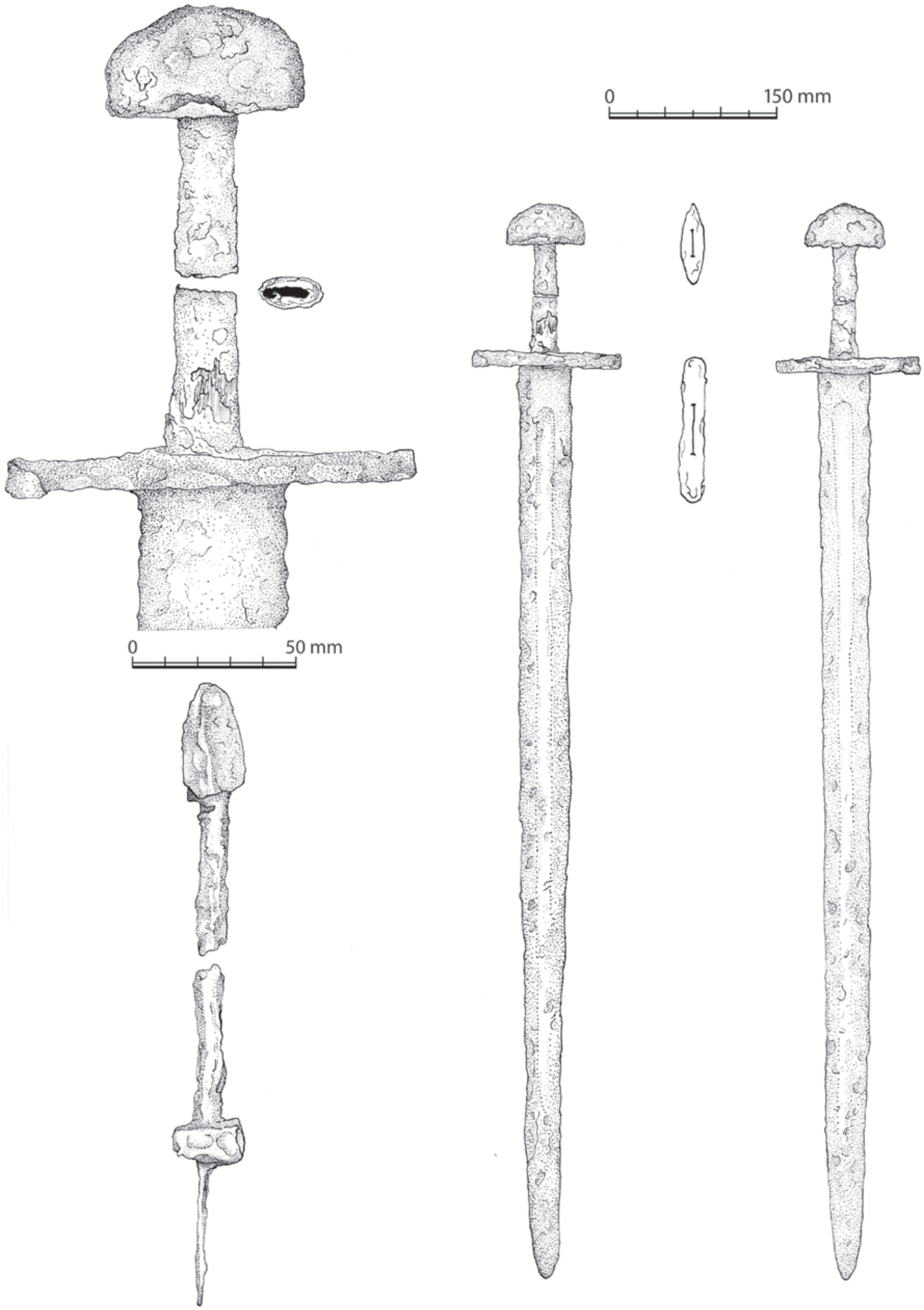

Fig. 83. Mikulčice-Valy, Hodonín County; sword from the grave No. 717 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

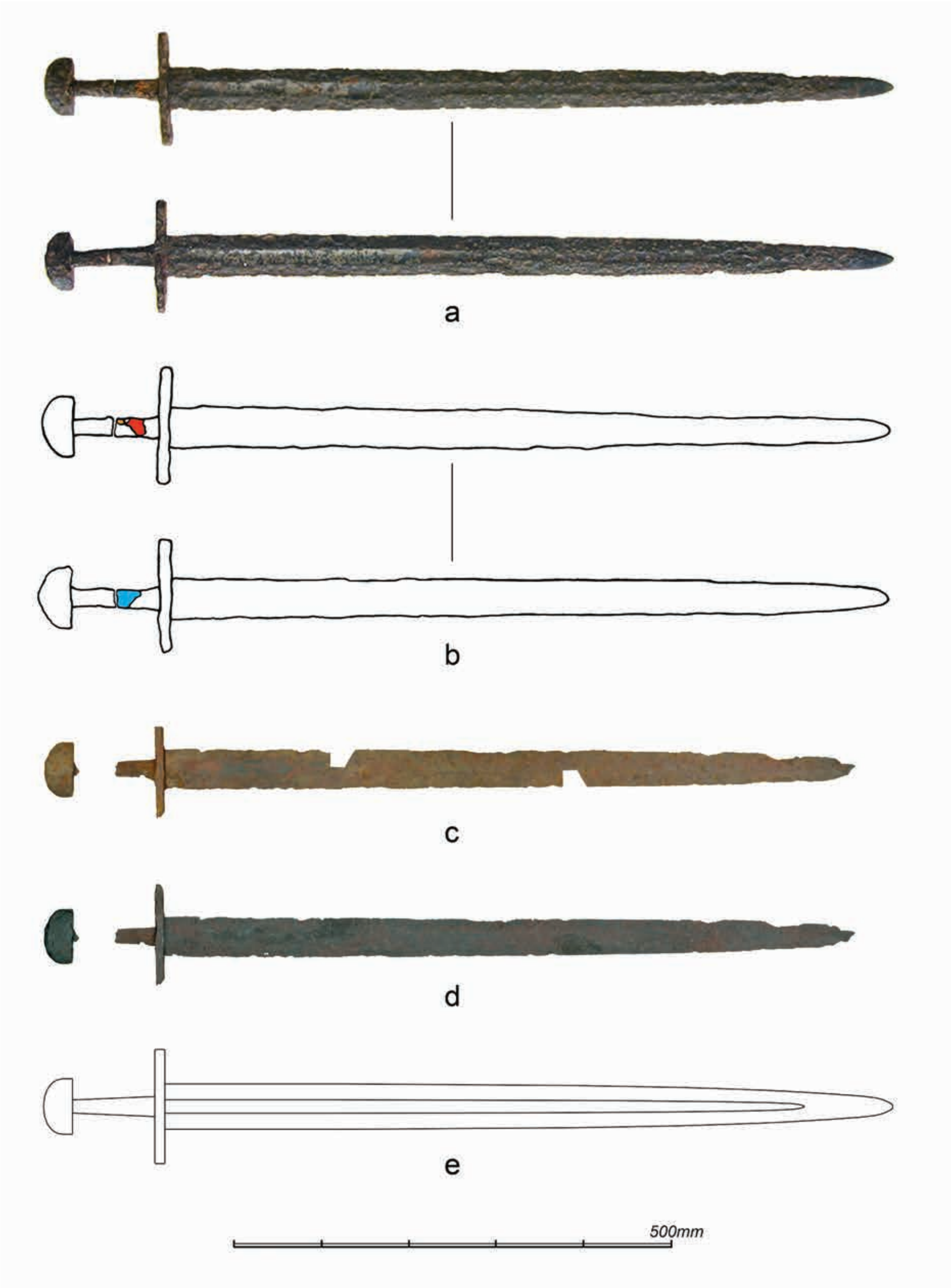

Fig. 84. Sword from grave No. 717; a – state before the depository fire; b – distribution of organic materials across the sword /red: wood (covering of the tang); blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

a wooden coffin provided with iron band-shaped fittings (594-5805a/58) situated on both sides of the head and tibias (Poláček 2005, 145). An iron cramp (594-5806b/58) was also part of the coffin. The W-E orientation of the grave deviated 10° to the south.

The deceased was placed in the standard position on his back with his head pointing to the west, human remains lay on the bottom of the pit to a length of 170 cm (Fig. 81 and 82). According to the results of the anthropological analysis (Stloukal 1967, 306) the remains belonged to a man in the age of *adultus II* (30–40 years).

A sword (1) lay by the right arm of the man, from the scapula to the level of his knees, but towards the knees it deviated from the body. At the left hand there was placed a knife (2). The buried man had footwear with a pair of spurs (3, 4); in the depository there was a fragment of the third spur (5) assigned to the grave goods. Three fragments of an iron object (6), the location of which was unknown within the grave, were probably also part of the spurs. Without location there were also a buckle (7) a strap keeper (8), originally maybe a part of the spurs garniture, and two little iron rods (9).

Finds

1) The iron sword with the remains of wooden scabbard (without evidence number; Fig. 83–89).
2) The iron knife (594-5550/58) with a straight back, gradually narrowing, by the point with an curved cutting edge (150 × 19 mm, length of the blade 112 mm).
3) The iron spur (594-5763/58) with a short cone-shaped prick and small square terminal plates with middle ribs (elongated arms), preserved in two fragments (147 mm long, length of the prick 19 mm). The arms are semicircular in their cross-section. The holes for rivets in the terminal were not visible when observed by the naked-eye.
4) Part of the iron spur (594-5763/58), arm with the semicircular cross-section preserved from the base of the prick to the terminal. The construction of the small corroded terminal was not distinct (preserved length 140 mm).
5) Part of the iron spur (under the evidence number 594-5763/58), with short cylindrical prick and adjacent part of slender arms of semicircular cross-section (length of the prick 17 mm).
6) Three fragments of a broken-off iron sheet (594-5766/58), across the middle of which there is a distinct central rib, accompanied on both sides by two smaller ribs, along the longitudinal axis.
7) The small iron buckle (594-5765/58), badly preserved, with a chape and with the remains of leather corroded to it (42 × 21 mm).
8) The iron strap keeper (594-5764/58), made of two rectangular plates, which are inserted into the longer sides of the rectangular frame from the iron strap.
9) Two thin iron rods, 50 mm and 53 mm long (594-5767/58). Probably fragments of dilapidated object or objects.

Description of the sword

This is a double-edged sword (without evidence number; Fig. 83–85) which was, at the time of its documentation in 2003, 972 mm long and weighed 1115 g; the weight of organic wrapping was negligible. It was impossible to measure the point of balance, because the pommel was broken off, but it probably lay roughly 205 mm from the crossguard. Both parts of the sword were found in the burned archaeological base in Mikulčice, though part of the tang below the pommel was damaged. The current weight of the sword corresponds with the weight before the fire.

A single highly arched semicircular pommel (65 mm long, 32 mm high and 20 mm wide) has a lenticular shape in the horizontal and its upper edge is sharp. From the front view, the angle between the sides and the base of the pommel is almost perpendicular and a distinct rounding is visible in the upper half of it. From the side the pommel has the shape of a narrow rectangle with slightly arched sides and with the top in the form of a pointed arch. The tang went through the centre of the pommel up to its top. On one side there was an irregular gap visible in the X-ray image between the tang and the side of the hole in the pommel.

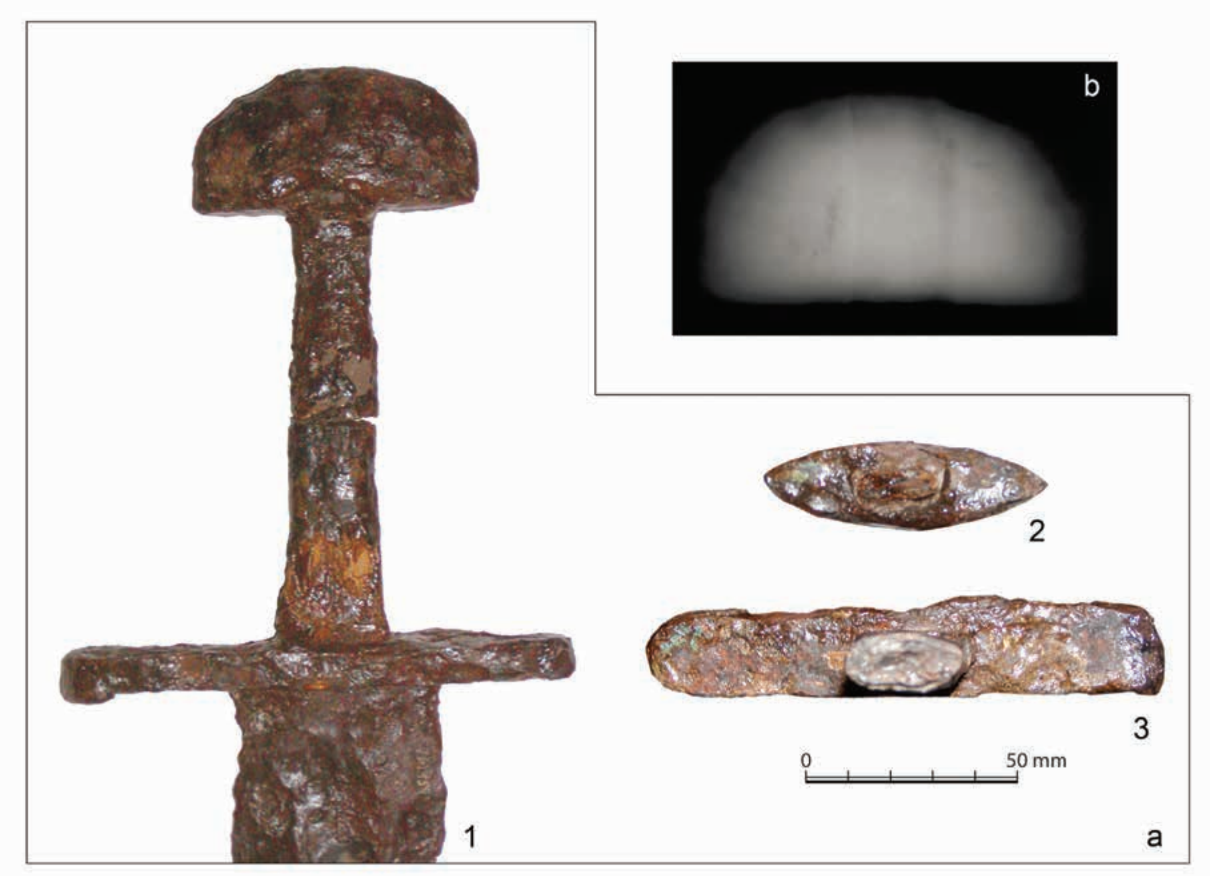

Fig. 85. Sword from the grave No. 717; a – hilt after first conservation (1 – hilt from the side A, 2 – undersurface of the pommel with traces of verdigris, 3 – undersurface of the crossguard with traces of verdigris); b – X-ray image of the pommel. Photos 'a' by R. Gronský; photo 'b' by Institute of Archaeology of the AS CR, Brno.

The length of the grip was 97 mm. The tang was 15 mm wide below the pommel and 23 mm wide above the crossguard, and bore remains of a wooden covering.

The thin and long crossguard is well-preserved (130 mm long, 11 mm high and 21 mm wide). It is from the front rectangular, while in the horizontal the sides are straight and rounded at the ends. X-ray images show a funnel-shaped broadening of the hole for the tang and the blade along throughout almost the entire height of the crossguard, and a step-like broadening for the blade appeared close to the bottom of the crossguard.

Despite damage caused by both corrosion and a grinding of the fuller (apparently performed in order to reveal symbols or inscriptions on the blade) the total shape of the blade is still distinct; It was a narrow (the original width oscillated around 50 mm, while its current width is 47 mm) and long blade (831 mm). The cutting edges are nearly parallel in the upper part of the blade and they start to converge towards the lower part. The narrow fuller, which was unfortunately partially damaged by grinding (performed in the course of conservation before the fire at the depository), started below the crossguard and ended approximately 100 mm above the point. In the upper part the fuller is about 15.5 mm wide, but in the lower part it narrows to 10 mm.

Typological determination of the sword

Due to the single semicircular pommel, the flat base of the pommel and the long crossguard, the sword belongs to Petersen's type X (Petersen 1919, 158–167), Geibig's type 12, variant I (specifically it is Geibig's combination type 12-12/18-9-11; Geibig 1991, 56–60) and Ruttkay's type VII (Ruttkay 1976, 249–251). The pommel

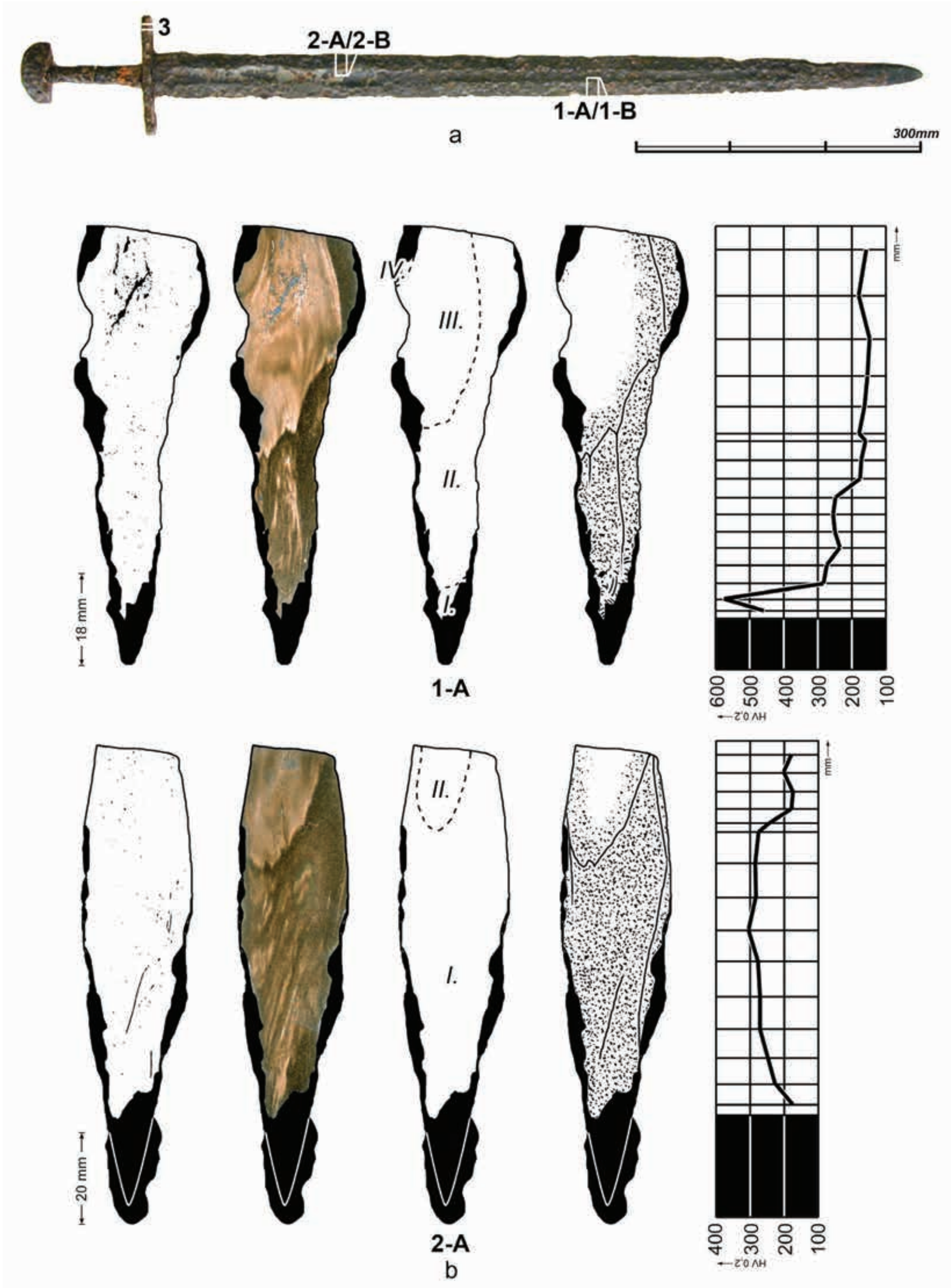

Fig. 86. Sword from the grave No. 717; a – the sword examined and the sampling method utilized; b – schematic drawings and scans of the blade samples (from the left: unetched state; after etching with Oberhoffer's reagent (scan); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

construction corresponds to Geibig's construction type III (GEIBIG 1991, 90–100). While according to Petersen's description of individual variants of the X type swords, the hilt of the sword from the grave 717 is on the boundary between earlier and later variants, on the other hand, according to the classification of Kucypera, Kurasiński and Pudło (2011) it unequivocally corresponds to variant X-earlier.

The lateral edges of the pommel rise up perpendicularly from the base and make the impression of a full semicircle, which might be regarded as a rather archaic feature with its roots in the semicircular upper hilt of Petersen's type N (Geibig 8). The shape of the pommel is interesting from the side and horizontal view, because the top edge of the pommel creates a sharp ridge, which gives a lenticular shape to the base and from the side it forms an acute angle at the top. The horizontal view of the pommel suggests that it belongs to Geibig's type 9, according to the length-width ratio 3.25. Such a pommel shape is usual among the X-type swords. The crossguard may be described as Ruttkay's type 6 (Ruttkay 1976, 249).

The sword blade has relatively specific morphological characteristics. It is narrow and at the same time relatively long, it has a narrow central fuller, but the end of the blade is relatively dully pointed. If we compare the blade parameters to Geibig's typology (Geibig 1991, 84–90), we find out that the characteristic of the blade oscillate between (often extreme) values that may be assigned to his types 2 or 3, which are usual in the 9th century. At the same time, some of the parameters correspond with a robust variant of the type 6b, which is, however, dated by A. Geibig (1991, 153) to the 11th and the 12th century. Hence, for this blade we do not find a corresponding Geibig's type.

Within the morphological classification of the blades presented in this study, the blade belongs to the group {d} (see Chap. 4.2), which is characteristic mainly by the blade-length exceeding 830 mm. In comparison with other 9th and 10th century swords, this group includes specimens with slender to medium-robust and very long blades. Later Carolingian swords prevail in this group.

Scabbard, straps and outer wrappings

No remains of organic wrapping were identified on the blade. A concretion of verdigris was situated on the tang of the blade, on side A, roughly 33 mm from the crossguard. A similar concretion was situated on the lateral lower side of the pommel. Further verdigris remains were identified on both ends of the crossguard (on the side pointing to the hilt). According to the *DGU* the sword bore remains of a wooden scabbard before the conservation.

Metallographic examination

Sampling: Sample [1-A] was taken from the left side of the blade 453 mm from the crossguard; sample [1-B] was detached from sample [1-A] and used as a check sample; sample [2-A] was taken from the right side of the blade 190 mm from the crossguard; sample [2-B] was detached from sample [2-A] and used as a check sample (Fig. 86:a).

Metallographic description of the blade: SAMPLE [1-A]: The sample contains numerous coarse slag inclusions (level 5 on the Jernkontoret scale) in the middle portion of the blade (Fig. 87:a). The line of attachment of the relatively pure cutting edge (level 1–2 on the Jernkontoret scale) is clearly defined by a chain of fine inclusions. Etching with Nital allowed four basic areas to be defined within the sample (Fig. 86:b). Area I, which is closest to the former original cutting-edge tip, contains a mixture of pearlite and tempered martensite with the hardness of about 520 HV0.2 (Fig. 87:b). Area II consists of a pearlitic-ferritic to pearlitic microstructure. The pearlitic-ferritic microstructure showed a maximum carbon content of 0.65% in places, where ferrite needles grow from the (prior austenite) boundary network into the pearlite areas. The grain size within the whole area corresponds to ASTM 5–6, and hardness is 255 ± 22 HV0.2, albeit near the line of attachment of Area III it is only 174 ± 11 HV0.2. In a surface panel of the core there is a predominantly pearlitic microstructure with a grain size of 6 ASTM and hardness of 265 ± 21 HV0.2 (Fig. 87:d, e). Area III has a ferritic micro structure with a grain size of ASTM 8 in places with a visible 'ghost' microstructure. The hardness of this area is 164 ± 16 HV0.2 (Fig. 88:a). The small Area IV consists of a ferritic-pearlitic

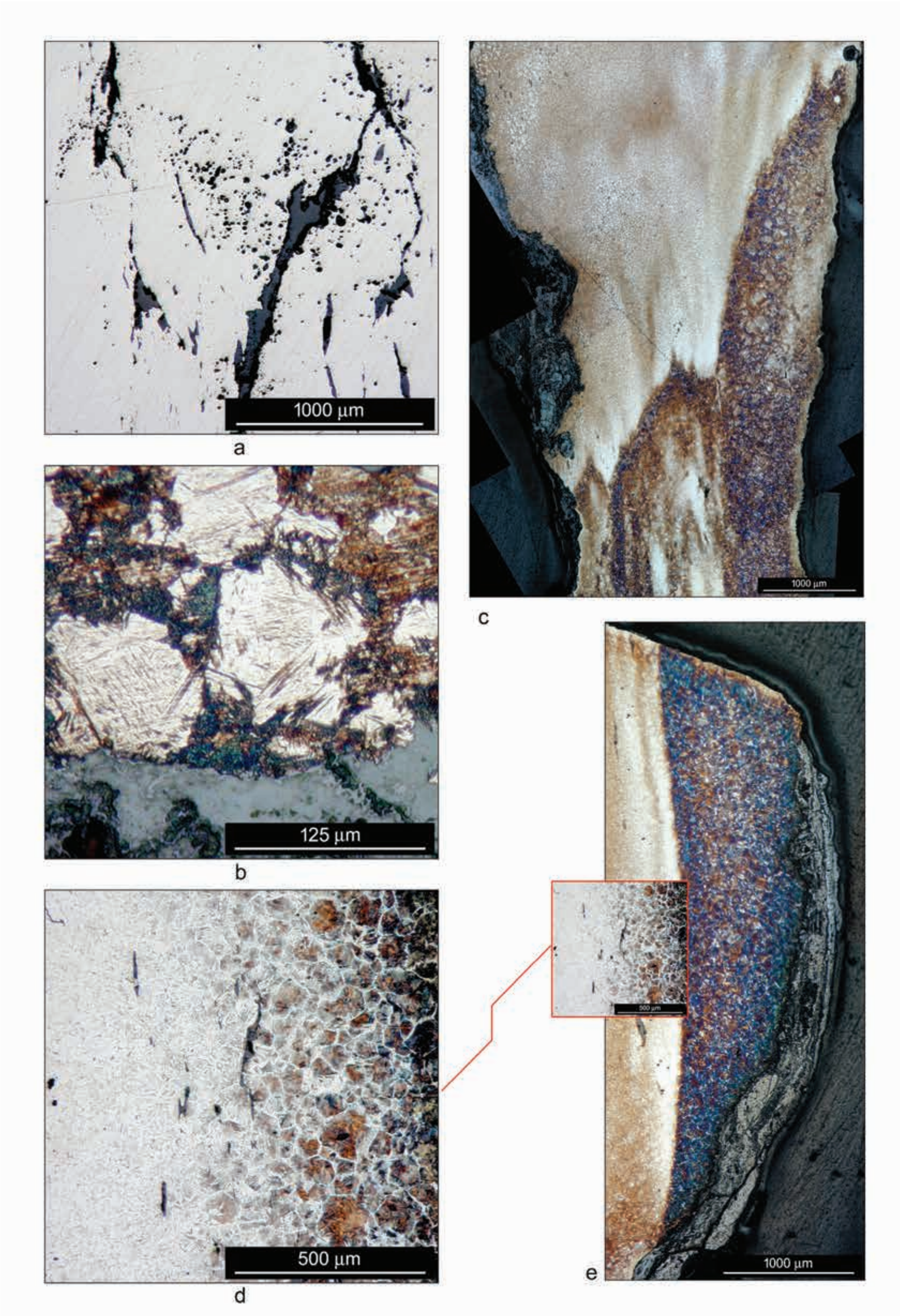

Fig. 87. Sword from the grave No. 717; a – an island in the blade core full of slag inclusions, sample [1-A]; b – martensitic areas in the proximity of the original cutting edge (Area I), sample [1-A]; c – macro photo of the weld between the steel cutting edge and the iron core, sample [1-A]; d – transition of the steel surface panel (Area II) into the iron core, sample [1-A]; e – macro photo of the weld between the steel surface panel and the iron core, sample [1-A]; unetched state: a; etched with Nital: b, d; etched with Oberhoffer's reagent: c, e. Photos by J. Hošek.

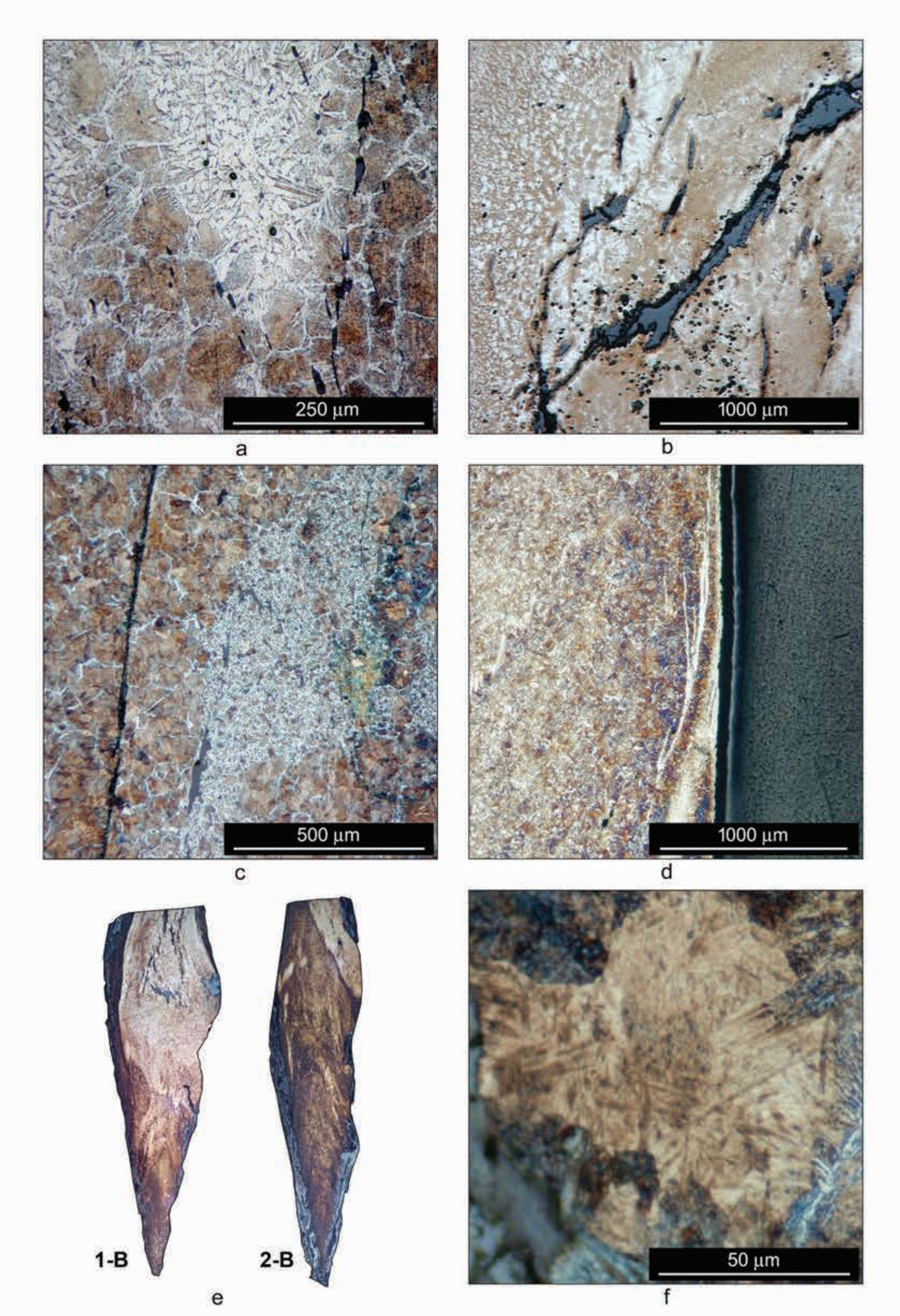

Fig. 88. Sword from the grave No. 717; a – close-up view of the weld between the cutting edge (Area II) and the iron core (Area III), sample [1-A]; b – ferritic microstructure in the area full of slag inclusions (Area III), sample [1-A]; c – smaller heterogeneous zones of the cutting edge, sample [2-A]; d – the weld indicating the attachment of the thin steel surface panel onto the cutting edge, sample [2-A]; e – samples [1-B] and [2-B]; f – martensite in the cutting edge of the blade, sample [2-B]; etched with Oberhoffer's reagent: b, e. etched with Nital: a, c, d, f. Photos by J. Hošek.

microstructure with a maximum carbon content of about 0.2% C (Fig. 88:b). In general, there are transitional zones consisting predominantly of Widmannstätten microstructures appearing between the high-carbon and ferritic areas. Etching with Oberhoffer's reagent showed that the blade was welded from several pieces, whose distribution within the samples often does not correspond with the distribution of the microstructural areas observed after Nital etching; see Fig. 87:d, e (pieces of steel etch dark, iron pieces etch light).

SAMPLE [2-A]: The material is relatively pure (level 2 on the Jernkontoret scale) in the middle portion of the blade. The number of inclusions rises to level 2–3 on the Jernkontoret scale in the cutting edge. Also longer welds of poor quality appear in the sample. Two basic areas can be determined after etching with Nital. Area I consists of a pearlitic-ferritic (zones with the maximum proportion of ferrite contain no more than 0.65%) to pearlitic microstructure. The pearlite consists of fine lamellae, grain size is around 6 ASTM, and the hardness of this area is 273 ± 22 HV0.2 (Fig. 88:c); however, hardness measurements conducted closer to the original cutting-edge tip show a decrease to 177 HV0.2. Area II contains a ferritic microstructure with traces of pearlite (grain size 8 ASTM), and a 'ghost' microstructure appears in places, where the grain borders are indistinct. The hardness of this area is 201 ± 27 HV0.2. Welds are within the sample visible as white lines (Fig. 88:d).

SAMPLE [1-B]: The distribution and composition of the microstructures are similar to those in the sample [1-A]. Both surface panels, which were found in the middle portion of the blade, had microstructures consisting of pearlite with some ferrite. The cutting edge consists of tempered martensite (hardness of 587 ± 29 HV0.2) with some pearlite (Fig. 88:e).

SAMPLE [2-B]: The distribution and composition of the structures are entirely similar to those in the sample [2-A], and areas of tempered martensite were also detected in the cutting edge (Fig. 88:e, f).

Metallographic description of the crossguard:

SAMPLE [3]: Roughly a third of the sample is full of inclusions (level 4–5 on the Jernkontoret scale), while the rest of the sample is relatively pure (level 1–2 on the Jernkontoret scale). After etching with Nital, the centre of Area I contains a pearlitic or in places a pearlitic-bainitic microstructure with a hardness of 349 ± 7 HV0.2 (Fig. 89:b); the microstructure at the margins is pearlitic-ferritic with a grain size of about 6 (sometimes up to 4) ASTM and with a hardness of 289 ± 5 HV0.2. The carbon content gradually falls on moving towards the low-carbon Areas II and III (Fig. 89:c). Area II contains a ferritic-pearlitic microstructure with around 0.2–0.3% C, a grain size of ASTM 7 and a hardness of 129 ± 5 HV0.2 (Fig. 89:d). Area III contains a ferritic microstructure with a grain size of ASTM 6 and a hardness of 107 ± 6 HV0.2 (Fig. 89:e). No technological or construction welds were discovered in the sample.

Assessment: The blade like many others had steel cutting edges and an iron core with steel surface panels. The results of examination, however, do not rule out the possibility that the steel surface panels overlapped, at least partially, the cutting edges. This might indicate an unusual manufacturing process. The steel (although rather soft without any heat treatment) used on the blade has an appropriate carbon content for hardening. The iron portion of the blade is piled and it corresponds to a partly processed bloomery iron. The blade was heat-treated in such a way that only the cutting edges are hardened. This may well have been by selective quenching. Thanks to its construction and also its successful heat treatment, the blade is a weapon of excellent quality. The crossguard shows no traces of intentional construction and it was most probably forged from heterogeneous piece of partly processed bloomery iron.

3.4.12 Sword from the grave 723

Circumstances of the discovery

The grave was discovered in 1958 in the eastern part of the area No. 5 'Z 1957–59' (Poláček/Marek 2005, 68–80), within the excavation

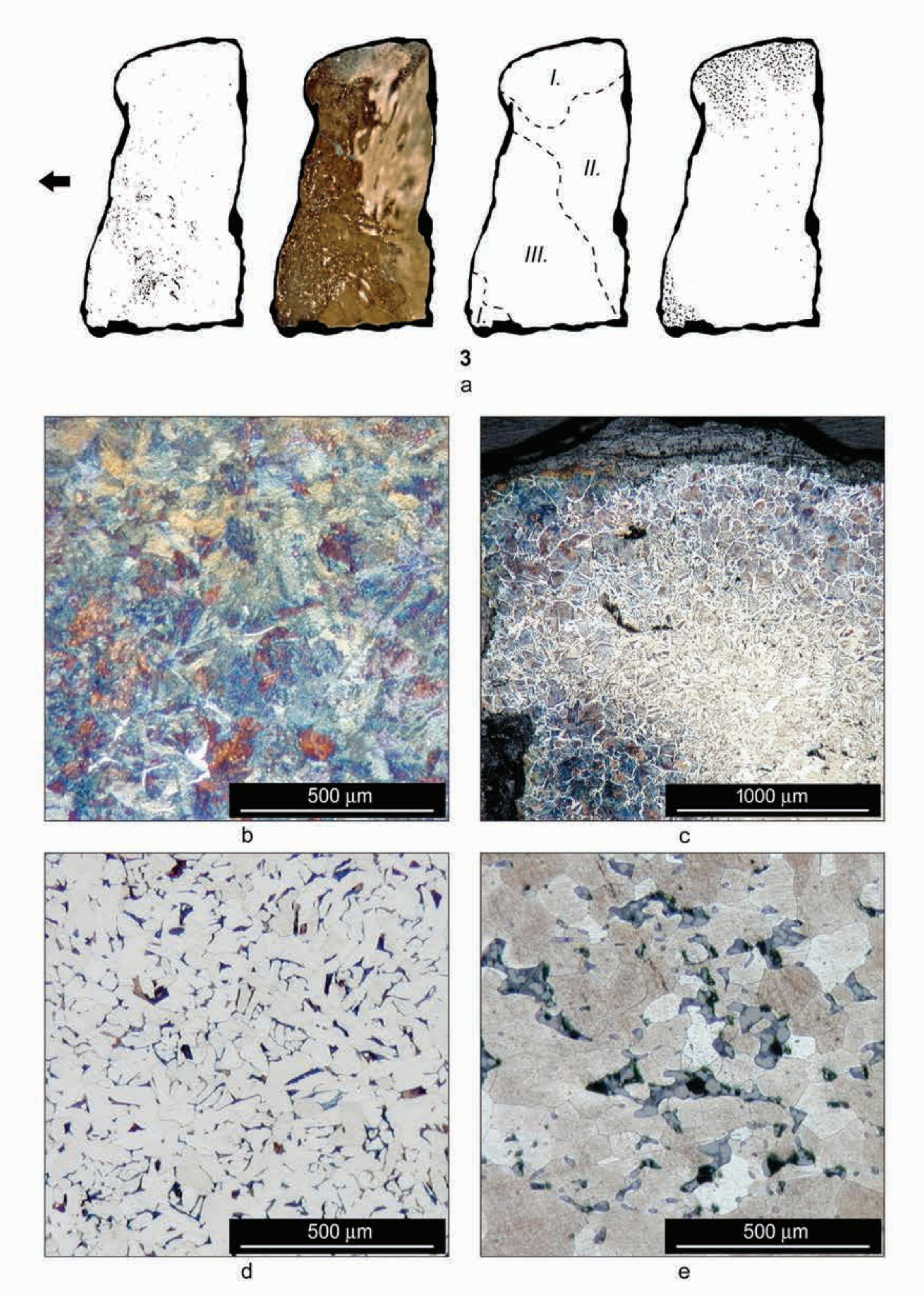

Fig. 89. Sword from the grave No. 717; a – schematic drawings of crossguard sample (from the left: unetched state, after etching with Oberhoffer's reagent, layout of the described areas, illustration of the structure); b – pearlitic microstructure in Area I; c – pearlitic-ferritic microstructure near the sample margins (Area I); d – ferritic-pearlitic microstructure in Area II; e – ferritic grains in the areas full of slag inclusions (Area III); Nital etched. Photos and drawings by J. Hošek and J. Košta.

directed by J. Poulík. It was situated in square 15/0 in the sandy underlying layer about 8 m from the NW part of the preserved foundations of the so-called palace. The grave lay in the eastern part of the group of graves located to the NW from the stone foundations of the above mentioned structure (see Chap. 1.2.1). The burial pit of a size of 315 × 55 to 105 cm was rectangular in the area of legs and behind the head it was rounder and distinctly narrow. The grave was situated in the depth of 75 cm below the surface, but the silhouette of the pit was not visible until 15 cm from the bottom. Over the head there was a cluster of stones, burial-pit fill was dark with sand and clay and it contained pottery shards and animal bones.

The supine burial belonged to male in the age of *adultus* (20–40 years) and was deviated 10° to the south from the ideal axis W-E (Fig. 90). The upper part of the skeleton, with the head pointing to the west, was preserved very badly (Stloukal 1967, 306). The only bones to be preserved were the remains of skull, left scapula and clavicle, long bones of the arms, thigh bones and fragments of vertebrae. The remains were stretched on the bottom of the burial pit to a length of 175 cm.

Under the left arm, from the shoulder to the knees, a sword lay flat (1). By the lower part of the right arm there was a knife (2). In the *DGU* a buckle (3) is mentioned, the location of which is unknown within the grave. In the area of toes there were spurs (4), and together with them fragments of unspecified objects (5) were inventoried.

Fig. 90. Mikulčice-Valy, Hodonín County; grave No. 723; photograph of the burial taken in the course of the excavation (Poláček 2006, 9).

Finds

1) The iron sword with the remains of a scabbard (without evidence number; see Fig. 91–101).
2) The iron knife (without evidence number). Under the evidence number 594-4903/59 there is a whittle tang, coming probably from the iron knife. Relation to the knife (2) is impossible to prove.
3) The iron buckle (without evidence number). Not at a disposal in 2003.
4) The iron spurs with thin arms and a short prick (594-4903/59). Only one part of the spur with the prick (length of the prick 2.5 mm, width of the prick 10 mm) and seven fragments of thin arms (4–5 mm wide) were preserved. On the ends of two fragments there are remains of damaged terminals of unidentifiable type.
5) Three fragments of iron artefacts that were inventoried together with the spurs. In one case it was 40 mm long whittle tang of the knife, which could relate to the knife (2). Further there were two fragments of unidentifiable iron objects (594-4903/59).

Description of the sword

This is a double-edged sword (without evidence number; Fig. 91, 92 and 93) which was 1011 mm long and at the time of its documentation in 2003 weighed 1080 g; the weight of organic wrapping was negligible. The point of balance lay on the blade, 240 mm below the crossguard.

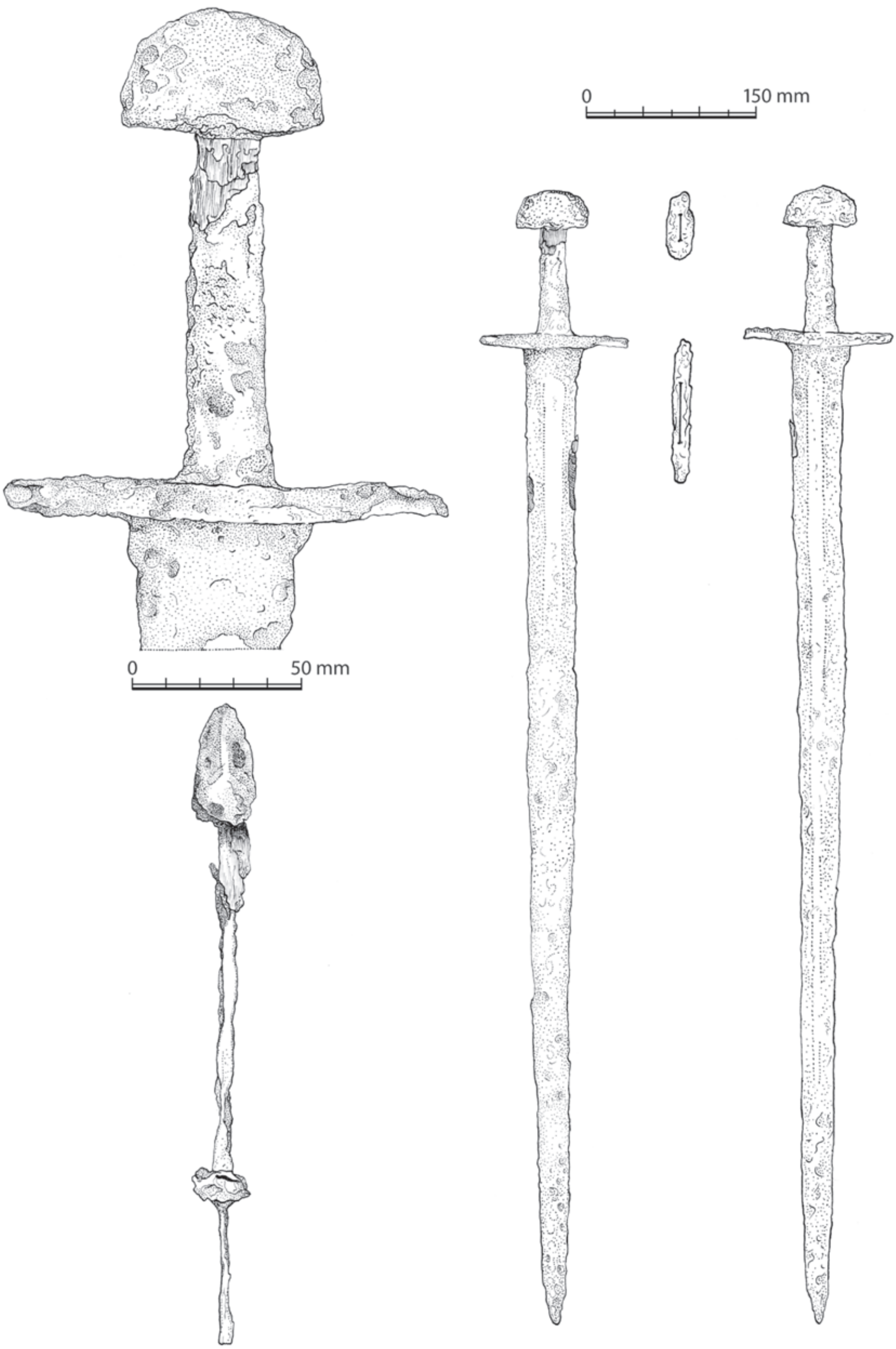

Fig. 91. Mikulčice-Valy, Hodonín County; sword from the grave No. 723 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

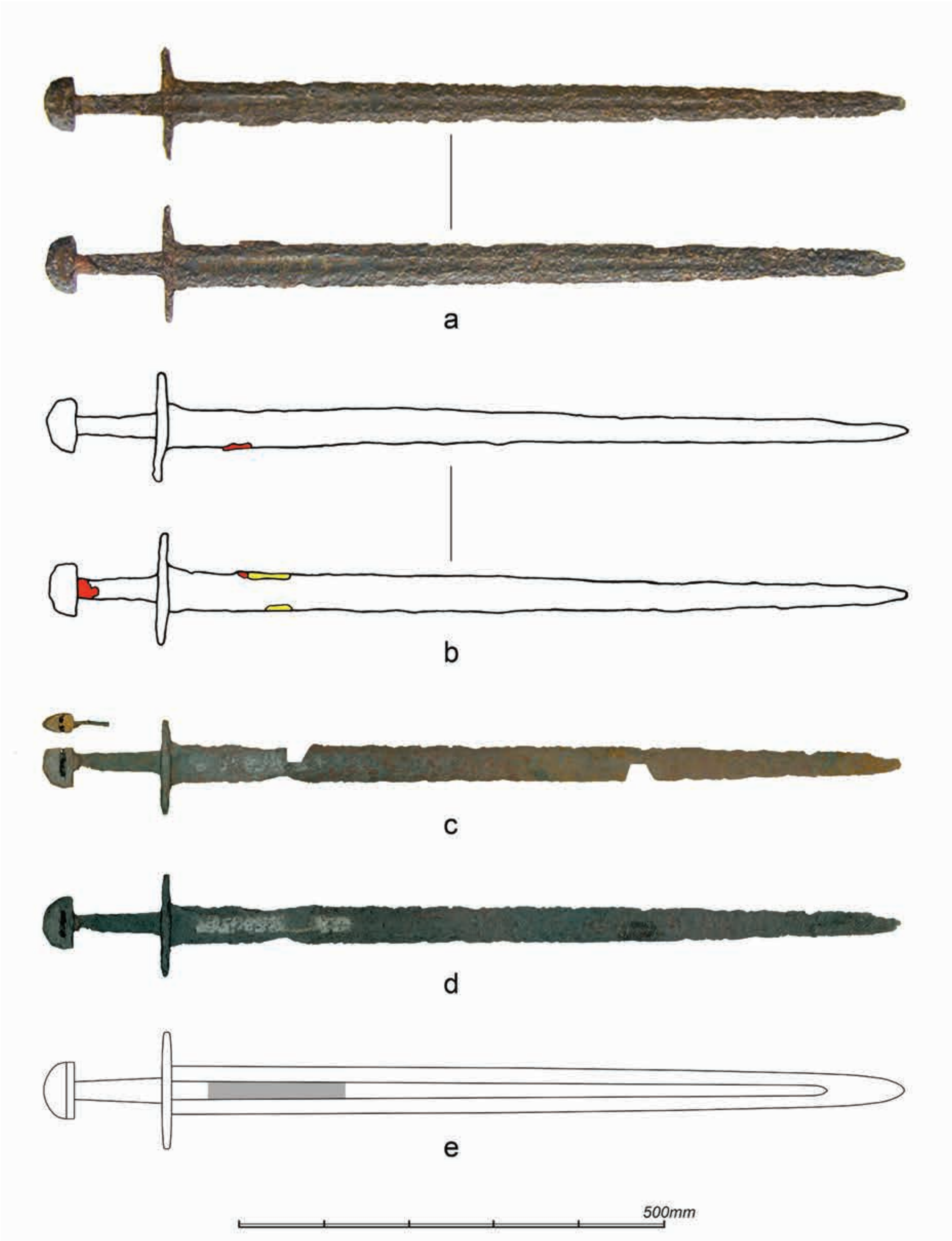

Fig. 92 Sword from grave No. 723; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile (lining of the scabbard); red: wood (corpus of the scabbard and coverings of the tang); discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword (the blade bore an ornamental inlay of phosphoric iron on one side, the other side was inlaid too, but the pattern was not recognized). Photos and drawings by J. Hošek and J. Košta.

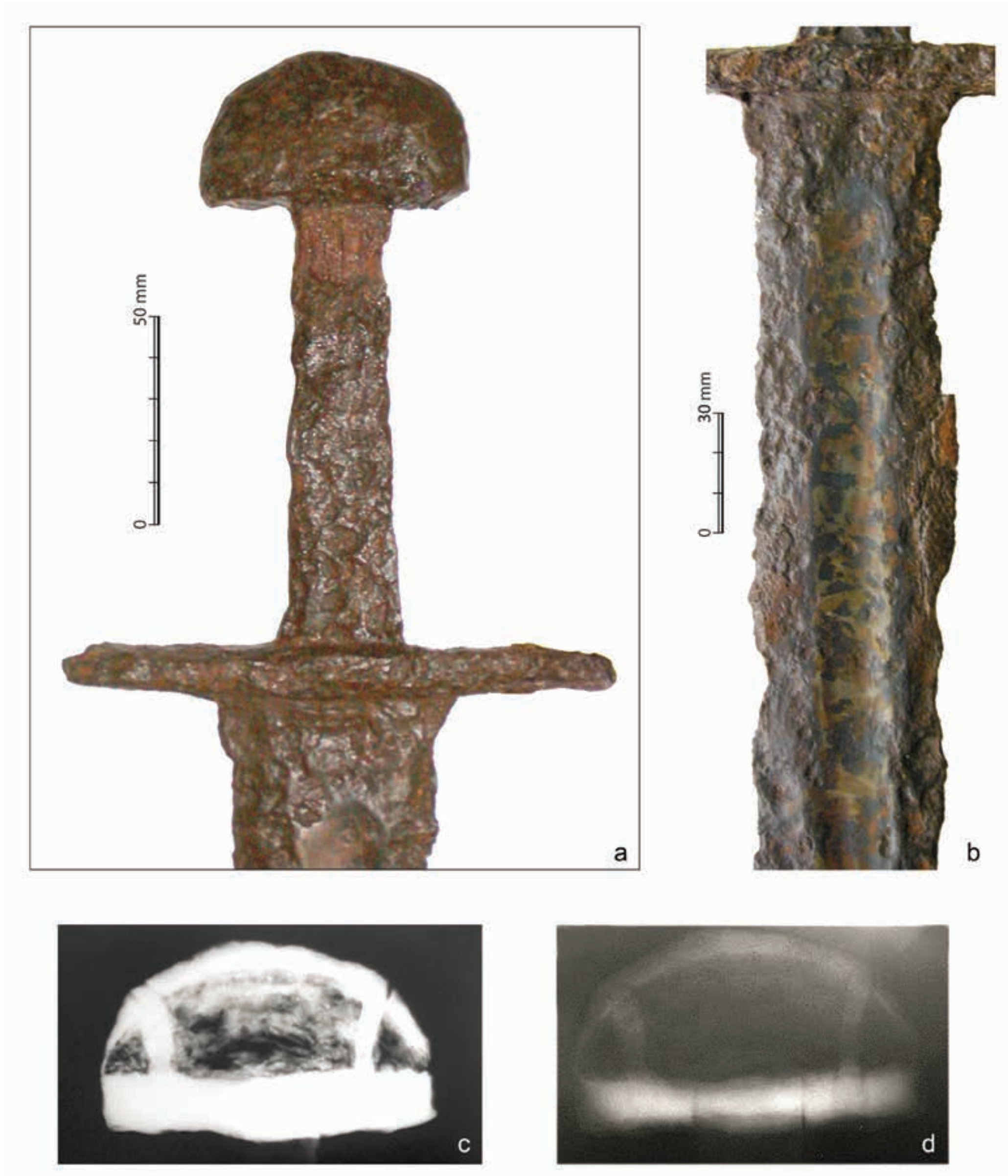

Fig. 93. Sword from the grave No. 723; a – hilt from the side A (documentation of the sword in 2003); b – upper part of the blade with remnants of an inscription (documentation of the sword in 2003); c, d – X-ray images of the upper hilt with different exposure times (documented prior to the depository fire). Photo 'a' by R. Gronský; photos 'b-d' by Institute of Archaeology of the AS CR, Brno.

During the salvage operations following the fire at the base in Mikulčice, the sword was preserved as a whole; its weight is currently 975 g.

The semicircular upper hilt is 67 mm long, 37 mm high and 24 mm wide. The upper guard is 10 mm high; it is rectangular from both the front and side and oval in the horizontal. The pommel is from the side sharply arched. The tang ends on the top of the upper guard to which the hollow pommel was fastened by a pair of rivets. The upper part of the cavity inside the pommel was filled with slag (*see below*). The grip was 103 mm long; the tang broadened from 21 mm (by the upper hilt) to 30 mm (by the lower guard) and bore remains of wood below the upper hilt.

The crossguard is a low, long and narrow prism in shape (137 mm long, 11 mm high and 16 mm wide) and its ends are rounded in the horizontal.

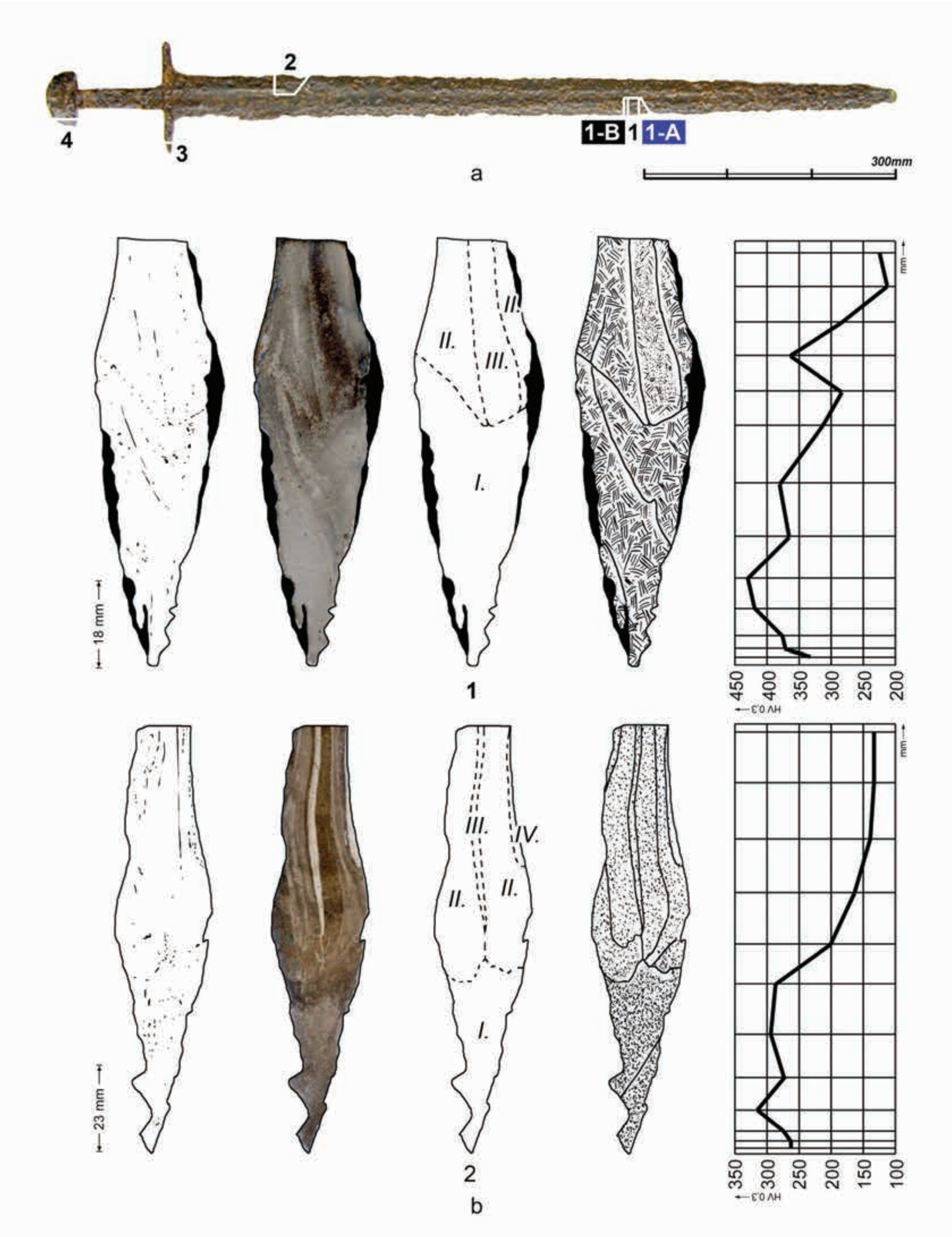

Fig. 94. Sword from the grave No. 723; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state, after etching with Oberhoffer's reagent (photo), layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

As the X-ray image show, the hole for the tang and blade was broadened in a step-like fashion.

The very long blade (860 mm) was 57 mm wide below the crossguard. The more distinct narrowing of the blade into a long point appears

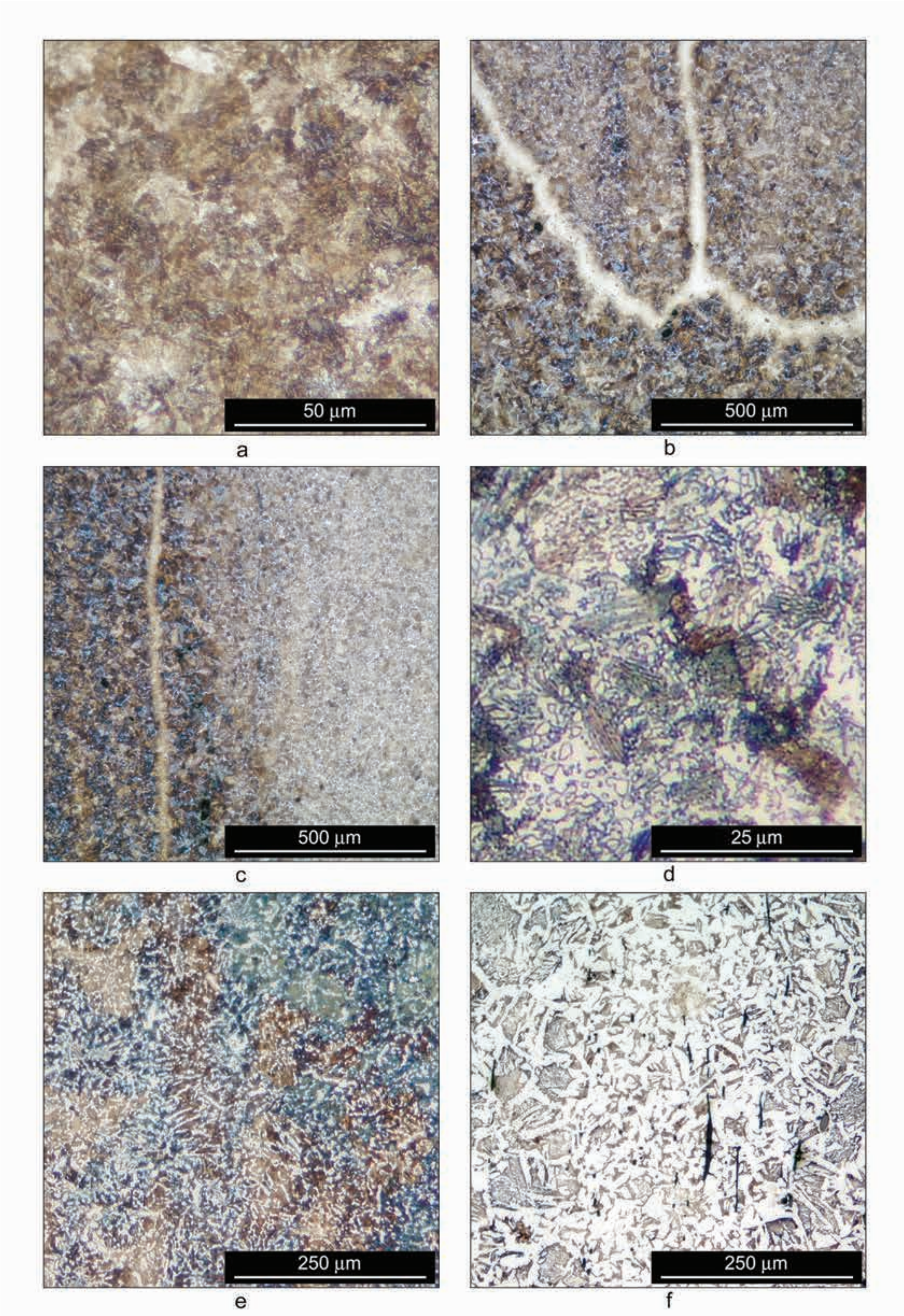

Fig. 95. Sword from the grave No. 723; a – mixture of bainite and fine pearlite in Area I, sample [1]; b – distinct weld between the cutting edge and the blade core, sample [1]; c – the transition between areas II and III in the core of sample [1]; d – lamellar and globular pearlite in Area I (cutting edge), sample [2]; e – pearlitic-ferritic microstructure in Area II in the proximity of the cutting edge, sample [2]; f – pearlitic-ferritic microstructure in Area III, sample [2]; Nital etched. Photos by J. Hošek.

approximately at the boundary of the first and the second thirds of the blade length. The fuller starts below the crossguard and ends roughly 90 mm above the point. It continually narrows from 21 mm by the crossguard to 13 mm in the last third of its length. During conservation performed prior to the fire, the fuller was ground on both sides of the blade in order to uncover those parts where inscriptions and letters of iron inlay usually occur. Indeed, on one side, at a distance between 43 mm and 205 mm from the crossguard, there occur crosses and groups of irregularly arranged sets of lines roughly 6 mm wide, which extend to the entire width of the fuller (approximately 20 mm), see Fig. 100:c, d and 101:a. The heavily worn iron inlay may be interpreted as the remains of an ornamental-geometric inlay that began and ended with equilateral crosses. The other side of the blade revealed only the remains of a sign in the form of a line crossing the fuller perpendicularly.

Typological determination of the sword

Due to the semicircular upper hilt and the long crossguard the sword corresponds with Geibig's type 8 (specifically Geibig's combination type 8-3-1-11; Geibig 1991, 48–50), which may be considered identical with Petersen's type N (*1919*, 125–126). The upper hilt may also be classified as Ruttkay's type VII (Ruttkay 1976, 249, 251).[83] On the basis of the upper hilt construction (a hollow pommel is fastened to the upper guard by a pair of rivets) the sword belongs to Geibig's construction type II (Geibig 1991, 90–100). The crossguard corresponds with Ruttkay's type 6 (Ruttkay 1976, 249).

Concerning morphology of the blade, due to its length, the length of the fuller and the shape of the point the blade corresponds to Geibig's type 5b. However, some features suggest type 3a, which was common in the 9th century (especially the width of the fuller and other parameters that are within the tolerance for type 5b). While type 3 was dated by Geibig from the late 8th to the mid-10th centuries, type 5 was dated from the mid-10th to the mid-11th centuries (Geibig 1991, 153). The blade from grave 723 is within the Geibig's typology without any exact analogy. According to the classification of blades, which was presented in this study, the blade belongs to the group {d} (see Chap. 4.2), which is characterised by length of blades (over 830 mm). In comparison with other 9th and 10th century swords, this group includes swords with slender to medium-robust and very long blades. Later Carolingian swords prevail in this group.

Scabbard, straps and outer wrappings

In the upper third along the cutting edge there were subtle remains of a wooden scabbard that had been lined with a textile (woven likely in a twill-weave). This textile was preserved, in at least two layers overlying each other, on the right edge of the blade, side A.

Metallographic examination

Sampling: Sample [1] was cut out from the left side of the blade 542 mm from the lower guard; sample [1-A] was subsequently detached from sample [1] and annealed in a controlled manner; sample [1-B] was detached from the same cut in the blade after it had withstood the fire. Sample [2] was taken from the right side of the blade 125 mm from the lower guard; sample [3] was cut off from the left side of the lower guard 40 mm from the tang; sample [4] was cut off from the left side of the upper hilt 8 mm from the tang (Fig. 94:a).

Metallographic description of the blade: SAMPLE [1]: The metal matrix is of mediocre purity, both the cutting edge and the blade core contains short sections of imperfect welds and the metal purity corresponds to level 3 to 4 on the Jernkontoret scale. Area I (cutting edge) consists of a mixture of bainite and pearlite (Fig. 95:a) with hardness of 373 ± 40 HV0.3 (332 HV0.3 in the cutting edge). Area II at the margins of the blade core contains bainite and pearlite with traces of ferrite at grain boundaries in places. Area III in the centre of the core consists

83 For more detailed comment to the type stated see Chap. 3.4.6 and 4.1.3.

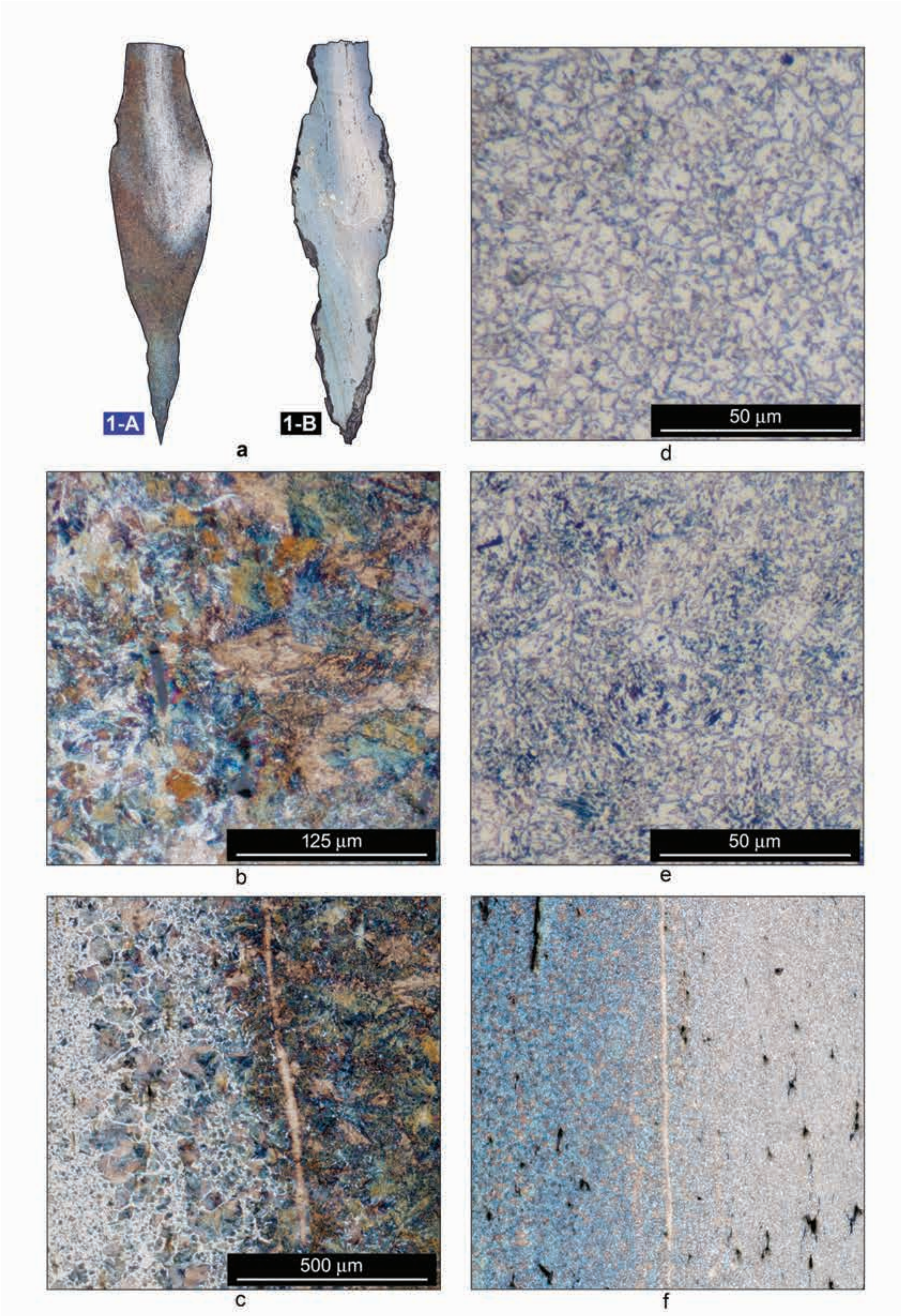

Fig. 96. Sword from the grave No. 723; a – samples [1-A] and [1-B]: b – pearlite with traces of ferrite in the cutting edge, sample [1-A]; c – attachment of the surface panel to the core of the blade body, sample [1-A]; d – ferritic-cementitic microstructure in the cutting edge of sample [1-B]; e – ferritic-cementitic microstructure along the edges of the middle portion of the blade, sample [1-B]; f – view of the attachment of a surface panel and the core in the middle portion of the blade, sample [1-B]; Nital etched. Photos by J. Hošek.

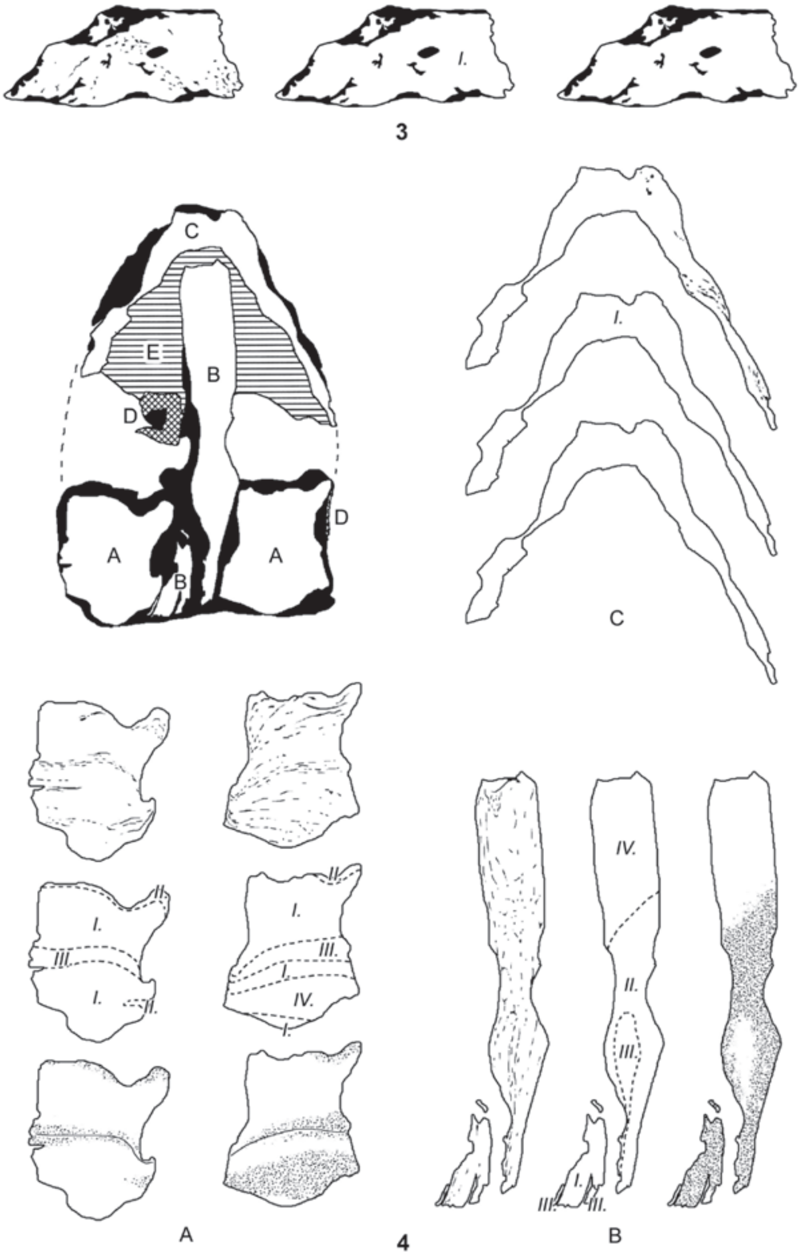

Fig. 97. Sword from the grave No. 723; lower guard (sample [3]) and upper hilt (sample [4]) with schematic drawings (from the left/top: unetched state; layout of areas described; distribution of the microstructures and of the main welds across the sample). Drawing by J. Hošek.

Tab. 1. Chemical analysis of the pommel infill (E); wt%.

spot	O	Mg	Al	Si	P	K	Ca	Fe	see Fig. 100:a
1	40.9	0.8	2.5	21.8	0.7	3.7	6.4	23.1	E3
2	–	–	–	0.5	–	–	–	99.5	E2
3	48.4	–	3.6	23.0	0.4	1.0	1.3	22.3	E2
4	53.6	–	–	46.5	–	–	–	–	E1

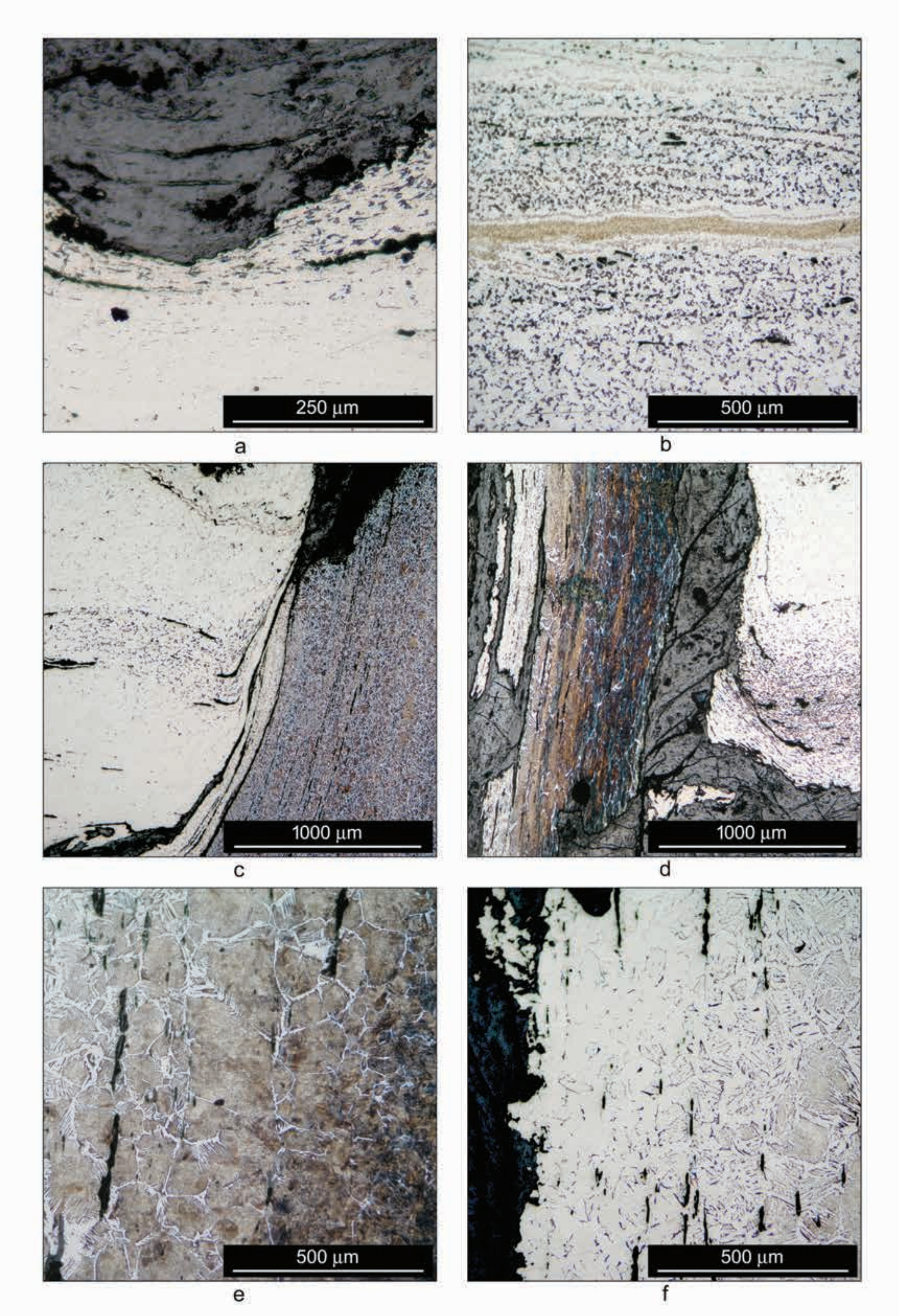

Fig. 98. Sword from the grave No. 723; all in sample [4], a – groove (?) with deformed microstructure (Area II) on the top side of the guard (A); b – a distinct weld enriched in copper in Area III of the guard (A); c – the rivet (on the right) fixed to the upper guard (on the left); d – the same on the right side of the rivet; e – the pearlitic-ferritic Area II in the rivet (B); f – transition between Areas III and II in the lower part of the rivet (B); Nital etched. Photos by J. Hošek.

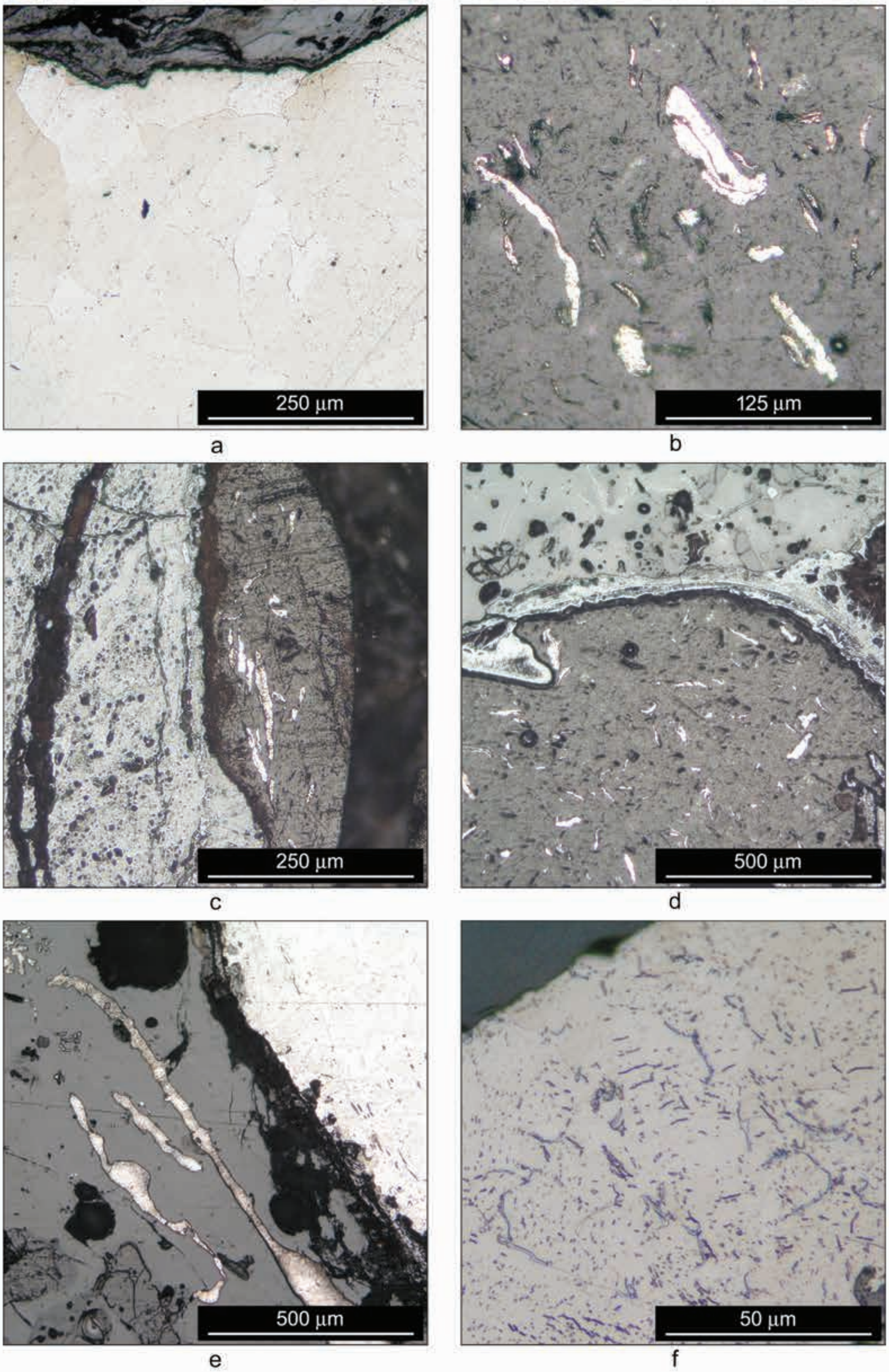

Fig. 99. Sword from the grave No. 723; all in sample [4], a – ferritic microstructure of part C (pommel); b – close-up view of part D (infill); c – thin layer D on the side of the upper guard (A, right side); d – part D with transition from part E; e – close-up view of the slag infill (E) with islands of iron; f – close-up view of an iron grain in part E; Nital etched. Photos by J. Hošek.

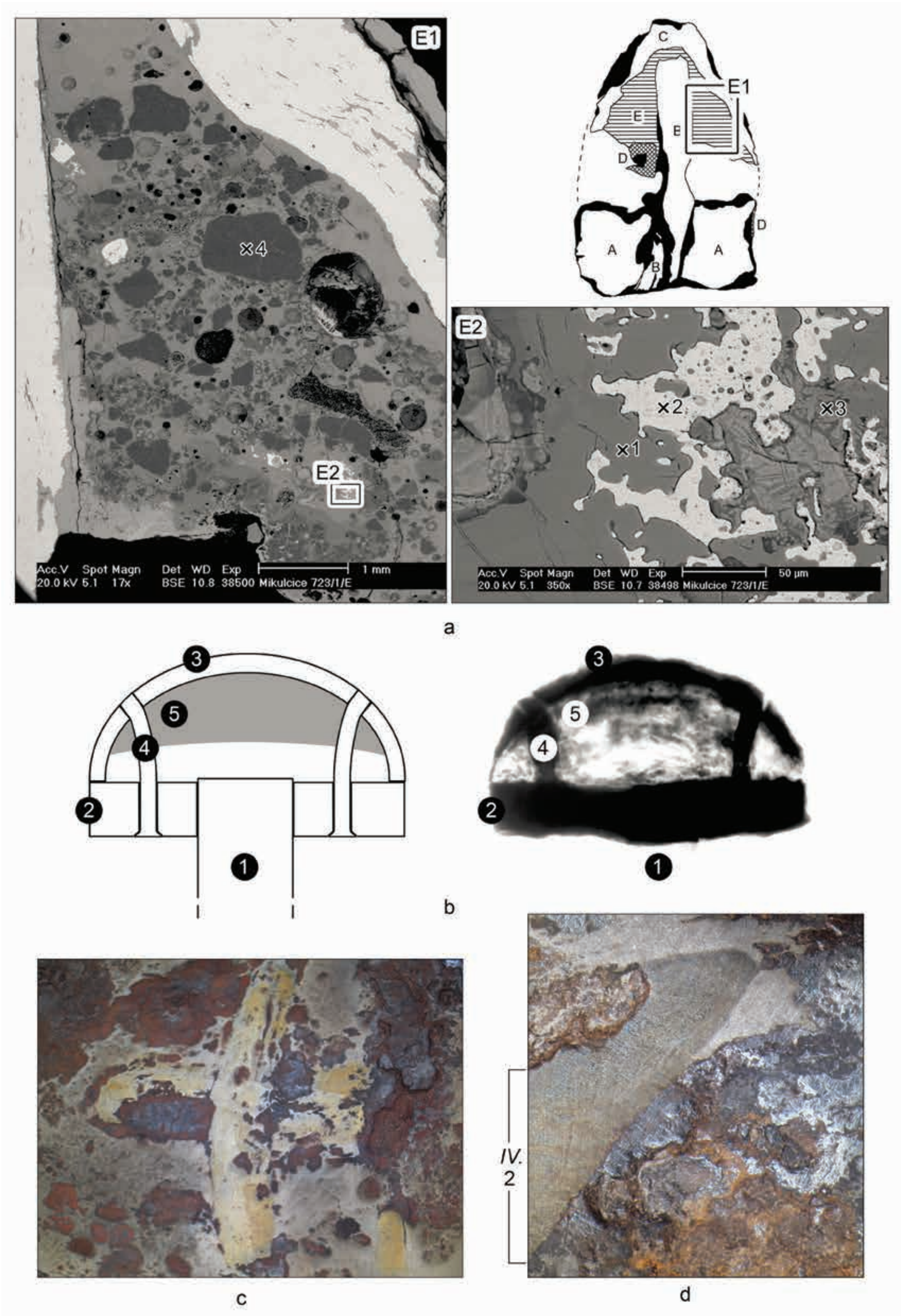

Fig. 100. Sword from the grave No. 723; a – slag forming an infill of the hollow pommel; b – schematic drawing and X-ray photograph of the upper hilt section (1 – tang; 2 – upper guard; 3 – pommel; 4 – rivets; 5 – slag infill); c – a cross inlaid into the blade; d – detail of an inlay made of phosphoric iron whose section has been observed in sample [2] (area IV); Nital etched. Photos and drawings by J. Hošek and D. Janová.

of a mixture of pearlite, bainite and ferrite with a maximum carbon content of about 0.6% C; the hardness is 243 ± 39HV0.3 and the grain size corresponds to ASTM 8–9 (Fig. 95:c).

SAMPLE [2]: The metal matrix contains a number of fine inclusions that corresponds to level 3 on the Jernkontoret scale in the cutting edge, and in the blade core to level 4–5. Welds of very fine inclusions show the line of the attachment between the cutting edge and the blade core, with a distinct imperfect weld (about 5.5mm long in the metallographic sample). Area I including the cutting edge contains a mixture of fine lamellar and globular pearlite with a grain size of ASTM 9 (Fig. 95:d). The partially spheroidised pearlite predominates in the upper part of the cutting edge. The hardness of the whole area is 280 ± 21 HV0.3. Area II (the core margins) consists of a pearlitic-ferritic microstructure with around 0.4 to 0.6% C (Fig. 95:e). The pearlite is partially spheroidised, the ferrite grain size is 5 to 7 ASTM, the pearlite is locally fine-grained (9 ASTM), and the hardness is 158 ± 27 HV0.3. Near the line of attachment to the cutting edge, the Area II reveals a similar microstructure as present in the lower part of the cutting edge with around 0.6% C and a grain size of 8 ASTM. Area III represents a narrow lighter-etching band with a pearlitic-ferritic microstructure, a carbon content of around 0.4% C and a grain size about 7 ASTM (Fig. 95:f). There is about of 0.4% P and 1% Co within the band. Area IV is located at one of the blade-core margins and contains a ferritic-pearlitic microstructure with around 0.2 to 0.4% C, a grain size is 8 to 7 ASTM. The Area contains around 1.3% P. Welds in the both samples are marked out by white-etching lines enriched in Ni (up to 3%) and Co (up to 1%) and they are as a rule accompanied by narrow rows of fine inclusions (Fig. 95:b).

SAMPLE [1-A]: The cutting edge predominantly contains a pearlitic microstructure with a hardness of 255 ± 11 HV0.2 (Fig. 96:a, b). There is also a zone with around 0.65% C, which appears on the side near the cutting-edge, and also a pearlitic-ferritic zone with around 0.4% C, which appears on the right side near the line of attachment to the blade body. The sides of the body have a pearlitic microstructure, with some ferrite in places, and decarburization to around 0.4% C can be seen at the right side near to the cutting-edge (Fig. 96:c). The central zone of the blade body contains a pearlitic-ferritic microstructure with carbon content of around 0.45%.

SAMPLE [1-B]: Etching of the cutting edge revealed fine cementite particles dispersed in a ferrite matrix, with a higher density of the particles on one side than on the other; the hardness of the cutting edge is 210 ± 7 HV0.2 (Fig. 96:d). In the middle portion of the blade the central part contains a ferritic-cementitic microstructure. The surface parts here (especially those situated further from the cutting edge) have a similar but finer microstructure with a higher density of the cementite particles (Fig. 96:e, f).

Metallographic description of the crossguard: The material of the guard is full of predominantly coarse slag inclusions which have an inner dendritic structure. The metal purity corresponds to level 3 to 4 on the Jernkontoret scale. The microstructure is ferritic with a grain size ATSM 5–4, the grain boundaries are locally indistinct. Its hardness is 132 ± 16 HV0.3.

Metallographic description of the upper hilt: Three basic parts of the upper hilt are distinguishable in the detached sample: upper guard (A), rivet (B) and pommel (C).

1) The upper guard (A) contains numerous fine and coarse inclusions following the direction of forging of the material. The metal purity is low and corresponds to level 4–5 on the Jernkontoret scale. Area I (in both cases) is ferritic with a grain size of ASTM 4÷6. The carbon content in the marginal Area II is 0.25% C, and the grain size is ASTM 7÷8 (Fig. 97:a). Area III (in both cases) is ferritic-pearlitic with a carbon content of 0.2 to 0.3% and a grain size of ASTM 8. The carbon content in Area IV is around 0.35% C and the grain size is 8÷9 ASTM. The central zone of Area III (in both cases) is intersected with distinct welding lines (Fig. 97:b) enriched with 4.4 ± 0.3% of copper while the copper content

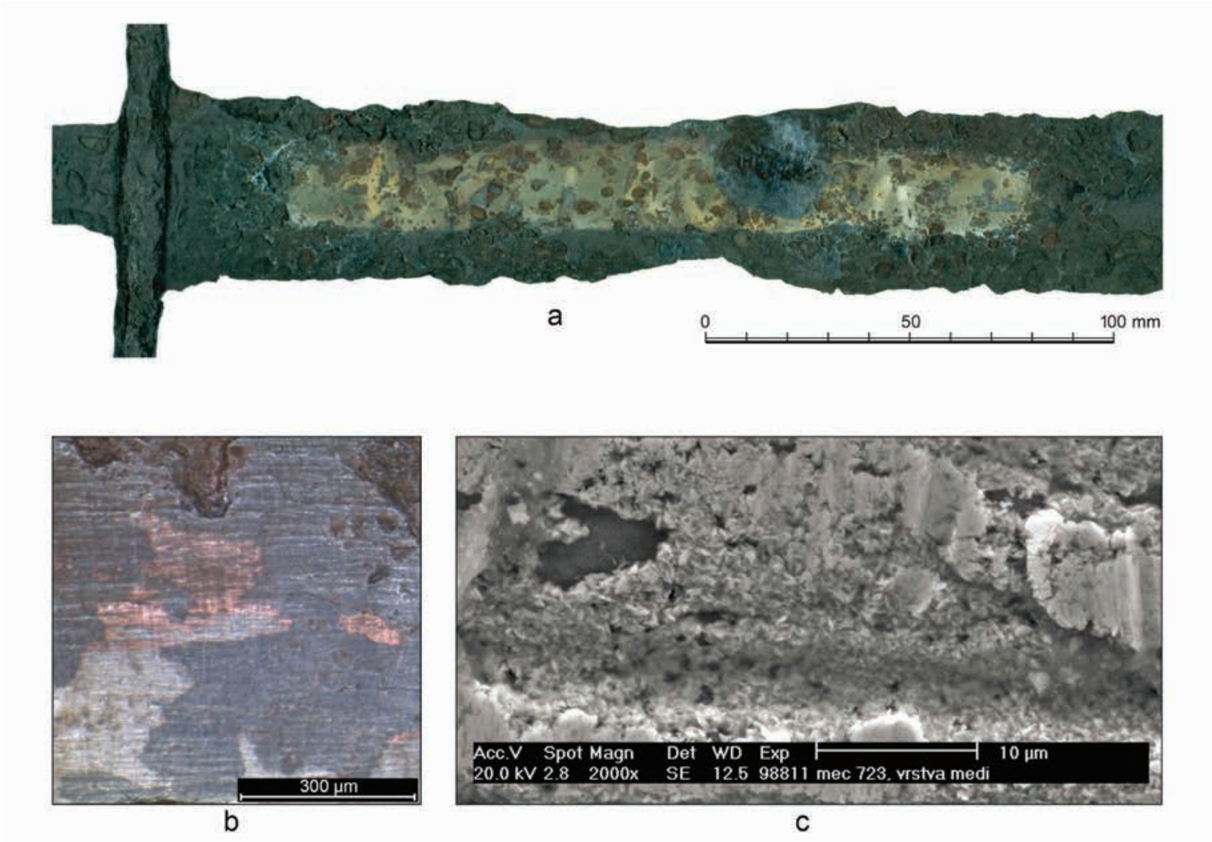

Fig. 101. Sword from the grave No. 723; a – denuded remnants of the iron inlay; b – deposits of copper uncovered on the sample [2] (view of the surface of the sword); c – crystalline structure visible in cavities of the deposits of copper; unetched, observed by optical microscope (b) and SEM (c). Photos by J. Hošek and D. Janová.

in the surrounding metal is below the detection level of the method used /EDXA/.

2) The rivet (B) is made from material of a very low purity corresponding to level 5 on the Jernkontoret scale. Inclusions are both fine and coarse, and distributed in the form of long lines or chains. Area I is ferritic-pearlitic with a carbon content of 0.4 to 0.6% and a grain size ASTM 10 to 7 (Fig. 97:c). Area II is pearlitic-ferritic with a carbon content from 0.5% to 0.78%. The grain size corresponds to ASTM 5 to 3 (Fig. 97: d, e). Area III consists of ferrite with traces of pearlite, the carbon content does not exceed 0.2% (in both cases). The grain size is 7÷6 ASTM (Fig. 97:f). Area IV consists of ferrite with a grain size of ASTM 5 to 7. The lower marginal areas of the rivet show more than 50% cold-work longitudinal deformation of the grains.

3) The pommel (C) is made of a pure material with only one cluster of coarse slag inclusions. The metal purity in general corresponds with level 1 to 2 on the Jernkontoret scale. The structure is ferritic with a grain size of ASTM 4 (Fig. 99:a). Furthermore, within the pommel two distinct infills were found:

4) The pommel infill (D) comprises dark-coloured matter, permeated with fine, partially deformed particles of very pure iron with inclusions typical for wrought metal (Fig. 99:b-d). SEM-EDX areal analysis: 69.9 ± 0.8% C; 27.4 ± 1.5% O; 0.8 ± 0.1% Cl; 1.9 ± 0.6% Fe.

5) The infill (E) is slag, permeated with grains of silica sand and islands of wrought iron (Fig. 99:e, f). For the results of chemical analysis see Tab. 1 and Fig. 100:a.

Restoration survey of the blade: An Iron inlay was revealed on the blade in the course of the re-conservation survey (Fig. 100:c, d and 101:a). The inlay includes a cross, 43mm from the lower guard. Sample No. 2 was used to verify the nature of the material applied. EDXA confirmed that the inlay is solely phosphoric iron (1.0 ± 0.3% P). When removing a surface layer of corrosion of the sample No. 2 (in order to find a part of the inlay on the sample), microdeposits of copper were found between the corrosion and the surviving metallic core (see Fig.101:b, c). The deposit is porous and consists of pure copper, whose crystals are well preserved in cavities. Both sides of the blade sample revealed such deposits.

Assessment: This blade features a piled steel core, to which steel cutting edges (also made from two or three parts) were attached. The lower part of the blade (from where sample No. 1 was removed) was quenched (perhaps in oil as martensite has not been formed), the upper part was not quenched. The blade bears an inlay of iron (steel in places) with enhanced phosphorus content. Individual elements of the inlay are, however, nearly worn off as suggested by the thin layer revealed in the sample No. 2 and marked as Area IV (which is a section of a part of the inlay). Deposits of copper, which were found in the course of the re-conservation survey, were overlaying the inlay, thus they are not related to the original manufacture of the weapon, but to processes that took place when the sword was deposited in the grave. It seems that formation of such deposits of copper was limited to certain surface areas of the weapon. The crossguard is made only of iron and bears no traces of steel surface enhancement. The upper hilt consists of an iron upper guard and a hollow pommel filled with slag and attached to the upper guard with two rivets (Fig. 100:b). The rivet holes were punched through the upper guard. Since both the upper guard and rivet revealed cold-worked microstructures, the slag in the pommel had to have been melted earlier (i.e. the rivets had to have been fitted to the pommel earlier) then the pommel and upper guard were riveted to each other. Area E represents an adhesive filled with iron filings used during restoration work performed in the past.

3.4.13 Sword from the grave 805

Circumstances of the discovery

The grave was discovered in 1965 in the eastern part of the excavation area No. 20 'Z 1965-66-I', within the excavation directed by J. Poulík (Klanica 1967b, tab. 26; Poláček/Marek 2005, 152–157). It was situated in square 31/0 in the southern part of the burial ground by the hypothetical XIth church. The pit of a size of 230 × 80 cm, which disrupted the settlement feature 602, was at a depth of 60 cm to 75 cm from the surface. In the fill of the burial pit, which was oriented SW-NE, there was a distinct dark layer, which sloped down in shape resembling a funnel-towards the knees of the skeleton.[84] If it was later encroachment, there is no damage to the skeleton and the human remains and the grave goods stayed in their original position.

The remains of a supine man are well preserved, with the arms along the body, and the head pointing to the SW. The man died in the age of *maturus I* (40–50 years) and was about 174 cm high (Stloukal 1981, 460, 487).

A sword (1), placed on its cutting edge, lay on the left side of the skeleton, just beside the arm (Fig. 102 and 103). It stretched from the cranium to about two thirds down the femur. Along the left side of the sword, under its crossguard and parallel to the blade, there was a long knife (2). By the left hand at the height of the pelvis another knife (3) was discovered. Under the sword, to the left of the pelvis there was an animal bone (4). Above the right shoulder of the skeleton there were several fragments, probably part of a knife in a sheath (5). According to the *DGU* there was also by the right shoulder, a buckle with a strap keeper (6), another

84 In the preliminary report about the burial ground it is mentioned that the grave 805 disturbed a child's grave 806 with a simple earring. According to the burial ground plan and the plan of the grave 805 it seems unlikely – the pit of the grave 805 ended more than 50 cm from the beginning of the skeleton of the burial 806 (Klanica 1967b, tab. 26; Poláček/Marek 2005, Abb. 135, 137).

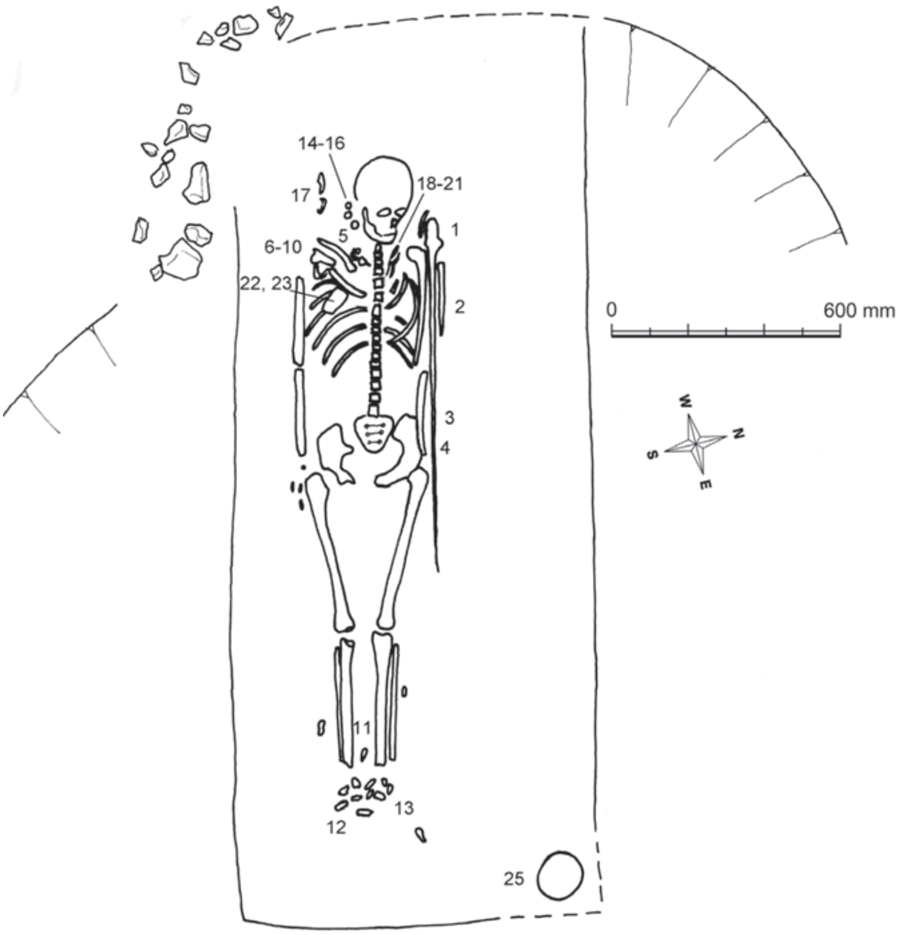

Fig. 102. Mikulčice-Valy, Hodonín County; grave No. 805; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

strap keeper (7) and a strap chape (8). Furthermore, there was a rivet (9) and iron fragments (10). Between the tibias there lay a small cramp (11). Near the toes there were fragmentary iron spurs (12–13). To the right of the jaw lay three flints (14–16) and two sheets interpreted as a firesteel (17). Under the chin, fragmentary iron objects were found. Among them there was a spike (18), an artefact in a shape of arrow-head with a tang (19), three objects connected by rust in the shape of a knife, possibly the remains of a folding knife (20) and a broken rectangular plate (21). Between the ribs there was burnt clay (22) and a narrow point (23). The position of another strap keeper is unknown within the grave (24). In the NE corner of the burial pit there was a ceramic vessel (25) broken into pieces. In the layer above the grave there was another broken ceramic vessel (26?). Whether this vessel was also part of the grave is unclear.

Finds

1) The iron sword with the remains of a scabbard (without evidence number; Fig. 104–111).
2) The long knife with a slightly curved back, straight cutting edge curved to back at the point, two shoulders and a whittle tang set just below the back. The blade with a damaged point is now 170 mm long and in maximum 25 mm wide (594-796/65), originally the blade was 5–10 mm longer. Total length of the knife exceeded 220 mm. The damaged tang depicted in the inventory was lost already before the documentation in 2003.
3) The iron knife with straight back (594-803/65), in the prolongation of which there was a whittle tang,

Fig. 103. Mikulčice-Valy, Hodonín County; grave No. 805; photographs of the burial; (top): viewed from the S; (below): viewed from the NW. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

and a narrow blade (total length 132 mm, length of the blade about 110 mm, width 14 mm).

4) The cracked animal bone, coming from a limb (594-794/65).
5) Fragments of the iron object and organic material (594-799/65): trapezial bar in a shape of a handle tang (53 mm long); tip of a narrower blade; part of a leather scabbard with the remains of textiles. The fragments were interpreted as the remains of a knife sheathed in the leather scabbard, to the surface of which the remains of textiles were stuck.
6) The small iron buckle with a semicircular frame, a prong and a fragment of a leather strap, to which was fastened, at the back part of the frame, an iron strap keeper with small oval shield (594-797/65; size of the frame 19 × 13 mm, size of the shield 19 × 11 mm).
7) The iron strap keeper with oval plate (594-797/65) analogous to the strap keeper 6 (19 × 10 mm).
8) The small iron tongue-shaped strap chape ended by a pointed arc, triangularly shaped in its cross section (594-797/65). On the back side there is an indistinctly visible lowered area for fastening rivets (19 × 12 mm).
9) The iron rivet with circular head and circular iron washer placed on the leather base (594-797/65; diameter of the head 8 mm, diameter of the washer 15 mm).
10) Seven iron fragments in the shape of thin band with sharp ends (width 5–10 mm). One fragment ended by very short and thin tang, some fragments are slightly bent (594-797/65).
11) The small iron cramp (594-798/65) made of thin band, 2 mm wide (length 19 mm).
12) Fragments of the slender iron spur (594-801/65) with short conic prick and rectangular terminal plates with three rivets placed in one line transverse to the arms of semicircular cross-section. On the preserved terminal there is no visible place where it was fastened to the arm. On the inner side of the arms and in the arch of the spur there are remains of some leather footwear with a visible seam, the thread of which fasten the footwear to the arm of the spur near the prick. The spur, connected to the left toe, was tightly tied to the footwear (length of the prick 18 mm, size of the terminal 22 × 14 mm).
13) Fragments of the slender iron spur (594-802/65) with short conic tang and with thin, in the arch band-like, arms. The terminals were not preserved. On one fragment of the arm there were preserved remains of two layers of leather, with textile was inserted between them (length of the prick 15 mm).
14) The flint flake of a size of 41 × 30 mm (594-795/65).
15) The flint flake of a size of 39 × 28 mm (594-795/65).

16) The flint flake of a size of 28 × 27 mm (594-795/65).
17) Two thin iron sheets rolled up to form an incomplete hollow cylinder (594-795/65; length 18 mm and 16 mm, diameter 7 mm).
18) Narrow iron point of three-sided cross-section (594-800/65; 45 × 6 mm).
19) The iron artefact in a shape of small rhombic arrowhead with a tang (594-800/65; 31 × 18 mm).
20) Three fragments of oblong iron plates lying on top of each other, probably fragment of a folding knife (594-800/65; preserved size 75 × 30 mm).
21) The rectangular iron plate, in pieces, (a blade?) with remains of wood on one edge and remains of textile with leather on the other edge (594-800/65; preserved length about 105 mm).
22) The fragment of burnt clay, with a groove in the middle (594-805/65; 43 mm).
23) Several iron fragments, which all together form a thin and very narrow prick-like point of circular cross-section, found together with a piece of wood (594-804/65).
24) The iron strap keeper with a small oval shield, divided transversely at regular intervals by three lines (size of the shield 20 × 15 mm). With remains of leather (594-808/65).
25) The egg-shaped ceramic pot (its max. convexity is at half the vessel height), irregular and wheel-turned, broken into pieces (594-806/65). Its S-shaped rim is vertically edged at its top and provided with delicate grooves. The shoulders are from the max. convexity upwards decorated by horizontal straight combing. The pottery clay is coarse and greyish. In the middle of the base there is a small circular mark from the wheel with distinct imprint of a textile. Under the neck of the pot there are two reparation holes (height 195 cm, diameter of the max. convexity 160 mm, diameter of the rim 15 mm, diameter of the base 11 mm).
26) Larger part of the ceramic pot with a wide rim and max. convexity in the upper third (594-819/65). The rim is S-shaped, distinctly pulled up outside, and slightly flattened near the end on the upper side. The end of the rim is vertically edged and on the bottom side there is a small raised band. The decoration is represented by a horizontal winding incised line, made by a thick stylus. The height of the lines, measured from the max. convexity to the missing base, is 9 cm. The material is very coarse, dark grey (preserved height 23 mm, diameter of max. convexity 225 mm, diameter of the rim 23 mm, diameter of the bottom of the preserved part 143 mm).

Description of the sword

This is a double-edged and overall a very slender sword (594-79/65; Fig. 104–106) which was 971 mm long and at the time of its documentation in 2003 weighed 865 g. The weight of the scabbard remains was negligible. During the fire at the archaeological base in Mikulčice the sword was not noticeably damaged and was preserved as a whole. The current weight is 819 g.

A low (28 mm), short (57 mm) and narrow (19 mm) single pommel of semicircular shape has slightly irregular lateral edges, which are perpendicular to the base. From the side the vertical sides of the pommel are almost parallel at the bottom part, while the top is sharply arched. The horizontal of the pommel is a narrow oval, whose shorter sides are considerably rounded. X-ray images show that the tang of the blade was inserted into the pommel regularly and without gaps.

The extremely short grip (85 mm) bore the body of a wooden covering. The tang broadens noticeably towards the crossguard (from 18 to 29 mm).

The medium long, small and roughly formed crossguard (98 mm long, 9 mm high and 15 mm wide) has the shape of a narrow block all of whose edges are sharp. The hole for the tang broadens towards the blade like a funnel. A distinct depression 54 mm wide for the shoulders of the blade is visible on the lower side of the guard. Within the depression, some remains of the blade were preserved and found to have a width of 47 mm. Prior to the fire in Mikulčice the blade under the guard was found to have been reduced by corrosion to a width of 42 mm.

The narrow and considerably long blade (length of 849 mm, maximum width of 47 mm) narrows down from the boundary between the first and second thirds of the length. The central fuller is 737 mm long, very narrow (12 mm to 15 mm), and begins approximately 20 mm below the crossguard.

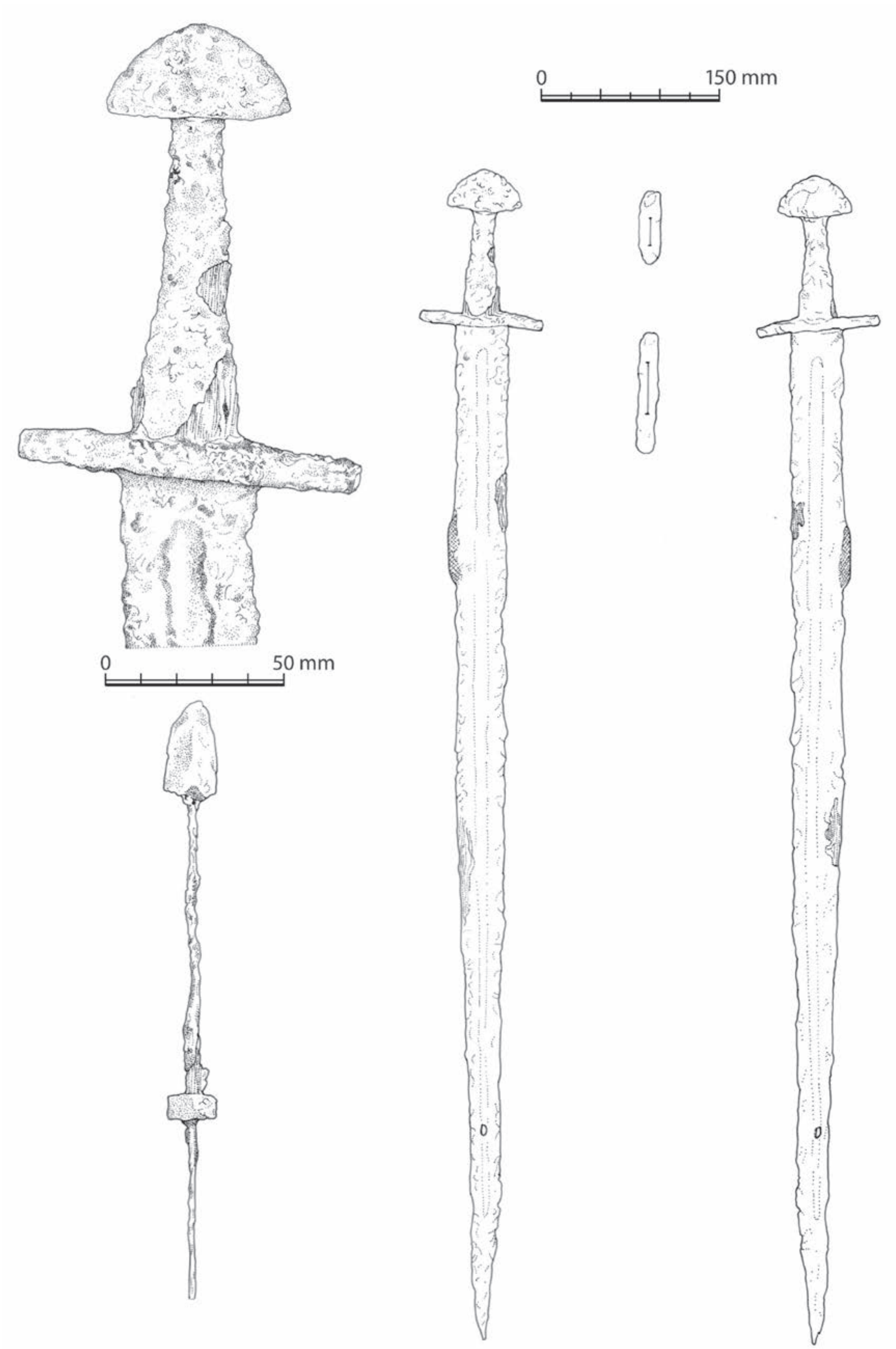

Fig. 104. Mikulčice-Valy, Hodonín County; sword from the grave No. 805 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

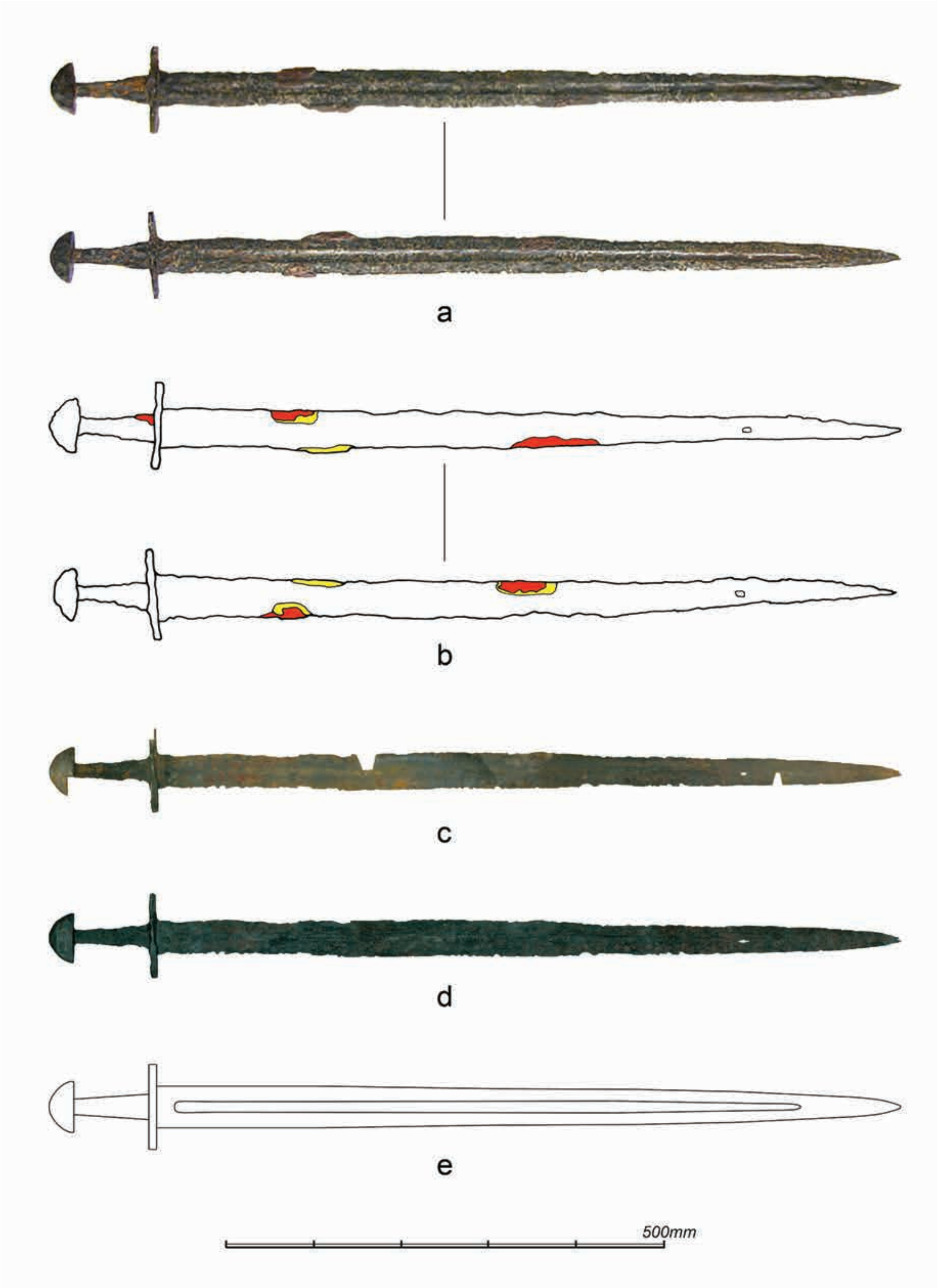

Fig. 105. Sword from grave No. 805; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile (lining of the scabbard); red: wood (corpus of the scabbard and coverings of the tang); discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

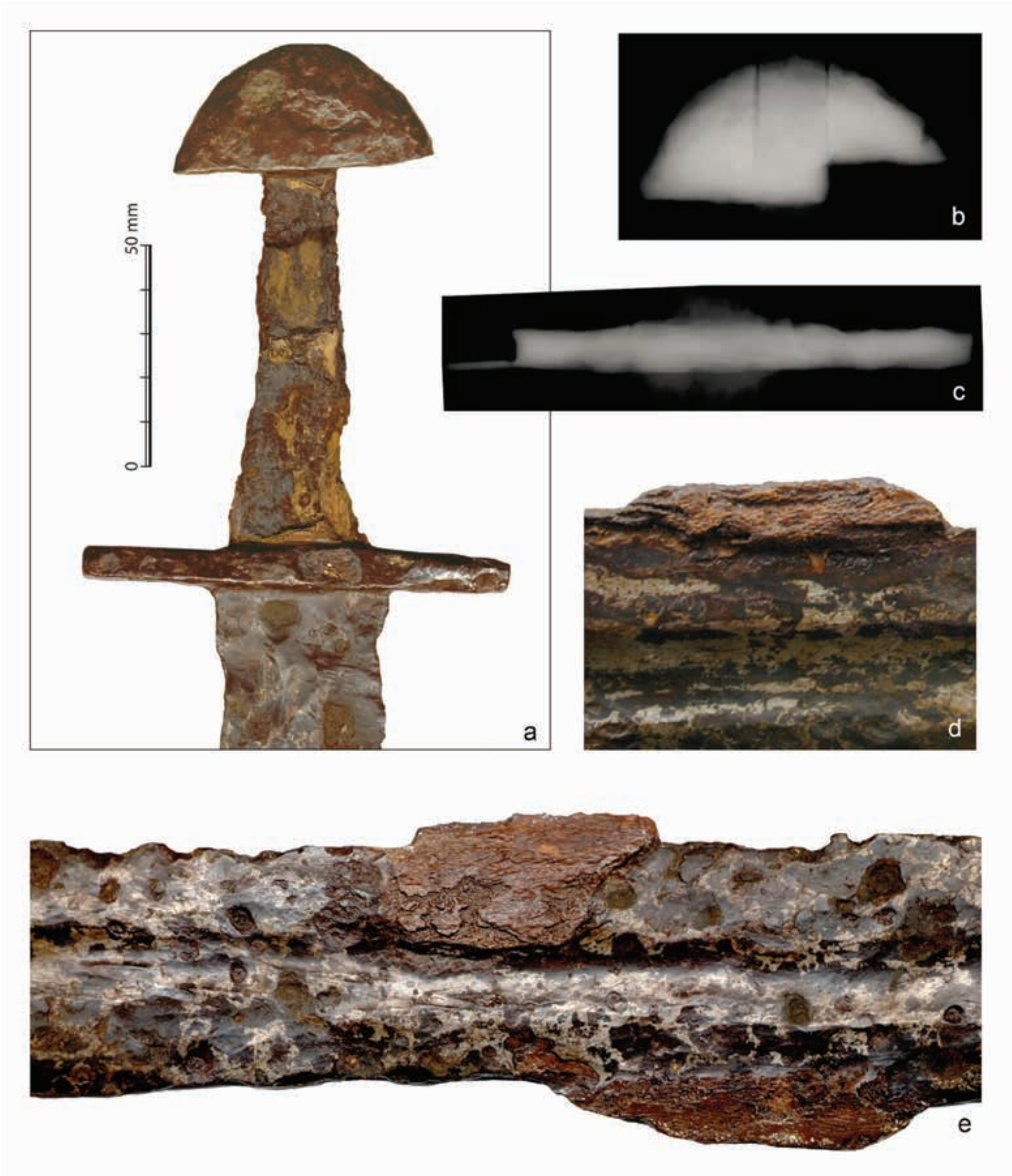

Fig. 106. Sword from the grave No. 805; a – hilt from the side A (documentation of the sword in 2003); b – X-ray image of the pommel (documented after the depository fire); c – X-ray image of the crossguard with visible broadening of the hole where the tang becomes the blade (documented after the depository fire); d – part of the blade with remnants of textile lining of the scabbard (documentation of the sword in 2003); e – middle part of the blade with remnants of scabbard (documentation of the sword in 2003). Photos 'a' and 'd-e' by R. Gronský; photos 'c-d' by I. Nacherová.

Typological determination of the sword

Due to both the single semicircular pommel with a flat base and the long crossguard, it is possible to classify the sword as Petersen's type X (Petersen 1919, 158–167), Geibig's type 12, variant I (specifically Geibig's combination type 12-12-46; Geibig 1991, 56–60) and Ruttkay's type VII (Ruttkay 1976, 249–251). The pommel construction corresponds to Geibig's construction type III (Geibig 1991, 90–100). According to the Petersen's description of type X swords, the hilt of the sword 805 combines features of both earlier and later variants of the type X (the pommel is very narrow, but at the same time small in general, the crossguard is low, but at the same time relatively short). According to the classification of swords with single semicircular pommels introduced

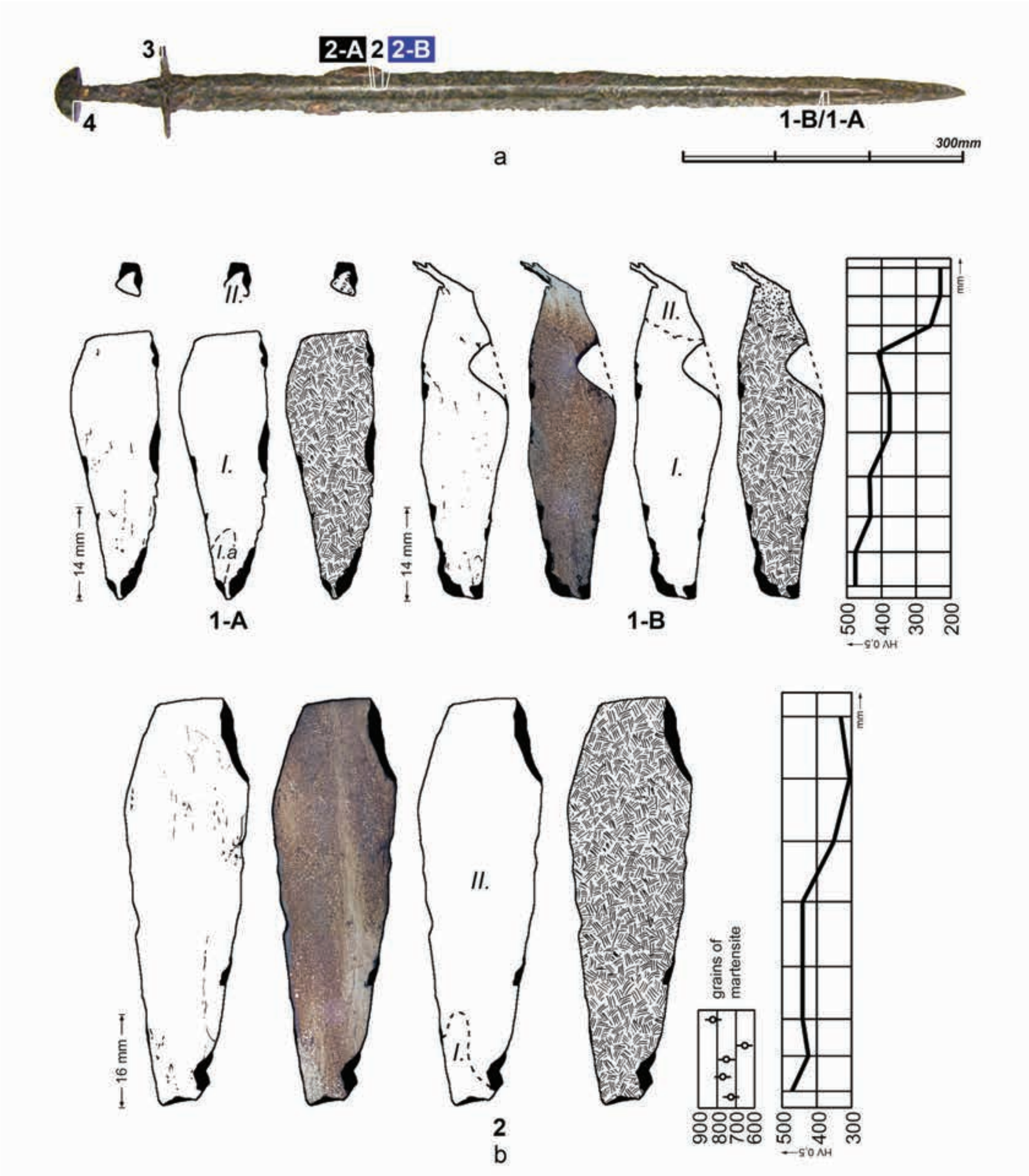

Fig. 107. Sword from the grave No. 805; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

by Kucypera, Kurasiński and Pudło (2011), the pommel corresponds with the variant X-later.

The crossguard, which may be classified as Ruttkay's type 7 (Ruttkay 1976, 249), does not reach the length that is usual for crossguards of sword type X (it is shorter than 110 mm), however the shape absolutely corresponds with this type. Geibig found a crossguard of Geibig's type 0-0-0-6 among swords found in Germany in only one case, namely in the sword of type Petersen X (Geibig 12, I) that probably came from Hedeby (Geibig 1991, 58, Taf. 158, Kat.-Nr. 279). Geibig identified two others of the Petersen X (Geibig 12, I) type with the crossguards shorter than 110 mm out of the 18 swords, which he had at his disposal (Geibig 1991, 58). Use

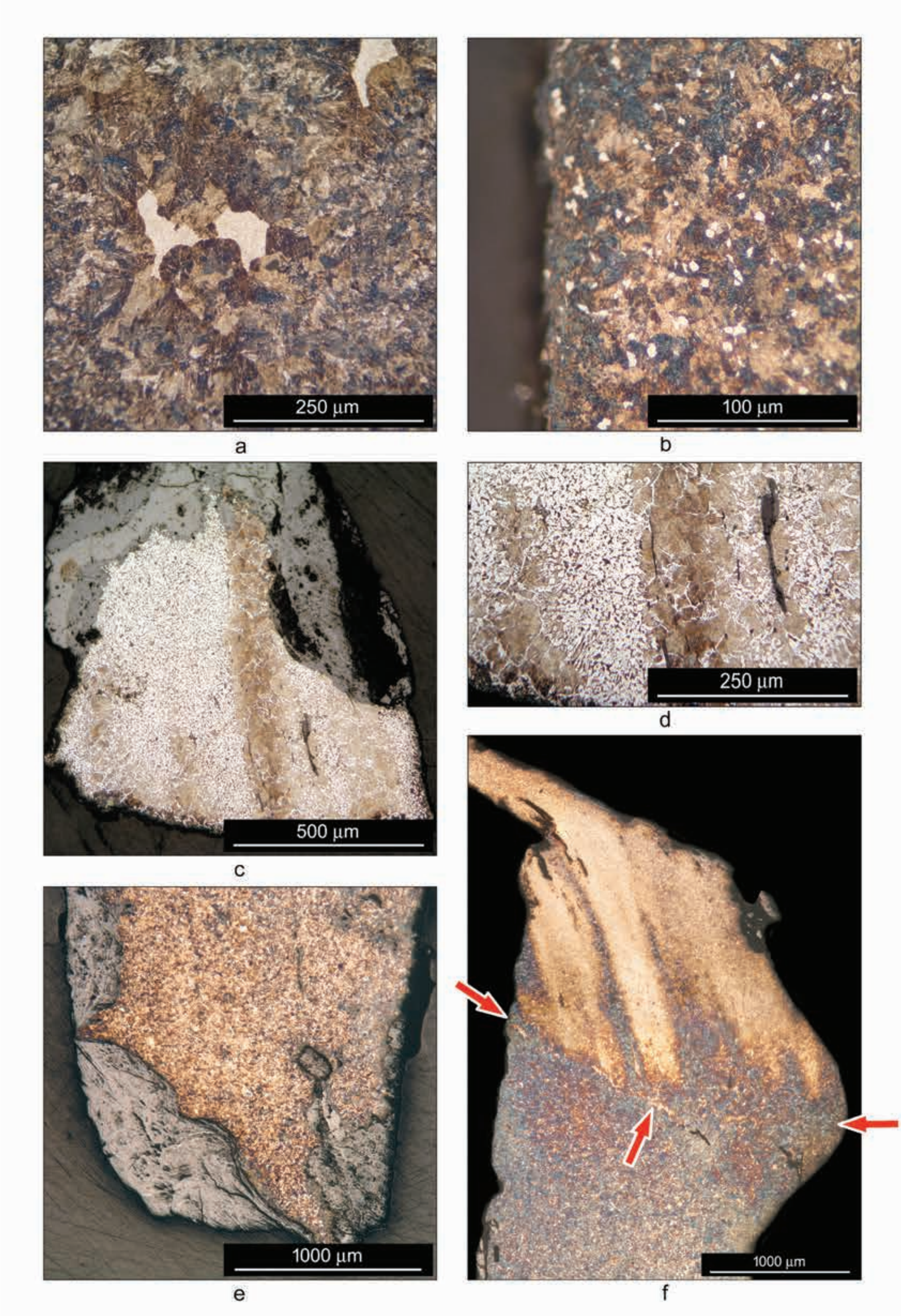

Fig. 108. Sword from the grave No. 805; a – areas of martensite in the bainitic-pearlitic microstructure of sample [1-A]; b – banitic-cementitic area, sample [1-A]; c – part of the sword body in sample [1-A]; d – close-up view of the banded pearlitic-ferritic microstructure of Area II, sample[1-A]; e – bainite in the preserved cutting edge, sample [1-B]; f – attachment of the cutting edge onto the blade body visible in sample [1-B] (arrows point at the welding line); etched with Nital (a–e) and Oberhoffer's reagent (f). Photo by J. Hošek.

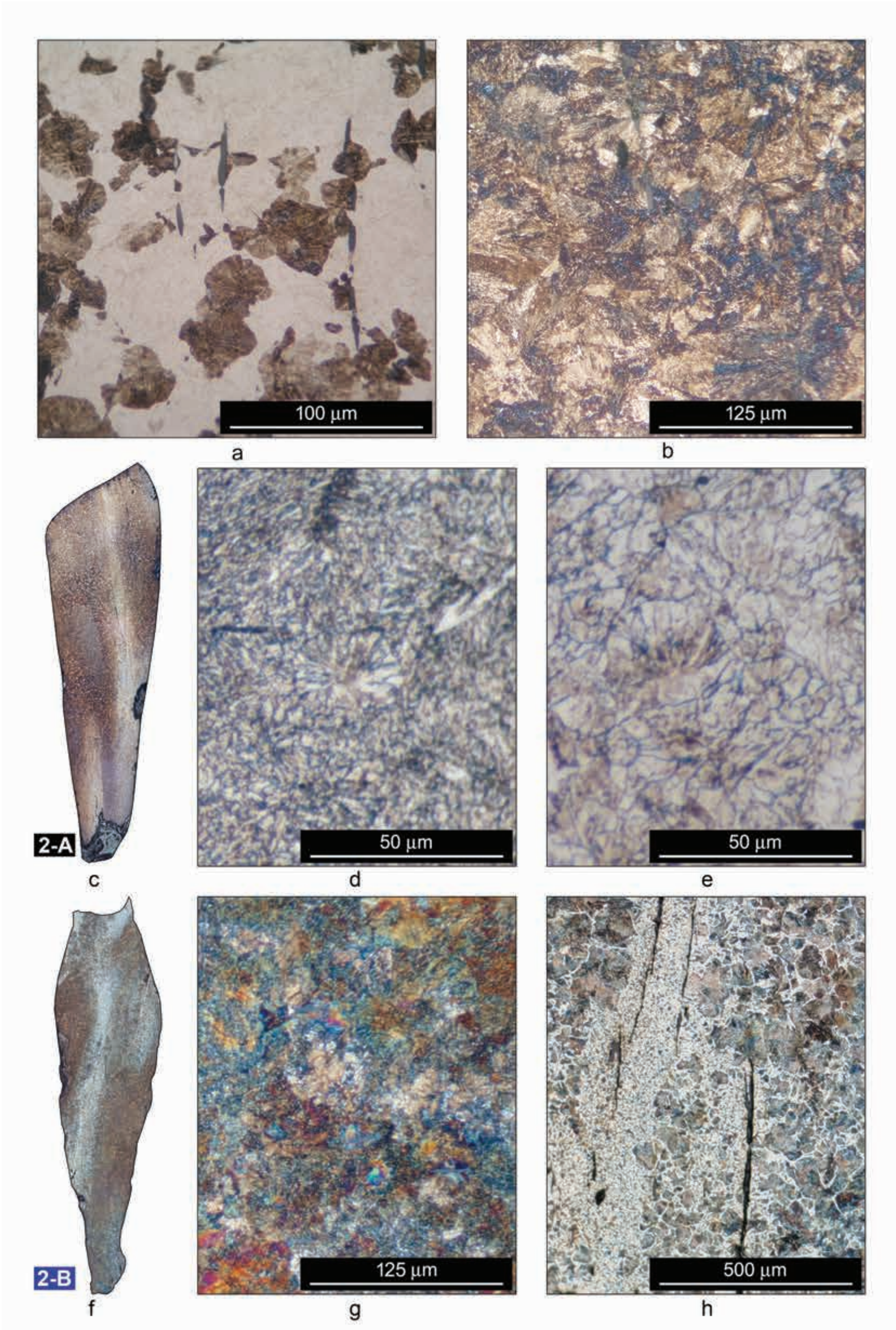

Fig. 109. Sword from the grave No. 805; a – martensitic-pearlitic zone, sample [2]; b – bainite in sample [2]; c – sample [2-A]; d – the granular microstructure in the cutting edge of sample [2-A]; e – microstructure along one of the cutting edge margins, sample [2-A]; f – sample [2-B]; g – a pearlitic microstructure in the cutting edge of the sample [2-B]; h – a heterogeneous pearlitic-ferritic microstructure in the central area of sample [2-B]; Nital etched. Photos by J. Hošek.

of unusually short crossguards is probably related to the slender character of these hilts.

The blade could be morphologically classified relatively easily. Almost all its parameters are related to Geibig's type 6, namely to the variant 6a with a long pointed part (Geibig 1991, 83–90). The only exception is that the blade/fuller length ratio (1.15), is lower than the minimum for types 5 and 6 but relates to types 1 to 4. The blade of sword 805 is the example of a progressive form, which does not correspond chronologically with the conclusions presented by Geibig in his typological study (Geibig 1991, 153). Only the relatively long fuller (in comparison to the blade) corresponds to types 2 and 3, which are dated by Geibig roughly from the mid-8th to the second third of the 10th century. Other examples with similar blades are the swords from graves 375, 723 and 1665 from Mikulčice (Košta 2005). Another important feature, which deviates from Geibig's classification, is an displaced central fuller. Within the classification of blades, which is presented in this study, the blade belongs to the group {d} (see Chap. 4.2) which is characterised by a considerable length (more than 830 mm). In comparison with other 9th and 10th century swords, this group includes specimens with slender to medium-robust and very long blades. Later Carolingian swords prevail in this group.

Scabbard, straps and outer wrappings

During the documentation of the sword conducted in 2003, several fragments of the organic remains of a scabbard were found stuck onto the cutting edges on both sides of the blade. Pieces of wood from the scabbard were overlying a textile, whose remains were found directly on the blade. A fragment of textile, which was preserved on the right edge on the side B approximately 220 mm from the crossguard, was folded several times.

This textile, made in a twill weave, was situated inside of the scabbard, beyond the cutting-edges. Several parallel threads went through several upthreads as in other examples of textiles found on the sword blades studied here. The exact character of the textile pattern could not be recognized from the small size of the fragment preserved.

Metallographic examination

Sampling: Sample [1-A] was cut out from the right side of the blade 700 mm from the crossguard; sample [1-B] was detached from sample [1-A] and used as a check sample. Sample [2] was taken from the left side of the blade 222 mm from the crossguard; sample [2-A] was subsequently detached from the same cut in the blade after it had withstood the fire; sample [2-B] was subsequently detached from sample [2] and annealed in a controlled manner. Sample [3] was taken from the left side of the crossguard 20 mm from the tang and sample [4] was cut off from the right bottom part of the pommel (Fig. 107:a).

Metallographic description of the blade: SAMPLES [1-A] and [1-B]: In terms of amount of inclusions, the matrix of both samples is of mediocre purity corresponding to level 2 on the Jernkontoret scale. The microstructure of both samples consists mainly of bainite with a hardness of 430 ± 38 HV0.5 (Area I), and containing areas of martensite in places (Fig. 108:a, e). Area I-a in sample [1-A] also contains a bainitic-cementitic microstructure (Fig. 108:b). Area II (in both cases) contains a banded pearlitic-ferritic microstructure (Fig. 108:c, d) with a hardness of 236 ± 20 HV0.5. The bands with an elevated carbon content consist of pearlite, with traces of ferrite (grain size 7 ASTM) in places, while the lower-carbon bands contain a maximum carbon content of 0.2 to 0.3% C (grain size ASTM 10). A welding line that shows the line of attachment of the cutting edge to the blade core (Areas I with Area II) is visible only in sample [1-B]. However, even here, the weld is almost imperceptible, yet it can be still distinguished after etching with Oberhoffer's reagent (Fig. 108:f). A narrow bainitic zone appears just beyond the weld, however, the microstructure quickly turns into an unquenched state.

SAMPLE [2]: The metal matrix is of medium purity, containing slag inclusions corresponding

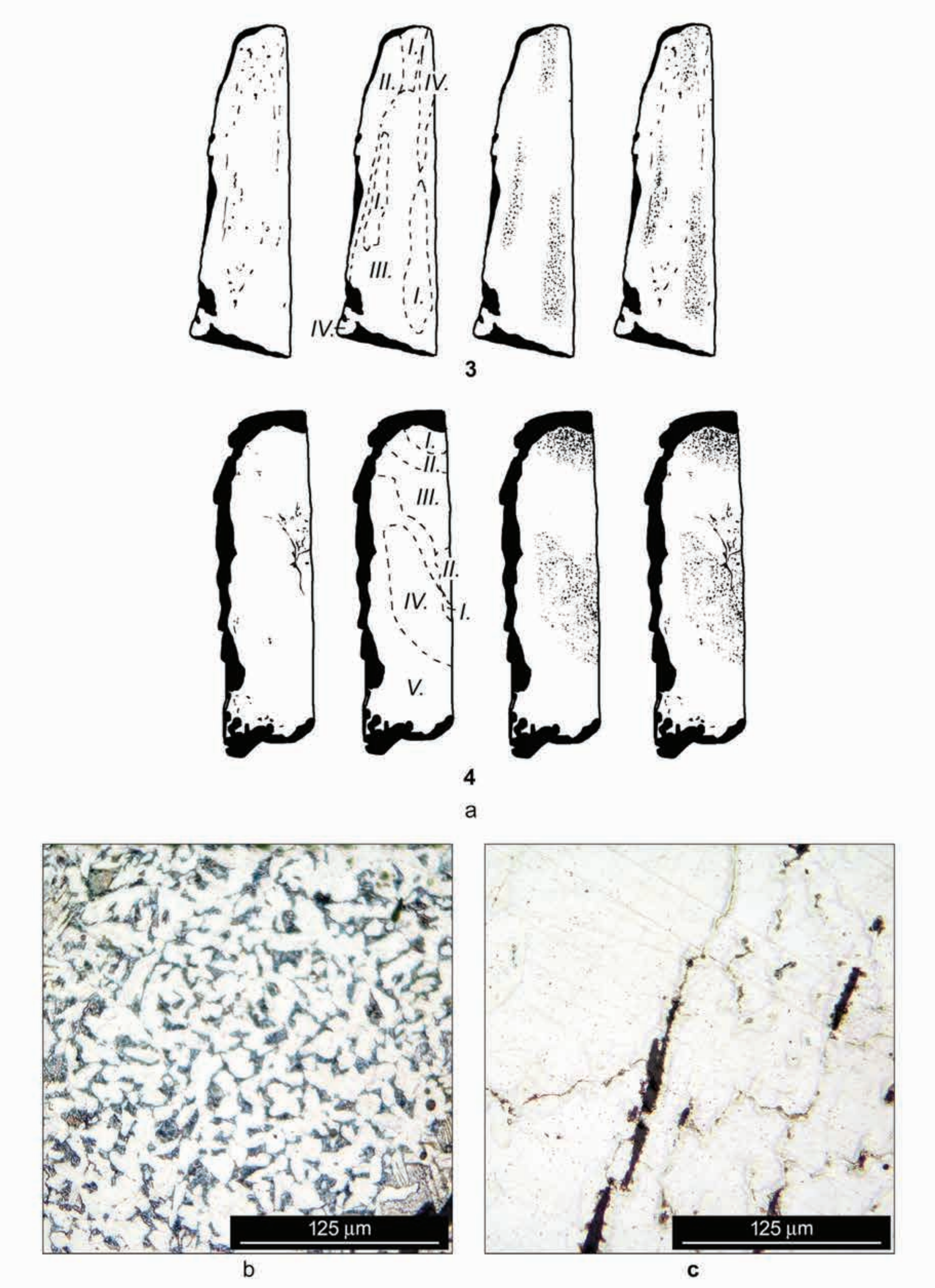

Fig. 110. Sword from the grave No. 805; a – schematic drawings of crossguard and pommel samples (from the left: unetched state, layout of the described areas, illustration of microstructures–without and with inclusions); b – ferritic-pearlitic structure in Area I, sample [3]; c – ferritic Area IV, sample[3]; Nital etched. Photos and drawings by J. Hošek.

to level 3 on the Jernkontoret scale. After etching with Nital, Area I consists of a martensitic-pearlitic microstructure (Fig. 109:a) and the hardness of the martensitic areas is up to 744 ± 62 HV0.2. Area II (which is the rest of the sample) consists of a bainitic-pearlitic microstructure with scattered martensite areas and a hardness of 419 ± 39 HV0.5 (Fig. 109:b).

SAMPLE [2-A]: The cutting edge contains zones of fine aggregate of nodular cementite and ferrite as well as very fine (almost irresolvable) low-carbon pearlite with hardnesses of 316 ± 8 HV0.2 (nodular microstructure) and 258 ± 9 HV0.2 (lamellar microstructure) respectively (Fig. 109:c, d). The nature of the microstructure, towards the middle of the blade, seems to be bainitic with little sign of subsequent tempering (the hardness is 317 ± 19 HV0.2), only some very fine (almost irresolvable) low-carbon pearlite is formed along the border of one side of the cutting edge (Fig. 109:e).

SAMPLE [2-B]: The predominant microstructure is pearlite (the hardness is 257 ± 15 HV0.2; Fig. 109:f, g), which has randomly scattered areas of a pearlitic-ferritic microstructure (Fig. 109:h) that are either more coarse-grained (with about 0.6% C) or more fine-grained (with about 0.45 to 0.5% C).

Metallographic description of the crossguard:

SAMPLE [3]: The metal matrix is full of slag inclusions coresponding to level 3–4 on the Jernkontoret scale. Area I has a ferritic-pearlitic microstructure with a carbon content of around 0.3% to 0.4% C, with a grain size of ASTM 7–8 and hardness of 149 ± 13 HV0.5 (Fig. 110:b). Area II is ferritic (gain size 5 to 7 ATSM). Area III also contains only very little carbon (up to 0.2%) and the grain size is . However the distinct 'ghosting' indicates an elevated phosphorus content. A 'ghost' microstructure with hardly distinct grain boundaries and with a hardness of 168 ± 9 HV0.5 is also present in the ferritic Area IV (Fig. 110:c). The lamellae of the pearlite in Areas I and III are spheroidised.

Metallographic description of the pommel:

SAMPLE [4]: The metal matrix is full of slag inclusions, which corresponds to level 4 on the Jernkontoret scale. In etched state, the sample can be divided into five basic areas (Fig. 110:a). Area I is pearlitic-ferritic with a carbon content of 0.3 to 0.55% and a hardness of 157 ± 11 HV0.5 (Fig. 111:a-c). The microstructure is both fine- (corresponding to ASTM 9) and coarse-grained (ASTM 5), while the coarser zones are richer in carbon. The adjoining Area II (in both cases) are also ferritic-pearlitic, but the carbon content falls to 0.2–0.3%; the grain size is ASTM 8. Area III is ferritic with a grain size ASTM 5 and a hardness of 104 ± 3 HV0.5 (Fig. 110:d, e). The rest of the sample reveals traces of higher phosphorus content. Area IV contains a 'ghost' microstructure with 0.2 to 0.3% C; the grain size is 7 ASTM (Fig. 110:f). Area V consists of ferritic grains, partly with indistinct boundaries, and partly with a grain size of ASTM 4 and distinct 'ghosting'; the hardness is 206 ± 11 HV0.5. The lamellae of pearlitic grains are partially or completely spheroidised in all zones.

Assessment: The blade has cutting edges of steel, which were hardened by some form of slack quenching (perhaps in oil), but the nature of the middle portion of the blade is rather unclear. Sample [1] suggests for a separate core with somewhat lower carbon content (steel or, rather, just iron whose carbon had diffused from the steel cutting edges), but in the sample [2] no line of attachment of the core could be detected. Thus, the blade was most likely made from pieces to form the edges of higher carbon content than the piece(s) which formed the core, but this is difficult to prove. The pommel and the crossguard are made of heterogeneous materials of uneven quality, and there is no logical correlation between the individual areas of different composition. Both pieces were probably simply forged from a heterogeneous semi-processed piece of bloomery or scrap iron. While no traces of eventual surface carburization are present in the crossguard, the pearlitic-ferritic zone (Area I) in the pommel could be a trace of such. However, intentional carburizing can be hardly proved, still less when this trace appears in a part of the weapon, where no corresponding

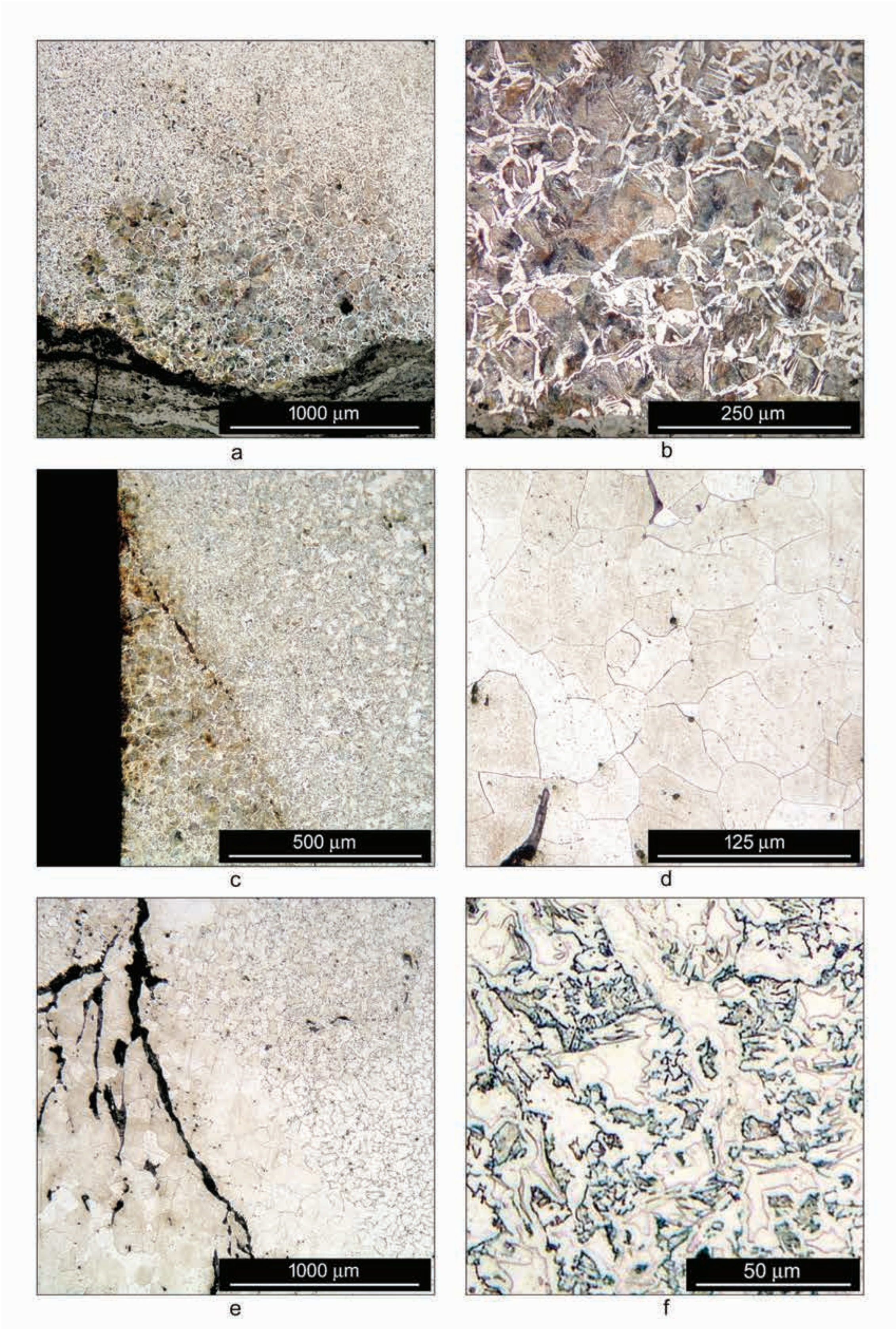

Fig. 111. Sword from the grave No. 805; a – overview of Areas I and II, sample [4]; b – close-up view of pearlitic-ferritic microstructure in Area I, sample [4]; c – junction between Areas I and IV (weld); d – ferrite in Area III, sample [4]; e – transition between Areas III and IV; f – ferritic-pearlitic microstructure in Area IV, sample [4]; Nital etched. Photos by J. Hošek.

improvement in its functionality could be expected. In any case, the sword is a high quality weapon.

3.4.14 Sword from the grave 1347

Circumstances of the discovery

The grave was discovered in square 81 during the excavations at area Nr. 47 'T 1975–76' (Poláček/Marek 2005, 182–188), directed by Z. Klanica (Klanica 1985a, 503, 513, 515–522). The excavation on the location 'Kostelec' ('Klášteřisko') in the NE part of the location 'Těšický les' revealed at a non-church burial ground (altogether 317 numbered graves). The grave 1347 (Klanica 1985a, 515–522), which was situated in the northern part of the excavated area, circa 10 m to the north from the foundations of the wooden structure that was older than the burial ground and probably never existed simultaneously with the ground (compare Klanica 1985b, 131–134; Hladík 2010; Hladík/Mazuch 2010), in the group of graves with axes, arranged in rows. The burial pit was visible on the level of the subsoil at a depth of 35–40 cm below the surface as a feature with an irregular circular silhouette. In a further layer the feature silhouette narrowed and elongated to the east (size 308 × 200 cm). The rectangular bottom (207 × 70 cm) with human remains, oriented in the W-E direction, lay in the eastern part of the pit at a depth of 110 cm from the surface (see the *DGU*). In the burial-pit fill there were flint flakes (594-2657/75 a 594-2660-62/75), burnt clay (594-2971/75) and pottery shards (1771-82/75).

It was a well-preserved male supine burial with the head pointing to the west (Fig. 112). The man, about 170 cm tall, died in the age of *adultus II* (30–40 years). He suffered from the deformation of spondylosis of the lumbar spine, a disease typical for physically stressed organisms (Stloukal/Hanáková 1985, 546, 565).

A sword (1) lay alongside the right arm of the skeleton, from the shoulder to the knee. By the left side of the sword, at its upper part, there were iron fragments (2). On the pelvis there was an iron sickle (3), a folding knife (4), flints (5-7) and a trapezoidal object (8). In the pelvis, under the sickle, there was a buckle (9). On the bottom of the buckle, leather from a belt was preserved, and under it remains of textile, probably clothes of the man. By the right hip there lay a knife (10). By the toes there was a pair of iron spurs (11, 12). To the garniture of spur-straps, mentioned in the *DGU*, belongs a buckle with a strap keeper (13) and another buckle (14) with a strap chape (15).

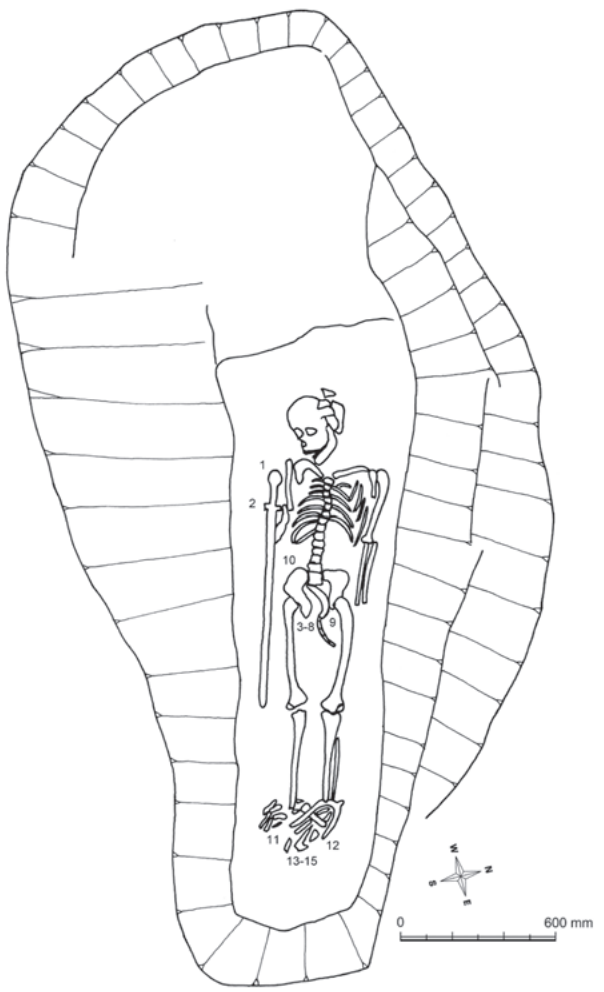

Fig. 112. Mikulčice-Kostelec, Hodonín County; grave No. 1347; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

Finds

1) The iron sword with the remains of a scabbard (594-3268/75; Fig. 113–119; Klanica 1985a, obr. 20:10).

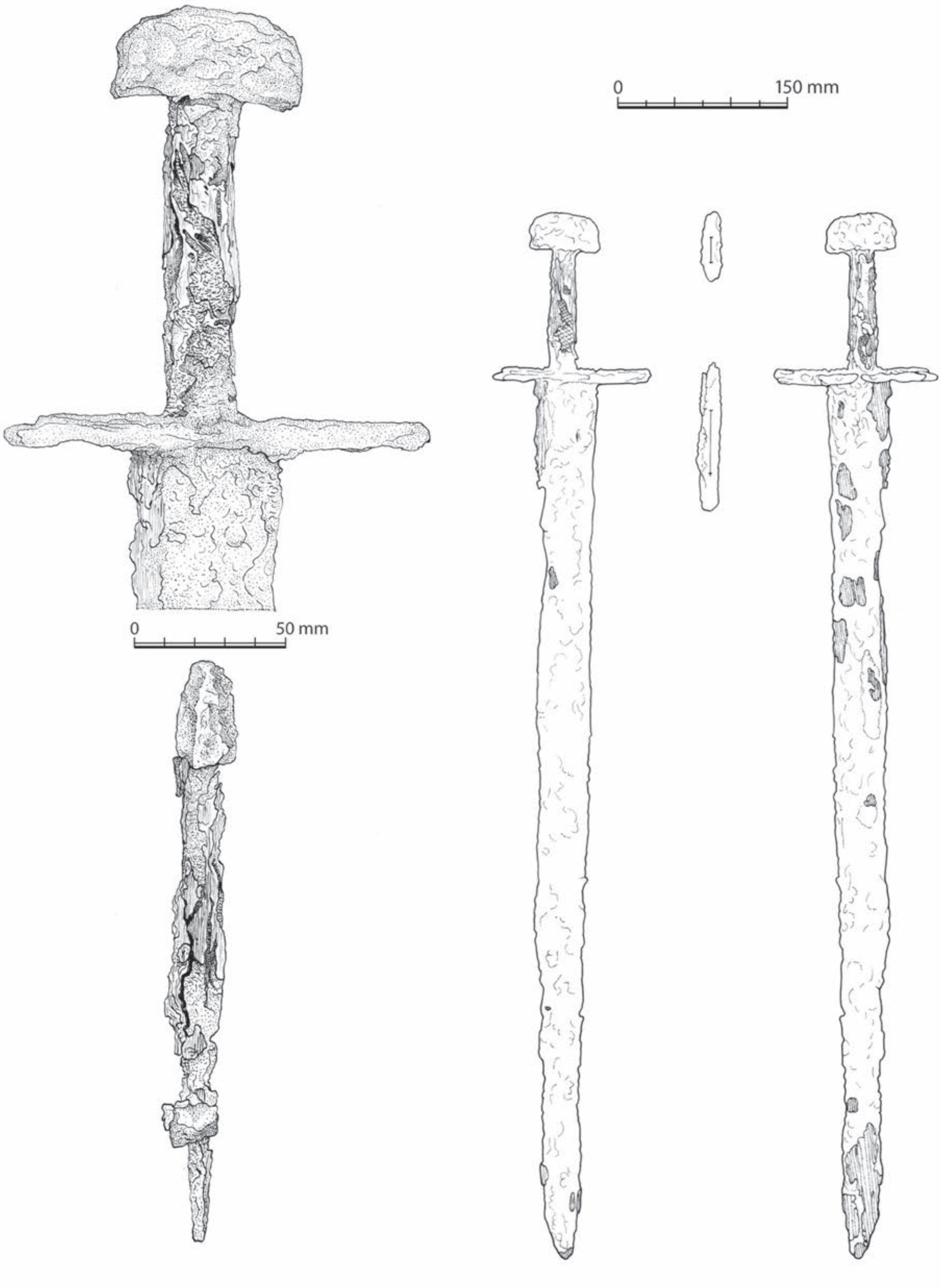

Fig. 113. Mikulčice-Kostelec, Hodonín County; sword from the grave No. 1347. Drawing by K. Urbanová.

2) The iron belt keeper of unknown shape and fragments of other objects, possibly iron fittings (without evidence number). Not at a disposal in 2003.
3) The iron sickle with a rectangular tang and wooden handle (594-3301/75, 594-3302/75), preserved in several pieces (about 290 mm long, length of the handle 105 mm). On the blade there were remains of a fabric with a plain weave (Klanica 1985a, obr. 20:7).
4) The iron folding knife (594-3327/75) in the shape of rectangle. Damaged by corrosion (105 × 38 mm; Klanica 1985a, obr. 20:8).
5) The flint flake of a size of 18 × 11 mm (594-2658/75).
6) The flint flake of a size of 29 × 17 mm (594-2659/75; Klanica 1985a, obr. 20:3).
7) The flint flake of a size of 21 × 19 mm (594-2659a/75; Klanica 1985a, obr. 20:4).
8) The iron object in the shape of oblong trapezoid with oval protrusion on the narrower transversal side made of an iron sheet folded several-times (88 × 21 mm). Due to the context with the flints, it is possible to interpret the object as an atypical firesteel (594-3328/75).
9) The buckle with a bronze frame and chip-carved decoration in the form of a row of semicircles or rounded zigzag patterns placed on the outer side of the frame (594-3182/75). On the rectangular chape and on the prong there were remains of a leather belt and of textile (39 × 46 mm; Klanica 1985a, obr. 20:1).
10) The knife with a whittle tang indented from the blade and with an almost straight back (594-3282/75; Klanica 1985a, obr. 20:6), preserved in pieces (preserved length 110 mm, preserved length of the blade 81 mm).
11) The iron spur with arms of semicircular cross-section and tongue-shaped terminal plates without a distinct middle rib. The terminals were equipped with one rivet in its middle (594-3314/75; Klanica 1985a, obr. 20:11). The massive short prick was of cylindrical shape ended by a cone-like point (156 mm long, length of the point 20 mm).
12) The iron spur with arms of high semicircular cross-section and damaged smaller terminal plates of unknown shape with rather indistinct middle rib, along which there was on each side of the plate one rivet (594-3315/75; Klanica 1985a, obr. 20:12). The massive prick was of cylindrical shape with a short point (length 153 mm, length of the point 27 mm).
13) The iron buckle (594-3319/75) with an oval frame, a prong and a strap keeper caught in the chape. The oval plate of the strap keeper is decorated by four longitudinal grooves (total length 63 mm, width of the frame 35 mm, length of the plate 30 mm; Klanica 1985a, obr. 20:2).
14) The iron buckle (594-3320/75) with an oval frame, a prong and a rectangular chape, belongs to the spur-garniture or to the left side of the upper part of the sword, where, according to the *DGU*, should have been a strap keeper and other remains of the fitting (total length 35 mm, width of the frame 33 mm; Klanica 1985a, obr. 20:5).
15) The strap chape, probably tongue-shaped with a cloven back and unclear remains of an engraved decoration (39 × 22 mm).

Description of the sword

This is a double-edged sword (594-3268/75; Fig. 113–115), which was 920 mm long and at the time of its documentation in 2003 weighed 1210 g including the sporadic remains of organic wrappings. The point of balance of the sword lay 190 mm from the crossguard. The sword is preserved as a whole despite the fire at the archaeological base in Mikulčice and its current weight is 966 g.

The crudely formed single pommel is 62 mm long, 31 mm high, 17 mm wide and has a shape of a high semicircle with a flattened top. From the side it is rectangular with a distinct arch on the top, in the horizontal it is an oblong oval or maybe a rectangle with rounded corners. The gaps visible on the X-ray image between the tang and pommel are irregular but in some places more distinct, which suggests a rather less accurate way of fastening.

The grip was 105 mm long. The tang, which broadens only slightly towards the crossguard (from 20 mm to 24 mm), had a fine textile wrapped around it several times and tightened in an S-thread. The textile was made in a plain weave with a thread count of 20/20 to 10 mm and overlaid by wood on all sides (for determination of the textile see Březinová, in print).

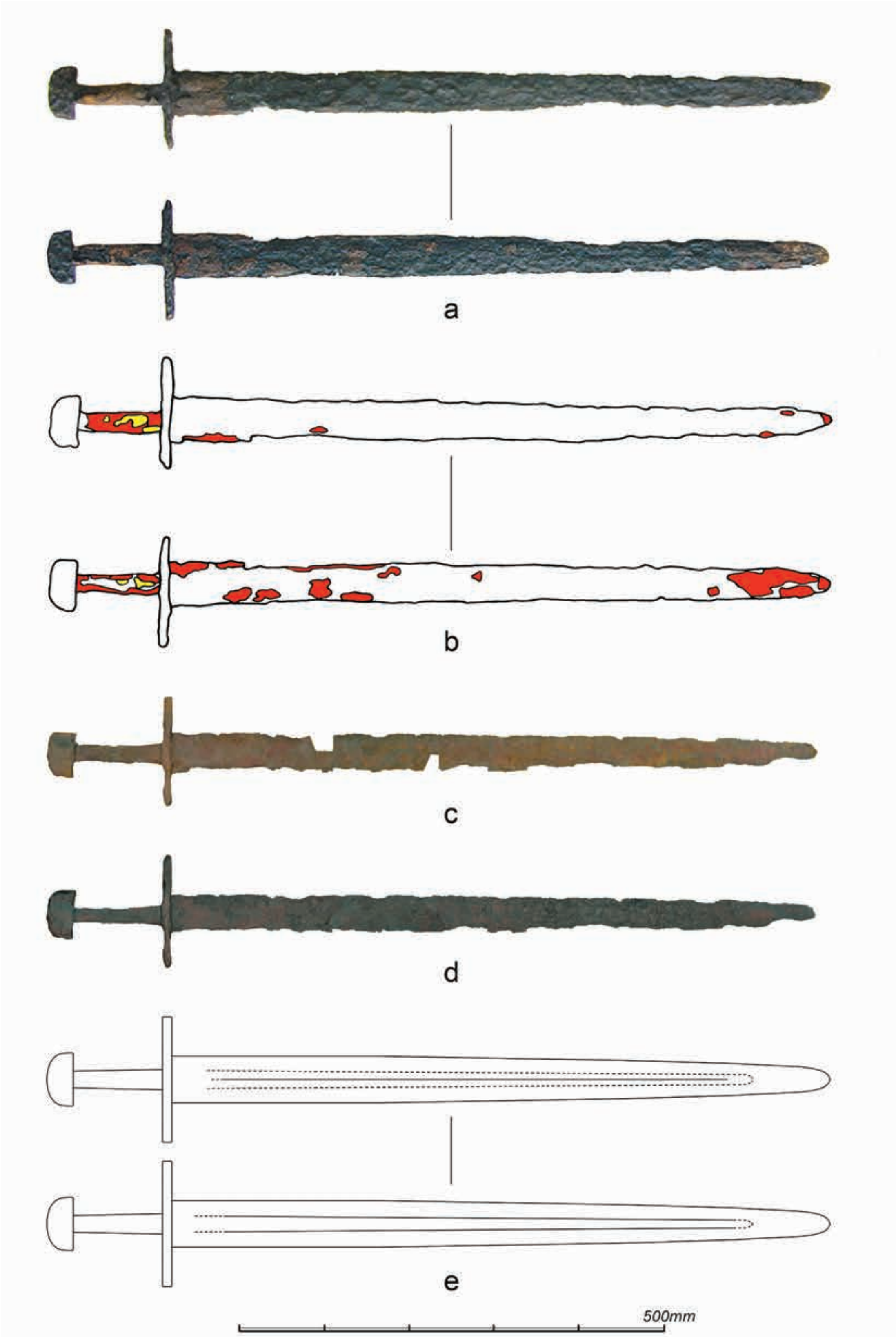

Fig. 114. Sword from grave No. 1347; a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile (wrapped around the tang); red: wood (corpus of the scabbard and coverings of the tang situated above the textile); discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

Fig. 115. Sword from the grave No. 1347; a – hilt from the side B (documentation of the sword in 2003); b – from the side A with remnants of organic materials (documentation of the sword in 2003); c – X-ray image of the pommel (documented after the depository fire); d – X-ray image of the crossguard with visible broadening of the hole. Photos 'a-b' by R. Gronský; photos 'c-d' by I. Nacherová.

The very long and straight crossguard, the ends of which were rounded when viewed horizontally, was partly damaged. The preserved length is 137 mm, but if the guard had been symmetrical, the original length would have been somewhat greater – about 147 mm). Its height was 11 mm and its width a maximum of 20 mm. An X-ray image revealed a funnel-like broadening of the hole for the tang and blade.

The relatively short and robust blade (773 mm long, 55 mm wide below the crossguard) has a medium-long pointed part. The fullers were indistinct and different on each side of the blade. On one side it was shallow, with indistinct margins and with a bottom formed into a sharp and long groove. The other side showed a standardly shaped funnel, whose width was about 19 mm in the upper third of the blade. With the naked eye the fuller is visible only in short sections; in the X-ray images it appears 50 mm below the crossguard and terminates 85 mm before the point.

Typological determination of the sword

Due to the single semicircular pommel with a flat base and the long crossguard the sword belongs to Petersen's type X (Petersen 1919, 158–167), Geibig's type 12, variant I (specifically it is Geibig's combination type 12-12-4-11; Geibig 1991, 56–60) and Ruttkay's type VII (Ruttkay 1976, 249–251). The pommel construction corresponds to Geibig's construction type III (Geibig 1991, 90–100). According to Petersen's description of type-X sword variants, the hilt of the sword from the grave 1347 corresponds rather with a later variant of the type X (the small size of the pommel, the low and very long crossguard). According to the classification of swords with single semicircular pommel that was presented by Kucypera, Kurasiński and Pudło (2011) the pommel corresponds with the variant X-earlier (especially the high arch).

All measurable parameters of the sword blade from the grave 1347 correspond to a medium robust variant of Geibig's types 2 or 3 (2c/3c; Geibig 1991, 83–90). Due to the unusual character of the central fuller (it is displaced, on one side of the blade the fuller has bottom sharply formed into a groove running along the sword axis) it is impossible to specify the blade type precisely. According to the classification of blades, which we present in this study, the blade belongs to the group {a2} (see Chap. 4.2). In comparison with other 9th and 10th century swords, this group includes specimens with medium-robust and medium-long blades. The group has been determined on the basis of lengths and widths of blades and their length/width ratios. Later Carolingian swords (especially Petersen's type X) prevail in the {a2} group, though there also appear swords of a transitional construction and occasionally also earlier Carolingian swords.

Scabbard, straps and outer wrappings

Some wooden scabbard remains lay directly on the blade, and thus no textile lining was used as results of the research conducted in 2003 shows. One of these wooden fragments bore remains of leather, but its relation to the scabbard was impossible to prove. The remains of an iron garniture – a belt fitting and an iron fragment (of a sword fitting) – accompanied the upper part of the sword. However, these objects were, in 2003, impossible to identify within the Mikulčice inventory.

Metallographic examination

Sampling: Sample [1] was taken from the left side of the blade 318 mm from the crossguard; sample [1-A] was subsequently detached from the sample [1] and annealed in a controlled manner; sample [2] was taken from the right side of the blade 190 mm from the crossguard; sample [3] was cut off from the right side of the crossguard 53 mm from the tang and sample [4] was taken from the right side of the pommel 9 mm from the tang. Sample [5] was additionally cut out from the right side of the blade 540 mm from the crossguard after the weapon had withstood the depository fire (Fig. 116:a).

Metallographic description of the blade: **SAMPLE [1]:** The middle portion of the blade is full of long lines of complex slag inclusions, otherwise, the material is relatively inclusions-free; the metal purity corresponds to level 2 on the Jernkontoret scale. The line of attachment of the cutting edge is clearly distinguishable because of the chains of fine inclusions in the welding line and because of the irregular arrangement of the very pure and impure zones. The overall cutting edge purity corresponds to level 4 on the Jernkontoret scale. In the etched state, the cutting edge consists of several zones with various carbon contents and thus different microstructures. In order to simplify the description, the cutting edge has been divided into only two basic areas (Fig. 116:b).

Area I is characterised by microstructures that have resulted from quenching; a martensitic

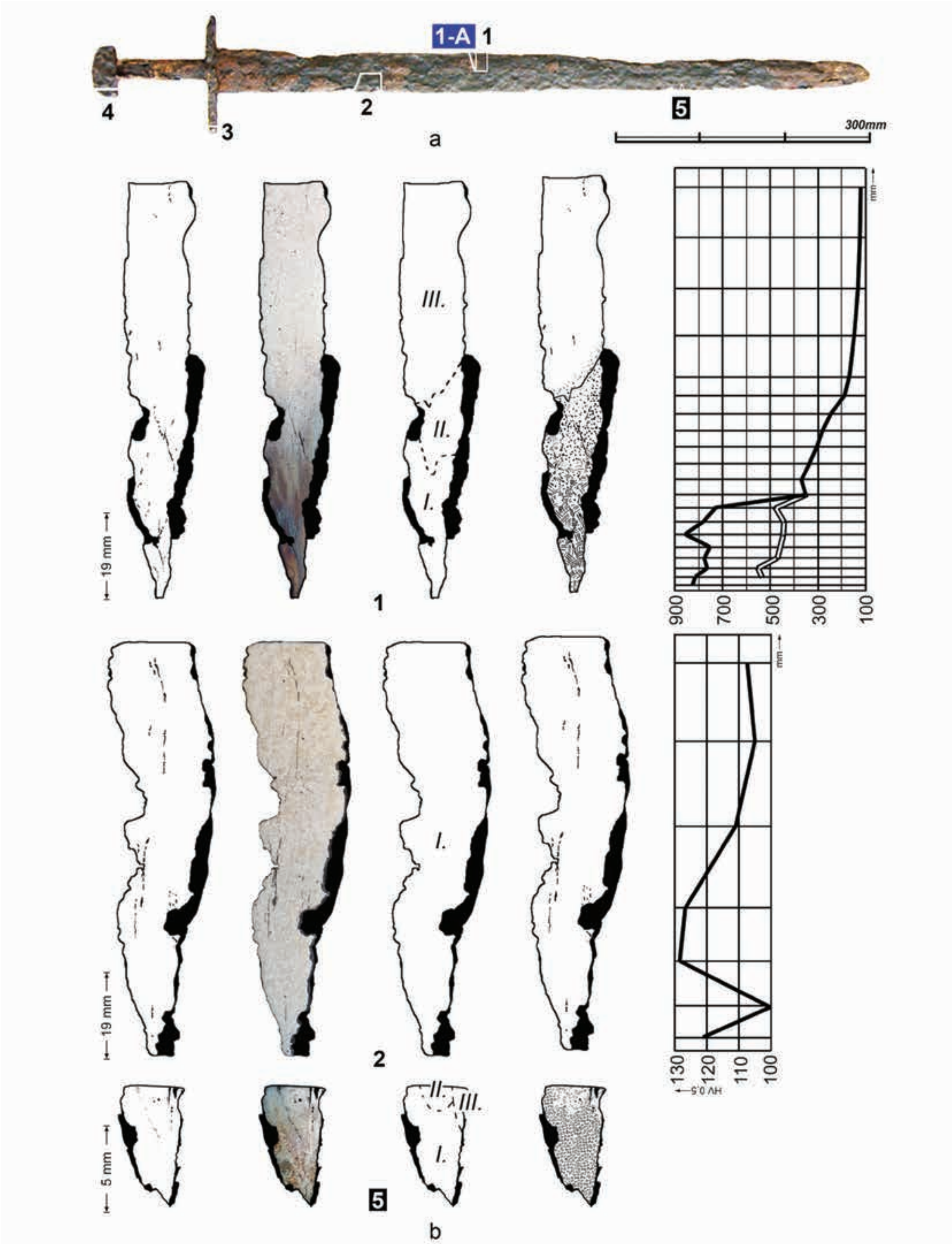

Fig. 116. Sword from the grave No. 1347; a – the sword examined and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart). Photos and drawings by J. Hošek and J. Košta.

zone (784 ± 27 HV0.5) extends into one side of the cutting edge, while a martensitic-ferritic zone (490 ± 47 HV0.5) extends into the other side of the cutting edge. Towards the body of the cutting edge there are areas which contain a banitic-pearlitic-ferritic microstructure (360 ± 17 HV0.5; Fig. 117: a, b). Area II contains predominantly pearlitic-ferritic microstructures with a grain size of ATSM 8-9 (Fig. 117: d). There are also coarser-grained microstructures, with acicular grains, in some places. The carbon content fluctuates between a maximum of 0.5% (in the proximity of Area I, where the hardness is 312 ± 25 HV0.5) to 0.3% (towards the blade body, where the hardness is 203 ± 34 HV0.5). The material closely surrounding the welding line contains a maximum of about 0.2% C on both sides of the welding line. Area III is ferritic, with a grain size between ASTM 7 (behind the weld) and ASTM 4 (towards the centre of the blade body), and the hardness is 122 ± 16 HV0.5 (Fig. 117: e). The weld line between the cutting edge and the blade core is enriched with one of the alloying elements (most probably nickel) and this is clearly distinguishable in the microstructure.

SAMPLE [2]: In terms of the amount of inclusions, this sample is basically identical with the middle portion of the blade in sample [1]. The whole surface (Area I) consists of a coarse-grained ferritic microstructure with a grain size fluctuating between 5 to 3 ASTM (Fig. 117: f). The ferritic grains, located roughly in the central part of the sample, show twinning lines. The hardness of this area is 114 ± 11 HV0.5.

SAMPLE [5]: The cutting edge, Area I, contains a granular microstructure (Fig. 117: g), which resembles highly tempered martensite or bainte. In the direction towards the blade body, the microstructure becomes coarser, which then dominates in Area II. The microstructure in Area III, located on the side of the sample, comprises a mixture of grains with both ferritic-cementitic and solely ferritic microstructures.

SAMPLE [1-A]: The cutting edge contains pearlite with traces of ferrite (circa 0.75% C; 244 ± 10 HV0.2; Fig. 119:c-e); towards the blade body, this microstructure is followed by areas containing pearlitic-ferritic microstructures (Fig. 119:f) with both coarser (circa 0.7% C) and finer grains (circa 0.5% C). In the proximity of the welding line between the cutting edge and the blade body, there is a zone with a fine-grained microstructure with circa 0.3% C (Fig. 119:g); the weld itself is surrounded on both sides by ferrite with some pearlite (0.15% C).

Metallographic description of the crossguard:
SAMPLE [3]: The surface of the crossguard sample contains numerous slag inclusions (level 4–5 on the Jernkontoret scale), however, zones of a purer material dominate (level 1 on the Jernkontoret scale). Area I is ferritic-pearlitic with carbon content up to 0.3%, a grain size of ASTM 8 and hardness of 119 ± 5 HV0.5 (Fig. 118:c). Areas II and III are both ferritic; they differ only in grain size: ASTM 7–6 in Area II and ASTM 3–2 in Area III; the hardness is 104 ± 10 HV0.5.

Metallographic description of the pommel:
SAMPLE [4]: The purity of the material in the pommel is uneven, corresponding to level 2 on the Jernkontoret scale in the purer areas and to level 4–5 in the areas with more inclusions. The inclusions are often coarse, irregularly shaped and with varying inner structures. Area I is a pearlitic zone with a hardness of 309 ± 16 HV0.5, and separated from Area II by a distinct light-etched welding line (Fig. 118:d and 119:a, b). The microstructure in Area II is pearlitic, but towards the central part of the sample, a ferritic network and arrows gradually appear (circa 0.7% C) and locally form a typical Widmannstätten structure; the hardness of this area is 195 ± 35 HV0.5. Areas III are pearlitic-ferritic; the carbon content reaches its highest levels in the centres of these areas (0.5 to 0.6%), the hardness is 164 ± 15 HV0.5. The size of the pearlitic grains is up to 5–4 ASTM; the grains are often full of ferritic arrows. Area IV contains 0.25 to 0.35% C, the grain size is 8 ATSM, and the hardness of the area is 95 ± 5 HV0.5. The shape and size of the grains vary between polyhedral grains, the size of which is 8 ASTM, and coarser compositions like the Widmannstätten structures. Area V contains up to 0.2% C, the grain size is ASTM 7–6; Area VI is ferritic (6 ASTM).

Assessment: The sword blade consists of an iron body and welded-on cutting edges of steel. It is not clear if the blade was in its upper part equipped with only one cutting edge or if it was simply not possible to detect the steel cutting

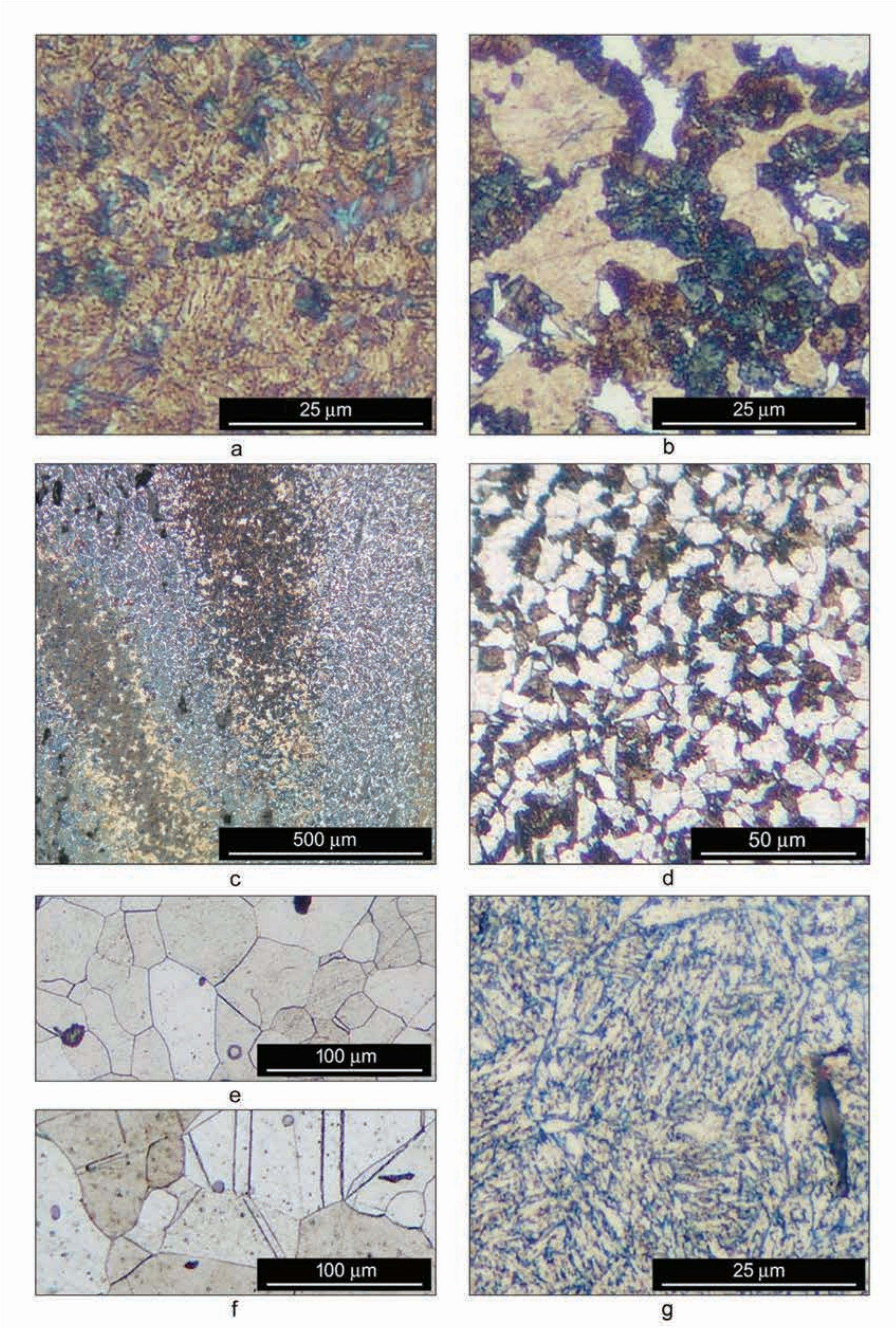

Fig. 117. Sword from the grave No. 1347; a – bainitic microstructure in the cutting edge of the blade (Area I), sample [1]; b – mixture of bainite, fine pearlite and ferrite in Area I, sample [1]; c – example of penetration of various structural zones in the cutting edge, sample [1]; d – pearlitic-ferritic microstructure of Area II, sample [1]; e – ferrite in sample [1]; f – ferrite in sample [2]; g – a granular microstructure in the cutting edge, sample [5]; Nital etched. Photos by J. Hošek.

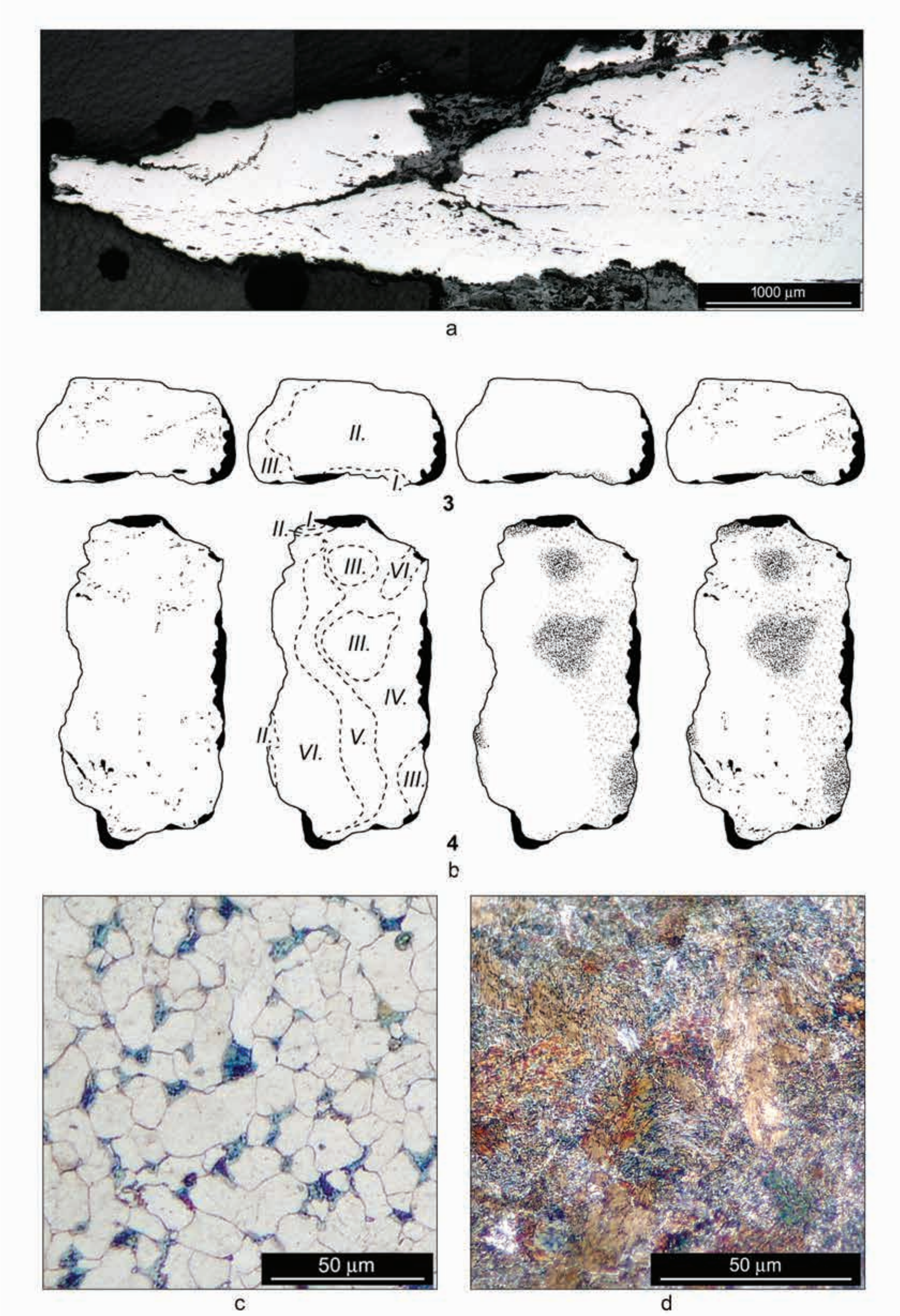

Fig. 118. Sword from the grave No. 1347; a – amount of inclusions in the cutting edge, sample [1] (unetched); b – schematic drawings of crossguard and pommel samples (from the left: unetched state, layout of the described areas; distribution of the microstructures and of the main welds across the sample (without and with slag inclusions)); c – ferritic-pearlitic microstructure in Area I, sample [3]; d – pearlite in Area I, sample [4]; Nital etched. Photos and drawings by J. Hošek.

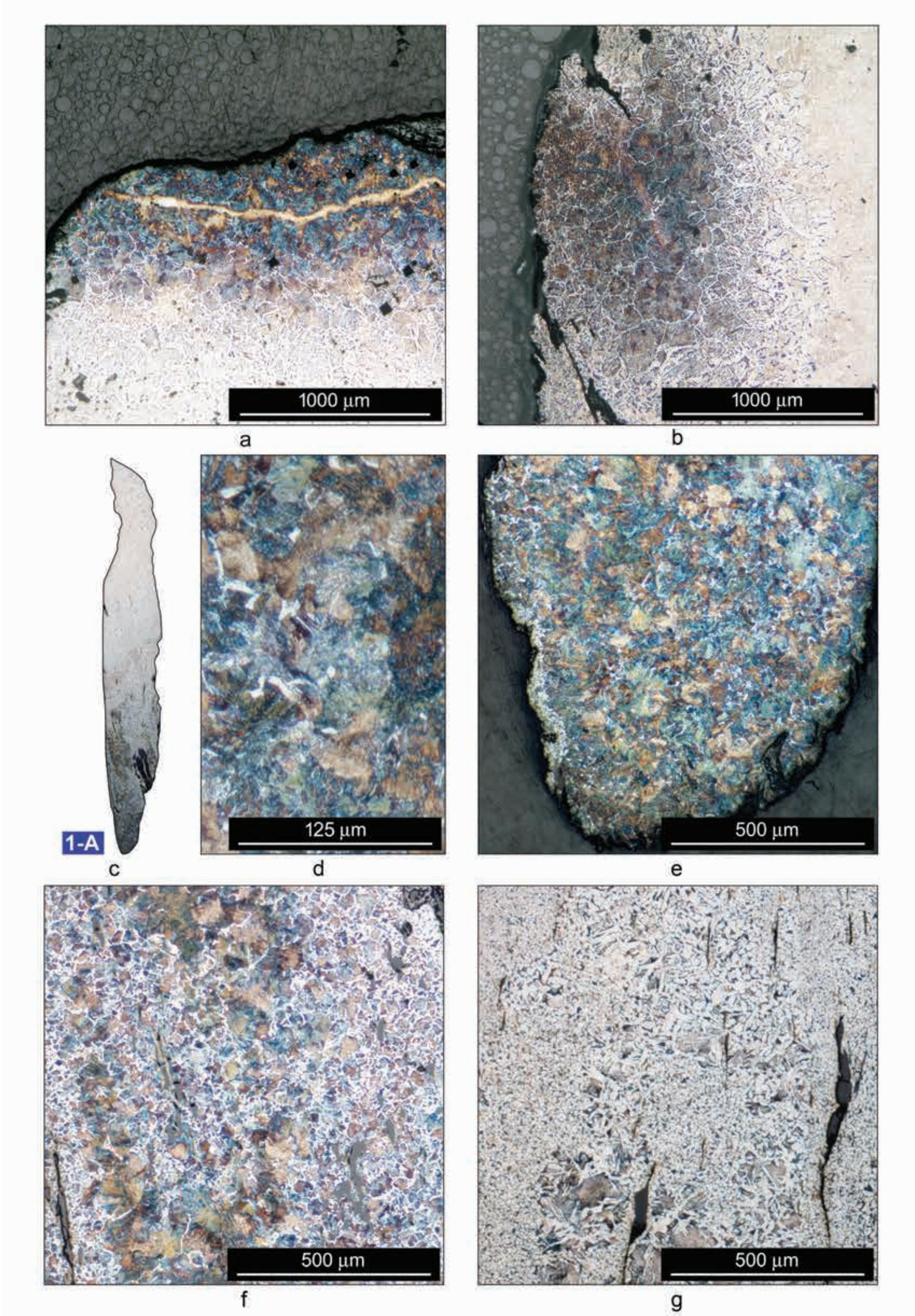

Fig. 119. Sword from the grave No. 1347; a, b – overviews of Areas I, II and III, sample [4]; c – sample [1-A]; d – pearlite with some ferrite in the cutting edge, sample [1-A]; e – the cutting edge with the pearlitic-ferritic microstructure, sample [1-A]; f – pearlitic-ferritic microstructure in the central area of the cutting edge [1-A]; g – ferritic-pearlitic microstructure in the top part of the cutting edge (near the line of attachment onto the iron blade body), sample [1-A]; Nital etched. Photos by J. Hošek.

edge in the sample [2]. The metal shard (sample [5]) removed additionally from the lower part of the blade was steel, i.e. both cutting edges were of steel here. The steel cutting edge in sample [1] contained an unevenly distributed carbon content (with almost eutectoid content in the cutting-edge tip) and it was probably welded from several separate rods of unequal composition. The blade was quenched in water with no substantial tempering of the cutting-edge tip, which was therefore very hard but also somewhat brittle, as indicated by the present crack (see Fig. 118:a). While the crossguard was made only of iron, the pommel sample indicates local high carburizing, which reaches a very high level of hardness in the small Area I near the surface. It is questionable whether this should be seen as a sign of any intentional procedure by the swordmaker. The microstructural characteristics correspond closely with a partly processed bloomery iron, which might have been used as the raw material. Unfortunately, we are unable to assess to what extent the materials used in the pommel, crossguard and blade correspond to each other. The sword can be assessed as a good weapon, though rather brittle in places.

3.4.15 Sword from the grave 1665

Circumstances of the discovery

The burial of two individuals was discovered in the square -17/+60 during the archaeological excavations in area No. 64 'X 1984–90' (Poláček/Marek 2005, 286–295) on the location 'Kostelisko', directed by Z. Klanica. The double-grave lay in the SW part of the centre of the large burial ground, extending to the west from the IXth church. It was situated in the southern part and on the bottom level of a cluster of burial pits, in a complex formation which overlapped each other in mutual superposition.[85] The pit of grave 1665, oriented in the direction WWS-EEN reached a size of 260 × 80 cm. The bottom of the pit lay at a depth of 165 cm, but the level of human remains was about 30 cm higher.

The southern remains were marked with the number 1665a and northern ones with 1665b, the heads of both buried pointed to the SWW. The individual 1665a was male and was of robust build, he died in the age of *maturus I* (40–50 years), see Fig. 120. The remains 1665b were badly preserved and they enabled only a rough determination of age as being in the interval between *infans II* and *adultus I* (7–30 years). On the basis of DNA analysis, the kinship between both buried was proved (Velemínský 2000). The preserved parts of skeletons were placed in their anatomical positions, while the absence of pelvises and chests and the relocated position of some artefacts testify for the grave's disruption. Dislocation of some artefacts does not exclude the possibility that they belonged to an older grave. With regard to this, it is necessary to point out that the bottom of the burial pit and the sword are at a distinctly lower level compared to the position of human remains.

On the northern side of the grave, a sword lay flat alongside the left side of the skeleton 1665b from the waist to the toes, but about 15 cm under the level of the body (1). Between the sword and the upper part of the tibia a knife was found (2). It was probably part of the garniture of the individual 1665b. By the waist of one of the skeletons there was another knife (3). In the area of their toes there lay two pairs of spurs.

85 After the removal of dark cultural layer there was, in the mixed subsoil on the eastern side of the square, a darker backfill, disrupted by a burial pit 1616 and partially also 1617. The backfill, marked as a feature 1165, seems to be a system of mutually connected burial pits, chronologically older than the graves 1616 and 1617. In the homogenous upper layer of the backfill there were the human remains in the non-anatomic position (part of them were marked as graves 1651 and 1652), probably relocated parts of older burials. On the lower level there seemed to be in a row next to each other burial pits with almost the same orientation. From the north it was grave 1689 in the superposition under slightly deviated grave 1667, grave of a small child 1669 and double-graves 1666a-b and 1665a-b. The graves 1665, 1666 and 1689, arranged in the lower part of the burial cluster, contained rich grave-goods.

To the grave 1665a belonged spurs (4) with a garniture consisting of a pair of strap keepers (5, 6). Spurs (7) situated to the north belonged to the burial 1665b. SW from the skull of the skeleton 1665a there was a dislocated globular button (a so-called *gombík*) (8) and by the southern side of the burial pit on the level of femurs there was a terminal from a spur (9). In the eastern part of the pit, near the toes and the spurs of the burial 1665b, about 5 cm above their level, there were fragments of another spur (10), a strap chape (11) and fragments of a decorated object (12). Over the knees of the skeletons there was a buckle with a strap keeper (13). A strap chape from the same garniture (14) was found outside the grave in the neighbouring square 17/+60.

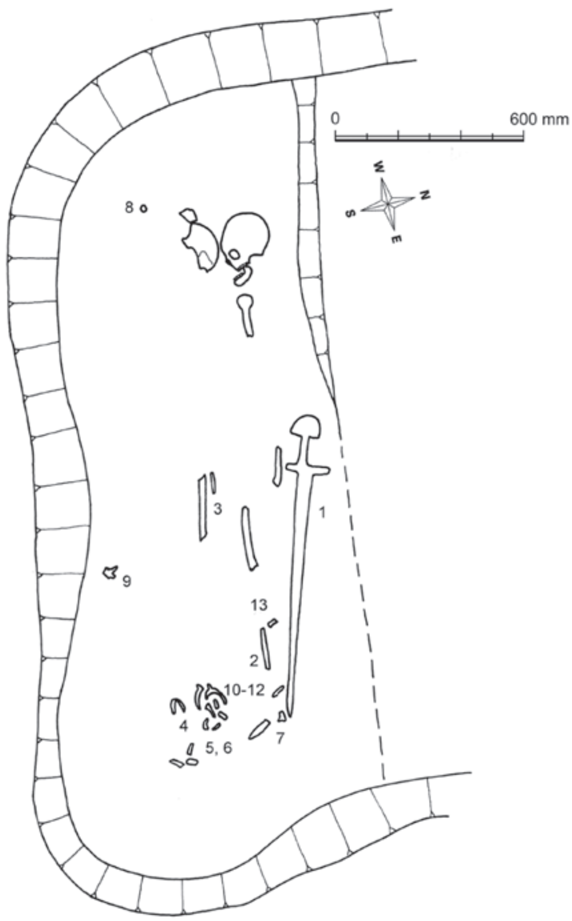

Fig. 120. Mikulčice-Kostelisko, Hodonín County; grave No. 1665; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

Finds

1) The iron sword with the remains of a scabbard (594-543/85; Fig. 121–124).
2) The iron knife with a thin blade that bore a distinct groove below the back and with remains of a wooden scabbard (594-525/85). Up to now, only the blade is preserved at a length of 110 mm (length measured after the discovery 135 mm), width of the blade is 13 mm.
3) The iron knife (594-528/85), from which also only a part of the thin blade was preserved (preserved length 86 mm, width 13 mm).
4) The pair of iron slender spurs with short (21 mm long) cylindrical pricks, preserved in pieces (594-529/85, 594-530/85, 594-532/85, 594-538/85). The arms of the spurs are of semicircular cross-section. The terminal plates are rectangular, and attached to the arms by their longer sides. There are three rivets arranged in one line in the upper part of the terminals, and the lower rim is decorated by notches.
5) The small iron buckle with a frame of semicircular shape, a prong and a strap keeper with small oval shield decorated on the longer sides by notches. The strap keeper was fastened to the back part of the frame (594-531/85). Among the corrosion products the remains of a leather strap were preserved (total length 37 mm, size of the frame 24 × 18 mm, size of the shield 21 × 12 mm).
6) The buckle of analogous construction to the buckle 5, the strap keeper with broken off shield (594-533/85). Among the corrosion there were remains of the leather strap and the footwear (total length 36 mm, size of the frame 24 × 18 mm).
7) Fragments of the pair of iron spurs with cylindrical pricks (length of the prick 26 mm, respectively 23 mm) and arms of high semicircular cross-section (594-539/85–594-541/85). Terminals with fastening system were not preserved. Two fragments of the arms bore on one side remains of leather and on the second remains of textile with elaborate weave.
8) Two fragments of small silver globular button (a so-called *gombík*) with pressed geometrical pattern in a form of narrow, vertically oriented, rhombuses or lenticular shapes making the impression of vertical ribbing (594-524/85). The loop for suspending is rimmed by filigree wreath (diameter about 10 mm).

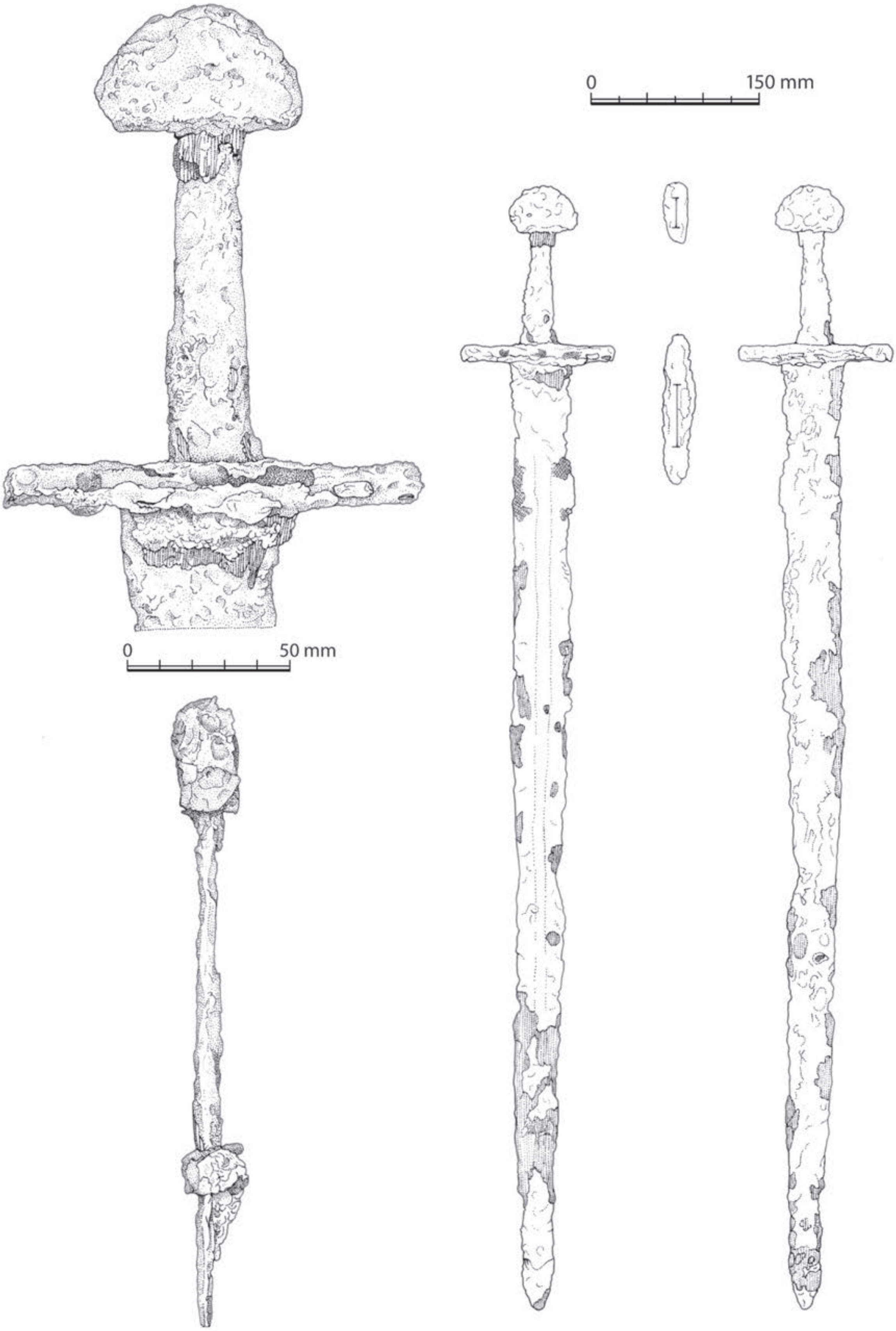

Fig. 121. Mikulčice-Kostelisko, Hodonín County; sword from the grave No. 1665 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

9) The rectangular terminal plate from a spur with a fragment of an arm and a part of retaining strap (594-542/85). On the basis of the shape it is analogous to the spur-terminals 4. It is provided with three rivets forming a line across to the arm and on its bottom rim there are notches.
10) Several fragments of arms and three terminal plates from spurs of Biskupija-Crkvina type (594-534/85, 594-536/85). The rectangular terminals are equipped with six rivets forming two lines around the middle rib and are of the same orientation as the arms of the spur.
11) The iron tongue-shaped strap chape ending in a pointed arch, triangularly shaped in its cross section (594-535/85). The back of the strap chape is damaged (31 × 16 mm).
12) The fragments of a rectangular iron object with the remains of decoration (594-537/85; 16 mm wide).
13) The bronze gilded buckle with an oval frame, a prong and a four-sided chape, to which a strap keeper with small oval shield is fastened (size of the frame 46 × 32 mm, size of the shield 32 × 21 mm). The widened part of the frame and the shield of the plate are decorated by stylized floral patterns made by the chip-carved decoration (594-526/85).
14) The bronze gilded tongue-like strap chape equipped in the rear with a line of six rivets (45 × 27 mm). The front side is decorated by two acanthus palmettes, situated under each other and separated by a smooth slat placed across the middle of the strap chape (594-527/85; Poláček 2006, 17). Part of the garniture with the buckle 13.

Description of the sword

This is a double-edged sword (594-543/85; Fig. 121–123), which is 993 mm long, and weighed 1400 g (including traces of the organic wrapping) at the time of its documentation in 2003. The point of balance of the sword lay 220 mm from the crossguard. The sword was relatively well preserved as a whole after the fire at the archaeological base in Mikulčice. Its current weight is 1345 g.

The single, roughly formed pommel has a semicircular shape like an arch, which is relatively high and short (56 mm long, 37 mm high, 21 mm wide). From the side view the pommel is rectangular with rounded corners on the top and in the horizontal it has the shape of a rectangle with the shorter sides somewhat rounded. The tang went through up to the top of the pommel, while the gaps visible between them on the X-ray image were irregular. The attachment of the pommel to the tang was secured by a small wedge in one of these gaps.

The grip is 100 mm long and the tang, which bore the slight remains of a wooden coating, broadens from 20 mm by the pommel to 27 mm by the crossguard.

The straight prism-shaped crossguard (127 mm long, 15 mm high and a maximum of 24 mm wide) is heavily damaged by corrosion. The guard was originally in the horizontal view probably slightly arched with rounded ends. The hole for the blade and the tang was rather indistinct; however it seems the hole broadened in step-like fashion.

The long, robust and double-edged blade is considerably damaged. It is 841 mm long and 52 mm wide by the crossguard. It narrows distinctly from the halfway mark of its length to the medium-long point. A distinctly profiled ridge leads from the crossguard to a length of 60 mm, when it is substituted by a narrow fuller (17 mm to 11 mm wide) that ends 130 mm before the point, and finally a less distinct ridge continues from there towards the point.

Typological determination of the sword

Due to the single semicircular pommel with the flat base and long crossguard the sword belongs to Petersen's type X (Petersen 1919, 158–167), Geibig's type 12, variant I (specifically Geibig's combination type 12-12-4-11; Geibig 1991, 56–60) and Ruttkay's type VII (Ruttkay 1976, 249–251). The pommel construction corresponds to Geibig's construction type III (Geibig 1991, 90–100). According to Petersen's classification of sword type-X variants, the hilt belongs to a later variant of type X (the smaller size and larger width of the pommel, and the low and very long crossguard). According to the classification of swords with single semicircular pommels by Kucypera,

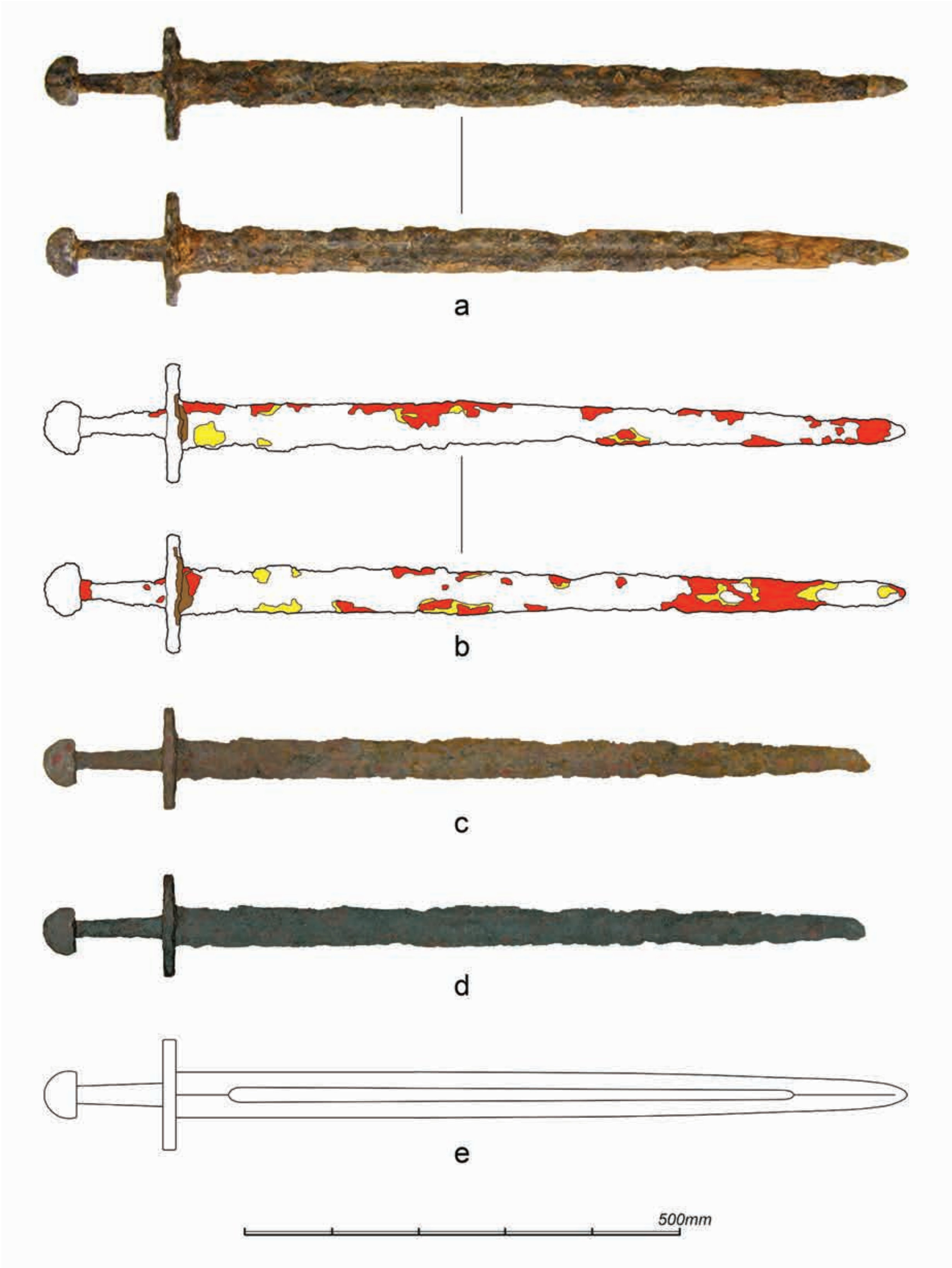

Fig. 122. Sword from grave No. 1665: a – state before the depository fire; b – distribution of organic materials across the sword /yellow: textile (lining of the scabbard); red: wood (corpus of the scabbard and coverings of the tang); brown: leather (observed in the upper part of the blade and on the guard in several layers); discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword. Photos and drawings by J. Hošek and J. Košta.

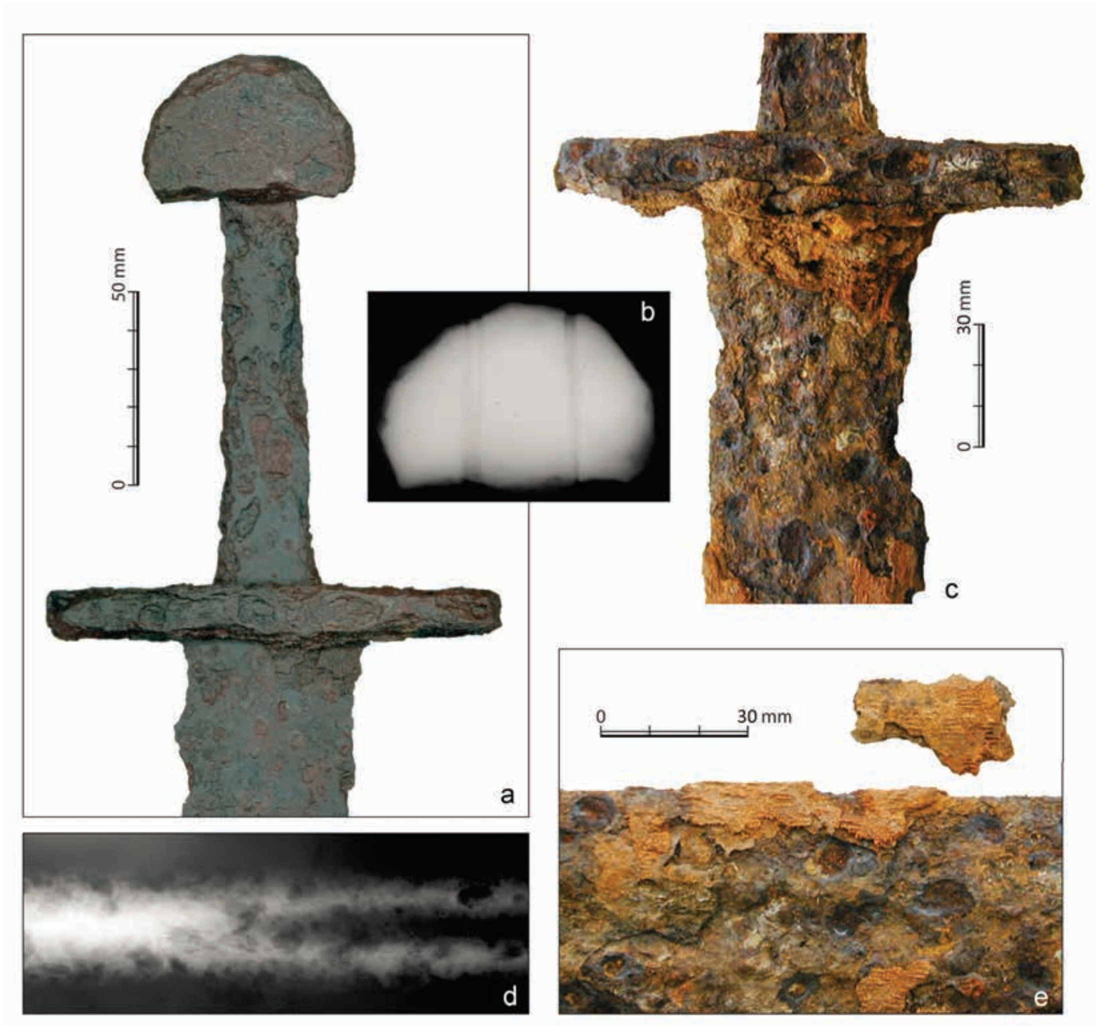

Fig. 123. Sword from the grave No. 1665; a – hilt from the side A (documentation after the depository fire and second conservation); b – X-ray image of the pommel (documented after the depository fire); c – crossguard and upper part of blade with remnants of organic materials (documented in 2003); d – X-ray image of the upper part of blade with an displaced fuller (documented prior to the depository fire); e – part of the blade with remnants of the textile lining of the scabbard (documented in 2003). Photo 'a' by E. Ottenwelter; photos 'b-e' by Institute of Archaeology of the AS CR, Brno.

Kurasiński and Pudło (2011) the pommel from the grave 1665 does not seem to be typologically very distinct, but it rather resembles the variant X-earlier (with a high arch).

Almost all the measurable parameters of the blade correspond to Geibig's type 6, specifically its variant with a long point (6a). The only exception is the insufficient narrowing of the blade along the first 600 mm of length (measured from the crossguard), which corresponds to types 2 and 3, but not to type 6 that is characterized by a rather gradual narrowing of the blade (Geibig 1991, 83–90). A significant difference from Geibig's sword types is the distinct indentation of the fuller. The blade from the grave 1665 is the example of a form that is outside the typological scheme of A. Geibig (1991, 83–90, 153). According to the classification of blades, that was presented in this study, the blade belongs to the group {d} (see Chap. 4.2), which is characterised by a blade length exceeding 830 mm. In comparison with other 9th and 10th century swords, this group includes specimens with slender to medium-robust and very

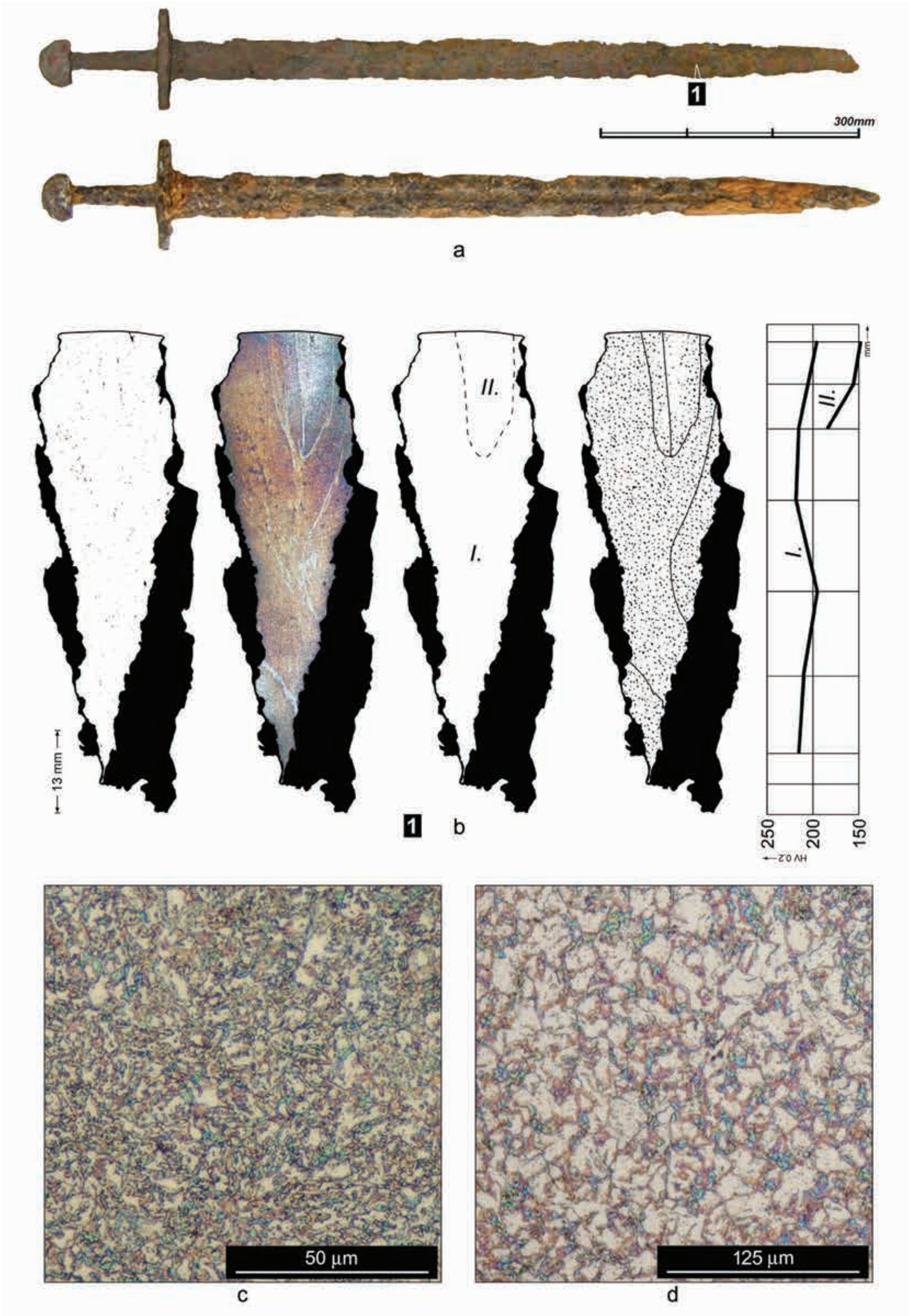

Fig. 124. Sword from the grave No. 1665; a – the sword examined (above: after the fire and before the conservation; below: before the depository fire) and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart); c – a ferritic-cementitic microstructure in the cutting edge, Area I; d – a ferritic-cementitic microstructure in the blade body, Area II; Nital etched. Photos and drawings by J. Hošek and J. Košta.

long blades. Later Carolingian swords prevail in this group.

Scabbard, straps and outer wrappings

The sword was sheathed in a wooden scabbard that was lined by a textile with a well visible structure. The textile lining was identified on both the blade and the fallen-off fragment. According to the analysis by H. Březinová (in print) it is 'the remainder of a textile in a twill three-weave, which is covered with a layer of the wooden scabbard. The analysis revealed 4 thicker thrown threads with 2s/S thread, which cross the textile in parallel to the set of threads in S thread. Unfortunately, both the state of preservation and the small size of the fragments made any study of the orientation of the textile and its possible patterning impossible. However, it is probable that this was the reverse side of a textile with a geometric pattern created by pairs of thicker patterning threads'. During the research into the sword in the Mikulčice depository in 2003, J. Košta observed a textile with regular geometric patterns in a shape of full rhomboi created by five patterning threads. The fragments of the wooden scabbard were scattered on both sides of the blade, but especially close to the point and below the crossguard. The scabbard bore remains of leather that reached to the crossguard and created the outer wrapping of the sword.

Metallographic examination

Sampling: Sample [1] was taken from one side of the cutting edge of the weapon after it had been affected by fire, approximately at a distance of 610 mm from the crossguard (Fig. 124:a).

Metallographic description of the blade: SAMPLE [1]: The metal purity corresponds to level 2 on the Jernkontoret scale; the cutting edge area contains fewer inclusions, while the line of attachment of the blade to the core contains more inclusions. The blade consists solely of a ferritic-cementitic microstructure; the cementite is dispersed in the form of small particles and veins, which form discontinuous network on grain boundaries. The occurrence of cementitic particles is higher in Area I, where the hardness reaches 208 ± 11 HV0.2 (Fig.124:c). Area II contains lower amount of cementite particles; the hardness is 162 ± 18 HV0.2 (Fig. 124:d).

Assessment: The blade evidently has welded-on steel cutting edges. The exact nature of the blade body is unclear, but it seems to have a lower carbon content than the cutting edges. The blade was most likely originally hardened, but overtempering has taken place during the fire.

3.4.16 Sword from the grave 1750

Circumstances of the discovery

The grave pit had a rectangular silhouette with rounded edges, was oriented in W-E direction, with a size of 205 × 85 cm, was embedded 30 cm into the subsoil and its bottom lay at a depth of 120 cm from the surface. It was discovered in 1986 on the boundary of squares -21/+60 and -21/+61 during the archaeological excavations in area No. 64 'X 1984–90' (Poláček/Marek 2005, 286–295) on the location 'Kostelisko', directed by Z. Klanica. The pit lay in the central part of the burial ground, near to its west border. To the NW it partially shaded into the pit of the grave 1745. Although the fill of the burial pit 1745 was visible at a higher level, the subsequence of the features is unclear.

The burial was a supine inhumation, the arms were along the body and the skull was pointing to the west (Fig. 125 and 126). The height of the man was between 163 and 165 cm and he died in the age of *maturus I* (40–50 years). The anthropological analysis revealed pathologic features of atrophy of the lower jaw in the area of the molars and enthesopathy, or bone lesions that are caused by a locally insufficient intake of oxygenated blood. It is mostly initiated by long-lasting physical stress to ligaments (Velemínský 2000).

On the left arm there was placed a sword (1). The pommel lay about 10 cm under the shoulder and the point under the left knee. Under the sword there was a knife pointing askew from the body (2). On the bottom part of the blade there lay an axe (3) with its cutting

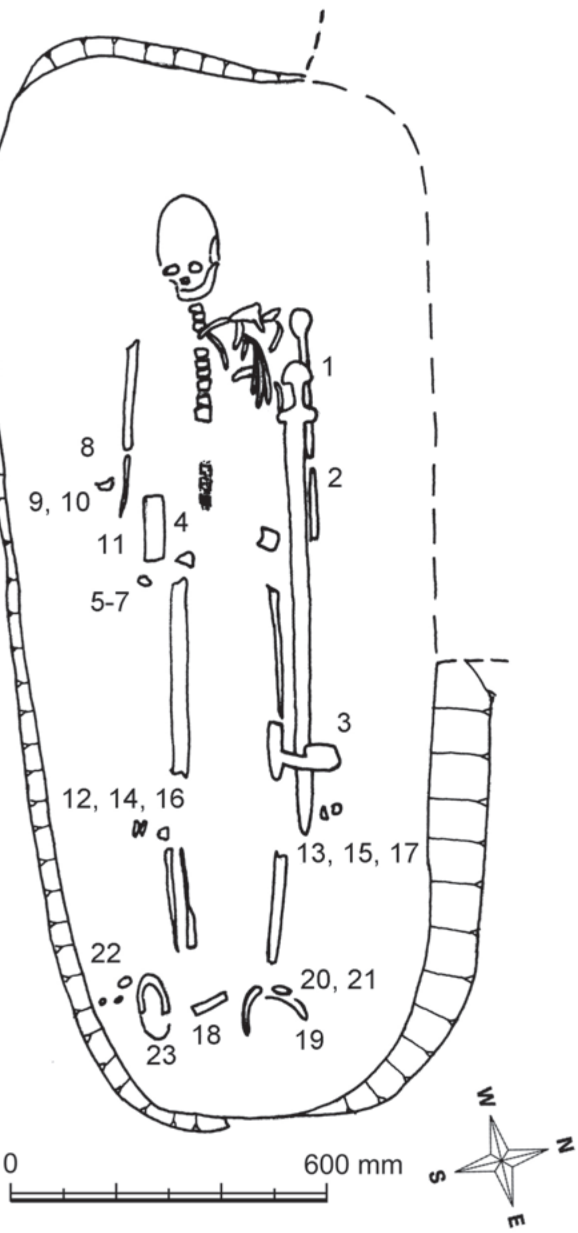

Fig. 125. Mikulčice-Kostelisko, Hodonín County; grave No. 1750; ground plan and distribution of the grave goods (the numbered items correspond with those in the list of the grave inventory in the paragraph 'Finds'). Drawing by B. Vávrová.

edge pointing to the skeleton. On the right hip there was a folding knife with remains of textile (4), three flints (5-7), an iron fragment, which is interpreted as part of a firesteel (8) and other iron fragments with organic materials, among which there was oblong iron object with traces of verdigris (9). A barbed arrowhead was probably situated on this object; however, the arrowhead was already unrecognizable among the fragments at the time of registering the burial in the *DGU* (10). By the right forearm, not far from the cluster of objects described above, there were iron fragments (11), which were interpreted uncertainly in the *DGU* as remains of a buckle, but it might have been also another fragment of the firesteel. By right (12, 14, 16) and left (13, 15, 17) knee there were two complete garnitures of shin straps. Each of them consisted of a strap chape (12–13), a buckle (14–15) and a strap keeper (16–17). By toes there lay iron spurs (18–19). Other garnitures of spur straps were preserved: above the arc of the left spur there was a buckle with a strap keeper (20) and a strap chape (21), another similar buckle (22) was found not far from the remains of the second spur, near a bucket (23), which was situated in the SE corner of the burial pit.

Finds

1) The iron sword with the remains of a scabbard 594-2978/86; Fig. 127–130; Klanica 1997a, obr. 19:8).
2) The corroded iron knife with a straight, back and curved blade, and rounded near the point. The blade was distinctly shouldered and provided with a whittle tang (594-2963/86; length of the preserved part 98 mm, length of the blade around 80 mm).
3) The iron broad axe is 155 mm long, with short lugs around the haft-hole, a narrow body and a typical cutting edge, which is 130 mm long, only slightly elongated up but significantly elongated down to a distinct beard (594-2962/86; Klanica 1997a, obr. 19:4).
4) The iron folding knife in a rectangular sheet case (133 mm long; 29 mm wide) with the remains of textile on the surface (594-2961/86). To one longitudinal side of the object, a fragment of curved, iron rod was attached by corrosion. It might have been a fragment of a firesteel (see number 8).
5) The flint flake of a size of 21 × 14 mm (594-2975/86).
6) The flint flake of a size of 17 × 15 mm (594-2976/86).
7) The flint flake of a size of 11 × 6 mm (594-2977/86).

8) The bent fragment of iron rod of square cross-section with a sign of S-shaped ending that is interpreted uncertainly in the *DGU* as a fragment of a firesteel (594-2965/86). Owing to the location within the grave (by the folding knife and near the flints), this fragment could have been related to the piece of curved, corroded iron rod (or to the folding knife or even to the rod) that is described among the fragments 11.
9) Oblong rectangular object from the iron band, the longitudinal edges of which are bent to the right angle (17 mm wide). On the object there are traces of verdigris (594-2968/86).
10) Three fragments of corroded unspecified iron object or objects (594-2968/86).
11) Two fragments of iron objects: small plate of irregular shape with the remains of textile on the surface and the rod of square cross-section, bent to semicircle (594-2964/86).
12) The iron (partially bronze) tongue-shaped strap chape, ending in a pointed arc. In its rear there is a line of three rivets, underlain by a rectangular plate (31 × 15 mm). On the front side, the chape is decorated with a band of parallel grooves leading from the bottom edge of the rivet area to the vertex of the arc (594-2970/86; KLANICA 1997a, obr. 19:3).
13) The strap chape (31 × 15 mm) of the same shape and decoration as 12. Around one rivet there is a filigree wreath (594-2972/86).
14) The iron buckle with a rectangular frame and a prong, without a chape (594-2971/86; 22 × 19 mm; KLANICA 1997a, obr. 19:1). On the surface there are remains of textile and leather strap, to which a strap keeper 16 was originally fastened.
15) The same buckle as the buckle 13 (594-2971/86; 22 × 20 mm). On the surface there are remains of textile and leather strap, to which a strap keeper 17 was originally fastened.
16) The iron strap keeper with small oval shield, which is 20 mm long (594-2971/86; KLANICA 1997a, obr. 19:2). On the surface there are remains of textile and leather strap with attached frame of the buckle 14.
17) The same strap keeper as the keeper 16 (594-2971/86). On the surface there are remains of textile and leather strap with attached frame of the buckle 15.

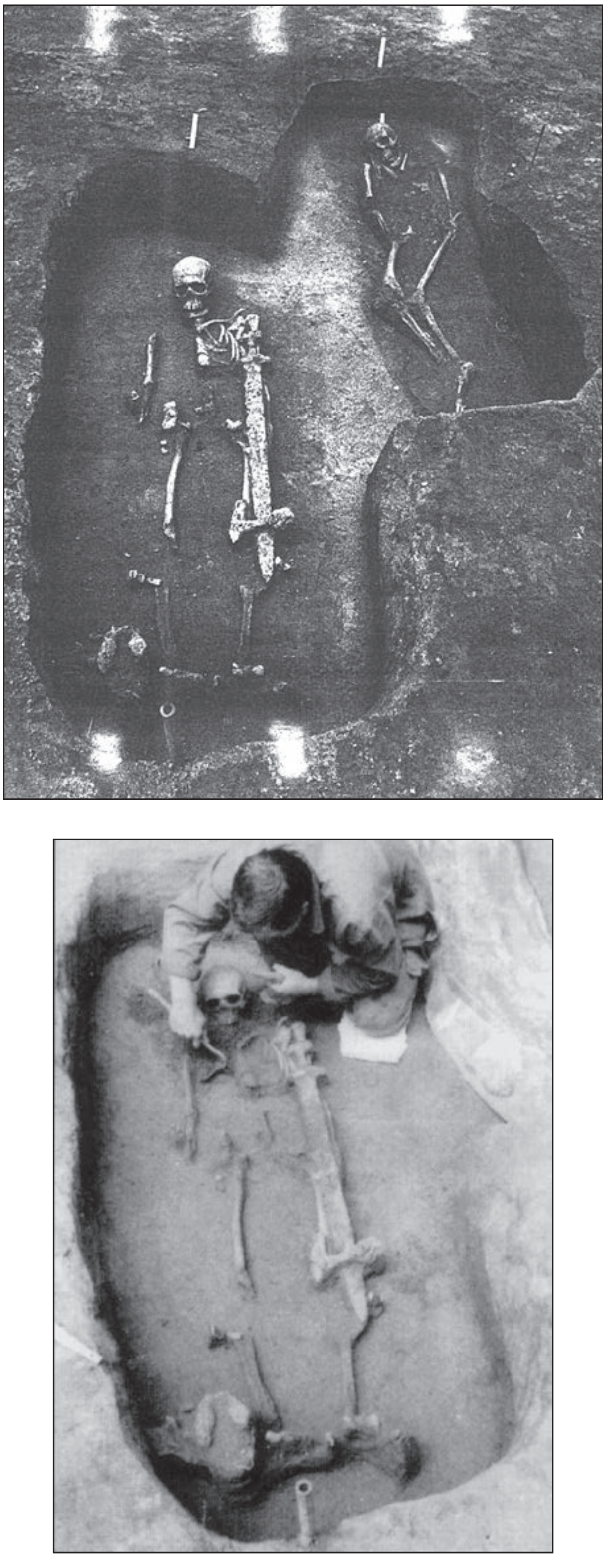

Fig. 126. Mikulčice-Kostelisko, Hodonín County; grave No. 1750; photographs of the burial taken in the course of the excavation, viewed from the E; (left): the grave 1750 together with the grave No. 1745 in the upper-right corner of the photograph. Photos from the archive of the Institute of Archaeology of the AS CR, Brno.

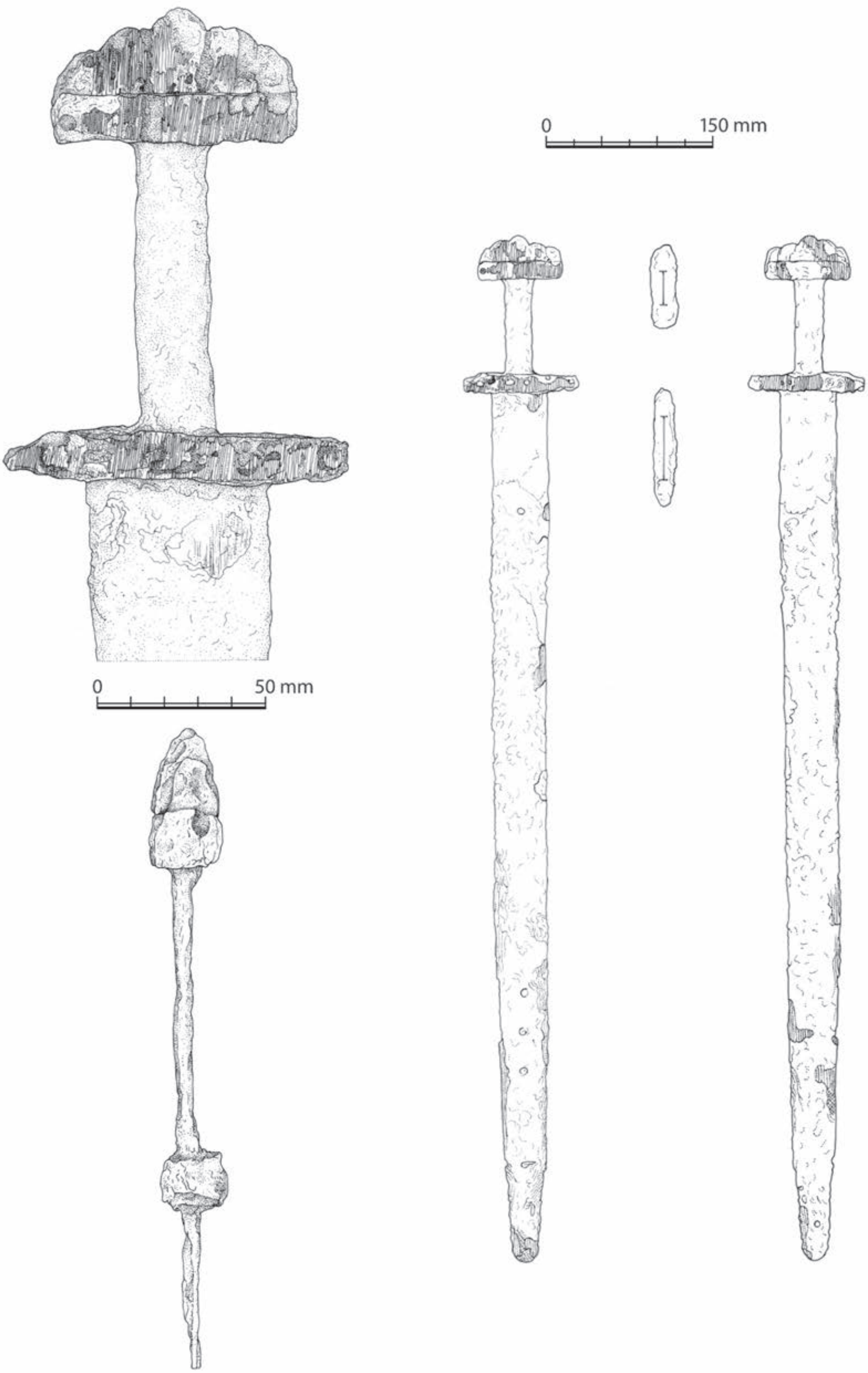

Fig. 127. Mikulčice-Kostelisko, Hodonín County; sword from the grave No. 1750 (the side A is depicted on the left, side B on the right). Drawing by K. Urbanová.

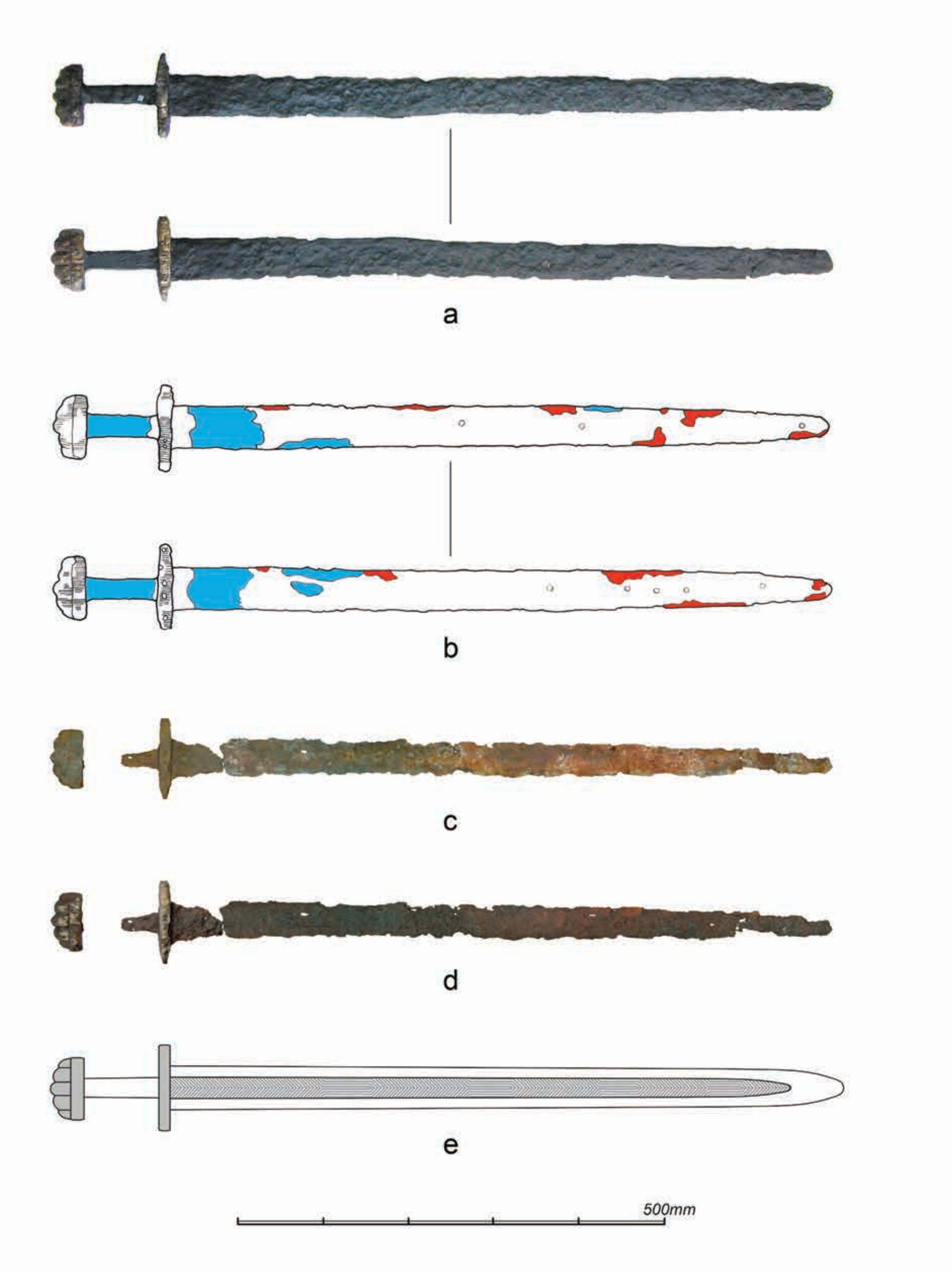

Fig. 128. Sword from grave No. 1750; a – state before the depository fire; b – distribution of organic materials across the sword /red: wood (scabbard); blue: synthetic resin; discoloured: metal surface of the weapon and corrosion products/; c – state after the depository fire; d – state after the last conservation; e – reconstruction of the sword (the hilt was provided with wire inlay of brass). Photos and drawings by J. Hošek and J. Košta.

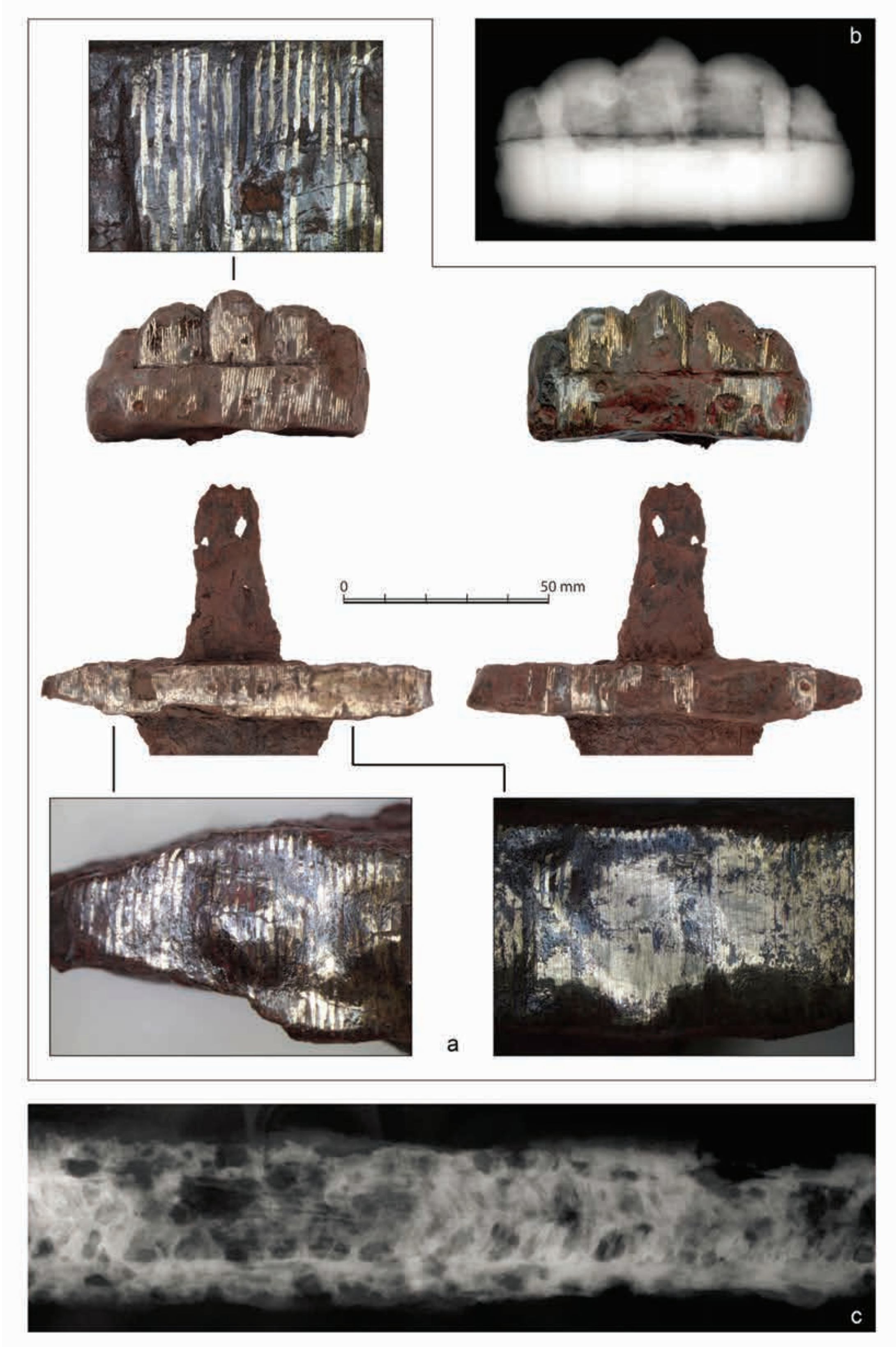

Fig. 129. Sword from the grave No. 1750; a – decorated hilt with details of the wire-inlay, from the both sides (documented after the depository fire in the course of the second conservation), photo by E. Ottenwelter; b – X-ray image of the upper hilt (documented prior to the fire); c – X-ray image of the blade with visible pattern-welding (documented prior to the fire). Photos 'a' by J. Hošek and E. Ottenwelter; photos 'b-c' by Institute of Archaeology of the AS CR, Brno.

18) The iron spur (173 mm long) has slender U-shaped arms and a short prick (18 mm) of octagonal cross–section (broadening towards the point) which ends in a blunt point. One of the arms with a semi-circular cross-section is incomplete, the other ends in a rectangular frame of a size of 21 × 17 mm (594-2979/86; Klanica 1997a, obr. 19:5-6).
19) The iron spur (preserved length 168 mm, span of the arms 86 mm) with a damaged point of the prick, analogous to the spur 18. Both arms have preserved terminal frames (594-2980/86; Klanica 1997a, obr. 19:5-6).
20) The iron buckle with an oval frame and a prong with remains of leather strap and a strap keeper inserted into a chape (24 mm wide). In fragments (594-2969/86).
21) The iron tongue-shaped strap chape (26 × 16 mm) ended with a pointed arc with remains of a leather belt and textile on the surface (594-2966/86).
22) The iron buckle with an oval frame with remains of a leather strap with a belt keeper (594-2974/86).
23) The oval bucket of a size of 150 × 80 mm (594-2967/86) with three hoops of different sized bands, remains of loops and of elliptic handle (Klanica 1997a, obr. 19:7).

Description of the sword

This is a double-edged sword (594-2978/86; Fig. 127 and 128) which was 918 mm long and at the time of its documentation in 2003 weighed 840 g, including the sparse remains of an organic wrappings. The point of balance lay on the blade at a distance of 160 mm from the crossguard. The sword was preserved in three pieces after the fire at the archaeological base in Mikulčice: 1) upper hilt, 2) lower guard with a part of the tang and upper part of the blade and 3) larger part of the blade down to the point. Weight of the preserved parts is 824 g.

The upper hilt (73 mm long, 39 mm high and 25 mm wide) has an upper guard that from the front has a prismatic shape and is 15 mm high. A hollow pommel, 24 mm high, is vertically divided into five lobes; the middle lobe is the highest and most massive, the others decrease symmetrically in dimensions towards the sides. The three central lobes are between 16 mm and 17 mm wide, the lateral ones are only 10 mm wide. From the side view the pommel is in a shape of high pointed arch. The horizontal view of the upper hilt is rectangular with distinctly rounded ends.

The tang of the blade ends above the upper guard to which a hollow pommel is fastened by two rivets that pass along the outer sides of the second and the fourth lobes. An X-ray image revealed a diagonally situated (metal?) bar within the hole of the central lobe; the bar is attached neither to the pommel nor to the upper guard and its function remains unknown. Both the upper hilt and the lower guard are decorated with wire inlay of brass[86] arranged in dense vertical lines (Fig. 129). There are around 14 inlaid wires per cm on the pommel.

When the sword was being lifted from the grave the tang broke into three pieces and during the subsequent conservation its fragments were put together and fixed by a layer of restoring materials. After the fire at the base in Mikulčice a part of the tang was not found. The length of the grip (87 mm), which was measured during the documentation of the swords in 2003, may not correspond with the reality. The tang was 22 mm wide below the upper hilt and broadened to 24 mm above the crossguard. The tang bore the remains of a wooden grip, which was removed during the initial conservation of the sword.

The crossguard (101 mm long, 13 mm high and 19 mm wide) is decorated with vertically arranged inlaid wires of brass[87] 0.25 mm wide. The wires are next to each other giving almost the illusion of continuous plating, as there are altogether around 18 inlaid wires per cm. From

86 The results of XRFA of the area inlaid with a non-ferrous metal: Cu 45.9%; Fe 33.9%; Zn; Pb 0.1%; Sn 0.1%. After subtraction of elements represented in the iron base and corrosion (Fe): Cu 69.4%; Zn 30.3%; Pb 0.15%; Sn 0.15%.

87 The results of XRFA of the area inlaid with a non-ferrous metal: Cu 65.0%; Zn 28.4%; Fe 6.6%. After subtraction of elements represented in the iron base and corrosion (Fe): Cu 69.6%; Zn 30.4%.

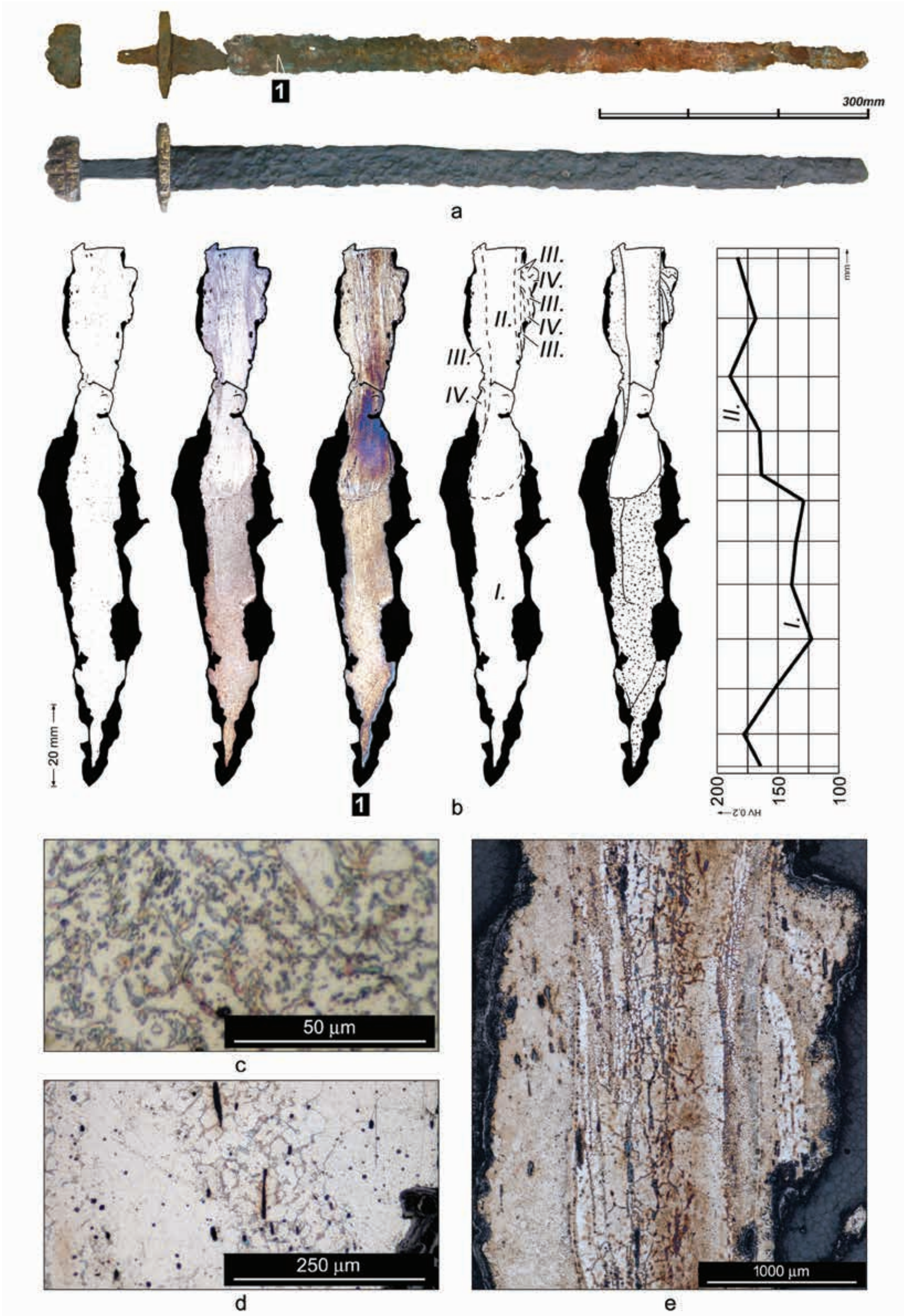

Fig. 130. Sword from the grave No. 1750; a – the sword examined (above: after the fire and before the conservation; below: before the depository fire) and the sampling method utilized; b – schematic drawings and macro photo of the blade samples (from the left: unetched state; after Nital etching (photo); after etching with Oberhoffer's reagent (photo); layout of areas described; distribution of the microstructures and of the main welds across the sample; hardness distribution chart); c – a ferritic-cementitic microstructure in the cutting edge, Area I; d – layers of steel and phosphorus iron in a pattern-welded surface panel; e – view of the middle portion of the blade (the pattern-welded surface panels and the core); etched with Nital (c, d) and Oberhoffer's reagent (e). Photos and drawings by J. Hošek and J. Košta.

the front view the lower guard was of rectangular shape, in the horizontal view it was in the shape of an oblong oval. An X-ray image revealed that the hole for the blade and the tang was broadened in step-like fashion.

The blade is relatively short (779 mm) and slender (51 mm wide by the lower guard), while a more distinct narrowing appeared near the point. The point itself was preserved in a rounded shape. The fuller, which did not narrow along most of its length, was 25 mm wide in the upper part of the blade and over the entire length was decorated with pattern-welding. Both the fuller and pattern-welding extended from the lower guard almost to the point. X-ray images show that a herringbone pattern of SZ-twist alternates with four straight patterned (II) sections.

Typological determination of the sword

Due to the pommel that is vertically divided into five closely adjacent lobes, the sword unambiguously belongs to Petersen's type K (Petersen 1919, 105–112; for other analysis of the type see Müller/Wille 1982, 137–149; Vinski 1983a, 477–487; Bilogrivić 2009). It is also Geibig's type 6 (specifically it is the combination type 6-3-4-3; see Geibig 1991, 44–47). The construction of the upper-hilt (the pommel is fastened to the upper guard by a pair of rivets) corresponds to Geibig's construction type II (Geibig 1991, 90–100). The individual lobes, with slightly rounded tops, are separated from each other by plastic depressions. Since the central lobe is slightly more massive than the others, the general shape of the pommel is somewhat triangular or rather transitional between triangular and semicircular. If we take into account also the relatively short-and-slender lower guard (whose length, nonetheless, still distinctly exceeds the width of the relatively narrow blade) and the wire inlay applied to both the upper hilt and crossguard, the weapon can be classified as a 'classical' variant of Petersen type K (Geibig 6), which lacks some features of both the earlier and later types of swords.

The crossguard belongs to Ruttkay's type 6 (Ruttkay 1976, 249) due to its shape.

The blade of the sword has the clear features of Geibig's type 2 (Geibig 1991, 83–90) and according to its slender form (a narrow and short blade, and low weight) it is closest to the variant 2b, although some parameters do not correspond with it. It differs from type 3 by the fuller, which does not narrow along the first 400 mm of its length. According to the classification presented in this study the blade belongs to the group {b} (see Chap. 4.2), which was determined on the basis of lengths and widths of blades. In comparison with other 9th and 10th century swords, this group includes swords with slender and short (to medium long) blades. Both early and late Carolingian swords appear in this group.

Scabbard, straps and outer wrappings

The blade bore the remains of a wooden scabbard, which probably was not lined with textile. The scabbard was, along the axis of the sword, provided with iron rivets; around four rivets or their imprints were preserved on the side B at a distance of 32 mm to 340 mm from the point, another three to six rivets were preserved on the side A at a distance of 60 mm to 285 mm from the point. Two other less distinct imprints of rivets were observed near the cutting edges on the side A.

Metallographic examination

Sampling: Sample [1] was taken from one side of the cutting edge of the weapon after it had been affected by fire, approximately at a distance of 116 mm from the crossguard (Fig. 130:a).

Metallographic description of the blade: **SAMPLE [1]:** The matrix is full of numerous very fine inclusions, which can be observed in the unetched state. The metal purity thus corresponds to level 4 on the Jernkontoret scale. The sample is divided by a distinct crosswise crack. Four basic structural areas can be determined after etching with Nital (Fig. 130:b). Area I consists of ferritic-cementitic microstructure (Fig. 130:c); the cementite in the cutting-edge tip forms fine globules and veins that locally create more or less enclosed cells on the grain

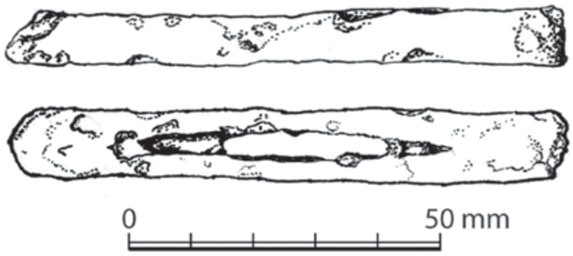

Fig. 131. Settlement find of the crossguard from Mikulčice-Kostelisko, square 3/IV. Drawing by J. Košta.

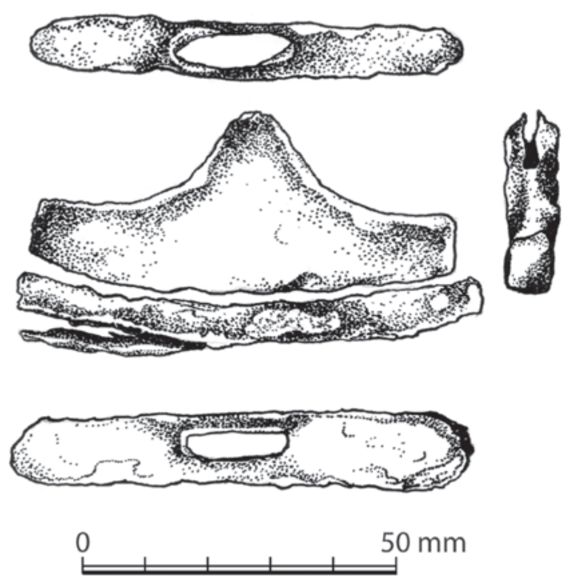

Fig. 132. Settlement find of the upper hilt from the Mikulčice-Valy, square 27/-4. Drawing by K. Urbanová

boundaries (the hardness of this microstructure is 165 ± 13 HV0.2) while the cementite closer to the central part of the blade creates a rather discontinuous network (the hardness here is 131 ± 7 HV0.2). Area II (covering most of the blade core) consists of a ferritic microstructure with a hardness of 174 ± 11 HV0.2. It has hard-to-distinguish grain boundaries, locally marked by traces of cementite. Area III contains a ferritic-cementitic microstructure (the cementite particles are deposited along the grain boundaries), while Area IV contains a ferritic microstructure without distinct grain boundaries (Fig. 130:d). After etching with Oberhoffer's reagent, Areas II and IV show an increased content of phosphorus (Fig. 130:e), what was confirmed by EDXA (0.8 ± 0.2% P). Welds are clearly distinguishable in the structure between the core, the pattern-welded panels and the cutting edge, although no welds are visible in the pattern-welded panels themselves.

Assessment: The blade is fitted with steel cutting edges, the surface pattern-welded panels consisted of high-phosphorus iron and steel, the blade core was mostly made of iron with an enhanced content of phosphorus, which is not appropriate for this purpose (low dynamic toughness). The current state of the microstructure does not allow us to determine the initial microstructure and possible heat treatment of the weapon. The sword was a visually impressive and possibly a high-quality weapon.

3.4.17 Crossguard from the 'Kostelisko'

Circumstances of the discovery

The crossguard was discovered during the archaeological excavations directed by J. Poulík in area No. 14, 1961–1962, north of the IX[th] church, namely in the square 3/IV (Poláček/Marek 2005, 121–129).

Description of the crossguard

The shorter straight crossguard (Fig. 131), with partially damaged ends of the arms, has a shape of an oblong prism (90 mm long, 10 mm high, 15 mm wide). From the side view the guard was narrowly rectangular; in the horizontal it was rectangular with slightly convex longer sides. The central hole, which was on the upper side 32 mm wide and on the bottom side 50 mm wide, contains preserved traces of a blade.

Typological determination:

The shape of the crossguard corresponds with Geibig's type 6 (Geibig 1991, 25) and Ruttkay's type 7 (Ruttkay 1976, 249). Geibig registered the crossguard of type 6 among the finds from

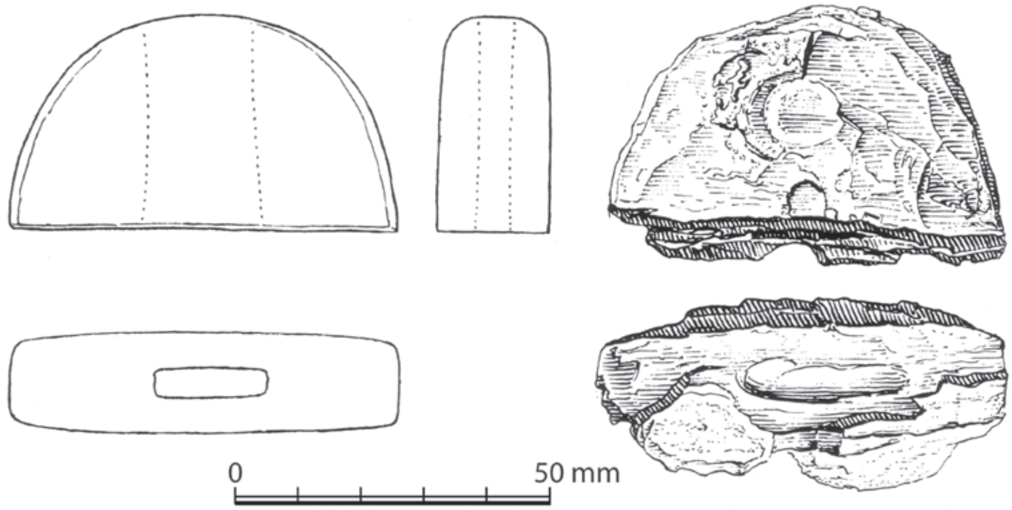

Fig. 133. Settlement find of the pommel from the northern extra-mural settlement (Klíma 2005).

Germany only in one case, that is in a sword of type X (Geibig 12, I), which comes, as somewhat uncertainly supposed, from Hedeby (Geibig 1991, 58, Taf. 158, Kat.-Nr. 279). At the same time, swords of Petersen's type X form the most numerous group of swords from Mikulčice. Nevertheless, the crossguard itself is not typical for the type of swords discussed. Concerning the shape it corresponds with the common crossguards used for the Petersen X (Geibig 12, I) swords, but it is considerably shorter – their length usually exceeded 110 mm. Geibig identified crossguards shorter than 110 mm only in three cases out of 18 (Geibig 1991, 58).

3.4.18 Upper hilt from the acropolis

Circumstances of the discovery

Both parts of the upper hilt were discovered during the archaeological excavations directed by J. Poulík in area No. 6 'IVth church 1958' (Poláček/Marek 2005, 81–86), southwest of the IVth church, namely in the square 27/-4.

Description of the upper hilt

The upper hilt (594-5118/58; Fig. 132) had a height of 35 mm, a length of 70 mm and a maximum width of 11 mm. A three-lobed 'cocked-hat style' pommel with the upper part in the shape of an inflexed arch was 29 mm high, 67 mm long and 9 mm wide; it was in a shape of a triangle with a slightly convex base and concave sides. A hole for a tang went through the whole pommel; on the top it was 12 mm long and 3 mm wide and in the base 19 mm long and 6 mm wide. Within the hole, the sparse remains of a corroded tang were preserved. A very low upper guard (70 mm long, 6 mm high and 11 mm wide) was curved as the pommel base. From the front view it had a shape of a narrow rectangle whose ends were curved towards the top of the pommel, in the horizontal it was rectangular with rounded ends. All its sides exceeded the size of the pommel by 1 mm to 1.5 mm. The hole for a tang was 4.5 mm wide and 17 mm long, i.e. the hole in the upper guard was somewhat smaller than those in the pommel base.

Typological determination

Regarding both the shape and the construction employing a wide and high pommel, the upper hilt belongs to Petersen's type Y, variant 2 (Petersen 1919, 167–173), Geibig's type 13, variant I (specifically Geibig's combination type 13-13-4-?; Geibig 1991, 60–63) and Ruttkay's type VII (Ruttkay 1976, 249–251).

The construction of the upper hilt may be best described by Geibig's construction type I, although it does not correspond to the chronological classification reported by Geibig for this type (Geibig 1991, 90–100). That is the reason why Geibig (rather unsystematically) considered the upper hilts of his type 13, I a special variant of construction type III (Geibig 1991, 98).

The upper hilt deviates by both size and typological features from the group of Y-type swords that occur in the southern part of central Europe. The closest analogy can be sought in a sword from grave 130 at the burial ground of Gars-Thunau (Nowotny 2011; in print).

The distinct height and length, but, at the same time, the small width of the pommel as well as the dimensions of the upper guard (which slightly exceeds both the width and length of the pommel and which is relatively high in comparison with the usual upper hilts of Y-type swords) indicate that the upper hilt discussed ranks among the earliest variants of the Petersen's type Y, which showed a morphological relation to the type L (Petersen 1919, 112–116).

3.4.19 Pommel from the northern extra-mural settlement

Circumstances of the discovery

The pommel was discovered during the archaeological excavations directed by Z. Klanica, in area No. 58 'P 1981–82' (Poláček/Marek 2005, 241–245). It was found in a cultural layer nearly 10 m southeast from a structure interpreted as a smithy, situated in the Northern Extra-mural Settlement, in the vicinity of the Mikulčice stronghold (Klíma 1985, 441–442).

Description of the pommel

The single, highly arched and massive pommel of semicircular shape (Fig. 133) had a regularly perforated hole for the tang (35 mm high, 64 mm long and 18 mm wide). From the side view it was oval with slightly rounded upper edges; in the horizontal it has the shape of a rectangle with slightly curved longer sides. The hole for the tang of the blade was 5 mm wide, in the base it was 25 mm long and on the top it was roughly 17 mm long.

Typological determination

The pommel belongs to Petersen's type X (Petersen 1919, 158–167), Geibig's type 12, variant I (specifically it is Geibig's combination type 12-11-6-?; Geibig 1991, 56–60) and Ruttkay's type VII (Ruttkay 1976, 249–251). The pommel construction corresponds with Geibig's construction type III (Geibig 1991, 90–100). Due to the highly arched shape the pommel is, according to the classification by Kucypera, Kurasiński and Pudło (2011), the variant X-earlier.

3.4.20 Pommel of an upper hilt from the acropolis

Circumstances of the discovery

The pommel was found using a metal detector in 2012 within the scientific archaeological excavation that took place in the eastern part of the acropolis (in location 'Horní Valy') of the Mikulčice stronghold.[88]

Description of the pommel

The hollow pommel of iron is segmented by shallow depressions into six (seven?) lobes. In the front view it has the shape of a relatively low circular segment. The pommel includes a preserved pair of rivets, which were symmetrically attached to the pommel. These rivets penetrated the pommel in the depressions between the first and second and the next-to-last and last lobes. The preserved parts of the rivets reached the space for an upper guard, which was originally fastened by the rivets to the pommel.

88 We are grateful to PhDr. L. Poláček, CSc. from the Institute of Archaeology of the AS CR in Brno for the information provided. In this study, the find is published preliminary, without any further details such as photographs photographs and dimensions.

Typological determination
The pommel belongs to the group of swords with the pommel divided into more than four plastic vertical lobes, which are interconnected with most of their contact area. This group corresponds, according to M. Jakobsson's classification, with the 'design principle 3' (swords with pommels having three or more lobes). The swords with five lobes were classified by Petersen as type K (Petersen 1919, 105–112) while other scholars also assigned to this group swords with pommels having a higher number of lobes (Müller-Wille 1976, 37). This widespread perception of swords of Petersen's type K corresponds also with typological classification of A. Geibig (1991, 44–47), who described the above mentioned upper hilts as type 6. The construction of the upper-hilt (the pommel is fastened to the upper guard by a pair of rivets) corresponds with Geibig's construction type II (Geibig 1991, 90–100).

4. Typology and chronology of Mikulčice swords

4.1 Summarization of sword-types by the hilts found in Mikulčice

Among the sixteen swords and four parts of swords found in Mikulčice two specimens whose upper hilts had a triangular-shaped pommel were found in graves 265 and 715 (see Fig. 134). These upper hilts, are typical for early Carolingian swords (see Chap. 2.2), but their construction differs. The upper hilt from grave 265, which was uncovered in the interior of the earlier phase of the IInd Mikulčice church, corresponds to Geibig's combination type 5, variant I. The construction of upper hilt of this type is significant – it has a hollow pommel fixed to the upper guard with two rivets, corresponding to Geibig's hilt-construction type II (Fig. 138). All the surface of the upper-hilt and crossguard was originally decorated with vertically inlaid wires of non-ferrous metal. This is the classical form of Petersen type H, but the criteria for defining his type H are not as strict as the criteria for defining Geibig's combination type 5, variant I (the type H could include weapons with upper hilts of identical forms but various modes of construction); see Fig. 135, 137. The sword from grave 715 has an undecorated upper hilt with a solid pommel of Geibig's construction type I (Fig. 138). By Petersen´s definitions, the sword must be classified as an undecorated variant of type H (or I, which is now usually united with type H). The features that are not usual for swords of Petersen´s type H (or I) are, among others, the absence of any characteristic decoration on the hilt as well as a different construction of the upper hilt (Geibig's construction type I). This connects the sword with the rather archaic Petersen´s type B (for more detailed description see typological determinations in Chap. 3.4.2 and 3.4.10).

Two swords from graves 90 and 1750 and one pommel (metal detector find) can be classified as Petersen's type K (Geibig's type 6), see Fig. 134–137. The grave finds of K-type swords from Mikulčice however differ significantly. The sword from grave 1750, is decorated with vertically inlaid wires of brass, and can be described as a 'classical' variant of Petersen type K. It belongs somewhere in the middle of the development series of K-type swords. A sword from grave 90 features a heavy semi-circular upper-hilt with a six-lobbed pommel divided by vertically placed wires of brass laid in indistinct grooves and very long narrow crossguard; this is a variant from the K-type sword, which inclines towards swords with a semi-circular upper hilt in terms of morphology (for more detailed description see typological determinations in Chap. 3.4.1 and 3.4.16).

Two Mikulčice swords, from graves 425 and 723, have a semi-circular upper hilt and their pommels are fixed to the upper guard by two rivets; so they can be labelled as Petersen's type N (Geibig combination type 8), see Fig. 134–137. The largest number of swords, nine specimens from graves (280, 341, 375, 438, 500, 717, 805, 1347 and 1665) and one settlement find of a pommel, feature simple semi-circular pommels and the weapons may be classified among Petersen's type X (Geibig's type 12, variant I), see Fig. 134–137. The upper hilt of a specific Y-type (Geibig's type 13, variant I) sword was found in a settlement context (see Fig. 135–137). The sword of archaic form from burial 580 could not be

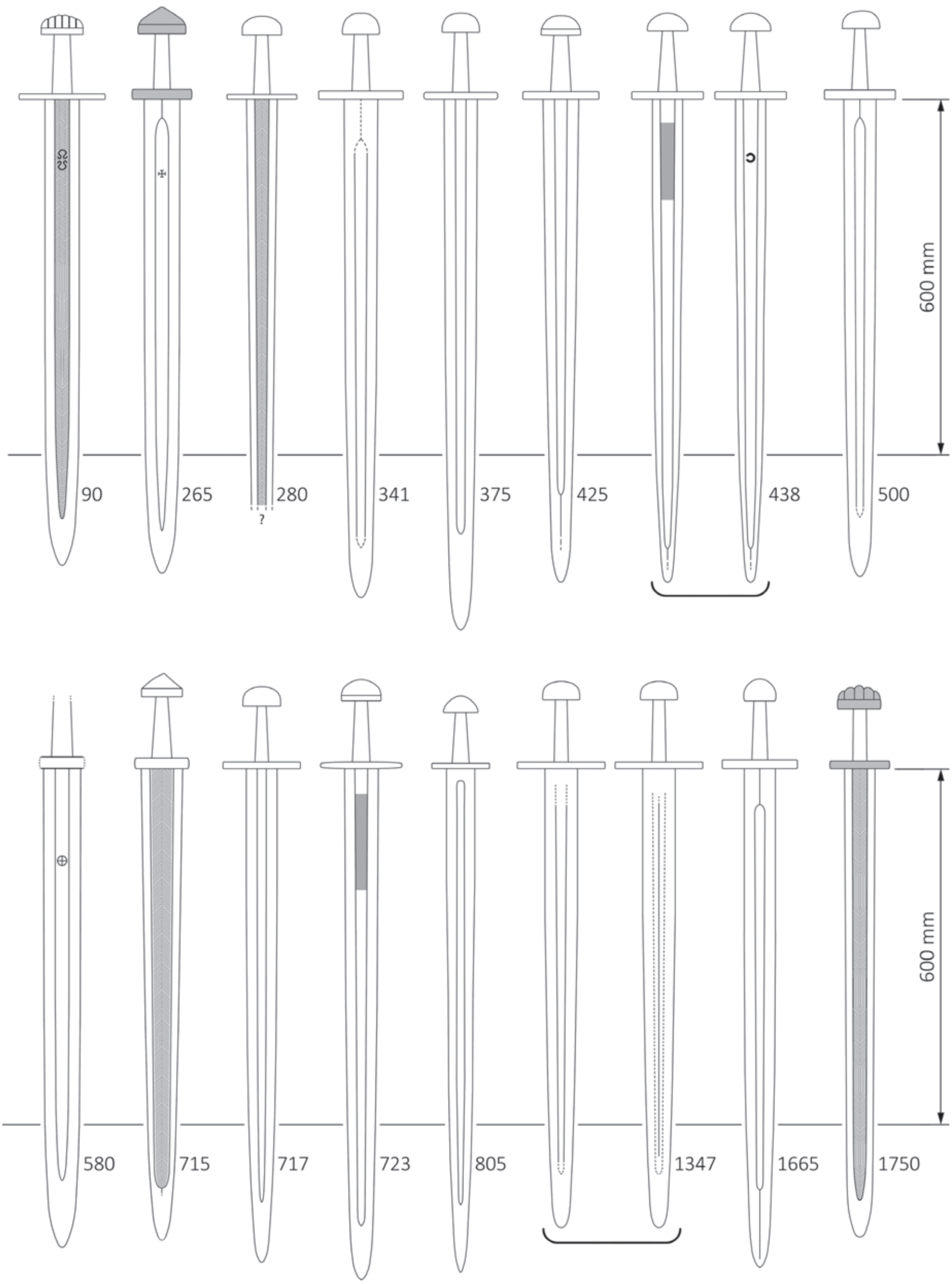

Fig. 134. Assumed appearance of the swords from Mikulčice (numbered according to the graves they come from). Drawings by J. Hošek and J. Košta.

typologically classified (for more precise description and consideration about dating of this sword see Chap. 3.4.9). Finally a narrow, low, prismatic but relatively short crossguard, preserved with the remains of a sword blade in an opening, was found in the settlement context (see Chap. 3.4.17).

4.1.1 Swords with a triangular pommel

As stated in the introduction to this chapter, two swords with a triangular pommel found in Mikulčice, despite differences in their construction and decoration, may be classified as Petersen type H (Petersen 1919). In Geibig's classification (Geibig 1991), each of these swords would be described as a different type, thus suggesting different production periods. As the specific case of the two Mikulčice swords reflects the broader problem of classifying Carolingian swords, the following text deals not only with the H-type sword but also takes a wider approach to the group of continental and Scandinavian sword finds with a triangular pommel. This group of swords is the result of the continual development of European swords in the Merovingian, Anglo-Saxon and Vendel environments[89]; also important with respect to continental Europe is the Niederramstadt-Dettingen-Schwabmühlhausen type described by F. Stein (1967) in south Germany for the Late Merovingian period, as well as the Arkebek type described in the north German region by J. Kleeman (2002, 112) those was before imprecisely designated like the Petersen type A (Schwarz 1984, 100–117). This type of sword with a low triangular pommel attached to the upper guard by means of the tang is perhaps the closest prototype of Carolingian swords with a triangular pommel.

The earliest Carolingian swords in this group are characterised by the use of a composite hilt with a solid pommel (Geibig's construction type I; see Fig. 138); the sides of the upper hilt are typically squared and the pommel in side view had a narrower, rectangular shape. However, compared to earlier swords, the pommels were substantially higher and their shape assumed a more dominant position[90]. North German researchers designated these swords as the Immenstedt or Altjührden types (Stein 1967; Menghin 1980; Kleemann 2002), but as F. Androŝuk (2007) recently demonstrated, they represent variants of the Petersen type B known from Scandinavian finds. A characteristic of early Carolingian swords is the substantial mixing of the different types of sword forms, which do not become clearly distinct from one another until later. For example, signs of vertical segmentation appear on the triangular pommels of swords. Swords whose forms are mixed in this way are sometimes classified under the vaguely defined Petersen type A (Petersen 1919; Androŝuk 2013, 39–40), and there have been attempts to classify them under Petersen's special type 1 (Vinski 1983a) or designate them as the Biskupija-Medvedička group (Müller-Wille 1982). While B-type swords (Immenstedt-type, Altjührden-type) emerged in northern Germany sometime around the middle of the 8th century (summarised most recently in Kleeman 2002), German scholars typically dated the end of the development of this type to the turn, or the beginning, of the 9th century. This dating is supported by the end of their occurrence in Saxo-Frisian cemeteries (Kleemann 2002, 273–295) and in burial grounds in the Austrian Danube region (Szameit 1986). In reality, the use of swords of a similar construction extended much longer into the 9th century, as is indicated by Scandinavian finds of Petersen type B swords and even certain others described by F. Androŝuk (2013, 39–40) as Petersen's type A. These were found in archaeological contexts from the Early Viking Period (between the late 8th century and the late 9th century). Similar sword finds are also known from central-eastern European cemeteries of the Great Moravian period.

89 Summarised in Davidson 1962; Bruce-Mitford 1978; Menghin 1983; Norgård-Jørgensen 1999b.

90 Although the sword from grave 715 has this type of upper hilt, but its upper hilt is more robust and closer to classic H-type swords.

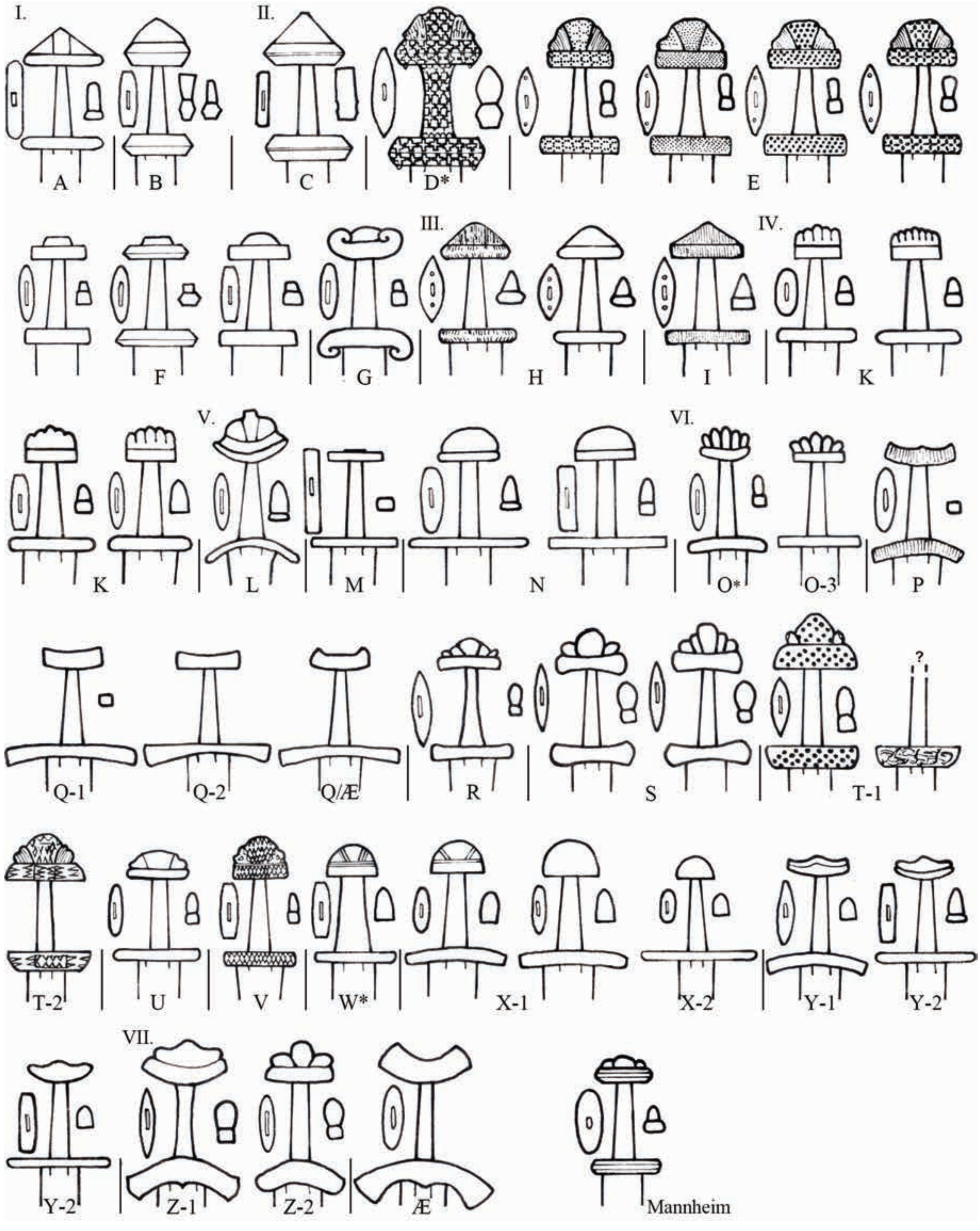

Fig. 135. Petersen's typology of swords and the sword of Mannheim type – schematic image of basic types and their variants. The Roman numerals mark the group of sword type; they are always placed above the first sword of the group. Arabic numerals stand for the variants of types defined by Petersen. Notes (*): D – Petersen differentiated three variants of this type according to decorative motives (miniature stylized animal heads; small crosses; small metal plates in quadrangular fields); O – the 1st variant differs from the 2nd by the style of decoration (separated bunches of stylized palmette; scandinavian animal ornaments and the plaits). W – pommel and the crossguard of the sword are made of bronze. Framed by J. Košta on the basis of Petersen's documentation, drawn by B. Vávrová.

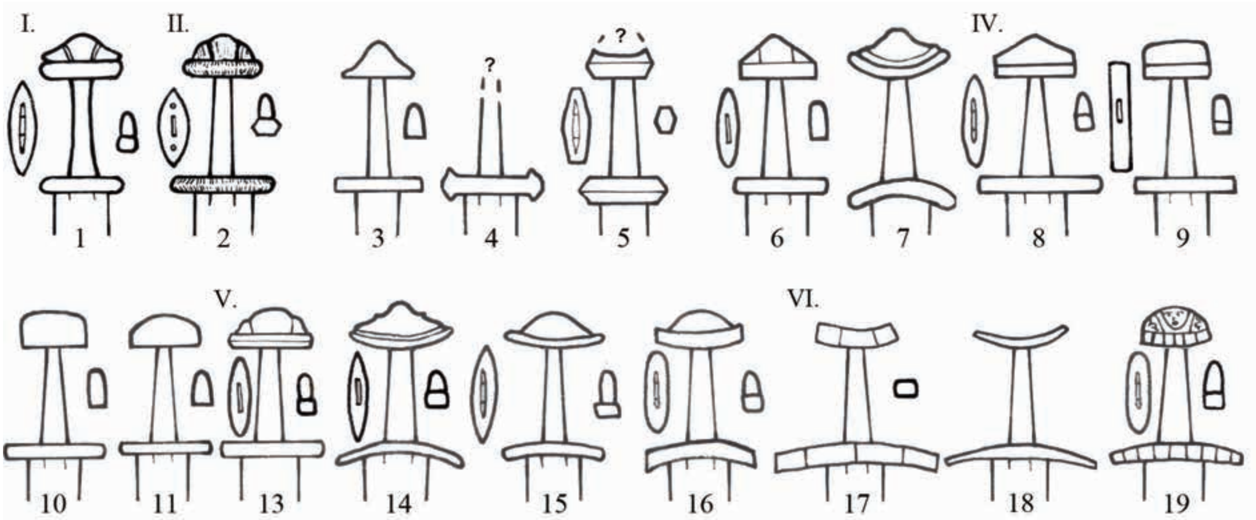

Fig. 136. Petersen's typology of swords – schematic image of special types. The Roman numerals stand for the group of swords; they are placed above the first sword of the group. Types not shown: special type 12 is morphologically the same as the type X; special type 20 represents decorated swords of V or H type with lost pommel and well-preserved rivet securing it to the upper guard. Framed by J. Košta on the basis of Petersen's documentation, drawn by B. Vávrová.

Another construction of upper hilts of Carolingian swords, which was designated by A. Geibig (1991, 90–100) as construction type II appeared as early as the second half of the 8th century (Fig. 138). The two-part upper hilts in the group of swords have a hollow pommel typically attached to the upper guard with a pair of rivets; the tang is hammered flat at the top of the upper guard, i.e. 'inside' the hollow pommel (as is the case with the sword from grave 265). A less frequent (and probably later) variant of this type is equipped with a single U-shaped rivet whose two straight ends are attached to the upper guard; the pommel is then soldered to the curved part of the rivet. The roots of this construction type of upper hilt can be traced to swords of the Merovingian period (Menghin 1983). Their large-scale employment in Carolingian swords occurred later during the final quarter of the 8th century and the beginning of the 9th century, when they appear in various swords whose pommels were lobed into vertical segments and when they also appear among swords with triangular pommels (Menghin 1980; Müller-Wille 1982; Geibig 1991). Sword upper hilts of this shape and construction appear in undecorated variants (designated in Germany as the Dunum type; see Menghin 1980) as well as in variants with typical inlaid decoration composed of vertically orientated bands of non-ferrous or precious metal set closely next to each other. Although similar decoration also appears on several other types of Carolingian swords (e.g. type K and special type 2 according to Petersen, etc.), it is especially characteristic of H-type swords, the vast majority of which feature this decoration.[91] A valuable resource for dating the beginning of the occurrence of type H swords in their classical form (with inlaid decoration, upper hilt construction and a triangular pommel in both front and side view) is a sword discovered in the western burial from double grave 217 at the cemetery in Schortens, Friesland (for the best documentation of the sword see Westphal 2002, 89–91); the grave was furnished with Charlemagne *denarii* minted between 771 and 793/4, providing the *post quem* dating of the grave unit (on the dating see Rötting 1985; Geibig 1991; Kleemann 2002).

91 Both J. Petersen (1919) and F. Androŝuk (2013) identified only isolated undecorated specimens among hundreds of Norwegian and Swedish finds of type H.

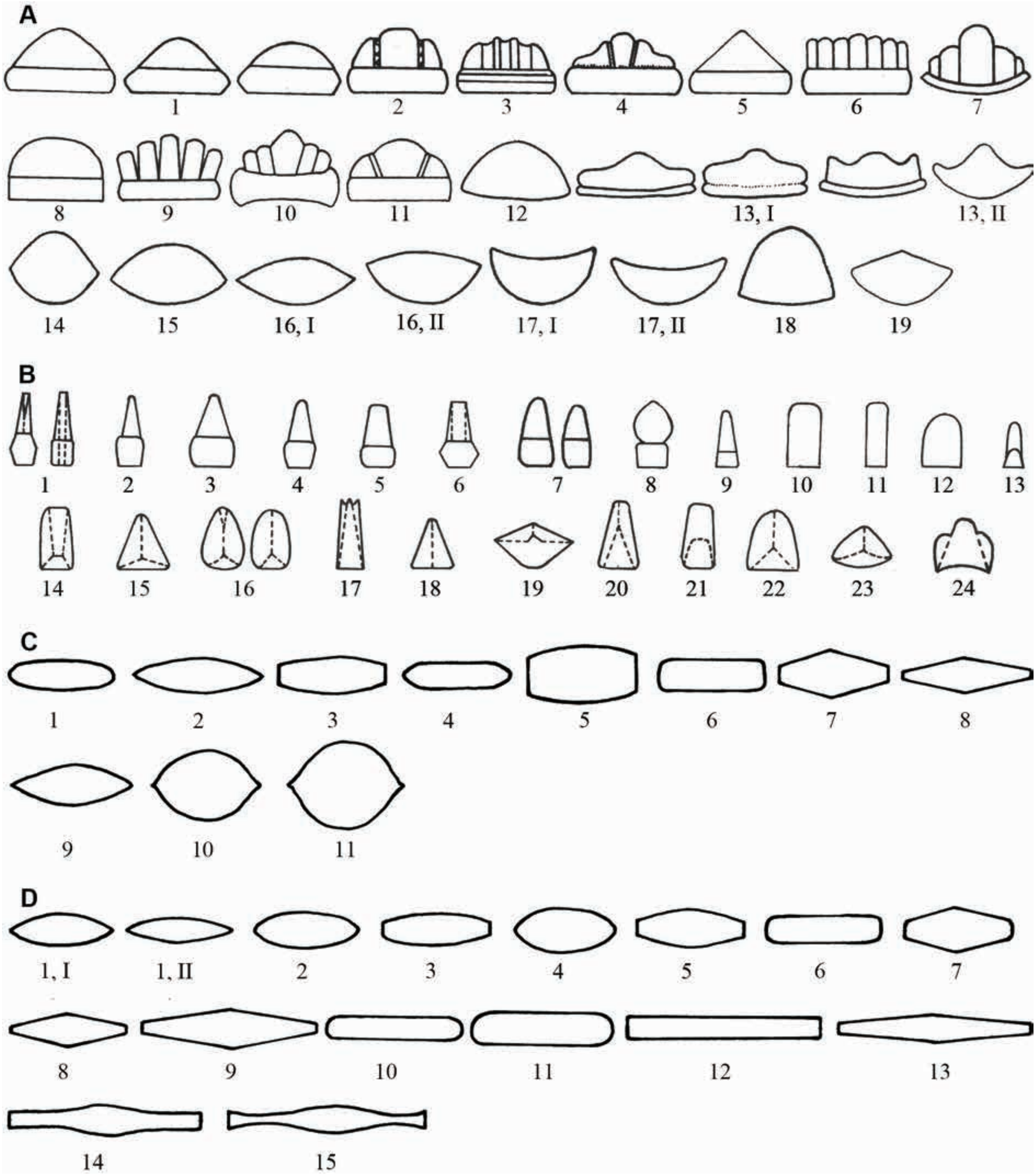

Fig. 137. Geibig's combinative typology of sword hilts. A – front view on the pommel; B – side view on the pommel; C – horizontal (undersurface) view on the pommel; D – horizontal (undersurface) view on the guard. Framed by J. Košta on the basis of Geibig's documentation, drawn by K. Urbanová and B. Vávrová.

Petersen type H swords are heavily represented in Scandinavia. J. Petersen (1919) presumed that the swords reached Norwegian grave units between the first half of the 9th century and the 10th century (primarily the first half). The basic problem with Petersen's dating of the swords is the fact that the author had only a very limited number of excavation units with an unambiguous archaeological context available at the time he developed his typology. In addition to type

H swords, Petersen also described a type I with a very similar construction which is in practice difficult to distinguish. Researchers working with Petersen's typology often combine types H and I into a single group (initially in Nordman 1943). F. Androŝuk (2013, 53–55) recently conducted a detailed comparison of the shapes and constructions of the upper hilts of type H and I swords based on Swedish finds and concluded that their features were not chronologically significant and that therefore it makes no sense to distinguish them. Androŝuk designated the type created by the merger of types H and I as type H/I. The later phases of type H swords are documented mainly by multiple finds from graves from the Swedish sites of Birka and Vendel, with coins dating from the period between the turn of the 10th century to the 940s (summarised in Androŝuk 2009; 2013, 138–143). Based on their joint occurrence with certain types of fibulae, some scholars speculate that H-type swords continued to be placed in graves in Scandinavia in the second half of the 10th century (Jansson 2005, 72; Jansson/Potupčik/Androŝuk 2006). But while the Swedish finds are of great use in dating the end of the occurrence of H-type swords, they cannot be used to establish their initial appearance, as Androŝuk attempted when he speculated that they were not used, until the course of the 10th century, with minor exceptions. Although it was not customary in southern and central Sweden in the Early Viking Age (or Early Birka Period) to place weapons in graves, H-type swords are represented among the small number of swords from well-datable graves from the 9th century. In contrast, in Gotland, where weapons were commonly placed in Early Viking Age graves, H-type swords dated to the 9th century are numerous (e.g. Thunmark-Nylén 1991; 1995).

The beginning of the production of H-type swords can be traced to the Carolingian Empire, from where their typical decoration in the form of vertically inlaid wires also comes and which also appears on different types of Carolingian swords (Arbman 1937, 222; Mühlen 1975, 36; Stein 1967, 80). The occurrence of type H swords spread eastward from the Frankish Empire as direct exports and they can be found in Croatian graves between the end of the 8th century and the middle of the 9th century (Vinski 1983a; Belošević 2007). Naturally, they are also found in Great Moravian cemeteries (Hrubý 1955; Dostál 1966; Vignatiová 1993). The extraordinarily high occurrence of H-type swords in Scandinavia accompanied, by the application of the H-type upper hilts on a single-edged blades of local origin (Petersen 1919; Androŝuk 2013) can be regarded as an indication that H-type swords were produced in this area perhaps using Carolingian prototypes and that their local production extended far beyond the period in which they were produced in continental Europe (Strömberg 1961, 137; Geibig 1991, 165). Despite the substantially conservative design of the hilts of H-type swords, certain features not usually found on swords of this type from continental Europe might testify to their continued production in the Viking environment. Such features might include, for example, a pommel soldered to a U-shaped rivet, both ends of which were inserted in the upper guard (Thålin-Bergman/Arrhenius 2005, 38, Tab. 5). Narrow upper hilts classified by J. Petersen as type I are also extremely rare outside Scandinavia. If H-type swords had fallen out of use in Scandinavia during the second half of the 10th century, in continental Europe they had already fallen out of use during the 9th century. Not a single sword of type H has been found at any inhumation cemetery in Bohemia, where graves were richly furnished from around the second half of the 9th century to the second third of the 10th century. Instead, X- and Y-type swords predominate in these cemeteries (Profantová 2011; 2012; Hošek/Košta/Mařík 2012).

Well-datable swords decorated with vertical wire inlay occur in continental Europe in the period between the second half of the 8th century and the first half, at most the second third, of the 9th century. Similarly decorated early Carolingian swords were found in the phase of the earliest inhumation graves at the cemetery in Staré

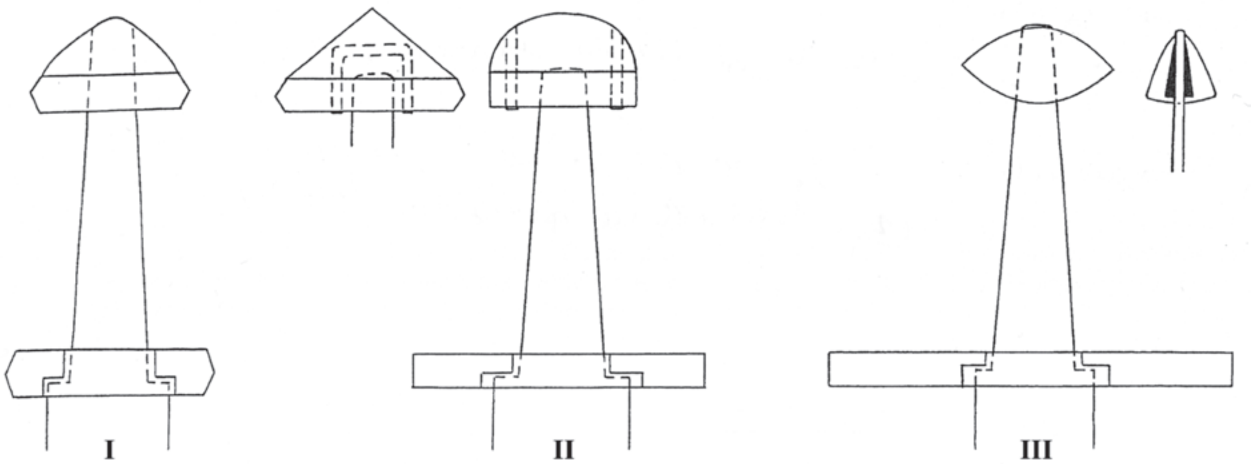

Fig. 138. Geibig's structural typology of sword hilts (taken from Geibig 1991, Abb. 24).

Město – Na Valách.[92] A sword from the barrow cemetery near Skalice (Slovakia) was also decorated in a similar manner (Budinský/Krička 1959). Undecorated swords with triangular upper hilts of Geibig construction type I (Fig. 138) related to Petersen type B swords (Immenstedt and Altjührden types), which were found in Austria in archaeological contexts datable to the later 8th century can be closely related with swords of a similar construction known from Dalmatian Croatia (e.g. Nin-Ždrijac; see Belošević 2007) and even Moravia. The sword from grave 65 from Břeclav-Pohansko is very similar to the sword from Mikulčice grave 715; the two swords have similar upper hilts and pattern-welded blades.[93] Burial 36 at the Nechvalín-Homole cemetery can be placed in the Early Great Moravian Horizon (Klanica 2006a, 33–36) and has a sword of similar construction. Finally, burial 277/49 from Staré Město – Na Valách, with a sword featuring an undecorated composite upper hilt (consisting of both pommel and upper guard) of an unclear internal construction and a short cross-guard, was deposited in a grave in the southern part of the cemetery in the early period of its use. This involved a relatively early grave whose relationship to the earliest phase of burials at the site and to the church is unclear.

In summary, Mikulčice swords with a triangular upper hilt were most probably produced between the end of the 8th century and the middle of the 9th century. Nonetheless, a somewhat later date cannot be ruled out entirely. The origin of the swords might be traced to the Frankish Empire, but a local origin cannot be completely ruled out for the simpler, undecorated upper hilts such as that found on Mikulčice sword 715.

4.1.2 Petersen type K (Geibig 6)

In contrast to swords with a triangular upper hilt, Petersen type K swords (Geibig combination

92 Burials 119/AZ and 223/51; sword 116/51 without an upper hilt also belongs in this group (see Hrubý 1955; Ustohal/Stránský 1992; Galuška 2003; Chorvátová 2004).

93 The grave 65 from Břeclav-Pohansko is located on the grounds of the magnate's court and respects its earlier as well as later palisade; it is covered by two superimposed graves (58 and 64), but is located relatively far from the church (Kalousek 1971, 55–56; Vignatiová 1993). If the opinion is to be accepted that burials began at the church cemetery at Pohansko only after the church was built (Dostál 1975, 240–241), the grave must be dated to the second half of the 9th century and was evidently covered with another grave during the Great Moravian period. It cannot be entirely ruled out that the grave is from the same period as the corner of the early palisade, prior to the construction of the church; J. Vignatiová (1993, 92, 97) also connects the grave to the early palisade. Nevertheless, the relatively poor grave furnishings unfortunately do not help to clarify the situation.

type 6) represent a relatively clearly defined group (Fig. 135, 137). These swords are characterised by an upper hilt (pommel) lobed into five or more vertically orientated segments (Petersen 1919, 105–112; supplemented by Müller-Wille 1976, 37). The majority of K-type swords have a composite upper hilt, while rare cases of single-part upper hilts apparently represent derivatives and local imitations of classic K-type swords.[94] In the majority of cases, type K swords with two-part upper hilt correspond to Geibig's construction type II, i.e. they have a hollow pommel attached to the upper guard by a pair of rivets (Fig. 138). Both Mikulčice specimens from graves 90 and 1750 belong to this group, as does the settlement find from the Mikulčice acropolis. J. Petersen suggests that K-type swords developed during the course of the 9th century, and that O-type swords evolved from them prior to the end of this century. Petersen type O swords mainly differed from K-type swords by the fan-shaped arrangement of the pommel segments in contrast to the vertically arranged segments typical for K-type swords. The development of O-type swords known from the Frankish Empire seems to have continued in Scandinavia in the first half of the 10th century. The differences between some O-type swords, which Petersen labelled as variant O-3, and K-type swords are so minor that they can be classified together as swords of type K (e.g. Androŝuk 2013, 62–63). A. Geibig (1991, 143) also dated his combination type 6 to the period between the turn of the 9th century and the end of the 9th century.

An interpretation of the absolute chronology of Dalmatian finds from the 'Biskupija-Crkvina Horizon' is of key importance for estimating the beginning of the development of K-type swords. Several richly furnished graves in the Biskupija-Crkvina cemetery, including burials with K-type swords, also contained Byzantine *solidi* of Constantine V and Leo IV, minted between 760 and 775 in Sicily. In the opinion of T. Šeparovič (2003), the presence of these coins is probably connected with Byzantine payments to Dalmatian towns or directly to the Croatian elite, aimed at stabilising the situation in the Adriatic after the fall of the Exarchate of Ravenna and the occupation of Istria by the Lombards after the breakup of the Lombard kingdom by Charlemagne. Recently, M. Petrinec (2009, 224–227) took this view to disprove the previous interpretation that the *solidi* were deposited in the graves over several generations (Werner 1979; Vinski 1983a). The argument of Petrinec was based primarily on the results of an unpublished revisory excavation of the cemetery in Biskupija-Crkvina and on the exclusion of the said *solidus* from the inventory of a burial in a sarcophagus in the Biskupija church, but this hypothesis cannot yet be verified. Based on an evaluation of the overall context of finds of Byzantine coins in the north-eastern Adriatic, it is necessary to accept that the coins in fact reached Croatia in the 760s or 770s and that they could have found their way into the find contexts over a period of several decades. Disregarding the historical interpretations used by a number of researchers (e.g. Werner 1979; Vinski 1983a) as an argument for a later dating, the coins are combined with artefacts of a Carolingian character which are difficult to date earlier than to the end of the 8th century on the basis of existing knowledge. Also belonging to this group are the swords of type K; the emergence of K-type swords apparently does not date earlier than the turn of the 9th century in the area around the North Sea as they have not been found in Saxon and Frisian burials of that period (Kleemann 2002, 175–295; Westphal 2002) nor in graves from all the territory of the Frankish Empire (Geibig 1991).[95] E. Szameit (1986, 395–396) also dates early forms of K-type swords from Austria to the early 9th century. Type K swords from well-datable contexts from continen-

94 F. A. Androŝuk (2013, 63) designated these swords as variant K-3.

95 Within the Frankish Empire, funerary customs which included the deposition of weapons in graves declined at the turn of the 9th century (e.g. Stein 1967; Kleemann 2002).

tal Europe cannot be dated to a period later than the third quarter of the 9th century (Menghin 1980; Müller-Wille 1982; Bilogrivić 2009). Among the most recent finds of classic K-type swords with a composite upper hilt construction (consisting of both pommel and upper guard) is a settlement find from Birka in Sweden that can be dated to the period around the year 900 (Wigh 2001; Androŝuk 2013, 195–201). An even later dating cannot be ruled out for certain type-K variants (e.g. those with a single-part upper hilt). Type K swords from Ireland can also be dated to the course of the 9th century (Walsh 1998).

The origin of K-type swords can be reliably traced to the territory of the Frankish Empire. In addition to the distribution of finds in a ring around the Frankish Empire, with a concentration in areas where it was still customary to place weapons in graves in the 9th century, this origin is also supported by evidence of the forming of this type of swords in Frankish territory along with inscriptions with Frankish names and decoration in the Carolingian floral style applied on cross-guards (Müller-Wille 1978; Geibig 1991; Bilogrivić 2009).

There was a fundamental transformation in the construction of Carolingian swords over the course of the development of the K-type swords, including an increase in the length of cross-guards. While the earliest K-type swords have very short crossguards that are similar, for example, to those found on B- and H-type swords, later K-type swords have crossguards of considerable length comparable to those on later Carolingian swords of type X. Providing a reliable *ante quem* dating for the occurrence of long crossguards is a K-type sword discovered in a ship burial in Hedeby, apparently from the second quarter of the 9th century (summarised in Wamers 1994). Representatives of both of these variants were found in Mikulčice. A sword-hilt of an earlier construction with a relatively short to medium length crossguard comes from grave 1750, while a specimen with a very long crossguard was found in grave 90. The crossguard length is not the only difference found on these swordhilts (see Chap. 3.3.1 and 3.3.16). The swordhilt from grave 1750 has a close parallel in finds from Croatia that can be dated to the first half of the 9th century (summarised in Bilogrivić 2009). The luxuriously decorated sword of type K from the ship burial in Hedeby stands somewhere between the two Mikulčice swords (Müler-Wille 1976; 1984; Wamers 1994). Close parallels to the sword from grave 90 can be found, for example, in swords from Hagenbach and Ludwigshaffen am Rhein-Oppau in Germany, on the upper hilt discovered in Mainz (Geibig 1991), as well as among certain swords from Croatia (e.g. Mogorjelo; Bilogrivić 2009). However, all of these are swords that cannot be dated with greater precision using their find contexts, and the dating of the sword from grave 90 is therefore of major importance in dating this group of K-type swords with stylistically later characteristics similar to swords with a semicircular pommel. For now, we are reluctant to place the pommel of the sword found in a settlement context in the Mikulčice acropolis (No. 20) with greater certainty along the timeline of the development of swords of type K.

4.1.3 Petersen type N (Geibig 8)

Petersen type N swords (Geibig combination type 8) are characterised by a composite, semicircular and undecorated upper hilt, and by a long crossguard (Petersen 1919, 125–126; Geibig 1991, 48–50; Androŝuk 2013, 66–67). In all described cases, the construction of the upper hilt corresponds to Geibig construction type II. Close parallels exist in these specimens to X-type swords. When X-ray images are not available, these upper hilts may be indistinguishable from the pommels of type X swords, because the border between the upper guard and the pommel may be confused with a decorative horizontal line. As a result, some type N swords have been designated as a variant of Petersen type X swords in the past.

Although Petersen and many other researchers[96] dated N-type swords to the second half of the 9th century, a lack of well-datable assemblages

96 E.g. Petersen 1919, 182; Jankuhn 1943, 120; Müller-Wille 1970, 73; Geibig 1991, 143–144.

means that their dating relies solely on morphological criteria. Because of their relationship to swords of type X, which they should precede according to their morphology, the first occurrence N-type swords is hypothetically dated to before the middle of the 9th century. Similar typological argument suggests that they were formed from later variants of swords of the Mannheim type, or the Petersen special type 2 and K-type swords, the later variants of which differ from type N swords only by the vertical segmentation of the pommel. Nevertheless, it is impossible to rule out a different model such as the simultaneous development of swords with a semicircular composite upper hilt (consisting of both pommel and upper guard) and swords with a semicircular single-part pommel of the type X which, in contrast, might have been the result of type X swords imitating earlier forms of swords with composite upper hilts. The end of the production of N-type swords was apparently in the early 10th century, although several specimens were deposited in Old Hungarian graves from Carpatian Basin (Bakay 1967; Ruttkay 1976). While swords with an undecorated, semi-circular, composite upper hilt are found in Scandinavia (Androŝuk 2013, 66–67), in the eastern Baltics (Kazakevičius 1996) and in Hungary (Bakay 1967; Kovács 1995) from the late 10th century and early 11th century, these swords have certain traits distinguishing them from the classic type N swords. These were a short crossguard (less than 110 mm), a relatively massive upper guard and a high upper hilt sharply rounded at the apex. The published documentation unfortunately does not permit any assessment of the inner construction of the upper hilts. These late sword forms with a semicircular, two-part upper hilt have close morphological ties to V- and W-type swords and might represent their undecorated iron variants. Any direct relationship of these swords to their earlier (type N) predecessors, is problematic.

As in the case with the dating of N-type swords, their origin has also been traced to the Frankish Empire primarily on the basis of morphological relationships with preceding and subsequent forms of Carolingian swords (Geibig 1991, 169). Other auxiliary indicators are the identification of archaeologically preserved N-type swords, as is the case with K- and X-type swords, in a regular ring around the east, north and northwest borders of the Frankish Empire in territories where it was still customary in the 9th and 10th centuries to bury weapons in graves.

4.1.4 Petersen type X (Geibig 12, variant I)

Petersen type X (Petersen 1919, 158–167) or Geibig combination type 12-I swords (Geibig 1991, 56–58) are characterised by a solid, single-part semicircular pommel with a flat bottom, corresponding to Geibig construction type III (Geibig 1991, 90–97; see Fig. 138). The tang extends through a hole perforating the entire upper hilt and is hammered flat at its top. Although the height/length ratio and the size of the upper hilt are highly variable, the upper hilts of X-type swords, like other Carolingian swords, are in general relatively narrow in plan and side view, thus clearly distinguishing them from the Geibig type 12, variant II swords, which was later (Geibig 1991, 58–60; Košta et al. 2014).[97] The bottom of the upper hilt is usually an elongated oval or a rounded rectangle, although lenticular shapes also appear. The crossguards of the swords studied are relatively long (their length typically exceeds 11 cm), straight and squared (with rounded corners). In rare cases they are slightly bent towards the blade. With few exceptions, the hilts of X-type swords are undecorated. Petersen specified two variants of type X: the earlier variant had a higher and wider, although less massive, upper hilt and a longer and more robust crossguard, sometimes slightly bent toward the blade, whereas the later variant had a smaller and more massive upper hilt and a crossguard of the same

97 The upper hilts of Geibig type 12-II swords are substantially more massive in the plan and side views; the upper guard has a lenticular shape and the arch is heavily squared over its entire length, giving the upper hilt the shape of a wide pointed arch in side view. The shape of the upper hilt in front view corresponds to Petersen type X (Geibig 12-I).

length (as the crossguard of the earlier variant) yet narrower. A comparison with datable specimens shows that this classification cannot be used to determine the chronology of X-type swords, since certain characteristics described reflect development trends (e.g. Androŝuk 2013, 75–76). A study by P. Kucypera, T. Kurasiński and P. Pudło (2011) described the development of the single-part upper hilts of swords from between the 9th and 12th centuries; both the earlier and later variants described by the authors belong to the earliest phase of X-type swords recognised in the Great Moravian period.

The chronology of swords of type X has long been the subject of discussions. When J. Petersen specified the type in 1919, he dated its initial appearance to the beginning of the 10th century (Petersen 1919, 165). However, during the interwar period several scholars connected type X swords with weapons of late Carolingian production and moved the beginning of their occurrence back to the end of the 9th century (Arbman 1937, 217, 227). Nevertheless, the belief that X-type swords occurred almost exclusively in the 10th and 11th centuries prevailed for most of the twentieth century (Nadolski 1954, 26, 35, Kirpičnikov 1966a, 33, Kazakevičius 1996, 67–70).

Czech and Slovak assemblages enabled a significant correction to be made to the traditional dating (summarised in Košta/Hošek 2009, 109–111). Unlike contemporary finds from most other parts of Europe, swords of type X often occur here in graves from the 9th century, the dating of which can be confirmed based on the larger number of grave goods and stratigraphy. Many of the graves containing X-type swords were found in Moravia, where they predominated in Great Moravian cemeteries; where these graves were often covered by later features datable to the Great Moravian period or else they contained artefacts used primarily during the course of the Early Great Moravian Horizon and whose use ended before the conclusion of the Great Moravian period.[98] This is evident at the Mikulčice settlement agglomeration (see Chap. 4.3). This relatively earlier dating of the emergence of X-type swords is also confirmed by several other finds from Moravia, including a find from Morkůvky (Kouřil 2005, 87–89, Měřínský/Unger 1990, 388). Graves 174 and 257 with X-type swords from the cemetery by the church in Břeclav-Pohansko were also covered by later burials (Kalousek 1971, 111–114, 149–152).[99]

Although the absolute chronology of the division between the early and Late Great Moravian Horizon cannot currently be established, it is clear that the frequent occurrence of X-type swords in Great Moravian assemblages must have preceded the end of the 9th century significantly and was probably closer to the middle of that century. Therefore, the beginning of the production of type X swords can be dated to the period around the middle of the 9th century. A. Geibig (1991) also used Great Moravian assemblages to date the beginning of the occurrence of X-type swords to the second half of the 9th century. This dating on the basis of Great Moravian finds is confirmed by evidence from other parts of Europe. Petersen's special type 12 (Petersen 1919), which he dated to the 9th century based on the archaeological context, formally corresponds to X-type swords. The single-part upper hilts of his special sword types 10 and 11 which, he dated to the second half of the 9th century on the basis of

98 E.g. Biskupija-Crkvina type spurs and gold globular buttons (*gombíks*) with vertical ribs (Chorvátová 2004; 2007; Kouřil 2005, 73–87; Košta 2008, 283–284; Kavánová/Šmerda 2010; Galuška 2013, 195–241; Košta/Lutovský 2014).

99 Typically included among type X swords with an early dating is the weapon from Závada, Slovakia (Bialeková 1982a, 163, Bialeková/Mihok/Pribulová 1998a, 37). The author regards as erroneous the dating of the grave unit to the first half of the ninth century based on iron forgings of a so called 'Blatnica-Mikulčice type' and strap spurs. The strap spurs at least partially correspond chronologically to type IA spurs, which belong to the Late Great Moravian Horizon (Košta 2008, 280–283, Chorvátová 2004). Although the specified forged sword straps cannot be dated more precisely than to the Great Moravian period, similar iron fittings were also heavily represented in its final phase (Ungerman 2011a; 2011b).

their morphological links to swords of type K are also very similar to the type X (see Fig. 136). The grave with a type-X sword found near Larne, Northern Ireland, can also be dated to the later part of the 9th century (Fanning 1970, 74, Fig. 1). In Birka, Sweden, type X swords occur in grave units with coins dated to the first decades of the 10th century; however, neither Swedish, eastern European nor even Danish assemblages can provide relevant data for the onset of X-type swords since the placement of weapons in graves is usually related to the Middle Viking Period, which roughly corresponds to the 10th century (summarised in Androŝuk 2013, 137–166).

In continental Europe, X-type swords predominate until the turn of the 11th century. Their use continued through most of the 11th century, when they were gradually replaced by derived forms of Romanesque swords with lenticular upper hilts (Nadolski 1954, 26–29, Geibig 1991, 65–73) or robust Geibig type 12-II swords with semicircular upper hilts (Geibig 1991, 58–60; Košta et al. 2014). Important for dating the end of the occurrence of classic type X swords (corresponding to Geibig type 12-I) is the absence of inscriptions from the MEFECIT and INNOMINE groups on their blades. The beginning of these can be established as being around the second half of the 11th century (Košta et al. 2014). Type X swords had evidently proven to be the optimal form of fighting tool and had satisfied warriors' demands for many years.

With respect to chronology, it is therefore possible to state that the Petersen type X (Geibig type 12 variant I) swords date to the period between the second half of the 9th century and the 11th century. The Frankish Empire was probably the area in which the idea for swords with a single-part, semicircular upper hilt emerged (Arbman 1937, 227). Their appearance falls into the context of the development of Carolingian swords in the first two-thirds of the 9th century, when a fundamental transformation in sword shape occurred in the Frankish Empire (see Chap. 2.2, Košta 2014, 229–231; Košta/Hošek 2009, 110). Petersen type X swords were the earliest representatives of late Carolingian swords in this period. Due to their very simple shape, the upper hilts of X-type swords could have been easily imitated elsewhere on the peripheries of the Frankish world. It cannot even be ruled out that convergent development involving the simplification of upper hilts with more complicated constructions took place simultaneously in several regions.

The shapes of X-type sword blades were highly variable; in addition to shorter and more robust forms (Geibig blade type 2 and 3), longer and more slender blade types comparable to Geibig type 5 and 6 appeared from the very beginning of their development (see Chap. 4.2). Type X swords, at least those specimens found in continental Europe, rarely feature pattern-welded blades.[100] On the other hand, pattern-welded metal was used relatively often for inscriptions inlaid in blades. The most numerous are the groups with ULFBERHT and INGELRII inscriptions and their derivatives.

4.1.5 Petersen type Y (Geibig 13, variant I)

Petersen type Y (Petersen 1919, 167–173) or Geibig combination type 13, variant I swords (Geibig 1991, 60–63) are characterised by a single-part or composite solid upper hilt with an upper part in the shape of an inflexed arch (Geibig construction type I or III). The upper guard of the composite variant has very low height. The lower edge (of the single- as well as two-part upper hilt) is usually slightly bent toward the handle. As with X-type swords, the crossguards are typically longer; they are slender and can be straight or slightly bent toward the blade. The hilts are usually undecorated; in certain cases single-part upper hilts can have a groove imitating an join between upper guards and pommels which appears on the composite upper-hilts. Type Y swords typically have more robust blade forms (Geibig type 2 and 3; Geibig 1991, 83–86). Pattern-welded blades are commonly

100 The only specimen from the Czech Republic comes from grave 280 in cemetery surroundings the IInd church in Mikulčice (see Chap. 3.4.3).

found, and they appear repeatedly on specimens from Bohemia (for example Hošek/Košta/Mařík 2012). Sword finds from continental Europe correspond to Petersen's second variant (Y-2) of this type; the first variant, for which Petersen assumed a Norwegian origin, is very closely related to type P swords (also in Androŝuk 2014).

According to Petersen (1919, 167–173), Y-type swords appear during the first half of the 10th century and their occurrence ends at the turn of the 11th centuries. Based on finds from Moravia, dated to the Great Moravian period, the beginning of the occurrence of Y-type swords was moved back to the late 9th century (Král 1970, Ruttkay 1976, 251, Geibig 1991, 145–146). However, the link between Y-type swords and the existence of the Great Moravian Empire is largely marginal.[101] Finds of this type of sword in Slovakia are related to the Old Hungarian environment (Ruttkay 1978, 251–252), and datable archaeological contexts with Y-type swords from Bohemia are also placed in the course of the 10th century (Hošek/Košta/Mařík 2012). When assessing swords of type Y in connection with the Great Moravian environment, it is necessary to bear in mind that weapons of this kind were not found in burials at Great Moravian centres such as Mikulčice, Staré Město near Uherské Hradiště or Břeclav-Pohansko. At the same time, around twenty-seven swords – a sufficiently large sample size – have been found in graves at these fortified settlements and in their agglomerations (see Chap. 2.4). It is possible that Y-type swords were deposited in graves as far back as the disintegration of the Great Moravian early state at the beginning of the 10th century, when the elite abandoned the central Great Moravian strongholds which were under attack by the Hungarians (see Chap. 2.1; Hošek/Košta 2011, 51–53). It is also possible that during the course of the Late Great Moravian Horizon there were some changes in funerary customs and that fewer swords were deposited in graves (see Chap. 1.2.1 and 4.3). This alteration might be verified by means of an analysis of Great Moravian cemeteries based on new knowledge about chronology. The discovery of two specimens in graves 129 and 130 at Thunau-Obere Holzwiese in Austria is a major contribution to the issue of the emergence of Y-type swords. Based on an analysis of grave units and radiocarbon analyses of bone remains, these swords can be dated with a high degree of probability to the final third of the 9th century (Nowotny 2011; in print). As such, these are the earliest verifiable find contexts for type Y swords known today, and they make it possible to consider a dating for their emergence as early as the late 9th century.

Expert opinions differ widely on where the upper hilt of type Y swords was designed. Petersen (1919, 172–173), who knew of no type Y sword specimens from the Frankish Empire, sought the origin of these weapons in northern Europe; his variant Y-1, closely related to type P, was to have been the product of west Norwegian workshops, while the most widespread group Y-2, which corresponds to continental finds of type Y swords, was to have come to Norway from the east (Sweden, eastern Baltics). Later scholars used various forms of type Y upper hilts to attempt to separate specimens of Frankish, Anglo-Saxon, Scandinavian and Baltic origin (Nerman 1929, 85, Mühlen 1975, 31; Bakay 1967, 169), or simply designated the origin of the type as uncertain (e.g. Arbman 1937, 227–229). Geibig was inclined to search for the origin of the Y-type

101 The lone known type Y sword in Moravia with a verifiable find context comes from grave 71 on the outskirts of the cemetery in Rajhradice (previously designated, according to the neighbouring cadastre, as Rebešovice: Král 1970; Staňa 2006, 145-146, 169). The weapon is accompanied by a set of fittings known, for example, from rich assemblages from the final horizons of several Great Moravian strongholds in Slovakia (Pobedim, Bojná; for the erroneous traditional dating of the final horizons of the strongholds see Ungerman 2011b; Henning/Ruttkay 2011). While another Moravian type X sword comes from the disturbed cemetery near Vranovice (Galuška 2001), the absence of find contexts makes it impossible to classify the sword into the Great Moravian or post-Great Moravian period. And finally, the upper hilt of an old variant of the type Y sword was found in a settlement situation in the acropolis of Mikulčice stronghold (see Chap. 3.4.18), but again, the find cannot be dated with greater precision.

sword in the Frankish Empire, although under possible Anglo-Saxon or Scandinavian influences. As was the case with X-type swords, late Carolingian specimens could then have been imitated in other parts of Europe (Geibig 1991, 169). Based on a synthesis of known data on Y-type swords (e.g. the geographic location of the earliest datable occurrence; morphological traits such as the use of a long cross-guard and solid pommel and even a single-part upper hilt on many specimens), their origin could probably be traced to the Frankish Empire; nonetheless, the parallel emergence of a similar form in the eastern Baltics cannot be ruled out. The creation of Y-type swords was probably influenced by Nordic and Anglo-Saxon swords,[102] as they appear during the period of Viking raids into Frankish territory. This influence is also manifested in other traits differentiating Y-type swords from their closest companions – swords of type X, and which, on the other hand, are similar to elements that still appear at the end of the 9th century on Scandinavian and Anglo-Saxon weapons (e.g. the more frequent use of pattern-welded decorative panels, and more robust blade forms). The results of a comparison of the relative representation of various types of swords in individual regions reveal a distinct concentration of Y-type swords in Bohemia and south Germany. Type Y swords could therefore rank among artefacts documenting intensive cultural and political contacts of the Bohemian 10th-century elite with south Germany, as is also known from written sources (Hošek/Košta/Mařík 2012).

The construction of the upper hilt from the settlement context in inner bailey of the stronghold of Mikulčice differs in size and typological features from the group of Y-type swords occurring in the southern part of Central Europe. The closest parallel can be found in a sword from grave 130 at the Gars-Thunau cemetery (Nowotny 2011 in print). The dimensions of the upper hilt indicate that it ranks among the earliest variants of the Petersen's type Y, which have a morphological connection to type L (Petersen 1919, 112–116). It can probably be dated to the beginning of Y-type swords from the late 9th century to the beginning of the 10th century.

102 Primarily Petersen types L and M (Petersen 1919, 112-126, 134-140).

4.2 Difficulties with the typological and morphological classification of blades

The typological evaluation of blades still represents one of the most problematic issues of research on early medieval swords (see chapter. 2.4). Although three comprehensive attempts to sort out early medieval blades were developed during the 20th century, none of them was based on a sufficiently large number of systematically examined specimens. Oakeshott's typology is useful only in the study of blades from the High Middle Ages; it is inadequate for the study of early medieval swords because of its brevity and shallowness (Oakeshott 1960, 142, 203–207; 1964). The analysis of the metric characteristics of swords was introduced by M. Maure (1977) and it emphasized the dimensions of blades. The author of the study allocated double-edged blades into four basic groups according to their length/width ratio.[103] Unfortunately, Maure's typological system, in the form in which has been presented, cannot answer questions concerning either the chronology or provenance of swords (Głosek/Kajzer 1978; Androŝuk 2013, 93–95). Despite that, some characteristics determined by Maure were also employed within a new grouping of swords by their length/width ratio introduced in this study (see below).

We have tried to assign the blades of Mikulčice swords to the types defined by A. Geibig, who was the third of researchers who have tried to sort swords according to a metric analysis of blades (Geibig 1991, 83–90). The main reason for this choice was the fact that Geibig's typology is the

103 Type E – length 60-70 cm and width 4.5 cm; type F – length 70-75 cm and width 5 cm; type G – length 75-80 cm a width 5-6 cm; type H – length 75-85 cm and width 6 cm.

Tab. 2. Dimensions and weights of swords from Mikulčice.

chapter	grave No. / sett. find	weight before the fire (g)	weight after the fire (g)	total length (mm)	distance of the point of balance from the crossguard (mm)	upper hilt / pommel			tang			crossguard			blade			
						height (mm)	length (mm)	width (mm)	length (mm)	width by the po-mmel (mm)	width by the cross-guard (mm)	height (mm)	length (mm)	width (mm)	length (mm)	width (mm)	max. width of the fuller (mm)	distance of the end of the fuller from the crossguard (mm)
3.4.1	90	1150**	662	(931) 941*	250*	31	71	25	101*	36	39	10	(128) 144*	16	(789) 799*	58	25	710
3.4.2	265	1525**	525	(926) 947*	165*	46	81	28	94	22,5	28	17	101	25	(769) 790*	61	25*	740
3.4.3	280	810**	265	(835)	-	32	63	18	100	25*	28	8,5	118	18	(698)	52	24	-
3.4.4	341	1565**	819	986	225*	35	63	24	95	23	30	14	143	25	842	57	21	772
3.4.5	375	1120	1045	1042	220	32	64	22	101	21	28	12	(119) 125*	30	897	57	18	737
3.4.6	425	1060	836	(945) 961*	190	33	68	25	95	24	35	13	129	20	(806) 820*	60	21	670
3.4.7	438	775	-	950	170	30	69	9	102	18	31	13	121	14	805	(44) 50*	25	758
3.4.8	500	1755**	1060	960	250*	30	63	16	106	17	27	16	120	19	808	58	15*	708
3.4.9	580	1275**	203	(920)	-	-	-	-	(93)	-	36	20	(42)	(23)	807	63	21-22	692
3.4.10	715	1150	1145	953	135	39	70	26	104	20	34	18	(89) 91*	44	792	70	30	707
3.4.11	717	1115	1115	972	(205)	32	65	20	97	15	23	11	130	21	831	(47) 50*	15,5	731
3.4.12	723	1080	975	1011	240	37	67	24	103	21	30	11	137	16	860	57	21	771
3.4.13	805	865	819	971	235	28	57	19	85	18	29	9	98	15	849	47	15	737
3.4.14	1347	1210	966	920	190	31	62	17	105	20	24	11	(137) 147*	20	773	55	19	688
3.4.15	1665	1400	1345	993	220	37	56	21	100	20	27	15	127	24	841	52	17	711
3.4.16	1750	840	824	918*	160	39	73	25	87*	22	24	13	101	19	779	51	25	770
3.4.17	sett. find	-	-	-	-	-	-	-	-	-	-	10	90	15	-	-	-	-
3.4.18	sett. find	-	-	-	-	35	64	18	-	25	-	-	-	-	-	-	-	-
3.4.19	sett. find	-	-	-	-	35	70	11	-	17	-	-	-	-	-	-	-	-

* – conjectural dimensions of a damaged sword; ** – including preserved organic materials; (–) – dimensions of the preserved part of a sword

Tab. 3. Typology, construction details, applied decoration and dating of the swords from Mikulčice and the most likely dating of the archaeological contexts in which swords were found.

chapter	grave No. / sett. find	hilt					blade					chronology	
		Peterse-n's type	Geibig's combina-tion type	Geibig's construc-tion type	Ruttka-y's type pommel / crossguard	decora-tion of upper hilt	Geibig's type	"length/ width" group	displa-ced fuller	pattern--welded blade	inscripti-on, marks on blade	the most likely dating of the context	the dating of the sword itself
3.4.1	90	K	6	II	-/6(7)	wires	2c	{a2}	-	YES	omega	2nd (3rd) quarter of the 9th c.	1st to 3rd quarter of the 9th c.
3.4.2	265	H	5,I	II	II/4	wire inlay	2a/c	{a1}	YES	-	cross potent	2nd quarter of the 9th c.	late 8th – 1st half the 9th c.
3.4.3	280	X	12,I	III	VII/7	-	3	{b?}	-	YES	-	3rd quarter of the 9th c.	3rd quarter of the 9th c.
3.4.4	341	X	12,I	III	VII/6	-	2a/c	{d}	YES?	-	-	2nd half of the 9th – early 10th c.	2nd half of the 9th – early 10th c.
3.4.5	375	X	12,I	III	VII/7	-	6a/2c	{d}	-	-	-	2nd half of the 9th – early 10th c.	2nd half of 9th – early 10th
3.4.6	425	N	8	II	VI/7	-	2a/3a	{a2}	-	-	-	3rd quarter of the 9th c.	2nd third/3rd quarter of the 9th c.
3.4.7	438	X	12,I	III	VII/7	-	3c	{b}	-	-	inscrip-tion	3rd quarter of the 9th c.	3rd quarter of the 9th c.
3.4.8	500	X	12,I	III	VII/7	-	2c/3c	{a2}	YES	-	-	3rd quarter of the 9th c.	3rd quarter of the 9th c.
3.4.9	580	?	?	?	?	-	2a	{a1}	-	-	encircled cross	2nd third of the 9th c.	the 8th – 2nd third of the 9th c.
3.4.10	715	H	5,(IV)	I	(II)/4	-	3a	{c}	-	YES	-	the 9th c.	the 8th/9th – 1st half of the 9th c.
3.4.11	717	X	12,I	III	VII/6	-	6b/2/3	{d}	-	-	-	2nd half of the 9th – early 10th c.	2nd half of the 9th – early 10th c.
3.4.12	723	N	8	II	VI/6	-	5b/3a	{d}	-	-	geo-metric pattern	2nd half of the 9th – early 10th c.	2nd half of the 9th – early 10th c.
3.4.13	805	X	12,I	III	VII/7	-	6a	{d}	YES	-	-	last third of the 9th – early 10th c.	2nd half of the 9th – early 10th c.
3.4.14	1347	X	12,I	III	VII/7	-	2c	{a2}	YES?	-	-	2nd half o fthe 9th c.	2nd half of the 9th c.
3.4.15	1665	X	12,I	III	VII/6	-	6a/3a	{d}	YES	-	-	2nd half of the 9th – early 10th c.	2nd half of the 9th – early 10th c.
3.4.16	1750	K	6	II	-/6	wire inlay	2b	{b}	-	YES	-	1st half of the 9th c.	the 8th/9th – 1st half of the 9th c.
3.4.17	síd.	?	?	?	7	-	-	-	-	-	-	-	the 9th – early 11th c.
3.4.18	síd.	Y	13,I	I	VIII/-	-	-	-	-	-	-	-	end of the 9th – early 10th c.
3.4.19	síd.	X	12,I	III	VII/-	-	-	-	-	-	-	-	2nd half the 9th–11th c.
3.4.20	síd.	K	6	II	-	-	-	-	-	-	-	-	the 9th c.

most detailed and therefore has the potential to illustrate a greater amount of change within the development of blades. His typology of sword blades contains fourteen types from the period between the 8th and 13th centuries. The basic criteria for Geibig's description of blades are metric data such as the length and width of the central fuller, the length and width of the blade, the narrowing of the blade over the first 60 cm of its length, the tapering of the fuller over the first 40 cm of the blade-length (from the crossguard) and the ratio of the blade-length to the fuller-length. Criteria that can be determined by visual inspection include the shape of the blade edges (parallel, convex narrowing, linear narrowing) and the length of the blade tip (short/long). As the author himself suggests, Geibig's sword blades' typology must be taken as a working material providing specialists with a guide to some of the possibilities of describing blades (Geibig 1991, 83–84). One of the fundamental problems of this typology of blades is the fact that the author did not have at his disposal a sufficient number of swords coming from well-datable archaeological contexts for most of the period studied (with the exception of the second half of the 8th and turn of the 9th century). Most of these newly defined typological characteristics had not been systematically monitored by anyone in the past, therefore Geibig could not compare his findings with datable weapons from surrounding areas, as he had done in the case of hilts. The chronology of blades proposed by Geibig on the basis of his typology therefore represents a rather basic concept that has been derived from general typological assumptions about blade development. In the study of particular specimens Geibig's typology faces a practical problem related to the state of preservation of the weapons. Many of the criteria employed by Geibig require very well-preserved swords. But most of the excavated swords, including those from Mikulčice, have only survived in a heavily damaged state. Therefore in those cases we cannot accurately record all the required criteria.

The measured data allowed Geibig's typology to be employed in only eight Mikulčice swords (out of sixteen). Swords with triangular pommels from graves 265 and 715, swords of Petersen's type K from grave 90 and 1750 as well as a sword of archaic design from burial 580 could be unambiguously assigned to various forms of Geibig's types 2 and/or 3. These differ from each other only in the degree of sturdiness of the blades, so that blades 580 and 715 are sturdy, blade 90 is moderately sturdy, and blade 1750 is slender but in the case of blade 265 the sturdiness could not be reliably defined. However, the morphological characteristics of Petersen's N- and X-type swords (Geibig 8 and I-12) were repeatedly beyond the limits for Geibig's types and nor did they correspond with the chronological frames which Geibig defined for his individual types. The blades of swords 280, 341, 425, 438, 500 and 1347 correspond to the blades of Geibig's type 2 or 3, which according to Geibig places them in the 9th or the 1st half of the 10th century. The blades of swords 375, 717, 723, 805 and 1665, however, by most of their characteristics belong to his types 5 or 6, which according to Geibig appeared somewhat later – type 5 after the mid-10th century and type 6 around the mid-11th century (Geibig 1991, 153). Because the most recent Mikulčice swords were buried very probably no later than the beginning of the 10th century (and certainly no later than the mid-10th century; see Chap. 4.3 and 4.4), there arises a problem with the synchronization of Geibig's dating and the dating of the archaeological contexts in Mikulčice.

Analysis of the sword blades from other Great Moravian cemeteries reveals that the Mikulčice specimens are not the only ones which differ in their parameters (see below). This difference could be explained by the limited basis of the material, which Geibig had at his disposal and which served for the determination of his types. Swords of Petersen's types N, X and Y with blades of types 2, 3 and 5, which were investigated by Geibig, were not always discovered in datable contexts. Geibig therefore logically designated those swords with blades of types 2 and 3, which also occur on early Carolingian swords, as if they were older ones.

Similarly, the first occurrence of blades of type 5, which do not occur on early Carolingian swords but occur on Romanesque swords, was dated roughly to the second half of the 10th century. The difference that he described between his types 5 and 6 was based on very precise measurements. We believe that the differences between types 5 and 6 are only nuances between blades of analogous character. With the exception of sword from grave 805, all the Mikulčice swords generally resemble the older blade-types 2 and 3. The shape of their blades cannot be consistently defined as any particular type of Geibig and so these swords could therefore indicate a continuous transformation of blades of types 2 and 3 into blades of later types.

We may conclude that the present typologies of early medieval sword-blades cannot convincingly address the issues of the chronology of swords, their provenance and design. This fact was concisely expressed by F. Androŝuk (2013, 93–98). He compared some of the parameters defined by A. Geibig (length and width of a blade and length of a fuller) as well as by M. Maure (length and width of a blade) with parameters of selected swords from Sweden, and finally concluded that there is no demonstrable correlation between these parameters and the types of hilts (according to Petersen). In his opinion, no detectable development in the shape of blades of Scandinavian swords took place within the Viking period. We do not know, however, how many of these blades might have been rehilted. Something different is illustrated by the distribution of the types of blades from Mikulčice. As mentioned above, the Mikulčice blades are quite variable in their character. Furthermore the distribution of the blade-types found on early and late Carolingian swords across the site differs and largely corresponds with the dating of archaeological contexts into the Early and Late Great Moravian Horizons (for more details see Chap. 4.3).

In addition, the swords from Mikulčice as well as from other parts of Europe show that Geibig's typology of blades is not sufficient to describe all early medieval European swords. Therefore we have decided to analyse the individual metric characteristics observable on blades of swords from the 9th and 10th centuries found on the territory of the Czech Republic. However, we have chosen the opposite approach to the authors of existing typologies. First, we have defined the characteristics that can be reliably observed within the set of selected swords (because sufficient numbers of well-preserved specimens with those characteristics need to be available). The individual characteristics of blades have been then sorted by means of cluster analysis in order to select those which tend to form separate groups within the set. In this way we have managed to define groups separate from each other and consisting of blades, which are actually very similar in shape. Now we have compared other characteristics associated with the swords within these groups (for example, their typology based on hilts and the chronology of the contexts in which they were found). It was pointless to monitor the territorial distribution of these swords, but we may assume that in the case of a higher number of swords from other areas the provenance of blades of individual groups could lead to important conclusions.

The significant characteristics that we have chosen for the analysis of swords from the Czech Republic are their length, width and length/width ratio. The involvement of more swords from other European regions may enable us to refine the results obtained, to monitor more characteristics, to study the evolution of blades over a longer period of time as well as studying the variability of individual territorial groups. The classification of blades into logically defined groups presented here is statistically valid for those swords, but the addition of more swords from other regions may well lead to the transformation of the groups we have obtained. Therefore the typology of blades presented here must be considered only as a working method, which aims to highlight the possibilities for a more systematic analysis of the blades of early medieval swords.

As mentioned above, cluster analysis was used to determine individual groups of blades, which

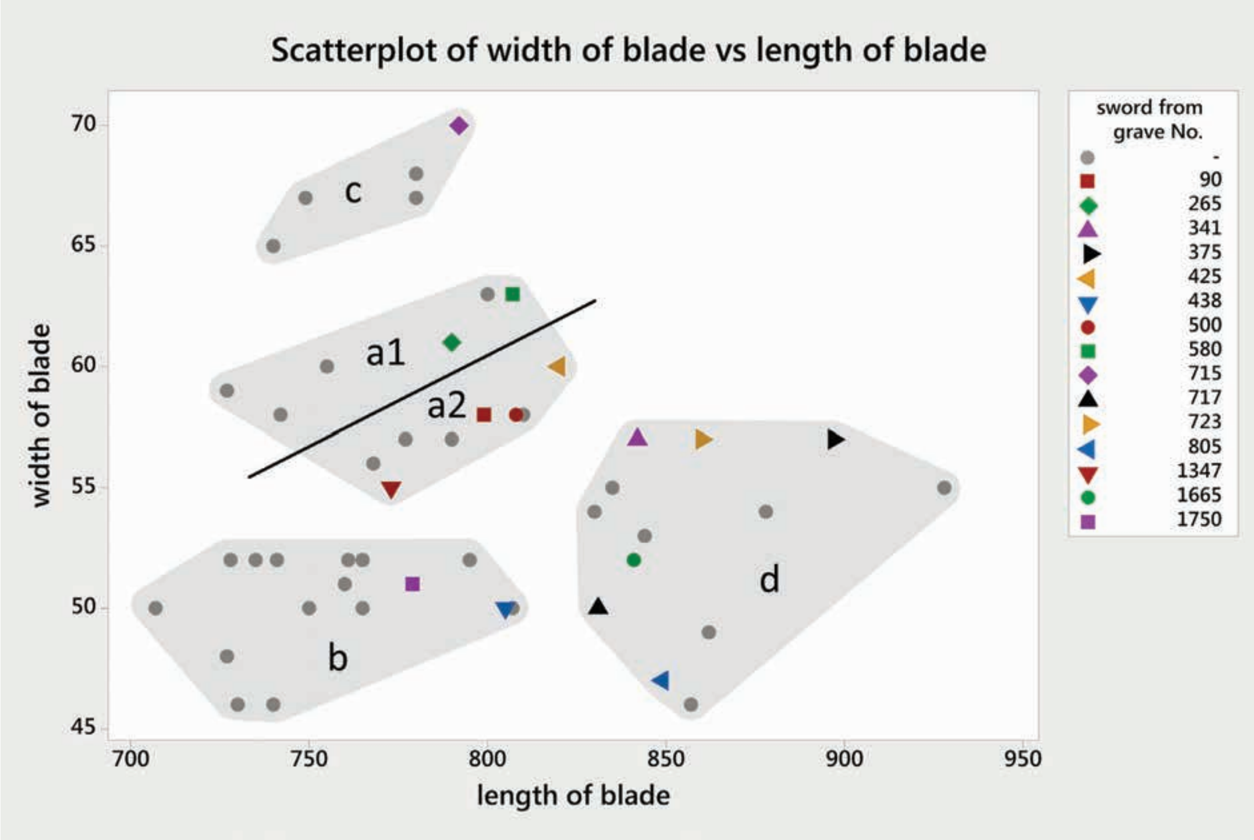

Fig. 139. Typological groups determined on the basis of forms and dimensions of sword-blades from what is now the Czech Republic; swords from individual Mikulčice graves are highlighted. By J. Hošek.

are similar in shape and dimensions. Hierarchical clustering procedure using Ward's linkage method was employed for this purpose (similarity level and distance between the joined clusters was a criterion helping to choose a number of clusters for the final partition). We hope to be able to place individual swords within significant groups. At first, blades of atypical dimensions were excluded and the remaining blades were classified according to their **length** and **width** into four groups {a}-{d}. Blades were also classified according to their **length**, **width** and **length/width ratio** into four groups {A}-{D}. Then we attempted to classify the blades according to their **length/width ratios** into six groups {1}-{6}. Similarities as well as differences among the all the obtained groups were noted. It was found, that grouping into either {a}-{d} or {A}-{D} groups did not make any significant difference, and that the {a}-{d} and {A}-{D} groupings are more meaningful and appropriate for our needs than groups {1}-{6}. The groups {1}-{6} generally extended across the {a}-{d} and {A}-{D} groups, with the exception of the groups {1} and {2}, which seemed to be related to groups {a} ({A}) and {c} ({C}). The group {1} corresponds with the group {c} ({C}), the group {2} makes a logical subgroup of the group {a} ({A}). Therefore, the group {a} ({A}) was divided into subgroup {a1} ({A1}) and {a2} ({A2}). Since the classification of blades into {a}-{d} groups is more user-friendly than classification into groups {A}-{D}, and because splitting the group {a} using the length/width ratio into two subgroups leads to meaningful categories of blades, typological groups {a1}, {a2}, {b}, {c} and {d} (which include all weapons from what is now the Czech Republic), were decided upon. The basic characterisations of these established groups are as follows (see Fig. 140 and 141):

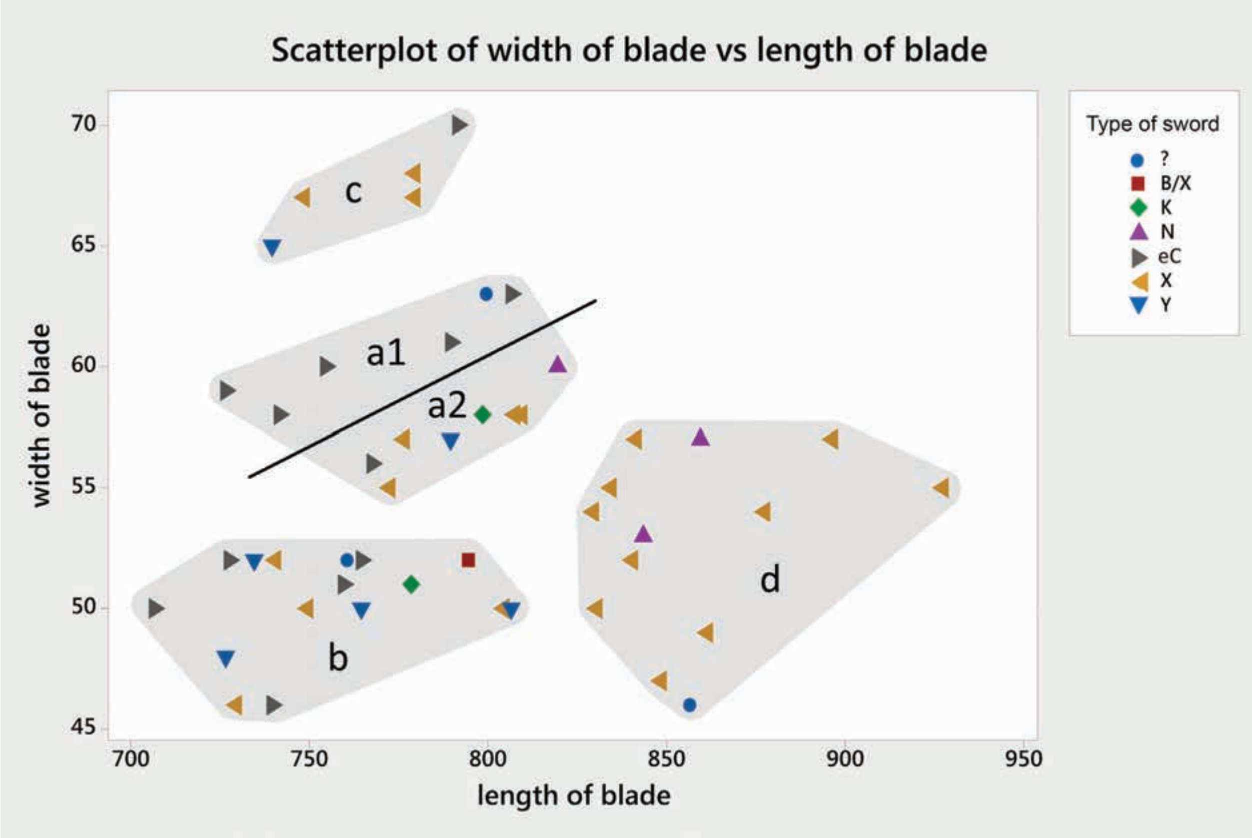

Fig. 140. Typological groups determined on the basis of forms and dimensions of sword-blades from what is now the Czech Republic; distribution of individual Petersen's types across the groups (eC means early Carolingian swords with upper hilts with triangular or three-lobed pommels). By J. Hošek.

Group {a1}
The typical length of blades: 720–810 mm
The typical width of blades: 55–65 mm
The typical length/width ratio of blades: 12.0–13.2

This group includes sturdy and short (to medium-long) blades that have been observed to date only on swords of early Carolingian construction (particularly swords with upper hilts with triangular or three-lobed pommels of Petersen types B, H and special type 2).

The group includes, among others, two swords from Mikulčice; H-type sword from grave 265 and the sword of archaic design without any upper hilt from the grave 580. Coincidentally, these are the weapons from the interiors of churches, which can be dated back to the Early Great Moravian Horizon (or to the turn of the Late Great Moravian Horizons; see Chap. 4.3).

Group {a2}
The typical length of blades: 765–820 mm
The typical width of blades: 55–60 mm
The typical length/width ratio of blades: 13.2–14.1

This group includes mainly late Carolingian swords with medium-sturdy and medium-long blades. The most numerous are swords of type X, but swords of type K and N with characteristics of both the early and late Carolingian weapons and one sword of type Y are present here as well.

Four swords from Mikulčice can be assigned to this group; the sword of type K from grave 90, sword of type N from burial 425 and the X-type swords from graves 500 and 1347. These weapons were found in graves which can be dated to whole Great Moravian period (most probably not to the very beginning or very end of the period; see. Chap. 4.3).

Group {b}

The typical length of blades: 700–810 mm
The typical width of blades: 45–55 mm (less than 55 mm)
The typical length/width ratio of blades: 13.9–16.2

This group includes medium-long, slender blades. Both late and early Carolingian swords are present (types Petersen H, K, X, Y). Majority of the Y type swords ranks to this group.

Three Mikulčice swords can be assigned to this group; the K-type sword 1750, which can be dated to the Early Great Moravian Horizon, X-type sword 438 and probably also X-type sword 280 with a damaged blade. Both these X-type swords were buried at the turn of the Late Great Moravian Horizons, thus a long time before the end of the Great Moravian period (see Chap. 4.3).

Group {c}

The typical length of blades: 740–800 mm
The typical width of blades: 65 mm a more
The typical length/width ratio of blades: 11.0–12.0

This group includes robust and relatively short blades and consists predominantly of late Carolingian swords (predominantly swords of Petersen's type X, one sword of type Y).

In this group, sword 715, whose upper hilt has triangular pommel of Geibig's construction type I, is the only representative of Mikulčice swords and, at the same time, the only representative of early Carolingian swords.

Group {d}

The typical length of blades: more than 830 mm
The typical width of blades: 45–60 mm
The typical length/width ratio of blades: 14.5–19.0

In comparison with other 9th and 10th century swords, this group includes slender to medium-robust but mainly very long blades. The group consists predominantly of late Carolingian swords of Petersen type X (with exception of two swords of type N with characteristics of both the early and late Carolingian swords).

Six swords from Mikulčice belong to this group. With the exception of one sword with two-part semicircular upper hilt of type N, only X-type swords rank to this group. Archaeological contexts of these weapons have revealed that the swords were buried mainly during the Late Great Moravian Horizon. Some of them could by buried even just at the turn of the Late Great Moravian Horizon (see Chap. 4.3).

The groups of blades of Carolingian swords introduced, which have been defined on the basis of finds from the Czech Republic, show that the basic shape of blades underwent a dynamic development during the 9th century. Most of the assessable weapons from the Czech Republic come from the 9th century and the earlier part the 10th century.

Group {a1} is so far evidenced mostly for early Carolingian swords, which can be dated almost exclusively to the Early Great Moravian Horizon on the basis of their archaeological contexts.

Group {a2} probably reflects the continuous development of blades from group {a1} towards more slender forms. The group includes some of the late Carolingian X-type swords as well as K-type and N-type swords of mixed characteristics. The earlier swords of this group were apparently used on the territory of the Czech Republic sometime during the second quarter or second third of the 9th century.

The Group {b} comprises slender blades of Early as well as Late Great Moravian Horizons. However, during the later period these blades predominated among swords of type Y, while X-type swords were seldom equipped with such slender blades.

Swords of the group {c} are relatively short and very sturdy; with the exception of one early Carolingian sword 715 from Mikulčice this group comprises only late Carolingian swords of type X. The question of the connection of the sword 715 with other representatives of this group remains open.

Finally, the group {d} comprises a relatively large number of swords with very long and moderately-sturdy to slender blades. Swords of this group are almost solely the late Carolingian swords of Petersen's type X. The oldest specimens were probably produced in the second half of the 9th century. In any case, swords belonging to this group were found in burials from Late Great Moravian Horizon and related stratigraphic situations indicate that several of these swords were not buried until the very end of the Great Moravian period (see Chap. 4.3).

The groups {c} and {d} include swords which are neither from Bohemia nor from the territory of today's Germany (Geibig 1991). Therefore, we cannot exclude that these reflect the local development of sword-blades in Great Moravia or in the adjacent areas of the Frankish empire (see Chap. 4.4). Of course, the questions outlined here concerning the blades of swords from the Czech Republic will have to be investigated by further research.

4.3 Chronology of the contexts in which the Mikulčice swords were found

In chapters 4.1 and 4.2 we have discussed the issue of dating the individual sword-types to which the finds from Mikučice can be assigned, the following chapter is devoted to the chronology of the archaeological contexts in which the Mikulčice swords were found.

Dating of archaeological contexts can lead to the more precise dating of the types of sword. On the other hand, the dating of typologically significant objects, among which swords undoubtedly rank, is an important tool for determining the chronology of the archaeological contexts as well as archaeological horizons and cultural interactions. Therefore (in order to assess the benefits of both these sources of information and in order to avoid circular reasoning) we must evaluate the dating of swords, based on their typological characteristics, and the dating of their archaeological contexts separately, and only then can we conduct the synthesis and interpretation of the data obtained. When dating the archaeological contexts, we must bear in mind that they are evidence of the time when the objects studied disappeared from the living culture. So, they serve as *termini ante quem*. The time during which the object was part of a living culture can only be estimated indirectly by comparison with many other data. In the case of swords as highly valuable artefacts, which might stay in good condition for a long time when properly looked after, the period of their use in the living culture might cover several generations.

In the introduction to this book we mentioned the importance of swords from Mikulčice (and other Great Moravian sites) for understanding the evolution of swords in the 9th and early 10th centuries in continental Europe. The significance of these Moravian swords is based mainly on archaeological information that results from the custom of placing swords in graves. This allows us to conduct their evaluation in the context of other items of grave goods as well as making a comparison of results obtained from the stratigraphy and analysis of cemeteries. On the other hand, we must admit that so far the potential of archaeological contexts cannot be fully employed for the Mikulčice swords. One of the problems is the current state of chronological evaluation of the Great Moravian period as a whole. A more fundamental difficulty is the state of processing of Mikulčice cemeteries where graves with swords have been found. Only two cemeteries with four such graves (out of sixteen) have been evaluated so far.[104] In both these cases, however, the current interpretation of results obtained by archaeological research significantly differs from the conclusions that followed from the preliminary processing of the excavations' data. Systematic evaluations of other burial grounds with graves with swords have not yet been published and we acquire information about them only from general studies (see Chap. 1.2.1).

104 The preliminary reports about archaeological excavations of the burial ground by the IInd church (Poulík 1957) and the burial ground on 'Kostelec' (Klanica 1985a).

In the context of research into swords, we have made some attempt to describe in detail both the graves and their grave goods and to process all the data obtained. But an adequate placement of these graves in the broader stratigraphic contexts is beyond the scope of this study and if we resort to it, then it is only as a hypothesis, which may be refuted by further systematic evaluation. For the same reason we have refrained from the analysis of contexts in which the settlement finds of sword fragments were found; such analysis would have been even more difficult than in the case of graves.

The unsatisfactory state of publishing archaeological results is accompanied by a low-quality of field documentation and a problematic excavation methodology (Poláček/Marek 1995; 2005), which nevertheless corresponds to the usual standards of conducting large-scale excavations from the 1950s until the 1980s in Czech archaeology. Unfortunately, the information potential of primary sources is often so small that it is difficult to interpret them clearly in terms of a living culture. The excavations conducted in the Mikulčice settlement agglomeration during the last two decades repeatedly reveal the enormous extent of data lost (e.g. Poláček/Škojec 2009; Poláček 2010; Hladík/Mazuch 2010; Hladík 2010). Another problem, which has a significant impact on the possibilities of interpretation of those graves with swords, is the state of the collections from the excavations. Almost all the items of grave goods were irretrievably damaged in the fire that struck the Mikulčice archaeological base in 2007. Many of them had not been well documented previously, and only a few of them had undergone archaeometric investigation. Unfortunately, some grave goods had already disappeared before the tragic fire (in some cases even before their registration in *ILF*). For instance, in the case of seven graves with swords we lack the spurs (the key artefacts for dating the graves within the Great Moravian period) as well as their documentation. For all these reasons, it is necessary to bear in mind that any chronological assessment of the Mikulčice swords should be regarded as a preliminary exercise.

The Great Moravian period is characterized by a distinctive material culture in its archaeological context (e.g. Poulík 1948; Dostál 1966; Macháček 2001). The beginning of the archaeologically defined Great Moravian period is associated with the onset of inhumation burials in areas north of the Thaya River, which Š. Ungerman (2006) puts in relation to the Pre-Köttlach Horizon of central and southern parts of eastern Austria. On this basis he dated the beginning of the Great Moravian period to the turn of the 9th century. Nevertheless, Ungerman supported the earlier dating of Pre-Köttlach Horizon in the case of the sites from. If we accept the possibility of a longer duration of the Pre-Köttlach Horizon, we cannot exclude an even later onset of inhumation burials (and thus of the Great Moravian period) in Moravia. In any case, the changes of material culture in Moravia occurred in connection with the events that took place in the late 8th and early 9th century in the Carpathian Basin. It might be interesting to discuss what these changes in the material culture reflect, and what causal relationship they might have to events described in the written sources.

We have only circumstantial evidence at present for the absolute dating of the beginning of inhumation burials in Mikulčice. The beginnings of burying in cemeteries are preceded by settlement activities, but we do not know certainly whether these settlements disappeared at the end of the pre-Great Moravian period or during the Early Great Moravian Horizon. Some clue might come from the dendrochronological dating of the bridges, which were situated in front of the gates to the stronghold (Poláček 2010, 45–46; 2011). The bridges are associated with the fortification of the Great Moravian stronghold and this construction can be put in the context of the emergence of the earlier phase of the IInd church (the oldest known church in Mikulčice) and the burial ground around it. Some of the dendrochronological measurements dated the bridges as early as the 830s, thus well into the time when the written sources mention the oldest known Moravian prince Mojmir I and when the baptism of 'all

Moravians' was said to have taken place (summarized by Třeštík 2001, 117–121). The current state of processing of data from the Mikulčice cemeteries does not allow us to decide whether the inhumations preceded the construction of the oldest churches in the settlement agglomeration. The beginning of burying in Mikulčice could therefore have occurred during the first quarter of the 9th century, but its onset during the second quarter of the 9th century is more likely. At this time the oldest church cemeteries in Mikulčice were also probably established (see Chap. 1.2).

There is a possibility (or rather inevitability) of comparison with written sources for the absolute dating of the end of the Great Moravian period. Information about the intensity of changes in the area east of the Frankish Empire in connection with the Hungarian invasion can be instructive. The political decay of Great Moravia had an enormous influence on the testimony of preserved archaeological records about that society in the first decade of the 10th century (Třeštík 1991; Štefan 2011). Yet the archaeological evidence provides different possibilities for interpretation of the processes of decay and extinction of the Great Moravian culture (Měřínský 1986; 2008; Kouřil 2003). Thus, two questions arise. First, whether and for how long the material culture of the Great Moravian period could persist after these changes. Second, what was the content of the material culture of the period following Great Moravia, how this differed from the Late Great Moravian Horizon and how in turn that differed from the material culture of the 'Late Hillfort' period. It seems that development of the burial rite in the post-Great Moravian period is characterized by a significant decline or even total disappearance of richly furnished graves. The grave goods usually consisted of simple and chronologically indeterminate components of jewellery (see Ungerman 2007). This trend is shown by the very low occurrence of spurs with long pricks in Moravia. Such spurs represent a typical item of male burials in 10th century Bohemia and Poland (Hilczerówna 1956, 30–33; Kavánová 1976, 54–60), while they occurred in the eastern periphery of the Frankish Empire probably a little earlier (e.g. Freeden 1983, 457–462; Pöllath 2002, 162–164).[105] There is only little evidence for Old Hungarian influence in Moravian contexts (Měřínský 1986; 2008; Kouřil 2003; 2006; 2008). Thus, the determination of finds dated to the post-Great Moravian period is very difficult and often must be supported by stratigraphy.

In the case of Mikulčice, the end of the Great Moravian period is clearly associated with a massive and devastating attack, whose evidence can be seen in a huge number of rhombic arrowheads and human remains buried abnormally and often shallowly and scattered over areas of both the settlement and fortifications (Hladík/Mazuch 2010). As a result of this attack, development of the centre in Mikulčice was stopped (the consequences of the attack were not properly removed; we lack evidence for further maintenance of the fortifications; the churches gradually turned into ruins; and the settlements in the suburbs disappeared). Some settlement activity continued on the sandy islands in later phases (Měřínský 1986; Poláček 1999; 2008c, 23; Hladík/Mazuch 2010) and burial grounds around the decaying churches might have been used for some time by people from this diminished settlement and also from the hinterland. In any case we can state that while burials with swords cannot be completely ruled out in the post-Great Moravian period, they are very unlikely.

The internal chronology of the Great Moravian material culture is currently the subject of intense debate. Attention is drawn in particular to the insufficient connection of present archaeological horizons with stratigraphy, or on the misinterpretation of the stratigraphy. The archaeological knowledge of Great Moravian sites has a great potential in this respect, but their full utilization is often hampered by insufficient levels of publishing their data. The existence of the

105 On the other hand, their low proportion in Moravia could be caused also by non-chronological factors such as popularity of spurs of local provenance (type 1A according to Hrubý; Hrubý 1955, 184–186).

so-called Blatnica-Mikulčice Horizon, which was considered a tool suitable for dating the majority of artefacts from Great Moravian male graves, was recently refuted by archaeological investigations (see Ungerman 2011b for details). Analysis of the stratigraphic relationships of Great Moravian graves led to the emergence of a new concept for the development of spurs from Great Moravia (Chorvátová 2004; Kouřil 2005; Košta 2008; Košta/Lutovský 2014). Detailed stratigraphic analysis of the settlement situations in Mikulčice made a basis for defining the late Great Moravian pottery groups ('Mikulčice-pottery' and 'Blučina-pottery', see Mazuch 2013). The chronology of Great Moravian jewellery has undergone significant changes during the last twenty years; despite the ongoing debate, there is almost complete consensus about the relative chronology of jewellery (Galuška 1996; 2013; Chorvátová 2004; 2007; Ungerman 2005; 2006; 2007).

The chronology of jewellery has become the main basis for definition of the so-called Early and Late Great Moravian Horizons.[106] Unfortunately, a similarly comprehensive and systematic treatment of data for male graves is lacking. The problem is the absolute dating of these horizons. The attempts to use absolute chronological dating reflect the subjective ideas of scholars about the development of the Great Moravian material culture in relation to information from written sources. There is also a purely mechanical and unsubstantiated division of the first and second half of the 9th century which has been used.[107]

One of the few tools that can help with the absolute dating of the beginning of the Late Great Moravian Horizon, is the stratigraphic situation near the IIIrd Mikulčice church in the immediate vicinity of burial 480, which contained a Byzantine *solidus* of Michael III. This stratigraphic situation has been recently analysed by B. Kavánová and J. Šmerda (2010) and we have discussed it in Chap. 1.2.1. Evidently the burial took place after the year 857, most likely between 863 and beginning of the 870s, although we cannot exclude a slightly later dating. This happened at the beginning of the later phase within the burial ground. In the earlier phase there are found spurs with strap-like arms and spurs of the Biskupija-Crkvina type (with terminal plates with two rows of rivets parallel with the arms), beside the earlier types of jewellery. The burial 480 is stratigraphically older than burial 398 which contained spurs with one row of rivets, oriented perpendicularly to the arm.[108] Application of this stratigraphic relationship to other situations within this cemetery could lead to more precise absolute dating of the end of the Early and beginning of the Late Great Moravian Horizons, but the accurate determination of their character must wait for the systematic evaluation of the cemetery as a whole (Ungerman/Kavánová 2010). On this basis we make a preliminary date for the Early Great Moravian Horizon in the first two thirds of the 9th century, though most of the assemblages presumably come from the second third of the 9th century. The Late Great Moravian Horizon can be dated to the last third of the 9th century and the beginning of the 10th century. At the boundary between these horizons, which most likely corresponds to the third quarter and the beginning of the fourth quarter of the 9th century, we find the greatest number of assemblages with characteristics typical for both the horizons.

Unfortunately, neither a revised processing of the whole relative chronology of the Great Moravian culture nor any reliable connection with an absolute chronology has been conducted so far. Hence, all the studies mentioned are merely attempts to approach this difficult goal.

106 Horizons A and B of the Veligrad (otherwise so-called Byzantine-Oriental) jewellery defined by H. Chorvátová (2007) correspond approximately to the Early Great Moravian Horizon as interpreted by Š. Ungerman and L. Galuška. Horizon C according to Chorvátová can be dated to Late Great Moravian Horizon.

107 See Klápště 1999, 796; Ungerman 2007, 37–38 for discussion about the 'dating conventions'.

108 Type 1A according to V. Hrubý (1955, 184–186) or type IV-A according to D. Bialeková (1977, 132–134).

Likewise, the artefacts from male graves have not yet been subjected to any comprehensive revision. Therefore it is difficult to comment unambiguously on the chronology of axes and of some other artefacts. Although there are some indications suggesting that their shapes evolved during the Great Moravian period, we decided not incorporate them into a discussion on the possible dating of the graves with swords (Klanica 1985a, 524; 2006a, 41–48; Měřínský/Unger 1990, 383; Galuška 1996, 104; Košta/Hošek 2008a, 194–195; Ungerman 2009). It is very difficult to assess the relationship between the sequences of dates, based on Great Moravian jewellery on one hand and spurs (and the swords themselves) on the other hand. This category of artefacts representing de facto the only more reliably datable components from the Mikulčice graves with swords. Besides stratigraphy, the only links between male and female grave inventories are globular buttons (*gombíks*) which are present in male as well as female burials. *Gombíks* were found as a verifiable part of grave goods in two Mikulčice graves with swords (425 and 580). In both the cases, the *gombíks* were made of gold, small and vertically ribbed. *Gombíks* of the same type come from women's graves, which are frequently dated to the Early Great Moravian Horizon (and to the A-Horizon of the Veligrad-type jewellery respectively; Chorvátová 2007, 85–86; Ungerman 2005, 710–717; Galuška 2013, 195–241).

Conditions for dating the Mikulčice graves with swords on the basis of their spurs are not optimal. Although spurs were found in fifteen out of the sixteen graves with swords (absent only in grave 580), in six cases (280, 341, 375, 425, 500, 715) they were subsequently lost without any documentation. All the graves, from which the spurs are still available, contained spurs with short pricks. The grave 723 contained fragments of spurs with long slender arms, of uncertain typology.

In the grave 1750 spurs were found with frame terminals but without inset buckles. The variant with inset buckles has been found in only one grave in the Great Moravian context, in the cemetery of Olomouc-Slavonín. This grave has been dated to the Early Great Moravian Horizon and probably comes from the second quarter of the 9th century (see Kouřil 2001). Spurs with frame terminals, sometimes fitted with inset buckles, are known from old Croatian graves of the Biskupija-Crkvina Horizon, which can be in general dated between the last quarter of the 8th and the mid-9th century (Belošević 1980, 161–162; Jelovina 1986, 43–44; Petrinec 2009, 192–203). Spurs with frames have been found from the area around the Zalavár stronghold in Pannonia and Hungarian scholars have dated their deposition into graves to around the middle or the second half of the 9th century (Sós/Bökönyi 1963, 62–66; Szőke 1992, 99–102; 2008, 44, Abb. 2; 2010, 36–37). However, all the examples of spurs from Pannonia are the variants with inset buckles. The variant without inset buckles has been found in the Dalmatian environment and there assessed as contemporary with or older than the variant with inset buckles (see Jelovina 1986, 12, 62; Petrinec 2009, 197–200). In any case, we can reliably date the spurs from the grave 1750 in the Early Great Moravian Horizon.

A slender variant of the spurs of the Biskupija-Crkvina type[109] was found in the grave 438. Spurs of this type are regularly found in stratigraphically older burials of the earlier Great Moravian period with partial overlap to the later period (Chorvátová 2004, 221–229; Kouřil 2005, 73–87; Košta/Lutovský 2014, 78–87). The sturdy spurs from grave 265 and also the spurs from grave 90, which B. Kavánová (1976, 19–20) assigned to the heterogeneous type I, probably represent imitations of the Biskupija-Crkvina type.

The spurs from grave 717 preserved in fragments belong to the type II according to Hrubý (1955, 186–188), to the type IV according to B. Kavánová (1976, 46–50), or to the type V-B

109 Type III according to V. Hrubý (1955, 186–188), type III according to B. Kavánová (1976, 40–46) and type V-A according to D. Bialeková (1977, 134–138, Abb. 2).

according to D. Bialeková (1977, 136–138). These types are disparate and include predominantly spurs of local provenance, whose individual representatives could come from either the Early or the Late Great Moravian Horizon. The same goes for the spurs from grave 1347. Each spur of the pair was provided with different terminal plates; there were rare terminal plates with one rivet and also terminal plates with a central rib and two rivets (each on one side of the terminal plate) in the grave.

In the grave 805 spurs were found with one row of rivets oriented perpendicularly to the arm.[110] These are typical of male burials in the Late Great Moravian Horizon.

The double-grave 1665 contained several pairs of spurs. By the deceased 1665a there were spurs of the same type like in grave 805 (1A according to Hrubý); by the burial 1665b damaged spurs with non-preserved terminals were found; finally, spurs of the Biskupija-Crkvina type were found at the lower level under the feet of the deceased 1665b. There cannot be ruled out the possibility of the existence of an older grave, to which the sword could have belonged. So this unclear archaeological situation means that it is not possible to employ the dating of spurs for the comparative dating of the sword.

More precise dating of the Mikulčice graves with swords within the Great Moravian period might have been achieved by analysis of the stratigraphic situations in which the individual graves were found. However, in this study we have had to limit ourselves to a basic stratigraphic evaluation, which is based on the information available in the documentation related to the graves studied and in the literature published. This information is summarised for individual swords in the section 'Circumstances of discovery' within Chap. 3.4. We have assumed that the preliminary results, which we present here, will be revised in the future within a systematic processing of data from all the cemeteries based on a broader stratigraphic analysis.

Graves with swords uncovered in the cemetery around the IInd church (90, 265 and 280) came from the earlier phase of the necropolis, which was related to the early stage of the church building (formerly known as 'building B'; for more details see Chap. 1.2 and 3.4.2). Burials in the early phase of the cemetery began well into the Early Great Moravian Horizon. According to indirect evidence (see above), the turn of the second third of the 9th century seems to be the most likely date for the construction of the church. The earliest phase of the church had been founded on the place of a previous settlement, and the earliest grave pits were dug into back-fills of the former settlement features. Because graves 265 and 280 caved considerably into such backfills, we can assume that the church was built (and the settlement was levelled) shortly before these burials took place. Grave 265 was dug in the interior of the second church during its earlier phase and sometime afterwards the interior was provided with a mortar floor. Encroachments into this floor suggest that a long period of time passed between the floor construction and the building of the later phase of the church. The later phase of the church was built of stone upon the levelling layer, which covered the earlier phase of the church and cemetery. The beginning of the later phase may be dated approximately to the second half of the 9th century, but probably sometime after the very beginning and sometime before the very end of this half-century. The earlier phase of the cemetery includes approximately two thirds of the graves and had to have been used for a relatively long time.

We may conclude that the graves 90, 265 and 280 (Chap. 3.4.1, 3.4.2 and 3.4.3) can probably be dated to the second or third quarter of the 9th century, on the basis of their terrain situation. Burial 265 took place in the older phase of this period (e.g. before the mid-9th century), because after the grave pit 265 was dug, the earlier phase of the church was adapted several times and then

110 Type 1A according to Hrubý (1955, 186–188), type II according to Kavánová (1976, 40–46) and type III according to Bialeková (1977, 134–138, Abb. 2).

the whole area was radically reconstructed and the new church building established.[111]

As in the case of the cemetery by the II[nd] church, the cemetery by the largest known Great Moravian church (the III[rd] church which was a three-aisled temple with narthex and atrium) was established in the place of an earlier settlement. Some graves here also caved into freshly back-filled features. The preliminary evaluation of the cemetery (Ungerman/Kavánová 2010, 80–82), shows that the first burials took place in the course of the Early Great Moravian Horizon (shortly before or around the mid-9[th] century). The cemetery was used for some time, to a limited extent, after the demise of the church (for more details see Chap. 1.2; Kavánová/Šmerda 2010; Ungerman/Kavánová 2010). One of the most interesting and the most discussed excavation units is the burial 580, which was found within the central nave of the church interior (Chap. 3.4.9; summarized by Košta/Hošek 2008a). The stratigraphical situation does not allow us to say anything more than that the burial took place during the time of the existence of the church.

Grave 425 (Chap. 3.4.6), which was overlaid by fragments of the church's ruins, revealed no vertical stratigraphic relationships with any other graves. Therefore, we cannot date grave 425 more accurately than to the Great Moravian period.

Burial 500 was placed in a grave pit lined with stones, which has been reported as tomb XIV (Chap. 3.4.8). The tomb was located near the church building, at the west side of the road leading from the north to the third church. In superposition above grave 500 there was grave 450 without grave goods, and above grave 450 there was a terrain modification which preceded the decay of the church. This stratigraphic situation suggests that construction of tomb XIV took place during the earlier phase of the cemetery.

Burial 341 was located by the same road, a little further from the church, and was also placed in a grave pit lined with stones (Chap. 3.4.4). The burial of a man with a sword (341) was accompanied by two child burials (340 and 342), which were placed into the tomb together with or shortly after the burial 341, since it had to be possible to open and then close the still intact tomb. The stratigraphic position of grave 341 depends on its relationship to a compartment, which was located to the west of the tomb and which contained specific objects. This compartment (sometimes considered as part of grave 341) was probably an older burial with unpreserved human remains, which was somewhat disturbed by grave 341. The inventory of this compartment is peculiar and it is difficult to date; analogous triangular bowls from Hedeby are dated to the first half of the 9th century (Steuer 1973; Laur 1993; Arents/Eisenschmidt 2010a, 148–153; Williams/Pentz/Wemhoff 2013, 144). Fragments of the ruins (including stones with mortar) caved into the upper part of the backfill of grave 341, therefore the ceiling of the tomb probably collapsed after the ruin of the church. So the grave probably did not come from the earliest phase of the cemetery but the burial certainly took place in the Great Moravian period (most likely in relation to the other huge graves located by the road to the north of the church building).

Grave 438, located next to the same road as graves 341 and 500, was the most remote from the 3[rd] church (Chap. 3.4.7). This grave overlapped a settlement feature, into whose backfill the deceased's body caved somewhat. This could suggest that the burial was placed in the grave pit in the earlier stages of the cemetery's use.[112]

111 For more detailed informations see Poulík 1957; Klanica 1985b; Košta 2004; Poláček 2010; Poláček/Škojec 2009.

112 There is an interesting relationship of the grave 438 to graves 440 and 439 situated across the road. Female burial 440 contained Veligrad-type jewellery from the Early Great Moravian Horizon (see Dostál 1966, Fig. 9:27 for analogies) and, likewise in the grave 438, a quern-stone was found above the deceased's skull. This burial was disturbed by grave 439 in such a way that only the skull and cervical spine remained in their original positions. The grave 439 contained spurs of the same type as the grave 438, and the burial was like burial 438 placed in a coffin with iron fittings. The grave 438 thus had

The last burial associated with the III[rd] church is burial 375, situated south of the church atrium (Chap. 3.4.5). This grave was located in the central part of the cemetery and was not in superposition with any other grave. The grave was intersected by a trough with dark filling, whose dating is uncertain (the trough respected the orientation of the church, but this does not prove that it was contemporary). A horizontal stratigraphic relationship with the atrium and narthex of the church, which were built later than the three-aisled nave, is probable but not certain. This grave probably does not belong among the oldest burials at the cemetery, but can be dated to all phases of the cemetery's use.

Graves 715, 717 and 723, from a small burial ground located north-west of the palace, cannot be dated precisely on the basis of stratigraphy. None of the graves was in any vertical stratigraphy with other graves. Grave 715 (Chap. 3.4.10) was caved into the soft backfill of an older settlement feature, therefore it was apparently dug shortly after the change of use of the area (but we do not know exactly when this change occurred). Excavation of the grave 717 (Chap. 3.4.11) revealed burnt stones and mortar, which suggests that the grave pit was dug after the construction or reconstruction of a masonry building in the settlement area. On the other hand, the use of coffins with iron band-shaped fittings clearly suggests a dating in the Great Moravian period. Hypothetically, we can consider the grave 723 relatively later because the grave was shallow and located outside the main row of graves (Chap. 3.4.12). Unfortunately, we do not know anything accurate about the period in use of the burial ground. It might have only been used for a short-time or for several generations by a very small group of the elite. Nor do we know anything about its chronological relation to the so-called palace.

The shallow grave 805 was located within the southern group of graves around the 'hypothetical XI[th] church' and was not in superposition with any other grave (Chap. 3.4.13). The terrain situation is unclear, but it is possible that the grave could have disrupted the ruins, which were put in a relation to the XI[th] church in the preliminary reports (Klanica 1966; 1967b). In any case, the grave is stratigraphically later in the archaeological sequence of the excavation conducted on the site and discussed here.

The relationship of grave 1347 (Chap. 3.4.14) with the ditch feature (formerly interpreted as a pre-christian temple) has been questioned recently by a revised analysis of the stratigraphic situation (Hladík 2010; Hladík/Mazuch 2010). According to this analysis the grave can only be dated generally to the Great Moravian period.

The finding circumstances of the grave 1665 in the location of 'Kostelec' are complicated (Chap. 3.4.15). The grave was located in an area with evidence of intense burial activity. In past, the sword was usually related to one of the contemporary burials 1665a and 1665b. However, the disrupted findings as well as other ambiguities suggest the existence of an earlier burial, which might have been disturbed by this double-grave.

Grave 1750 was found in the central part of the cemetery located in 'Kostelec' (Chap. 3.4.16; Klanica 1997a, 110, 134). This grave partially disrupted another grave 1745. Although the fill of the burial pit 1745 was visible at a higher level, the sequence of these burials is unclear. Stratigraphic analysis thus cannot help to specify its dating.

If we compare the findings from the chronologically sensitive grave goods as well as analysis of their stratigraphic situation and the dating of types of Carolingian swords (see Chap. 4.1), we may be able to achieve a more precise dating of the Mikulčice graves with swords (and thus the dating of the period, when these swords disappeared from the living culture). Ones of the oldest burials with swords were undoubtedly those in graves 1750 and 265. The deceased in the grave 1750 was buried with spurs and a sword of type K (Chap. 4.1.2), which can be dated to the Early Great Moravian Horizon. Other items of grave

features of both these burials (Chap. 3.4.7; Košta 2004, 78).

goods also support the early dating of this grave. The burial took place during the first or second third of the 9th century, but probably before 850. Its unique stratigraphic situation determines the dating of grave 265 to around the middle of the Early Great Moravian Horizon – thus after the construction of the earlier phase of the second church and longer time before the construction of the later phase of the church and adjacent cemetery. This period, which can be roughly dated to the second quarter of the 9th century, is confirmed by the dating of the H-type sword (Chap. 4.1.1) as well as of spurs from the grave inventory.

Grave 580 from the interior of the IIIrd church can be accurately dated on the basis of certain items from the grave goods (including the sword). The character of the goods suggests a date in the Early Great Moravian Horizon. The richness and diversity of the set of grave goods of undiminished character (see Chap. 6) in the context of the burial in the church interior also suggests this earlier dating. The beginning of the time interval when burial 580 could have taken place is bounded by the founding of the IIIrd church, which occurred sometime during the Early Great Moravian Horizon, so it is in the second third of the 9th century, but more likely around the middle of the 9th century (Ungerman/Kavánová 2010, 80–82). The end of this interval cannot be bounded definitely; it is only likely that the burial did not take place later than the second third of the 9th century.

A sword of a morphologically later form of type K from grave 90 (Chap. 4.1.2) and a sword of type X (Chap. 4.1.4) from grave 280 can be dated fairly well on the basis of stratigraphy. Both were buried during the earlier phase of the cemetery around the IInd church, which we have dated approximately in the second and third quarters of the 9th century. Spurs and a sword from grave 90 also confirm a date within this range and some clues (such as the character of the grave pit etc.) indicate an even earlier dating. The grave 280 contained an X-type sword with a distinctive semicircular pommel and a pattern-welded blade. With regard to the general dating of swords of type X, we may assume that the burial took place sometime in the third quarter of the 9th century. In any case, the sword from grave 280 is one of the oldest known representatives of X-type swords.

Unfortunately, we cannot accurately date grave 715, which contained an H-type sword (Chap. 4.1.1) with a two-part upper hilt whose pommel was solid (Geibig's construction type I). Analogies known from continental Europe suggest that this sword was probably made at the end of the pre-Great Moravian period or during the Early Great Moravian Horizon. Of course, the sword might have been buried sometime later. Dating the grave from the beginning of the development of this small burial ground might be based on the fact that the grave caved into backfill of an earlier settlement feature, can only be relative, because we do not know when the cemetery (by the 'palace'), began to be used. Thus the sword might have been placed in the grave at any time during the Great Moravian period although the Early Great Moravian Horizon is more likely.

Similarly, we have no more information for dating the two other graves from the burial ground located northwest of the 'palace'. Grave 717 with a sword of type X (Chap. 4.1.4) can be dated to the second half of the 9th century, on the basis of dating the swords. The deceased was buried in a coffin with iron band-shaped fittings which indicate that the burial took place during the Great Moravian period. As indicated by indirect evidence. Grave 723 with an N-type sword comes (Chap. 4.1.3) from the later phase of the burial ground and was probably dug sometime during the Late Great Moravian Horizon. But we cannot exclude another alternative.

Grave 425 with an N-type sword, located in the cemetery around the IIIrd church, can be dated more accurately only because it contained a typical globular button (*gombík*), thanks to which we suppose that the burial took place in the Early Great Moravian Horizon or at the turn of the Late Great Moravian Horizon. With regard to the dating of the cemetery, therefore, we assumed the dating of grave 425 between the end of the second quarter and the beginning of the last quarter of the 9th century. These dates are not inconsistent with the dating of the N-type swords (Chap. 4.1.3).

The remaining Mikulčice burials with swords contained swords of type X, which could have been made in the second half of the 9th century or somewhat later, even from the post-Great Moravian period. The contents of goods in graves with X-type swords correspond to the boundary between the Early and Late Great Moravian Horizons, and to the Late Great Moravian Horizon itself. The earlier dating can be attributed to the swords from grave 280 (which has been discussed earlier), 438 and 500. Grave 438 contained spurs of the Biskupija-Crkvina type, which allow us to date the burial to the third quarter of the 9th century. The location of the burial within the cemetery suggests a dating to the later part of the earlier phase of the cemetery use. We may also date the grave 500 to the third quarter of the 9th century. Because of its location near the IIIrd church the burial 500 might have taken place even earlier than the burial 438. The sword from grave 1347 was apparently buried during the third or fourth quarter of the 9th century, sometime before the end of the Great Moravian period. According to the latest revision of data from the excavation (Hladík 2010; Hladík/Mazuch 2010), burial activity in the location of 'Kostelec' was replaced by settlement activities during the late Great Moravian period (this was dated on the basis of ceramics from the Mikulčice pottery group). Other burials, 341 and 375, were not among the first graves by the IIIrd church. These burials undoubtedly took place in the Great Moravian period, sometime in the second half (but more likely in the last third) of the 9th century and perhaps the early 10th century. The earliest dating of sword found in grave 1665 cannot be determined more accurately than to the start of the Late Great Moravian Horizon, due to the unclear circumstances of the find. The fact that all the spurs had short pricks excludes dating of all the burials to the post-Great Moravian period. The sword from grave 805 is dated to the Late Great Moravian Horizon by the same type of spurs and this burial presumably took place in the last third of the 9th century or in the early 10th century. None of the Mikulčice swords can be definitely dated to the post-Great Moravian period. In case of some burials (e.g. 723, 805) we cannot rule out a possibility that they took place after the tragic events of the first decade of the 10th century. However, this alternative is less probable for those graves.

5. Manufacture of the Mikulčice swords

Swords are in general complex products that can be assessed from many perspectives. Besides the standard forms, one can classify them according to from what materials and how their blades and hilts were made, and with what materials and how they were eventually decorated or signed. Furthermore, the scabbards and straps with their fittings were important parts of swords. All this additional information, which will be presented here, helps to establish both the functional and aesthetic qualities of individual weapons and, hence, their overall value.[113] Finally, we will discuss the possibility of determining the provenance of the Mikulčice swords, because, the overall design of the swords may tell us whether particular weapons were imported or whether they were local products.

5.1 Manufacture of blades and hilts of the Mikulčice swords

5.1.1 Blades

When sword-blades are examined, one can assess:

1) Their internal structure and heat treatment (i.e., the characteristics discernible only by metallography).
2) Their basic characteristics of their shape, especially their length, width and the extent of their narrowing and shaping to a point, also the dimensions of any central fuller. In addition, the location of the point of balance is also related to the blade shape, as well as depending on the weight of the hilt.
3) The details of their external aesthetic and/or symbolic elements, such as pattern-welding, inlaid inscriptions (whether with iron or non-ferrous metals) and any decorative ornament, which was originally visible to the naked eye. Nowadays it may also be revealed by conservation treatments.

The Mikulčice swords are discussed in the following chapters from all these perspectives.

5.1.1.1 Internal structure and heat treatment of blades

Internal structure (construction)

The distribution of materials within a blade indicates the method of its construction, which may have resulted from welding semi-finished pieces of certain metal alloys together to make a billet, from which the sword-blade was subsequently formed by forging and grinding (see Fig. 141). Despite the number of metallographic examinations of medieval swords published, there is no general typology of such construction schemes established to date. Therefore the procedures used to manufacture the Mikulčice swords are described as the particular arrangements of semi-finished pieces into billets and by the materials used as together they illustrate contemporary methods of sword-making. The methods employed of welding semi-finished pieces together are presented in Fig. 142. The initial materials used were iron, a heterogeneous metal varying between iron and steel, and, in the case of method C, also pattern-welded composites.

113 See Tab. 4 and 5 for summarized data on metallography and research into organic remains of scabbards, straps and wrappings of swords.

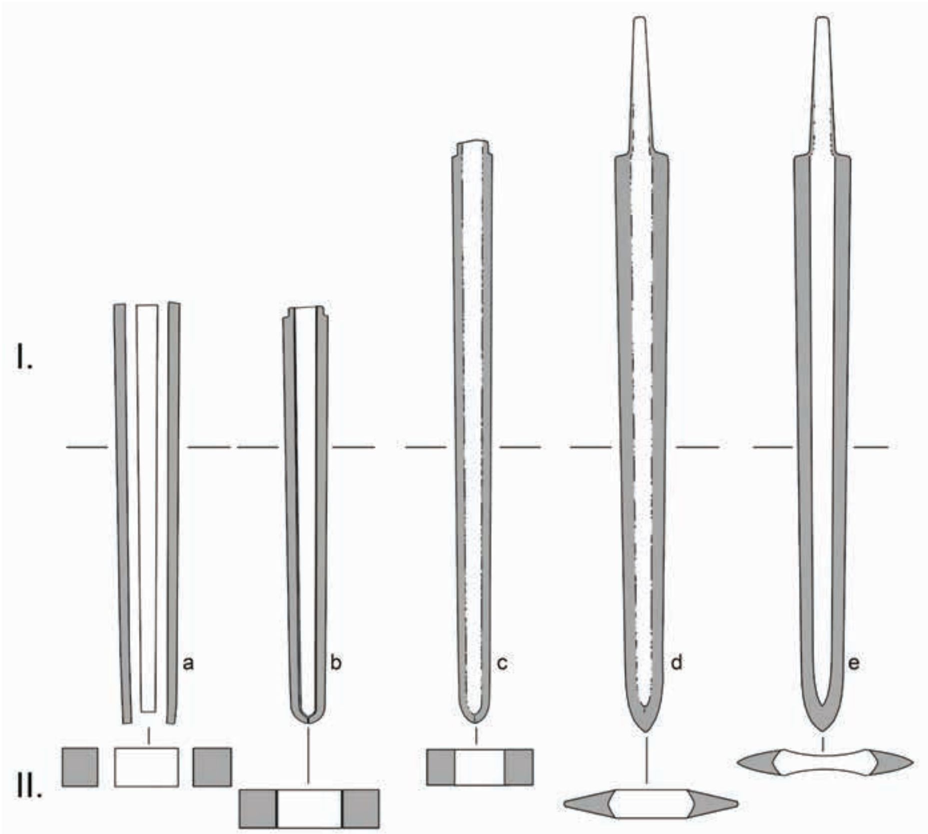

Fig. 141. One of the possible methods to make a sword blade (here with an iron core and edges of steel); a – pieces of iron and steel are forged into rods of appropriate dimensions; b – the rods are shaped and assembled together into a form of a billet; c – the billet is made by welding the individual rods together; d – the billet is forged into a rough shape of the blade (still without fuller); e – the blade is provided with a fuller, heat treated and ground into the final shape. I – semi-products in the process of the blade manufacture, II – cross sections of the semi-products in approximate half of their length. Drawing by J. Hošek.

Swords made according to method A

The assembly of semi-finished pieces using method A can be assumed in the case of those blades having steel cutting edges welded onto an iron core, whose deliberate assembly from individual pieces of different composition cannot be proved. The cores of such blades might have been made from a single piece of metal without traces of welding or from a piece that was prepared by folding and forge-welding several times or even by the random welding of several smaller pieces together. We must divide swords made using the method A to variants with iron cores (low-carbon steel can occur in places but iron predominates), cores made of a heterogeneous material varying between iron and steel, or even, cores of steel.

Sword blades with iron cores (only locally corresponding to low-carbon steel)

Steel cutting edges welded onto an iron core were found only in the case of sword 1347. This specimen was a relatively good quality weapon, albeit simple in terms of its construction and the materials used. Although such blades are considered widespread, it seems that their production was rather limited in the 9th and 10th centuries. In general, the strength and hence the quality of such blades primarily depended on the amount of steel used. While blades provided with deep cutting edges of steel were undoubtedly good quality weapons, blades with more shallow cutting edges would be less strong. Swords with blades made in a similar way are the following: sword from Vranovice /9th century; Czech Republic/ (Galuška 2001), swords from cemeteries of Gnezdovo /No. 11 and

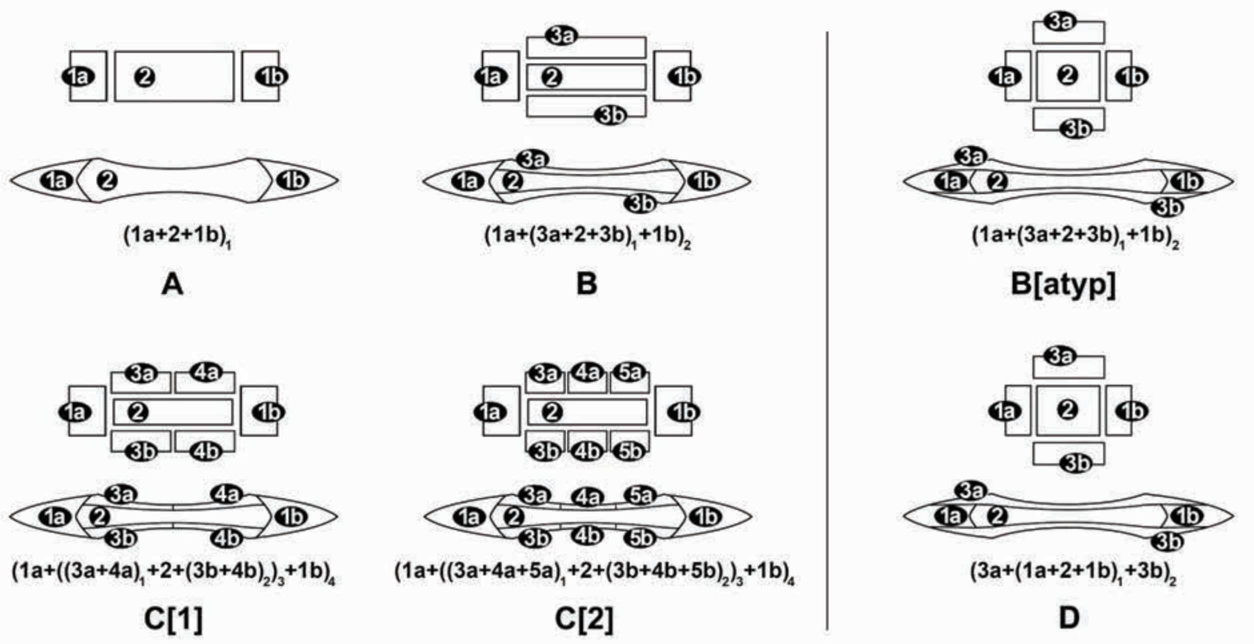

Fig. 142. Metallographically evidenced (A, B, C[1, 2]) or suggested (B[atyp], D) methods of welding semi-finished pieces together to make the blades of Mikulčice swords. Individual pieces of iron or steel (labelled as 1a, 1b…5a, 5b) were welded together to form the billet which was shaped into the sword. This welding was probably done in more than one stage. If, for instance, pieces 3a + 2 + 3b were welded together in the first stage, this is shown as $(3a + 2 + 3b)_1$. If pieces 1a and 1b were then welded in a second stage, this is shown as $(1a+(3a + 2 + 3b)_1 + 1b)_2$. Drawings by J. Hošek.

12; early 10th century; Russia/ and Michajlovskoe /No. 3; 9th to 10th century; Russia/ (Kolčin 1953, 133–134, Ris. 106) and one sword lifted from Thames river at Brentford /S44; 11th century; England/ (Tylecote/Gilmour 1986, 234–235). The welding of steel cutting edges onto an iron body is assumed also in the case of sword from cemetery of Kanín / No. 184; 10th century; Czech Republic/ (Hošek/Košta/Mařík 2012, 75–76).

Sword blades with heterogeneous cores varying from iron to steel

In the case of the swords of this group one cannot assume either the intention to provide a blade with an iron core nor the intention to provide it with a core of steel. The cause of this uncertainty may simply be the uneven quality (in terms of the distribution of carbon) of the semi-finished material used. Among the Mikulčice swords, the weapon from grave 500 belongs to this group. The sword has a simply made blade with very shallow cutting edges of steel. Its overall quality was low, perhaps the lowest within the whole set. With some caution, we can assign the sword blade 805 to this group as well; its blade was provided with deep cutting edges of high quality steel and the blade's core probably consisted of a material varying between iron and steel, although we cannot exclude the possibility that the whole core was steel (only a little portion of the core was detected with an uneven distribution of carbon; which allows for multiple interpretations).

Sword blades with steel cores

Five blades were provided with cutting edges as well as cores of steel. The semi-finished pieces used as cores were, in case of the Mikulčice swords, not single pieces of homogeneous steel, but were welded from several pieces (piled) or made from a piece of steel folded and forge welded together several times (as the welding seams and banded structures indicate). The cores of steel were found in the case of swords 265, 341, 375, 580, and 723, and all of these can be considered good quality products from the perspective of their construction scheme and the materials used. In some cases (such as swords 341, 375, and 723) the middle portions evidently consisted of surface panels of high carbon steel welded onto an inner core with a somewhat lower carbon content, and, therefore, one might also classify them as weapons made according to method B. However, since it is generally difficult to distinguish between such cases reliably, it seems more advantageous to classify these examples as all-steel blades manufactured using method A. All-steel blades represented a very common type in the 9th and 10th centuries (perhaps even the most widespread type), which would have had good mechanical properties. For well-known analogies to this group of blades we can mention the sword from Kolín /the 9th century/ (Pleiner 1962, 164, T. LXII), the sword from Nemilany /9th to 10th centuries; Czech Republic/ Selucká/Richtrová/Hložek 2002; Kalábek 2002), the sword from Lutomiersk /No. 3; the 11th century/ (Piaskowski 1959, 165), the swords from old Russian cemeteries of Gnezdovo /No. 12; 10th century; Russia/ and Priladož'e /Nos. 10 and 11; the 10th century; Russia/ (Kolčin 1953, 132–134, Ris. 106), and the sword raised from the river Thames /S23; 8th to 10th centuries; England) Tylecote/Gilmour 1986, 218–220), etc.

Swords made according to method B

In the case of the assembly of semi-finished pieces using method B, one can justifiably assume that the blade-smith deliberately provided the blade with a core of low carbon content (of iron as a rule), to which rods of high quality (i.e. of high carbon) steel were welded from all sides. In total, three swords undoubtedly correspond to this method; out of these, two (Nos. 425 and 438) were evidently made using the standard method B. The sword 425 has a core of iron, while the sword 438 of material varying between iron and low carbon steel. Considering sword 717, we can find a variant in which the cutting edges are at least partially overlapped by the surface panels (see method B[atyp]). If this overlapping was a chance result, this blade would represent only one of the possible variations of the final form of blades made by the same method B. However, the intentional overlapping of the cutting edges (which in this case cannot be proved) would on the other hand testify another, different technological process: i.e. method D. In this study, we have assumed that the blade 717 was made using method B, i.e., the supposed overlap does not demonstrate any intentional assembly as it would in method D. The blade of sword 717 has a core of iron, while its cutting edges and the surface panels are steel. Analogous to these is a sword made evidently using method B comes from the old Rus' town of Vŝiž /11th to 12th centuries; Russia/ Kolčin 1953, 132–134, Ris. 106).

Swords made according to method C

The assembly of semi-finished pieces using method C are typical for pattern-welded swords. One can further distinguish several variants of this scheme according to the number of pattern-welded rods used; in our case these are variant C[1], in which swords 280, 715, and 1750 were made, and variant C[2], in which sword 90 was made. However, since the number of surface pattern-welded panels (as well as chosen pattern) depended just on the aesthetic demands of customers, we will not deal with it here. Pattern-welded swords were primarily valued for their attractive appearance, while hardness and strength may not have been considered as essential by most of the customers buying such swords. Nevertheless, blades with cores and cutting edges of steel can be considered those of the highest quality, because the strength of pattern-welded blades mostly depended, on the amount of steel utilized (pattern-welded elements had no significant positive effect on mechanical properties, although some people have suggested this in the past (Thiele et al. in print)). Blades made entirely of iron as well as blades entirely of steel (except for the pattern-welding) are known, but during the 9th century the production of pattern-welded swords gradually declined and after the 10th century such swords were seldom made.

The blade of sword 1750 has a core of iron and cutting edges of steel. Swords with blades, which were made in a similar manner, can be found, e.g., in the old-Rus' cemeteries of Gnezdovo /No. 15; 10th century; Russia/ and Michajlovskoe /No. 5; 9th to 10th century; Russia/ (Kolčin 1953, 133–134, Ris. 106). The blade of sword 280 has both cutting edges and core made of a heterogeneous material that varies between iron and steel. It is impossible to say whether the tips of the cutting edges were steel, because they have corroded away. The sword 715 seems to be made solely of iron. However, the tips of the cutting edges, as in the case of the blade 280, have corroded away and we cannot assess them. The sporadic occurrence of martensite in the microstructure suggests that some sort of hardening was attempted, which might imply the original presence of steel in the edges, but this cannot now be established. Analogous cutting edges of iron were found in the pattern-welded sword from Libice nad Cidlinou /H227a; 10th century; Czech Republic/. The tips of its original cutting-edges are now corroded, but (based on the microstructure of the surviving part) it seems possible that they might originally have contained some steel and been hardened (Hošek/Košta/Mařík 2012, 79–80).

Materials used to manufacture the blades
Steels

The microstructures of samples taken from swords which have undergone equilibrium cooling allow the carbon content to be estimated fairly accurately, since the pearlite will then contain 0.77% C. However, if the sword has undergone some attempt at hardening by heat-treatment, then it is more difficult because the pearlite may contain a different proportion of cementite. The reason is that a faster rate of cooling of austenite will restrain the separation of ferrite in a hypoeutectoid steel (so the pearlite will contain *less* C than in equilibrium cooling), or the separation of cementite in a hypereutectoid steel (so the pearlite will contain *more* C than in equilibrium cooling), (Pluhař/Koritta 1966, 253–254). Naturally, this might have been a source of misinterpretations. Nevertheless, even with the knowledge of possible errors, an assessment of the steels in blades in terms of their carbon content makes sense. In case of the Mikulčice swords, an opportunity was taken to avoid the difficulties mentioned above by using parts of some of the samples for controlled annealing, after which the micro structure consisted of pearlite and ferrite formed by equilibrium cooling. This allowed us to determine, using image analysis, the carbon content across sections of eight blades (90, 341, 375, 425, 438, 723, 805 and 1347). The results are summarized in Fig. 143 in a simplified form. Furthermore, one can estimate that the blade of sword 580 was made of steel containing about 0.7% to 0.77% C and the blade of sword 717 was of steel containing about 0.6% to 0.77% C. The results obtained suggest that the cutting edges as well as the surface panels of these blades were typically made of high carbon steel, often of eutectoid or nearly eutectoid composition. This means that great attention must have been paid to the selection of materials for these blades. The cores of all eight blades had less carbon than the surface panels and cutting edges, which may indicate that an attempt to provide blades with cores having less carbon was a widespread trend. Our results can be compared to a certain extent with work of A. Williams (2007a; 2007b; 2009; 2012, 116–183), who has performed long-term metallographic research into swords bearing the 'Ulfberht' inscription. Williams (2012, 118) divides blades of these swords into five groups. The first group includes swords made of hypereutectoid steels (more than 0.8% C, 9 blades in total out of 55 examined), the second group includes swords made of eutectoid steel (about 0.8% C, 5 blades in total). And these are the examples in which the inscription is spelt as +VLFBERH+T, rather than a variant. Some of the Mikulčice swords, or their cutting edges, respectively, that underwent the carbon content evaluation, would – from this perspective – rank with the second group. Williams highly values the swords from both the first and second group and

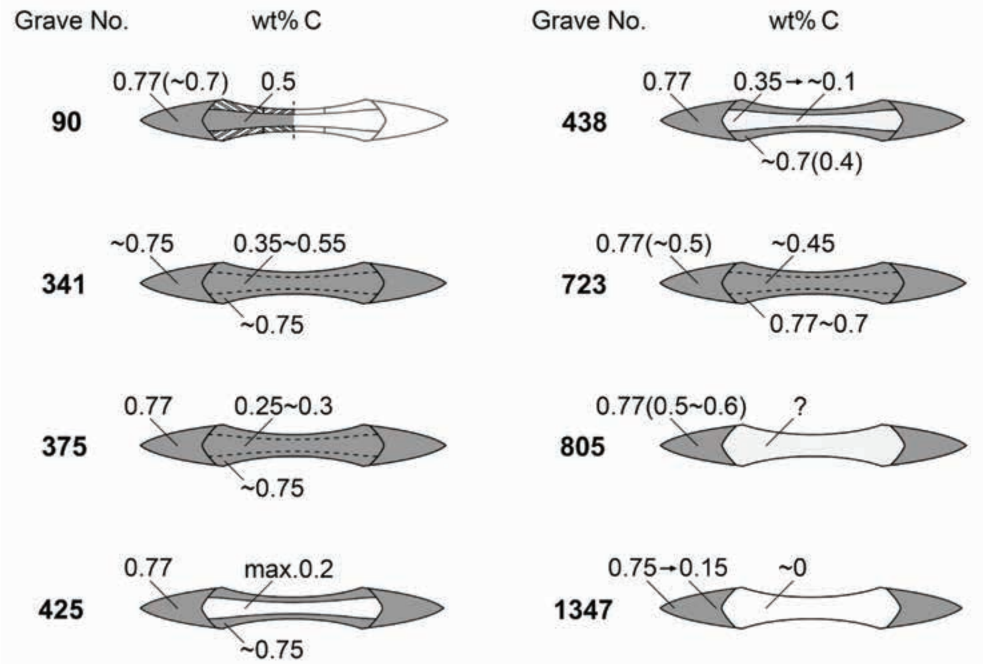

Fig. 143. Simplified overview of the content and distribution of carbon in the cross-sections of selected Mikulčice sword blades. Explanation of the applied description: X(Y)…structure consists of X and of separate zones of Y; X~Y…structure varies between X and Y; X→Y…structure is gradually changing from X to Y. Drawings by J. Hošek.

considers them 'genuine' Ulfberht swords, whose blades might have been made of crucible steel of some sort. The Mikulčice swords were made of bloomery steel and their cutting edges show traces of welding. This was apparently the result of either welding several pieces of metal together to make a billet of sufficient size or else folding and forge-welding a single billet several times to minimize potential differences in carbon content. This is clear evidence that the blade smiths had at their disposal bloomery steel, which was in terms of carbon content a high quality material. However, the overall quality of steels does not depend on the carbon content only. Metal purity plays an important role too, and from this point of view steels of the Mikulčice swords were not the best (regarding the amounts of slag inclusions observed, the steels were usually of only medium purity)[114]. Therefore, steels used for the Mikulčice swords were in general not so good as steels encountered in some of the 'Ulfberht swords'.

114 Of course, bloomery steel would have a lower slag content than bloomery iron (Williams 2003, 879).

Pattern-welded composites

It is well known that pattern-welded composites employed since the 2nd century CE onwards comprises layers of high-phosphoric iron and low-phosphoric iron or steel (Thiele et al. in print). The phosphoric iron utilized in the pattern-welded elements of swords can contain from 0.4 to 1.4% P (Thiele/Hošek in print). The pattern-welded composites used in the Mikulčice swords correspond well with this data: there was about 0.8% P in the composite of sword 90, 0.6 ± 0.1% P in the composite of sword 280, 0.9 ± 0.0% P in the sword 715 and 0.8 ± 0.2% P in the composite of sword 1750. In the case of sword 715 phosphoric iron was combined with ordinary iron, in the case of sword 280 with a heterogeneous material fluctuating between iron and steel, and in the case of sword 1750 with steel.

Iron

Individual parts of iron utilized in sword-making can differ in both carbon and phosphorus content, as well as in metal purity (from slag), overall homogeneity etc. All these characteristics have some influence on the mechanical properties of blades and hence on their functional quality. Concerning the Mikulčice swords, pure soft iron was used in the blade of sword 1347. Examination of the sword 425 revealed in its blade a phosphorus-free iron with little carbon (less than 0.2%). Iron in the blade of sword 717 was piled and corresponds to a bloomery material with low purity and elevated phosphorus content. Individual iron parts appeared also in the pattern-welded swords 715 and 1750. Iron used in the blade 715 is heterogeneous in terms of both carbon and phosphorus content. Its layered structure suggests piling. The iron used in the blade 1750 has an enhanced content of phosphorus. The above findings suggest that iron free of phosphorus and with acceptable metal purity was not widely available for the manufacture of sword blades. Iron with enhanced phosphorus content was detected in cores of both pattern-welded blades, which demonstrates that no special attention was paid to the selection of the iron. Presumably, sword makers did not hesitate to use the iron of variable quality that was widely available at the time.

Notes to mutual welding of the materials

The welds observed in the samples are of good quality with the exception of samples from the swords 341 and 375, in which local imperfections were found. The welds are distinguishable (though sometimes with difficulty) in all the blades as light-etching lines (or white lines), probably because they are enriched in such elements as nickel and/or cobalt. Chemical EDX analysis, was performed however, only in the case of sword 580 (around 1% Ni was detected) and 723 (up to 3% Ni and up to 1% Co), because the chemical composition of welding lines is useless for provenance studies (due to high variability of such enrichments, even within one weld).

Heat treatment of blades

In general, heat treatment (referred to further in the text as *HT* only) may be defined as heating and cooling operation(s) applied to metals and alloys in the solid state so as to obtain the desired properties (Rajan/Sharma/Sharma 1992, 1). However, particular methods of *HT* of sword blades, besides the temperatures reached, and the rates of heating or cooling, depend also on the choice of blade parts to undergo the *HT*. Therefore, one can assume, in case of *HT* of blades, the following basic methods, which may overlap with each other to a certain extent: 1) full quenching (to form an all-martensite structure); 2) various forms of slack quenching (to produce a mixture of martensite and other products, such as bainite and/or pearlite); 3) tempering of quenched blades (to form structure consisting mostly of aggregates of carbide particles); 4) time-quenching (an interrupted quenching to produce surface transformation microstructures, which are subsequently tempered by residual heat from the inner part of the blade when removed from the quenching bath); 5) non-selective quenching (quenching a blade throughout its whole cross-section and length; Fig. 144:a, A); 6) selective quenching (limited to the tips of cutting edges [Fig. 144:b, B], to the surface [see time-quenching], or to a selected length of the blade [Fig. 144:a, C]). For more details see Williams (1977, 77; 2012, 21–22), Kapp/Kapp/Yoshihara (1987, 38–40, 85–86).

Concerning the Mikulčice swords, eleven weapons were examined in the state of their original heat treatment, and five after their damage by the depositary fire, i.e., 16 weapons in total. Out of these, twelve blades revealed microstructures that imply that the blades were quenched in some way. Samples detached from blades 265 and 580 revealed no traces of hardening, which however does not mean that the blades were not quenched at all. The samples examined came from the upper parts of the blades, where inlaid signs of non-ferrous metals were found; it might well have been possible that the signs were inlaid into nearly finished blades, whose inlaid parts had to remain unquenched for that reason. Furthermore, the tips of the cutting edges could not be examined as they had corroded away. The blades may therefore have been quenched only in their lower parts or in their cutting edge tips, where metallographic examinations were not conducted. One example

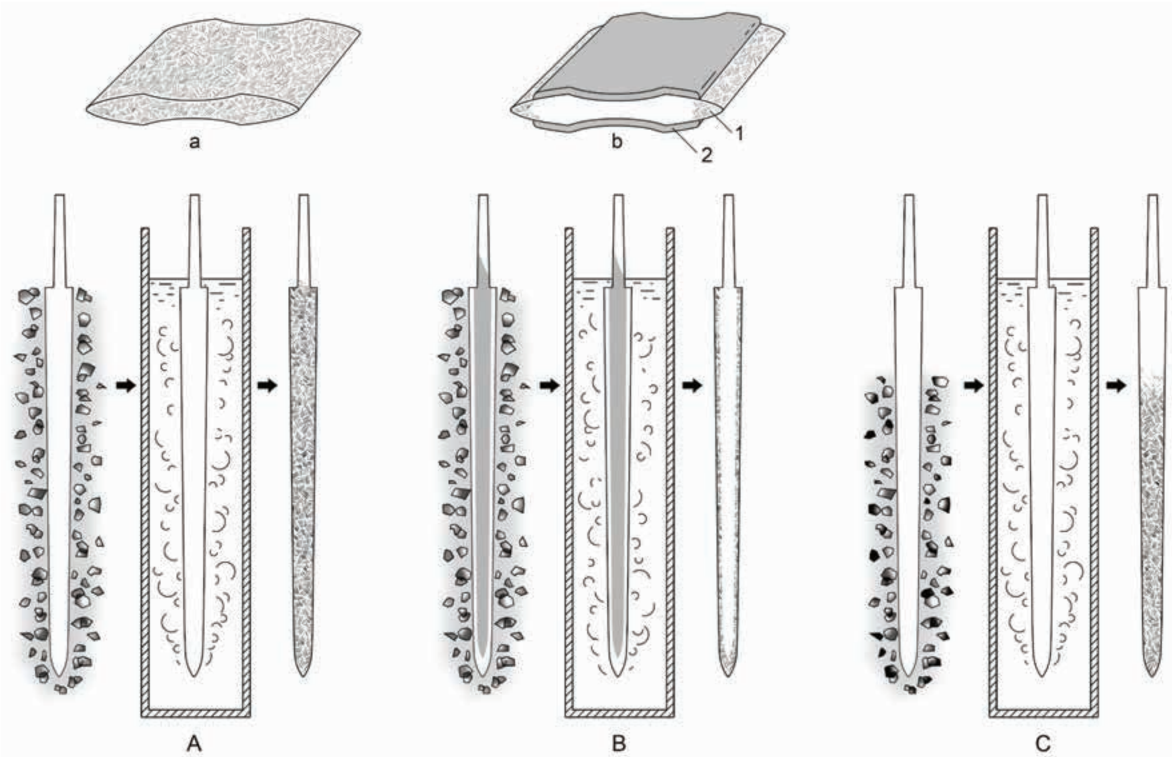

Fig. 144. Various methods of blade quenching: a – blade quenched in the whole cross section; b – blade quenched in cutting edge tips only (1), using insulating layer of clay (2); A – blade heated and quenched along its entire length; B – clayed blade heated along the entire length and quenched in the exposed cutting-edge tips only; C – blade heated and quenched along a part of its length. Drawings by J. Hošek.

of a selectively quenched weapon, according to the Fig. 144:C, is the sword 723. While the sample detached from the upper (inlaid) part of the blade is in a non-quenched state, the sample taken from lower part of the blade shows evidence of hardening. A quenching limited to the tips of cutting edges (likely according to the Fig. 144:B) may be assumed in case of blades 341, 375, 425 and 717. It does not seem that this form of quenching was limited to any specific blade-construction scheme, though all those blades, which were quenched only in their cutting edges, were made with steel in their middle parts. In the case of the other blades, a selective quenching of any type could not be proved. Therefore, it can be assumed that a majority of the Mikulčice blades were quenched in their whole volumes (certainly these blades were quenched in the parts where samples No. 2 were detached for metallography). We lack direct evidence of the hardening of blades Nos. 90, 500, 715 and 1665. Concerning the blades 280 and 1750, we cannot – at present – reliably assess their initial heat treatment at all. But in the case of blades 90, 500, 1665 and 715 we can still assume some type of hardening on the basis of indirect evidence, namely on the basis of martensitic grains sporadically occurring in the ferritic-pearlitic structures (swords 500 and 715), and some form of dispersion of cementite particles in the ferritic matrix of the blades affected by the depository fire (swords 90 and 1665). In many cases, it appears difficult to distinguish reliably between full (martensitic) quenching with subsequent tempering and slack quenching, e.g., in oil, because both these sorts of hardening can result in rather similar metallographic structures. Anyway, the blades of swords 438, 723, and 805, which were provided with steel in their middle portions (438 and 723) or have at least cutting edges of steel (805), show microstructures suggesting slack quenching of some sort. The reason for slack quenching can be sought in needs to minimize the risk of excessive deformation or cracking of the heat-treated blade. It is also a much simpler process to control. Quenching in water followed by tempering could be applied rather in cases when the formation of martensite did not take place in the central part of a blade. A good example of such a water-quenched weapon is the sword 1347.

5.1.1.2 Shape of blades

The blades of the Mikulčice swords reveal considerable variation in shape (Fig. 134), suggesting a certain chronological development, mainly from shorter to longer blades. The issue of the development of the length and width of blades was discussed in detail in Chap. 4.2, where attention was drawn also to the significant group of long swords whose blade length exceeds 830 mm. This group is particularly important in relation to the absence of similarly long swords dated to the 9th or the first half of the 10th century from the territory of the former Frankish Empire (cf. Geibig 1991). The overall shape of the blade is usually closely related to the shape of the point. While swords with blades assigned to groups {a1} and {a2} or {c} tend to have a shorter point, long swords from group {d} have their points longer. In some cases, however, the shape of the point could not be reliably determined because of damage to the blade.

The fullers of the Mikulčice swords are also very variable. They range in width from 15 to 30 mm, and differ also in their profile. Some of them are therefore clearly visible while others are hardly noticeable on the corroded blade surface. Fullers having a width of 24–30 mm appear on pattern-welded blades (swords from graves 90, 280, 715 and 1750), what is presumably related to the dimensions of the pattern-welded rods which formed the surface panels. Similarly, the sword 438 with an inscription has a central fuller 25 mm wide. Blades with inlaid crosses (265, 580) belonging to group {a1} have moderately wide fullers with dimensions of 21–22 mm. By contrast, the swords with long blades from group {d} have narrow fullers, 15 to 21 mm wide; the widest fuller (21 mm) was observed on the sword 723, which is the only one of group {d} decorated with a geometric iron inlay. Shallow and indistinct fullers were found on swords 500 and 1347 (both blades belong to group {a2}). The blade 1347 even has a long and sharp groove on one side instead of the usual fuller. The majority of the Mikulčice swords were provided with fullers, which gradually narrowed down their length. In some cases the narrowing of the fuller corresponded approximately to the narrowing of the blade, but fullers that narrowed less than the blade are more common (see Fig. 134). In case of some swords the narrowing of their fullers could not be reliably documented. The blade/fuller length ratio is also very variable; relatively short fullers have been observed on long as well as short blades (swords 375, 425, 580, 805, 1665), though relatively long fullers were documented on blades with pattern-welding or ferrous inlays.

Some fullers have an unusual design as they do not start immediately below the crossguard (as is usual), but a few centimetres further down below the crossguard. Such fullers were found on swords 265, 500, 805 and 1665, and probably occurred also on swords 341 and 1347. These displaced fullers can be replaced by a central rib below the crossguards. They are as rule relatively narrow (except for the blade 265) and they appear on long blades from group {d} as well as on blades from groups {a2} and {a1}. Except for the H-type early Carolingian sword 265, all the swords with displaced fullers belong to the Petersen type X. An analogous design of blades has not yet been found among Carolingian swords. Displaced fullers are not even included in Geibig's typology of blades (Geibig 1991, 83–90). It is not possible to decide whether these displaced fullers were really so rare, or whether they have just not been noticed by scholars describing early medieval swords.

The quality of every sword is determined not only by the microstructure of the blade, but also by its length, total weight and by the distance of its centre of gravity from the crossguard. The production of swords with low weight, especially of those with average or longer blade, requires a great deal of experience in sword-making and steel of high quality. Lightweight and well balanced swords are handy. Longer blades furthermore increased the space threatened by the warrior. And if they were easily manoeuvrable in one hand they were especially convenient for horseback fighting. Swords could be made deliberately heavy and well balanced as well. Heavy swords could more easily cut through the opponent's protective clothing and they became popular in the Romanesque and early Gothic periods, in the context of the spread of mail armour. Therefore, the ratio of the weight of the sword to the length of the blade as well as the ratio of the distance of the point of balance from the crossguard to the length of the sword are important for the assessment of blade quality. Naturally, these parameters can be measured accurately only on those swords whose blades are well preserved and whose entire hilts are still present. Therefore swords 280 and 580 could not be evaluated, as they are in fragments. Big problems in measuring the weight and the location of the centre of gravity were caused by the remnants of scabbards penetrated by corrosion products, which were present on some of the swords before the depository fire. The sword 90, when measured, had approximately half of the scabbard still attached, and swords 265, 341 and 500 were covered with the remains of scabbards that covered much of the blades in massive layers. By contrast, the low weight of swords measured after the fire was the result of the damage by corrosion, which developed further under the organic remains of the scabbards despite surface conservation treatment. We may assume that the weight of the scabbard remains of individual Mikulčice swords could achieve 500 g in maximum (the remnants of the scabbard of sword 90 weighed 150 g), because the weight of common medieval scabbards is estimated at 500 g on the basis of comparison with current replicas.

Nevertheless, when working with data on swords with massive scabbard remains it is necessary to bear in mind the high degree of imprecision. Other swords were covered with few organic remnants, whose weight was negligible. When evaluating the results of analyses that depend on the distribution of weight across the weapons, we must expect a certain degree of imprecision resulting from the uneven damage from corrosion, which was caused by different methods of conservation as well as different soil conditions within individual graves. The lowest value of the weight-of-sword/length-of-blade ratio and hence the best design of blade was found for the sword 438 (0.96). Similarly well designed swords were those from graves 805 and 1750, where the ratio was lower than 1.1. All these swords belong to the group which probably also included the incompletely preserved sword from grave 280. Of course, the manufacture of such swords without any reduction in the strength of their blades required adequate skill and suitable metal.

The swords from graves 375, 723, 90, 425, and 717 with the weight-of-sword/length-of-blade ratio between 1.2 and 1.35 form an intermediate group. These swords are weapons with a moderate weight in the range 1000 to 1150 g. A larger group consists of those swords, which have robust blades with the ratio between 1.45 and 1.81 (the swords 715, 341, 265, 1347, 1665 and 500). This group includes those swords with a triangular pommel (265, 715), which according to Geibig's typology have robust blades, and those swords with displaced fullers (265, 500, 1665, and probably also 341 and 1347, but not the sword from grave 805). While the swords with triangular pommels are relatively heavy weapons with short but very well balanced blades, the Petersen type-X swords with displaced fullers are weapons with roughly manufactured, massive blades, whose fullers are too narrow and shallow. Use of the distance-of-point-of-balance-from-crossguard/length-of-sword ratio leads to a somewhat different grouping. The best balanced swords are those with triangular pommels. The best balanced weapon is the sword 715 with the ratio 0.14, followed by the sword 265, whose ratio was 0.17 despite the massive layers of organic materials covering its blade (without these it would be certainly comparable with the sword 715). This group of very well-balanced weapons includes also the swords from graves 1750 (with the ratio 0.17) and 438 (with the ratio 0.18). In particular, the sword 438 was well balanced thanks to the sophisticated design of the blade which has a low weight despite its considerable length (the slender pommel could not adequately assist in balancing the sword). The group of swords with a mediocre balance includes weapons with the ratio 0.20 to 0.23. These are the swords 425, 1347, 375, 717, 1665, and (despite considerable remnants of organic materials) also 341. Hence, several swords with long blades belonging in group {d} (375, 717, 1665) are also among these weapons. The group of ill-balanced swords includes the weapons from graves 723, 805, 500 and 90. Again, the balance of swords 90 and 500 was somewhat distorted by the preserved organic material; in both cases the ratio was probably around 0.24, as in the case of swords 723 and 805. Insufficient balance is mostly the result of a combination of lightweight pommels (upper guards) and long blades. A sword with a blade of significantly poor design is the weapon from grave 500, which is not even very long.

5.1.1.3 Signs and inscriptions on blades

Signs of non-ferrous metals

Some early medieval sword blades were provided with small inlaid crosses of non-ferrous alloys. Two such specimens were discovered in Mikulčice. The blade of the sword from grave 265 had a *cross potent*, which was approximately 12 mm wide and made of an alloy of yellow colour. The blade

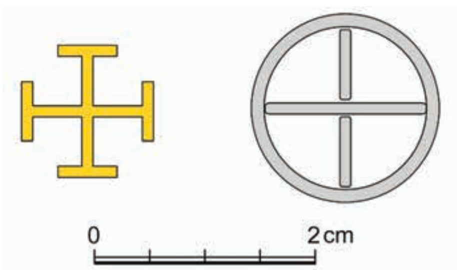

Fig. 145. Reconstruction of non-ferrous inlaid crosses of swords from graves 265 (left) and 580 (right). Drawing by J. Hošek.

of sword 580 bore an encircled cross of silver alloy, roughly 17 mm wide (Fig. 145). In the case of both crosses the method of inlaying used was undoubtedly based on hammering pieces of wire into previously cut cavities. The crosses were inlaid into all-steel blades that were not quenched at the places of inlaying. Both swords were originally provided with exceptional hilts, in the case of sword 265 with a mosaic inlay of silver and brass; in the case of sword 580 presumably of organic material such as bone, antler, etc.

In general, the 9th and 10th century blades bearing inlaid crosses are extremely rare finds (Geibig 1991, 130–133, 155–157). One of such, the N-type sword with an inlaid cross potent, and dated to the second half of the 9th century, comes from the port of Hedeby (Geibig 1999, 57, Taf. 5, 13). This sword was dropped onto the seabed of the port around or prior to the year 894, as suggested by dendrochronological dating of the pier whose pile damaged the sword (Kalmring 2010). In addition, the earliest appearance of the N-type swords themselves might be dated shortly before the first half of the 9th century. A cross potent of brass, inlaid into another blade of a H-type sword from Lithse Ham in the Netherlands (Ypey 1986, 139–143), was situated amidst a typical geometric plaited motif that adorned the reverse side of a blade with an +VLFBERHT+ inscription. In case of this sword Ypey suggested that it was made at the end of the 8th or the first half of the 9th century. However, the cross could have been inlaid later into this blade. In addition, the K-type sword discovered in the chamber B of the ship-burial in Hedeby was an opulent sword decorated *inter alia* with a cross fleury motif on the guard (Wamers 1994; Arents/Eisenschmidt 2010a, 71–79; 2010b). Nevertheless, although rarely evidenced by archaeological finds, blades provided with crosses were presumably not so rare at the time; the Arabic philosopher al-Kindi (803–870) mentioned Frankish swords decorated with inlaid crosses of gold or brass in his treatise 'On swords' (see Hoyland/Gilmour 2006, 43). It is interesting that signs of the cross also occur on blades of swords belonging to the rulers of the medieval Roman Empire. A biography of Charlemagne (*Gesta Karoli*), written by Notker in the 880s in the monastery of St. Gallen, includes a description of Charlemagne's sword. According to Notker, the sword was in its centre provided with a cross that 'should serve to doom heathens'.[115] The blade of the oldest preserved imperial sword (Reichsschwert) features a small silver inlaid and encircled cross (Schulze-Dörrlamm 1995; 1997). This sword is dated to the second half of the 12th century, but the use of the symbol may have been inspired by earlier imperial ceremonial weapons. A ceremonial imperial sword, produced in Palermo around 1220, features a blade decorated with a small golden inlaid cross (Fillitz 1986, 168; Schulze-Dörrlamm 1995, 23). A filed-out Latin cross replaced the original pattern-welded sign or symbol on the blade of the St. Wenceslas coronation sword used by Bohemian rulers (Bravermanová 2007).

Iron inlaid inscriptions and signs

The term 'iron inlay' covers all the variants of inlays consisting of Fe-alloys and their composites. In the period discussed, when the Mikulčice swords were manufactured, iron inlays were generally made of both twisted and untwisted composite wires (combining phosphoric iron with non-phosphoric iron or steel), but mono-iron or mono-steel variants appear as well (Moilanen 2009). Undoubtedly, several methods of iron inlaying were in use in the Middle Ages. As suggested by experiments conducted by M. Moilanen (2009), the simplest method consisted of hammering cold letters or symbols directly into the surface of a hot billet so that no engraving of cavities was required. Then this billet with the sunken elements was further heated and so the elements were forge-welded into the billet. Excellent results could be obtained by using more complex methods; e.g. if possible, the letters or symbols to be inlaid were prepared first, then laid onto the billet in order to mark their outlines on the billet surface. This facilitated the engraving of cavities of appropriate form and size. Then the single elements were hammered cold into the cavities and the billet then heated and the elements forge-welded-in.[116] Once the billet was inlaid it may be further formed into the final shape of the blade.

An inscription, consisting of twisted (pattern-welded) composite wire-inlay, was found on the sword 438 (Fig. 146). The damaged inscription appears along the entire width of the fuller between 40 mm and 170 mm from the crossguard. Approximately seven characters or parts thereof have been preserved; today, they are illegible even on the X-ray images. The majority of these characters can be identified as remnants of letters, but the end part of the inscription faded away completely. The opposite side of the blade bears a symbol in the form of an open circle or the letter U, which was inlaid 100 mm from the crossguard. The size and the technology employed in the production of the inscription, as well as the appearance and dating of the weapon offer the possibility of identifying the piece as an 'Ulfberht' type sword or a copy thereof; however, we cannot rule out other designs.[117] The blade of sword No. 723 was provided with a geometrically patterned (letter-like) inlay (Fig. 146). Although the single elements are almost completely corroded and worn away, the inlay (situated on the first side of the blade) begins with a cross placed at a distance of 43 mm from the crossguard. The inlay then continues with groups of irregularly arranged lines and most likely terminates 205 mm from the guard with another cross. The material used for the inlay was not a composite, but simply a

115 "…post haec balteus spate colligatus. Que spatha primum vagina, secundo corio qualicumque, tercio lintheamine candidissimo cera lucidissima roborato ita cingebatur, ut per medium cruciculis eminentibus ad peremptionem gentilium duraretur" (Notkeri Gesta Karoli I, 33). Various authors translate the term 'eminentibus' differently. We cannot confirm nor refute whether Notker Balbulus meant inlaid cross from precious metals.

116 Based on a personal communication with Patrick Bárta (April 20, 2013).

117 See Chap. 2.4 for references on literature devoted to 'Ulfberht' inscriptions.

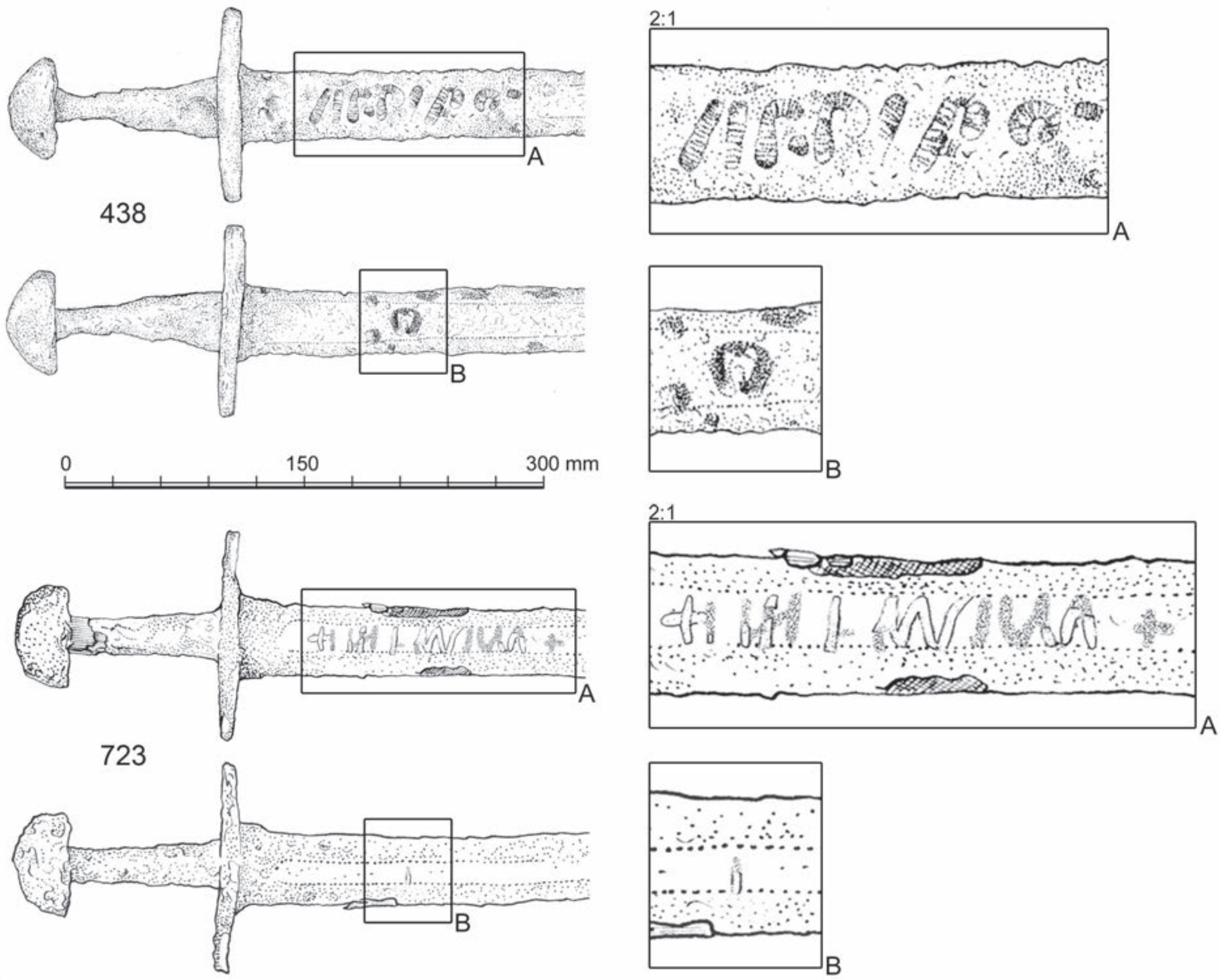

Fig. 146. Swords from graves Nos. 438 and 723 with detailed view of the inlays. By K. Urbanová.

phosphoric iron (containing 0.7% to 1.4% P and locally up to 0.4% C). The second side of the blade also bore some inlay of phosphoric iron, but it survives only in traces and it is nowadays impossible to recognize any original geometric pattern or mark used. Inlays made solely of phosphoric iron seem to be rare, especially in the case of 9th century weapons. The only analogies known to the authors are those described by M. Moilanen (in print); one sword fragment from Mynämäki, location of Junnila /KM 2979:8; roughly the 2nd half of the 10th century; Finland/ and one blade fragment from Nousiainen, location of Moisio /KM 9142:8; probably 11th century; Finland/. Like the sword 723, both the sword fragments bear no inscriptions but geometrically patterned inlays. As mentioned above, while the inlaid part of the blade 723 was not quenched, the lower part of the blade was. We do not know, however, whether this pattern of quenching was determined by the inscription. Finally, the sword 90 originally bore an inlay, which resembles two opposed omegas in form. The first omega is situated 80 mm from the guard, the second is now almost entirely worn off. The inlay was made from untwisted composite wire and was set into a pattern-welded panel of the blade. Analogous omegas we know, for example, from the sword of Petersen type H from Strasbourg (Vinski 1983a, 472). An omega-like ornament is one of the options from the limited range of known inlays set into pattern-welded surfaces; it is therefore questionable whether it can be interpreted as a Christian symbol. It could also be, for instance, the mark of a smith's workshop. Omega-like ornaments are relatively frequent among the

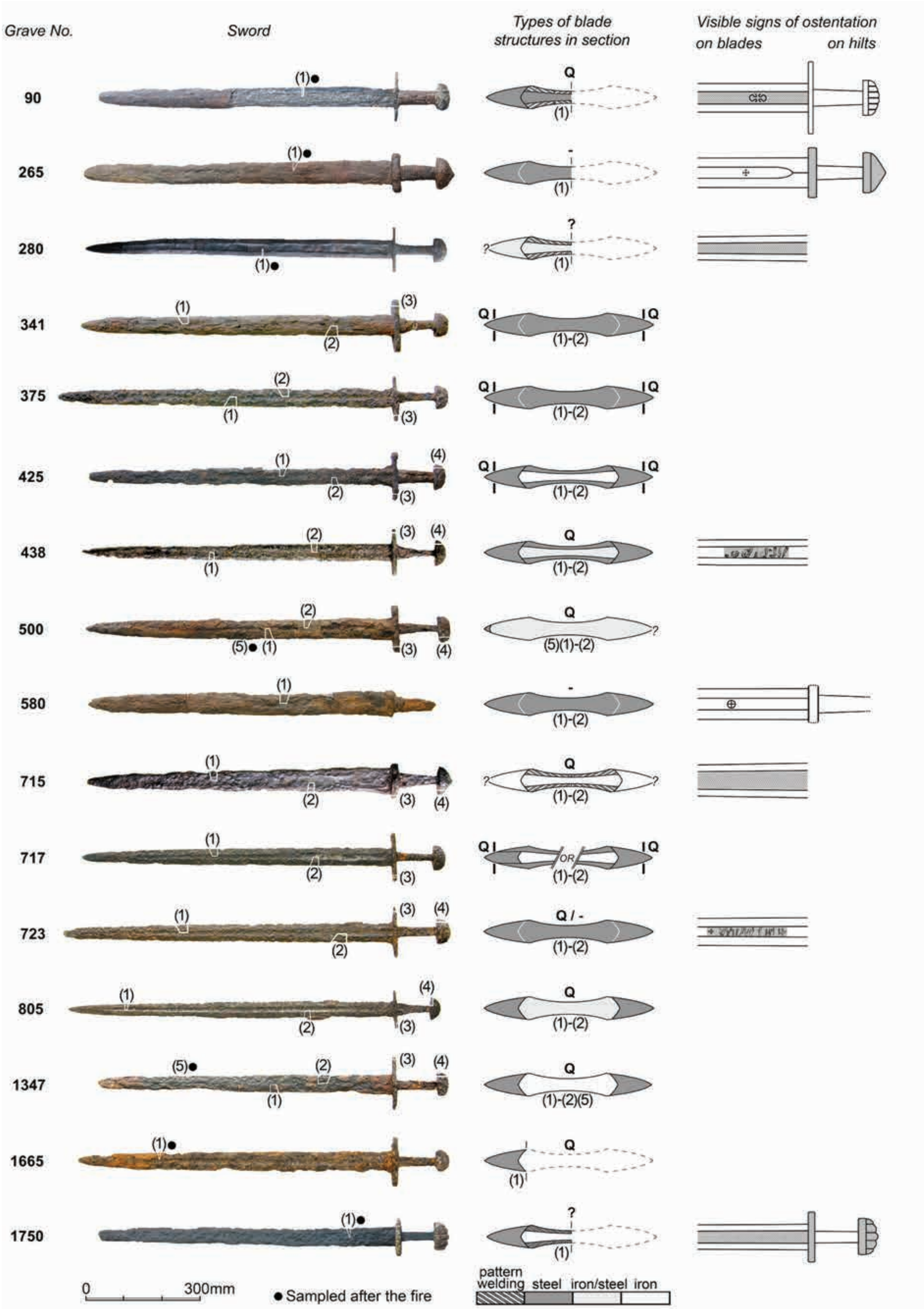

Fig. 147. The swords examined and the blade structures used. By J. Hošek.

decorations of early medieval swords; they were first applied onto pattern-welded blades, but their popularity survived also on non-pattern-welded blades, where the omegas were often combined with other signs and inscriptions (crosses, inscriptions of 'Ulfberht' etc.; see e.g. Kirpičnikov 1966a, tab. XVIII:8, XXI:3; Geibig 1991, 114).

Unfortunately, the state of preservation of the observed iron-inlays does not allow us to determine which method of inlaying might have been used in case of the Mikulčice swords.

5.1.2 Hilts

As in the case of blades, hilts can be described in terms of their morphological typology, the inner structures of their upper hilts, and the types of decoration and materials used.

Materials and heat treatment used to manufacture the hilts

Concerning the swords from Mikulčice, heterogeneous (unsorted) iron was as a rule used for the manufacture of guards and pommels. Neither surface cementation nor hardening were found. Hence, considering the materials used and heat-treatment applied, no attention was paid to the manufacture of these elements. Welds indicating a deliberate construction from several pieces were not recognized among the hilts; this proves that the guards and pommels (including those used in the upper hilts) were generally made from one piece of metal. Concerning the welds, we may mention as a curiosity the upper guard of sword 723, whose matrix was intersected with a welding line enriched in copper (around 4.4 ± 0.3% Cu). Copper seldom appears in welding seams and such a weld enriched only in copper have been among the archaeological iron objects excavated on the territory of the Czech Republic detected for the first time. Nevertheless, we can hardly use it in any discussion of the provenance of the upper hilt (local product vs. import).[118]

The techniques used to assemble the upper hilts

Some 9th–10th century swords have hilts which are made up of only a pommel, while others have an upper guard as well as a pommel. If there is only a pommel, then it was a solid mass with a hole through which the tang of the sword was pushed and secured by hammering and expanding the tang-end over the pommel or into a recess in its top. If there was an upper guard (with a hole in it) as well, then there were several ways of fastening the hilt to the tang. If the pommel was again a solid mass with a hole, then the tang was pushed through this and the hole in the upper guard as well. If on the other hand, the pommel was hollow, then the tang was only pushed through the hole in the upper guard. The pommel was then secured to the upper guard by U-shaped rivet or two separate rivets. The U-shaped rivet was often attached to the pommel by brazing.

Concerning the finds from Mikulčice, eight (composed) upper hilts have been found in total. Six of them as parts of swords (from graves 90, 265, 425, 715, 723, and 1750), and two as isolated settlement finds (Nos. 18 and 20). Out of these, two have a solid pommel with a central hole for a tang (grave 715, settlement find No. 18), six have hollow pommels that were attached to lower guards with pairs of rivets. Metallography of the upper hilt of sword 425 revealed islands of brass (around 92% Cu; 5% Zn; 3% Fe) in the pommel matrix. Considering where the brass was detected, one cannot exclude a possibility that a piece of brazed iron was simply reutilized to make the

118 The welding line was enriched in copper due to oxidation enrichment, which took place in the subscale layer of iron pieces (to be mutually welded) when heated in a hearth (Tylecote 1990; Melford 1962). Naturally, copper must be for such subscale oxidation enrichments present in the metal base as a residual element. Regarding the data published by Melford (1962, 292), one can expect somewhat between the 0.1% and 0.3% of copper in the metal used, although copper in the area adjacent to the discussed weld is under the detection limit of the used SEM/EDX analysis. However, subscale enrichment strongly depend on scaling conditions and chemical composition of welds is also affected by consequent heating cycles in course of forging an artefact. Therefore, weld enrichments are mostly useless in the provenance studies.

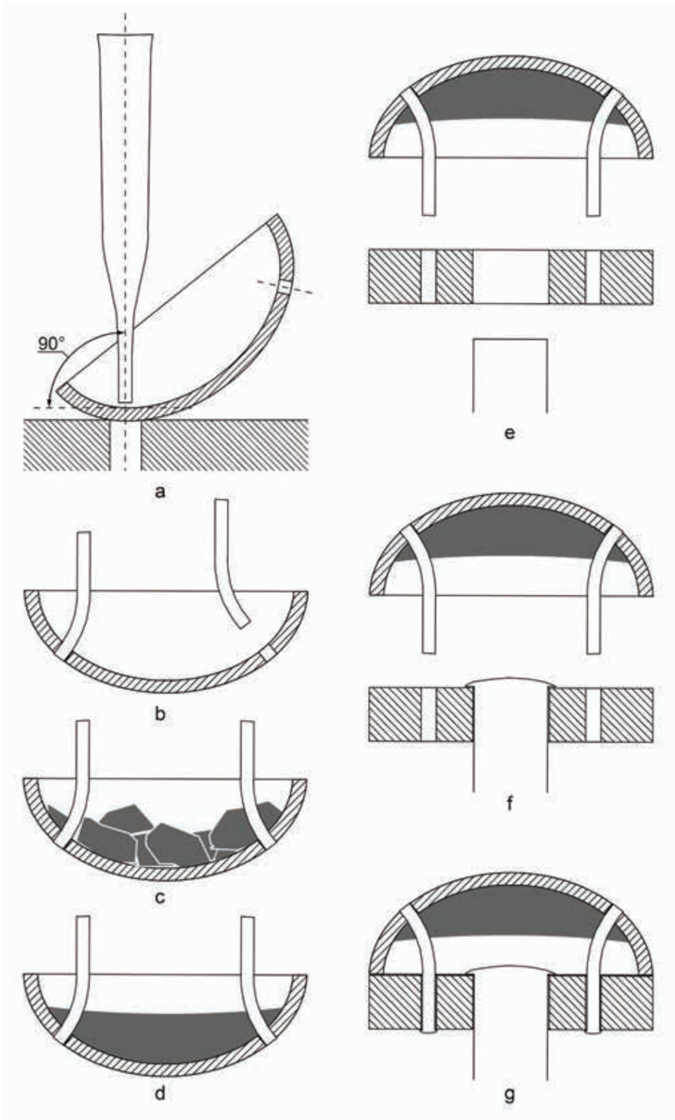

Fig. 148. Possible method of assembling the upper hilt of sword No. 723; a – holes for rivets were cut out perpendicularly to the pommel surface; b – two rivets were formed to fit into the holes; c – hollow of the pommel was filled with pieces of iron slag; d – the slag pieces were melted in order to secure the rivets into the pommel; e–f – upper guard was attached to the tang; g – the pommel was attached to the upper guard. Drawings by J. Hošek.

pommel. However, the presence of brass seems to be rather an evidence of a technological procedure based on the use of a copper alloy for fitting rivets to the pommel. Brazing is a technique that was widely employed in case of pommels with U-shaped loops (e.g. Kainov 2012, 8) but fitting a pair of rivets by brazing was presumably not unusual either. The fact that a pair of rivets might have been additionally secured within the pommels somehow is supported by considering the upper hilt of sword 723, which has a hollow pommel filled with slag. The slag infill facilitated fitting rivets to the pommel and fixed them in a stable position. Indeed, it is clearly visible that the rivet-holes in the pommel were punched-out perpendicularly to the inner surface of the pommel and not in the same axis as the rivet-holes in the upper guard, what means that only deflected rivets could have been used. In order to facilitate riveting of the bent rivets to the upper guard, the rivets had to be fixed in a stable position within the pommel and the slag infill served for this. The expected procedure for assembly of the upper-hilt is depicted in Fig. 148.

It seems that there is no obvious relation between the composed upper hilts and any other technological characteristics of the Mikulčice swords, albeit only the hollow pommels were decorated with non-ferrous inlays.

Decoration of the hilts

Hilts of the period discussed could be decorated using various techniques such as engraving, non-ferrous inlaying and overlaying, plating or attaching plain, engraved or openwork plates. The individual techniques and/or examples of sword hilts to which those techniques were applied are well described in numerous publications (e.g. Untracht 1985, 283–317, 348; Geibig 1991, 134–138; Kainov 2012).

Within the set of the Mikulčice swords, the only technique of non-ferrous inlaying was that found on the hilts of weapons from graves 90, 265 and 1750. Metallic plates attached to the upper and lower sides of the lower guards were found in the swords from graves Nos. 265 and 580. The sword 90 has an upper guard whose pommel is decorated by five perpendicular rods of brass (around 75% Cu and 25% Zn) each being approximately 1.5 mm in diameter. A similar decoration was common on early Carolingian swords with multi-lobed pommels, whether their surface was entirely covered by wire inlay or not (as in the case of the swords from Kolín). Close analogies to the decoration of the sword from grave 90 can be found, e.g., in the sword from Ludwigshaffen am Rhein-Oppau and also on the upper hilt discovered in the Rhine near Mainz (Geibig 1991, Taf. 70). Similar swords are also known from Old Croatian archaeological contexts (e.g. Biskupija-Crkvina, grave 1, Koljane Gornje, Podsused and Prozor-Gornja Luka; see Bilogrivić 2009). The sword 265 has its hilt inlaid with wires of silver and brass. The faces of the pommel were decorated by 4 wires of silver (around 90% Ag, 9% Cu, 1% Pb) alternating with 4 wires of brass (around 80% Cu and 20% Zn) on three different levels, creating a chessboard pattern. In total, there are around 20 inlaid wires per cm. Two rivets attaching the pommel to the upper guard stood slightly proud of the surface of the pommel; the overhangs created were brass-plated (see Fig. 18). The side of the pommel is highlighted by four inlaid lines of brass. The upper guard was probably inlaid in the same manner (with a chessboard pattern), but the inlay is not preserved (except for two wires of brass). The crossguard was evidently covered on the top and the bottom with a plate of brass 0.25 mm thick (around 78% Cu, 19% Zn, 1% Sn and 2% Pb), but no rivets attaching these plates were found. The faces of the crossguard were decorated with inlays of brass and silver like the pommel. There are around 21 inlaid wires per cm. The sword 1750 has its hilt decorated by parallel wire inlays of brass (around 70% Cu and 30% Zn). The pommel and the upper guard have around 14 inlaid wires per cm. The lower guard has around 18 inlaid wires per cm (the wires are next to each other, giving almost the illusion of a whole plating). Swords with similar vertical wire inlays are also known from another Great Moravian site of Staré Město and from several other sites (Hrubý 1955, 163–168; Felgenhauer/Galuška/Windl 2000). A precise analogy to the ornament formed by alternating fields of silver and brass inlaid wires, which we found on the sword 265, was found on the sword discovered in the port of Hedeby (Geibig 1999, 16–18, 55, Taf. 2) and also on the sword from Huseby-Leikanger in the county of Sogn og Fjordane in Norway (Petersen 1919, tab. II/1). Two other swords of the Mannheim-Speyer type (Geibig's type 4), found in the Middle Rhine Rhineland and most likely manufactured in the first half of the 9th century, were provided with a similar decoration. A sword of Petersen type H from Lithse Ham in the Netherlands (Ypey 1986, 139–143) is also very interesting in the context of the sword 265. The hilt of this weapon was decorated vertically with thin and long fields of wire inlay, and its blade was provided with a cross potent of brass – in the same way as the sword 265 (see above). In general, vertically positioned wires inlaid into pommels and guards rank among the decorative features, which appeared on the hilts of Western

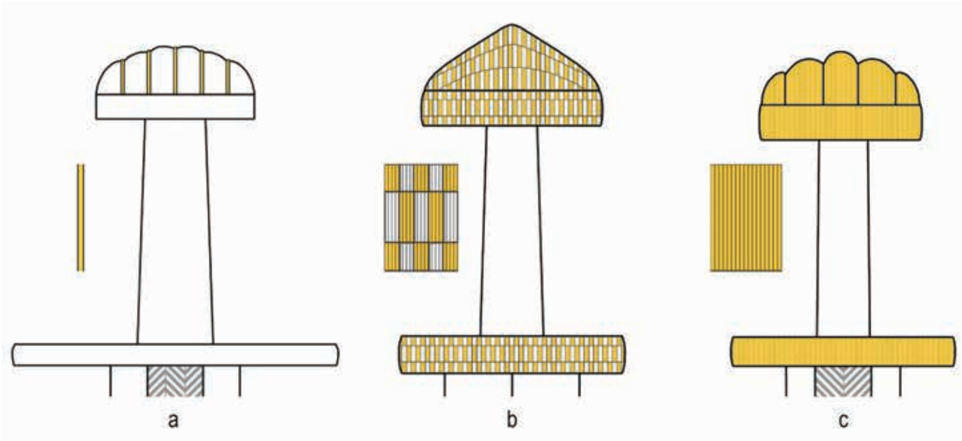

Fig. 149. Hilts decorated with non-ferrous inlays; a – the sword from grave 90; b – the sword from grave 265; c – the sword from grave 1750. Drawings by J. Hošek.

European swords as early as Merovingian period (Menghin 1983; 1994). Since the beginning of the 8th century, wire inlays began to cover the whole surfaces of pommels and guards (especially in case of swords of the Haldenegg type; Stein 1967, 10–12; Müller-Wille 1982, 117, 127–128). In the later 8th century and in the first half of the 9th century, this type of decoration was very popular in the Frankish sphere. It was used for swords of the Mannheim and Mannheim-Speyer types (Menghin 1980; Müller-Wille 1982), for Petersen's types 1 and 2 (Petersen 1919, 63–65, 85; Müller-Wille 1982), and also for swords of Petersen's type H (to which the sword 265 belongs; Petersen 1919, 89–101) and for one group of the K-type swords (to which the sword 1750 belongs; Petersen 1919, 105–110).[119]

5.2 The scabbards, straps and wrappings of swords from the Mikulčice assemblage

Fifteen out of the sixteen Mikulčice swords bore remains of coverings and suspension straps. The organic coverings, consisted of as many as six layers, see Tab. 5. These were made almost entirely of organic materials and formed the scabbards and their outer wrappings. Only on the sword from grave 717, could no coverings of organic materials be distinguished probably due to the extreme conservation methods employed in the past on weapons without proper documentation. According to the *DGU* this sword also bore the remains of a wooden scabbard when it was found.

Scabbards were typically attached to suspension straps and constructed in such a way that the holder of the sword was able to draw the sheathed weapon quickly when needed for combat. A. Geibig (1991, 108–111, Abb. 29) summarised the types of scabbards known from illuminated manuscripts of the 9th to 10th centuries. At least some of the Mikulčice swords (usually the entire sword) were wrapped in additional outer coverings prior to their deposition in the grave. Such wrappings were used not only for burial purposes, but also generally, in everyday life, to improve the protection of stored weapons. The use of outer wrappings on swords is an important testimony to the fact that a specific sword was not deposited next to a buried warrior in an 'active' position but was wrapped to ensure that it would be protected as long as possible from the aggressive environment in the grave pit.

In order to reconstruct the appearance and structure of the scabbards and the outer wrappings, it is important to separate these parts from one another. The Mikulčice swords were furnished with scabbards whose bodies were made of wood.

119 I.e. for swords of Geibig's types 2 to 6 (Geibig 1991, 31–47)

Therefore, it is known with certainty that wooden parts and any wooden layers beneath them belonged to the scabbards. Layers of organic materials found away from the sword blades, or those which also covered the crossguards, can be attributed to the outer wrappings. In the case of leather remains, certain fragments found away from the surface of the scabbard could have come from straps wrapped around the upper part of the sword. However, even when the presence of such outer organic materials is found, it is not certain that these belonged to the outer wrappings of the swords, because they could have also been the remains of the deceased individual's clothing.

The surface of the scabbard of sword 90 was leather, and near the point of the blade it bore horizontal decorative bands, presumably impressed. A similar decoration made from an organic material, probably leather, was identified on the point of the scabbard of the sword from burial 580. This type of decoration was relatively common in the 9th century. It has been documented on at least eight swords from the territory of the former West Germany, which were dated to the early Carolingian period (Geibig 1991, 105, Abb. 28, note 55). There, the lower parts of scabbards were usually decorated by textile straps, but one cannot exclude the use of leather straps as in the Mikulčice swords (Geibig 1991, Kat. Nr. 198, 199). The lower parts of scabbards were decorated in the same way in the case of swords from the Norwegian sites Rypdal, Romsdalen and Kvam ved Stankjoer (Petersen 1918, Abb. 1–2). Scabbards with a similar decoration are often depicted in illuminations of the 9th and occasionally also of the 10th century (Geibig 1991, 108–110, Abb. 29:1–5,7,9–11). A fine textile in plain weave lined the wooden body of the scabbard of the sword from grave 341, and the small fragment of thin leather found upon the textile near a rivet hole 330 mm from the crossguard was probably from a collar for the straps for the sword. One of the wooden scabbard fragments, which presumably fell off the blade of sword 1347, bore remains of leather, but its relation to the scabbard was impossible to prove. Therefore the existence of a leather surface on the scabbard is uncertain in this case.

The identification of outer wrappings can be certain only when the same material is documented on both sides of the sword. Further evidence might be deposition in several layers one over the other, or a crumpled or wrinkled surface. In addition, further layers were often identified between the wood of a scabbard and unambiguous outer wrappings. In case of these layers it is not usually possible to determine reliably whether they formed the surface layer of the scabbard or whether they belonged to the outer wrappings. In the majority of cases it was possible to prove that the wood of the body formed the uppermost part of the scabbard; but a layer of leather of uncertain function was found on top of the wood on the sword from grave 1347. A layer of textile of uncertain function was found on sword 341.

A more intricate method of scabbard construction was suggested on the sword from grave 580. An upper layer of textile was found below the iron sleeve forming the mouth of the scabbard. The holes in the scabbard of the sword 580 might have originally been intended to fix a gilded sheet with transverse handle-ribs to the scabbard. The ends of the ribs are widened, pierced and provided with small rivets. Near the left side of the skeleton from grave 580 there was a garniture or set of luxury weapons. This consisted of a sword and a fighting knife (or seax) in a leather sheath decorated by a ski-shaped fitting, fragments of a leather strap, a tongue-shaped strap chape made of silver and partially gilded, a buckle and keeper, and the aforementioned gilded sheet with transverse handle-ribs and perhaps fragments of a small silver (or bronze) plate with holes for rivets. It is also possible that two individual strap sets were buried next to each other in the grave. In such a case the strap fittings would have been associated with the fighting knife, because the ski-shaped fitting of its scabbard was decorated in the same manner as the mountings of the belt, i.e. by crosses ending in trefoils. These sets of straps for weapons from grave 580 are unique. On the basis of the shape of the metallic fittings, as well as

Tab.4. Metallographic data of swords from Mikulčice.

chapter	grave No.	Peterse-n's type	method of welding semi--finished pieces together	affected by fire	evidence of quen-ching	quen-ching li-mited to cutting edges	material			microconstituents (related hardness HV0.2)			confirmed carbon content [wt%]		
							cutting edges	core	surface panels	cutting edges	core	surface panels	cutting edges	core	surface panels
3.4.1	90	K	C[2]	YES	YES	-	steel	steel	p-w	C-F (230-250 HV), P-F (224±17 HV)	C-F (190±15 HV)	?-F	0.77 (~0.7)	0.5	-
3.4.2	265	H	A	YES	-	-	steel	steel		P(268±6 HV)	P-F (170±18 HV)	-	-	-	-
3.4.3	280	X	C[1]	YES	?	-	iron/ steel	iron/ steel	p-w	F-C (107±6 ;122±3 HV)	F-C (155±6 HV)	F (169±15; 115 HV), 126±17 HV)	-	-	-
3.4.4	341	X	A	-	YES	YES	steel	steel	-	M-P (635±62 HV), P (305±23HV)	P-F (173±1 HV), P (289±17 HV)	-	~0.75	0.35~0.55 / ~0.75	-
3.4.5	375	X	A	-	YES	YES	steel	steel	-	M (633±10 HV), B or P (358±30 HV)	P (249±14 HV), F-P (161±19 HV)	-	0.77	0.25~0.3 / ~0.75	-
3.4.6	425	N	B	-	YES	YES	steel	iron	steel	TM or B (414±14 HV), P (314±34 HV)	F (104±9 HV), F-P (142±10 HV)	P (321±32 HV)	0.77	max. 0.2	~0.75
3.4.7	438	X	B	-	YES		steel	iron/ steel	steel	B (476±18 HV)	F-P (205±23 HV), F (123±8 HV)	B (421±45 HV)	0.77	0.35 →0.1	~0.7 (0.4)
3.4.8	500	X	A?	YES	YES	-	steel	iron/ steel	-	C-F	F (146±16; 168±15 HV), F-P-M (187±7 HV), F-P (175±17 HV), P (190 HV)	-	-	-	-
3.4.9	580	?	A	-	-		steel	steel		P-F (273±21 HV)	P-F (215±14 HV)	-	-	-	-
3.4.10	715	B/H	C[1]	-	YES	-	iron	iron	p-w	F (190±20; 150±19 HV)	F (138±7 HV), F-P-M (198±25 HV)	F (151±6 HV), F (216±5; 237±5 HV)	-	-	-
3.4.11	717	X	B or B[atyp]?	-	YES	YES	steel	iron	steel	P-TM (520 HV), P-F (273±22 HV)	F (164±16; 201±27 HV)	P-F (229±15 HV)	-	-	-
3.4.12	723	N	A	-	YES	-	steel	steel	-	B-P (373±40 HV), P (280±21 HV)	B-P, P-F (158±27 HV)	-	0.77 (~0.5)	~0.45 / 0.77~0.7	-
3.4.13	805	X	A	-	YES	-	steel	iron/ steel	-	B (430±38 HV)	P-F (236±20 HV)	-	0.77 (0.5~0.6)	?	-
3.4.14	1347	X	A	-	YES	-	steel	iron	-	M (784±27 HV), B-P-F (360±17 HV), P-F (312±25; 203±34 HV)	F (122±16 HV)	-	0.75→0.15	~0	-
3.4.15	1665	X	A or B	YES	YES	-	steel	?		C-F (208±11 HV)	?		-	-	-
3.4.16	1750	K	C[1]	YES	?	-	steel	iron	p-w	C-F (165±13 HV)	F (174±11 HV)	F, F-C	-	-	-

Labelling of the microconstituents: F – ferrite; P – pearlite; B – bainite; M – martensite; TM – tempered martensite; C – cementite.

Tab. 5. Layers of covers (remnants of scabbards, scraps and outer wrappings) preserved on swords from Mikulčice. Outer layers are numbered from inside the wood of the scabbard towards the outermost layer.

chapter	grave No.	scabbard lining	scabbard body	1st outer layer	2nd outer layer	3rd outer layer	4th outer layer
3.4.1	90		wood	thin leather	textile, plain-weave (2x)	thin leather?	-
3.4.2	265	coarse textile (1), plain-weave	wood	leather and fittings of sraps	fine textile (2), plain-weave (3x)	leather	fur
3.4.3	280		wood	-	-	-	-
3.4.4	341	coarse patterned textile (1)	wood	fine textile (2), plain-weave	thin leather	fine textil (3), plain-weave	thin leather?
3.4.5	375	textile?	wood		-	-	-
3.4.6	425	textile? (1)	wood	textile (2), plain-weave	-	-	-
3.4.7	438	textile	wood	-	-	-	-
3.4.8	500	coarse patterned textile (1)	wood	coarse textile (2)	fine textile (3), plain-weave	thin leather	-
3.4.9	580	coarse textile, (1) twill-weave	wood	coarse textile (2), twill-weave	fine textile (3), plain-weave	leather?	iron mouth-band
3.4.11	715		wood	-	-	-	-
3.4.12	723	textile, twill-weave	wood	-	-	-	-
3.4.13	805	patterned? textile, twill-weave	wood	-	-	-	-
3.4.14	1347		wood	leather	-	-	-
3.4.15	1665	coarse patterned textile	wood	leather	-	-	-
3.4.16	1750		wood	-	-	-	-

Underlined text - components from which the scabbard probably consisted.

Numbers in parentheses – numeric designation of textiles within the swords' covers.

the floral decoration on the hemispherical gilded silver sheet cap of the fighting knive's handle, it may well have a Carolingian provenance (Košta/Hošek 2008a, 200–201).

The other sword garnitures, provided with trefoil strap distributor, were found in graves 375 and 500. Garnitures with trefoil strap fittings were popular in the 9th century. Between around 840 and 870 they regularly appear in the illuminations of Carolingian manuscripts (for more details see Wamers 1981; Baumeister 1998, 173–175; Ungerman 2011a, 578–584; Košta/Lutovský 2014). Both these garnitures are of specific types. The garniture from grave 375, which includes a rectangular roof-like fitting and the triangular fitting with very short arms, was described by Š. Ungerman (2011a, 581, Abb. 6:1-2) as the B-variant garniture with trefoil fittings. The garniture of the sword belt from grave 500 consisted of a trefoil fitting, three rectangular attachment fittings, a rectangular chape and one or two buckles, which is described as variant C in the classification of Š. Ungerman (2011a, 581–584, Abb. 7).

Sword 265 was accompanied by a simple garniture consisting of a tongue-shaped strap end with four rivets and the strap-plate of a buckle with the remains of some outer wrappings; any other fittings have not been identified. According to *DGU,* some strap fittings were found along with the sword 1347 (perhaps by its upper part). However, these were missing from the depository in 2003 and J. Klanica in his book devoted to the cemetery of 'Kostelec' did not specify their location within the grave (Klanica 1985a, 513).

A large number of wooden scabbards were lined with rough textiles, mostly twill-weave or patterned. However, a textile scabbard lining was not found on four of the swords (280, 715, 1347 and 1750), and possibly sword 717), while in a few other instances the existence of a lining is uncertain (375 and 425). In the majority of cases, the textile was probably glued into the scabbard, since it was never found wrinkled and it did not cover the surface of the blade in several layers; only in some cases the textile remains were bunched in the area around the cutting edges (exemplary 805), probably to prevent the blade from moving inside the scabbard. The fact that decorative textiles were used for the scabbard linings is further evidence of the reverential treatment of weapons.

The wooden bodies of scabbards were made from two parts joined along the edges of the blades; these joints were clearly visible on those scabbards that were preserved in a more intact condition (90, 265, 341, 500 and 580). Iron rivets, originally belonging to scabbards, remained on several weapons (rivets or holes were preserved on the blades 90, 265, 341, 580 and 1750). They probably served to attach the surface layers of the scabbard (and/or the parts of straps) to the wooden body.

Some of the holes on the sword 341 featured remains of leather, which were apparently from the adjacent strap attached to the lower third of the scabbard length. Most impressive was the aforementioned scabbard from grave 580, which was lined with a patterned textile, covered with another layer of fine textile with a plain weave and provided with a mouth-band. A small corroded iron ring, which was apparently related to the construction of the scabbard and the suspending parts of the sword garniture, was found near the right edge of the blade of sword 500.

Remains of leather straps were found stuck to the surface of some scabbards and sword hilts; these straps had iron fittings (minimally in the case of swords 265, 375, 500 and 1347). Also remains of metal fittings, textile and fur covers were preserved on fragments related to the scabbard from grave 265. Layers of outer wrappings very often consisted of fine textiles with a plain weave, over which a layer of leather was sometimes found (90, 265, 341, 425, 500). In the case of sword 1665 (and possibly also 1347, assuming the leather layer did not belong directly to the scabbard), leather was situated directly on the wood; it was not possible to determine reliably whether the leather came from a strap or from the outer wrapping of the scabbard.

In summary, the swords at Mikulčice were placed in wooden scabbards lined, especially in the graves at the acropolis (separately from the group at the palace), with luxurious, coarser woven textile. In five cases (90, 265, 341, 500, 1665), it was positively determined that the weapon was wrapped in an outer cover made of fine textile with a plain weave, and/or leather. In at least two cases (265 and 500), both types of material were used together. The textile in a plain weave on the surface of the scabbard of sword 425 could be a remainder of the outer wrapping, or it could be from a textile that was not directly connected to the deposition of the sword. Only in one case were no remains of any outer cover found (i.e. neither wrapping nor scabbard), although it cannot be ruled out that the conservation-restoration conducted in the past caused the loss of this information.

Only a small amount of data has been published on the comparison of scabbards and outer wrappings of swords. The items of related information were published unsystematically, so it is often unclear whether all the organic layers were described in their correct order and their materials properly identified. It is possible that important data was lost in many cases even before documentation of the sword. Concerning the swords excavated on the territory of the Czech Republic, only the scabbard of a sword from Olomouc-Nemilany has been published in detail. The construction of the scabbard was similar to some of the Mikulčice scabbards – a wooden body was lined with three sorts of twill-woven textiles (Selucká/Richtrová/Hložek 2002, 29–30). The sword from Zlín-Louky was also of the same construction (Dostál 1961a). Wooden scabbards lined with textiles were also found on the swords from graves 124 and 126 coming from the burial ground of Nechvalín-Klenča (Košta 2004, 101; Klanica 2006b). The sword from Žlutava was covered by layers of wood and textiles, but it is not clear in what order (Dostál 1966, 195). The available data suggests that most of the Moravian swords were sheathed in simple wooden scabbards. Some of the Mikulčice swords have been assigned to a specific group of weapons with scabbards covered by iron sheet which have no analogies among contemporary scabbards from other parts of Europe (Břeclav-Pohansko, grave 174; Rajhradice, grave 71; Blučina). J. Vignatiová describes an iron scabbard in the case of the sword from grave 65 from a church cemetery in Břeclav-Pohansko (Vignatiová 1993, 93), but this is not in accordance with the original description and drawings made by F. Kalousek (1971, 55–56). Even in the case of another three swords the situation is unclear. Photography of the sword from Blučina reveals wood and one or two layers of textile but no iron sheet (Poulík 1948, 39, tab. XLVII.). It is said that an iron sheet from a scabbard of the sword from Rajhradice was broken into pieces when excavated and nothing from it has been preserved (Král 1970; Staňa 2006, 145). Nor does documentation of the sword from grave 174 from Břeclav-Pohansko reliably prove the existence of iron sheet (Kalousek 1971, 111–114; Vignatiová 1993, 93–94). It is possible that the uppermost layer of leather (that was recognized on some of the Mikulčice swords as well as on other contemporary European swords) was confused with an iron sheet. For instance, a wooden scabbard body covered with leather was also found, on the sword excavated on the Prague Castle (Sláma 1977, 105). Leather permeated by the corrosion products of iron could actually resemble sheet iron.

The most comprehensive research into sword scabbards has been conducted by E. A. Cameron (2000) on the basis of 4th to 11th centuries finds from England. Besides the finds of scabbard leathers themselves, the scabbards of the 8th to 11th century swords from England were of a rigid multilayer construction. The lining of the scabbards usually consisted of animal fur (or perhaps of sheepskin), but woollen fabric was also used, albeit rarely. The wooden scabbard plates were fixed to each other by a leather coat (Cameron 2000, 57–62). Scabbards of Carolingian and Ottonian swords from the territory of the former West Germany were researched in detail by A. Geibig (1991, 104–111), who worked mainly with weapons excavated in cemeteries of the second half of the 8th century. According to Geibig, the most common scabbards from the former West Germany were those lined with fine fur and covered with layers of textile, which was sometimes turned into a strap that was then wrapped around the whole scabbard in order to achieve a decorative effect (see above; Geibig 1991, 109). Traces of similar decoration have been observed on the leather covering the scabbards of the Mikulčice swords 90 and 580. Another construction of a scabbard included a textile lining and outer layer of leather or textile (or both). According to Geibig this variant was not found in Germany. In contrast, such scabbards have been discovered on some of the Mikulčice swords. However, we cannot exclude the possibility that Geibig incorrectly determined some of the preserved materials (see Geibig 1991, 106 for Geibig's polemic on this topic with other German scholars). In any case, scabbards were usually assembled from thin wooden scabbard plates. Their systematic use in the construction of scabbards from Mikulčice as well as from other Moravian sites of the 9th to early 10th century thus corresponds with the standard contemporary method. Scabbards made of wood, lined with textiles and then covered with textiles and leather, such as those found on the sword from grave 341 and probably also that from 580, were discovered in two Viking graves on the island of Man (Bersu/Wilson 1966). A textile lining of a scabbard was found on a Norwegian sword from Rypdal, Romsdalen (Petersen 1918, 166–167) and, in addition to the mentioned finds from Moravia, on the sword from a princely grave from Kolín in Bohemia (Košta/Lutovský 2014). A central ridge visible on the wooden scabbard plate of the sword 500 might be a remnant from the line of seaming of the leather scabbard cover; a similar constructions of leather covers is known (for example Beatson 1994, 18, fig. 2; Cameron 2000, 59–60, Fig. 38–40).

It is possible that in future even the construction of scabbards will contribute to answering the questions of provenance and chronology of swords. For instance, there is supposed to be a common use of animal fur for scabbard linings in the Anglo-Saxon environment in contrast to the Viking environment (Cameron 2000, 59). The present-day state of research however does not allow us to verify this hypothesis and the value of analogies in this case must be regarded with reserve.

An interesting feature of the Mikulčice group is the high proportion of scabbards lined with textiles. Scabbards covered by textiles or leather are also relatively common; furthermore, the absence of such covering layers is not evidence that the wooden bodies were not originally covered at all. Leather or textiles tied around the scabbard had an essential function – they served for fixing wooden scabbard plates to each other. There seems to be no relation between the supposed value of the swords and the construction of their scabbards. It is interesting that scabbards without a textile lining appear in Mikulčice more frequently among the earlier variants of Carolingian swords or in graves from the earlier period (swords 90, 280, 715, 1750). On the other hand, some scabbards with a textile lining (those from grave 265 and probably 580) were found in the most important graves in the interiors of churches and they come from the early phase of the Great Moravian culture.

5.3 The question of the provenance of the Mikulčice swords

There is no doubt that swords of Carolingian-type construction became a regular part of the material culture of the upper levels of Great Moravian society in the 9th century (see Chap. 6). However, it is difficult to prove that the production of these swords took place on Great Moravian territory because it is difficult to identify which of the weapons found in archaeological contexts associated with the Great Moravian period were imported and which were local products. Archaeology as rule offers only indirect evidence for solving such issues and written sources may not provide us with unambiguous evidence.

Let us recall at least the written sources relating to the regulation of exports of weapons to neighbours of the Frankish Empire. Repeated attempts of Charlemagne to regulate or perhaps to ban the exporting of armours and weapons (primarily swords, as the most effective Frankish personal weapons) into the territories of the neighbours of the Frankish Empire[120] suggest a few possibilities. First, these attempts indicate that the Franks had the feeling that armours and weapons of Frankish provenance in the hands of their neighbours could threaten the Frankish policy; these worries may have been based on concrete facts. Production of swords and mail armours on territories of the eastern and northern neighbours of Frankish Empire at least in the early 9th century could not meet the demands of local warriors (if such a production existed), otherwise they would not have sought to import them from Frankish territory and so it would not be necessary to regulate the export of Frankish weapons. Repeating the regulations on the banning of the export of weapons and armours indicates that these regulations were being violated. Export restrictions could naturally encourage the production of swords and iron armours in the local environment. It is interesting that information about similar export bans and restrictions are extremely rare after the 820s, that is from the period in which Great Moravia occurs in written sources.[121] Either these restrictions had been so effective that they did not need to be repeated or these regulations had lost their meaning because of the local development and production of Frankish-type weapons (Ruttkay 1997, 182).

The large-scale production of iron and iron artefacts has been found on a number of Great Moravian sites, but the question remains open as to whether local smithy workshops were able to produce high-quality swords and if so in what number. A specialized production was found at the stronghold of Břeclav-Pohansko, where the production of mail armour was deduced (Pleiner 2002). One separate pommel of Petersen type X was even found near a smithy, which was located in the northern Mikulčice suburb (Klíma 1985, 441–442); but the relation of the pommel to the smithy is ambiguous. Even if the pommel was actually the product of this smithy, it could not be considered as a proof of local production of sword blades (it might be evidence that damaged weapons were repaired or that imported blades were only hilted in this workshop). Considering the amount of information about the size and military potential of Moravian troops (summarized by Ruttkay 1982; 1997; 2002) as well as the overall development of the Great Moravian centres, we might reasonably assume that some of these swords were produced in Great Moravia although we do not know the proportions.

Up to now, we have failed to define on the basis of the shape and decoration of their hilts any group of swords that might be considered a group of locally made weapons. So far, none of the swords found in Great Moravian archaeological contexts have born demonstrable signs of any local style of decoration. On the contrary, vertical wire inlay, which occurs on several swords found in Moravia, has analogies in Germany (Geibig, 1991, 134–138), Croatia (Vinski 1983a; Jelovina 1986) and northern Europe (Petersen 1919, 86–105).

120 For example *Capitulare Mantuanum* (781), *Capitulare Missorum* (803), *Capitulare* from Thionville (805) and *Capitulare* from Boulogne (811) (Fuglesang 2000; Stalsberg 2008, 107–108). The swords are concretely mentioned in the Vatican Manuscript of *Capitulare Missorum* and in *Capitulare* from Boulogne, in *Capitulare Mantuanum* and *Capitulare* from Thionville there are armours and weapons mentioned generally, but we can assume that swords (and lances) were in territories beyond Frankish Empire most required weapons that Frankish workshops produced (e.g. Solberg 1991). The Slavs (along with the Avars) are concretely mentioned in the *Capitulare* from Thionwille. The *Capitularia* probably do not forbid trade undertaken with the permission of the Frankish king (Kirpičnikov 1966a, 48–49; Stalsberg 2008, 107–108).

121 The sole source is *Edictum Pistense* from year 864, in which armours and weapons are mentioned generally. The edict focuses more likely on northern neighbours of Frankish Empire (Fuglesang 2000; Stalsberg 2008, 107).

The morphology of the upper hilts closely resembles many Carolingian swords (see Chap. 4.1). Despite that, in the case of some swords with two-part upper hilts with solid pommels, such as those from Břeclav-Pohansko (Vignatiová 1993), we cannot rule out the possibility that simplified imitations of Frankish upper-hilts were made by local craftsmen. Similarly pommels of Petersen's type X, which in Great Moravian contexts occur very early, might have been made locally.

The more significant characteristics of the blades (such as pattern-welded inlays, non-ferrous inlays and pattern-welded blades) cannot be considered indications of local manufacture, because of their variability. For instance, the pattern-welding of each of the four pattern-welded Mikulčice swords (from graves 90, 280, 715 and 1750) was different. Weapons with these characteristics were more probably imported. By contrast, some specific characteristics of blades were in the Mikulčice set encountered repeatedly. For example, considerable blade length (particularly the blades of group {d}; see Chap. 4.2) and fullers somewhat displaced from the crossguards.[122] Both these characteristics of blades (displaced fullers and long blades of the group {d}) we will have to monitor carefully with further comparative research.

The weapons that might be thought of as local productions, are the non-decorated specimens with fewer significant characteristics. These include some weapons of lower construction quality and unusual shapes of blades, such as the sword from grave 1347 in Mikulčice. On the other hand, it would be misleading to consider all the simpler weapons local products because some simpler swords could be imported too. So there is no sure evidence either way. Weapons that might have been made locally are those of Petersen's type X, which are the most common type in Moravia.

If we summarize the current findings, we can say that Mikulčice swords from graves 90, 265, 280, 438, 580, 715 and 1750 were probably imported, possibly from the Frankish Empire. Imported swords are more likely also those of Petersen's type N, which have been found in graves 425 and 723. Other swords may be of local origin. Weapons that might more likely have been local products come from those graves datable to the second half of the 9th century. Even if the local production might have covered the military needs of the emerging Great Moravian state, it probably could not meet the demands of a high-ranking elite for ostentatious pieces.

122 But a displaced fuller was also found on the sword from grave 265, whose two-part upper hilt and crossguard were wire inlaid and whose blade was decorated by inlayed cross from non-ferrous metal.

6. The swords from Mikulčice as status symbols

A detailed analysis of the symbolic meaning of a sword in the Great Moravian society (or in any of the territories bordering the Frankish Empire) is beyond the goals of this study. Such a goal would require the systematic processing of data on weapons and other artefacts associated with the higher social classes, then including the findings in an study of the development of burial rites and other phenomena that reflect the social processes taking place in early medieval societies and, finally, a comparison with the results of similar analyses from other areas and periods. Here we will only attempt to characterise the sword as a status symbol in Great Moravian society from the archaeological evidence. Then we will briefly comment on the possibilities of evaluating the social status of the deceased owners of the swords from Mikulčice. Even at this point, it will just be a basic outline, because it is not possible to assess their status without considering this in a broader context which would depend upon the analysis of much more data.

The basic characterization of an early medieval sword as a weapon and symbol of social status has been discussed in Chap. 2.2. Let us recall that the presence of a sword in early medieval graves undoubtedly implies the deceased's higher social status, which is clearly determined by the value of the weapon itself. This is clearly valid also for the Great Moravian environment. But to seek some standard principle for the burying of swords is very difficult. There probably never existed a direct symmetry between the social status of the deceased and the richness and character of the enclosed grave goods; customs related to a burial rite were not always settled in time or space. The rules of a burial rite did not strictly dictate to survivors what objects should be buried along with the dead. Particular facts about the dead (e.g. their social status) might be expressed by means of grave goods in different ways. On the contrary, various social phenomena could be expressed by means of grave goods in identical ways.[123] Some customs could be applied to a wider group within the upper layers of the secular society, but burial rites were often apparently determined by other, exceptional circumstances, which could vary from case to case, and which we are presently not able to distinguish (Hošek/Košta/Mařík 2012, 81–83).[124] Differences between social groups that buried their dead with swords are indicated by substantial differences in quality (and probably also cost) of the individual items buried.

A major limiting factor in the study of swords as status symbols is the character of the burial rite. The occurrence of swords in graves with rich sets of grave goods is generally associated with the onset of inhumation in early medieval Moravia. We believe that this is one of the imitations of the customs of elites from neighbouring areas which accompanies the development of a more

123 This issue was, with regard to the Great Moravian environment, recently summarized by J. Klápště (2005, 20–34; 2009) and I. Štefan (2011, 334–339). For valuable sidelights on the burial rites see Steuer 1995; Härke 2001; 2003; Brather 2008.

124 A model example of one possible scenario is a case when a sword is buried with the last adult family member in the male line. Another possibility can be the exceptional merit of the deceased, achieved in the service for a ruler or for the community. It is obvious that such hypotheses cannot be proved by the archaeological material.

complex society (Štefan 2007, 825–827). The transformation of the rite thus seems to be one manifestation of the initial phase of the transformation from a pre-state society to an early state society. However, monitoring the dynamics of the transition to skeletal burials is complicated by the fact that the older cremation form of the rite is not archaeologically detectable (aside from a few exceptional cases; summarised by Měřínský 2002, 93–123, 331–332). As a manifestation of an inner transformation of society there is the development of the custom of inserting grave goods into graves. The basis of grave goods was always the personal property of the deceased, which the survivors 'shared' with the dead in varying ratios (Steuer 1982, 517–518).

In the first stage of inhumations in Moravia and other parts of central and eastern Europe, survivors placed in graves items of clothing, adornment, weapons and food offerings that are usually documented by vessels. The form and character of grave goods were not prescribed but varied in time and space on the basis of local customs. One of the general tendencies in the development of the rite is a gradual reduction in the assemblages of grave goods, characterized by a decrease of certain categories of objects, which either completely disappeared or were symbolically replaced in the sense of *pars pro toto* (Klápště 2009, 530). The class of artefacts whose regular burial ended earlier included weapons. As in the case of the transition to inhumation, the custom of including valuable artefacts among grave goods was abandoned first by the highest elite. This process varied considerably from region to region and between centres and peripheries as well as between church and non-church cemeteries (Hošek/Košta/Mařík 2012, 81–82). The tendencies described, however, were not universal and differences between individual areas as well as between cemeteries may reflect differences in the chronology as well as in a number of non-chronological factors. According to present indications, the trend in reducing sets of grave goods was not fully completed during the Great Moravian society. Burials with complete and unreduced assemblages of grave-goods probably continued to a limited extent in church cemeteries at the centres of power until the end of the Great Moravian period. However, besides the proportion of individuals buried with complete and incomplete sets of grave goods, the overall symbolic significance of burials also underwent a transformation. The social groups that placed grave goods into burials with swords might also have been transformed. The placing of rich grave goods is characteristic for permeable social structures (social ranks) and became less frequent in those areas, where relatively closed social classes and stable institutions emerged (Steuer 1982, 421, 525–528; Steuer 1995, 89–95; Böhme 1996; Brather 2008; Štefan 2011).

6.1 The Mikulčice burials with swords and their grave goods

Burials with swords were usually concentrated in groups of richly furnished graves in the cemeteries in the Mikulčice settlement agglomeration. They were generally situated along paths leading to church buildings or in their interiors. At least four of the ten graves in the church cemeteries lay along paths (90, 341, 438, 500), while two graves lay inside churches (265, 580). It is interesting that they do not appear among the graves that lay immediately beside the walls of the churches. It seems that the highest representatives of elite preferred to be buried along the main roads of the cemeteries, so that Mikulčice residents as well as foreigners going to visit the church, could have a look at their final resting place, which was probably clearly marked out on the surface. In the case of non-church cemeteries and sometimes also nearby churches (375), the representatives of the elite were buried in defined areas, perhaps belonging to individual kin groups.

Burials 265, 341, 438, 500, 580 and 717 were placed in coffins provided with iron fittings, while the man buried in grave 90 was placed in an elaborate all-wooden construction. The coffins of graves 341, 500 and 580, which were found in the III[rd] church (580) or in the surrounding cemetery (341, 500), were inserted into huge pits lined with stones. In addition, the dimensions of the grave pit and the location of grave 265 within the interior of the II[nd] church allow us to include burial 265 in the group of graves with specially adapted burial pits and/or coffins with fittings as well. In connection with swords, special adaptations of burial pits and coffins provided with iron fittings appear exclusively on the acropolis, particularly by the II[nd] and III[rd] churches. Burials in coffins with iron fittings belong to the elite of Great Moravian society and occur in graves at two main Great Moravian centres, in Mikulčice and Staré Město – Uherské Hradiště (Hrubý 1955, 56–68; Galuška 2005; Poláček 2005). Coffins provided with iron fittings are extremely rare on other Great Moravian sites (e.g. Klanica 2006a, 29–30). Elaborately designed wooden constructions (both coffins and other constructions) also have analogies among richly furnished graves. As examples we can mention burials 277/49, 116/51 and 223/51 with swords of early Carolingian design from the burial ground 'Na Valách' in Staré Město (Hrubý 1955).

Swords in the Mikulčice graves were found mainly along the left side of the interred body. In five cases (280, 375, 425, 715, 1665) they were along the lower part of the body;[125] in six cases along the upper part of the body (265, 341, 438, 723, 805, 1750); and exactly in the middle in grave 580. However, four swords lay along the right side of the body, all along the upper half (90, 500, 717 and 1347). Most of the swords were deposited flatwise, only in two cases (graves 425, 805) with one edge facing down. Some of the swords were found under and some of them above the remains of hands or legs of the deceased. Weapons buried along the upper half of the body, wrapped in outer wrappings and deposited at a greater distance from the skeleton or wound about by the sword straps (as in the case of swords from the graves of 375, 500 and 580) had to have been placed in graves separately from the body of the deceased. Swords that might have been fastened to the body by sword belts and straps were found only in graves 280, 425 and 715; but even in these cases we lack direct evidence for this.

As expected, on average, graves with swords were richly furnished, but there were also graves whose inventory, excluding the sword, was not particularly rich. In general, the grave goods varied in categories as well as the numbers of objects deposited. Besides burials containing artistically decorated artefacts there occurred burials with simpler, functional grave goods.

Like the belts with which the deceased were girded, the straps, buried with the swords, generally bore some artefacts. The sword belts are identified in their archaeological contexts by their position. They are found along the upper part of the sword. The belt of sword 500 bore also a knife, a bag containing a folding knife and fire-set (firesteel and flints), and perhaps also a long (fighting) knife. A magnificent garniture with fittings from gilded silver and copper alloys was found in grave 580; beside the sword this set bore an opulent fighting knife (see Chap. 3.4.9; Košta/Hošek 2008a, 182–183, 200–201, obr. 9). A knife was presumably attached to the sword belt in grave 375. Long knives were probably attached to sword belts found in graves 90 and 805. Perhaps also in the case of grave 1750 the sword belt bore a knife. Even in other cases we cannot exclude the presence of sword belts and objects attached to them, but on the basis of the preserved situation in graves this cannot be proved.

The most common accompanying artefact of the sword was a knife (knives were found in about 90% of Great Moravian graves with swords, see Fig. 150). In Mikulčice, all the graves with swords probably also contained a knife, whose presence is uncertain only in grave 280 (see Chap. 3.4.3). Knives appeared in the Great Moravian period in the majority of graves that contained some grave goods. In many graves (mostly male), a knife is the only object found (Hrubý 1955,

125 The deciding factor was the position of the cross-guard relative to the elbow.

Tab. 6. Parameters of burial pits of graves with swords from Mikulčice.

chapter	grave No.	Petersen's type of the sword	location of the sword in the grave	age of the buried man	orientation of the grave	dimensions of the burial pit			stone lining	wooden lining / coffin	coffin with iron fittings	burial in the church interior
						length (cm)	width (cm)	depth (cm)				
3.4.1	90	K	1	senilis	W-E	300	160	180	-	YES	-	-
3.4.2	265	H	3	adultus	W-E	250	150		-	-	YES	YES
3.4.3	280	X	4	maturus	NWW-SEE	-	-	-	-	-	-	-
3.4.4	341	X	3	adultus I	NWW-SEE	328 (450)	150	170	YES	-	YES	-
3.4.5	375	X	4	full-grown	NWW-SEE	260	115	140	-	-	-	-
3.4.6	425	N	3	full-grown	NWW-SEE	235	80	120	-	-	-	-
3.4.7	438	X	3	maturus I	W-E	220	80	132-155	YES	-	-	-
3.4.8	500	X	1	adultus II	NWW-SEE	320	160	165	YES	-	YES	-
3.4.9	580	?	3/4	?	NWW-SEE	270	130	170	YES	YES	YES	YES
3.4.10	715	B/H	4	maturus	W-E	-	-	125-145	-	-	-	-
3.4.11	717	X	1	adultus II	W-E	220	110	105	-	YES	YES	-
3.4.12	723	N	3	adultus	W-E	315	55-105	75	YES	-	-	-
3.4.13	805	X	3	maturus I	SW-NE	230	80	60-75	-	-	-	-
3.4.14	1347	X	1	adultus II	W-E	207	70	110	-	-	-	-
3.4.15	1665b	X	4	inf II – adu I	SWW-NEE	260	80	165 (135)	-	-	-	-
3.4.16	1750	K	3	maturus	W-E	205	85	120	-	-	-	-

Tab. 7. Grave goods found in graves with swords from Mikulčice. Only the presence of artefacts within the stated categories is reported. Their uncertain presence is indicated by a question mark.

chapter	grave No.	fittings of sword straps	belt fittings	spurs	spur straps	calf straps	globular button (*gombík*)	gol-den sheet	knife	follding knife	long / fighting knife	axe	arrow-head	shears	sickle	firesteel / flint flakes	bucket	ceramic vessel	animal bones	other
3.4.1	90	-	YES	YES	YES	-	-	-	YES	-	YES	-	-	-	-	-	YES	-	-	whetstone (touchstone?), small buckle
3.4.2	265	YES	-	YES	YES	-	-	-	YES	-	-	-	-	-	-	YES	-	-	YES?	buckle, iron framents
3.4.3	280	-	-	YES	-	-	-	-	YES?	-	-	-	-	-	-	-	-	-	-	-
3.4.4	341	-	-	YES	-	-	-	-	YES	-	-	-	-	-	-	-	YES	-	-	finds from the W-area
3.4.5	375	YES	-	YES	-	-	-	-	YES	YES?	-	YES	-	-	-	YES	YES	-	-	iron bowl, iron framents
3.4.6	425	-	-	YES	-	-	YES	-	YES	YES?	-	-	-	-	-	-	-	-	-	iron fragments
3.4.7	438	-	YES?	YES	YES?	-	-	YES	YES	-	-	YES	YES	YES	-	YES	YES	-	-	grave fill: knife, fragments of a jingle bell, whorl, spur, and iron items
3.4.8	500	YES	YES?	YES	-	-	-	-	YES	YES	YES	-	-	-	-	YES	-	-	-	small belt keeper
3.4.9	580	YES?	-		-	-	YES	-	YES	YES	YES	YES	-	-	-	YES	YES	-	-	fragments of gilded sheet, iron fragments
3.4.10	715	-	-	YES		-	-	-	YES	-	-	YES	-	-	-	-	-	-	-	-
3.4.11	717	-	-	YES	YES?	-	-	-	YES	-	-	-	-	-	-	-	-	-	-	iron fragments
3.4.12	723	-	-	YES	-	-	-	-	YES	-	-	-	-	-	-	-	-	-	-	buckle, iron fragments
3.4.13	805	-	YES?	YES	-	-	-	-	YES	YES?	YES	-	YES?	-	-	YES	-	YES	YES	fittings of small straps, spike, cramp, iron fragments
3.4.14	1347	YES	YES	YES	YES	-	-	-	YES	YES	-	-	-	-	YES	YES	-	-	-	iron fragments
3.4.15	1665b	-	-	YES	-	-	YES?	-	YES	-	-	-	-	-	-	-	-	-	-	grave fill: buckle with belt keeper
3.4.16	1750	-	-	YES	YES	YES	-	-	YES	YES	-	YES	YES?	-	-	YES	YES	-	-	iron fragments

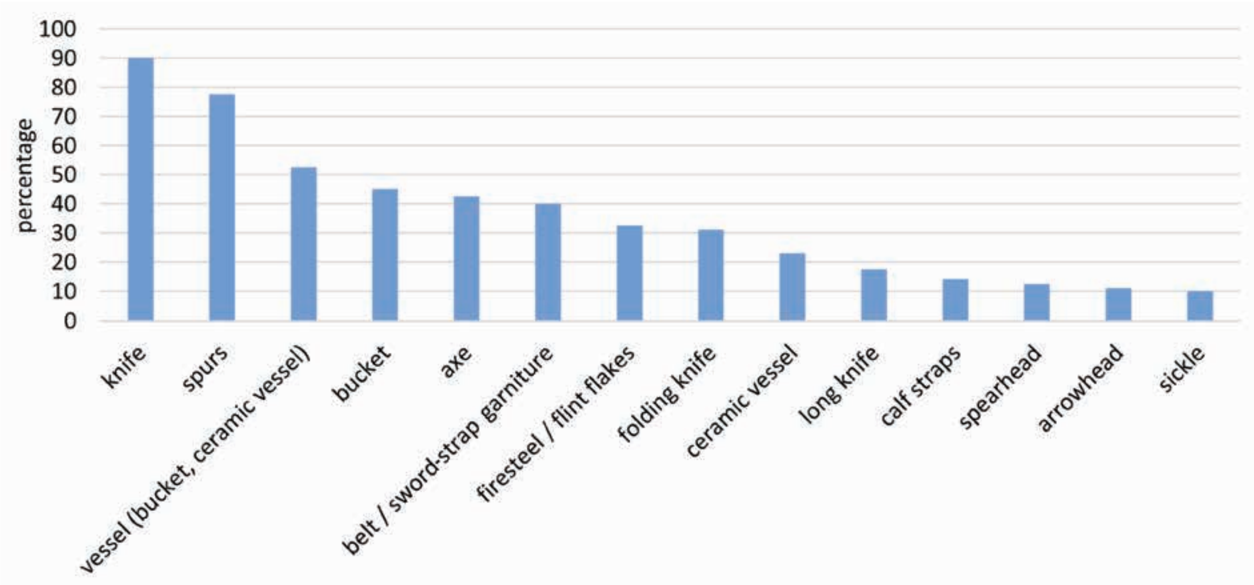

Fig. 150. Percentage of individual items of grave goods found in Great Moravian graves with swords. By J. Košta.

108–113; Dostál 1966; Hanuliak 2004). This fact confirms its frequent presence in those graves with swords.

Long knives (with blade-length exceeding 150 mm) appear in the equipment of male graves; we can therefore consider them weapons (e.g. Hrubý 1955, 108, 173–176; Košta 2004, 107–108). Such knives have been found in 17.5% of early medieval Moravian graves with swords (Fig. 150). A long knife (which might be described as a short seax) was found together with a scramaseax in the grave 119/60 in Uherské Hradiště – Sady (Galuška 1996, 102–104). Long knives have also been discovered in four Mikulčice graves with swords (i.e. 25%) and in all the cases they were lying alongside a sword. Therefore these knives were most likely attached together with the swords to the straps of sword-belts. They were placed in graves as additional weapons for warriors with swords. Two long knives (from graves 90 and 580) and one knife of standard length (from grave 265) were sheathed in a scabbard with a ski-shaped fitting. This type of more elaborate scabbard-fitting occurs in other Great Moravian graves (e.g. the burial with sword 190/50 or grave 23/48 in the cemeteries of Staré Město – Na Valách; Hrubý 1955, 412–413, 491–492, tab. 54:1) and is closely related to burials of men from the higher levels of society.

In Moravia, spurs were found in more than 78% of early medieval graves with a sword, and along with knives they are the artefacts which occur most frequently in such graves (Fig. 150). In the case of Mikulčice, spurs were found in all the graves with a sword except for burial 580. In cemeteries remote from central localities however, a lower proportion of spurs in graves with swords was found (Košta 2004, tab. 7). Also in the cemetery located within the magnate's court of the inner bailey of the stronghold of Břeclav-Pohansko, spurs were found in only one of the four graves with swords (Kalousek 1971; Vignatiová 1993). The high proportion of spurs in graves with swords is particularly interesting because spurs were included in Great Moravian grave goods significantly less frequently than knives. On the other hand, spurs are artefacts, whose presence in graves is not negligible. Inserting them into graves clearly reflects a custom accepted by the majority of Great Moravian society. Spurs clearly refer to the status of 'horseman' or 'cavalryman', which was at least since the Carolingian period one of the primary identifiers for representatives of the elite in continental Europe (Steuer 1968; 1982; 1995; Ruttkay

1982; Szameit 2007). Presence of spurs in graves with swords found in the eastern periphery of the Frankish Empire suggests that the Carolingian swords were used primarily as a weapon of a horse-riding elite (White 1962; Ruttkay 1975, 245–246; 1982; 1997; 2002, 113–121; Szameit 2007, 67–68). This is indicated also by illuminations in Carolingian manuscripts.[126] In view of the fact that spurs are found in Great Moravian burials of adult men as well as little boys, often even made for shoes of small children who could not ride a horse, inserting spurs into graves reflected efforts to demonstrate a hereditary claim to social status and its related power (Profantová 2005; Klápště 2005, 24–25; 2009, 534; Štefan 2011, 335). Spurs were, in contrast to swords, inserted also into graves whose grave goods were reduced to clothing and jewellery. The numerical ratio of graves with spurs to burials with swords, which is approximately 10:1 in Mikulčice, is therefore probably the sum of various factors.

Grave goods of early medieval graves with swords from Moravia frequently (20–55%) also contained vessels (wooden buckets with iron fittings and ceramic vessels), axes and fire-sets (firesteels with flints) as well as the straps of swords and belt garnitures decorated with metallic fittings (Fig. 150). In some cases it can be difficult to distinguish the type of garniture we are dealing with, therefore they are all evaluated together.

Vessels were inserted into graves as containers for food offerings. Therefore, regarding both the process of the reduction in grave-goods and the acceptance of Christianity, the vessels belong among a more archaic version of the burial rite in early medieval Moravia. Buckets accompanied swords in graves approximately twice as often as pottery vessels. Buckets are more distinctively related to graves from Moravian centres while pottery vessels to burial grounds beyond the centres. However, we know of graves with both a bucket and a pottery vessel.[127] Buckets have been documented in six Mikulčice graves with swords; this number corresponds to the usual proportion of these containers in graves from Moravian centres. Pottery only was found in grave 805 (without a bucket). The Mikulčice grave 375 contained, according to *DGU*, a shallow iron bowl (of Silesian-type). Among the sites with frequent occurrence of swords as well as vessels, only Břeclav-Pohansko did not reveal any graves with swords which also contained a vessel (Kalousek 1971; Vignatiová 1993). The variability of vessels in graves with swords is due to both chronological and non-chronological factors.

The most widespread weapon of the western Slavs, the axe, is the most common weapon found in early medieval graves in Moravia and occurs in more than 40% of Moravian graves with swords (Fig. 150). The proportion of axes in graves with swords varies, again, according to individual regions of Moravia. Their more frequent occurrence was reported in the area around the settlement agglomeration of Staré Město – Uherské Hradiště (Košta 2004, tab. 7). But in Mikulčice, axes in combination with swords occur much less frequently than in other parts of Moravia. Only five graves with swords (375, 438, 580, 715 and 1750) contained axes as well. Four graves (375, 438, 580 and 715) revealed Moravian beard-axes, which were the most common axes of the Great Moravian period. By contrast, grave 1750 contained a broad-axe with a narrow blade, which is rare in Moravia. Like spurs, axes (in contrast to swords) also occurred even in children's graves and were thus used to demonstrate a hereditary claim to social status (Profantová 2005;

126 E.g. The Stuttgart Psalter, fol. 3v, 19r, 32v, 66v (Der Stuttgarter 1965/68); The Utrecht Psalter, fol. 25r (Horst/Noel/Wüstenfeld 1996); The Golden Psalter (Psalterium Aureum) of St. Gall (Mütherich/Gaehde 1976, 122–125); Bible of San Paolo fuori le Mura, fol CCCXXXIV v (Wamers/Brandt 2005, 21, Abb. 1); The Maccabees of St. Gall, fol. 9r, 16r, 22r (Kahsnitz 2001, 218–219).

127 E.g. Nechvalín, graves 36 and 124 (Klanica 2006a; 2006b), Staré Město – Na Valách, grave 277/49 (Hrubý 1955, 454–455); Boleradice (Poulík 1948, 150–151), Blučina (Poulík 1948, 143).

Klápště 2009, 534). Axes occurred in graves along with spurs proportionally less frequently than swords along with spurs did (Ruttkay 1982; 2002, 117; Hanuliak 2004; Štefan 2011, 335–336, fig. 2–3). They had an unambiguously lower symbolic significance than swords in Great Moravia. As typical weapons of infantry warriors, impractical for horse-back combats, they most often indicated that the deceased belonged to a wider rank of warriors (Ruttkay 1982, 182). This rank probably best corresponds to the term 'free Moravians' mentioned in written sources (Havlík 1978, 56–58; Třeštík 1997, 288–289). As far as we can read at a symbolic level of axes found in combination with other weapons and equipment within graves, the importance of axes lay in the strengthening and highlighting of a warrior's status. Theoretically, the perception of an axe as traditional weapon might also be of some significance, in contrast to those swords, which had penetrated as a 'cultural import' from the Frankish Empire among the western Slavs about the turn of the 9th century (see Chap. 2.6).

Approximately one-third of the Moravian graves from Great Moravian period contained fire-sets (firesteels and flints; Fig. 150). These were found in eight Mikulčice graves. The proportion of graves with swords which had fire-sets also, in Mikulčice, as well as in the burial ground of Staré Město – Na Valách, was well above their average found in other Moravian sites. Fire-sets were often buried in graves as components of kits of small tools probably placed in small bags or pouches attached to belts. Any search for a deeper symbolic meaning of fire-sets, which might have resulted from their function, is speculative in this context.

Folding knives are found in graves with swords in a similar proportion to fire-sets in graves with swords and both are commonly found together in such graves.

Interestingly, sword-straps with metal fittings are found in rather small numbers in early medieval Moravian graves with swords. Belt fittings are even rarer. Artistically decorated fittings, either gilded or made of precious metals, are almost absent; such fittings have been found only in graves 190/50 and 223/51 in Staré Město – Na Valách (Hrubý 1955, 491–492, 524–525) and in the grave 580 in Mikulčice (Chap. 3.4.9). But neither of these fittings are comparable with the lavishly decorated belt garnitures, which are known mainly from the Mikulčice graves though they appear also in Staré Město – Na Valách, Břeclav-Pohansko and Rajhradice (summarized by Ungerman 2001). These ostentatious belt garnitures were placed in graves of adult men as well as boys. So far it is not clear why these two categories of objects (swords and sumptuous belt garnitures), which are both associated with the elite of early medieval society, are seldom found together in graves. To understand this it might be helpful to monitor the chronology of graves with splendid belt garnitures. In any case, the ostentatious belt garnitures could be placed in burials whose inventory was reduced to clothes and jewellery; it seems that they might be more abundant in the Late Great Moravian Horizon.

Spearheads, calf straps, sickles and the spherical buttons (known as *gombíks*) are artefacts that seldom appear in graves along with swords (Fig. 150).

Two spearheads were found in the grave 119/AZ with sword in Staré Město – Na Valách (Hrubý 1955, 381) and another nearby in Žlutava (Dostál 1966, 194–195, tab. 44:1). A winged spearhead was discovered in Morkůvky (Kouřil 2005) and further spearheads were found in three out of the four graves with swords from two burial grounds on the cadastre of Nechvalín (Klanica 2006a; 2006b). The Mikulčice graves with swords did not contain spearheads at all. Only one spearhead with wings is known from grave 1241 from the non-church burial ground in the location of 'Kostelec' (Klanica 1985a, 509, 528; Kouřil 2005, 91, Abb. 2:1), where grave 1347 with sword was also uncovered. Spears, like swords or spurs, also represented status symbols, which might demonstrate the deceased's membership of the social elite. Only a few of them have been found in Great Moravian graves and they occur almost solely on non-church burial grounds.

Calf straps are known from burial contexts on the south-eastern periphery of the Frankish Empire (from Moravia to Dalmatia). They reflect the acceptance of a Carolingian fashion by local elites. Differences in the material used for their manufacture as well as their origin (Frankish imports vs. local products) imply further differences in the social status of their holders; from simpler warriors to representatives of the highest elite. Š. Ungerman (in press) has identified them in 45 graves from Moravia. Burials with swords clearly form a minority group among them. Calf straps are more often combined with spurs. Like the spurs, calf straps were inserted also into graves whose inventory was reduced to clothes and jewellery.

A sickle has been found along with a sword in the grave 1347 in Mikulčice (Chap. 3.4.14), in grave 119/60 with a scramaseax in Uherské Hradiště – Sady (Galuška 1996, 104), in grave 277/49 in cemetery of Staré Město – Na Valách (Hrubý 1955, 454–455), then in Blučina (Poulík 1948, 143) and finally in grave 36 in Nechvalín-Homole (Klanica 2006a, Tab 4; 2006b, 20–21). We cannot accurately interpret the symbolic meaning of this agricultural tool in the context of burials with swords but it probably reflects a pre-Christian tradition. Sickles were occasionally placed in both male and female graves. The roots of this tradition can be traced back to Avar burial grounds, from where this custom was probably transferred into the Great Moravian environment (summarized by Klanica 2006a, 67–69).

The appearance of spherical buttons (*gombíks*) in two (or even more) Mikulčice graves with swords (425, 580) is very interesting. There was one golden *gombík* in each of these graves and both of them were of the same type and identically decorated with ribbing. Besides Mikulčice, fragments of *gombíks* were found along with a sword only in grave 1 in the barrow 22 of tumulus burial ground in Skalica-Háje in Slovakia (Budinský/Krička 1959, 89, Taf. XXI:4). This locality is situated near Mikulčice. *Gombíks* were used and placed in burials as adornments (or fasteners) of female clothing and occasionally also male clothing. They were usually worn on the neck or shoulders, and were often included in children's burials (Klanica 1970; Chorvátová 2009, 11–12). A map of the distribution of *gombíks* shows clearly that they were most frequently buried in south Moravia, where also the greatest variability of these jewels was found. The number of Moravian finds significantly exceeds the number of these buttons known from other regions. Elaborately decorated *gombíks* of precious metals, or at least gilded, occur frequently in cemeteries of Great Moravian centres of Mikulčice, Staré Město and Břeclav-Pohansko, as well as other jewellery of the Veligrad type. Furthermore they have been found in the burial grounds of Rajhradice, Rajhrad (Staňa 2006) as well as in an unprofessionally excavated burial ground in Předmostí u Přerova in the location 'Chromečkova zahrada' (Dostál 1966, 155–158, tab. XXXIV). These burial grounds were probably also related to some centres of power. The genesis of *gombíks* took place in Central-Eastern Europe and their emergence could have been influenced by the manufacturers of late-Avar and Byzantine-Oriental jewellery, as well as the craftsmen who produced west-European earrings composed of metal beads. An important moment for this genesis was that part of the elite, which had been established in areas previously controlled by the Avar Khaganate, adopted the *gombík* as one of the key indicators of social, political and ethnic identity. This happened mainly in Moravia, because the central part of the Moravian principality was undoubtedly the place where the greatest use of these jewels took place in the 9th century. Their production was concentrated in important centres, in which the majority of the clientele lived (Klanica 1970; Chorvátová 2009; Košta/Lutovský 2014, 93–95). Even the use of gold for their manufacture (in the case of the graves with swords 425 and 580) clearly shows the extraordinary social status of their wearers. A small plate of gold, which was placed in the mouth of the dead from grave 438, gives similar evidence. The use of small golden plates (or a Byzantine *solidus* in the case of grave 480 in Mikulčice) as obols is occasionally found in graves from the central cemeteries of major Great Moravian centres, such as the cemetery in Staré Město – Na Valách (Hrubý 1955; Galuška 2013, 175–182) or the necropolis around the IIIrd church in Mikulčice (Kavánová/Šmerda 2010, 160–161).

6.2 Remarks on the social interpretation of swords deposited as grave goods in Great Moravia

Now we will try to analyse the sword as an item of grave goods in relation to the various categories of social structure and identity (Steuer 1982, 471–497; Härke 2000). If we summarize the current findings, we can identify a sword as an artefact, which had the most important position among those weapons that were placed in graves. The high cost of the sword is itself evidence of the deceased's wealth (or that of the community that buried him). The absolute proportion of swords among weapons in graves is very low,[128] which of course does not reflect their real proportion in the living culture. We may assume that not every man who bore a sword during his lifetime was buried with that sword. Especially during the Late Great Moravian Horizon a comparable status could be expressed only by including spurs. A significant relationship with spurs highlights the role of the sword as a weapon of horse-riding warriors who formed the core of the Great Moravian troops as well as the political core of the emerging Great Moravian state (Chap. 6.1). Of course, swords were always primarily weapons, but the custom of their burial definitely had a broader meaning, showing the interdependence of the warriorship with administrative and executive power. Swords could therefore accompany members of a warrior upper class, including officials of the early Great Moravian state as well as the rulers themselves (compare with Steuer 1987; Härke 2000). All of these classes were closely interdependent. High social respect, which people buried with swords enjoyed, is shown in a number of cases by the location of the grave within the cemetery (Steuer 1982, 488–489).[129]

Swords of the Great Moravian period are in all the cases, when it was possible to determine the sex of the individual, related to male burials. As the most effective personal weapons they were unambiguously used to express the social status of the male population. Interestingly, swords discovered in graves of early medieval Moravia were in all cases buried alongside full-grown individuals. In this respect they differ significantly from spurs and axes, which we know also from children's burials. So, in this way, in Great Moravian society a hereditary claim of children to the social status of their families was regularly expressed. The reason for the absence of swords from children's graves is not entirely clear. A sword could, for example, express some achieved social function of the dead or his leadership within the group. Another solution is much more prosaic; a sword (or even a miniature metallic imitation, which we know from contemporary Nordic finds; e.g. the chamber grave II/1930 from Hedeby; Arents/Eisenschmidt 2010b, 94, 331, Taf. 33) could simply be too costly for the demonstration of the social status of a child.

Swords in western European form started to come in larger quantities into the west Slavonic environment at the time when the local elite began to be inspired by the fundamental patterns of Frankish society, including of course Frankish fashions, lifestyle and warfare techniques. In all of these patterns the sword had its central position – it was an indispensable accessory for the elite as well as an excellent weapon. Swords represented a cultural import and, perhaps also at the beginning, a physical import from a foreign

128 Among the Great Moravian finds from Slovakia, for example, swords occur in around 7% of cases (Ruttkay 2002, 115).

129 Many of the Mikulčice graves with swords were situated on prominent places, in the interiors of churches or along major roads leading to the temples; also some burials with swords in rural burial grounds were situated in dominant positions (e.g. Nechvalín; Morkůvky).

environment. This may be inferred from the oldest swords being characterized by a heterogeneous proportion of types and forms of swords and blades and by a high abundance of elaborately decorated specimens in styles that do not correspond to that typical of the Moravian environment. Local craftsmen may well have copied these imports later. A connection with Frankish fashions would have increased their value even more in Great Moravian society. However, burials with swords have not yet been discovered in Moravia, which could be assigned to individuals originating from a foreign cultural environment (see Košta 2010 for more details).

Swords in graves do not inform about the religious beliefs of their owners anything more than the character of unreduced sets of grave goods can say. The deposit of food offerings especially can be seen as a relic of pre-Christian thinking. However, the deposit of undiminished goods into graves was tolerated by the Church, at least in the period shortly after the Christianization of society. This is shown by the occurrence of swords (along with other weapons and food offerings) in the Great Moravian non-church burial grounds as well as directly in the Christian churches. Religious motifs may be found on the weapons and their garnitures, as in the case of burials 265 and 580 in Mikulčice.

6.3 Remarks on the interpretation of the social position of men buried with swords in early medieval Mikulčice

When conducting the social interpretation of the graves with swords in Mikulčice we will deal with the higher layers of Great Moravian society, and our goal will be to depict the nuances in their social stratification. It is interesting that some swords were not accompanied by substantial grave goods, and only a small number of Moravian graves with swords included artefacts made from precious metals. This may be evidence of a pronounced social stratification of these men as well as an expression of the development of the custom of the Moravians of placing fewer objects among the grave goods. There was a gradual reduction of grave goods in terms of the variety of objects buried and this process could also affect the graves with swords. In any case, in male graves the Old Moravians preferred to provide a customary variety and include a number of useful artefacts while disregarding their sumptuousness. The situation was different for female jewellery; the quality of decoration and materials used for the jewellery was of crucial importance for them. Among the criteria, which contribute to the definition of the highest elite, there may be included the presence of costly or rare artefacts with high symbolic significance, the presence of objects made of gold or silver, imported objects, artefacts reflecting a high lifestyle, the intricate construction of the grave and the significant location of the burial (Steuer 1982, 438).

The most distinctive burials with swords were undoubtedly found in graves 265 and 580, which were situated in the interiors of Mikulčice churches. The grave 265 was found in the earlier phase of the IInd church and the grave 580 in the most prominent place – the middle aisle of the greatest known Great Moravian sanctuary – the IIIrd church. It is possible, that the burial 265 took place in the earliest sanctuary on the acropolis, well before the IIIrd church was established, and thus also in the most prominent place at that period. Furthermore the set of grave goods found in the grave 580 belongs among the richest grave goods found in male burials within the whole Great Moravian context. The small number of burials uncovered in the interiors of Great Moravian churches suggests that the privilege of being buried in a place of such importance was probably reserved for individuals within the family of the ruling dynasty (Schulze-Dörrlamm 1993, 618-619, Tab. 1) or for the highest representatives of the church.

It is interesting, that the deceased in both graves (265, 580) were provided with swords whose blades bore inlaid crosses of non-ferrous metal. Crosses inlaid into sword blades are not a frequent feature among swords from the 9th and 10th centuries. A decoration in the form of a cross is mentioned in the case of the sword of Charlemagne and crosses are also documented on the later swords of imperial rulers (for information about analogies see Chap. 5.1.1.3). The fact that only two such decorated swords were deposited in the only two graves with swords in the interior of a church speaks of the significant role played by a cross inlaid into a blade in a Great Moravian context. The swords decorated with cross symbols may well have been attributes of the Christian rulers of Great Moravia.

There are limited possibilities of assigning the social status of other burials within the higher levels of the society. This is partly caused by the fact that we still lack accurate ideas about the development of the Mikulčice cemeteries because the related excavation data have not yet been properly processed (see Chap. 1.2). Very important individuals were apparently those buried in coffins with iron fittings (the deceased in graves 265, 580, 341, 438, 500 and 717). Such burials are known almost exclusively from the centres in the Staré Město – Uherské Hradiště and Mikulčice (see Chap. 6.1). The Moravian coffins with iron fittings frequently contained rich grave goods, including vessels and weapons. In this aspect the Moravian cemeteries differ from, e.g., the cemetery in the acropolis of stronghold in Libice nad Cidlinou in middle-eastern Bohemia, where coffins with iron fittings were equipped with no, or only with poor and ambiguous, grave goods (Turek 1976; 1978; Koštová 2014, 48–50). Burials with coffins are concentrated in the important cemeteries around the III^rd^ church in Mikulčice and also in the group of graves located north-west of the palace (Poláček 2005). It is interesting that such burials do not occur in the cemeteries around the churches outside the acropolis, nor in the cemetery around the IV^th^ church and probably not in the later phase of the cemetery around the II^nd^ church. Because some of the elite were also buried in these cemeteries, which developed during the Late Great Moravian Horizon, it is possible that the popularity of burying in coffins with iron fittings did not last until the end of the Great Moravian period. The fact that burials in coffins are found in main Great Moravian centres probably reflects the close relationship of the deceased to the culture of court. We are unable to define the concrete forms of these bonds, but it is evident that the culture of the upper levels of society in the main centres differed in certain respects from the culture of the upper levels of society in the agrarian settlements outside the centres which we know from their burial grounds. The differences between the centres and peripheries can be illustrated, for instance, by the distribution of Veligrad-type jewellery (Košta/Lutovský 2014, 94).

If a detailed analysis of the cemetery around the III^rd^ church proves the hypothesis that there was a path connecting the temple with the main road of the acropolis in a north-south direction, we may assume that those burials with swords that were prominently located along the path (341, 438, 500) belonged to the leading representatives of the Great Moravian elite, who ranked among the members of the close circle around the ruler.

Differences in the composition and quality of their grave goods were probably less significant than the location of burials. High-quality swords, probably imported, were buried in graves 90, 438 and 1750 (see Chap. 5.3). These graves contained rich sets of grave goods. In the case of burial 438, for example, a golden plate was inserted into the mouth of the dead; a parallel to this custom was found in grave 380, which was placed in the central nave of the III^rd^ church (Poulík 1975, 77; Klanica 1985b, 120), as well as in some burials from the cemetery in Staré Město – Na Valách (Hrubý 1955; Galuška 2013, 175–182). Grave 1750 has in this respect an extraordinary position because it was discovered at the cemetery outside the acropolis, where a church building was not archaeologically evidenced. Due to its dating the burial might precede burials around the second Mikulčice church and thus could be the oldest burial with a sword in Mikulčice. However, it cannot be proved unambiguously (see Chap. 4.3). Its position, nevertheless, proves that burials with extraordinarily rich sets of grave goods containing numerous imports, could also take place in non-church cemeteries outside the acropolis. Burial 425, which was deposited in a less distinctive grave pit, which contained fewer grave goods and which was located in a somewhat less impressive place, was one of three Mikulčice graves with swords, which included a gold *gombík* – the golden globular button of the same type that was found in grave 580 in the interior of the III[rd] church. The occurrence of objects of gold in graves with swords is rare and we can consider it as illustrating the environment closely associated with the courtly culture of the stronghold, which was one of the residences of the Great Moravian rulers.

A specific, possibly high status was enjoyed by those buried in the small cemetery with a number of richly furnished graves located NW from the foundations of the stone building interpreted as a palace (see Chap. 1.2.1). Assemblages of grave goods found in the graves with swords from the burial ground (715, 717 and 723) are not the richest ones among such graves. This small cemetery was probably used by a small closed community of people. Its relationship to the palatial building unfortunately cannot be proved without a detailed analysis of the cemetery and the overall field situation. In any case, members of this community buried their dead outside the large cemetery around the III[rd] church, where a number of elite burials was found. That may have been the result of their rank or post. Groups of graves of the upper classes mixed with those of the lower classes in cemeteries in the Great Moravian environment are a significant phenomenon, to which more attention should be paid. Let us mention, for instance, the concentration of rich graves in the pre-church phase of the burial ground of Staré Město – Na Valách (Hrubý 1955; interpretation of terrain situation e.g. Chorvátová 2004; Galuška 2013, 195–241). Other examples are the warrior graves in Nechvalín (Klanica 2006b, 46–49, 56; Štefan 2011, fig. 4). In Mikulčice, some graves with swords (at least such as 375, 1347 and 1665; Chap. 3.4.5, 3.4.14 and 3.4.15) were part of such groups of graves with weapons and rich jewellery. Grouping of such graves probably reflects family ties, albeit we still lack archeogenetic evidence.

A unique object among all the grave goods with swords from Mikulčice is the sickle from grave 1347, which was uncovered at the non-church burial ground outside the fortified area. It is not a unique example of a burial of warrior with both sword and sickle (see Chap. 6.1). We are not able to determine accurately the exact meaning of the depositing of a sickle in a grave, but the roots of this custom must be sought in the pre-Christian cult (summarised by Klanica 2006a, 67–69). In this context, the character of this burial is rare among the Mikulčice graves with swords but corresponds to the overall character of the burial ground in the location of 'Kostelec' (Klanica 1985a). Unlike graves 1665 and 1750 from 'Kostelisko', grave 1347 represents a distinctly different burial from the majority of burials at the acropolis. It seems that the community using this burial ground maintained elements in its funerary rite that are encountered in more peripherally situated cemeteries. Also grave 805 has a peculiar character which is difficult to interpret. This burial, which was the only one containing a ceramic vessel among the Mikulčice burials with swords, chronologically falls into the Later Great Moravian Horizon. One possible interpretation is that a representative of the elite was buried here at the time of the Great Moravian decay. However, this is only one hypothesis.

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