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40 lat „Acta Universitatis Lodziensis. Folia Archaeologica"

Szanowni Czytelnicy, tom, który Wam przedstawiamy, jest jubileuszowym. W sposób oczywisty wskazuje na to numer na okładce – 35. Jednak świętujemy jeszcze jedną rocznicę. Minęło właśnie 40 lat od czasu powołania do życia „Acta Universitatis Lodziensis. Folia Archaeologica". Pierwszy tom, który ukazał się w 1980 r., był dla tego wydawnictwa raczej nietypowy, gdyż była to monografia pióra Leszka Kajzera. Od tamtego czasu wydanych zostało 36 woluminów (w 2001 r. powstały dwa tomy). W zdecydowanej większości były to zbiory prac, a jedynie w trzech przypadkach monografie. Opublikowaliśmy łącznie 358 artykułów, w większości w języku polskim. Pojawiły się też 43 teksty angielskie, 11 niemieckich, 6 rosyjskich, 6 czeskich i 5 francuskich.

Tematyka prac na przestrzeni tych lat była bardzo szeroka – obejmowała zarówno pradzieje, jak i archeologię historyczną. W stosunku do innych periodyków z naszej dyscypliny, udział prac z tej drugiej jest od pewnego czasu znacznie większy. Staramy się tym samym odpowiedzieć na wyraźne zapotrzebowanie środowiska.

Pierwsze ukazujące się tomy były drukowane w czerwonych okładkach. To zmieniło się w 1994 r. z inicjatywy Wydawnictwa Uniwersytetu Łódzkiego. Obecnie postanowiliśmy nawiązać do tradycji i nasze tomy znów są czerwone.

Życzymy inspirującej lektury i zapraszamy do współpracy.

W imieniu Redakcji „Acta Universitatis Lodziensis. Folia Archaeologica"
Anna Marciniak-Kajzer

40 Years of "Acta Universitatis Lodziensis. Folia Archaeologica"

Dear Readers, this volume is a jubilee issue, which is obviously indicated by the number 35 on the cover. However, we are also celebrating another anniversary. It has been 40 years since "Acta Universitatis Lodziensis. Folia Archaeologica" was created. The first volume, published in 1980, was rather unusual as it was a monograph by Leszek Kajzer. Since that time, 36 volumes have been published (with 2 volumes in 2001). A vast majority of them were collections, with only three monographs. We have published a total of 358 papers, mostly in Polish, but there have also been 43 texts in English, 11 in German, 6 in Russian, 6 in Czech, and 5 in French.

The topics of articles over these years were very diverse, including ancient history and historical archaeology. Compared with other journals in our field, the number of papers concerning the latter has grown considerably, which is our response to the clear demand from the scientific circles.

The first volumes had red covers, which changed in 1994 on the initiative of the Lodz University Press. We have decided to pay tribute to tradition and our volumes are red again.

We hope you will find the publication inspiring and we are looking forward to your contribution.

On behalf of the Editorial Team of "Acta Universitatis Lodziensis. Folia Archaeologica"
Anna Marciniak-Kajzer

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"...a Gentle Calm and Happy Resurrection" – Theological and Folk-religious Backgrounds of Crypt Burials

If one tries to understand the mentality of our Christian ancestors and the way they buried their dead, we need to move away from the contemporary perspective of religious abstraction.

In fact, the body of the risen Christ, and thus our own body, is at the centre of Christian eschatology. The oldest Christian testimony in which the resurrection is thematised is Paulus' first letter to the Thessalonians, probably dated around 50 A.D., which speaks of the "Son whom God raised from the dead" (1 Th 1,10). In the first letter to the Corinthians, probably written five years later, Paulus writes: *But if Christ is not risen, our preaching is in vain, your faith is also in vain... For if the dead are not risen, Christ is not risen either* (1 Cor 14–16).

In the two thousand years that have passed since then, the bodily resurrection has never been doubted by the official dogmatic guideline of the Catholic Church, but has been confirmed in the 20th and early 21st century: *The resurrected body is the same body as that which belonged to the soul in earth life* (cf. Ratzinger 1957: 1042)[1]. However, the protestant theology of the second half of the 20th century and the forced or self-chosen turning away of large parts of mankind from the religious led to a "disenchantment of the world", as Max Weber felt (1992: 46). The thorough demythologization of the New Testament by an increasing materialism in the period after the Enlightenment and especially in the second half of the 20th century, also made many believers understand the miracles of Christ only in symbolic parables. In comparison to the words of the Bible, now a resurrection can

1 As Pope Benedict XVI., he reaffirmed this dogma in 2013.

still be hoped for, but only of the immortal soul. It remains to assume that until the early 20th century the belief in a bodily resurrection was only doubted by an intellectual elite. Those whose bodies rest in the tombs of the 16th to 19th centuries have never questioned the resurrection of the flesh, in accordance to the bodily resurrection of Christ. Given this religious background, the object of research is somewhat more complicated.

In order to understand the phenomenon of crypt burials, aspects of religion, estates, families and socio-historical backgrounds must be examined. Unfortunately, ethical points of view are often not taken into account. Most of the crypt mummies, when known, are today not placed into the religious context of their time, but are marketed, as "biological miracles", like the so-called "Knight Kahlbutz" in Kampehl, a small town in the north-west of Berlin. This nobleman died in 1702, was buried in the church crypt and mummified naturally. Today, his body is well-preserved, due to the ventilation inside the crypt. But many myths were developed around the conjunction of his bad behaviour in lifetime and his body's preservation after death. His body, like many other crypt mummies, has been scientifically studied. Other examples are the mummies in the crypts of Illmersdorf (Brandenburg) and Nedlitz (Saxony-Anhalt)[2]. Some scientists have drawn parallels to the independent tradition of mummification in early modern Catholic Italy, for example in Palermo, Savoca and Venzone. Especially in the "Catacombe dei Cappuccini" in Palermo the dead were visited by their relatives and it is for this purpose that their bodies were artificially mummified. However, these customs are not comparable with the Central, Eastern and Northern European burial culture, where the corpses rest in double-sealed coffins. Here, the coffins were not opened after the funeral; the corpses were not exhibited.

Furthermore, representative aspects form an essential part of this burial culture. The social status – achieved or inherited – in life is also reflected in the burial sites. A family grave on one's own land or the patronage church was, comparable with the patronage or princely lodges and the epitaphs in the church, a visible monument of a dynastic and pecuniary founded self-confidence. Family crypts offered the possibility of representing power and prosperity over several generations through splendidly designed epitaphs, crypt portals and in some cases the display of precious sarcophagi. The statement of these monuments is: we are here, we have been here for a long time and we will stay here.

The consideration of family aspects is of great importance for the understanding of crypts. Even if death causes a gap in the family structure, it is partly closed

2 In Nedlitz, Amelie Alterauge (University of Bern) discovered an allegedly female mummy to be that of a man (Alterauge 2019). A look at the clothing shows the same result, since the mummy is dressed in a typical men's housecoat from around 1800.

by the reunification of all family members at the grave. "Ancestor samples", i.e. proofs of ancestry with a large number of coats of arms, were used to prove the famous origin and the importance of each individual of that very family (Fig. 1). The building of such a family tomb secured the *memoria*, more precisely the honourable memory of the family members for future times.

Fig. 1. Coffin of Augusta von Rantzau (deceased 1667) with proof of ancestry in Dänischenhagen near Kiel (Schleswig-Holstein) (prepared by Forschungsstelle Gruft, Lübeck).

Every death is terrible for relatives, but whose heritage is living in the memory of one's descendants, like it is in the case of Maria Luise Albertine von Leiningen-Dagsburg-Falkenburg (died 1818), can die in peace. She was the grandmother of Queen Luise, the so-called and beloved "Queen of Hearts". Her coffin stands in the crypt of the family von Mecklenburg-Strelitz in the Johanniterkirche (church of the order of St. John) in Mirow (Mecklenburg-Vorpommern). The inscription on it makes impressively clear that the impact of the individual's death to its family is only eased by the individual's – and therefore family's – progeny: "The widowed Countess of Hesse-Darmstadt, born imperial countess of Leiningen-Dagsburg and Broich, who is resting here in God, had 9 children in her marriage and had the rare luck of experiencing 24 grandchildren and 12 grandchildren-in-law of these and three sons-in-law, 56 great-grandchildren and 7 great-grandchildren-in-law and 11 great-grandchildren of these. All in all 122; which they were allowed to call mother. She was loved and honoured by all, as she had earned it abundantly".

Fig. 2. Funeral wreath of the von Bünau family vault in Burkhardswalde near Pirna (Saxonia), 17th century (prepared by Forschungsstelle Gruft, Lübeck).

Medieval and early modern society in Europe was strongly interwoven with religious and moral backgrounds. Consequently, the concern for the dead as one of the Seven Works of Mercy according to the catechetical tradition of the Church is central. Even the youngest deceased individuals are lovingly cared for. Their funeral wreaths are among the most conspicuous and frequent burial objects (Fig. 2). They were given to unmarried deceased persons of both sexes and both confessions, Catholic as well as Protestant, regardless of the individual's age, as a substitute for a wedding that had not taken place in life or for a "heavenly wedding". These fragile structures of mostly non-ferrous metal wires, sequins as well as fabric or paper blossoms are mainly documented for the 17th and 18th centuries.

Fig. 3. Coffin of Ottilia Elisabeth von Bismarck (deceased 1695) in the Wunderblutkirche ("Miracle Blood Church") in Bad Wilsnack (Brandenburg) (prepared by Forschungsstelle Gruft, Lübeck).

Fig. 4. Quote from the Bible, Job 19,25–27; on the cemetery gate (1542) in Eisfeld (Thuringia) (prepared by Forschungsstelle Gruft, Lübeck).

Roses, as a symbol of love, were placed on the corpse or painted on the coffin. The rose-shaped handles attached to the coffin of Ottilia Elisabeth von Bismarck, who died in 1695, buried in the Wunderblutkirche in Bad Wilsnack (Brandenburg) are absolutely unique (Fig. 3).

As stated above, our modern, almost clinical perspective has made us forget the immense importance of religion and belief in earlier times. In almost every tomb we encounter the Bible quotation Job 19,25 to 27: *For I know that my Redeemer lives, and at the last he will stand upon the earth. And after my skin has been thus destroyed, yet in my flesh I shall see God, whom I shall see for myself, and my eyes shall behold, and not another* (Fig. 4). Even though Luther translated it wrongly here (the passage should actually be translated as *and after this my skin is shattered, I will see God without my flesh*, which would correspond to a purely spiritual resurrection), his version was nevertheless received vividly in the early modern burial culture. Basically, every Christian tomb and crypt is a place of resurrection. As already mentioned at the beginning: It is also always about the physical resurrection. This is as well confirmed by the quotation in Ezekiel 37,4 to 6, which can be found less frequently on the coffins, but also here the physical resurrection from

Fig. 5. Mummy from storage with poor ventilation, Parochialkirche (Berlin), burial from the Biedermeier era (prepared by Forschungsstelle Gruft, Lübeck).

Fig. 6. Mummy from storage with good ventilation, Parochialkirche (Berlin), burial from the first half of the 18th century (prepared by Forschungsstelle Gruft, Lübeck).

the bones is invoked[3]. The pictures of the Last Judgement, where people crawl out of their graves like cockchafers, are well known. They collect their bones together in order to be able to resurrect completely on the great day. The painting of the

3 *Prophesy over these bones, and say to them, O dry bones, hear the word of the Lord. Thus says the Lord God to these bones: Behold, I will cause breath to enter you, and you shall live. And I will lay sinews upon you, and will cause flesh to come upon you, and cover you with skin, and put breath in you, and you shall live, and you shall know that I am the lord.*

Last Judgement of Jehan Bellegambe[4] focuses on the reconstruction of the body. Here an angel assembles the body of a resurrected man who, still drowsy, raises his head in the direction of Christ as judge of the world.

Then the question arises whether the preservation of the bodies in the tombs was intended. In general, organic materials inside crypts are preserved if these are well ventilated (Fig. 5 and 6). This circumstance has led to the fact that in European tombs there are hundreds of naturally mummified individuals; and only 100 years ago there were probably thousands. If ventilation is interrupted, the corpses disintegrate. Many of the mummies have been damaged or are now completely skeletonized. One of the reasons is the blocking of existing ventilation systems by improper bricklaying and clogging of the openings.

Fig. 7. Mummy of Caroline von der Wense (deceased 1838) in Lüneburg with cross-shaped section cuts (prepared by Forschungsstelle Gruft, Lübeck).

Plundering, above all in the past 70 years, thus in the time after the Second World War, caused enormous damages', and in the consequence many of the once so well-preserved corpses were cremated.

The aforementioned natural mummification is enhanced by an appropriate bedding of the corpses. Hop bedding is particularly suitable, as hop flowers are absorbent and further also antibacterial and antifungal. Last but not least, hop was used among the living as a barbiturate, thus in the coffin providing a good sleep for the deceased, which did last, in accordance to Luther's perception, until the day of resurrection.

Corpses were often opened in preparation of burials and transfers of coffins with corpses inside.

In the case of the abbess Caroline von der Wense, who died in July 1838 in the Lüne monastery in Lüneburg, and was not the slimmest, the organs had been removed in order to make the

4 Berlin, Staatliche Museen zu Berlin – Preußischer Kulturbesitz, Gemäldegalerie.

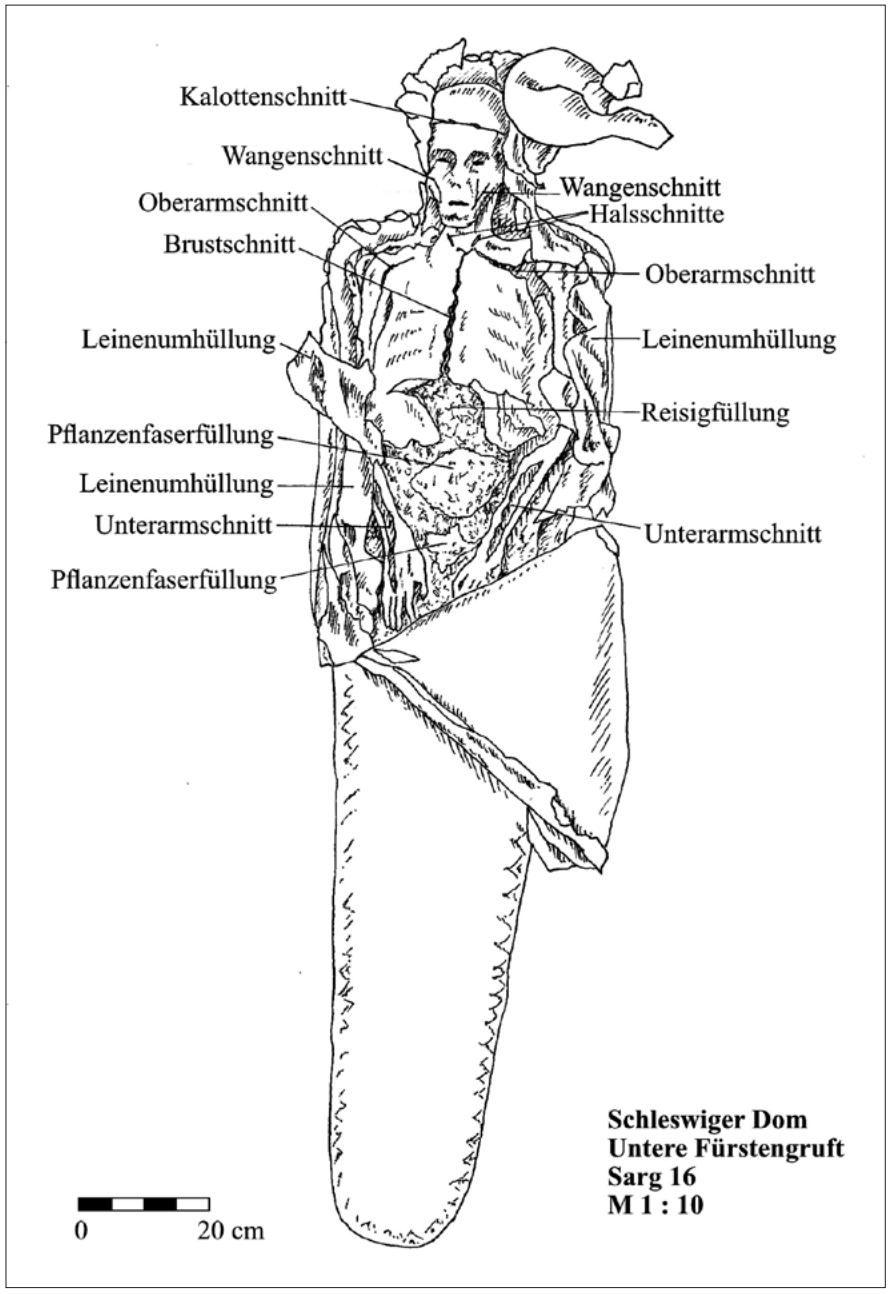

Fig. 8. Mummy of Friedrich, Prince of Schleswig-Holstein-Gottorf (deceased 1654 in Paris) with the section cuts (prepared by Forschungsstelle Gruft, Lübeck).

presentation of the body during the funerary rituals more pleasant (Fig. 7). Cross and double cross sections were also carried out in the abdominal regions of two corpses buried in the princely tomb at Mirow. Sometimes many days or weeks passed until the whole family had gathered from the Reich to say farewell. For example, six days passed between the death of Grand Duke Georg von Mecklenburg-Strelitz on 6 September 1860 and his funeral on 13 September. He had ordered the opening of his corpse in his will, and this should also prove helpful for the public presentation of his body during the funerary ceremony. Duke Adolf of Schleswig-Holstein-Gottorf died in 1631 after the Battle of Breitenfeld (Saxony) in the Thirty Years' War, and had to be transferred from Eilenburg, about 18 days away, to Schleswig. This would not have been possible without extensive conservation carried out before the transfer, until today body and clothing are very well preserved. A more detailed investigation of the conservation measures is still pending. This also applies to the corpse of Friedrich von Schleswig-Holstein-Gottorf, who died in 1654 at the age of 19 during his cavalier tour in Paris (Fig. 8). The body got artfully prepared. Numerous sewn cuts all over the body testify to the systematic approach to draining the body. The cuts can be seen on the head, neck, arms, chest and stomach. The abdominal cavity then got filled with an aromatic mixture of plant parts and a bulky filling of a yet undetermined material. The corpse was then finally wrapped in coarse linen, placed into a transport coffin, which then was soldered. The thus sealed ensemble was transferred to the ceremonial place or finally into the burial crypt, and there placed into the outer coffin.

This special process of getting rid of the corpse's liquids, applied here, is well described in the relevant literature of the 16th century. The French military surgeon Ambroise Paré is regarded as the father of modern surgery, and was the personal physician of the French kings Henri II, Francois II, Charles IX and Henri III. He also developed a successful method for preserving corpses. In his 1594 posthumous publication *Opera chirurgica*, Paré complains about the unsuccessful conservation methods of his time.

He had developed an own method, that required the removal of the intestines, deep cuttings in the muscles and then to place the body in a wooden tub with a solution of vinegar, aloe, wormwood, coloquines and alcohol. After three weeks of leaving the body in this liquid, he allowed the body to dry in a ventilated place, thus preserving it successfully for the period of public display of the corpse and the subsequent transfer to the final resting place, assuring a worthy dealing with the body.

None of the doctors or embalmers like Paré intended to make mummies. Moreover, nobody from the noble families ever opened a screwed coffin and, noticed how well the mummification succeeded. These crypt mummies described here are the result of preparations related to the public display of the deceased

during the funerary ceremonies and the subsequent transfer of the body to the crypt. The coffins did serve as an ornamental armour for the deceased, the graves being the places where they wanted to be kept until the Last Judgement. Mummified or skeletonized, God will reassemble them all. Only physical completeness should be guaranteed. This is the reason why the Catholic rejection of cremation in particular is partly to the present day. The inference is therefore that there is no European tradition of mummification in the narrower sense, as for example in Egypt or in the Italian examples.

After decades of tomb investigations in Northern and Central Europe, nowadays also the socio-historical background of the early modern tombs is taken into consideration during their investigation. Their numerous occurrences, especially from the 17th century onwards, seem to be connected with social upheavals that would go beyond the scope of this description. It is a combination of several factors that caused a period of crisis; such as the Reformation with its general religious insecurity, the Thirty Years War with its social and religious consequences, epidemics and famine years, which in turn are related to the climate changes caused by the Little Ice Age. A comprehensive publication on this topic is in preparation. It is not only about saving graves and tombs, but also about interpreting them correctly.

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Summary

"...a Gentle Calm and Happy Resurrection" – Theological and Folk-religious Backgrounds of Crypt Burials

For years there has been a lively discussion if there did exist a tradition of intentional mummification in Christian Europe, since hundreds of naturally mummified individuals of a social elite have been found preserved in family- and church crypts. But in most cases well ventilated crypt spaces are the reason for this natural mummification. Besides their dynastic and representative nature, crypts with the well closed coffins were probably understood as spaces of protection for a facilitated resurrection of the body at the day of judgement. Physical resurrection was church-dogmatical from the beginning of Christianity until 20th century and as well a private religious fact. Numerous inscriptions on

coffins and crypt walls testify the hope of a "happy resurrection". The believe in resurrection is common for all confessions, though it is probably Protestantism that has promoted burials in crypts. But only the comprehension of the interaction of different social and religious aspects opens the access to the complex "crypt".

Keywords: crypt, mummification, resurrection, theological background

Streszczenie

„...łagodne, spokojne i szczęśliwe zmartwychwstanie" – teologiczny i związany z religią naturalną wymiar pochówków w kryptach

Od lat trwa ożywiona dyskusja na temat tego, czy w chrześcijańskiej Europie istniała tradycja celowych mumifikacji, jako że w kryptach rodzinnych i kościelnych odnaleziono setki naturalnie zmumifikowanych ciał przedstawicieli elit społecznych. W większości przypadków jednak powodem tego typu naturalnych mumifikacji była dobra wentylacja krypt. Poza swym dynastycznym i reprezentatywnym charakterem, krypty ze szczelnie zamkniętymi trumnami prawdopodobnie rozumiano jako przestrzenie ochronne, mające ułatwić wskrzeszenie ciała w dniu ostatecznym. Fizyczne zmartwychwstanie stanowiło dogmat od początku chrześcijaństwa do XX w., jak również fakt religii naturalnej. Wiele inskrypcji na trumnach i ścianach krypt świadczy o nadziei na „szczęśliwe zmartwychwstanie". Wiara w zmartwychwstanie jest powszechna dla wszystkich wyznań, choć prawdopodobnie to protestantyzm rozpowszechnił pochówki w kryptach. Jednakże dostęp do złożoności „krypty" uzyskać można wyłącznie poprzez zrozumienie interakcji między różnymi aspektami społecznymi i religijnymi.

Słowa kluczowe: krypta (rodzinna), mumifikacja, zmartwychwstanie, kontekst teologiczny

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Burial Crypts and Vaults in Britain and Ireland: a Biographical Approach

Various types of burial chamber in Britain belonging to the period from the Reformation until the 19th century have long been investigated archaeologically, but their frequency was only appreciated with the extensive investigation of St. Augustine the Less, Bristol, for which unfortunately there is still only an interim report (Boore 1986). The initial classification of both coffins and burial spaces was produced by Julian Litten (1985), and the variability in coffin design was greatly expanded by the investigation of the communal crypt at Christ Church Spitalfields, London (hereafter Spitalfields) during 1984–1986 (Reeve, Adams 1993). The original classification and dating sequence for burial structures proposed by Litten (1985: 10) is still valid, and it is set out in Table 1. Mainly concentrating on elite burial spaces, Litten defined four categories of burial space in 1999: large dynastic vault, family vault, brick grave and extensive private and public vaults (Litten 1999: 115). This study defines the range of types that are most frequently encountered and the form of the evidence normally surviving in these burial spaces, building on these pioneering studies.

This study considers for the first time the biography of the coffin, and of the various types of burial spaces, both in terms of successive interment and some of the subsequent taphonomic processes that subsequently affect the location of the coffins within these burial spaces. The categories of space are organised by size, starting with the smallest, for one or two individuals, through family vaults of varying size to communal crypts. Given the paucity of dating evidence for construction of many vaults, and the relatively small sample that is available through academic publication and the 'grey literature' of contract archaeology, no detailed chronology or appreciation of regional variation can yet be confidently proposed. Whilst the dates obtained from coffins, with their depositum plates providing details of the deceased, can suggest a date for a burial space, they are not always

reliable. Coffins could be moved from one grave to a new family burial space to keep family members together in death. Nevertheless, it seems that elite vaults were constructed from the later 15th century onwards, with middle class vaults and lined burial shafts commencing during the 17th century and increasing in popularity in later centuries. Church crypts become popular in major towns and cities from the later 18th century but their use ended with legislation against all intra-mural burial in the middle of the 19th century. Family vaults continue in use, but they are rarely constructed today.

Numerous crypts and family burial vaults, particularly those thought to contain royal or aristocratic individuals, were frequently opened and explored during 19th-century renovations of church buildings. For example, a search in Westminster Abbey for the remains of James I led to the examination of some of the earliest known vaults, such as that for Mary, Queen of Scots (died 1587). Several early 17th-century vaults, some with anthropoid coffins, were revealed there, and similar vaults elsewhere were also erected at this time (Litten 2009; Stanley 1869). Elite family vaults have been investigated in recent times (Litten 1999; Redknap 1985; Butler, Morris 1994). These, together with brief descriptions in local sources, and his other unpublished observations provided Litten with the evidence for the original classification and his update. More recent extensive investigations and numerous small-scale observations have shown that these categories, whilst largely correct, do not reflect the full richness of both the original designs and the ways in which such spaces were adapted and filled. This chapter is the first attempt to explore and understand this complexity, building on Litten's pioneering work biased on a wider range of examples.

In the first two decades of the 21st century numerous subterranean burial structures have been recorded, though they were often unexpectedly discovered by accident during church refurbishment and observed or rapidly recorded as part of the archaeological oversight of such projects. The unexpected appearance of such features, and the limited experience of dealing with such opportunities by many of the contractors, has led to inconsistent recording procedures and terminology. Nevertheless, some information from a wide range of locations augments the large-scale investigations at a small number of graveyards and internal vaults and crypts where more intensive investigation has taken place. Although the St. Martins-in-the-Bull Ring, Birmingham (hereafter St. Martins; Brickley, Buteux 2006), was a significant investigation away from the capital, but most of the major studies have been in London, notably at the subject-defining site of Spitalfields (Reeve, Adams 1993), followed by St. George's Church, Bloomsbury (hereafter Bloomsbury; Boyle et al. 2005) and St. Luke's, Islington (hereafter St. Luke's; Boston et al. 2009). The present data set is already sufficient to confirm the main forms of burial vault found across Britain and Ireland and also consider some of the variation in their

details; it forms part of a wider burgeoning archaeological interest in post-medieval mortuary culture in Britain and Ireland (Cherryson et al. 2012; Renshaw, Powers 2016; Mytum 2017; 2018a). Whilst individual narratives have been elucidated in site reports, it is now possible to compare and contrast the varied biographies of both coffins and their burial chambers across a range of sites for the first time.

Biographies of shafts, vaults and crypts

Brick or stone burial shafts

Shafts designed to contain one or more coffins stacked above each other were the simplest form of construction beyond the earth-dug grave. They mirror in size and organisation the simple grave, but are lined with brick or, on some regions, stone. They provided the least expensive form of protection of the interred from disturbance from later burials. These shafts occur within churches, but also in churchyards and burial grounds of different denominations (Cox, Stock 1996).

Shafts could be rectangular or hexagonal in shape, and if lined with brick could be one or two bricks thick. The 24 examples investigated at St. Martins show the common forms found elsewhere (Brickley, Buteux 2006: 70–89), and most were closed with a barrel vault, though some were covered with a ledger slab. The vault would have to be dismantled for each interment, but in some cases an area was excavated at the end of the grave to enable the narrow east or west end wall to be dismantled and the next coffin to be inserted. It was easier to move aside a ledger for subsequent burials, as these could be lowered down from above. Some shafts were enhanced on the inner faces with whitewash. A memorial – floor slab inside the church or ledger or another form of monument in the churchyard – would mark the position of the shaft and give details of those interred beneath. Shafts were designed for two adult interments, but some of those at St. Martins also contained up to two additional infants or children.

The use of the shafts was similar in all cases, with coffins placed one above another, though not normally actually resting on each other, though how this was achieved does vary. The first coffin was placed in the base, but subsequent interments were rested above this with two timbers placed across the width of the shaft, either in already prepared putlog holes, or ones that were cut out as required. Alternatively, the iron bars were set between the courses of brick or masonry. At St. Martin's, the lower burial was occasionally sealed with a full floor over it (Brickley, Buteux 2006: 72). In the majority of shafts with transverse supports, the next coffin could be lowered down and rested on these, ensuring that the first coffin was not crushed. Some of the shafts at St. Luke's did not have the supports and the coffins were just stacked one on top of another (Boyle et al.

2005: 57). In most shafts, as the coffins decayed, the surviving fragments and the coffin fittings and contents fell to the bottom. This can mean that establishing the original sequence and appearance of the coffins can be difficult.

Small family vaults

Small family vaults were usually constructed as small rectangular chambers with brick walls and arched roof. These allow two burials side by side, rather than one above the other, as with the shafts, usually directly on the floor but sometimes on timbers to allow air to circulate (Mytum 1988). Other family vaults incorporated the coffin stacking concept of the shafts with transverse supports to allow up to four levels. Small family vaults occur both within churches and in graveyards, often under horizontal ledger stones or tombs. An example of a vault beneath a chest tomb is that rapidly recorded at Aldersgate Street, London (Wroe-Brown 2011), and others were identified at St. Luke's and St. Martins-in-the-Bull Ring. The Aldersgate Street vault, designed to take two coffins side by side, had an entrance at the eastern end of the grave, allowing coffins to be moved down to sit the length of the grave space beneath the tomb, though other small vaults, such as those at St. Luke's, generally had an access point on one of the longer sides. Internal vaults usually had steps, but external ones often required dug to be dug away to provide access from an end or side. In these cases, other burials had to placed away from the area that would be disturbed to access the vault, and so affected wider burial ground management.

In the churchyard of All Saints' Church, Bisley, Gloucestershire, an external stone-built burial chamber c. 2.2 m x 2.1 m x 2.1 m beneath a pair of ledger stones for William Tyloe (died 1808) and his wife Mary (died 1818) was inspected during conservation work. The human remains and coffin fittings were well preserved but disturbed, in part from the decay of the coffins but also possibly by a fluctuating water table and animal disturbance (Williams 2007). An alternative is that the coffins may have been raised above the base of the chamber on wooden beams that were set in putlog holes in the walls, and they would have become scattered once the wooden coffins decayed. Natural taphonomic processes have been little studied in terms of vault biography to date. An unusual feature of this vault was that access was gained by way of a coffin-slide tunnel with an aperture of c. 1.2 m x 0.8 m and near the surface; this allowed coffins to be placed into the space without removing the ledgers over the top, or digging a large amount of earth away to allow a wall to be dismantled.

The vaults at St. Martins reveal a variety of external forms, some only a single level, others with several levels up to four. Most single level vaults were separate structures as with the Bisley example already discussed, but some were grouped together with separate rooms all accessed from a single subterranean corridor with

one shared set of steps for access. This multiple vault structure was a speculative development by the church, constructed c. 1785, and each space was sold to an individual family, with its entrance bricked up between interments. These vaults were similar to those built within communal crypts such as St. Luke's discussed below. The four chambers varied in their intensity of use between a single adult in Chamber A to five adults in two stacks and three children in another stack within Chamber D.

The multiple level vaults at St. Martins had their layers of coffins separated by using transverse timbers in the same arrangement as with the grave shafts discussed above. The Ainsworth vault (Fig. 1) was first used for two children's interments (1, 2) in one corner, with the other two adults later occupying most of the space, all dying within the space of a decade (Brickley, Buteux 2006: 39–42). Level 2 contains just two adults, again interred a decade apart, and the third level was filled with coffins for three adults. Most of the coffins in this vault can be dated, and they reveal that a straightforward stratigraphic sequence starting from the bottom was not always the case, as the middle level contains Elizabeth Ainsworth and her husband, John, who died after his brother Benjamin who was placed on the highest level to leave room for John to join his wife.

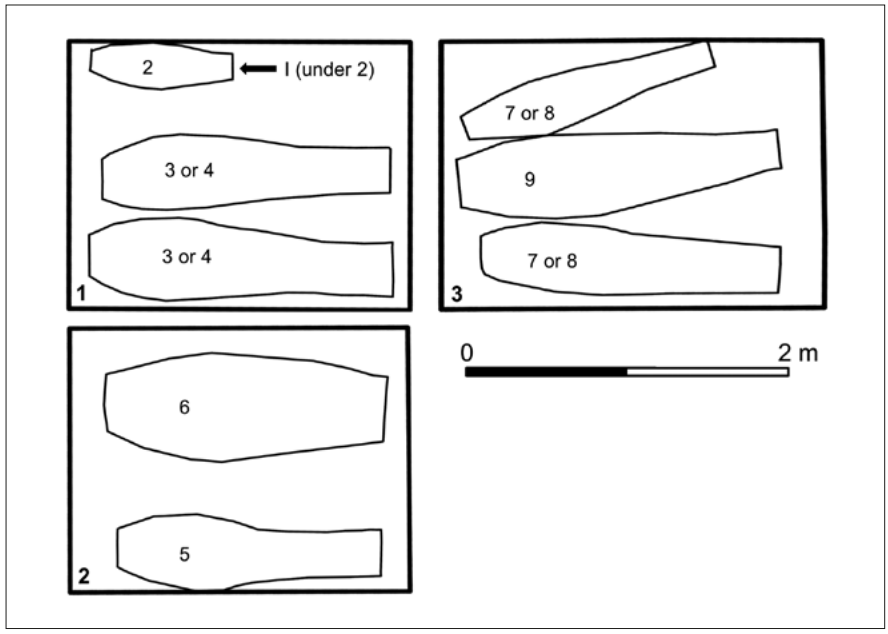

Fig. 1. Plans of the three levels in the Ainsworth vault, St. Martins-in-the-Bull Ring, Birmingham. The lowest is level **1**, followed by level **2** with level **3** the highest (Mytum and Philpott, simplified from Brickley, Buteux 2006).

This indicates that the transverse timbers for the upper two layers of coffins were built into the structure from the start. These vaults were not opened from the top, as was the case with the shafts, but from a side or end, so coffins could be slid into any layer within the vault.

An interior vault was investigated at Boone's Chapel, Lewisham (Langthorne 2006). Measuring c. 1.6 by 2.4 m and 1.5 m high, this brick-lined barrel-vaulted structure was constructed in the Boone chapel for the family of that name in 1686. The interior was only viewed through a gap in the wall and two coffins for adults could be identified. One was collapsed but a breastplate for Christopher Boone could be seen. The other more complete example retained a coffin stud design pattern of two parallel rows which would have held a fabric covering in place. This is likely to be Christopher's wife Mary who died in 1722. No other interments would appear to have been added as these would have been on top of the two original occupants.

Some vaults of this scale were used over longer periods of time. A vault at Cuddington, Buckinghamshire, measured 2.5 x 2.6 x 2.2 m and contained five coffins when observed during the installation of a new floor on the north aisle; two could be dated and belonged to the Clarke family, with Dorothy dying in 1752 aged 22 and Rupert in 1811 aged 76 years (Lewis 2009), 59 years apart; the pattern of vault use at the two sites with the largest samples – St. Luke's and St. Martins – is discussed below as an aspect of vault biography.

Vaults could be reused during building alterations. Vault 106 in the chapel of St. John's College, Oxford had its roof removed when heating ducts were installed in the Victorian period, and this was replaced with a covering slab (Dean, Hiller 2008: 4). As the vault interior contained a large amount of disarticulated human remains, it is likely that this was formed of human remains recovered during the construction of the duct and placed in this convenient space before it was re-sealed. As the vault was not excavated, it is not known whether the original occupants lie undisturbed beneath the charnel. Many sites have produced evidence of internal family vaults being subsequently used as a convenient location for charnel.

In Ireland, small family vaults were often constructed of stone, though others were in brick. Many have barrel vault roofs close to the surface, but others are partly above-ground structures. In these latter cases the entrances could be closed off with iron doors or grilles or infilled with brick or stone, sometimes then plastered over. Examples from Donaghmoyne, County Monaghan, demonstrate the structure, and a missing stone in the end wall allowed observation of the interior with its extremely disturbed contents, suggesting animal and possibly human entry in the past (Fig. 2). Many other forms of vault, often in regional styles such as those found in County Kerry (Mytum 2012: 9), can only be observed externally and so are not further discussed here.

Fig. 2. External partially subterranean burial vaults, Donaghmoyne, County Monaghan. Top: Outside view of family vault. Bottom: Interior view of family vault (photographs by H. Mytum).

Large family vaults

Aristocratic families often constructed vaults within churches during the 17th century, sometimes beneath the floors of chapels that had been built as chantry chapels for their ancestors before the Reformation. Although prayers for the soul of the deceased were no longer such a priority, the coherence of family remained, so the burial vaults in use continued much as before. The funeral customs changed (Litten 1991) but the process of interment was not affected by religion. The large vaults had access from either within the church or from the exterior, sometimes well-hidden but in other cases marked by a door or inscribed slabs. Most vaults of this size incorporated ventilation grilles or shafts within their original designs (Litten 1999).

The Roper vault beneath what had been the family's chantry chapel was constructed as an addition to St. Dunstan's parish church, Canterbury, to the south of the chancel (Tatton-Brown 1980). It was constructed in the early 16th century, just decades before the Reformation and the end of such chapels, and it was designed with a niche to contain a lead box containing the head of Sir Thomas More, made a saint within the Roman Catholic church. The burial vault was able to house four interments on the floor of the vault, reached by a set of steps entered from within the chapel, and continued in family use for several centuries (Fig. 3). An awareness that it would fill relatively quickly was acknowledged with the provision at the southern end of a shaft into which human remains and coffin fragments could be placed, and indeed had been used for eight individuals.

Rycote Chapel, Thame, was constructed as a chantry chapel in 1449, though the vault beneath only began to be used for interments from the mid-17th century by the then owners of the nearby Rycote House. The vault became filled with 26 coffins, almost all of the Bertie family, which survive neatly laid out, though not all in parallel East-West orientation (Boston 2007). The pattern of filling of the vault is informative, and this discussed later as an example of a larger family vault biography (Fig. 6).

The Shirley vault, Ettington, Warwickshire, was 5.0 x 3.8 x 2.2 m in size and contained four shelves, two at 0.6 m from the floor and the others at 1.2 m on each long side. These, and the floor spaces beneath shelves, would have held six coffins, but in fact none had been used and the vault was empty (Collins, McNicol 2008). The use of shelves is a common choice for larger family vaults, normally placed so that their long sides were visible. An alternative, with some larger vaults, is that the coffins were inserted end-on into loculi, which is a way of arranging coffins seen in some community crypts (Litten 1999). The Castle Howard mausoleum was designed with loculi, and here the chambers containing a coffin were sealed with a stone tablet inscribed with the names and dates of the deceased, though many are still unfilled. In most family vaults, they are not sealed off. Some vaults were upgraded over time; this was the case with the Sackville vault, Withyham, Sussex,

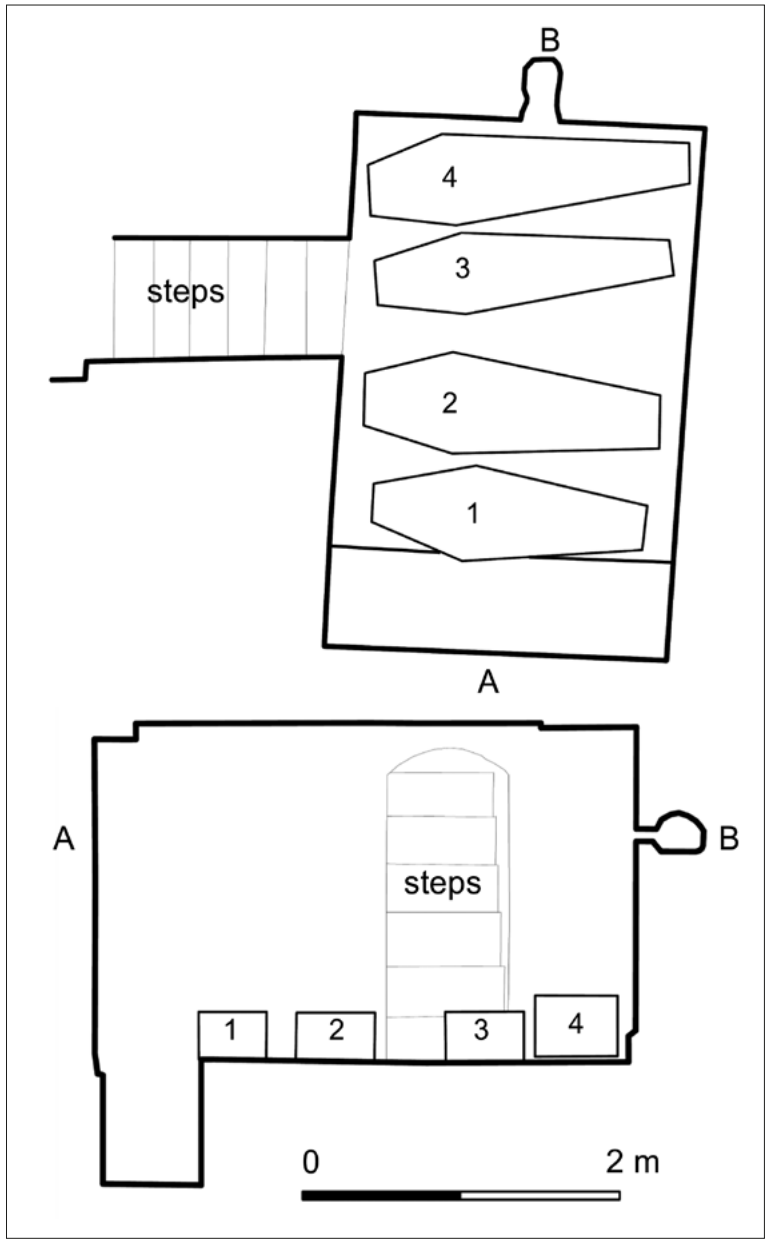

Fig. 3. Roper Chapel vault, St. Dunstan's parish church, Canterbury. Plan and elevation of the vault with a niche, four coffins on the floor, and a sunken location for charnel and coffin fragments (Mytum and Philpott, simplified from Tatton-Brown 1980).

built in 1677 with coffins to be placed on the floor, but refurbished with shelves and the coffins rearranged in 1825 (Litten 1999: 110–111). There was sufficient room with this new arrangement for a mortuary table in the centre of the vault for the latest interment to rest.

Community crypts

Many parish churches in urban centres were either built with underground spaces for the interment of human remains from their initial design, or had crypts originally used for other purposes converted to this use. These provide large samples of mortuary data as they were often popular with the middle classes able to avoid the overcrowded churchyards with their risks of bodysnatching, inter-cutting graves, and an unseemly final stage in the interment of family remains. Whilst community crypts could have space compartmentalised by additional walls and railings to create family vaults, as at Bloomsbury, most contained spaces which contained members of many different families. Most crypts had stone or brick floors, though St. Luke's had an earth floor allowing earth-dug graves. Some crypts had wooden or iron racks fixed to the walls which allowed the coffins to be stacked in separate shelves, preventing crushing, though many others did not. In these cases, coffins were stacked, with sometimes larger ones at the bottom and smaller (including those of children) at the top. Small spaces and alcoves were also used, often filled with small coffins.

At Bloomsbury, the crypt consisted of a number of distinct areas (vaults 1–7) of varying size set to the north and south of a central aisle, accessed by a flight of stairs. Only vault 1 had the racking remaining in one part of the vault, and other vaults had evidence on the walls for racking that had been removed. In vault 1, most of the coffins were not on the racking, and were just stacked, and that was the case in the other vaults. Some may have been moved when the crypt was closed in 1856, when the central aisle was cleared of any coffins and the vaults bricked closed (Boston et al. 2009: 36); it is possible that some of the racking was recovered at this time, so some of the stacking of coffins even in the vault where they were originally placed could have been re-ordered. Nevertheless, the stacks reveal an unexpectedly high degree of coffin movement, and this is discussed below as an example of a coffin biography.

Biographies of coffins

By untangling the biography of things, the importance of different features of the artefact can be identified as significant at certain times, and not at others. This approach identifies the ways in which value and meaning of an artefact changes

over time, space and social context (Gosden, Marshall 1999), and it can be applied to both artefacts such as the coffin and structures, such as a vault. Being more mobile that a vault or crypt, the coffin's biography is more complex in that it was visible in a variety of different of physical and social contexts, unlike the fixed and subterranean burial spaces. All the biographies, however, reveal new insights into the significance of such material items to those who commissioned and used them.

The coffin in the 18th or 19th century was made to order for a particular deceased individual, though the production process and choice of coffin fittings (also called furniture) rapidly developed in Britain into a commercial arrangement that combined the use of mass-produced elements that were assembled into a bespoke combination for each client (Church, Smith 1966; Mytum 2004; 2018b). Earlier coffins, and some in the 18th century in rural areas were still produced by local part-time undertakers for which the funeral business was only part of their income. For wooden coffins they were otherwise carpenters, for lead coffins they were plumbers, used to working with the appropriate materials. Numerically, however, by the mid-18th-century most burials would have been arranged through a professional undertaker, modelled in some respects on aristocratic funerals, though Litten (1991) emphasises this to the exclusion of the agency of first the middle and later the working classes in affecting the details of the coffin and indeed the whole of the funerary process. Burial societies enabled working classes to have a socially acceptable funeral (Moerman, van der Laan 2020), though these were within expenditure levels that meant that the interments were in earth-cut graves and so beyond the remit of this paper. Coffin quality and finish was dependent on the funds available for the funeral; from the later 18th century the middle classes had coffins covered with fabric. In the later 19th century the quality of wood and its working became significant again as fabric coverings went out of fashion, but by this time most coffins were made in factories and sent to undertakers who ordered the appropriate size, style and finish, the coffins then distributed by train (Mytum 2015).

The creation of a distinctive popular form of mortuary practice in terms of the coffin and its interment still requires considerable attention to more fully appreciate the forces operating on the products, through archival research and those surviving unused samples and production sites such as the Newman Brothers Coffin Works, Birmingham (Buteux 2017). The conservatism in styles, with limited and slow change compared with contemporary mortuary monuments, suggests that the coffin producers – the undertakers – had a more dominant role than in many other forms of contemporary consumer behaviour and consumption. The bereaved consumers were often not in an emotional state which enabled them to make decisions about the coffin; they generally left this to the professionals who gauged their social position and ability to pay to decide on the appropriate level of ostentation (Mytum 2015; 2018b).

A typical wooden coffin starts life in the undertaker's workshop where it is constructed of materials already in stock. Whilst burials of the destitute from the workhouse may have had coffins constructed from scraps of wood, possibly reused, most coffins had new sawn timber. A range of species were used, and the coffin was fixed together using iron nails. For much of the 18th- and into the 19th-century, there may have been several coffins nested one inside the other (in some cases including a lead coffin layer to seal in any liquids and odours that may emanate from the corpse). Many coffins were also covered with fabric, usually wool, which came in a range of colours. The fabric was then held in place with decorative patterns of copper-alloy upholstery pins, and could also have additional tinned iron plates, many with elaborate stamped designs, on the top of the coffin and additional small plates, escutcheons, on the sides. There were also handles, usually held in plate by decorated plates, on the sides of the coffin, though these were decorative and not functional. The depositum plate, with name and other details, was normally on the top of the coffin. The variability of designs in the metalwork, and their arrangement, was first noted at Spitalfields (Reeves, Adams 1993) but is now even more widely appreciated (*Death across Oceans…* 2018).

Coffin components start as raw materials converted into generic planks in the case of the timber, before being purchased by the undertaker. The coffin fittings in the 17th and early 18th century were items produced primarily for the furniture trade, and had no associative funerary association or meaning, but during the 18th century a repertoire of products was produced specially for coffins, though upholstery pins continued to be standard products. These were largely manufactured in the West Midlands of England where they formed a product amongst many others by those in the 'metal-bashing' industries (Church, Smith 1966). The capitalist foundry owners merely saw this as an extension of their markets into a new area of demand, supplying undertakers with items displaying designs appropriate to their purpose whilst also producing hardware for furniture, and for the construction industry.

Fittings for coffins were individually low-value bulk products in the eyes of the producer, and part of the stock by which to furnish coffin orders with the perspective of the undertaker. The greater the number and the more elaborate the form of the fittings that could be sold with a coffin, the greater opportunity for profit for the undertaker. Most fittings were made of iron stamped out into a repoussé design which was usually tinned for a shiny silvery finish, or they were painted or lacquered to be a funeral black. Use of other materials for fittings – copper alloy or in some cases solid silver – provided additional opportunities for profit. Whilst the undertaker recognised some variation in consumer choice beyond elaboration – notably by religion with crucifixion plaques available for Roman Catholics for example – there is little evidence that the undertakers were greatly concerned about the symbolism and meaning of any designs.

There is little evidence of interest by undertakers in generating stylistic change. Demand was dictated only by the necessity of a decent funeral, and it could not be expanded by creating fashion trends. This led to a conservative tradition in designs across the sector (Mytum 2018b), in contrast to memorials which show clear fashion trends. However, that does not mean that the coffin and fittings did not have any significance beyond the functional container for a cadaver. Many coffins had name plates affixed to them which served to identify the deceased at all stages of its journey to interment; this could be a simple inscribed or painted plaque or could be an elaborate mass-produced design with a central area on which the text could be added in an appropriate style. This recognised the significance of the individual (Mytum 2018a). Variability was also achieved though the colour of fabric which could cover the coffin, and the pattern of upholstery pins which held this in place but also created designs on the sides and sometimes the lid of the coffin.

The bereaved wished, as part of a widespread cultural expectation, to have a socially respectable sequence of funerary practices following a death. An early stage of this was the presentation of the body, within its open coffin, within the family home in a room which could be visited by friends, neighbours and relations as part of a pattern of condolence (Jalland 1996). Here, the treatment of the corpse, its presentation including coffin lining and any funeral clothes (though sometimes the deceased was dressed in their own clothes) and the coffin itself would, in combination, be the centre of attention. This was the only moment in the coffin's life when the whole coffin design, and the detail of the form and decoration of the fittings, could be inspected by a socially significant audience. This period of semi-public agency lasted only a few days, and that is why the products could have a smart appearance but did not have to be manufactured for any other functional effectiveness or longevity. Funerary clothing did not have hems as the cloth did not have the opportunity to unravel, and it was not sewn together at the back as the wearer was not going to move from their prone position (Janaway 1993; 1998). For the cadaver to look (and indeed smell) its best, the body could be set on sawdust, and sprigs of plants could also be added to the coffin contents; jewellery and false teeth could remain with the body (Cherryson 2018).

The period of mourning with the deceased present in the house was important for the spread of normative practice within any social group. Those arranging a funeral would have already attended many such events and have called upon numerous bereaved families and inspected their coffins, noting their choice of fabric colour, arrangement of upholstery pins and the nature of the remaining fittings. This would have been particularly the case when visiting families where there was less emotional attachment, so that the observations of the material accoutrements could be absorbed without being swamped by the emotion of the occasion. As coffins only remained in this visible sphere before a short public journey (when

more people could see the coffin, but only fleetingly) to the place of the funeral service, and then being interred, all the efforts in agreeing and producing the design were only appreciated at this point. These few days were when the coffin's agency was at its height.

The public display of the coffin whilst transported to the funeral service would vary – either carried on shoulders of the bearers, on an open hearse moved by a person or a horse or within a closed, glass-sided hearse with a pair or more of horses. Only on the open hearse might the top of the coffin be visible on this journey, and then briefly. During the service in church or chapel, and at interment, opportunities for detailed observation were no better. The coffin (and what it contained) may have been the focus of attention, but the life and character of the deceased were the aspects most of the congregation were absorbing and reflecting upon. The coffin was at this stage publicly visible and provided generalised messages regarding the quality and extent of elaboration that would have fed into the assessment of the seemliness (or otherwise) of the occasion by the congregation. Too ostentatious a display, or an apparent frugality, would be identified against the observers' expectations from their previous funeral and family visit experiences. The agency of the coffin in the creation of new or the reinforcement of existing social positions for the deceased was high; the ensemble indeed reflected at least as heavily on the bereaved who had made the choices (or at least acquiesced to undertaker's suggestions) regarding the coffin and its fittings. These social perceptions would be highly contextualised; the same coffin could be viewed differently by diverse audiences with their own expectations. It is notable that coffins for Quakers, who were not allowed elaborate memorials over their graves, could be as ostentatious as for other denominations (Stock 1993).

The disposal of the coffin and the body it contained would then be in an earth-dug grave or into one of the spaces described above, the shaft giving a similar experience at interment as that of an earth grave where the mourners leave for the coffin to be covered by earth by the gravediggers. The others provided a different perspective, with the coffin being taken either down steps into a family of communal vault, or it was pushed into a smaller aperture that provided access for the coffins. Once out of sight, only those moving the coffin knew what happened to the container and its contents. In Britain, smaller family vaults or community crypts were not accessible to relatives. Those external subterranean structures with above-ground markers could still act as the foci for visiting and remembrance, but this did not entail any direct access to the coffin. Whilst St. Michan's church, Dublin, has had crypt tours for over 80 years where the coffins (and indeed some mummified human remains) are visible (Hobson 1935), this is nevertheless a more recent tourist dimension to visiting, rather than a tradition from the time the interments were made.

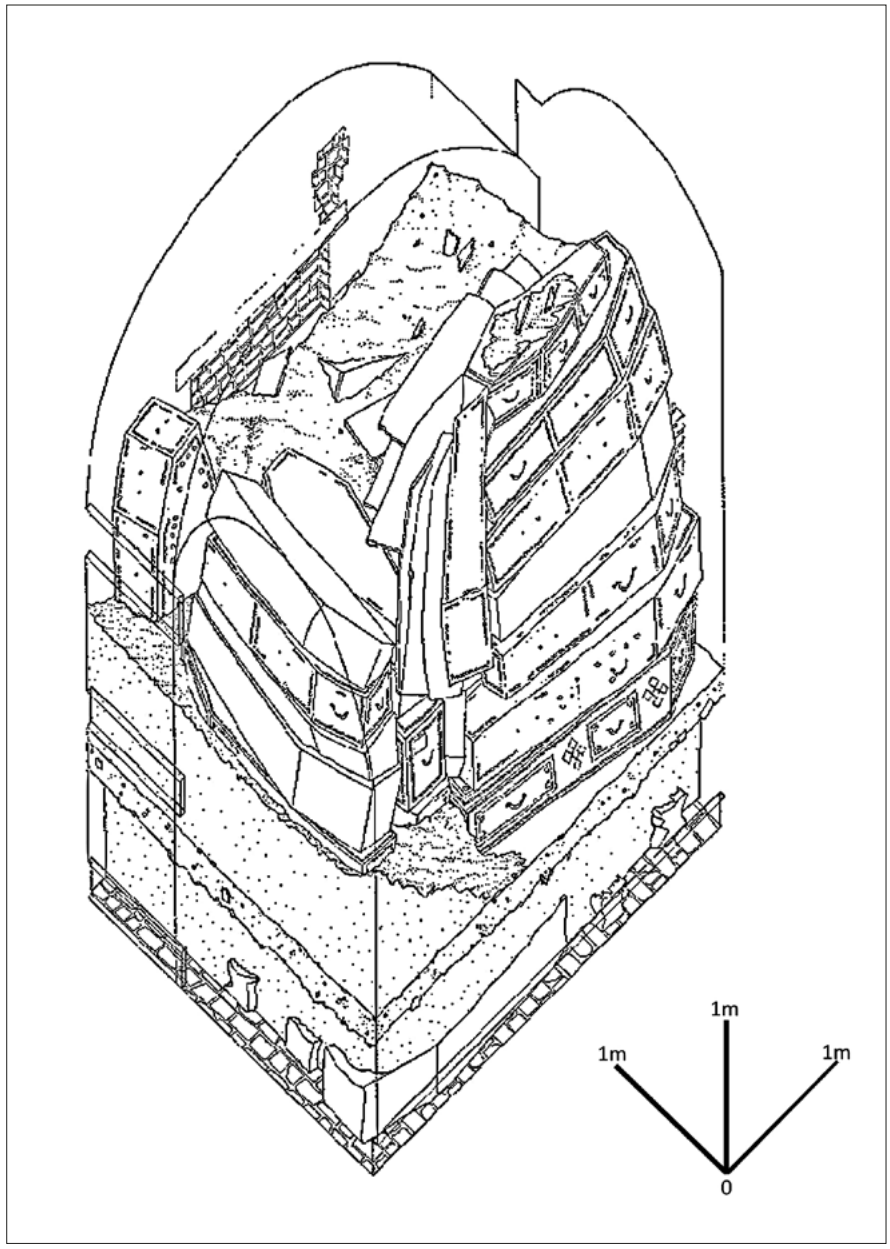

Fig. 4. Isometric drawing of the northern parochial vault within the communal crypt at Christ Church, Spitalfields, London, showing the stacking and placement of coffins vertically (Reeve, Adams 1993; research funded by English Heritage and derived from the Archaeology Data Service).

In smaller vaults and shafts, the biography of coffins follows a simple one of decay and collapse, possibly leading to complete rotting of textiles and wood, and severe corrosion of the fittings. This is common where conditions are damp. In some cases, drier conditions allow the coffin to remain intact, with its cloth covering and the fittings having only a small amount of tarnishing. The state of preservation within the container varies greatly and does not seem to have any direct relationship to that which is visible; the taphonomy of human remains, textiles and other materials within the coffin is still a subject of active research (Lipkin et al. 2020).

Many coffins do not rest in peace, however, being moved about within the space within which they were placed, especially in community vaults. More recent coffins were stacked on older ones can lead to the lower ones being crushed, so they were often moved to one side to create a space for the new insertion into the vault. The extent of this phenomenon was first revealed at Spitalfields where every available space was used, with coffins stacked up to the roof of many of the parts of the crypt (Fig. 4).

The numerous interments at Bloomsbury were arranged in rows and stacks, carefully recorded by Boston et al. (2009) who point out the extensive evidence for movement of coffins. Some coffins were arranged in racking, but others were just piled one on another (as was the case at Spitalfields). Two of the non-rack rows of stacks in vault 1 illustrate the chronological mixing (Fig. 5). The central stack of row 1 shows the expected pattern of deposition with the oldest coffin at the bottom and the latest at the top, with the rest in sequence in between. However, the other four stacks in Row A and all those in row D reveal more mixed sequences, demonstrating the amount of movement. This could include the placing of family members together (four of the Burley and two of the Groom families – shown shaded) but that does not fully explain the order. In row D, only two adjacent stacks contained members of the Hay family set next to each other, and the rest of the arrangement appears random. Not all the re-ordering can be explained by any movement of coffins when the vaults were closed; this must have been a frequent shuffling to keep maximising the space use within these constrained locations.

Sometimes, the burial space is reorganised, and at Spitalfields this led to the splitting up of family groupings, packing as many coffins as possible into chambers, and in standing coffins on end to create space for more (Reeve, Adams 1993). The overcrowding in this parish crypt was more dramatic than in a family vault, but it indicates how in all cases those entering these spaces were considering the immediate problem to be solved – introducing an additional coffin – over respect and appreciation of those coffins already present. As none of the actions were visible to the family or wider community, this hidden, secret pattern of behaviours reveals that the coffins now had no social or symbolic significance. There was a widespread

attitude from those with the responsibility of continuing interment traditions in such spaces that the desire to see the coffin of the newly-deceased enter this space was the overriding concern. Its hidden consequences were of no account.

The coffin's visible, socially significant, biography was a matter of days – first at the home of the deceased where a limited number but to the bereaved most socially significant observers could examine the choices in detail, followed by only hours of more public viewing before descending from sight for ever. For earth-dug graves the coffin was then permanently beyond view, and although coffins in crypts and vaults may remain visible within those spaces, the audience was thereafter tiny. It was possible that families could visit vaults within crypts beneath churches (or Vault 10 in St. Martin's-in-the-Bull Ring churchyard) but there were no decayed flowers or wreaths found to suggest this occurred. Instead,

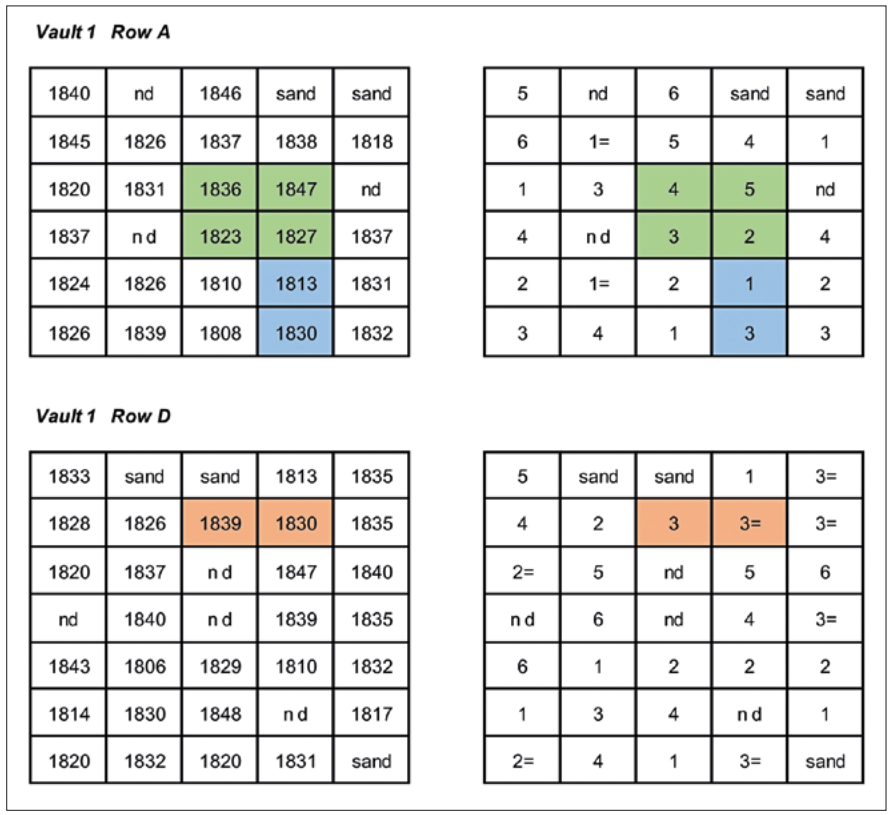

Fig. 5. Diagrammatic representation of Rows A and D in Vault 1 at St George's Church, Bloomsbury. Some family groupings are shaded: Row A four Burley members (green), two Groom members (blue); Row D two Hay members (brown) (Mytum and Philpott, created from data in Boyle et al. 2005).

only those concerned with the addition of further coffins would enter these spaces, not obtaining meaning from those already there but concentrating on placing the addition within the space. The pattern of public crypt visiting seen in some European countries such as Finland and Italy (Väre et al. 2020; Stone 2006) was never a feature of British burial ground visiting. Indeed, public catacombs as at some of the larger cemeteries such as Brompton Road and Highgate in London and St. James', Liverpool, remain largely unfilled to this day even though they may form architecturally significant features in the cemetery landscape (Curl 1980). Even family mausolea, such as that at Castle Howard, North Yorkshire, contain many empty loculi, as members of the family have not always wished to be interred at that location (Mytum 2007).

If left undisturbed, coffins with their fittings and coverings could remain remarkably intact and well preserved, but a damp atmosphere often led to outer layers (shells) of multicomponent coffins and their coverings often decayed away, revealing an inner lead component which then often corroded to a whitish colour. All-wood coffins could completely disintegrate, leaving the human remains surrounded by a scatter of metal fittings. Disturbance by animals may sometimes occur, though most vaults were well-constructed with mortared bricks which impeded rodent access. More problematic could be intermittent rising levels of groundwater, which could lead to coffins moving around in the water and settling in new locations as the water levels fell.

Crypts and vault biographies

Crypt and vault biographies are intimately linked to those of the coffins, with the number and relative frequency of interments affecting how they could be accommodated. The small vaults have limited biographies as they often only contain one or two interments, the latter usually husband and wife. The vaults at St. Martins with several levels demonstrate more complex filling as shown with the Ashworth vault discussed above (Fig. 1), a pattern also seen with the Jenkins vault though most, such as the Warden and Haines vaults, were filled in chronological order, starting at the lowest level (Brickley, Buteux 2006: 39–70).

The vaults within crypts also largely had short and limited use (Tab. 1), or sometimes even no use at all (e.g. St. Luke's vault 104). The average use life where this can be estimated at St. Luke's was 15 years, but this varied from just one occasion (5 cases) to up to 77 years (vault 126). At St. Martins the average was greater at 42 years, with a maximum of 73 years. Those vaults with longer activity sometimes with a late phase of extreme overcrowding; the fullest vault at St. Luke's contained 11 interments, but this was a much larger vault than the others at this church; the most at St. Martins was 13.

Tab. 1. Chronology of burial vault forms (after Litten 1985: 10, with additions based on recent discoveries).

LATE 16th CENTURY	Vertical walls on all sides and gently curving roof
EARLY 17th CENTURY	Vertical walls on all sides and flat roof
MID TO LATE 17th CENTURY	Vertical walls on all sides and slightly barrelled roof
18th CENTURY	Vertical E and W walls and barrel vault springing from low on the N and S walls
19th CENTURY	Vertical walls on all sides and flat roof (many examples of 18th century design continue to be built)

The numbers of interments and the time over which they took place creates an activity rate for each vault – an average of an interment every five years at St. Martins, this is more difficult to calculate for St. Luke's as many vaults only had few dated interments, but the average seems to be only slightly greater. With low density use, coffins could be arranged on the floor, raised on beams, or placed on specially constructed shelves or loculi. As intensity of interment increased, older coffins were moved out of the way, sometimes disintegrating in the process, or new coffins were stacked on top of the existing occupants, causing the collapse of those below. Access was via steps leading to a door normally bricked up or sealed with a stone slab, or via a removable slab in the roof (in at least two cases, the slabs were re-used gravestones); in both arrangements, the intermittent disturbance could be fully repaired, and vaults only seem to have received alteration if accidentally discovered during later construction works when the location of the vault had been forgotten. In these cases, the vaults could be left as voids but re-sealed, used for charnel created by the building work, or filled with sand to help stabilise the building.

Elite family vaults could have longer biographies, and Rycote Chapel vault (Boston 2007) is an excellent example of this pattern (Fig. 6). The earliest interments were two infants (1, 2), in the north-eastern corner; they are probably undisturbed (though are both unusually with their heads to the east) as the next interment (3), the 1st Earl of Abingdon, was then placed in the south-eastern corner. The first 18th-century interment (4) is the brother of one of the infants (2) and was placed next to him. The remaining early 18th-century interments are grouped in the south-eastern corner, the 2nd Earl's wife (6), followed by her husband (7), with the 3rd Earl (8) and then his wife (7) next to be interred. In the later 18th century, an unmarried daughter of the 3rd Earl (9) and the 3rd Earl (10) himself were added,

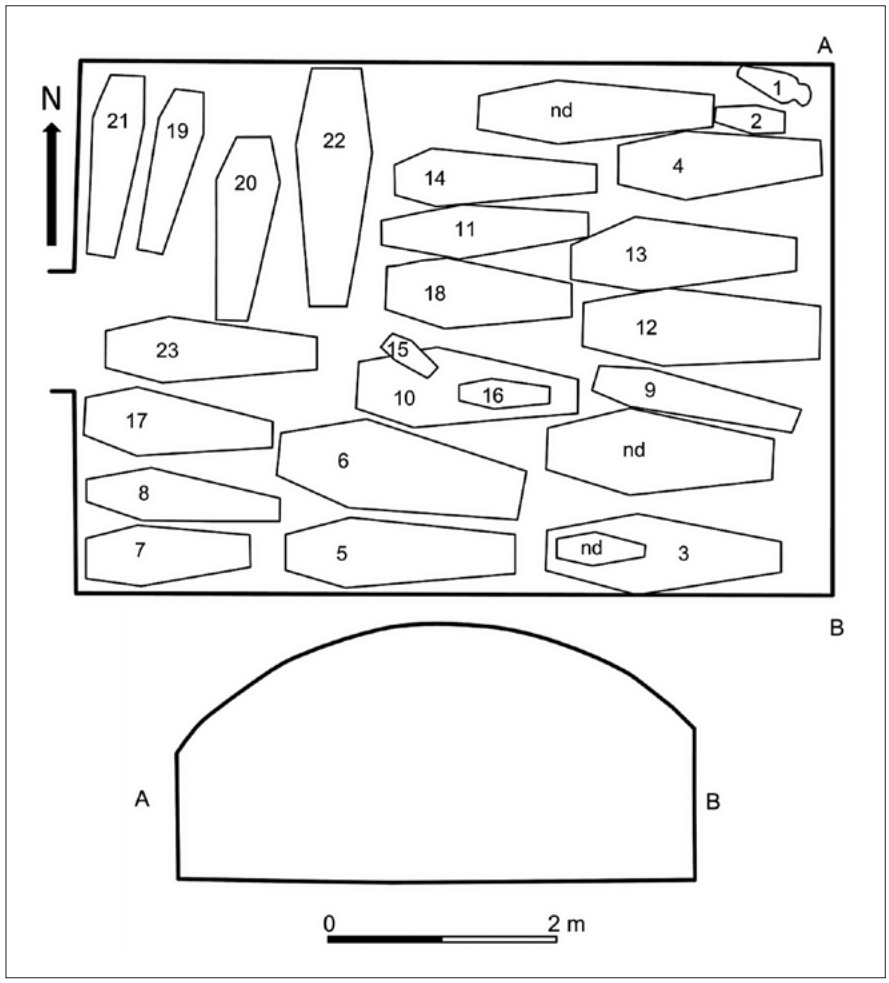

Fig. 6. Plan of family vault containing members of the Bertie family, Rycote Chapel, Thame, numbered in order of interment (Mytum and Philpott, created from data in Boston 2007).

followed by his wife (11), the 4th Earl's wife (12) and the Earl (13) and his unmarried daughter (14). Two infants (15, 16) were then placed on top of the 3rd Earl's coffin (9) and, as the remaining space became more restricted, the next coffin (17) was placed just south of the entrance and the one remaining space in central part of the floor was used (18). Attention then turned to the north-western area, with four coffins (19–22) placed in a north-south orientation, including the 5th Earl and his wife (20, 22). The final burial was laid just at the foot of the steps, completely filling the vault; this was the 6th Earl, completing almost 250 years of the crypt biography.

Parish crypts have their own biographies which, given the number of burials and the greater number of individuals involved in their management over a longer period of time, have more complex histories. Though most happened out of sight of the bereaved and the Sunday congregations, and it is likely many of the details were also unknown even to the vicar and churchwardens. The private vaults within the St. Luke's crypt were not part of the original design, but they were constructed in a variety of different styles and butt-jointed to the crypt walls (Boyle et al. 2005). Their gradual arrival (in Bay 2 from 1814 to 1846 and Bay 3 from 1800 to 1845) altered the internal geography of the crypt and limited the space for earth-dug graves. It shows a privatisation of the burial space in the same way as monuments and plots with railings were used in the graveyard.

Conclusions

The evidence for subsurface structures in Britain, and particularly England, has increased greatly since Julian Litten's seminal classification in 1985. Moreover, the geographical spread of investigated structures has also reinforced the widespread provision of built subterranean burial spaces and that, whilst there are regional and local variations, there is a clear set of sizes of such spaces, and a limited range of management principles applied to them. Whilst individual biographies vary as such structures were adapted and filled, many valid generalisations about typical use lives can now be made for the first time, and the ways in which the coffin passed on its journey during body disposal and mourning to reside and in many cases decay within its built structure can be set out and its varied agency considered.

As the shafts, vaults and crypts were the popular choice of burial location for the more affluent portions of the middle classes and of the aristocracy, they provide an important material representation of those groups' concerns over the bodies of the deceased. Despite their invisible character, they were considerable investments that do not relate to overt display (though monuments above them may do so). Rather, they indicate concerns over the body, and the type of company with which the bereaved wished their relatives to await the Second Coming. A fuller exploration of the meanings of such spaces is still required, but this can only be achieved once the degree of variation in such data, and how it relates to familial relations across generations, is assessed. This study reveals the recent increase in data and understanding of mortuary practices since Litten's pioneering 20th-century works. The mitigation in advance of church and churchyard alterations – large and small – are all accumulating valuable data for analysis beyond that of individual, site-specific case studies, and revealing larger scale patterns in Britain and Ireland.

Note: For consistency, all measurements within this study have been presented to the nearest 0.1 m. The 'grey literature' reports have used a variety of terms for vaults and crypts, but here the various burial chambers have been described using the terminology set out at the start of the chapter. Many of the line illustrations were drawn by R. Philpott and annotated by the author.

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Summary

Burial Crypts and Vaults in Britain and Ireland: a Biographical Approach

The range of post-medieval burial structures found in Britain and Ireland defined by Julian Litten in 1985 are reviewed in the light of more recent discoveries. The degree of variability within each of these – lined burial shafts, small family vaults, large family vaults, and communal crypts – can now be evaluated. Using the biography of objects approach for the first time on mortuary data, the changing agency of coffins over their use-lives is considered, with varying degree of visibility during the stages between construction and final deposition. The biography of vaults is indicated through a selection of burial structures, revealing patterns of use over time. Issues of space management, in some cases with considerable overcrowding and movement of coffins, is seen to be problem only with communal crypts. Shafts and vaults were predominantly for few generations, apart from some elite family where the same space could be used over several centuries.

Keywords: biography, Britain, burial shaft, coffins, crypt, vault

Streszczenie

Krypty grobowe i podziemia w Wielkiej Brytanii i Irlandii: podejście biograficzne

Szereg pośredniowiecznych struktur pogrzebowych z terenu Wielkiej Brytanii i Irlandii zdefiniowanych przez Juliana Littena w 1985 r. zostaje poddanych rewizji w świetle późniejszych odkryć. Obecnie można określić stopień różnorodności w ramach każdej z grup: grobów szybowych, niewielkich krypt rodzinnych, dużych krypt rodzinnych oraz krypt wspólnych. Wykorzystując po raz pierwszy podejście oparte na biografii przedmiotów w odniesieniu do danych grobowych, rozważana jest zmieniająca się funkcja trumien przez cały ich okres użytkowy, wraz ze zmieniającym się stopniem widoczności między okresami od powstania do ostatecznego zdeponowania w ziemi. Biografia krypt analizowana jest w oparciu o wybrane struktury grobowe, co pozwala odkryć wzorce użytkowania w czasie. Kwestie gospodarowania przestrzenią, co w niektórych przypadkach obejmuje znaczne przeludnienie i konieczność przenoszenia trumien, zdają się być problemem dotykającym wyłącznie krypty wspólne. Szyby i krypty zasadniczo przeznaczone były dla kilku pokoleń, z wyjątkiem kilku elitarnych rodzin, w przypadku których ta sama przestrzeń mogła być wykorzystywana przez kilka wieków.

Słowa kluczowe: biografia, Wielka Brytania, groby szybowe, trumny, krypta, podziemia

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Modern Wooden Coffins – A Biography of Things

Introduction

The term 'biography of things' denotes a theoretical approach combining a physical description (e.g. size, shape, colour) with a description of the meaning of things (places), mostly focusing on the multitude, changeability, and diversity of meanings of objects studied in time. The concept consisting in the study of a social life of things leading to the creation of their biography was introduced by Arjun Appadurai (*The Social Life of Things...* 1986) and Igor Kopytoff (2003: 249–274), and it has been cultivated or developed by other researchers (Gosden, Marshall 1999: 169–178; Domańska 2008: 13–21; Kobiałka 2008a: 201–215; 2008b: 227–239; Joy 2009: 540–556; Kędzierzawski 2014: 207–230; Kobiałka 2015: 48–49). An inspiration for the use of elements of the biographical approach with regard to wooden coffins, along with the previously adopted material approach, was the growing number of archaeological investigations conducted in churches and cemeteries, during which attempts were made to identify the excavated human remains based on broadly defined grave goods. A biography usually concerns uniform sets or isolated artefacts (Joy 2009: 540–544). This paper discusses the issue from the perspective of biographical events common to many objects (coffins). The aim was to identify past and present functions by determining the life cycle of a coffin: from its manufacturing (determination of its manufacturer and recipient; manufacturing techniques; the shape; the size; ornamentation) through 'participation' in a funeral ceremony, including transportation of the dead to the church, viewing, inhumation, and the period of 'concealment', to its revival (e.g. as a museum exhibit).

The manufacturing of a coffin

In cities, joiners, chest makers, carpenters, and woodcarvers usually competed for the right to make wooden coffins, which led to conflicts between guilds. In modern Bremen, coffins, with planks joined with joiner's techniques, were usually made by joiners, whereas coffins made by carpenters were nailed together (Kizik 1998: 96; 2001: 204). In the country, coffin makers were usually neighbours, not necessarily qualified craftsmen, typically 'strangers', meaning non-relatives (Biegeleisen 1930: 177). In most cases, it is impossible to determine the producer of a specific coffin, however, identification of the wood processing methods employed allows to assess the maker's skills.

Certain actions, involving various customs and beliefs connected with the preparation of a coffin, are indicated by ethnographic sources concerning rural areas. In the south-eastern territory of Poland, it was believed that

> there should be no knots in the coffin lid over the head of the dead or at least they should not fall out as through the knot hole the dead would see the world and might take one of the relatives with him (Biegeleisen 1930: 179).

Furthermore, it was not right to bargain over the price of the coffin so that it did not burden the soul of the dead. This was also why no measurements were taken (Fischer 1921: 157–159).

Due to this mostly individual production, confirmed by archaeological research, no two identical objects are found among late medieval and modern coffins (Wąsik 2006: 143–144; Králíková 2007; Trawicka 2011: 4–5; Majorek, Grupa 2013: 69–82; Drążkowska 2014: 297–315; Grupa et al. 2014: 27–38; Majorek, Grupa 2014: 91–106; Ströbl 2014; Dudziński et al. 2015: 84, 86–87, 89, 91, 93, 95; Ginter 2015: 165–195; Grupa et al. 2015a: 28–46; Grupa et al. 2015b: 35–38; Kjellberg 2015: 163–171; Niedźwiadek et al. 2015: 19–70; *Der vergessene Friedhof...* 2015; Janowski 2016: 293–356; Majorek 2016: 51–64; Niedźwiadek 2016: 333–368; Vasilieva 2016: 296–308; Alterauge et al. 2017; Dudziński et al. 2017: 110–116; Majorek 2019). Their individualisation mostly had the form of changing their shape, covering them with coloured paints, upholstering, using selected woodcarving techniques, and placing inscriptions, signs and/or portraits on external panels. The manufacturing process and the skills of the maker can be determined through technological and typological analysis of coffins. Recognising wood species of special characteristics (e.g. not found locally) can indicate the place of origin of the material, while dendrochronological analysis may specify the dating. During the initial stage of research into coffins, it seems key to determine the shape of the coffin in cross-section and in plan view, based on the typology according to A. Ströbl (2014), J. Kjellberg (2015: 169). These analyses were used by the Author to create a typological key for the artefacts described, which was an

Fig. 1. Coffins with different types of ornamentation (the Church of the Most Holy Name of the Blessed Virgin Mary in Szczuczyn): **a)** a plant-like ornament; **b)** inscriptions; **c)** woodcarving decorations; **d)** upholstery (photograph by M. Majorek).

element of her PhD thesis (Majorek 2019: 75–78). Basically, coffins evolved from simple forms, with quadrangular cross-section and flat lids, to complicated forms, with polygonal cross-section and the so-called 'inflated', convex lid. The coffin shape was also influenced by instructions left in last wills and testaments (requests for a modest burial) as well as secular and church law. Coffin individualisation is more visible in the ornamentation. A popular form of ornamentation was painting with specially selected colours. Many colours were used to cover external plates, in different combinations – black and white, blue and red or white, or yellow and brown – which we can see on coffins in, for example, the crypts of the church in Szczuczyn (Majorek 2019: 89–109), the Holy Trinity Church in Radzyń Podlaski (Author's observations), the Lublin Archcathedral (Niedźwiadek et al. 2015: 28), and the crypt of the Church of the Finding of the Holy Cross and Saint John the Apostle in Końskowola (Niedźwiadek et al. 2015: 54). The common denominator for coffins painted white, blue, and red was the fact that in most cases they were coffins of children and young people, perhaps maidens and bachelors (Grupa et al. 2014: 47). Coffins painted black were usually coffins of monks and nuns, and sometimes adult laymen (Majorek 2019: 95, 98). Important changes only took place in the middle of the nineteenth century, when black coffins became much more popular. This can be exemplified by such coffins found in the crypts of the church in Pluty and the Frombork Archcathedral (Author's observations). Brown, different shades of yellow, and natural wood colours were used on coffins of the adult dead, examples of which are burials in such coffins in the crypts of the Holy Trinity Church in Byszew and in the crypt of the Church of Saint Adalbert the Martyr in Biała Rawska (Author's observations).

What makes each of the coffins unique are figurative representations, including mostly original, handmade ornaments, and inscriptions. Coffins with woodcarving and upholstery decorations were less frequent, so potentially more distinctive (Fig. 1a, b, c, d). Coffins with upholstery decorations, though rare, were used to bury the dead in, for example, the crypts of the church in Szczuczyn (Majorek 2019: 110–129), the Lublin Archcathedral (Niedźwiadek et al. 2015: 33–34; Grupa et al. 2015b: 34), the church in Dubno in Ukraine (Niedźwiadek et al. 2015: 58–59), in Opole Lubelskie (Niedźwiadek et al. 2015: 59, 60 – Fig. 37), Gniewkowo (Majorek, Grupa 2014: 96), Frombork, Byszew, and Biała Rawska (Author's observations).

Woodcarving skills were used to create coffins that, along with the remains of the dead, can be found in, for example, the crypts of the church in Gniew (Grupa et al. 2015b: 14–15, 35–38), Gdańsk, Radzyń Podlaski (Author's observations), Przeczno (Sulkowska-Tuszyńska 2016: 137–138), and Szczuczyn (Majorek 2019: 130–140). Such objects are also found in Central and Eastern Europe – in Germany, Austria, the Czech Republic, and Ukraine (Ströbl 2014; Alterauge et al. 2017; Niedźwiadek et al. 2015: 58).

People are constant observers of life and phenomena connected with it. Thus, the very existence of a coffin conveyed a certain message. Its appearance determined the insights of the observers or 'witnesses'. It allowed to draw conclusions with regard to religiousness as well as the socioeconomic status of the dead and their families. Coffins, however, were mostly a testimony to death. Thus, it can be said that they served an **informative** function.

A coffin during a funeral ceremony and the time of 'concealment'

The body of the dead was put in a properly prepared and decorated coffin. This marked the beginning of a long journey, both literally and metaphorically. From that moment on, the coffin drew the attention of participants of the funeral and constituted a barrier between the living and the dead, thus serving a **protective** function. It was the coffin with the body of the dead that stood in the centre of *castrum doloris*. The protective function also involved the practical sphere. Funeral ceremonies lasting many days, weeks, or even months required the body to be properly prepared. Of course, it could be embalmed, which was done in the case of those from the highest class. However, one should bear in mind that even in the case of the most impoverished gentry or burghers burials were frequently delayed. A properly prepared coffin protected the body against rapid decomposition, and in the case of putrefaction, it did not allow its products to be publicly seen. Decomposition products give off highly unpleasant smell, which is why coffins

Fig. 2. A double coffin of Stanisław August Szczuka (the Church of the Most Holy Name of the Blessed Virgin Mary in Szczuczyn) (photograph by M. Majorek).

Fig. 3. A child's burial in a coffin with a large amount of herbs (the Church of the Most Holy Name of the Blessed Lady Mary in Szczuczyn) (photograph by M. Majorek).

were sealed with wood tar or even double coffins were used (Fig. 2). An example of a double coffin is an artefact from the crypts of the church in Szczuczyn, in which Stanisław Antoni Szczuka – founder of the church – was buried. He died in 1710 and was transported from Warsaw to Szczuczyn, and the funeral ceremonies ended a year after his death (Dudziński et al. 2013: 10). However, this solution was not always adopted. In most cases, herbs (Fig. 3) used as lining under the internal upholstery and the filling of the mattress and pillows were enough to slow down the decomposition process, at the same time keeping insects away and containing the unpleasant smell. Once the coffin with the body was buried in ground or placed in a crypt, the coffin box still served its protective function. It protected against the direct influence of the environment: water, air, and living organisms including people.

At this stage, coffins also served a very important **informative** function on a number of planes. Just like at the stage of creation, they informed about death, providing much data about the dead they protected. The way they were made was a very good indicator of how old an individual was at the time of their death and of their financial situation. Painted coffins were definitely cheaper than the upholstered ones, particularly those upholstered with silk. The symbolism of figurative representations was also strongly connected with the religious message. In most cases, a cross was placed on the lids of coffins in which Catholics were

buried, and less frequently there were also short monograms on the sides: Marian and IHS (Author's observations). Participants of a funeral ceremony could 'see' who had been taken away by death and in what circumstances.

'Revival'

Coffins discovered during archaeological research get 'revived'. Documentation is drawn up, specialist analyses are carried out, and based on them attempts are made to identify burials and to interpret other finds on which time had left its mark. It is more and more common to undertake activities with the aim to display artefacts again, for example, in the form of a museum exhibition in the vault of the church, just like in the Archcathedral of John the Baptist and St. John the Evangelist in Lublin, the church of St. Nicholas in Gniew, and the Archcathedral of St. John the Baptist and the Assumption of Mary in Przemyśl, or in museums, which can be exemplified by an exhibition held from the middle of April 2015 to the middle of July 2016 in the former hospital complex of the Holy Spirit in Frombork, entitled *Dębowa kamizelka – skrzynka – drewniana jesionka. Trumna – ostatnie mieszkanie zmarłego, znak odejścia oraz przejścia w zaświaty* (*An Oak Vest – a Box – a Wooden Coat. A Coffin – the Last Home of the Dead, a Symbol of Departure and Moving to the Afterlife*). History also knows of coffins that were revived more than once. Reusable coffins, with hinged flaps on the bottom, were called economy coffins, and their originator was Holy Roman Emperor Joseph II Habsburg. At a funeral, directly over the pit, handles were released, the bottom opened, and the body dropped into the grave. The obligation to use such structures was a result of the sanitary and epidemic situation in Vienna at the end of the eighteenth century (Kizik 1998: 98).

At the 'revival' stage, coffins once again serve an **informative** function. Similarly to their past role, coffin decorations can provide a basis for attempts to estimate the cost of a given artefact, the time of manufacturing, and the socioeconomic status of the dead and their families. However, on the interpretive level, one should remain careful as historical sources mention families running up debts to hold an elaborate funeral ceremony as well as requests for modest burials made by wealthy people in their last wills and testaments.

It seems that the most important data is offered by the state of preservation of the coffin. Good or very good state of preservation of the structures suggests to archaeologists and anthropologists good state of preservation of bone remains, and sometimes of mummified bodies and grave goods (**protective** function), opening up research possibilities. Poor state of preservation makes analysis and result interpretation more difficult. Favourable environmental conditions allowing to preserve coffin burials in good state were found in the crypts of the church in Szczuczyn.

Fig. 4. The painting *The Funeral of Juliet* by Władysław Czachórski, 1874, inv. no. MP5263MNW (http://cyfrowe.mnw.art.pl/).

Many of the human remains there were mummified, and nearly all grave goods preserved their original shape, colour, and ornamentation. It is a unique situation, with virtually no analogy in the territory of Poland. However, many crypts offer good conditions, and the amount of information obtained is directly proportional to the skills and experience of archaeologists conducting research.

After their revival, coffins also serve **verification purposes**, confirming or denying information from ethnographic, historical, and artistic sources. In the course of the research conducted by the Author, it turned out that these three types of sources provide different data (Majorek 2019: 43–62). Rituals connected with the preparation of a coffin, the appearance of painted coffins, and animal behaviour indicating upcoming death are all described in ethnographic literature but it mostly concerns the nineteenth and twentieth centuries. Historical sources also have their flaws. In most cases, they concern wealthy people. Instructions in last wills and testaments about the appearance of coffins could considerably distort their actual image. Representatives of the gentry frequently asked for a modest burial and a grey or black coffin, whereas coffins found in crypts are usually colourful. Despite this data that might mislead readers, it should be emphasised that without written sources it would be impossible to identify burials. Written sources used by historians include all kinds of birth records, death certificates, and baptism certificates, without which it would never be possible to identify individuals. Thus, coffins with inscriptions, sings, and portraits also serve an **identification function**. Finally, when visual arts are concerned, paintings and drawing have provided 'images' that accompanied participants of funeral ceremonies (Fig. 4). Without them, many elements, including certain objects and behaviours, would have been lost to us.

Conclusions

There are no two identical coffins and the history of each of them is unique, which makes this research subject extremely interesting, however, it does not make interpretive processes easier (e.g. determination of the maker, the time of manufacturing, identification of the dead etc.). A general look at coffins made it possible to create their biographies and to identify a number of common characteristics and functions. It turned out that at all stages of its 'life cycle', a coffin served an informative function. Initially, it informed about death, then about the identity of the dead, and then once again about the dead but in the context of research possibilities allowing to tell their story. At the same time, it protected against the eyes of the living, then against quick natural decomposition, and most probably also against plunder. The moment it was again seen by the living, it started serving a verification and identification function, valuable to researchers in the field. As it was already mentioned in the paper, this is not the end as coffins more and more often appear in museums or are displayed in church vaults. They acquire a new function as they educate the public, influence tourism, encourage reflection, and revive the memory of the dead.

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Summary

Modern Wooden Coffins – A Biography of Things

This paper discusses the issue of a biography of a coffin from the perspective of biographical events common to many modern artefacts from the Polish territory. The aim was to identify past and present functions by determining the life cycle of a coffin: from its manufacturing (determination of its manufacturer and recipient; manufacturing techniques; the shape; the size; ornamentation) through 'participation' in a funeral ceremony, including transportation of the dead to the church, viewing, inhumation, the period of 'concealment', to its revival (e.g. as a museum exhibit). It was determined that at each stage of its 'life', the coffin served informative and protective purposes. Additionally, at the stage of its revival, it serves an important verification and identification function from the perspective of researchers in the field. Moreover, preservation of individual burials in coffins and crypts promotes sacral tourism; coffins in the church space have enormous exhibition potential that can be used to build a national and local community.

Keywords: coffins, biography of things, modern era

Streszczenie

Nowożytne trumny drewniane – biografia rzeczy

W poniższym artykule omówiono zagadnienie biografii trumny przez pryzmat zdarzeń biograficznych wspólnych dla wielu nowożytnych obiektów z ziem polskich. Celem tych działań było wskazanie dawnej i obecnej funkcji trumny przez rozpoznanie ciągu jej życia – od jej powstania (ustalenie wytwórcy i odbiorcy; techniki wykonania, kształtu, wielkości, zdobień), poprzez „uczestnictwo" w ceremonii pogrzebowej, w tym eksportację zmarłego do świątyni, „wystawienie", złożenie w grobie, czas „ukrycia" – do jej powrotu do życia (np. jako eksponat muzealny). Ustalono, że na każdym etapie „życia", trumna pełniła rolę informacyjną i ochronną. Dodatkowo, na etapie powrotu do życia przyjmuje ona cenną dla badaczy tematu funkcję weryfikacyjną i identyfikującą. Ponadto konserwacja pochówków indywidualnych w trumnach oraz krypt sprzyja promowaniu turystyki obiektów sakralnych, a w przestrzeni świątyni trumny posiadają szczególny potencjał wystawienniczy, który może zostać wykorzystany w celu budowania narodowej i lokalnej wspólnoty.

Słowa kluczowe: trumny, biografia rzeczy, nowożytność

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Rich or Modest – Analysis and Reconstruction of the Appearance of a Child's Coffin from 1779 from the Church of St. Nicholas in Gniew (Pomerania Province, Poland)

Introduction

Archaeological research carried out[1] in 2013 in the Church of St. Nicholas in Gniew definitely broadened the knowledge of historians, art historians, and archaeologists of the material culture of the inhabitants of Royal Prussia. Much historical material was discovered in the church and the graveyard, including fragments of ceramic and glass dishes, textiles, archaeological wood, and metal artefacts, mostly represented by nails and devotional items (Grupa, Drążkowska 2014; Grupa et al. 2014a; Grupa 2015; 2016; Grupa et al. 2015; 2016a; 2016b; Grupa, Warecka 2018; Michalik 2018a; 2018b). The researchers managed to identify, to a large extent, outlines of grave pits and, in some cases, to excavate remains of wooden coffins. In most research projects, teams register the existence of coffins and, possibly, describe their cross-sections, but this is the end of their analysis. In Gniew, archaeologists

1 The work was carried out by a research team consisting of MA and PhD students under the supervision of Dr hab. Małgorzata Grupa, Professor of Nicolaus Copernicus University from the Institute of Archaeology of Nicolaus Copernicus University in Toruń.

took samples for dendrological analysis, which was carried out in the Laboratory of Monument Documentation and Conservation of the Nicolaus Copernicus University in Toruń (Michalik 2018a). There was ample material from earlier seasons (2009–2012). Each research season brought about new interesting findings including artificial flowers made of silk, paper, and metal wires (Grupa 2015: 48–51; Grupa et al. 2015; 2016a; 2016b; Grupa, Nowak 2017: 160–168; Majorek, Grupa 2014, 335–347; 2016: 165–172) as well as metal decorations of a bonnet and a child's grave dress made of metal plates of silver-plated copper alloy (Grupa, Łukaszewicz 2019: 140–152). It was similar in 2013, when each burial was analysed in detail on site (if possible), while other activities were performed in a laboratory. One of the most interesting findings was a child's coffin decorated with artificial flowers placed on the outside, in the corners and in the middle.

The aim of the work was to collect and describe the results of various examinations performed in relation to the child's coffin mentioned. It was unique on account of the fact that it was the first such detailed research including fabric analysis, identification of the taxon of the wood the coffin was made of, the structure and description of nails and artificial flowers. The final result of the above analyses was a drawing reconstructing the probable appearance of the coffin.

Funeral ceremonies in modern Poland

Both old and young people were buried ceremoniously in the church, in a crypt, on in the graveyard. In most cases, preparing the dead for their last road was the responsibility of the family. Customs differed, however, it was mostly about a worthy burial that would reflect the social status of the dead person and their family. In the Baroque, the wealthy dead were given lavish ceremonies that nearly turned into theatrical plays called *pompa funebris*. The whole ceremonial included a great number of actions: suitable for the occasion preparation of the house, both inside and on the outside walls, preparation of the body including make-up, preparation of grave clothes and a coffin, and then a whole series of prayers and singing during a vigil, an adequate number of mourners, and written invitations to the funeral delivered by the so-called funeral bidders. If the person died away from the planned burial place, the body was transported in a large funeral procession to the designated church. Sometimes, it would take a day, a few days, or even a month, depending on the distance and the programme of funeral services in different churches. In the church, *castrum doloris* was usually prepared, the basis of which was a catafalque decorated with fabrics, flowers and a large number of candles in candle holders[2].

2 In most cases, it can be presumed that the person made some arrangements with their family with regard to the funeral ceremony, and sometimes they would even leave

People sang and prayed both during the day and at night, then a funeral service was held (usually in the evening), a remedy cheering people's hearts, and then the person was buried in a crypt, under the church floor, or in the graveyard. All these activities considerably increased the cost of the funeral ceremony and, depending on their scale, their prices differed (Chrościcki 1974: 34–38; Kizik 1998: 18, 72, 85, 181; Grupa 2005: 28–35; Grupa et al. 2014b: 23–26).

What ultimately remained after each funeral ceremony were the remains and the coffin, buried in a grave or in a crypt, and their relics are now discovered by archaeologists. The body was usually put in a coffin in the shape of a flat or trapezium box with all kinds of decorations. It was upholstered with cloth – silk, linen, wool – sometimes even in two layers – linen and wool or linen and silk. Cheaper boxes were only painted. They were plain or with ornaments, sometimes imitating silk. There were also tapes on the coffin edge, attached to the coffin with studs along with the fabric. The studs did not only serve as structural elements but also as carriers of information, as they were used to form dates and inscriptions on the coffin lid. Apart from that, boxes were decorated with garlands or bunches of both real and artificial flowers (with the latter only found by archaeologists on coffins from the nineteenth century). The last decoration was a coffin portrait, a unique element in the Polish funeral culture (Chrościcki 1974: 54, 57; Dziubkowa 1993: 35; Grupa 2005: 32, 59–61, 87, 100–101; Majorek, Grupa 2013: 70–71, 80).

The coffin's description and location

Coffin no. 3 with artificial flowers was located in excavation no. 5/13. The excavation was made in the central nave of the church between the first pillar and the chancel, from the north (Fig. 1). The grave pit was in the shape of a trapezium, along the W-E axis. Unfortunately, it was impossible to uncover it completely as part of it was located in the northern section of the excavation, and disturbing this structure posed a risk of wall collapsing. It was similar in the case of the coffin, the whole length of which but not the whole width was uncovered (Fig. 2), which is why its exploration was very difficult. However, even this partial uncovering of the coffin revealed artificial flowers in the corners. There were also lots of metal studs on the boards. The coffin was 110 cm long and its maximum width at the head end was 42 cm, while at the feet end – 33 cm. The thickness of the coffin boards was approx. 2 cm. It is possible that the coffin used to have turned 'legs', approx. 3.5 cm in diameters, which were captured as wooden remains forming impressions in clay. On the eastern side of the lid (the narrowest part), a date made of studs could be seen – 1779 (Fig. 3).

written instructions in their last will (Grupa 2005: 30; Nowosad, Kowalkowski 2016: 334; Klint et al. 2018: 340, 482–483).

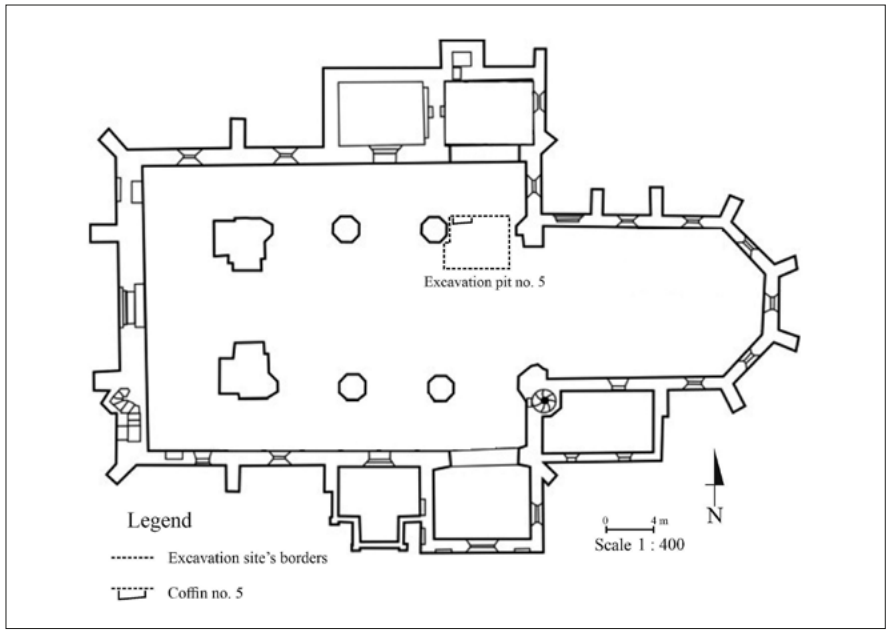

Fig. 1. The layout of the Church of St. Nicholas, with the location of the 5/13 excavation (prepared by J. Michalik, the layout as published in: Grupa et al. 2015, p. 12, Fig. 2).

Fig. 2. A photograph of the N profile, with a visible outline of coffin no. 3 (photograph by D. Grupa).

A child's skeleton was considerably mineralised. Due to contact with the ground, the bones became very brittle, and a large part of them was only seen as white impressions in the clay layer. Thus, anthropological examination was very limited. The partially preserved skull allowed to say it was a child. It was the second evidence for that, as the length of the coffin indicated a child's burial. Inside the coffin, apart from the skull bones and traces of decomposed skeleton bones, no grave goods were found. It can be assumed that they had completely decomposed. Thus, only the well-preserved flowers and studs on the coffin were analysed.

Analysis of wood from the coffin

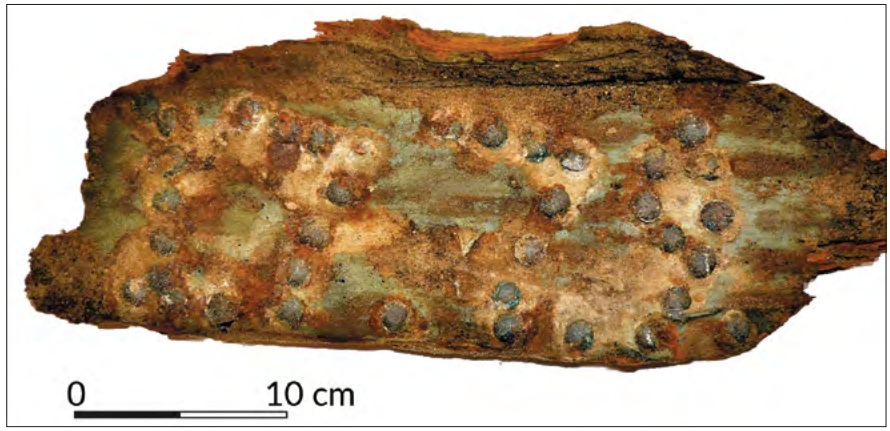

Fig. 3. The top of coffin no. 3, with the date '1779' (photograph by D. Grupa).

Archaeological wood is a material that is only preserved in specific conditions. It quickly degrades in changing environmental conditions, so it is very rarely found in the accumulations discovered by archaeologists. In the case described, wood spent approximately 200 years in relatively stable humidity and temperature, which created and stabilised anaerobic conditions. This was an appropriate environment that preserved at least some elements of the burial (Grupa 2014: 299). The structure of the wood was considerably weakened, so it was difficult to take out the side with the burial date but ultimately, the whole of it was excavated (Fig. 3) and proper samples were taken.

Due to the fact that the wood structure during its deposition in clay was partially decomposed, samples needed to be adequately prepared in order to properly determine the wood taxon. Each sample collected was first soaked in water and then cut to obtain 'slices' with preserved structures of wood tissues that were examined under the microscope. For this purpose, a Zeiss microscope with Axio

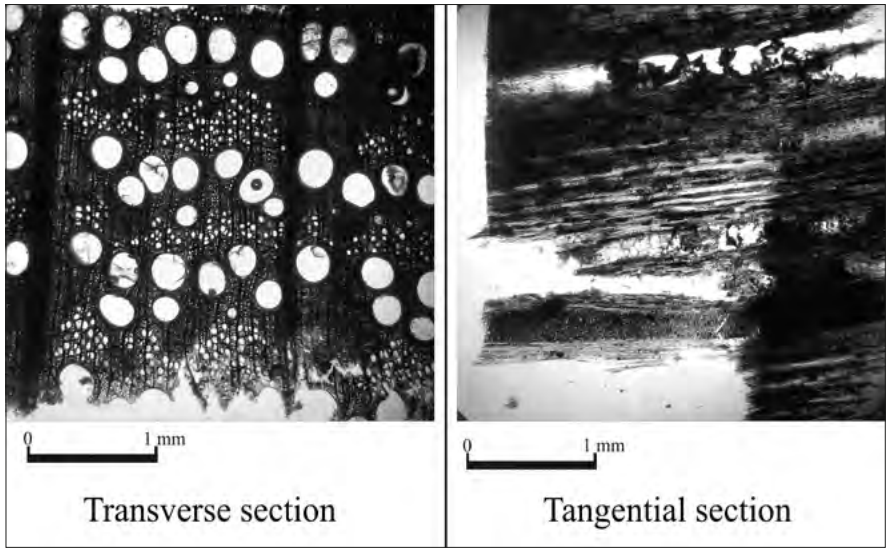

Fig. 4. A microscopic image of wood tissues from the coffin (photograph and prepared by J. Michalik).

Cam software was used, equipped with a Canon digital film camera and camera that were used to take photographs of the preparations, included in this paper. Thus obtained images of wood tissues were compared with tissue patterns from catalogues of F.H. Schweingruber (2011) and P. Greguss (1959), which allowed to identify the wood species.

The coffin in question was made of oak wood. Despite the small size of the samples and their considerable damage, it was possible to identify annual growth rings in cross and radial sections (Fig. 4). Based on this, the characteristic arrangement of tracheids and vessel elements could be compared with model preparations from the already mentioned catalogues.

Among the identified wood species from the twenty-five selected coffins from the Church of St. Nicholas, a vast majority were coniferous trees, mostly pines. Oak wood was only identified in five cases (Michalik 2018a: 53–59).

Wire flowers from the coffin

The coffin lid was decorated with eight artificial flowers, preserved in varying states. The collection included two types of three-leaf flowers, with slender, ellipsoidal petals – type 1 (Fig. 5, 6) and with round petals – type 2 (Fig. 7). The main frame of the petals was made of wire, 0.1 mm in diameter, with ends meeting at the base

Fig. 5. A flower of the first type found on the coffin lid (photograph by D. Grupa).

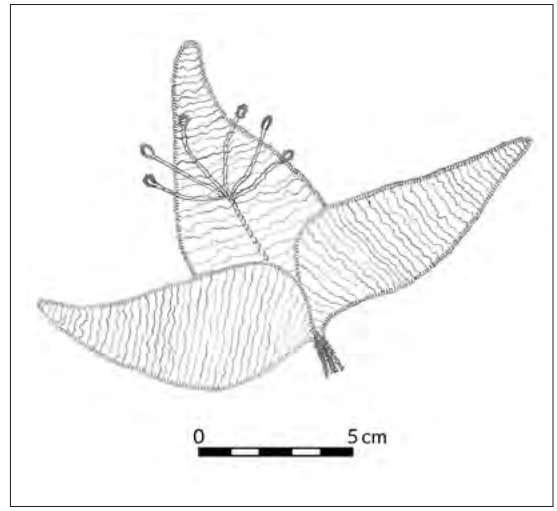

Fig. 6. A reconstruction drawing of a flower with ellipsoidal petals, opened (made by K. Kolaska).

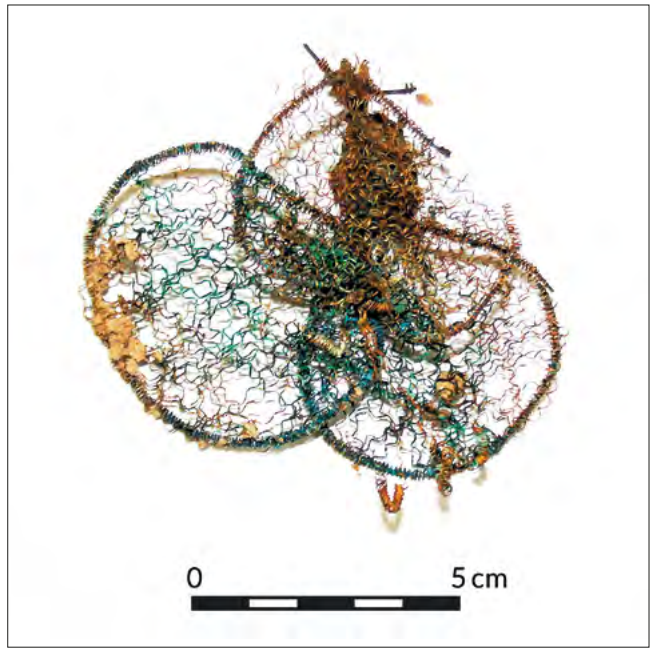

Fig. 7. A flower of the second type found on the coffin lid (photograph by D. Grupa).

and twisted together, forming the stem. The wire on the edges of the petals was additionally decorated with tightly wound wire, also with diameter of 0.1 mm.

The central part of the petals was filled with parallel, slightly twisted wires, arranged crosswise, which most probably formed the basis for yarn or transparent silk gauze. Microscopic analyses performed revealed silk fibres entangled with the twisted wire.

Their total length, including ellipsoidal petals, was 113.9 mm, and each petal was 95.1 mm long and 41.2 mm wide. The stem was 17.8 mm long, and between 4.4 mm and 6.3 mm in diameter. In the central part of the flower calyx, there were stamens of different length (max. 2.6 mm, min. 1.9 mm), made of spirally twisted wire.

The maximum width of a flower with round petals was 83.3 mm, and its minimum width was 66.0 mm. The petals were up to 52.5 mm long, and up to 52.0 mm wide. The stem was 22.7 mm long, and its diameter was between 6.2 mm and 4.6 mm. In the middle part, there were nine stamens concentrated in two pistils, with four and five stamens respectively.

Studs

Metal studs could be found outside and inside the coffin. Despite considerable damage, three types of studs could be identified: decorative with a diameter of 13 mm and 15 mm, and plain, semi-circular, with a diameter of 10 mm (Fig. 8). All studs were made of thin sheet of copper alloy, with thickness below 1 mm, onto which an iron shank was soldered. Such a combination of metals caused corrosion, which is why most studs were destroyed to a greater or lesser extent. In the case of isolated studs, complete partially-damaged shanks, covered with rust, were

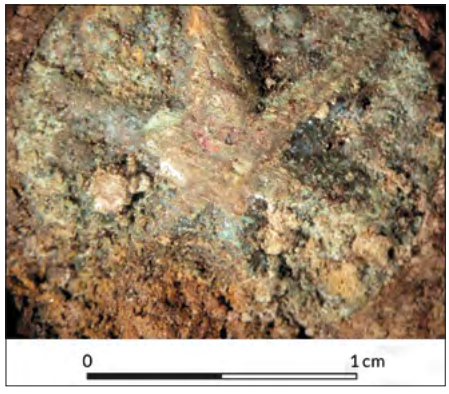

Fig. 8. A stud head detail (photograph by J. Michalik).

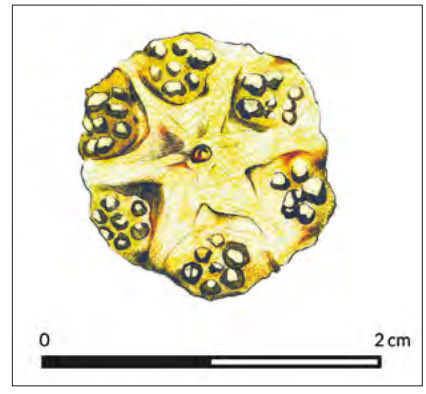

Fig. 9. A reconstruction drawing of a stud from the coffin (made by K. Kolaska).

found, approx. 15 mm long, with a diameter of 2 mm. The studs had probably been decorated before the shanks were attached. Their uniform coating indicates that they were made using a die in the shape of a six-pointed star, within which four to six, usually five, small 'dots' were punched, forming the shape of a simple flower calyx (Fig. 9). The irregular arrangement of the 'dots' allows to assume that they were made by hand after the shape of the star had been struck or that a few dies were used, with handmade 'dot' patterns.

Analysis of the upholstery fabric

During the initial stage of analysis of the coffin surface, no decorations apart from relics of metal flowers and studs were found. However, after microscopic analysis of the underside of the studs it turned out that there was fabric stuck to metal. And after corrosion had been gently removed, another fabric was discovered. The one closest to the stud surface was silk yarn, and the other was unmatted wool, plain-woven 1/1 (Fig. 10). It was also determined that the woollen fabric had been

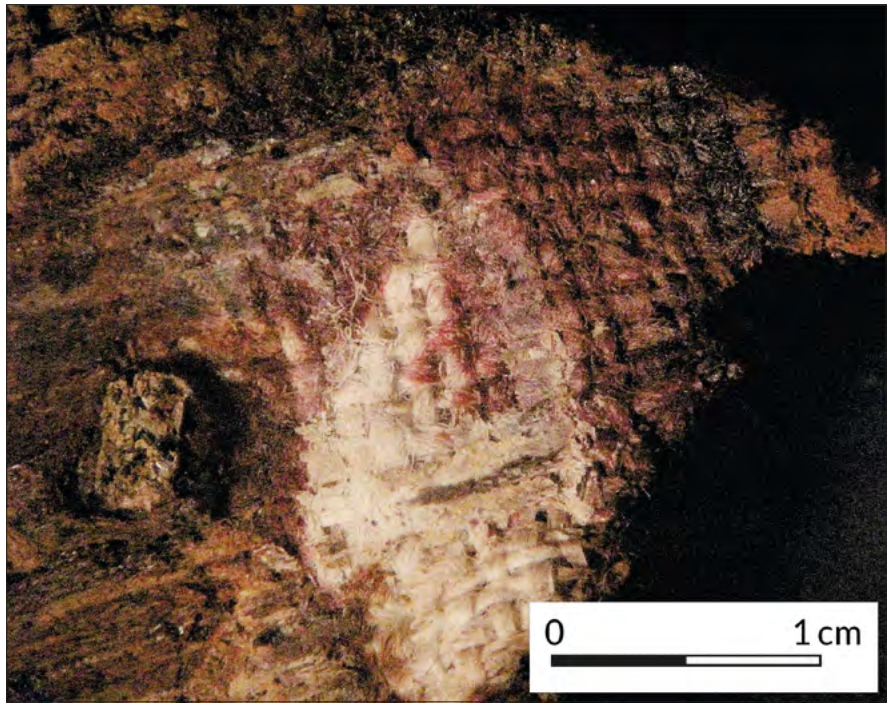

Fig. 10. Silk and woollen cloths found on the underside of a stud (photograph by J. Michalik).

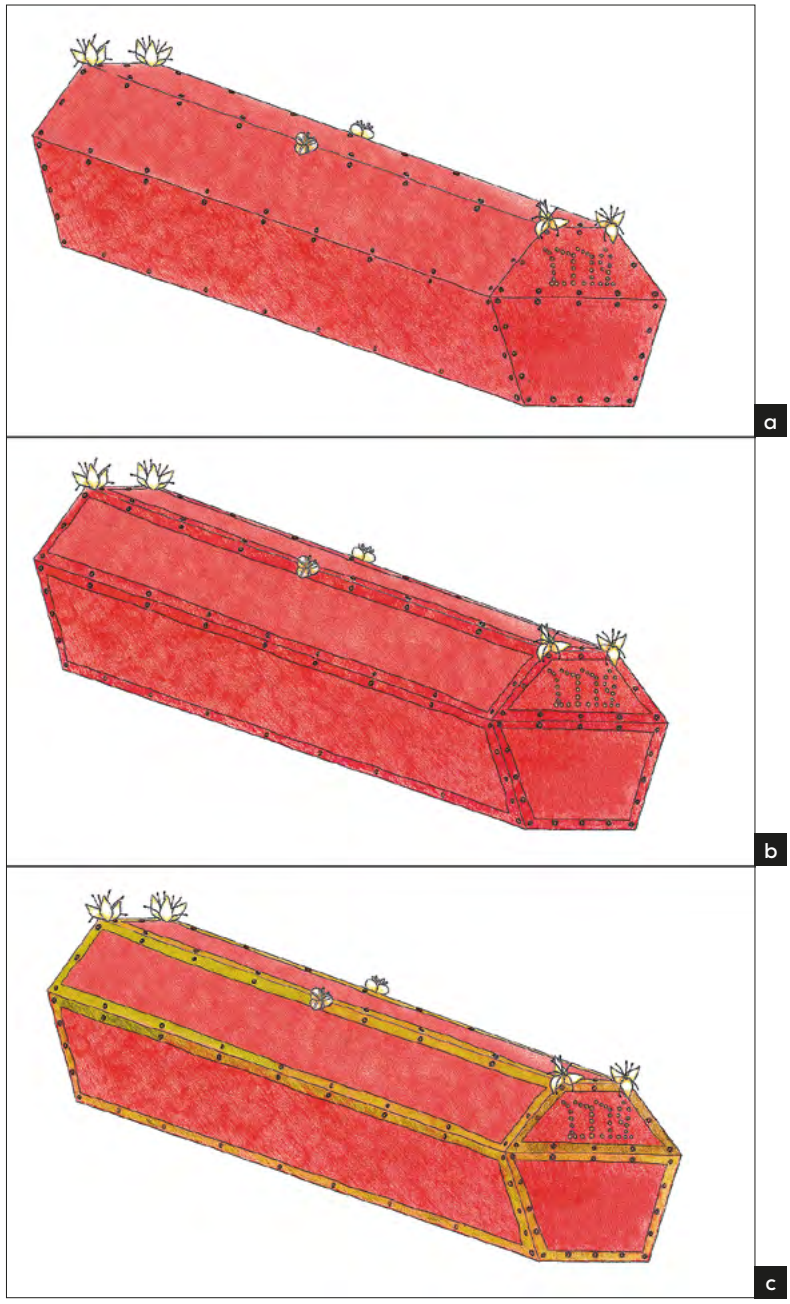

Fig. 11. Reconstruction of the probable appearance of the coffin: **a)** a variant without a tape; **b)** a variant with a red tape; **c)** a variant with a golden tape (by K. Kolaska).

died red after weaving[3]. It is impossible to precisely recreate the original appearance of the coffin. Was it upholstered with two types of cloth or only wool, or is silk a relic of the tape along the edge of the woollen fabric that was attached to the wood with studs? Unfortunately, the scraps preserved only under the studs are not enough to determine the original state. The fabrics on the coffin were completely decomposed, just like those inside it. It can only be presumed that studs found inside the coffin were used to attach the internal upholstery fabric.

Decorating bodies and coffins with flowers was a common practice in the seventeenth and eighteenth centuries. Garlands of flowers were placed on the heads of the deceased, and bunches of flowers were put into their hands. The flowers could be only real, only artificial, or a combination of the two. In Gniew, all possible variants were identified during research (Grupa 2015: 48–51; Grupa et al. 2015: 117–120; Grupa, Nowak 2017: 160–168). Systematic analysis of the material provides some basis for general conclusions concerning artificial flowers in garlands and bunches. The flower structure was, to a large extent, based on wire of copper alloy imitating golden wire, twisted in the form of spirals with varying density, with individual elements attached. They seem to have been made based on some general rules in one workshop. However, flowers from the coffin dated 1779 were at least a hundred years younger than the ones found in the northern crypt. They did look magnificent, but they were definitely more modest compared with the older ones. It seems that it was not necessary to extend them as they were elements of a designed whole, which included upholstery fabrics on the outside and studs decorating the coffin edge. Artificial flowers, with their delicate openwork structure, served as an elegant complement to the whole (Fig. 11, a, b, c). Figure 11 shows three possible variants of the coffin appearance during the funeral in 1779.

Conclusions

Many instructions about funeral costs did not provide any information on flowers, neither artificial nor real. Only regulations of some of the cities suggest moderation (Grupa 2005: 72–73). In this case, however, they were clearly not observed. It was similar in the case of the funeral of August Michał Szczuka, son of Stanisław Antoni Szczuka, who died in 1702 and was buried in the crypt under the chancel of the Church of the Blessed Lady Mary in Szczuczyn. The cost of a funeral ceremony of a three-year-old amounted to PLN 405.35, which included candles, studs for the coffin (890 for PLN 46), fabrics as well as priests and other people performing

3 During research into woollen fabrics from Gdańsk it was noted that some of the matted fabrics were died after weaving. Analysis showed that outer and inner structures of the fabric were not uniformly saturated with dye (Grupa 2012: 110). It is similar in the case of the coffin upholstery fabric, even though it was not matted.

the last offices. The high cost of this funeral is proved by a different bill issued a few years later in connection with the death of one of Szczuka's servants, which amounted to PLN 41.48 (Grupa et al. 2014b: 21). It should be assumed that the cost of the funeral of the child from Gniew was similar to the cost of the funeral of young Szczuka, if not higher, as the studs were not plain but decorated with floral ornaments, which definitely increased their manufacturing costs.

It is believed that the most exclusive coffins were upholstered in whole. The richest were upholstered with silk (also on the inside), which was the most expensive cloth in the world at the time. The less wealthy were buried in more modest, yet still sumptuous, coffins upholstered with wool (Majorek, Grupa 2013: 80; Grupa et al. 2014a: 166–181). Moreover, the eighteenth-century coffins were usually painted on the outside[4], and at the end of the century upholstering coffin lids was rare.

This was the first so richly ornamented child's coffin in archaeological research. If artificial flowers were used, they were included in bunches and garlands inside the coffin. In this case, all known coffin decorations were used, with value added by compositions of artificial flowers, the metal structure of which imitated golden wire. Another element that increased the burial cost was an oaken coffin. As already mentioned, most coffins from Gniew were made of pine boards, also known from other sites (Piaseczno, Szczuczyn, Radzyń Podlaski, and Łuków)[5].

The child's coffin from Gniew was definitely more richly decorated than coffins of adults, including those found in the church crypt (Grupa et al. 2015: 35–38). There is no doubt that the child who died in 1779 and was buried in the coffin described in this paper had a sumptuous, worthy funeral organised by the family, celebrating all *pompa funebris* principles.

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4 Admittedly, painters attempted to give them the appearance of motifs used on silk, but these were modest representations resembling patterned silks, with fine designs that were to resemble floral ornaments – observations of the authors.

5 Analysis of the wood from the coffins is carried out by Jakub Michalik, and its results will be published in a separate paper.

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Summary

Rich or Modest – Analysis and Reconstruction of the Appearance of a Child's Coffin from 1779 from the Church of St. Nicholas in Gniew (Pomerania Province, Poland)

Research conducted in churches provides more and more information about the funeral culture in the Baroque. The basic elements of a funeral were wooden coffins, in which bodies were buried. They were prepared for the funeral in different ways. The simplest were ordinary boxes made of planed boards. What draws attention, however, are those with additional elements on the outside. This child's coffin found in the central nave between the chancel and the first pillar was decorated with artificial flowers made of wire imitating golden wire. These flowers drew the attention of the research team to the unique ornamentation of the coffin. The next stage of the work involved cleaning the studs found (three types), and then analysing the unusual structures on their underside. This revealed two types of cloth stuck to metal. All the information gathered allowed to

prepare three variants of the appearance of the coffin with the year 1779 studded with one of the stud types. Considering the above, it was concluded that the child's burial was rich, and that the coffin decorations were exceptionally sumptuous.

Keywords: coffin, artificial flowers, church, modern era, Gniew

Streszczenie

Bogata czy uboga – analiza i rekonstrukcja wyglądu dziecięcej trumny z 1779 roku z kościoła pw. św. Mikołaja w Gniewie (woj. pomorskie, Polska)

Badania prowadzone w kościołach dostarczają coraz więcej informacji na temat kultury funeralnej okresu baroku. Jednym z podstawowych elementów samego pogrzebu są drewniane trumny, w których składano ciała. Były one w bardzo różny sposób przygotowywane do ceremonii pogrzebowej. Najprostsze to zwykła skrzynka wykonana z obrobionych desek. Uwagę jednak zwracają te z dodatkowymi elementami na powierzchni. Dziecięca trumna znajdująca się w nawie głównej pomiędzy prezbiterium a pierwszym filarem była ozdobiona sztucznymi kwiatami wykonanymi z drutu imitującego pierwotnie złoty. I to właśnie te kwiaty zwróciły uwagę ekipy badawczej na unikatowe zdobienie trumny. Kolejnym etapem prac było oczyszczenie znalezionych ćwieków (były ich trzy rodzaje), a następnie analiza dziwnych struktur znajdujących się po lewej stronie. W wyniku tych czynności ujawniono dwa rodzaje tkanin przylegających do metalu. Wszystkie odkryte informacje pozwoliły na przygotowanie trzech wariantów wystroju powierzchni trumny z datą 1779 nabitą jednym z rodzajów ćwieków. W świetle tych przesłanek stwierdzono, że pochówek dziecka należał do bogatych, a wystrój trumny do wyjątkowo bogatych.

Słowa kluczowe: trumna, sztuczne kwiaty, kościół, epoka nowożytna, Gniew

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Crypt Burials from the Cloister Church of Riesa (Germany) – Changes of Funerary Customs, Body Treatment, and Attitudes to Death

Introduction

The city of Riesa (Saxony, Germany) is located on the Elbe River, approximately 50 km northwest of Dresden. Between 1111 and 1119, a monastery was founded on the Elbe shore and was later transformed into a Benedictine nuns' convent in the 13th century (Ender et al. 2007: 15; Dannenberg, Westphalen 2019: 231). After the secularization in 1540, the convent became part of Riesa manor. The owners of Riesa manor were local noble families who used the cloister church as patriarchy church and burial place. Several epitaphs and tombstones within the church attest to their presence.

The oldest crypt is located in the northern annexe to the nave right below the patronage lodge (Fig. 1) and was used from 1595 onwards by the families von Embden and Bock as burial place (Gurlitt 1914: 120). This vault was evicted in the following centuries, therefore no remains from this crypt are preserved today. The biggest and most important crypt for this study is the one below the altar, a groined vault with a size of circa 32 m^2 and with two opposite openings for ventilation (Fig. 2). Nowadays, a staircase, emerging behind the altar, grants access to the crypt while in the past, there has been an additional sinkhole through which the coffins could be brought into the vault. The crypt was erected from quarrystones, bricks and Elbe sandstone, probably right after Christoph von Felgenhauer (II) (1577–1638) had purchased Riesa manor in 1622. His surname Felgenhauer (English: wheelwright)

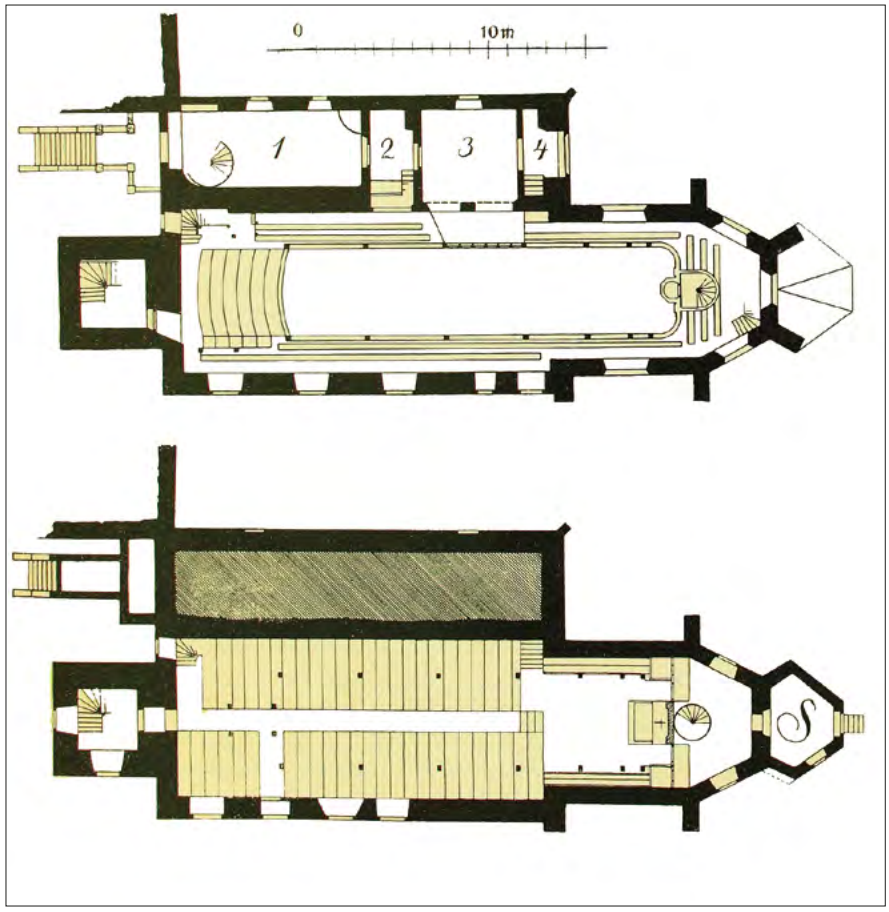

Fig. 1. Floor plan of Riesa cloister church with first gallery (top) and nave (bottom), situation prior to 1909. The crypt below the altar is situated underneath the choir. The northern crypt is located on the ground floor below rooms 3 and 4, the Embden crypt below room 1. Figure modified after Gurlitt 1914, fig. 156–157.

reveals their common origin as craftsmen. The purchase was a step in the orchestration of the family as being of noble origin with a long history, even by inventing a noble genealogy (von Uechtritz 1792: 136–144; von Feilitzsch 1896: 70–74). In fact, Christoph von Felgenhauer (II) was a commoner who made career under the Electors of Saxony and was only conferred ennoblement in 1624 (Donath 2019: 244). Riesa manor became the family seat of von Felgenhauer and soon received market rights, resulting in the flourishing of the city. Besides, the family held a second estate at Hirschstein Castle. During their regime, the family used the former cloister church as patriarchy church and burial place (Gurlitt 1914: 120). The descendants of Christoph

von Felgenhauer (II) held Riesa manor until 1716, afterwards the estate was acquired by councilor of commerce Johann Christoph Hanisch (1708–1774) whose descendants were ennobled in 1790 as the barons von Odeleben. Due to severe indebtedness, Riesa manor was placed under sequestration in 1813, from which Curt Robert Freiherr von Welck (1798–1866) purchased it in 1824. In 1828, following his curiosity, the new estate owner opened the sealed crypt below the altar and arranged for an official documentation of the crypt's content (Thomas 1928; Voigtländer 1861). He decided in 1856 to found a new crypt for himself and his family (Welck 1992: 164, 169; Welck 2019: 249). This barrel vault is located in the northeastern corner of the annexe and is nowadays referred to as the "northern crypt" (Fig. 1).

In the crypt below the altar, Curt Robert Freiherr von Welck observed a total of 50 coffins, among them larger adult and smaller children coffins, piled up into three stacks (von Welck 1828). Together with a local priest and a physician, they opened all the coffins and described the clothing and state of preservation of the deceased as well as the presence of possible grave goods. Due to the ventilation, several bodies were preserved as mummies of leathery appearance, sometimes still with hair. 20 less well-preserved coffins were subsequently removed from the crypt and transported to the former Embden crypt from where their remains came again to light during construction works in 1984 and 2009. The 30 remaining coffins in the crypt below

Fig. 2. View into the crypt below the altar in 1975/1976 prior to the museal presentation. Due to space constraints, the coffins were placed on top of each other. Note the ventilation opening (photograph by M. Dietrich).

the altar were numbered and information regarding the coffin (color, material, and decoration), the deceased, the state of preservation and the year of death (if available) recorded. Two side chambers to the crypt below the altar had already been opened in 1811 and could be attributed to Dr. Georg Abel Ficker (1583–1652) and Christoph von Felgenhauer (III) (1608–1679) and their respective wives (Voigtländer 1861).

The official documentation from 1828 constitutes the background for the current identification of the burials, even though they were later affected by multiple changes resulting in the current appearance. In 1927, several objects, especially funerary wreaths, were removed from the coffins and brought to the local history museum. In order to achieve a respectful display, the crypt was cleaned, and corpses were put back in (their) coffins and covered with linen sheets between 1974 and 1978 (Fig. 2). The glass covers and lighting originate from this period (Fig. 3) to grant the public temporary access to the crypt. However, despite the partial eviction and rearrangement of the interments, the inventory is far less disturbed than in other crypts since the translation of the remains was performed under careful consideration of the original setting. In addition, historical sources, such as the church register as well as family chronicles and later correspondence and photographs, allow us to reconstruct the changes, which the crypts underwent during time (Ströbl 2009).

With permission of the State Heritage Office of Saxony, the authors have conducted a thorough documentation and scientific analysis of the preserved coffins and coffin contents between 2016 and 2018 (Alterauge, Hofmann 2019). The research was only possible with the generous support of the Protestant-Lutheran parish of Riesa, who granted access to the crypts and provided the facilities for the investigations.

The aim of the project was to inventory the preserved remains at several locations in the cloister church which not only included the crypt below the altar and the northern crypt, but also findings formerly originating from the crypts and currently stored at the attics. The documentation and scientific analyses, which are still ongoing, have provided and will provide many insights into early modern funerary practices. We can retrieve information on wealth, social status, familial structures, infant mortality, piety, and faith of three ennobled Protestant families as well as individual fates from early 17th to late 19th century.

Material and methods

The cloister church has yielded different burial assemblages:
Crypt below the altar:

- Remains of the 30 coffins labelled and described in 1828 (von Welck 1828). Most of these coffins and mummified bodies are still located in the crypt below the altar (Fig. 3). This study focuses on these remains since the original context is mostly still preserved.

- Remains of the 20 coffins translated in 1828 to the former Embden crypt. Wooden coffin planks, grave goods, textiles (mostly clothing) and skeletonized human remains are stored at the attic as well as in the side chambers of the crypt below the altar.
- Funerary objects, especially 12 funerary crowns, in the collection of the City Museum of Riesa (Lippok 2019).

Northern crypt:

- Five coffins in the northern crypt containing human mummified or skeletonized remains (Fig. 4). Burials of the family von Welck. The coffins were labelled with "N" plus a number to distinguish them from the coffins in the crypt below the altar.
- Remains of three coffins originating from the northern crypt at the attic.

Prior to the documentation, an investigation protocol was developed to limit movements of the coffins and human remains to the necessary minimum. All researchers were wearing protective clothing (masks, gloves, over-suit), and indoor climate was recorded through temperature and humidity data logger.

Every coffin was described, photographed, and measured, and isolated coffin planks were assembled according to their size, appearance and furnishing. If the

Fig. 3. Condition of the crypt below the altar in 2017, view to the southern corner with the children coffins. The glass covers and lighting were first established in 1978 (photograph by A. Alterauge).

Fig. 4. Children coffins from the northern crypt, condition in 2017. From right to left: coffin N1, N2, N3. Note the visibility of the naked wood, the elevated coffin lid and the fluted side plates (photograph by A. Alterauge).

coffin did not yield a date of death, it was dated according to the typo-chronology of Ströbl (2014). Whenever possible, material and construction technique were noted, as well as the presence of other particularities (e.g., locks). The coffin furnishing was recorded so far it was visible. It included the coffin padding and the upholstery on which the deceased was lying. Coffin inscriptions were transliterated using the original spelling and indication of the Bible's book, chapter, and verse.

All coffins with human remains were X-rayed on site with a mobile X-ray device (Examion® PX-20 BT Plus X-ray generator, Examion® X-DR portable detector) in anteroposterior and/or lateral projection. The bodies were left in place during the X-ray examination. This approach turned out to be very advantageous since the X-ray images do not only reveal any metal components of the coffin construction (e.g., nails) (Herrmann et al. 1990: 207–212), but also helped in deciphering the inscriptions made of lead paint. The textile and costume analyses were performed by conservators from the Museums of the City of Dresden. A visual inspection of the textiles revealed the style, cut, fashion, function, and material of the clothing as well as of footwear, stockings, gloves, bonnets and bands (Hofmann 2009; 2010). In a second step, assumptions on the functionality and dating of the clothing were made, which also benefited from the X-ray images due to the depiction of haberdasheries. Besides, the conservators undertook the challenging task of sorting, documenting and flattening textile fragments from the church's attic.

All bodies underwent a morphological investigation to estimate age, sex and body length of the deceased (Buikstra, Ubelaker 1994). Since all the bodies were either mummified and/or dressed, we were only able to collect very basic information on the biological profile of the individuals. Sex estimation either relied on the presence of genitalia or on the X-rays of the pelvis and skull (Ferembach et al. 1979). The state of dentition, skeletal maturation and degenerative changes were considered for the estimation of age-at-death. Total body length was contrasted with calculated body height. Pathological particularities (e.g., caries, fractures) were noted whenever visible. As a limitation, none of the classical anthropological occupational or stress markers (e.g., Cribra orbitalia, periosteal reactions) could be systematically assessed (Grupe et al. 2015: 340–353, 367).

The mummies were searched for any postmortem changes, such as traces of evisceration or embalming. In selected cases, samples for stable isotope (carbon, nitrogen, sulphur) and aDNA analysis were taken at an inconspicuous location. The samples are currently analyzed at the Institutes of Forensic Medicine of the Universities in Bern and Zurich (Switzerland) to test for kinship, diet, weaning and origin of the individuals.

The commingled human remains stored at the attic, which probably represent the bodies translated in 1828, were also analyzed to determine a minimum number of individuals (see Indra et al. 2020).

Puparia, empty shells from which adult insects had successfully hatched, were collected at several locations at the bodies and within the textiles. Analyses are currently performed at the Institute of Forensic Medicine in Frankfurt/Main (Germany).

Even though it was neither the goal nor did the (logistical and financial) circumstances allow for an extensive conservation, minor conservation measures were conducted during the project, including superficial cleaning of the coffin surfaces and textiles, as well as the fixation of loose drapery. Together with the State Heritage Office and the Parish, it was decided to improve the presentation of some naked bodies, now wrapped in white silk and placed at a height appropriate to the exhibits. Protective measures also included new Tyvek covers for the coffins and acid-free cardboard backboards.

Results

Coffins

In contrast to other Eastern German burial crypts (Ströbl 2016a; 2017a; Ströbl et al. 2019), there are only wooden coffins in Riesa, mostly made of oak or pinewood. Both single and double layered coffins occur; however, there seems to be a chronological tendency towards double coffins of being reserved to adults during the 17th century

Fig. 5. Painted coffin 4 with iron clasps, biblical quotation (Esa. 35,10), floral ornaments, and putti, post-1637 (photograph by S. Giersch).

Fig. 6. One of the coffins translated in 1828, belonging to Ludovica Louisa von Felgenhauer (†1693), with cross and biblical quotations (cross: Phil. 1,21; right side plate: Hiob 14,1–2; left side plate: Esa. 40,6–7) (photograph by S. Giersch).

(e.g., coffin 10), while in the 19th century northern crypt, they appear for both children (e.g., coffin N2) and adults (e.g., coffin N5). In terms of coffin shapes, a range of trapeze-gabled, hexagon-gabled and hip lid coffins could be observed, all with a trapezoid base (Ströbl 2014). As known from other sites, painted trapeze-gabled coffins are restricted to the 17th century, while hexagon-gabled coffins only appear in the first half of the 18th century. The 17th century coffins follow the standard decoration patterns of their time (Ströbl, Vick 2007; Alterauge et al. 2014; Ströbl, Ströbl 2017; Ströbl et al. 2019): a painted crucifix (or cross) on the lid and biblical inscriptions on the sides, often surrounded by floral ornaments, sometimes crowned with putti (Fig. 5). The white, yellow or golden inscriptions form a remarkable contrast to the blackened surfaces of the coffin (Fig. 6). Iron clasps around the coffin edges are limited to the second half of the 17th century. During the 18th century, more emphasis is put on the visibility of the naked wood, leading thereinafter to profiled, fluted surfaces. As an intermediate step, decorative strips appear on the coffins, imitating coffering (e.g., Fig. 2, children coffins to the right). The climax is reached in mid-19th century coffins with elevated lids and white alloy furnishings (Fig. 5).

Coffin furnishings, especially handles, are more common in adult than in subadult coffins, not only to ease the transport, but also due to their representative nature. Until the 19th century, none of the children under the age of 8 years are equipped with coffin handles in Riesa. To protect the dead until the day of judgment, all the coffins were originally sealed, until they were opened in 1828. The coffins were either sealed with nails or – in few cases – with locks or hooks. The latter theoretically allowed a repeated farewell from the deceased, as did windows in the coffin lid (Ströbl, Vick 2011: 102).

The coffin padding mostly consisted of wood shavings, possibly originating from the coffin fabrication. It served two purposes: to keep the deceased at an elevated position in the coffin, like during eternal sleep, and to absorb body liquids. The padding was covered with linen or silk lining, attached to the coffin's edges. In most cases, the coffins were equipped with cushions, filled with straw, hay or brushwood. Other plants, such as boxwood and yew branches, were part of the coffin furnishing and symbolized as evergreen plants eternal life.

Inscriptions

The observed coffin inscriptions can be divided into the following categories: biblical quotations, biographical information on the deceased (e.g., name, genealogy, date of birth and death) and folkloric proverbs. All inscriptions are in German and refer to different aspects of death and resurrection. The emphasis on words is typical for Protestant 17th century inhumations, and the coffin decoration and funerary goods were intended to support the written message (Ströbl 2016b: 87).

Fig. 7. Coffin 13 of a female member of the von Felgenhauer family, late 17th century. The white drapery was added in 1978. Note the presence of a comb and a brush. The individual was buried in adapted clothing, namely a velvet male jerkin (photograph by S. Giersch).

The late 17th century children coffins provide the richest collection in biblical quotations. In times when infant mortality was very high and only about one third of the offspring reached reproductive age, death accompanied every life from the very beginning. However, the inscriptions and funerary provisions reveal that the death of every child hit his parents hard. For example, Christoph Ludwig von Felgenhauer (1650–1707) had 20 children from two wives, of whom only eight reached adult age. Parents grief was voiced through the inscriptions on the coffins, for instance with reference to premature death (Hiob 14,1–2; Sap. 4,7; Esa. 38,13) (Fig. 6). At the same time, the inscriptions allude to the vanity of life (also: Hiob 14,1–2; Esa. 40,6) and the voidness of human existence (Ps. 30,1). But on the other hand, they provide solace to the bereaved since God offers salvation to the little ones (Mark 10,14; Matt. 18,14) who have pleased him (Sap. 4,10). Only

God can provide calmness and peace during eternal sleep (Ps. 4,9). In addition, God redeems the deceased from sin (Joh. 1,8; Sap. 4,20) and offers them eternal life. For this reason, death is seen as gain (Phil. 1,21) (Fig. 6).

Despite the uniformity of the quotations, which were probably at least partly taken from Martin Luther's preface to his *Begräbnislieder* (1542) (Ströbl 2017b), there was also room for individuality. Older children received other quotes than the still- and newborns, e.g. by referring to the years not-to-live (Sap. 4,8–9; Sir. 42,5–7) or to the heavenly reunion with God (Hos. 2,19–20; Ps. 45,10,15–16). Great sorrow expressed through some folkloric proverbs (*Today red, tomorrow dead*) alluding to the sudden and unexpected death of children.

The few adult coffins with inscriptions, one belonging to Maria Magdalena von Felgenhauer (†1676), show similar inscriptions to those for children (Sap. 4,7; Rom. 14,8) but put a larger emphasis on belief in God (Joh. 3,16) and a righteous life (Sap. 4,7,14) as a precondition to reach salvation. Unique to the adult coffins are quotations on the bodily resurrection (Hiob 19,25–27), depicting a physical resurrection with own skin, flesh and eyes. In which way mummification might have facilitated resurrection, is rather a matter for theological discussions.

In contrast to their older counterparts, no inscriptions were directly written on the 19th century coffins. Instead, they have lead inscriptions plates attached to the lids, revealing the identity and rank of the deceased (Fig. 4). Nonetheless, in the northern crypt, these plates also contain religious quotations (Joh. 11,25; Matt. 19,14; Ps. 4,9; Jes. 1,6; Jes. 49,16), revealing the faith in God and hope of resurrection was hardly on the wane.

Grave goods

We define grave goods as objects that were unambiguously deposited with the deceased, while elements of clothing (hooks and eyes, pins, buckles) are to be treated together with the corresponding attire. We distinguish between profane and symbolic or religious burial goods, even though ambiguity might be inherent in all objects given to the deceased.

Profane utensils used for the cleaning, shaving and general preparation of the body for the funeral are the most common finds from the crypt, even though we cannot calculate their frequency due to their recovery as stray finds and not surely attributable objects (Fig. 7). Combs, washing brushes (previously interpreted as razor brushes or aspergillum), sponges and washing pans might have touched the dead and were therefore considered baneful and impure for further use (Ströbl, Vick 2009: 320). For this reason, these objects had to be removed from the world of the living, possibly also out of fear of the revenant dead (Melisch 2015: 114), and were placed into the deceased's coffin. Jewellery (ring, earring, necklaces, and amulets) was only preserved

Fig. 8. Photograph of some children coffins in front of the altar, taken in 1927 on order of Franz Xaver Hynek (1879–1952) (Credit: City Museum Riesa). The funeral wreaths are still in place. Note also the funeral crosses and flowers arrangements in some coffins, e.g. coffin 4, coffin 28. Coffin assignment by the authors.

in exceptional cases or as stray finds due to previous lootings but was probably more frequent than we know today (see Steeger 2003). From the side chambers, there are for instance a golden ceremonial chain and a signet ring preserved.

Through historical records, we know of the presence of additional grave goods, which are no longer available for analysis. Two individuals were buried with prayer books and inlaid devotional images that are typical grave goods of the Protestant elite (Kenzler 2011: 25). Clay eggs were found in one coffin, symbolizing life and resurrection. Unique are so far playing cards that were found in the coffin of Magdalena Ficker, née von Felgenhauer (1606–1674) (Voigtländer, Hennig 1892).

While the above-mentioned grave goods were exclusively given to adults, the children burials contain plenty of religious or symbolic objects. Funeral wreaths (or crowns) belonged to the grave goods denoting status, given to unmarried individuals and symbolizing a bridal crown as well as the innocence and virginity of the deceased. A photograph from 1927 shows the funeral wreaths from Riesa still in their original position, deposited on the heads and on the postcranium of both girls and boys (Fig. 8). During her investigation of the remaining funeral wreaths at the City Museum of Riesa, Lippok was able to distinguish different types and shapes

of wreaths, dating from the 17th till 19th century, which show strong similarities to the funeral wreaths from Dresden (Lippok 2016) and Freiberg (Schubert 2014: 225). The wreaths are made of leonic wires being silver-plated or gold-plated copper wires and threads, which were formed into floral ornaments and accompanied by beads, silk decoration elements, paper flowers and real cloves.

The 17th century children inhumations were also equipped with funeral crosses, which were once carrying a three-dimensional Jesus figurine (Fig. 8). The crosses are black with golden stars at the end of the arms and placed in the left elbow of the deceased (Fig. 9). In Riesa, those funeral crosses were only given to children above the age of three months and are often correlated to funeral wreaths whereas elsewhere, they occur in adult burials, too (e.g. Freiberg; Schubert 2014: 227).

Other typical Saxon children grave goods were wreaths or bunches made of splinter wood and covered in cloves thread onto fine wires (Fig. 9, 10). The cloves appear in the form of flowerbuds or mother cloves, both sometimes gilded (Hofmann 2012: 51). The cultivation of cloves was restricted to the Spice Islands (today: Moluccas in eastern Indonesia) until the 18th century, and their export was strictly controlled by the Dutch. Therefore, together with nutmeg and piment, cloves belonged the most valuable plants of their time and were a sign for social distinction. Besides, cloves have also a symbolic meaning representing the nails used for the crucifixion of Christ (Ströbl, Ströbl 2020: 253).

Fig. 9. Coffin 4 of an infant in a red silk taffeta bodice and skirt and a white blouse with red-white braids. Shoes and stockings are not visible, a bonnet and blanket were removed in 1927. The funeral cross and the clove-covered wreaths around the wrists are still present, as are the bunches of splinter wood, flowers, cloves, and boxwood. Dating: post-1637 (photograph by S. Giersch).

Fig. 10. Lateral x-ray of coffin 28, containing the inhumation of a boy of 5–7 years, late 17th century. Due to the two-dimensional projection, the metallic structures of the coffin (e.g. iron clasps, coffin nails) overlap the image of the deceased. Thread and drilled cloves are visible above the head and next to the chest. Courtesy of the Institute of Forensic Medicine, University of Bern.

To the coffins' embellishment also contributed bunches of splinter wood and artificial flowers, feathers or gilded laurel leaves which are a sign of the elaborate handicraft of the 17th century (see Steeger 2003).

So far, it seems that the 17th century inhumations were equipped with objects of higher value, quality and quantity than during later times. On the one hand, this practice mirrors the contemporary funerary customs of the nobility and bourgeoisie in Saxony (Hofmann 2009; 2010; 2012; Ströbl et al. 2019), but also in neighboring Poland (Majorek, Grupa 2016), on the other hand, it highlights the achievements of the von Felgenhauer family.

While we need to keep in mind that the sample is biased towards 17th century children burials in terms of quantity and preservation, no funeral wreaths or flower bunches are reported from the children coffins of the Hanisch/von Odeleben family. So-called luxury decrees prohibited in the 18th century the excess luxury and splendor of funerals, leading to the use of different techniques and materials in the fabrication of funeral wreaths (Lippok 2013: 197–198). We suggest that the

floral wreaths made of flowers, laurel and moss from the mid-19th century children burials in the northern crypt are to be considered in this context.

Clothing

Burial clothes may be seen as a representation of the deceased's social identity and dressers' perception of death and the deceased. Within this framework, it was not only significant which kind of clothing was used to wrap the deceased, but also from what kind of materials they were made. Due to their excellent preservation, the garments from Riesa are a valuable source for research in early modern costume and art history as well as textile craft. Even though clothing is not preserved for all the inhumations or fragments can no longer be attributed to specific individuals, they add nicely to the textile corpus from Dresden Frauenkirche and Sophienkirche (Hofmann 2009). In Riesa, both clothes worn during lifetime and burial gowns occur, even though the differentiation is not always simple. We may differentiate between the following categories of clothing (adapted from Grömer, Ullermann 2020):

- Full wearable attire with outer- and underclothing, bonnet, stockings and shoes (e.g., coffin 4) (Fig. 9);
- Re-worked, adapted clothing, meaning private clothes, not necessarily the personal ones, draped with pins or open back (e.g., coffin 13) (Fig. 7);
- Burial gowns which were exclusively made for the funeral, often simple shirts or dresses without haberdasheries, often only applied to the body (not dressed) (e.g., coffin 2) (Fig. 11);
- Wraparound garments for still- and newborns (coffin 19, 20).

So far, we were not able to detect any chronological changes in the preferment of wearable or funeral attire. If anything, children seem to be buried more often in burial gowns than adults, especially the very young ones (< 3 months), if they were not buried in wraparounds.

Different material of the clothing could be determined: silk, satin, taffeta, and velvet dominate the outer clothing, while wool is quite uncommon, except in jackets of coffin 27 and 28. Linen is seen in undergarments, such as shirts. In general, as often seen in crypt burials, the preservation of animal protein fibres is much better than of plant fibres. Being the most expensive fabric at the time, dressing the dead in silk defined univocally that the deceased was a member of the elite. Ornamenting motifs of the woven fabrics took the form of geometric or floral shapes. Laces, ribbons, and bows were used for decoration of the clothes, but were also regularly found tied around the wrists of the deceased. Haberdashery included hooks and eyes, spherical and round coated buttons, iron hooks, and shoe buckles.

Besides, not only the clothing was made of silk but sometimes also the coffin lining. In contrary to textiles from archaeological context, the observed textiles

Fig. 11. Photograph and anteroposterior x-ray of coffin 3, infant of 0–3 months. The individual was dressed in a beige silk taffeta burial gown with green bows, which was pinned in shape. A flower bouquet from leonic wires and silk flowers was placed on the lap. The metallic components are revealed by the x-ray (photograph by S. Giersch; x-ray: courtesy of the Institute of Forensic Medicine, University of Bern).

appear in yellow, red, green, black, brown, and light blue shades of color and have mostly kept their luminance and pliability. The child burials are rather associated with bright and vivid colors highlighting the innocence of the deceased, while black clothing is restricted to adult inhumations.

Identification and health

From the genealogies and death registers, we have a pretty good understanding of who was buried in the crypts (Thomas 1931), even though little inconsistencies in name spellings or date of birth and death might occur in-between sources. Members of the families von Felgenhauer, von Grünrodt, von Gersdorff, and Hanisch/von Odeleben were entombed in the crypt below the altar, while only members of the von Welck family were interred in the northern crypt. It is noteworthy that not only Felgenhauers residential in Hirschstein Castle were buried in the crypt, but that daughters who had married into other families and moved away were sometimes transported to Riesa in order to be interred alongside their relatives.

Thanks to the X-rays, the age and sex of all the mummified individuals from the crypts could be determined. The age ranges from still- and newborn infants (Fig. 11) to older children and from young adults of both sexes to middle-aged men and elderly women. The morphological age-at-death estimations were compared to the historical data of the deceased to verify the identifications which are based on the official documentation from 1828. As a result, all identifications adapted from the coffin inscriptions or inscription plates are plausible, and as additional evidence, the style and cut of the clothing can be taken as further affirmative chronological element. However, the identifications are less reliable when it comes to the inhumations without inscriptions. Here, the aDNA analysis can provide clues by revealing kinship relations between identified and unknown individuals, as will the forensic entomological analysis on the season at death.

Information on the health of the entombed individuals offer valuable insights into the living conditions of the lesser nobility in Saxony. As limitation, the overlap of radiodense structures hampered a systematical paleopathological approach, so that we can only list single conditions, such as caries, antemortem tooth loss, healed fractures, and spinal degenerative changes. Two isolated fontanelle plates were recovered as stray finds and attest the application of medicinal practices by which an ulcer was artificially induced and kept open in sense of the humoral-pathological ideas (Häck, Nerlich 2016: 297–303).

Sometimes, the death register offers additional information on the cause of death, e.g. death in childbed, child variola (probably chickenpox), edema, hemorrhage, diphteria and dysentery.

Mummification

During the project, 29 mummies could be investigated by means of visual inspection and radiography. They are of leathery appearance with dried skin and soft tissue. Except in one individual (coffin X), no incisions or residues of embalming fluids could be observed, which suggests that we are predominantly dealing with spontaneous mummies created unintentionally due to the environmental conditions. The crypts are well ventilated with gentle variation in temperature and relatively low humidity, as shown by our current hygrometric climate control. As reported in 1828, the coffins which were located close to the ventilation openings showed the best preservation of the body as of the wood. The coffins' furnishing with wood shavings might have enhanced the mummification process by absorbing the body fluids and emitting tannic acids. It was also favorable that the entombment usually took place within four days after death, if the funeral was not delayed due to a transport from far away or other external circumstances (e.g., gathering of the family).

There has been a lively debate for years if there is a tradition of intentional mummification in Christian Middle Europe (Schmitz-Esser 2014: 298–299). Especially from the early modern period, there are thousands of dry mummies of the social elite preserved in family- and church vaults (Behre 1956; Jungklaus, Vick 2011). Nonetheless, the physical completeness of the body was an accepted, yet unintended, side effect of crypt burial even though the phenomenon evoked the curiosity of the contemporaries and descendants. We might believe that it was not only the ambition to possess a representative family vault, that has inspired the barons von Welck for the foundation of the northern crypt, but also their knowledge of the conservatory effects of the place.

Occupation

Despite the rich archival records, it is to date still very difficult to determine the occupation time of the crypt below the altar. That is because we do not know the exact construction date of the crypt, even though we might assume that it accompanied the erection of the choir. Whether this happened already in 1622, when Christoph von Felgenhauer (II) purchased Riesa manor, is not documented. This is quite surprising since we know of his other endowments, e.g. the organ. The oldest inhumation in the crypt is that of an infant of about 3–9 months who was entombed in a painted coffin with iron clasps (Fig. 5). A blanket found in the coffin is embroidered with the initials "REvG" and the year 1637, but we did not find a corresponding death in the church register. Therefore, we can neither exclude that this infant was buried in the crypt already in 1637, nor that the blanket was given to it at a later date. According to the absence of year-dated coffins and corresponding entries in the death register, none of the children of the first and second marriage of Christoph von Felgenhauer (III) (1608–1679) seem to have been buried in the crypt. It is possible that the siblings Christoph von Felgenhauer (III) and Magdalena Ficker (1606–1674) were the first von Felgenhauer to be interred in the crypt, namely in the antecedent side chambers with their respective spouses (Voigtländer, Hennig 1892).

The death register is also not very precise about the exact location of the interments and is therefore not providing any additional clues: until 1679, there has been a standard formula, wishing the deceased gentle peace and a joyful resurrection for eternal life in its resting chamber. Afterwards, the entries are more precise, stating the entombment in the Felgenhauer, aristocratic, or ancestral sepulture. From 1755 onwards, the crypt was referred to as the manorial crypt, a term that was later also used for the northern crypt of the family von Welck.

The last inhumations before 1828 were members of the middle-class and later ennobled family Hanisch or von Odeleben. However, in 1923, a 31st coffin

is reported in the crypt which obviously was entombed there after the official documentation in 1828. It is believed that it is the body of Ernst Otto Innocenz Freiherr von Odeleben (1777–1833), a cartographer in Napoleon's services, who was transported by the von Welck brothers after his death in Dresden to the crypt in Riesa (Brunner 2007). An oval incision, the cut of the sternum and stitching on the abdomen revealed that the corpse had been eviscerated. However, the morphological analysis has raised doubts on the identity of the corpse, and no such incident is reported in the diaries of Curt Robert Freiherr von Welck (pers. comm. Josef Matzerath, Dresden 2018), nor is there any entry in the death register. Additional scientific analyses are currently performed to reveal the identity of the deceased.

The northern crypt was founded in 1856 following the death of Anna Editha Freifrau von Welck (1828–1856), accompanied by the exhumation of her daughter Sara (1855–1856). The crypt was used until 1869, sheltering in the meanwhile three generations of the barons von Welck.

Conclusion

The documentation of the burial crypts in the cloister church of Riesa allowed high-quality recovery of extensive burial data, including interments where coffins, clothing, and mummified remains were not only encountered, but thoroughly recorded and analyzed (Alterauge, Hofmann 2019). The prominent position of the owners of Riesa manor became evident in the elaborate design and quality of the coffins, furnishings, grave goods and clothing. The inhumations show changing influences of style, fashion and time on a local and regional level, particularly evident in the children burials. We hope that further bioarchaeological research will help to elucidate the identity of the so far unknown individuals, which again will add reliable information on the funerary customs.

Alongside with the ongoing scientific analyses, this study has the potential to give a fuller understanding of the identity and mind-sets of early modern ennobled families.

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Summary

Crypt Burials from the Cloister Church of Riesa (Germany) – Changes of Funerary Customs, Body Treatment, and Attitudes to Death

The cloister church of Riesa (Saxony, Germany) contains two burial crypts which were used from the 17th to 19th century AD by local noble families, namely the barons von Felgenhauer, Hanisch/von Odeleben and von Welck. The crypt beneath the altar originally contained 50 inhumations of which about 30 are still preserved at present, either as coffins and/or mummies, while the northern crypt contained eight interments.

During the last two centuries, the crypts have experienced major changes which could partly be reconstructed through historical records, photographs and oral history. The aim of the investigations, supported by the parish and the city museum, was to document the current state-of-preservation and to identify the inhumations by combining different types of evidence.

The coffins were visually inspected and dated by typo-chronological comparisons, and inscriptions were transliterated whenever possible. Material, fabrication, clothing type and dating of the garments were determined during costume analysis. The mummified remains were subjected to a morphological investigation, including X-rays. Different body treatments resulting in natural or artificial mummification could be observed. In selected cases, samples for aDNA analysis were taken to test for kinship between individuals, and stable isotope analysis was performed for the reconstruction of diet, origin and age of weaning. Probable identification could only be achieved for the individuals with contextual information; however, the bioarchaeological analyses are still ongoing.

The coffin ornamentation and inscriptions as well as the garments show chronological changes as well as individual preferences from the 17th to 19th century, most distinctive in the children burials. Faith in God and hope of resurrection remain constant attitudes to death, but familial affiliation becomes an important factor in early modern noble burials.

Keywords: crypt, burial, mummy, post-medieval, nobility

Streszczenie

Pochówki w kryptach z kościoła klasztornego w Riesie (Niemcy) – zmieniające się zwyczaje pogrzebowe, sposoby postępowania z ciałem i podejścia do śmierci

Kościół klasztorny w Riesie (Saksonia, Niemcy) posiada dwie krypty grobowe, wykorzystywane od XVII do XIX w. przez miejscowe rodziny szlacheckie, w tym baronów von Felgenhauer, Hanisch/von Odeleben oraz von Welck. Krypta pod ołtarzem pierwotnie

zawierała 50 pochówków, z których 30 dotrwało do czasów współczesnych w formie trumien i/lub mumii, a krypta północna zawierała osiem pochówków.

Na przestrzeni ostatnich dwóch wieków w kryptach zaszły ogromne zmiany, które udało się po części zrekonstruować w oparciu o zapisy historyczne, zdjęcia oraz historię ustną. Celem badań prowadzonych przy wsparciu parafii i muzeum miejskiego było udokumentowanie obecnego stanu zachowania oraz identyfikacja pochówków poprzez łączenie różnych rodzajów dowodów.

Trumny zostały poddane inspekcji wzrokowej i datowane w oparciu o porównania typochronologiczne, a ponadto w miarę możliwości dokonano transliteracji inskrypcji. Materiały, sposób wytworzenia, typ i datowanie odzieży zostały ustalone w ramach analizy kostiumologicznej. Zmumifikowane szczątki poddano badaniom morfologicznym, w tym prześwietleniom rentgenowskim. Zaobserwowano różne sposoby postępowania z ciałem, prowadzące do naturalnej lub sztucznej mumifikacji. W wybranych przypadkach pobrano próbki do analizy DNA, aby sprawdzić stopień pokrewieństwa. Przeprowadzono też analizę izotopów stabilnych celem ustalenia diety, pochodzenia i wieku odstawienia od piersi. Prawdopodobną tożsamość można było ustalić wyłącznie w przypadku osób, dla których dostępne były informacje kontekstowe. Niemniej jednak trwają wciąż analizy bioarcheologiczne.

Zdobienia trumien i inskrypcje, jak również odzież odzwierciedlają zmiany chronologiczne oraz indywidualne preferencje z okresu od XVII do XIX w., co jest szczególnie widoczne w przypadku pochówków dzieci. Wiara w Boga i nadzieja na zmartwychwstanie pozostają stałymi elementami podejścia do śmierci, jednakże we wczesnonowożytnych pochówkach szlacheckich istotną rolę zaczynają odgrywać więzy rodzinne.

Słowa kluczowe: krypta, pochówek, mumia, czasy pośredniowieczne, szlachta

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Research in the Crypts of the Church of Saint Francis of Assisi in Cracow

Introduction

The Church of Saint Francis of Assisi is a part of a monastic complex of the Order of Friars Minor located in the Old Town in Cracow in All Saints Square and in Franciszkańska Street. It was built of brick, with stone in decorative and architectural details. It is oriented, and today it consists of a chancel, a transept, a nave, and three chapels (of Blessed Salomea, of the Passion of Christ, and of Our Lady of Sorrows). It dates back to the thirteenth century, when Friars Minor came to Cracow in 1237 and started building a church that was consecrated in 1269. Some researchers consider the Cracow Voivode Teodor Gryfit, called Czader, the first founder of this church (Labuda 1983: 369–381). However, according to Jan Długosz, the founder was a Piast Duke Bolesław V the Chaste (Długosz 1864: 463; 1973: 548–549). The oldest, eastern part of the church was built on a plan of a Greek cross (Niewalda, Rojkowska 2006: 81–130; 2008: 271–298). The main body, as it looks today, was most probably added to the eastern cross part in the third quarter of the thirteenth century. In the fifteenth century, the church was extended, prolonging the chancel by two spans and enclosing it from the east with a three-sided apse. At the northern wall of the chancel, a chapel of the guild of carpenters and bricklayers was erected, and in 1674 it was dedicated to Blessed Salomea (Kantak 1937: 56). In the fifteenth century, cloisters were completed, connecting the church, chapels, and monastery building to form a whole. Over the centuries, the church underwent a number of alterations and changed its appearance. These changes were caused by, among others, multiple fires (1436, 1476, 1655, 1850). For example, after the fire in 1655, the interior became baroque and the space was divided into the central nave and a closed chapel in the north (today's Chapel of the Passion of

Christ). Separation of the northern nave rearranged the space, creating a one-nave church with a transept made of side cross arms.

The most damaging was the fire in 1850, and restoration after it caused considerable stylistic changes including introduction of neo-Gothic and pseudo-Romanesque elements. Some beautiful polychrome paintings of Stanisław Wyspiański appeared on the church walls, and huge window openings were covered with stained glass by the same author.

The aim and the course of the research

Recent years have seen a growing interest in opening vaults hidden under church floors. The activities undertaken are not always carried out with proper care and diligence, and the artefacts discovered are not always analysed using specialist techniques. We decided to run a project that would allow to demonstrate the complexity and multifaceted character of research conducted in vaults, and to carry it out on different planes using modern equipment.

We were able to implement this plan thanks to funding from the National Science Centre[1]. Under this project, archaeological research was carried out in 2017 and 2018 in the Church of Saint Francis of Assisi with the aim to locate, inventory, and explore crypts, and particularly to study the burials and grave goods. The work was directed by Professor Anna Drążkowska from the Institute of Archaeology of Nicolaus Copernicus University in Toruń, who picked a team of researchers including representatives of many disciplines to fulfil the aims of an interdisciplinary project. Thanks to this, Polish crypts and burials were explored as thoroughly and comprehensively as never before.

Research in the Cracow church posed a great challenge to archaeologists as most crypts were not marked on the floor. This made it possible to test different modern devices and search methods.

During the first stage of research, for cognitive reasons, as many as three different sets of georadar equipment were used for field surveys: a Swedish Ground Explorer (GX) georadar manufactured by Mala/ABM with a monostatic antenna with central frequency of 450 MHz (HDR – High Dynamic Range), a VIY-300iw set manufactured by a Ukrainian company Transient Technologies with a monostatic antenna with frequency of 300 MHz, and a Swedish U-Explorer georadar manufactured by Geoscanners AB, also with a monostatic antenna with nominal frequency of 300 MHz. The georadar exploration was carried out in the available

1 "Crypts in the Church of Saint Francis of Assisi in Cracow in Interdisciplinary Research" project funded by the National Science Centre as part of the OPUS 12 competition (registration number: 2016/23/B/HS3/01910).

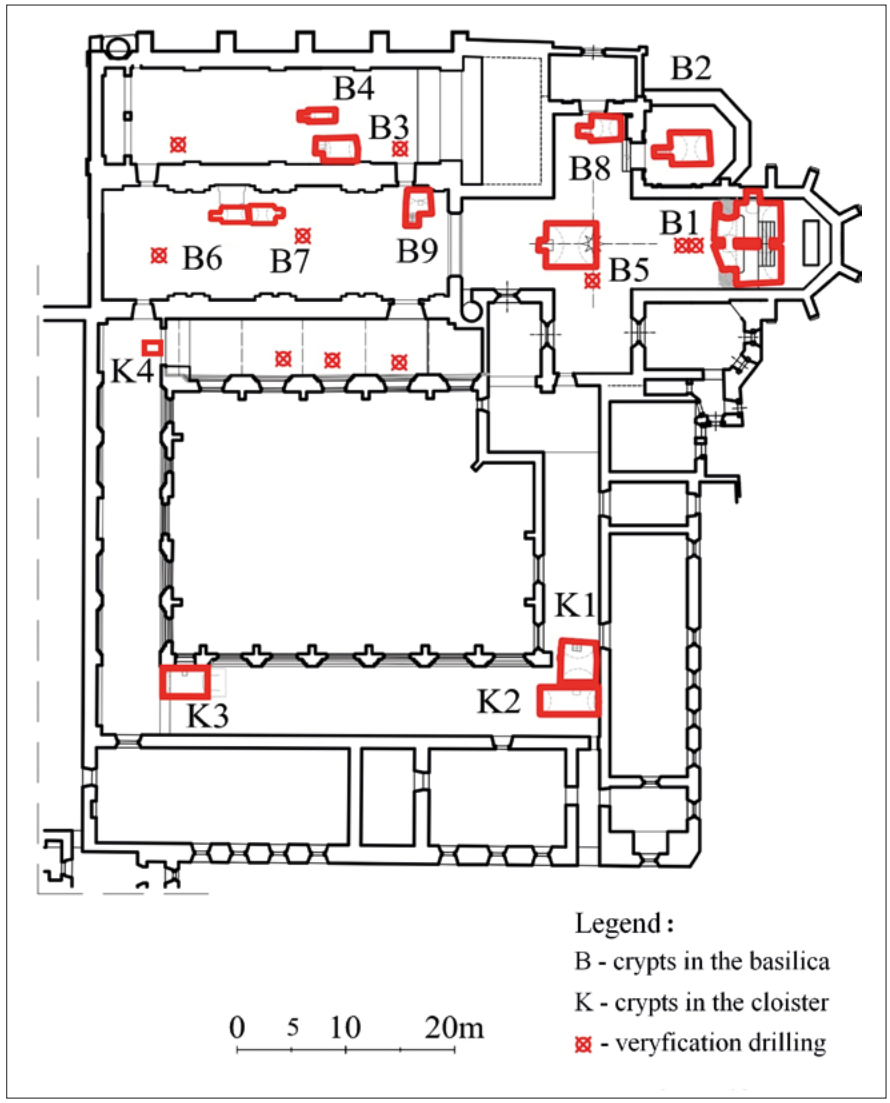

Fig. 1. The layout of the Church of Saint Francis of Assisi and the Franciscan monastery, with the location of crypts and boreholes (prepared by S. Cechosz, Ł. Holcer).

section of the basilica (the chancel, the transept, the nave, and the chapels) and in the cloisters (Łyczak et al. 2018: 357–372). The fixed furnishings of the church, meaning connected heavy pews, confessionals, choir stalls, and the scaffolding in some of the cloisters, slightly limited the extent of the survey. The results of investigations using three different devices were rather similar (Welc et al. 2020)

and, after analysis of registered anomalies in sections and time sections, they allowed to identify crypt locations. However, the largest amount of information and high-resolution time sections were obtained thanks to the use of the Ground Explorer georadar manufactured by Mala/ABEM. The locations identified were compared with two archival plans (1908, 1922) of the church and the monastery, drawn up by Fr. Alojzy Karwacki, who marked the locations of all graves, tombs, crypts, altars, and epitaphs he was aware of in 1908 (Karwacki 1908; 1922: 543–545). Most of the crypts indicated on the plan were provisionally matched with the registered geophysical anomalies. Apart from that, comparison of non-invasive research results with preserved documents made it possible to find underground vaults not mentioned in archival sources, such as the crypts under the Chapel of the Passion of Christ (B3 and B4).

The next stage involved confirmation of the location of underground vaults using an inspection camera, which was also to determine the state of preservation of the crypts and the coffins. Another purpose of such non-invasive research was to establish where the flooring had to be removed to get through to the crypts. It was very important as the Franciscan basilica is strictly protected, which is why only five floor tiles (30 x 30 cm) could be removed at a time, and the place where the hole was made had to be covered with a tent.

Thanks to all these non-invasive methods, we were able to locate eighteen crypts (Fig. 1). Apart from that, the location of four crypts was known thanks to gravestones covering them. Thirteen crypts were opened, but only twelve sepulchral vaults were investigated: nine in the basilica (B1–B9) and three in the cloisters (K1–K3)[2].

The remaining underground stone vaults (9) could only be investigated using non-invasive methods, analysing and assessing them based on inspection camera images taken through small-diameter boreholes. Some of them were filled with rubble but the sepulchral function was confirmed in all cases.

Before the beginning of the exploration, the team of archaeologists came up with procedures that would ensure that all specialist analyses were correct and could be compared. This also allowed to maintain order and to bear in mind other tasks that were to be performed in all crypts later.

Before the exploration started, samples for microbiologists were collected and then – after the disinfection of the crypt – photographic and drawing documentation was drawn up. Then, thanks to modern technical solutions offered by ground 3D laser scanning, imaging measurement methods were employed to

2 The crypts under the floor of the basilica we entered were marked with the letter B and numbers from 1 to 9 in the order of opening. The crypts in the cloisters were marked with the letter K and numbers from 1 to 4. The K4 crypt in the cloisters was full of bones and had served as an ossuary.

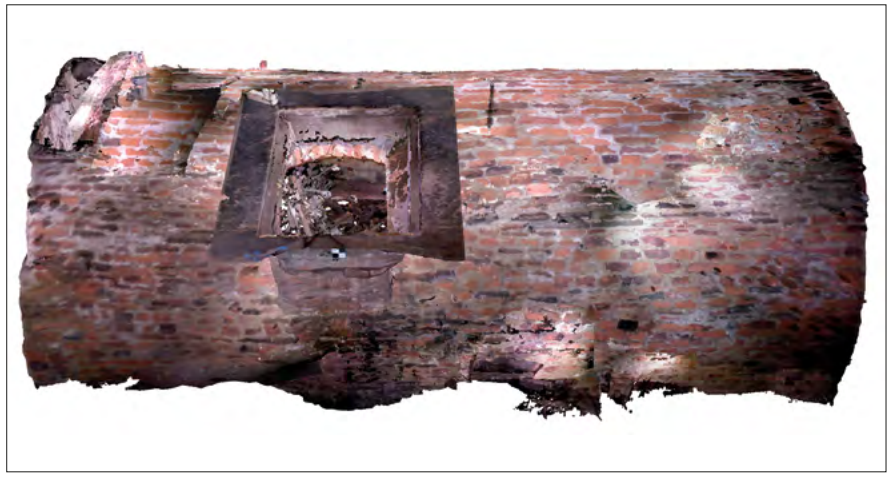

Fig. 2. A 3D model of the K2 crypt in the eastern wing of the cloisters (prepared by J. Curyło).

inventory the crypts, devised by two independent teams using different equipment and analysing the data obtained in different ways[3].

The scanners used included: time-of-flight Z+F Imager 5010C, Faro Focus 3D and S150 manufactured by FARO. In order to supplement and improve the image quality in some inaccessible crypts, a digital camera and photogrammetric 3D model rendering were used. Thanks to this, fully metric models were created offering complete, accurate rendering of the structure and the shape of the objects (Fig. 2), preserving their dimensions, proper location, and reproducing the smallest details, the size of bricks on the walls and the ceiling, decorative details of coffins (Fig. 3) as well as details of the clothing of the dead. The point clouds obtained provided a basis for further detailed analyses and can be used for various purposes. For example, they allowed to create an interactive virtual tour of the crypts that, as soon as the research ended, once again became inaccessible and covered with flooring.

Apart from that, the imaging measurement method was employed to inventory the whole church, thanks to which its detailed 3D model was created, allowing to prepare an animation showing the crypts and their layout.

After the end of the documentation work described above, coffins, burials, and goods were inventoried, and samples were collected to be analysed by various scientists (e.g. fragments of bones, fabrics, lace, and plants).

3 One team came from the AGH University of Science – Antoni Rzonca and Maciej Bernaś, the other team included Jakub Curyło from the Cybid company.

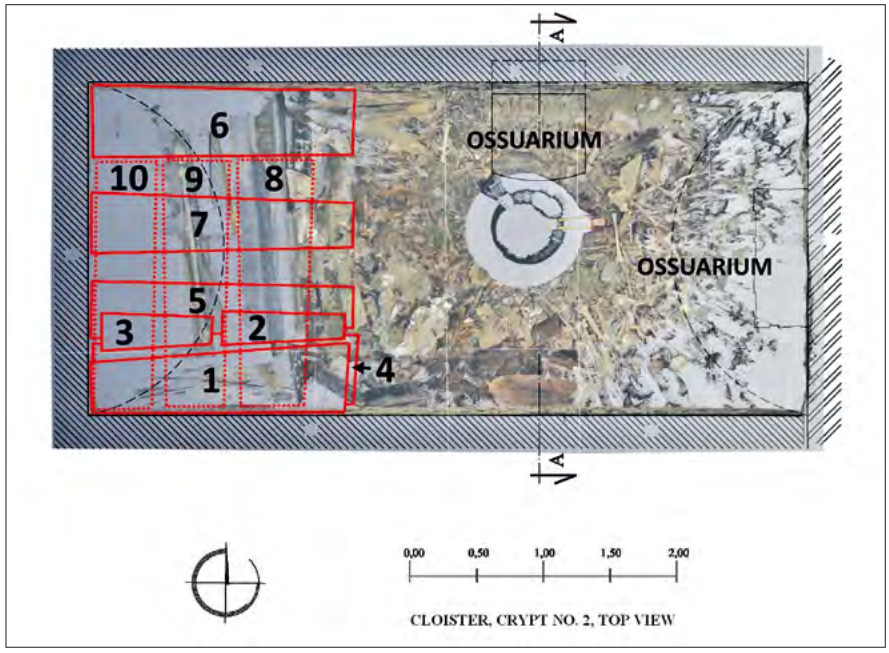

Fig. 3. The arrangement of burials in the K2 crypt located in the eastern wing of the cloisters, based on an orthoscan (prepared by J. Curyło).

General research results

Based on exploratory and non-invasive research, it was determined that the crypts under the Franciscan basilica had no dense spatial arrangement in architectural terms and they were not connected. Neither were they designed at the same time, which is why their layout seems rather chaotic. This is also indicated by the fact that crypts were built in places occupied by previous masonry structures for burying the dead. The location of a grave, as in any other church, depended on the rank and the financial situation of the dead. Most of the crypts found date back to the seventeenth and the eighteenth centuries. All are made of brick, with barrel vaults. Those buried under the floor of the Franciscan church included the founders of the church and the monastery, monks and nuns, members of eminent noble families, and wealthy citizens of Cracow.

In the crypts opened, the researchers found and inventoried 96 burials in 95 wooden painted (41) or upholstered (55)[4] coffins (Fig. 4). In one case, in the B9 crypt, coffin 11, the remains of two people, a man and a woman, were found. The

4 In the B2 crypt, there was a double coffin.

woman's bones had probably been added when the crypt had been cleaned. In the B1 crypt and in K1, K2 and K4 crypts in the cloisters, apart from coffin burials, there were also ossuaries. The K4 crypt was filled with bones.

The number of burials was different depending on the crypt. This, to a large extent, resulted from different dimensions of the vaults. In a majority of cases, they had up to twenty coffins. Most burials (26) were found in the B5 crypt, while the B4 crypt under the floor of the Chapel of the Passion of Christ had only one burial. Due to the poor state of preservation, only some of the skeletons were subjected to anthropological analysis. There were 40 men, 14 women, and 18 infants 1 children buried in the vaults. It was impossible to determine the sex of 24 skeletons. Most of the dead were lying in accordance with the Christian burial tradition, in anatomical supine position, along the east-west axis, with the head towards the west.

A significant problem during the research was the identification of the dead, so most of them remained unidentified. Names were only found on two coffins.

Under the chancel in the B1 crypt, in coffin no. 2, the remains of guardian Reverentissimus Pater Magister Teofil Nowakowski were found, and in the B3 crypt, in coffin no. 2, under the floor of the Chapel of the Passion of Christ – the remains of 'Woiewodziwic Poznaski' (Poznań Voivode) Fran.[ciszek] Bętkoski, who died in 1789. On other thirty-two coffins, initials, dates, and, in a few cases, also coats of arms (B2\1 – Leliwa coat of arms, B3\2 – Ostoja coat of arms, B6\1, B6\5 – probably Odyniec coat of arms, B8\1 – Jastrzębiec, B9\13 – probably Sas) were painted or imprinted with nails. Only in one case, the buried person was identified using

Fig. 4. Coffins from the B3 crypt under the Chapel of the Passion of Christ (photograph by J. Curyło).

archival sources based on the initials on the chest XWW: Rev. Wincenty Wyszkowski (the B9 crypt, burial 1). When determining the identity of the dead, the researchers also tried to use the plans drawn up by Alojzy Karwacki in 1908 and 1922, where the monk marked the location of the crypts, with information who was buried in them: B1 – *the tomb of provincials*, B2 – *the grave of the Zborowski family*, B3 and B4 – not marked on the plans, B5 – *the grave of the Przyłęcki family*, B6 – *the grave of the Gielec family*, B7 – unknown, B8 – *the grave of the Brzechwa family*, B9 – *the grave of the Bełchacki family*. When it comes to the identification of the crypts in the cloisters, the plans only provided information about the K2 crypt – *presumably the grave of sisters of Saint Clare; rotten coffins, and the bodies have veils around their heads*. However, when the crypt was opened, it turned out only the lay were buried there.

The coffins found in the Cracow crypts contained all kinds of goods. The largest collection included clothes of the lay and the clergy with accessories (131) found in the case of 62 burials. The 74 items for the lay included shirts, a national Polish costume[5], women's and children's dresses, an apron, trousers, and habits of members of the archbrotherhood. Most clothes were made of silk, with a few items of wool and linen preserved in small fragments. The clothing was analysed by costumists, and the fabrics were analysed by technical and technological specialists. Also the dyes used were analysed. The results indicate that the grave clothes were of different colours: red, blue, green, and yellow, with only a few black items.

Another large collection found in 46 chests consisted of pillows and mattresses (23). The dead were also given devotional items: scapulars (26), rosaries (26), crosses made of wood (17) and metal (8), medallions (17), rings (4), one holy picture, and a reliquary. Garlands of natural flowers were found in four graves of children and one of an adult woman. Bunches of fresh flowers were found in sixteen coffins.

To sum up, apart from the above information, an exceptional value of the research carried out in the Cracow crypts lies in the fact that one project allowed to conduct a very detailed non-invasive (georadar) investigation, testing the usefulness of different devices, and the results obtained could be correlated with the results of archaeological and architectural work. Based on that, apart from the location of the crypts, it was possible to register the remains of the foundation walls of old above-ground structures, which is important for the determination of architectural changes undergone by the church and the monastery.

5 The collection is represented by as many as 20 items: 13 *żupans*, 2 items of *czechman*, 2 pairs of trousers, a feryaz, a *kontusz*, and one national costume preserved in small fragments.

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Summary

Research in the Crypts of the Church of Saint Francis of Assisi in Cracow

The paper presents the results of archaeological research carried out from 2017 to 2018 in the Church of Saint Francis of Assisi in Cracow, funded by the National Science Centre. The aim of the work undertaken was to locate, inventory, and explore crypts, and to study in detail burials and grave goods. The paper discusses different devices, research methods, and procedures developed by the team and used to locate crypts. They allowed to find

eighteen crypts in the church and four in the cloisters. All underground chambers were inventoried using 3D laser scanning. During research, ninety-six burials of the lay and the clergy, men, women, and children, were found.

Keywords: research in crypts, Cracow, funeral culture

Streszczenie

Badania w kryptach kościoła św. Franciszka z Asyżu w Krakowie

W artykule zaprezentowano wyniki badań archeologicznych prowadzonych w latach 2017–2018 w kościele św. Franciszka z Asyżu w Krakowie, które finansowane były przez Narodowe Centrum Nauki. Celem podjętych prac było zlokalizowanie, inwentaryzacja i eksploracja krypt grobowych oraz szczegółowe przebadanie pochówków wraz z wyposażeniem. Omówiono różne urządzenia użyte do poszukiwań krypt, metody badań i wypracowane przez zespół procedury. Dzięki nim odnaleziono osiemnaście krypt w kościele i cztery w krużgankach klasztoru. Wszystkie podziemne pomieszczenia zostały zinwentaryzowane za pomocą skaningu laserowego 3D. W trakcie badań odnaleziono 96 pochówków osób świeckich i duchownych, mężczyzn, kobiet i dzieci.

Słowa kluczowe: badania w kryptach, Kraków, kultura funeralna

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The Fate of the Remains and Funerary Equipment of Czech Rulers and Their Family Members

Introduction

Prague Castle was the most important burial site of the Czech rulers and their relatives. The graves are located in the Church of the Virgin Mary (Spytihněv I †915 and his wife), in St. George Church and Convent (St. Ludmila †921; Boleslaus II †999; Vratislaus I †921; Oldřich? †934), and, in the greatest numbers, in St. Vitus Rotunda, which later became St. Vitus Basilica (St. Wenceslaus †935; Boleslaus I? †971; Bretislaus I †1055; Spytihněv II †1061; Bretislaus II †1100; Bořivoj II †1124; Ottokar I †1230; Rudolph I Habsburg †1307; Ottokar II †1278). In 1373, these remains were transferred to the chancel chapel of the newly constructed Gothic cathedral.

As Emperor Charles IV intended to make St. Vitus Cathedral the final resting place for himself and his family, he had a masonry crypt built in the chancel, where his family members, the emperor himself and finally the kings of Bohemia from the 15th and 16th centuries were buried. Construction was launched in 1566 on a new royal crypt, the subterranean part of which was expanded to include a mausoleum on the ground level. The remains of the kings and their family members were moved here in 1580 (Blanche of Valois †1348; Anne of Bavaria †1353; Anna von Schweidnitz †1362; Charles IV †1378; Joanna of Bavaria †1386; Elizabeth of Pomerania †1393; John of Görlitz †1396; Wenceslaus IV †1419; Ladislaus the Posthumous †1457; George of Podebrady †1471; Eleonora †1580; Rudolph II †1612);

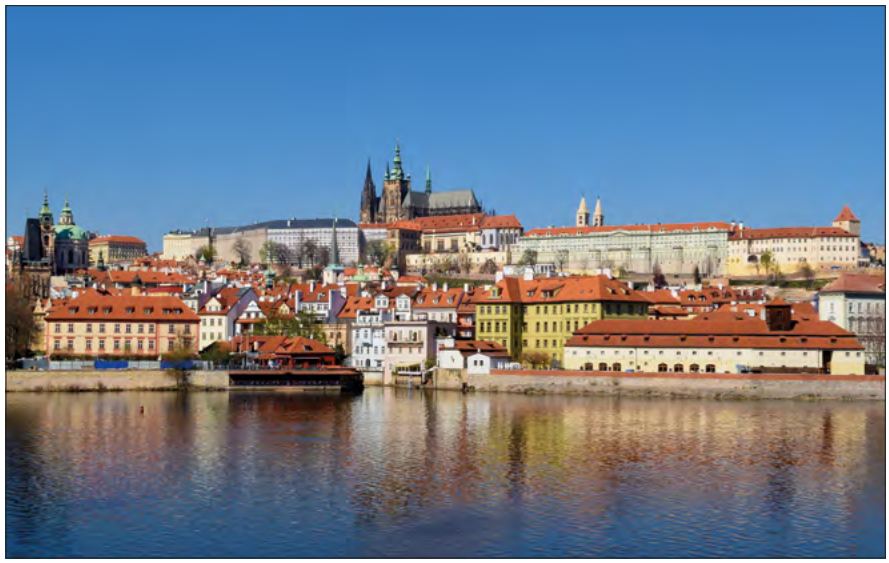

Fig. 1. Prague Castle. © Markéta Březinová.

Renaissance rulers were buried in the mausoleum (Ferdinand I †1564; Anne of Bohemia and Hungary †1547; Maximilian II †1576).

Reliquary tombs of the most important Czech patron saints are also located at Prague Castle: St. Ludmila in St. George Basilica, St. Wenceslaus, St. Adalbert and St. John of Nepomuk in St. Vitus Cathedral and St. Procopius in All Saints Church.

We also know the graves of 12 Prague bishops (Šebíř †1067; Gebhart †1090; Kosmas †1098; Menhart †1134; Jan I †1139; Daniel I †1167; Friedrich von Putelendorf †1179; Valentin †1182; Ondřej †1223; Jan II †1236; Bernard †1240; Mikuláš von Riesenburg †1258; Jan III from Dražice †1278; Tobiáš from Bechyně †1296; Řehoř Zajíc from Valdek †1301; Jan IV from Dražice †1343) that were originally located in the St. Vitus Rotunda and Basilica. Their remains were brought to the chancel of St. Vitus Cathedral in 1374 (for instance Bravermanová 2005; Lutovský, Bravermanová 2007; Bravermanová 2016).

Opening the graves and handling the remains

The majority of the aforementioned graves have been opened several times in the past for a variety of reasons, mainly because a better and more dignified location was sought and the disintegrating coffins were replaced by more lavish and durable sarcophagi. Graves were also opened in many cases due to reconstruction on the actively used grounds of Prague Castle. A turning point in this respect did not come

Fig. 2. Remains of Spytihněv I and his wife in the Church of the Virgin Mary (according to Vlček 1997: 87).

until the 20th century (Lutovský, Bravermanová 2007: 7–8). When the royal tomb in St. Vitus Cathedral was opened and remains were removed in 1928, the aim was still to build a more dignified space for their deposition (Hilbert et al. 1928–1930). However, subsequent activity was guided more by the pursuit of archaeological and anthropological knowledge (Borkovský 1975; Bravermanová, Otavská 2013; Frolík et al. 1988; Matiegka 1932; Smetánka et al. 1986; Vlček 1997; 1999; 2000).

The reliquaries of the saints met a slightly different fate: their opening in the past was connected with the canonisation process and with interest in the relics. The St. Wenceslaus reliquary and its surroundings were investigated in the early 20th century, at which time the first anthropological study was also conducted (Podlaha 1911). This then became the impulse for the later opening of the St. Adalbert, St. Ludmila and St. Procopius reliquaries (Bravermanová 2006; Vlček 1995).

The repeated opening of graves, the handling of remains and their transfer caused various problems, the most serious of which involved the confusion of relics. One of the first such cases was recorded as far back as the 14th century by chronicler Beneš Krabice of Weitmil, who described the situation in the context of the construction of the Gothic cathedral (Beneš Krabice z Weitmile 1884:

Fig. 3. Remains of St. Ludmila in the St. George Church (according to Vlček 1997: 69).

547–548). Relics were also mixed during the modern investigation of the tomb of Bretislaus I, his wife Jitka and son Spytihněv II in 1978 and 1983 (Frolík et al. 1988). In 2002, only children's and female skeletal remains were removed from the tomb of Bretislaus II instead of the anticipated male remains (Bravermanová, Otavská 2013). Also mixed at some point were the remains of the four wives of Charles IV, which were apparently placed in a single coffin in 1612 during the deposition of the large sarcophagus of Rudolph II in the royal crypt (Matiegka 1932). The final case that can be mentioned is the opening of the reliquary of St. Procopius in 1987, at which time it was discovered that none of the preserved relics could have belonged to him. It is therefore evident that during the transfer from the Sázava monastery to Prague Castle in 1588, the authentic relics of St. Procopius perhaps no longer existed (Bravermanová 2005: 104–107).

The manner in which the graves were opened in the 20th century can already be regarded as building-historical and archaeological investigations. However, they were not always conducted in a proper manner, despite the fact that archive sources related to these activities mention the names of professionals. The tombstone of St. Wenceslaus was studied with relative care in 1911 (Podlaha 1911) and

Fig. 4. The Royal Tomb in 1928 (according to Hilbert et al. 1928–1930: 245).

the opening of the bishops' graves in 1928 was conducted with similar attention (Bravermanová 2004). However, the opening of old coffins and the removal of remains and grave furnishings from the royal crypt in the same year was far more problematic, with those performing this work failing to compile documentation in greater detail or to describe the content of individual coffins (Lutovský, Bravermanová 2007: 154–158).

The archaeological excavation of the Church of the Virgin Mary in 1950 (Borkovský 1953) and the St. George Basilica and Convent in 1959–1962 (Borkovský 1975) was conducted on the highest professional level for the period, including work in the field, the removal of remains and grave goods, as well as the documentation of all methods and discovered artefacts.

Anthropological study

The first systematic anthropological investigations were conducted at the beginning of the 20th century. The foundation of the research was morphology, i.e. a description of the individual parts of bones, the identification of possible anomalies and

Fig. 5. Remains of Ferdinand I, Maximilian II and Anne of Bohemia and Hungary in the Renaissance mausoleum (according to Vlček 1997: 82).

Fig. 6. Mixed up remains from the coffin of Czech queens (according to Vlček 1999: 210).

an evaluation. One interesting method was an attempt to determine which skull and skeleton in the common coffin in the royal tomb belonged to which queen (Matiegka 1932). In addition to comparing the age of skulls and skeletons with their age at death, the method of superimposing the skulls on the busts on the triforium in St. Vitus Cathedral, of which it is said that they have very realistic traits, was also employed at the time (Matiegka 1932: 5, 13; Vlček 1999: 213). The remains of nearly all historical personalities buried at Prague Castle were available for another anthropological study conducted in the 1960s. Although more modern methods were utilised, the basis of the work was again morphology. Gustafson's method for determining age based on the condition of teeth was used for the first time (Vlček 1997). And yet, the interpretations often did not agree with historical information and triggered considerable debate. This method is now rejected by even anthropologists themselves (Sláma 1983; Brůžek, Novotný 1999).

Topics currently being addressed include a reconstruction of diet using analyses of stable nitrogen and carbon isotopes, the verification of residential mobility by means of analyses of strontium isotopes and the radiocarbon dating of selected samples. If possible, historical DNA is also analysed using methods of identification genetics enabling the classification of skeletal remains into family lines and the determination of family relationships between studied individuals (for instance, Bravermanová et al. 2018). The results of these new investigations are in process and continuously published (Frolík, Kaupová 2016; Votrubova et al. 2017; Kaupová et al. 2018; Saunders et al. 2019).

However, proving to be highly debatable are investigations in which archaeologists did not assist anthropologists in the opening of graves and tombs, as was the case in the 1970s with the Renaissance mausoleum (Documentation on inv.

no. PHA 24–26) and the tomb of Bretislaus I and Ottokar I in St. Vitus Cathedral and in 1974 with the important princely grave known as K1 in the former St. Vitus Rotunda (Frolík 2005: 32). In contrast, the investigations of the tomb of Spytihněv II in 1983 (Frolík et al. 1988) and Bretislaus II in 2002 (Bravermanová, Otavská 2013) can be described as work conducted in a modern manner.

Care of grave goods

In the past, removed grave goods did not receive proper care for the most part, mainly due to a lack of understanding as to what constituted correct procedures for handling artefacts deposited for years in the unsuitable conditions of graves and tombs (Bravermanová et al. 2011). For example, many grave goods were not adequately labelled following their removal, e.g. the furnishings of the graves of the Prague bishops. In 1928, the objects were placed in glass frames, often with several units grouped together, but the frames were not adequately labelled. When the textiles and leather artefacts were handed over for restoration in 1985, documentation of their initial condition was not compiled; moreover, the contents of the frames and their inventory numbers were again mixed, resulting in a situation in which the "artefacts were missing their bishop and the bishops were missing their grave goods". It was not until 2005 that all the preceding work was revised and a new interpretation was attempted (Bravermanová 2004).

The handling of the inventory of the royal tomb was similarly problematic. For example, soon after the opening of the crypt in 1928, a ring with amethyst retrieved from the common grave of Charles IV's wives was lost (Lutovský, Bravermanová 2007: 158). The situation surrounding textile finds is very complicated: the coffin from which these remnants of funeral robes and clothing accessories came from was not recorded. Although the concise publication released in 1937 provides a description and art history interpretation of twenty patterns, no effort was made to identify the discovered fabrics with the clothing of specific individuals (Gollerová-Plachá 1937).

Further confusion and especially losses occurred in the period in which copies of several textiles were acquired, as fragments of the original fabrics were handed over at the time to selected textile schools without proper records. According to a preserved report, a small number of the original textiles were returned in 1937 wrapped in a "single package", which was subsequently forgotten about over time before being discovered again by chance in 1979 (Documentation on the royal tomb; Bravermanová et al. 2005: 476).

The grave goods themselves were often restored in an inappropriate manner. The textiles from the royal tomb and from the graves of the Prague bishops were handed over for restoration in 1985, but the resulting work was highly problematic.

Fig. 7. Funeral jewels from the tomb of Ottokar II (according to Lutovský, Bravermanová 2007).

Chemicals were used to aggressively clean fine fabrics with remnants of gold threads, resulting in the heavy loss of material. A reconstruction of the original form or an interpretation of the entire situation were either not performed or done incorrectly (Bravermanová, Otavská 2000: 410). Finally, a hot iron was used to attach a backing with a polymer to the remarkably fine and precious reliquary textiles of St. Ludmila (Bravermanová, Otavská 2001). The Renaissance clothing was also poorly restored: without accompanying documentation, the robes were cleaned with chemicals typically used for removing rust, individual textile fragments were trimmed with scissors and sewn to a new base with darning yarn (Bravermanová et al. 1994: 439–441).

Although the methods for restoring archaeological metals were perhaps less problematic, mistakes were again made. For example, the funeral jewels of Rudolph I Habsburg were galvanically gold-plated in the 1960s (Documentation on inv. no. K 268–280). Later, wishing to avoid this procedure during their work with the similar jewels of Ottokar II, restorers did not provide any exterior protection to their surface. The jewels very soon began to corrode again (Documentation on inv. no. PHA 30).

Fig. 8. Dress from the tomb of John of Görlitz (according to Lutovský, Bravermanová 2007).

The restoration situation improved significantly after the establishment of restoration and conservation workshops in 2000. Research is now conducted before any measures are taken, and the actual restoration is conservative, with chemicals being use only when it is necessary and justified. The artefacts and methods are documented and conclusions are evaluated and published.

To preserve grave inventories, their deposition in the proper environment with respect to temperature, humidity and light is also extremely important. Protection against harmful insects is also essential. The situation has also improved considerably in this respect in recent years, as new depositories were simultaneously built with the new restoration workshops at Prague Castle. Attention must also be paid to the way the artefacts are displayed, and, recently, architects and heritage administrators have begun to think about how exhibition spaces and the showcases installed in them must meet certain parameters. For example, although the National Museum's historical exhibit opened in 1986 in Lobkowicz Palace at Prague Castle featured impressively massive showcases, because the air was not controlled inside them or in the surrounding room, the funeral jewels of Ottokar II began to corrode soon after the exhibit was opened to the public.

The permanent exhibit "The Story of Prague Castle" opened in 2004 in the Old Royal Palace is already equipped with fully air-conditioned display cases in which both temperature and humidity are controlled.

Conclusion

The opening of graves is problematic and, from an ethical point of view, should be performed only to a very limited extent. Necessary construction work is a common reason for disruption, and in this case remains should be treated with respect. And if grave goods are removed, they must be cared for in a proper manner, as these artefacts are often irreplaceable heritage whose scientific study is a legitimate pursuit. The mere lust for knowledge, often connected with efforts to generate sensation, does not entitle us to disturb the resting place of our ancestors with ill-considered interventions.

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Translated by D.J. Gaul

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Summary

The Fate of the Remains and Funerary Equipment of Czech Rulers and Their Family Members

Prague Castle was the most important burial site of the Czech rulers and their relatives. The graves are located in the Church of the Virgin Mary, in St. George Church and Convent, and, in the greatest numbers in the St. Vitus Cathedral.

Reliquary tombs of the most important Czech patron saints are also located at Prague Castle – in St. George Basilica, in St. Vitus Cathedral and in All Saints Church. We also know the graves of 12 Prague bishops that are located in the St. Vitus Cathedral.

The majority of the aforementioned graves have been opened several times in the past for a variety of reasons, that caused various problems, the most serious of which involved the confusion of relics.

The first systematic anthropological investigations were conducted at the beginning of the 20th century. The remains of nearly all historical personalities buried at Prague Castle were available for another anthropological study conducted in the 1960s. Currently, the research continues with modern nature science analyzes.

In the past, removed grave goods did not receive proper care for the most part, mainly due to a lack of understanding as to what constituted correct procedures for handling artefacts deposited for years in the unsuitable conditions of graves and tombs. The grave goods themselves were often restored in an inappropriate manner. The restoration situation improved significantly after the establishment of restoration and conservation workshops in 2000.

The opening of graves is problematic and, from an ethical point of view, should be performed only to a very limited extent. Necessary construction work is a common reason for disruption, and in this case remains should be treated with respect. And if grave goods are removed, they must be cared for in a proper manner, as these artefacts are often irreplaceable heritage whose scientific study is a legitimate pursuit. The mere lust for knowledge, often connected with efforts to generate sensation, does not entitle us to disturb the resting place of our ancestors with ill-considered interventions.

Keywords: Prague Castle, Czech rulers, funerary equipment, archaeological textiles, Czech patron saints, Prague bishops, anthropological study

Streszczenie

Losy szczątków zmarłych i relikty wyposażenia grobowego czeskich władców i członków ich rodzin

Zamek Praski był najważniejszym miejscem pochówku czeskich władców i ich krewnych. Groby znajdują się w kościele Matki Boskiej, w kościele i klasztorze pod wezwaniem św. Jerzego oraz, najliczniej, w katedrze św. Wita.

Grobowce z relikwiami najważniejszych świętych patronów Czech również znajdują się na Zamku Praskim w bazylice św. Jerzego, katedrze św. Wita oraz kościele Wszystkich Świętych. Wiemy także o grobach dwunastu praskich biskupów w katedrze św. Wita.

Większość wspomnianych grobów otwierano już kilkukrotnie w przeszłości z różnych powodów, co przysporzyło różnego rodzaju problemów, spośród których najpoważniejszym było mylenie relikwii.

Pierwsze systematyczne badania antropologiczne przeprowadzono na początku XX w. Szczątki niemal wszystkich postaci historycznych pochowanych na Zamku Praskim zostały udostępnione do innego badania antropologicznego przeprowadzonego w latach 60. XX w. Obecnie trwają dalsze badania obejmujące nowoczesne analizy w zakresie nauk przyrodniczych.

Wydobyte w przeszłości wyposażenie grobowe w większości przypadków nie było należycie traktowane głównie ze względu na brak świadomości prawidłowych procedur postępowania z artefaktami, które wiele lat spędziły w nieodpowiednich warunkach panujących w grobach i grobowcach. Wyposażenie grobowe często było konserwowane w nieprawidłowy sposób. Poziom konserwacji znacznie wzrósł po tym, jak w 2000 r. powstały warsztaty renowacyjno-konserwatorskie.

Otwieranie grobów jest problematyczne, a biorąc pod uwagę kwestie etyczne, powinno do niego dochodzić wyłącznie w ograniczonym zakresie. Częstym powodem są konieczne prace budowlane i w takich przypadkach należy okazywać szczątkom należyty szacunek. Z kolei z wydobywanym wyposażeniem grobowym należy postępować we właściwy sposób, gdyż artefakty te często stanowią niezastąpione dziedzictwo, które należy poddawać naukowym analizom. Sam głód wiedzy, często związany z próbą wywołania sensacji, nie upoważnia nas do zakłócania miejsc pochówku naszych przodków nieprzemyślanymi działaniami.

Słowa kluczowe: Zamek Praski, władcy Czech, wyposażenie grobowe, tekstylia archeologiczne, czescy święci patroni, biskupi prascy, badania antropologiczne

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Functional Analysis of Garments in 18th Century Burials from St. Michael's Crypt in Vienna, Austria

Introduction

Crypt research is some specific aspect of archaeological research. Similar to research on prehistoric and historic cemeteries we work with artefact analysis, anthropology, and written sources to get socio-historical information about the people buried. Material analysis, typology and others tell us about the material culture involved to understand burial customs. Textile material from crypts belong to specific artefact groups. Due to certain circumstances, the environmental conditions in crypts often favour the preservation even of organic material. Such, we have many details that are lost on other cemeteries. In good cases we have complete garments, such as in our case study St. Michael's crypt.

There are different research approaches that can be applied to garments found in crypts. Mainly these are aspects of conservation and preparation, followed by studies in costume history (Bravermanová 2010; Hofmann 2010; Ströbl 2013). Another point of view are questions about the functionality (e.g. Lipkin et al. 2015; Vedeler 2010: 255). This includes the interpretation of the costume such as if they are "normal" daily life (or festive) garments or specific funeral costumes.

In this paper, the functionality of the garments found in the coffins is in focus, but also it is our aim to gain information for archaeological textile research in general. The comparison with textiles from crypts is an essential research approach for the understanding of textile remnants from contemporary cemeteries with earth

burials, because organic material obtained from soil burials in Central Europe usually are only fragmented. Such, the inventories from crypts give a glimpse into what is lost in unfavourable conditions. Nevertheless, there is also research needed about what inventories are special in crypts, what we do not have from contemporary cemeteries with earth graves. This especially can be seen in durable materials like metal artefacts that survive both in crypts and earth burials. For our contemporary comparison material from earth graves in this contribution examples from Stephens cathedral in Vienna and St. Pölten Domplatz, both Austria, are discussed (Klammer et al. 2018; *Verstorben, begraben…* 2019; Grömer et al. 2019).

Case study: St. Michael's crypt

The church of St Michael's was built in the second decade of 13th century. In early times a cemetery was located around the church. In 1508 it was closed by the Habsburgian emperor Maximilian I. In consequence the crypt chambers were built successively, to satisfy the needs for burial places (Fig. 1). First there were small separate crypt chambers for noble families. From 1668 on huge crypt chambers were built underneath the main nave and the transept. Following crypts are mentioned in funeral documents of the parish St. Michael: Herrengruft, Spanische Gruft, Pfarrgruft, Vesperbildgruft, Engelsgruft and Maria Candia Gruft. The latter mentioned in 1731 is important for our study, for there are located most of the mummified burials wearing well preserved garments. According to the funeral protocols, the crypt has been used between 1560 and 1784 by the local nobility of the city center in Vienna (*Die Michaelergruft in Wien…* 2005: 117; Youtube Michaelergruft; Homepage Michaelergruft). In 1783 – one year before the final closure of the crypt of St. Michael's – funerals were forbidden in the center of Vienna by decree of the Austrian emperor Joseph II.

Fig. 1. Vienna, St. Michael's crypt (© Pfarre St. Michael).

Fig. 2. St. Michael's crypt: coffin 83 before and after cleaning treatment (after Gengler 2018).

Still, around 250 coffins (among them 33 metal coffins, the others are wooden coffins) are kept at the crypt *Die Michaelergruft in Wien…* 2005: 31). The inventory of a number of coffins has been preserved due to favorite environmental condition. Such, it offers the possibility to study specific details about the funeral customs of the 17th and 18th century in Central Europe. Selected burials dating to the 18th century from the Michaelergruft serve as case studies for developing new theoretical and methodological approaches in investigating the textiles and garments found in the coffins.

Modern investigation of the inventories of St. Michael's crypt started in 2004 due to a weevil infestation (*Penthartrum huttonii*) caused by drastic climate change in the Michaelergruft. An attempt was made to stabilize the climate by installing an air conditioning system and reopening the air shafts, which originally led to the natural mummification of many dead people and were walled up in the beginning of the 20th century.

In addition, 50 coffins were restored. The conservation treatments were carried out from 2009 to 2013 in seven batches (Fankl 2014). After provisional relocation of the coffin contents, endangered objects were temporarily removed from the crypt, and the coffins were roughly cleaned and conditioned for 3 weeks on workshop climate. In general the wooden parts had to be consolidated with synthetic resin. A mayor problem were the powdering paint layers on the coffins. They had to be consolidated and cleaned afterwards to keep the pigments in place. After conservations treatment, the bodies with their garments and burial gifts were returned to their original, conserved coffins. As some of the coffins still are on display and open for the public in the crypt, some last cleaning treatments (Fig. 2) of the textiles have been carried out in 2018/2019 (Gengler 2018).

In the course of conservation, 50 coffins were documented in detail: The preservation of fibers is unusual, since silk is very good, linen is moderate and wool is not preserved (Ullermann 2005). As a result, women's burial garments made of silk have been preserved. Some men's garments like suit coats (Justaucorps) and breeches, which were made of wool, did not survive and sometimes can only be seen due to the silk lining material of the garments. Remnants of patterned silk velvet could only be found in the metal coffins the aristocratic tombs. The more or less complete garments found in the coffins of St. Michael's crypt correspond essentially to the fashion of the middle, or second half of the 18th century (before 1784).

In addition to funerary clothing, numerous grave goods of religious content were found (Mais 1954), e.g. rosaries and/or hand crosses are present in almost each coffin. These could be made of cheap material especially for the funeral (hand crosses made of wax cords), as well as made of precious materials such as elaborate hand crosses made of wood with mother of pearl inlays or rosaries from jet and

semi-precious stones. In addition, pilgrimage plaques mainly on rosaries, prints of images of grace and objects that indicated affiliation to brotherhoods, such as scapulars or brotherhood belts. Further there were several funeral crowns made of rosemary, ornated with flowers of silk and metal. Finally, medically intended objects were found in the coffins, such as applied lead labels and so called *Fontanellenbleche* (Häck, Nehrlich 2016).

Research on the functionality of the garments – criteria

In the following paper, criteria (Fig. 3) are discussed which enable to distinguish between "functional garments" worn also in daily life, "adapted garments" (daily life clothing that has been re-sewn, cut or altered to be used as garment for the dead), and "funeral costumes" that have been deliberately made. For the definition of those criteria, few excellently preserved coffins have been selected, as explained on 3 case studies. The application of those categories to more coffin inventories is aimed for future research.

Searching for criteria that can be a hint for "functional garments" relies on different aspects which tell that those garments also might have been used as wearable costumes in daily life. This includes questions like: Are the buttons and button tapes on garments (e.g. Justeaucorps, vests, women's garments) functional? Can they be closed at the front in a functional way, or are they sewn up and purely as a decor? How is the overall execution of the garments, are there any typical characteristics for everyday clothing as we know them from garments stored in costume collections (see e.g. Baumgarten, Watson 1999; Bönsch 2001; Houze 2015).

Technical characteristics of the garments like characteristic linings, junctions, seams, facings, trimmings are also of interest. For women's gear it has to be examined, if there are functional elements like hooks, eyelets, buttons in the area between chest and hip.

"Funeral costumes" can be determined that the garment clearly could not be worn by a living person, as determined by the criteria for functional garments. Usually those garments are not worn in a correct manner such as daily life garments (e.g. Bönsch 2001), as corresponding dress openings are missing or cannot be opened. The sewn-on garment openings and missing closures are found on vests, Justeaucorps, or women's garments that are usually closed in the front part. The garments are usually just "laid over" the corpse, but hands in sleeves (see also e.g. Lipkin et al. 2015: fig. 20.2). It is some "fake" clothing, having an optically correct image of contemporary typical garments (Hofmann 2010: 33–34).

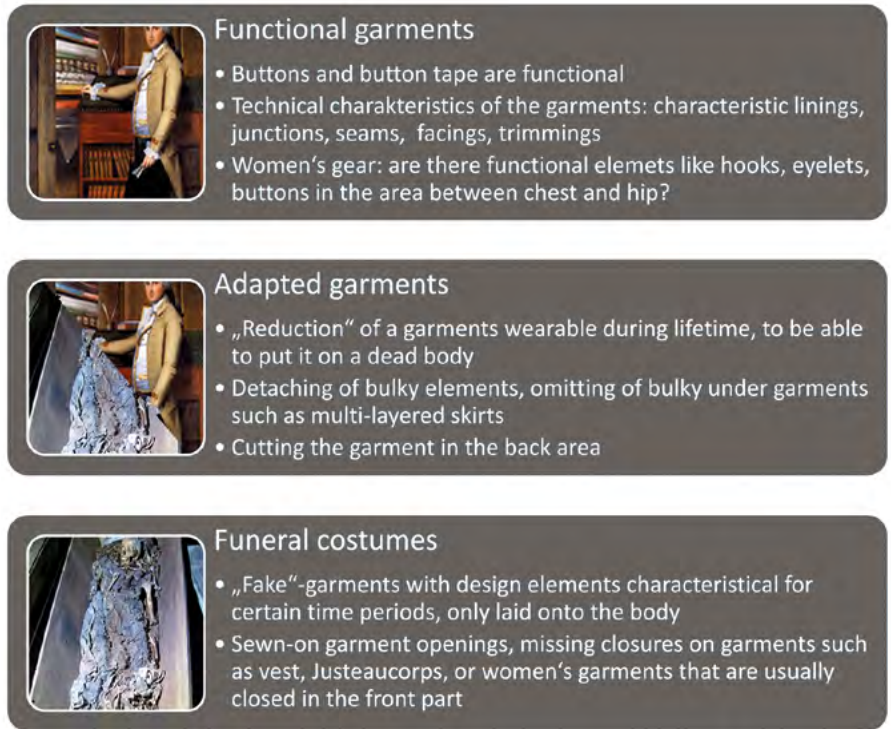

Fig. 3. Criteria for the functional interpretation of costumes found in graves (image: K. Grömer).

We have to differentiate a further category "adapted garments", that lies between the functional garments and funeral costumes. Sometimes a garment wearable during lifetime is "reduced" to be able to put it on a corpse in a coffin. In some cases, bulky elements are detached and bulky under garments are omitted such as multi-layered skirts. One criterium is also that the garment might be cut in the back area to put it on a corpse.

Further criteria that have to be kept in mind are e.g. if the shoes are worn or not – which is recognizable by the soles. Also ribbons and decorative elements are of interest: are the same kind of ribbons used for the decoration of shoes, clothes, bonnets, coffin decoration etc. this could be an indication that a matching ensemble has been made. If we have for example unused shoes with matching ribbons to the garment and maybe also to coffin decoration, and also more hints for deviations from wearable clothing, this might be a funeral costume.

Research on the functionality of the garments – Examples St. Michael's crypt

Example for a "functional garment"

Coffin 88 (Fig. 4)
Mummified man buried in 1769 (Mais, 1954: 258; Gengler 2018). Male corpse lying on wood chips. The man is fully clothed with the time-typical costume. All relevant parts of an mid-18th century costume can be identified: suit coat, shirt, scarf, knee breeches, silk stockings with knitted patterns and buckled shoes, including a wig. So far, a waist coat could not be determined.

The suit coat is made of a woolen fabric. As mentioned before, wool is completely degenerated in that crypt, therefore the top fabric is gone but the design of the dress can be perfectly distinguished by the remaining silk lining. For the same reason the wig was found without hair.

It is a type of a garment ensemble without any perceptible alterations similar to contemporary pictorial sources and ensembles kept in costume collections. In this case, no specially made funeral garment wear was used, but a costume wearable in daily life.

Example for an "adapted garment"

Coffin 83 (Fig. 5)
Female corpse lying on wood chips, buried around 1755 (Fankl 2012: chap. 2.1; Gengler 2018). The gown made of silk tabby looks functional (design of the upper body part, pleats at the bottom of the skirt, which provide room for cross-oval Panniers) to be functional for a wearable dress. This is also underlined by the functional underdress, the bonnet, the leather gloves and the shoes. However, the upper dress is cut open at the back and laid on the body and clothes parts such as pouches/puffs and petticoats are missing (see for 18th century undergarments Baumgarten, Watson 1999: 29–38, 69–71).

The whole ensemble looks like parts of a functional wearable garment ensemble, modified to funeral wear; rich or bulky parts omitted, the dress was cut back to be able to put it on the corpse. It is clear that bulky elements like hoop petticoat skirts had to be removed simply to fit physically into the coffin.

Example for a "funeral costume"

Coffin 147 (Fig. 6)
Woman buried around 1760. The 40–50 years old woman is bedded on wood chips, dressed with a light silk gown. The torso area with the stomacher of the bodice is

Fig. 4. St. Michael's crypt: overview to coffin 88, "functional garments" (photograph by C. Gengler).

Fig. 5. St. Michael's crypt: overview to coffin 83, "adapted garments" (photograph by C. Gengler).

Fig. 6. St. Michael's crypt: overview to coffin 147, "funeral costume" (photograph by K. Grömer).

not closed by hemming or eyelets and held in place, but it is assembled by means of copper needles. Also under garments such as chemise and petticoats are missing, in the upper body area also no corset/*Schnürleib* etc. available (because of lack of accessibility). It looks like a funeral costume that imitates the appearance of a time-typical garment with robing and trimmed stomacher. The dress made of light silk tabby is ornated with ondulating ruffles of punched ribbons.

In this case, no reshaped everyday or festive costume was used, but a deliberately made garment, with certain design features.

Conclusions: Research about functionality

The study presented deals with the question of whether the dead person was buried in a clothing that was wearable during life (as an everyday or probably festive clothing), or if it was a custom-made funeral costume. For this purpose, several criteria for the description and functional classification of the garments found in crypts were presented and discussed on the basis of case studies.

These detailed criteria were chosen to provide textile conservators and textile researchers dealing with garments from tombs with a standardized catalogue of descriptions. This might be elaborated by further research.

Due to observations on many other coffins described in the St. Michael's crypt, it can be stated that men are often buried in functional costumes (but in new shoes), while women are laid to rest in an adapted garment or pure funeral costume.

This may also be due to the fact that representative women's gowns of the upper class of the 18th century, from the St. Michael's vault, are also very expansive

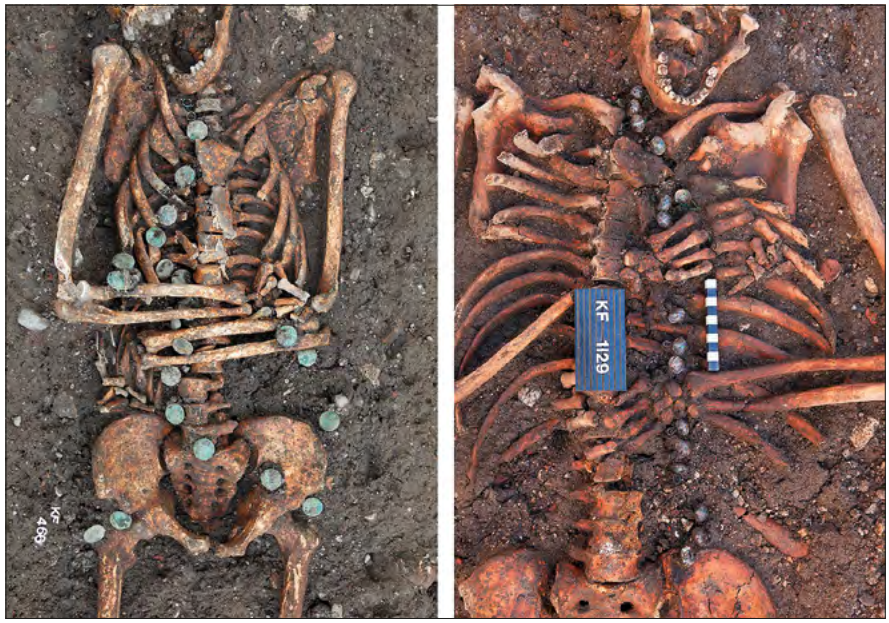

Fig. 7. St. Pölten Cathedral cemetery: earth graves, organic material decayed, buttons still *in situ* (© Stadtarchäologie St. Pölten).

through their under garments (e.g. hoop skirts, multi-layered underskirts) and hardly would find space physically in their entirety in a coffin (compare e.g. Baumgarten, Watson 1999: 69–71).

For future research on the use of functional costume, adapted garments, and funeral costume, it would be desirable to work out chronological and regional tendencies as well as specific differences, for example, between robes found in catholic and protestant tombs in different regions in Europe. This includes observations about functionality of the garments and also the use of color or specific dress accessories (e.g. Bravermanová 2010; Lipkin et al. 2015; Ströbl 2013; Vedeler 2010).

Furthermore, a cross-reference between crypt material and cemeteries around churches is also of interest. Research results from crypts can be useful for understanding archaeological material from the same periods, that have been found in earth graves. It is also worth to be studied if there are differences in the different contexts. For example noble or rich persons in St. Michael's crypt with their proximity to the Habsburg imperial house in comparison with other populations like people buried around St. Stephen's Cathedral in Vienna (Klammer et al. 2018) or more rural people as in St. Pölten in Lower Austria (*Verstorben, begraben…* 2019; Grömer et al. 2019).

As one of the first results in this regard, the following can be stated: In the St. Michael's cemetery we only found so far textile buttons with wooden cores, while e.g.

in the cemetery at the Cathedral St. Pölten (Fig. 7) many buttons of other material (metal, glass) have been excavated, as well as eyelets, buckles, rivets etc. (Rösel-Mautendorfer 2019). These can then, together with any existing decorative elements made of metal, such as rosettes, decorative buttons, decorative sheets, etc. used by their location on the skeletons for the reconstruction of textile and leather objects help, together with any adhering organic residues. For the interpretation of these reconstructed robes from the earth tombs, this must finally be discussed with the results from the functional analysis of the St. Michael's crypt, which are contemporary and 50 km in distance.

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Summary

Functional Analysis of Garments in 18th Century Burials from St. Michael's Crypt in Vienna, Austria

The Michaelergruft in Vienna (St. Michael's crypt), Austria, is located near the imperial palace Vienna and has been used between 1560 and 1784 by the local nobility of the city center in Vienna. The inventory of a large number of coffins has been preserved due to favorite

environmental conditions, it offers the possibility to study specific details about the funeral customs of the 17th and 18th century in Central Europe. Selected burials dating to the 18th century from the Michaelergruft serve as case studies for developing new theoretical and methodological approaches in investigating the textiles and garments found in the coffins.

Garments found in crypts usually are analysed due to costume history, aspects of conservation and preparation. Also textile analysis and modern analytical methods are applied to the material. In discussing the garments from St. Michael's crypt, questions about the interpretation of the costume arise such as if they are "normal" daily life (or festivy) garments or specific funeral costumes. In the following paper criteria are discussed which enable to distinguish between "functional garments" worn also in daily life, "adapted garments" (daily life clothing that has been re-sewn, cut or altered to be used as garment for the dead), and "funeral costumes" that have been deliberately made.

Keywords: crypt, clothing, funeral garments, functional analysis, 18th century AD, Vienna

Streszczenie

Analiza funkcjonalna odzieży z XVIII-wiecznych pochówków z krypty św. Michała w Wiedniu, w Austrii

Michaelergruft (krypta św. Michała) w Wiedniu (Austria) położona jest w pobliżu pałacu cesarskiego i wykorzystywana była w latach 1560–1784 przez miejscową szlachtę z centrum Wiednia. Duża liczba trumien, zachowana ze względu na korzystne warunki otoczenia, daje możliwość przeprowadzenia szczegółowych badań zwyczajów pogrzebowych panujących w Europie Środkowej w XVII i XVIII w. Wybrane pochówki z Michaelergruft datowane na XVIII w. stanowią studia przypadku pozwalające rozwijać nowe podejścia teoretyczne i metodologiczne w zakresie badań tkanin i strojów znajdowanych w trumnach.

Odzież z krypt zazwyczaj analizowana jest pod kątem historii kostiumologicznej, stopnia zachowania i przygotowania. Ponadto, materiał poddawany jest analizie z wykorzystaniem nowoczesnych metod. Dyskusja na temat odzieży z krypty św. Michała rodzi pytania o interpretację kostiumów, np. czy są to stroje „normalne", codzienne (czy odświętne), czy może specjalne stroje pogrzebowe. Niniejszy artykuł omawia kryteria pozwalające odróżnić „stroje funkcjonalne", noszone na co dzień, od „strojów adaptowanych" (codziennych ubrań, które zostały uszyte ponownie, obcięte lub przerobione, tak by stały się strojem dla zmarłego) oraz „strojów pogrzebowych", które stworzone zostały w tym właśnie celu.

Słowa kluczowe: krypta, odzież, strój pogrzebowy, analiza funkcjonalna, XVIII w., Wiedeń

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Open-back Shoes from the Southern Crypt in Piaseczno, Pomerania Province

Introduction

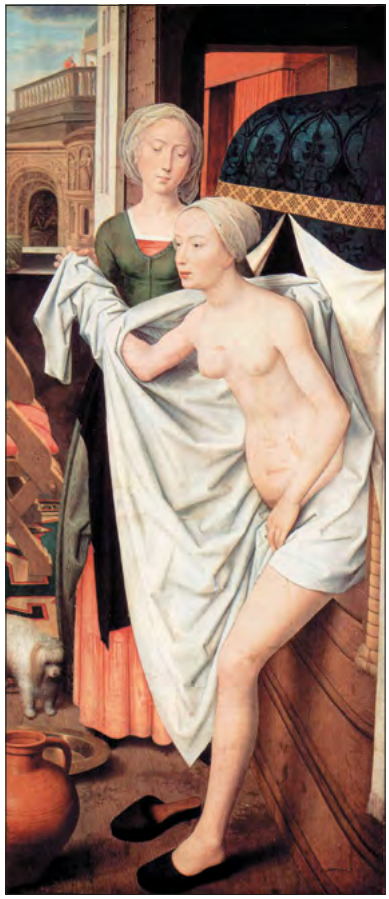
In 2017, research was conducted in the Church of the Nativity of the Blessed Virgin Mary in Piaseczno[1]. The basic task of the team was to explore the crypt located under the floor of the Chapel of Our Lady of the Scapular (hereinafter referred to as the southern crypt) (Grupa et al. 2015: 15–16; Grupa 2019: 192–198). The coffins were rather scattered, and there were two heaps of rubble mixed with grave goods and wooden relics of coffins, marked as rubble heap 1 and rubble heap 2. Under a bricked-in ventilation hole (the southern wall of the crypt), there was much rubbish thrown inside for at least two centuries. The situation was similar in the crypt under the chancel explored a year earlier (Grupa 2018: 33). As a result, some of the grave goods were outside the coffins and it was difficult to match the artefacts found to specific burials. The main task of archaeologists and anthropologists was to separate human remains from rubbish and grave goods.

The open-back shoes presented below were only completed after restoration carried out in the Laboratory of Monument Conservation of the Nicolaus Copernicus University in Toruń. Each shoe was found in a different part of the crypt: one between rotten wooden joists, under coffin no. 7, while the other one in the rubble heap no. 2 near the southern wall. The main aim of the analysis carried

1 It was carried out by MA and PhD students of the Institute of Archaeology of the Nicolaus Copernicus University. It was the second research season.

out at the time was to determine the basic function of the shoes: whether they were protective or house shoes, or if perhaps they served both these functions.

The development of open-back footwear



The history of open-back footwear was described by costumists and archaeologists at least from the second half of the twentieth century (Gutkowska-Rychlewska 1968: 35; Turnau 1983: 96, 98–99; Cnotliwy 1994: Fig. 5.2, 5.3; Wywrot-Wyszkowska 2002: Fig. 1; 2008: 54–56; Ceynowa 2004: Fig. 2; 2005: Fig. 4). The earliest artefacts of this kind date back to the thirteenth century (Drążkowska 2011: 115). However, at the time, these were overshoes worn outdoors, put on cloth leggings[2] or leather shoes. They were called pattens, and their structure was simple. A sole with high supports was carved from a block of softwood[3], and a leather upper was attached to it with iron nails, approximately 2 cm long[4]. The upper could be one- or two-part, and the structure was in some cases supplemented with a leather toe (Ceynowa 2004: 141–145; *Każdy krok...* 2016: 77–80, 84–85). Over time, the structure was modified and the

Fig. 1. Bathsheba in the Bath Hans Memling c. 1480, https://en.wikipedia.org/wiki/Bathsheba_(Memling)#/media/File:Hans_Memling_009.jpg (access 16 IV 2020).

2 The sole of cloth leggings was frequently reinforced by an additional layer of cloth or a leather sole (Zimmerman 2007: 349–352; Grupa 2012: 237).

3 The dendrological research carried out by the Toruń team indicate that the most often used species were lime, willow, and birch. This probably resulted from the availability of the material on the market.

4 The Authors' own research. Nails of this length were used in pattens found during research at 3a Panieńska Street (research carried out in 2007 by Lidia Grzeszkiewicz-Kotlewska) and on Granary Island (research carried out in 2016 by Renata Wiloch-Kozłowska).

next pattens (in the fifteenth century) were leather, with uppers and soles made of leather. Between the layers of the sole of such footwear there was a cork or wooden insulation layer (Ceynowa 2009: 99). Their uppers were open unlike in the case of mules that developed at the same time. Mules had uppers that usually covered toes and the whole instep (*Każdy krok*... 2016: 103–110), thanks to which shoes stayed safely on feet and people could walk freely. An additional insulation layer of wood or cork in a leather sole muffled the loud clack on stone or brick floors in rooms, which is probably why shoes of this type were also worn indoors. Moreover, the use of such a structure was perfect for thermal reasons, as it provided insulation against the floor that was always cold. This simple solution considerably improved the standard of living of people inhabiting Renaissance castles and tenements. It seems that at the end of the fifteenth century and at the beginning of the sixteenth century, home shoes started to get distinguished from outdoor footwear. This is confirmed by medieval and Renaissance iconography showing women at their toilet, with leather pattens or mules on their bare feet (Fig. 1). There are also representations with shoes of this type at the beds of the sleeping (Cassagnes-Brouquet 2009: 23). The three types of protective overshoes (wooden pattens, leather pattens, and mules) were used all over medieval Europe, which is confirmed by archaeological research (Grew, de Neergaard 2001: 91–101; Goubitz et al. 2001: 243–266; *Każdy krok*... 2016: 103–110) and iconographic representations (Pescio 2017: 70–71, 98, 126, 129[5]). Over the following years, this footwear underwent many stylistic metamorphoses. Different names were used: clogs, pantables[6], mules[7], and in Polish seventeenth-century testaments – slippers. Slippers were mostly worn on high-top boots called *baczmagi*[8] (Klint et al. 2018: 79, 107, 148). In this case, they should be treated as outdoor footwear with

5 These are mostly women presented in the privacy of their homes: *A Woman at her Toilet*, 1659–1660, painted by Jan Steen, Amsterdam, Rijksmuseum; *Woman Tearing a Letter*, 1631, painted by Dirck Hals, Mainz, Mittelrheinisches Landesmuseum; *Two Kinds of Games (Interior of an Inn)*, painted by Jan Steen, Amsterdam, Rijksmuseum; *Woman Reading a Letter*, 1662–1665, painted by Gabriel Metsu, Dublin, National Gallery of Ireland, and female nudes, the best example of which is *Susanna*, 1636, painted by Rembrandt, The Hague, Mauritshius.

6 In British written sources, the term *mule* only refers to sixteenth-century chopines with tall platforms. Shoes with a similar or identical form as the ones described in this paper were called *slippers* or *pantables*, which corresponds to the Polish term *pantofle* (Swann 1982: 22).

7 In the Western literature the terms *mules* and *pantables* are used interchangeably to describe shoes consisting of soles and uppers only covering the forefoot. Such shoes typically have a thicker front part than standard shoes (Goubitz et al. 2011: 243).

8 It is worth noting that shoes are virtually absent from last wills and testaments. They provide details of all kinds of clothes but there are no mentions of foot protection, except for stockings. Last wills and testaments from the Halych Land concerning *baczmagi* and slippers are rather unique.

Fig. 2. A child's slipper from the grave of the Kos family in the Oliwa Cathedral (photograph by D. Grupa).

a structure resembling low leather and wooden pattens. A perfect example of a slipper can be seen on the grave of the Kos family in the Oliwa Cathedral (Sikora, Szleszyński 2014: 178). A small boy kneeling before the figures of Mikołaj (d. 1599) and Andrzej Kos (d. 1618) is wearing a leather boot above the ankle (with a medium top) and a green slipper with a deep upper[9] (Fig. 2) on a thick sole in the form of a wedge (higher at the heel, lower at the toes). In such a case, it is difficult to say whether the inside of the sole was made of cork, softwood, or a combination of the two. What matters is the fact that the Polish dress included soft leather shoes with thick-soled slippers protecting the shoes against mechanical damage and ensuring thermal insulation against the ground. It cannot be excluded, however, that slippers at the time were multi-purpose footwear worn outdoors and/or indoors. A similar open-back shoe (made slightly higher with a layer of wood under the heel) was displayed at an exhibition *Każdy krok zostawia ślad* (*Every Step Leaves a Footprint*) in the Archaeological Museum in Gdańsk (ref. no. MAG/GD/255/125/408).

Heels developed in the seventeenth century entailed other structural modifications to open-back shoes. Some shoes of this type were raised this way, which made squat slippers shapelier and slimmer. Others had their form adjusted so that

9 Perhaps this is the slipper structure mentioned in the last will and testament of N. Swaryczowski from 1636. Search in the territory of the Republic of Poland connected with the name of this type of footwear is very limited as it is hardly ever mentioned in last wills. N. Swaryczowski was a soldier from the Halych Land. Most probably, he was unmarried, which is why he informed the executors how he wanted to be dressed after his death. Apart from a scarlet satin jacket, a feryaz or a delia, crimson trousers, and a red satin cap with tails, he asked for boots or slippers (Klint et al. 2018: 148). If both these names are mentioned, then boots were riding boots, which in the Polish army had high tops, whereas slippers should be treated as home open-back shoes or multi-purpose shoes that could also be worn over high boots. Perhaps this name was only associated with men's footwear.

Fig. 3. Bytom Odrzański. A wooden heel with a thick, stiff sole (photograph by D. Grupa).

Fig. 4. Piaseczno. The left shoe right after it was found (photograph by A. Zamorowska).

they could be worn over high-heeled shoes. They still had two purposes. On the one hand, they were used to protect delicate shoes made of soft leather or luxurious cloth (silk) and were frequently adjusted to their style, but on the other hand they served as separate home shoes. The upper could be made of colourful cloth (silk, wool) or delicate, soft leather, lined with cloth or another layer of leather. The sole was made of hard leather, and the heel was either wooden (Fig. 3) and covered with soft leather, or leather, sometimes made of even more than ten layers. There were lots of different possibilities and variants, which is proved by seventeenth-century and eighteenth-century museum collections not only in Poland but also abroad (Durian-Ress 1991: 70–73; Pratt, Woolley 2008: 48; Drążkowska 2011: 235–275). Textile shoes became highly popular in the eighteenth century (Kulesz 2019: 164–167), and their mass production started. It can be assumed that both full textiles shoes and open-back mules were similar in structure, and they were worn by both men and women.

A description of the shoes from Piaseczno

The general state of preservation is good. The condition of the leather on the soles, heels, and uppers indicates that the shoes were intensively used when their owner was alive. There is no difference in cut between the left and the right shoe, however, deformations resulting from wearing allow to say which shoe was worn

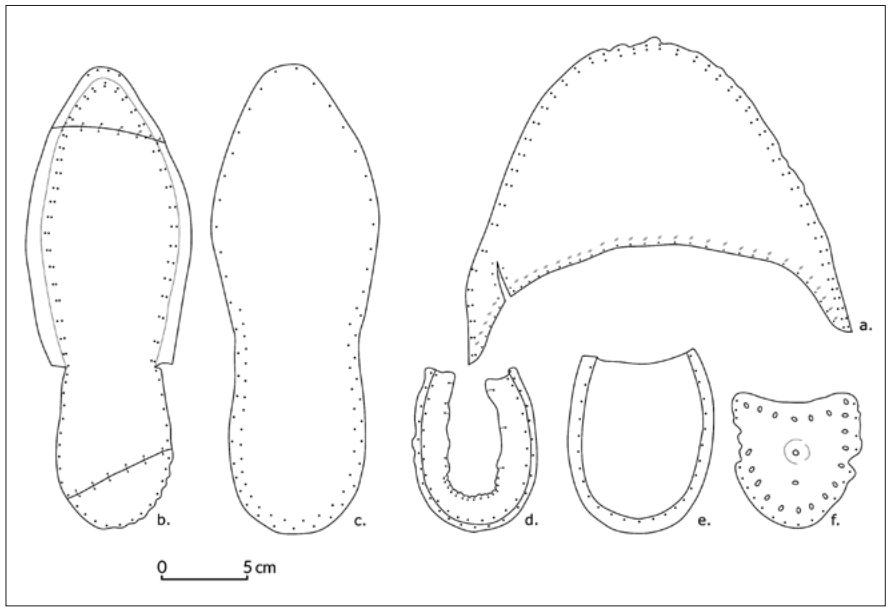


Fig. 5. Piaseczno. Shoe elements: **a**. the upper; **b**. the undersole; **c**. the sole; **d**. the strap; **e**. the external heel counter; **f**. the heel layer (prepared by A. Kulesz).

on which foot. The left shoe has been preserved almost whole (Fig. 4). All leather components of the shoe were identified (Fig. 5): the sole, the undersole, the upper, the external heel counter, the strap, and heel layers. The right has been preserved in part (the sole, the undersole, the heel counter, the strap – torn in half, and a fragment of the upper).

The sole (Fig. 5c)

The right and the left soles are identical, symmetrical in shape. An almond-shaped toe, a symmetrical forefoot, a midfoot slightly undercut on both sides, a rounded heel. There are cuts on the underside of the sole at the midfoot, which were to make leather in this part of the shoe more flexible. A part of the stitch at the heel on the underside of the sole is oblique, which protected it from leaking. Dimensions: length – 282 mm, forefoot width – 98 mm, midfoot width – 70 mm, heel width – 75 mm.

The undersole (Fig. 5b)

The undersole was made of three fragments. Smaller fragments that formed the toe and the heel were joined diagonally with the main part of the undersole. They were joined with a running stitch (Fig. 6), but fragments were also

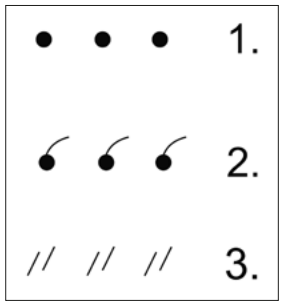


Fig. 6. Stitch marks: 1. double-needle straight stitching; 2. one-needle perpendicular stitching; 3. stitching marks in the leather (as called in Blusiewicz 2009: 45).

placed so that they contacted one another. At the toe and at the forefoot, the undersole was stitched directly to the sole and the upper, while at the heel and at the midfoot, elements were joined with a strap. The shape of the undersole at the midfoot and at the toe is widened by a rim that did not serve any structural purposes but only concealed and sealed stitches from the inside, thanks to which wearing the shoe was more comfortable. Dimensions: length – 263 mm, forefoot width – 92 mm, midfoot width – 62 mm, heel width – 65 mm.

The strap (Fig. 5d)

A structural element that allowed to sew the sole and the undersole together at the heel. Width – 20 mm.

Heel layers (Fig. 5f)

The heel of the left shoe consisted of six full layers. They were joined in the centre, most probably with a nail, and additionally along the edge with wooden dowels with ellipsoidal cross-section. The upper layers of the heel were joined not only with dowels but also with a stitch along the edge. Elements of the heel were made of leather offcuts or reused fragments. Some of the layers consisted of two elements sewn together. Dimensions: length – 83 mm, width – approx. 70 mm.

Heel counter (Fig. 5e)

It was an element improving the comfort of use and aesthetic qualities of the heel and the midfoot of the shoes. It concealed all stitches joining the undersole with the sole. The counter was connected with the outer edge of the undersole. Dimensions: length – 96 mm, midfoot width – 64 mm, heel width – 81 mm.

The upper (Fig. 5a)

The upper is rather full, with a rather shallow cut-out. Leather along the cut-out was folded and oversewn, which protected its edge from damage. On the outer surface there are clear marks of animal blood vessels, which means it was made of the flesh side of leather, the structure of which resembles suede. On the inside, there was an imprint of fabric, perhaps lining.

Characteristics of the shoes from Piaseczno

Considering their rather delicate structure and size, the items found in Piaseczno can be classified as home shoes worn in the second half of the eighteenth century. Such pantables were worn in the privacy of one's home, while relaxing or receiving trusted guests, and sometimes also symbolised an informal character of meetings outside (Pratt, Woolley 2008: 40).

Home shoes were frequently elements of a night set, along with a nightshirt and a nightcap (Pratt, Woolley 2008: 40). Probably, they were often comfortable elements of the *robe de chambre* popular at the time, called *rubdeszan* in Poland (Dudziński et al. 2015: 54–55).

Perhaps the uppers of the pair of shoes in question were covered with decorative fabric. This is indicated by numerous prick marks on their surface, which could have been left by the thread joining the leather part with the textile one. Moreover, the threads of the shoes are finished rather sloppily, which may indicate that they were originally covered.

It has to be noted that concealing the threads of the sole obliquely prepared the shoes to be worn outside, protecting them from absorbing too much moisture, but it does not mean that they were worn over other footwear.

The structure of the open-back shoes found in Piaseczno resembles the pair of shoes from the grave of Rev. Kazimierz Jugowski, excavated during research in Gniew in 2013. The basic structure of the shoes was fully made of leather. An additional element was felt on the inside of the upper (Grupa et al. 2014: 73, note 149). The priest died on January 14, 1726, so lined open-back shoes and thick woollen socks are not surprising elements of the grave goods. The felt insulating the upper was so loose that it was necessary to add a textile lining. Unfortunately, this element has not been preserved, so it can only be presumed that it was linen or woollen fabric.

Known Polish materials include a few examples of similar shoes from Gdańsk and Elbląg. Each of them has some individual characteristics. It may be an upper edged with a decorative trim or ornamented surface. The size of these shoes differ (*Każdy krok…* 2016: 103–110). The shoe from Elbląg was made of thick leather. It is large and its graceless form may indicate it was an overshoe (Drążkowska 2011: 220–221). If these assumptions are correct, it would be another form of a slipper with a heel of leather layers and a thick sole reinforced with a few layers of leather at the midfoot.

Conclusions

The pair of shoes found in Piaseczno and described in this paper represents a valuable contribution to the discussion on open-back shoes. It should be noted that finding a pair of shoes in archaeological material is rare. So far, such finds have only come from graves. Urban accumulations usually offer isolated artefacts.

When interpreting such finds, the basic difficulty is the determination of their function. In specific circumstances, functions of overshoes and home shoes could to a certain extent overlap. However, it seems that in the modern era separate pairs of shoes were made to serve these different purposes. Unfortunately, the only evidence that would allow to lean towards one of the options involves the categories of massiveness and size of the shoes, and the diversity of the materials used.

The issue of nomenclature is equally complicated. The paper uses a number of names for open-back shoes (pattens, mules, chopines, slippers, pantables) to reflect the linguistic richness. Undoubtedly, different designs used to have their own names. Perhaps the etymology of the names listed would offer some suggestions. However, this should be a subject of further research. The issue requires careful studies, but as it was already mentioned, last wills and testaments and posthumous inventories from the seventeenth and eighteenth centuries rarely include shoes. One can once again quote a fragment of the last will and testament from the Halych Land, in which Piotr Wirozembski (1625) asks to be buried in specific clothes:

> [...] After I die, dress my body first in a new shirt and long johns, an old Moravian dolman, a cap, fine clothes, *baczmagi* and slippers. This is all prepared with me. [...] (Klint et al. 2018: 107).

In this case, specific names of shoes were used – *baczmagi*, which were imported from Turkey (with toes curled up), and slippers. This suggests that slippers were to be worn over *baczmagi*. What should be emphasised is the fact that the most neutral term is the descriptive term 'open-back shoes'.

A good state of preservation of the shoes from Piaseczno, which allowed for reconstruction (Fig. 7) and analysis of the cutting and stitching, provides new

Fig. 7. Piaseczno. A reconstructed shoe (photograph by A. Kulesz).

information about shoemaking techniques in the modern era. Studies of modern artefacts, long neglected by archaeologists, still include very few works concerning shoes. This perhaps results from the fact that these artefacts are to a large extent fragmentary. The Authors' observations indicate that graves usually only include leather soles and, at times, fragments of heels. They are most probably elements of textile shoes that are not immediately recognisable to archaeologists, and in most cases such information is only shared orally without any deep reflection.

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Summary

Open-back Shoes from the Southern Crypt in Piaseczno, Pomerania Province

A discussion on modern shoes is limited on account of the scarcity of sources provided by archaeological research. This gap is to a certain extent filled by museum collections and iconography. This is why it is so important to publish new finds as one can only initiate discussion on isolated artefacts of open-back shoes based on such publications. Such a pair was found in the southern crypt of the Church of the Nativity of the Blessed

Virgin Mary in Piaseczno. These are unique objects as it is possible to identify all their elements and to determine the quality of leather, which was rather thick. Their general state of preservation is good. The condition of the leather on the soles, heels, and uppers indicates that the shoes were intensively used when their owner was alive. There is no difference in cut between the left and the right shoe, however, deformations resulting from wearing allow to say which shoe was worn on which foot.

The pair of shoes found in Piaseczno and described above represents a valuable contribution to the discussion on open-back shoes. When interpreting such finds, the basic difficulty is the determination of their function. In specific circumstances, functions of overshoes and home shoes could to a certain extent overlap. However, it seems that in the modern era separate pairs of shoes were made to serve these different purposes. Unfortunately, the only evidence that would allow to lean towards one of the options involves the categories of massiveness and size of the shoes, and the diversity of the materials used.

The paper uses a number of names for open-back shoes (pattens, mules, chopines, slippers, pantables) to reflect the linguistic richness. There is no doubt that different designs used to have individual names, however, the scarcity of accounts makes it very difficult to reconstruct the linguistic reality of old.

Keywords: open-back leather shoes, pantables, mules, slippers, eighteenth century, Piaseczno, Poland

Streszczenie

Obuwie z wolną piętą z południowej krypty w Piasecznie, woj. pomorskie

Dyskusja na temat nowożytnego obuwia jest dość ograniczona ze względu na szczupłość źródeł pozyskiwanych w czasie badań archeologicznych. Jednak tę lukę uzupełniają w jakiejś mierze kolekcje muzealne i ikonografia. Dlatego tak istotne jest publikowanie kolejnych znalezisk, bo tylko w oparciu o nie można podjąć dyskusję na temat pojedynczych egzemplarzy obuwia z wolną piętą. Taka właśnie para została znaleziona w południowej krypcia kościoła pw. Narodzenia Najświętszej Marii Panny w Piasecznie. Należy ona do unikatowych obiektów, ponieważ można określić jej wszystkie elementy oraz jakość skóry, która raczej należała do grubych. Ogólny stan zachowania obuwia można określić jako dobry. Powierzchnia skóry na podeszwach, obcasach oraz przyszwach świadczy o intensywnym użytkowaniu wyrobu za życia właściciela. Zostały one wykonane bez rozróżnienia kroju dla prawej i lewej stopy, ale odkształcenia wynikające ze znoszenia pozwalają ocenić, który pantofel noszono, na której stopie.

Opisywana powyżej para pantofli odnaleziona w Piasecznie stanowi ciekawy przyczynek do dyskusji na temat obuwia z wolną piętą w ogóle. Podstawową trudność w interpretacji takiego znaleziska może sprawiać określenie funkcji, jaką pełniło. Funkcje obuwia ochronnego i obuwia domowego do pewnego momentu lub w specyficznych okolicznościach mogły przenikać się. Jednak wydaje się, że w czasach nowożytnych konstruowano oddzielne pary obuwia służącego jednym i drugim celom. Niestety, jedynymi przesłankami pozwalającymi skłaniać się ku którejś z tez są raczej subiektywne kategorie masywności i wielkości obuwia oraz różnorodność zastosowanych surowców.

W artykule posłużono się szeregiem określeń obuwia z wolną piętą (patynki, mule, mulety, kapcie, pantofle), by unaocznić bogactwo językowe. Z pewnością w latach minionych określone modele miały swoje nazwy, niestety szczupłość przekazów nastręcza wielkie trudności w rekonstruowaniu dawnej rzeczywistości językowej.

Słowa kluczowe: skórzane obuwie z wolną piętą, mule, pantofle, kapcie, XVIII w., Piaseczno, Polska

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Modern Shoe Buckles from Archaeological Research in Gniew and Piaseczno (Pomerania Province, Poland)

Introduction

During archaeological research carried out from 2009 to 2016 in the Church of St. Nicholas in Gniew, a set of three metal buckles was found. Then, in 2017, excavations were conducted in the southern crypt of the Church of the Nativity of the Blessed Virgin Mary in the village of Piaseczno, in the Gniew District. Two other pairs of buckles were uncovered at this site. The buckles were analysed, restored, and documented, which involved their detailed description and measurement. On account of the diversity of buckles and a similar context of their discovery, it was decided that a comparison of shoe buckles would make a valuable contribution to studies on the character of the artefacts described below.

Buckles as dress elements in the modern era

Since antiquity, buckles have served functional purposes. With special straps made of leather or cloth they joined different elements of dress or gear (Wróblewska 2008: 200). In the modern era, they were frequently used to fasten belts, pattens, hats, trousers legs, armour, horse harness, and mostly shoes. Examples of such buckles have been found in many places in the territory of Poland including: Toruń (Grupa 2005; Drążkowska 2006; Bojarski 2013), Wrocław (Wachowski 1995; 2010; Konczewska, Konczewski 2004), Gdańsk (Ceynowa 2005; Bednarz 2016; *Każdy krok…* 2017), Warsaw (Blusiewicz 2009), Pułtusk (Drążkowska 2007),

Szczuczyn (Grupa 2012), the HMS *General Carleton* wreck (Wróblewska 2008), Stargard (Janowski 2016), and those described in this paper – Gniew (Grupa et al. 2015) and Piaseczno (Kulesz 2018; 2019).

The origins and development of shoe buckles

Even though buckles, sometimes called clasps, have been known since the Roman times, they only started to be used as shoe fastenings approximately in the twelfth century, which is indicated by shoes found during excavations in Lübeck (Goubitz, van Driel-Murray et al. 2001: 209). Throughout the Middle Ages and the Early Modern Era, they were usually used to fasten one or a few narrow straps on both high and low shoes. Such a fastening was placed on the side of the foot, and the buckle was fixed permanently to a fastening strap (Goubitz, van Driel-Murray et al. 2001: 212–218). Buckles of this type were manufactured by blacksmiths dealing with small items, and based on ceramic and stone moulds known from European cities (Willemsen, Ernst 2012: 39; Egan, Pritchard 2013: 105; Bednarz 2016: 268), such as Gdańsk (Majorek 2017), it can be presumed that they were not only forged but also cast. Iron buckles were most common, sometimes plated with tin or silver, however, some were also made of a tin and lead alloy. Also buckles made of a copper alloy – bronze or brass – are found (Ceynowa 2005: 323; Wachowski 2010: 244; Bednarz 2016: 268).

Over time, buckles on low shoes were moved to the central part of the instep, and they became larger and larger (Pratt, Woolley 2008: 29). Starting in the 1660s, an innovative use of buckles appeared. Metal buckles started to gradually supplant textile ornaments placed in the central part of the instep. These were usually lace rosettes[1] or monstrously big bows in strikingly different colours than the leather shoes or identical to the colour of the leather[2] (Drążkowska 2011: 202–203). Buckles became the central ornament of the foot, drawing attention on account of the difference in colours between leather and metal, and over time they became more and more decorative[3]. Their production was taken over by jewellers, while users

1 A portrait of Prince Janusz Radziwiłł (1632), painted by Dawid Bailly, National Museum in Wrocław (Dudziński et al. 2015; Fig. 7).

2 This is perfectly exemplified by black shoes tied with black ribbons depicted in the painting of Frans Hals and Pieter Codde *The company of Captain Reinier Reael and Lieutenant Cornelis Michielsz Blaeuw* created in 1633–1637 (Pescio 2017: 32–33). Men wearing black wamses and knee breeches with black stockings are wearing such shoes. The only elements breaking the blackness are white ruffs. Of course, all types of fabric: silk, wool, and leather, despite their black colour, are clearly distinct in the painting as their textures reflect the light differently, which was perfectly captured by the authors.

3 However, in this case these were decorations of the surface and not new elements added to the buckle and increasing its weight as in monstrous textile ornaments.

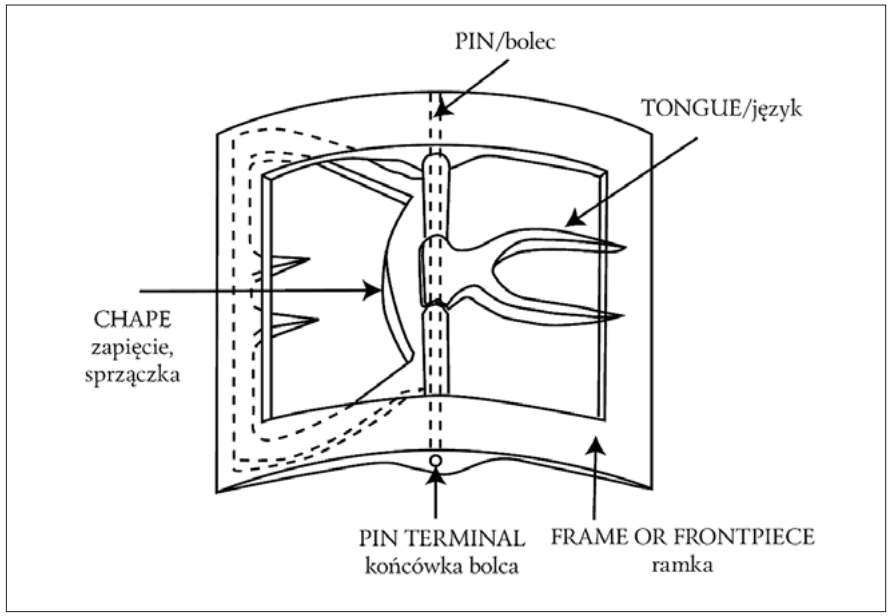

Fig. 1. The buckle structure and names of its elements according to Ewa Wróblewska (Wróblewska 2008: 202, Fig. 3).

started treating them as jewellery rather than integral elements of shoes (Pratt, Woolley 2008: 41). Of course, buckles not made of precious metals and those without any special ornaments were still manufactured by blacksmiths and brassfounders. As the perception of buckles changed, their construction was modified and they were no longer fixed permanently to shoes. A pin with a tongue appeared (Fig. 1), sometimes ending with a ball, which allowed to attach the buckle to a fastening strap and to unclasp it when needed (Swann 1982: 20; Goubitz, van Driel-Murray et al. 2001: 289, 291, Fig. 1a).

In the seventeenth century, buckles were still relatively small and their ornaments were rather simple, mostly geometrical (Pratt, Woolley 2008: 30; Whitehead 1996: 118). Decorative fastenings were made of different materials. The most expensive ones were made of silver and gold, and their surface was studded with jewels. Cheaper items were made of copper, tombac, and iron, and expensive jewels were replaced with rhinestones – diamond imitations, made of polished glass[4] or

4 Buckles with polished glass were found in a crypt under the chancel of the Church of the Assumption of Mary in Toruń (Drążkowska 2006: 69–72). The crypt was created after the Tumult of Thorn in 1724 (Grupa 2005: 21). It was the burial place of representatives of the local gentry wearing Polish dress and gentry women wearing Western dresses (or, in fact, their substitutes as for burial purposes they were sewn of the trains

Fig. 2. An example of buckles on low shoes (*Portrait of Kazimierz Poniatowski*, Marcello Bacciarelli, c. 1757, source: National Museum in Warsaw).

rock crystal (Whitehead 1996: 118; Boucher 2004: 281, 283; Pratt, Woolley 2008: 41). At the beginning of the eighteenth century, shoes became more massive, so their fastenings also evolved into larger, more massive forms (Swann 1982: 20). This resulted in a change in the way buckles were fastened as a single pin was not enough to secure them properly. Thus, a forked fastening was used (Whitehead 1996: 114) or a fastening in the shape of an anchor (Goubitz, van Driel-Murray et al. 2001: 290–291, Fig. 1b). In the eighteenth century, buckles became more and more decorative and larger and larger (Fig. 2), and in the 1770s, they were out of proportion to the shoe size, with some even covering the whole instep and half of the foot. Such impressive buckles made fastening straps wear more quickly, so they had to be regularly replaced (Pratt, Woolley 2008: 41). Also the form of frame ornaments reached its peak in the eighteenth century – simple or openwork casts were used. Geometrical and floral designs could be combined to form sophisticated compositions following the current fashion (Boucher 2004: 281). In the nineteenth century, buckle forms were simplified, and the fastening became triple (Whitehead 1996: 114). It should be emphasised that buckles as ornaments of the front part of the shoe have never gone out of use.

A description of buckles from Gniew and Piaseczno

The first buckle from Gniew was found in the dirt floor in the southern crypt in St. Anna's Chapel in the Church of St. Nicholas. It is arched, and its shape resembles a rectangle (Fig. 3). It is 28 mm wide and 40 mm long. In the centre, to the left, it had a thickened area for an iron pin which was 1.5 mm in diameter. The width

of dresses worn by women when they were alive – Grupa 2005: 21, 62–63; 2019: 180–182). It is presumed that the buckles excavated were elements of textile women's shoes similar to those found in museum collections (Drążkowska 2011: 252, 279). However, iconographic analysis indicates that such buckles were also worn by men, which is proved by full-length portraits of Louis XIV and Augustus II the Strong (Możdżyńska-Nawotka 2002: 112; Grupa 2005: 77; Lachi 2011: 360).

Fig. 3. Gniew, a shoe buckle made of a copper alloy, found in a crypt under St. Anna's Chapel (Grupa et al. 2015: 146, Fig. 107).

of the tape the buckle was made of was 5–6 mm. It was decorated in the simplest possible way, with shallow grooves along its outer and inner rims (Grupa et al. 2015: 145–146). In the case of this buckle, remains of shoes have been preserved, which is why an attempt was made to identify the sex of the owner by comparing the sizes of soles found in the crypt with an average height of men and women in the Middle Ages. Thus, it can be said that it is highly probable that these were men's shoes of a larger size (Grupa et al. 2015: 147).

The other buckle, found during excavation in Gniew, just like the first one, came from the accumulation in the southern crypt. It is wholly made of iron and its shape and thickness suggest that it was forged of wire (Fig. 4). It is rectangular in shape, and it is 50 mm long, 43 mm wide, and 2–4 mm thick. It is narrowest on shorter sides, where it is 2–3 mm thick, while its longer arched sides are 4 mm thick at the fastening pin mounting. The surface of the buckle is not decorated (Michalik 2017: 2).

Fig. 4. Gniew, a shoe buckle made of an iron alloy, the southern crypt (photograph by J. Michalik).

Unfortunately, in the case of these two buckle types, fastening elements have not been preserved. Fastening

Fig. 5. Gniew, a detail of burial no. 7 located in the chancel of the Church of St. Nicholas (photograph by D. Grupa).

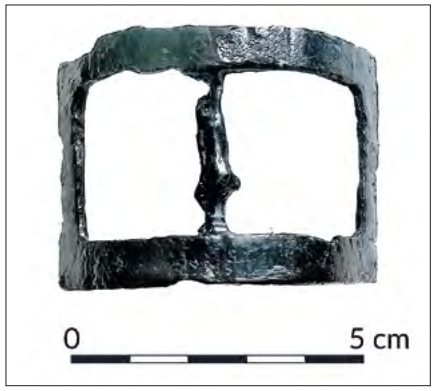

Fig. 6. Gniew, a shoe buckle made of iron, from a burial in the chancel of the Church of St. Nicholas (photograph by J. Michalik).

is the part most prone to mechanical damage as it holds the shoe on the foot. However, in the case of buckles of the shoes from Gniew, there was no mechanical damage as they were found in burials. Most probably, the fastenings corroded and fell apart as a result of the influence of organic matter (leather in this case) on the iron structure[5].

The third of the buckles from Gniew was discovered during archaeological research in 2011 along with the remains of a left shoe and human remains buried in the chancel of the church (Fig. 5). It does not differ from other buckles in shape: it is a rectangular frame, 70 mm long and 45 mm wide. The buckle was made of iron tape (10 mm wide). In the centre of the buckle there is a fastening with two teeth preserved, most probably made of 5 mm wide wire (Fig. 6). Moreover, similarly to other buckles, it was arched so as to fit the shape of the shoe. The buckle surface was smooth, without any ornaments (Michalik 2020b: 3).

5 In such combinations, iron gets destroyed first – Authors' observations.

Fig. 7. Piaseczno, a shoe buckle made of a copper alloy, the southern crypt of the Church of the Nativity of the Blessed Virgin Mary (photograph by A. Kulesz).

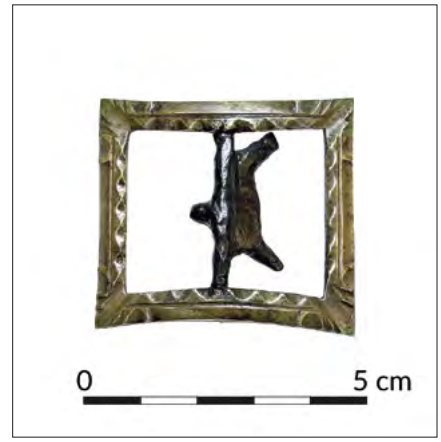

Fig. 8. Piaseczno, a shoe buckle made of a copper alloy with silver plating, the southern crypt of the Church of the Nativity of the Blessed Virgin Mary (photograph by J. Michalik).

The first two buckles from Piaseczno were nearly rectangular in shape, 60 mm long and 45 mm wide, with rounded apices. Their profile is emphasised by an internal opening with slightly wavy edges. Moreover, the buckles are arched and their surface is decorated with slight notches (Fig. 7). They were made of metal sheet, approx. 1 mm thick. The frames were made of a copper alloy, which is proved by the green colour of corrosion products on their surface. The pin dividing the buckle in half and the forked tongue fixed to it were most probably made of iron (Kulesz 2018: 85). The buckles were found as elements of well-preserved ankle-high shoes made of multiple fragments, with a quarter divided into two parts (Kulesz 2018: 79–80). Despite difficulties with finding similar buckles at other sites, a very similar buckle (only differing in ornamentation and size) was found on Granary Island in Gdańsk, in a levelling layer located behind the back wall of the 'Drey Sterne' granary, dated to the period between 1690 and 1790 (Bednarz 2016: 320).

The other pair of buckles from the crypt in Piaseczno were most probably made of a copper alloy (brass), plated with silver (Michalik 2020: 116) (Fig. 8). The frame was probably cut out of one rectangular piece of metal sheet, which was 50 mm long, 40 mm wide, and 3 mm thick. Just like in the case of other buckles, they are arched, and they are additionally decorated with cuts, notches, and grooves (Michalik 2020a: 3).

A majority of shoe buckles consist of two parts (with a movable fastening forming an axis), and so is the case with buckles from Gniew and Piaseczno, which

can be classified into the group of two-part buckles with rectangular frames[6]. However, despite a common feature, the buckles described differ considerably. Thanks to this, one can get an impression that apart from holding the shoe on the foot, they also served decorative purposes. One can distinguish two main types of buckles: those made of iron and those made of a copper alloy (Tab. 1). The latter, considering ornaments, could be more valuable than their iron counterparts. Regardless of the alloy used, manufacturing techniques differed, some of which were those used in the case of buckles from Gniew and Piaseczno: wire forging, cutting out of thick metal sheet, and folding thin metal sheet.

What is curious is the use of different alloys for frames and fastenings. In the case of the two types of shoe buckles from Piaseczno, frames were made of a copper alloy (including one plated with silver) and fastenings were iron. Cases of using two different alloys to manufacture shoe buckles are known from, among others, a large collection found in the HMS *General Carleton* wreck (Wróblewska 2016: Fig. 6, 8, 9, 11). The collection of more than 157 items includes both frames and fastenings made of iron and a copper alloy, so most probably there were no uniform rules of choosing alloys for frames and fastenings. This issue requires separate research on a much larger number of shoe buckles using archaeometric analysis.

Tab. 1. A comparison of buckles found during archaeological research in churches in Gniew and Piaseczno.

No.	Location	Buckle frame dimensions	Material	Ornamentation
1	Gniew	Width: 28 mm, length: 40 mm, tape width: 5–6 mm	Copper alloy	Grooves along the edge
2	Gniew	Width: 43 mm, length: 50 mm, thickness: 2–4 mm	Iron alloy	None
3	Gniew	Width: 45 mm, length: 70 mm, tape width: 10 mm	Iron alloy	None
4	Piaseczno	Width: 60 mm, length: 45 mm, sheet thickness: 1 mm	Copper alloy, fastening of iron alloy	Notches, moulding
5	Piaseczno	Width: 40 mm, length: 50 mm, thickness: 5 mm	Silver-plated copper alloy, fastening of iron alloy	Notches, grooves, cuts

6 Based on the nomenclature used by Szymon Bednarz (2016: 269–270).

Characteristics of buckles from Gniew and Piaseczno

The dimensions of all buckles described above clearly indicate their function: keeping shoes on feet. Shoes, however, were not the only dress elements fastened with buckles. Buckles were commonly used to fasten short trousers (breeches) at knee height (Boucher 2004: 283) and they were attached to leather and textile straps (Willemsen, Ernst 2012: 7–10, 100–103; Egan, Pritchard 2013: 50–122). Buckles used for fastening trouser legs frequently corresponded with shoe buckles, together forming a set (Pratt, Woolley 2008: 41). However, they were much smaller, and the buckle axle was usually fixed along its longer side (Whitehead 1996: 123).

The buckles from Gniew and Piaseczno are not richly ornamented or they have no ornaments whatsoever. Thus, it can be said they were rather cheap, which made them more popular among users from different social classes. Examples of such modest buckles were also found at other sites: in Gdańsk (*Każdy krok...* 2017: 124–125) and among artefacts from the HMS *General Carleton* wreck (Wróblewska 2008: Fig. 1, 6, 7, 9, 10, 11).

It is much more difficult to explicitly determine the sex of the users of the artefacts described. Two of the buckles could be described as men's (no. 1 from Gniew and no. 1 from Piaseczno), which is mostly indicated by the size and the form of the shoes found with them. It is not certain in the case of other artefacts. Shoes fastened with buckles at the front were initially popular among men because women's dresses to the ground only revealed shoe toes. On account of this, buckles became elements of women's dress later, as the fashion trends changed (Swann 1982: 20; Pratt, Woolley 2008: 31). An additional problem were sharp buckle edges that easily caught on and tore the fronts of long clothes (Pratt, Woolley 2008: 31, 41). It is generally assumed that women's buckles were smaller than men's, however, in the last quarter of the eighteenth century buckles became universal and those worn by men and women became identical (Pratt, Woolley 2008: 31, 41; Whitehead 1996: 115).

It might be equally difficult to determine the chronology of the artefacts in question. In all likelihood they can be classified as artefacts from the eighteenth century. The dating of the buckle[7] found along with low shoes in Piaseczno is least difficult as the form of the shoes indicates the second half of the eighteenth century (Kulesz 2018: 85). The situation is also rather clear in the case of brass artefacts with ornamented frames from Piaseczno, with which a fastening element with two pins has been preserved (thus, the shape, dimensions, and the fastening method all form an image typical of eighteenth-century buckles). The considerable size of buckle no. 3 from Gniew allows to unambiguously identify it as an artefact

7 In size, it corresponds with the buckle found on the leather shoes of Franciszek Schuldie, who died in 1782 in Szczuczyn (Dudziński et al. 2015: 65–66, 88).

also used in the second half of the eighteenth century. The other two buckles were found in an ossuary in the southern crypt, dated to the end of the first half of the eighteenth century, but they were buried already in the seventeenth century.

Conclusions

The described buckles from two neighbouring sites (the distance between the two towns is 6 km) do not have any individual characteristics. It was impossible to determine any features that would suggest where the artefacts had been manufactured. However, it was observed that all buckles were rather modest in formal terms and that they were made of common metals. On account of their jewellery-like character, buckles could be bequeathed, and grave shoes were only fastened with tailor's pins (Kulesz 2019: 160; Grupa, Wojciechowska et al. 2013: 103, 156, Fig. 7) or put on the feet of the dead without fastening. This practice particularly concerned shoes with textile uppers[8], which mostly meant women's shoes. It may suggest that the items in question were rather owned by men. The buckles described could be thus elements of the everyday attire. One should also bear in mind that no one placed the most expensive buckles in the grave[9], and – as the historic material from Gniew and Piaseczno indicates – the very presence of buckles among the clothes of the dead is rare.

It should also be emphasised that shoes fastened with central buckles were elements of the Western dress (Blusiewicz 2009: 72–79; Dudziński et al. 2015: 65). The canon of the Polish dress included completely different shoes, with uppers of a different length, without buckles or high heels. It is another reason to emphasise popularity of Western fashion in the territory of Pomerania in the eighteenth century, which is additionally confirmed by iconographic representations from the beginning of the seventeenth century onwards (Drążkowska 2011: 209–213; Grupa 2012: 117; Grupa, Wojciechowska et al. 2013: 101).

Modern buckles found during archaeological research can pose numerous interpretive problems. They are usually found as independent items, unrelated to any specific pair of shoes. Naturally, this results from their use described above, which involved exchanging buckles between different pairs of shoes. In order to illustrate this, it is enough to mention that in the whole history of Dutch archaeological research until 2011, only one low shoe was found with a buckle still attached in its original position (Goubitz, van Driel-Murray et al. 2001: 289). In Poland,

8 Some of the textile shoes in museum collections have no buckles even though whole fastening straps have been preserved (Drążkowska 2011: 247, 250, 252, 267, 278).

9 However, there are known cases of burying the dead with highly ornamental buckles, decorated with imitations of expensive jewels and made of precious metals (Drążkowska 2006: 69; 2007: 13–19).

shoes with buckles are equally rare and they are found in specific conditions: in the case of burials in crypts and under the church floor (Kulesz 2018; Dudziński et al. 2015: 65, 136, Fig. 38, 39). It should be once again emphasised that it was not a rule to bury the dead in shoes with buckles. Thus, the only indication allowing to determine the function of a buckle is its size and fastening method.

A separate issue is the dating of specific artefacts. Apart from the already described system of fastenings, there are no characteristics that would clearly indicate the chronology of the buckles. This indicator only allows to narrow down the dating to a century, however, it should be considered that the fastening element is not always preserved (usually, only the frame is available). This can be exemplified by the collection of buckles excavated from the HMS *General Carleton* wreck, in which most artefacts have no fastening elements (Wróblewska 2008: 199–200). Large size may suggest that buckles were manufactured in the second half of the eighteenth century, however, this does not mean that by a process of simple elimination it can be presumed that smaller objects are younger. Many of the buckles preserved with clear chronology show that small buckles were used throughout the eighteenth century and in the second half of the seventeenth century (Whitehead 1996: no. 757–765, no. 769). The buckle shape does not provide any clear indications either. Even though seventeenth-century buckles were frequently asymmetrical, and those from the eighteenth century were rectangular, in both these period a four-sided shape with rounded apices was popular. Descriptions of the shape of buckles were rarely connected with the determination of their purpose. There are still no clear terms that would denote shoe or belt buckles. Issues connected with a formal and typological interpretation of the buckles found indicate interpretive problems faced by archaeologists dealing with these aspects of costume studies. Modern shoes, due to the scarcity of artefacts in archaeological collections, remain mysterious and puzzling objects. Thus, it is important for the broadening of knowledge in this field to describe their structure and fastening elements including buckles.

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Summary

Modern Shoe Buckles from Archaeological Research in Gniew and Piaseczno (Pomerania Province, Poland)

During archaeological research carried out from 2009 to 2016 in the Church of St. Nicholas in Gniew, a set of three metal buckles was found. Then, in 2017, excavations were conducted in crypts of the Church of the Nativity of the Blessed Virgin Mary in the village of Piaseczno, in the Gniew District. Two other pairs of buckles were uncovered at this site. All the buckles found differ considerably. Thanks to this, one can get an impression that apart from holding the shoe on the foot, they also served decorative purposes. One can distinguish two main types of buckles: those made of iron and those made of a copper alloy. The latter, considering ornaments, could be more valuable than their iron counterparts. Regardless of the alloy used, manufacturing techniques differed, some of which were those used in the case of buckles from Gniew and Piaseczno: wire forging, cutting out of thick metal sheet, and folding thin metal sheet.

On account of their jewellery-like character, this small collection of buckles discussed could be bequeathed, while most grave shoes were only fastened with tailor's pins or put on the feet of the dead without fastening. This practice particularly concerned shoes with textile uppers, which mostly meant women's shoes. It may suggest that the items in question were rather owned by men. The buckles described could be thus elements of the everyday attire.

Issues connected with a formal and typological interpretation of the buckles found indicate interpretive problems faced by archaeologists dealing with these aspects of costume studies. Modern shoes, due to the scarcity of artefacts in archaeological collections, remain mysterious and puzzling objects.

Keywords: shoe buckle, shoe clasp, archaeology, shoes, modern era, Gniew, Piaseczno, funeral culture

Streszczenie

Nowożytne klamry do butów z badań archeologicznych w Gniewie i Piasecznie (woj. pomorskie)

W trakcie badań archeologicznych prowadzonych w latach 2009–2016 w kościele pw. św. Mikołaja w Gniewie pozyskano zespół trzech klamer metalowych. Następnie w 2017 r. przeprowadzono badania wykopaliskowe w kryptach kościoła pw. Narodzenia Najświętszej Marii Panny we wsi Piaseczno, należącej do gminy Gniew. Na stanowisku tym odkryto dwie kolejne pary klamer. Wszystkie znalezione klamry znacznie różnią się od siebie. Dzięki temu można odnieść wrażenie, że prócz trzymania buta na stopie, pełniły również funkcję dekoracyjną. Wyróżnić można dwa główne rodzaje klamer – wykonane z żelaza i ze stopu miedzi. Te drugie, sądząc po obecności zdobienia, mogły być bardziej wartościowe od ich odpowiedników ze stopu żelaza. Niezależnie od zastosowanego stopu korzystano z różnych technik ich produkcji, spośród których wymienić można te użyte

w przypadku klamer z Gniewu i Piaseczna: kucie z drutu, wycinanie z kawałka grubej blachy i wywijane z cienkiej blachy.

Zbiór omawianych sprzączek, pochodzących z dwóch sąsiadujących z sobą stanowisk (odległość pomiędzy miejscowościami wynosi 6 km), nie wykazał żadnych cech charakterystycznych dla poszczególnych egzemplarzy. Nie udało się ustalić żadnych wyróżników, które mogłaby sugerować miejsce wykonania omawianych artefaktów. Zaobserwowano jednak, że wszystkie sprzączki są dość skromne formalnie, a wszystkie też zostały wykonane z popularnych metali. Z uwagi na biżuteryjny charakter klamry mogły być przekazywane w spadku, a obuwie grobowe zapinane było tylko szpilkami krawieckimi lub nasuwane na stopę zmarłego bez zapięcia. Praktyka ta odnosi się w szczególności do obuwia, którego wierzchy wykonane zostały z tkanin, czyli przede wszystkim damskiego. Może to sugerować, że omawiane egzemplarze raczej należały do mężczyzn. Opisywane klamry mogły zatem stanowić element ubioru codziennego.

Zagadnienia związane z interpretacją formalno-typologiczną znalezionych klamerek wskazują, z jakimi trudnościami interpretacyjnymi stykają się archeolodzy zajmujący się tymi aspektami kostiumologii. Obuwie z okresów nowożytnych z uwagi na niewielką ilość występowania w kolekcjach archeologicznych jest w dalszym ciągu materiałem tajemniczym i zagadkowym.

Słowa kluczowe: klamra do butów, sprzączka do butów, archeologia, buty, epoka nowożytna, Gniew, Piaseczno, kultura pogrzebowa

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The Saint Benedict Cross or the Saint Benedict Medal Based on a Find from Archaeological Research in Gniew (Pomerania Province)

Preliminary issues

In 2015, during archaeological research conducted around the church in Gniew (Pomerania Province), a small fragment of a metal plate was found. After it was cleaned as part of restoration it turned out to be a cross. The excavation was located outside, near the wall of the chancel of the Church of St. Nicholas (Fig. 1). The research conducted confirmed the conclusions drawn in previous years, i.e. that the church grounds had been used as a graveyard. The fact that the graveyard had been used for a long time was proved by numerous burials, overlapping grave pits and ossuaries[1].

Devotional items have been long connected with the Christian tradition. They include crucifixes, medals, scapulars, and prayer ropes. The fact that they are found during excavations in churches and graveyards may indicate that they were highly popular in the Late Middle Ages and the Modern Era. We know of crucifixes and other devotional items found during archaeological research conducted in churches and graveyards in such places as: Maniowy in Podhale (Chudzińska 1998), Lubiń (Białobłocki 1991/1992: 161–185), Trzemeszno (Wiewióra 1995: 433–442), Toruń (Grupa 2005: 20–21; Kwiatkowski 2005: 31–39; Stawarz 2014: 20), Strzelno (Sulkowska-Tuszyńska 2006), Pułtusk (Kołyszko 2007:

1 Ossuaries are places where human remains were gathered after earlier burials in the graveyard and the church had been emptied (Grupa et al. 2015b: 16–18; Kozłowski, Grupa 2019: 38–49).

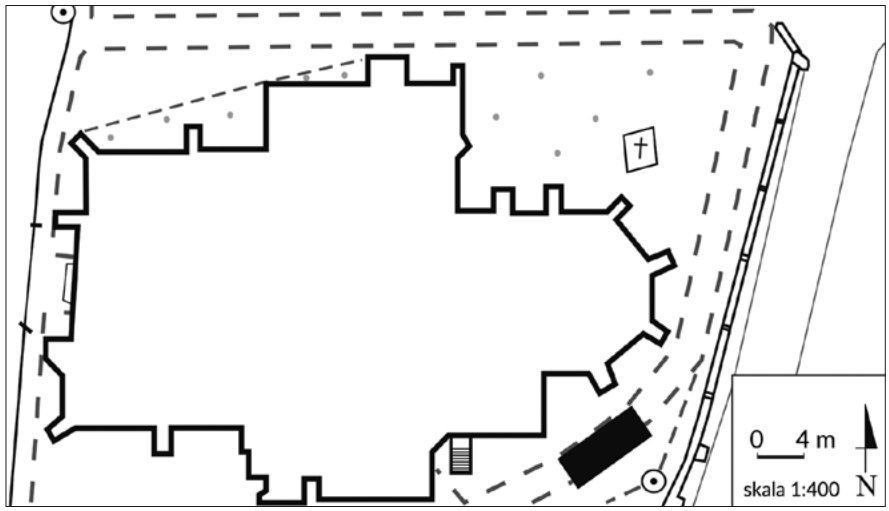

Fig. 1. Gniew; the layout of the Church of St. Nicholas, with the location of excavation 3/15 (marked with a black rectangle) (prepared by J. Michalik, the layout as published in: Grupa et al. 2015b: Fig. 2).

65–111), Lublin (Niedźwiadek et al. 2015: 71–82), Płonkowo (Grupa et al. 2015a: 40, 46), Sandomierz (Rostkowska 1996: 405–414), Gliwice (Furmanek, Michnik 2004: 399–420), Warsaw (Dąbrowska 2012: 331–354), Wrocław (Pankiewicz, Witkowski 2012: 49–68; Wojcieszak 2012: 58–103), Częstochowa (Młodkowska-Przepiórowska 2018: 207–245), Szczuczyn (Dudziński et al. 2015: 56–57, 74–75; 2017: 50, 52, 62), and, in this particular case, Gniew (Niedźwiadek et al. 2015: 98; Grupa, Warecka 2017: 31–42; Michalik 2018: 60–67; Pawikowski 2018: 69–75).

The aim of the work was to determine the state of research into the symbolism of St. Benedict and then to describe it on an example of the cross found in Gniew. Thus, the paper discusses issues relating to nomenclature, symbolism, full forms of abbreviations, the life of Saint Benedict of Nursia, and his cult after his death. One of the most important works on the Saint Benedict medal is the work from 1862 by Prosper Guèranger[2], an abbot of Solesmes, also called the restorer of the French Benedictines. This work is frequently cited in descriptions of devotional objects with symbols of Saint Benedict, just like the cross from Gniew.

Metal devotional objects, most of which were medals or crosses, were typically worn on textile ribbons or strings around the neck. When worn like that, they were not exposed to others, probably constituting a private sphere of piety. They

2 The work mentioned is Essai Sur L'origine, La Signification Et Les Privilèges De La Médaille Ou Croix De St Benoit published in Poitiers in 1862.

were also sewn on to scapulars (Grupa et al. 2015b: 134; Niedźwiadek et al. 2015: 102) or worn threaded on a belt[3], which can sometimes be seen in iconographic representations from the Late Middle Ages and the Modern Era (Pisarzak 1979: 1226; Kołyszko 2013: 236).

The archaeological context

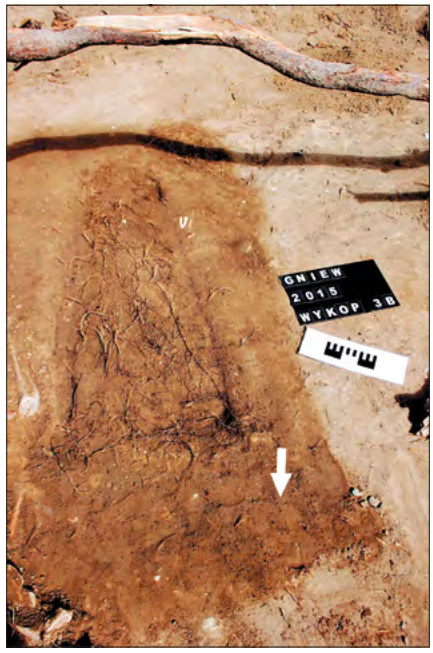

Fig. 2. Gniew, excavation 3/15; an outline of an excavation with a child's coffin, with the place where the cross was found marked with an arrow (photograph by D. Grupa).

The cross found in the excavation no. 3/2015 at a depth of approx. 1 m, was located in a layer of ground being a backfill of a cut made over a child's coffin (Fig. 2). In this case, it can be presumed that gravediggers digging a hole for the coffin disturbed and exposed the remains of earlier burials, which is why the cross was found in a heap of ground used to backfill the grave. Approx. 20 cm above the cross there was a fragment of a grave garland which could come from the same grave as the cross. Moreover, small fragments of human bones were found in the ground that had covered the child's coffin. Possibly, gravediggers later exhumed burials from that place (most probably because of the limited space in the graveyard) and moved the bones to one of the ossuaries located in the graveyard, perhaps the nearest one, at the eastern wall of the church chancel (Kozłowski, Grupa 2019: 46).

The state of preservation of the artefact

The cross has not been preserved whole (Fig. 3, 4). It is difficult to determine whether the missing loop and two fragments of the horizontal bar were damaged when it was used by its owner or as a result of corrosion taking place after it had been deposited in the ground. The cross is 2.4 cm long, with the remaining part

3 Monks would sometimes attach them to a rope, a rosary or a chaplet on a belt (*Medalik…* 2017: 43).

Fig. 3. Gniew; the obverse of the cross of St. Benedict (photograph and prepared by J. Michalik).

Fig. 4. Budapest; a cross devoted to St. Ulrich (*Treasures…* 2017: 164).

of the loop not exceeding 0.2 cm. In width, the preserved part is approx. 2.5 cm (Fig. 3, 4). Despite damage to the cross, it was possible to identify it, however, some of the letters could not be read as they had been worn away or because large fragments of the plate were missing.

Nomenclature problems

It is puzzling that the plate found in excavation 3/15 in Gniew greatly resembles both a cross and a medal (in the shape of a dodecagon). Identical devotional items are called by Barbara Chudzińska medals and crosses interchangeably (Chudzińska 1998: 30, Table VI; 2008: 288), however, she also advances a thesis that these could be pendants in the shape of a knight's cross (Chudzińska 1998: 30). On the other hand Kornel Białobłocki treats them as crosses (which, considering their shape, seems logical), and this is why this term will be used in this paper.

In the literature, it is assumed that characteristic crosses with arms of equal length can only be associated with the figure of Saint Benedict and his prayer, and with the blessing of Saint Zacharias. However, a cross of the same shape found in Budapest changes the perception of this artefact. It was identified as the cross of Saint Ulrich (Fig. 5). It differs from the cross of Saint Benedict in iconography and inscriptions. Its main part is probably a representation of a scene from the life of Saint Ulrich, with inscriptions concerning the saint underneath (*Treasures…* 2017: 164, Cat. no. 444). Perhaps its owner went on a pilgrimage to Augsburg and lost it on the way or a Budapest citizen had obtained and lost it

Fig. 5. Gniew; the reverse of the cross of St. Benedict (prepared by J. Michalik).

Fig. 6. Gniew; a detail from the reverse of the cross of St. Benedict (photograph by J. Michalik).

earlier. According to B. Chudzińska, the cross of Saint Benedict is derived from the cross of Saint Ulrich. It refers to a knight's cross with arms of equal length that widen at the end[4] (Chudzińska 1998: 30).

Full forms of abbreviations and the symbolism of the cross

The obverse of the cross found in Gniew depicts two knight's crosses, one inscribed within the other (Fig. 4). Between them, there are letters, out of which we can read: '[CSP]B [CS]SML NDMD', which will be explained later. Firstly, we should consider the symbolism of the Saint Benedict Cross.

Apart from the obvious symbolism of the cross in Christianity, it also played an important role in the life of Saint Benedict. According to *Dialogues* by Saint Gregory the Great,

> Taking counsel together, they [monks at Vicovaro] agreed to poison his wine: which being done, and the glass wherein that wine was, according to the custom, offered to the Abbot to bless, he, putting forth his hand, made the sign of the cross, and straightway the glass, that was held far off, broke in pieces, as though the sign of the cross had been a stone thrown against it.

4 In the case of the cross from Budapest it is difficult to determine details as authors, apart from naming the saint and publishing a photograph of the artefact, do not provide any further information about it, and there were a few saints carrying that name in the Middle Ages.

This is the story most frequently quoted when describing the Saint Benedict Cross as one of its origin stories (Guèranger 1869: 7–8; Grzegorz Wielki 2000: 136; Hiżycki 2011: 14–15).

Knowing one of the motives for using the cross to create items devoted to Saint Benedict, one can move on to reading the letters inscribed on it. As it was already noted, these were the first letters of words of a popular prayer, proving the significance of the cross in Christianity, which was to protect against evil human deeds provoked by Satan. The meaning of the prayer and its translation into Polish can be found both in the works of Paweł Szczaniecki (2016) and of K. Białobłocki (1991/1992), which Szczaniecki used as his source. However, one of the oldest translations is the one by Prosper Guèranger (1869: 42–44) and this will be used in the following discussion.

The prayer should be read starting with letters placed between the cross arms: [C(rux) S(ancti) P(atris)] B(enedicti) – the Cross of Holy Father Benedict. Then, in the vertical line of the cross: [C(rux) S(acra)] S(it) M(ihi) L(ux) – Let the Holy Cross be my light. And in the horizontal line: N(on) D(raco) S(it) M(ihi) D(ux) – May the dragon never be my overlord! The second line can be seen on the rim of the cross, starting with the monogram of Christ: [IHS (the monogram of Christ) V(ade) R(etro) S(atana), N(unquam) S(uade) M(ihi) V(ana) S(unt) M(ala) Q(uae) L(ibas), I(pse) V(enena) B(ibas)] – Begone, Satan! Never tempt me with your vanities! What you offer me is evil. Drink your poisons yourself (Guèranger 1869: 42–44).

P. Guèranger (1869) suggests that these words were spoken by Saint Benedict – the first line during the bodily temptation he felt, which he overcame with

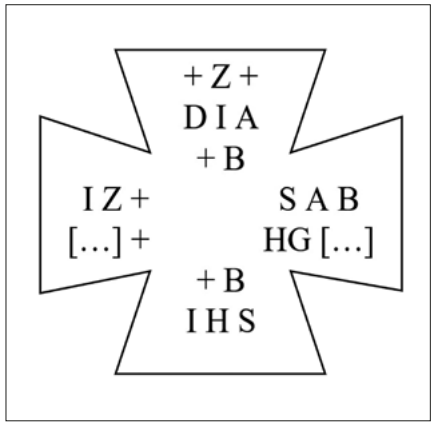

Fig. 7. Gniew; the arrangement of letters of the blessing of St. Zacharias on the cross (prepared by J. Michalik).

Fig. 8. A cholera cross put up in Sztum (Pomeranian Voivodeship, Poland) as protection against SARS-CoV-2 (photograph by A. Michalik).

the sign of the cross[5]. The second line concerns the already mentioned story when he was given poison in a glass which he destroyed by making the sign of the cross over it.

On the reverse of the medal, there is only one knight's cross; in the middle of it there is a pearl surround, with the image of Saint Benedict inside (Fig. 4). The outline of the figure has been worn away but one can see a figure with a crosier in the left hand and an indistinct item in the other hand, probably a stick[6] (Fig. 6). On the arms of the cross, there are letters forming the blessing of Saint Zacharias (Fig. 7).

The blessing of Saint Zacharias is closely related to the cross of Caravaca, also called a cholera cross, a plague cross, or the cross of St. Zacharias. Pope Zacharias was a Benedictine monk. In 752, he published the life of Saint Benedict written in Greek by Gregory the Great (Szczaniecki 2016: 54). Initially, abbreviations of the blessing of Saint Zacharias were placed on a long copper cross that was to protect against the cholera epidemic[7] and other plagues (Szczaniecki 2016: 54; Pawikowski 2018: 71).

The alleged author of the Polish translation of the blessing of Saint Zacharias was Fr Roman (Amand) Zawadzki from Tyniec, and the translation consisted in adjusting Polish words to Latin letters from the cross (Szczaniecki 2016: 64–65). In the paper, the prayer has been considerably shortened, but the whole text in Polish is quoted by P. Szczaniecki in *Szkic o pochodzeniu i łaskach medalika albo krzyża św. Benedykta* (2016).

The blessing of Zacharias (as written in the original) (Szczaniecki 2016: 65–71) reads as follows:

> + (Crux – Krzyżu Chrystusów zbaw mię. / O Cross of Christ, save me.);
>
> Z(elus – Żarliwość domu twego niech mię uwolni. / May zeal for your house free me.);
>
> + (Crux – Krzyż zwycięża, krzyż panuje, krzyż rozkazuje [...] / The Cross conquers; the Cross reigns; the Cross rules [...]);
>
> D(eus – Dajże to [...] Boże mój , żebym ja i to miejsce było uwolnione od powietrza tego. / God, my God, drive this plague away from me, and from this place, and free me.);

5 The story was already described by Gregory the Great in his *Dialogues*, which concerned the events from the sixth century (Grzegorz Wielki 2000: 135).

6 According to the legend of Saint Benedict, he used the stick to chase away the devil who interrupted the prayer of a monk (Seibert 2007: 47).

7 It is worth mentioning a cross of Caravaca drawn in ink on paper, found in the collection of the Jagiellonian Library (Karawaka, ref. no. I. 10. 997–189/1). It can be inferred that it was to be used as a protection amulet (the drawing was signed "contra pestem, contra praestigia", which can be translated as "against the plague, against sorcery" (Szczaniecki 2016: 64), according to P. Szczaniecki, crosses and medals served the same function.

I(n manus – Jezu [...] w ręce Twoje polecam ducha mego, serce i ciało moje. / Jesus [...] / In your hands, O Lord, I commend my spirit, my heart, and my body.);

A(nte – Aniżeli stworzył Bóg niebo i ziemię [...] On mocny jest wybawić mię od powietrza tego. / Before heaven and earth God was; and God is able to liberate me from this plague.);

+ (Crux – Krzyż Chrystusów mocny jest odpędzić zarazy, powietrza z miejsca tego i od ciała mego. / The Cross of Christ will expel the plague from this place and from my body.);

B(onum – Barzo jest rzecz dobra, oczekiwać w milczeniu ratunku Boskiego, aby odpędził zarazę ode mnie nędznego. / It is good to wait for the help of God in silence, that he may drive away this plague from me.);

I(nclinabo – Ja nakłonię serce moje do usprawiedliwienia Twojego [...] / I will incline my heart to performing your just deeds [...]);

Z(elavi – Z wielką żarliwością zapaliłem się niezbożne [...] w Tobie samym ufność miałem. / I had zeal on occasion of the wicked [...] I have hoped in you.);

+ (Crux – Krzyż Chrystusów odpędza czartów i powietrze zepsowane niech wyżenie. / The Cross of Christ puts demons to flight; corrupt air; and drives away the plague.);

S(alus – Słusznie, zbawieniem twoim sam jestem, [...] wzywaj Mię, Ja wysłucham i cię i wybawię od powietrza tego. / I am your Salvation [...] cry out to me, and I will hear you, and I will liberate you from this plague.);

A(byssus – Azaś przepaść przepaści nie wzywa i w szumie głosu Twego odpędziłeś czarty i od zarazy powietrza uwolniłeś mię. / Abyss calls to abyss, and you have expelled demons by your voice; liberate me from this plague.);

B(eatus – Błogosławiony mąż, który ufa w Panu i nie obrócił oczu w próżność [...] / Blessed the man who hopes in the Lord, and does not look upon vanities [...]);

+ (Crux – Krzyż Chrystusów [...] niech odpędzi z miejsca tego czarta i zepsowane powietrze i zarazę od ciała mego. / May the Cross of Christ [...] expel from this place the demon, and corrupt air, and plague from my body.);

Z(elus – Żarliwość czci Boskiej strawiła mię pierwej [...] wybaw mię od tej zarazy powietrza złego. / May zeal for the honour of God convert me before I die [...] save me from this plague.);

+ (Crucis – Krzyża świętego znak uwolni [...] od powietrza tych, którzy Mu ufają. / May sign of the Cross free [...] those who trust in him from the plague.);

H(aeccine – Hej! Także to Panu oddajecie ludzie głupi i bezrozumni? [...] którzy w Nim ufają nie będą zawstydzeni. / Will this foolish people return to the Lord? [...] for whoever trusts in him will not be confounded.);

G(utturi – Gardłu memu i do ust moich przyschnie język, jeżeli Cię wielbić nie będę [...] Zbaw mię, Boże mój, z zarazy tej powietrza [...] / If I will not praise you, let my tongue stick to my throat and to my jaws [...] liberate me and this place, O God, from this plague [...]);

F(actae – Firmament ziemski wszystek pokryty był ciemnością podczas śmierci Twojej, Panie, Boże mój. [...] Niechaj ustąpi powietrze zaraźliwe ode mnie do ciemności zewnętrznych.

/ At your death, O Lord, darkness fell over the whole earth. [...] may the corrupt air depart from me into the outer darkness.);

+ (Crux – Krzyżu Chrystusów, broń nas i odpędź zarazę powietrza z miejsca tego [...] / Defend us, O Cross of Christ, and expel from this place the plague [...]);

B(eatus – Błogosławion, który nie obrócił oczu swoich na marności, dnia złego wybawi go Pan. Panie mój, ufałem Tobie, uwolnij mię od tej zarazy powietrza. / Blessed is he who does not look upon vanities, and false extravagances; on the day of evil the Lord will free him. Lord, I have trusted in you; free me from this plague.);

F(actus – Fortecą stałeś się, Boże, bom w Tobie położył nadzieję moje. Uwolnij mię od tej zarazy powietrza. / God has become my refuge; because I have trusted in you, free me from this plague);

R(espice – Racz wejrzeć na mię, Panie, Boże [...] od tej zarazy powietrza racz mię uwolnić. / Look upon me, O Lord my God [...] free me from this plague.);

S(alus – Stałeś się, Panie, Zbawieniem moim. Uzdrów mię, a będę uzdrowień, zbaw mię, a będę zbawion. / You are my Salvation: heal me, and I will be healed; save me, and I will be saved.);

A(men.);

IHS (the monogram of Christ);

MRA (the Marian monogram).

The blessing was closely related to the protection against cholera, which in the Modern Era wreaked havoc not only in Europe but also on other continents. The cholera epidemic left its mark on many aspects of the everyday life including devotional items, which was reflected by, among others, the appearance of crosses devoted to protection against the epidemic (e.g. cholera crosses – crosses of Caravaca), and prayers frequently inscribed on devotional items.

However, devotional items worn for protection against infection were used not only in the case of cholera. Between the Middle Ages and the nineteenth century there were also other diseases, such as pox, flu, typhoid fever, spotted fever, dysentery, and the most dangerous one – the plague. Epidemics were frequently described as bad (foul) air[8], which later made it difficult to identify the specific disease. Frequent epidemics in modern Europe resulted in considerable demographic, economic, and cultural changes. Thus, the everyday social life changed dramatically because of epidemics (Pękacka-Falkowska 2009: 6).

In many cases, the reasons for epidemics and the routes of transmission to new victims were not known. People tried all kinds of treatment, however, most of them were ineffective on account of a severe and rapid course of the disease ending in

8 It was believed that foul air could get inside the body through skin pores (Grupa, Grupa, Nowak 2018: 112).

death. Doctors at the time were helpless in the face of epidemics taking a heavier and heavier toll (Zajączkowski 2017: 27). As the scientific methods of treatment were ineffective, both those infected and healthy tried to protect themselves by whatever means available, including supernatural items such as magical amulets, health stones, and pomanders with herbs. What mattered to Catholics in these difficult moments was the intercession of the saints, which was reflected in wearing devotional items with their images and prayers (Pękacka-Falkowska 2009: 106–107).

The plague became a myth, appearing out of nowhere, meting out sentences and punishments, and then disappearing as soon as it appeared. This was frequently accompanied by an idealised image of the world of old, compared with the present, often apocalyptic, state of affairs (Sznajderman 2020: 22). Another theory formulated at the time equated the epidemics with the punishment imposed by God, who sent the disease to places inhabited by sinners, with the only medicines being contrition, prayer, and atonement (Pękacka-Falkowska 2009: 17). However, this does not only refer to the Church as in folk tales and myths epidemics are also sent as punishment for shedding the blood of a family member, stealing relics from the church or desecrating a grave. As was aptly noted by Monika Sznajderman: *the plague has always been a sanction for the violation of the national, religious, or tribal law* (Sznajderman 2020: 24).

The fear of a deadly disease gave rise to social unrest. According to a conspiracy theory spreading among people, the disease was brought about on purpose to destroy lower social classes as they suffered the most (Zajączkowski 2017: 27). On other occasions, the outbreak of the epidemic was blamed on the poor, the underclass or people of different religions (usually Jews), skin colour or professions connected with unpleasant smells (e.g. tanners, furriers, dyers) (Pękacka-Falkowska 2009: 6; Sznajderman 2020: 30). Even though during each epidemic people felt the need to find a scapegoat, the disease attacked everyone alike, regardless of their social class, religion and wealth (Szczaniecki 2016: 71). Over centuries, for this reason and because of general fear, many rebellions and protests occurred, and in France this was one of the reasons behind the revolution (Zajączkowski 2017: 27). In some cases, cities struck by epidemics descended into chaos. The accompanying sense of impunity led to a number of burglaries, thefts, and trade in the property of the epidemic's victims, mostly clothes and bedlinen. Punishments for such offences were severe (Pękacka-Falkowska 2009: 66–67; Karpiński 2014: 375). People felt completely defenceless, which is why they resorted to anything that could ease their suffering, including prayers of intercession to saints depicted on medals and crosses – Saint Benedict, Saint Ulrich – and on crosses of Caravaca (Szczaniecki 2016: 71).

It is worth noting some positive effects of prayers to saints for protection or the relieving of symptoms. In his work *O cholerze indyjskiej epidemicznej* (*On the*

Indian epidemic cholera) of 1831, Wilhelm Malcz lists factors that increased the probability of contracting cholera including failure to satisfy the basic needs, overcrowded living conditions, malnutrition, overwork as well as stress and fear of being ill (Malcz 1831: 66–70). Pinning one's hopes on being protected against the disease by devotional items calmed the faithful down, at the same time seemingly slowing down or eliminating one of the main (as was thought at the time) factors that could 'attract' cholera.

Even today it is important to ensure the sense of security in the case of diseases and epidemics. Devotional items are still manufactured and epidemic crosses are still erected to protect communities against fatal diseases (e.g. infection with 2019-nCoV virus) and other inconveniences (Fig. 8).

Most probably because of the already mentioned faith in the protective properties of prayers on crosses and medals (treated as a kind of amulets) of Saint Benedict and the blessing of Saint Zacharias, at the end of the seventeenth century these two forms merged, and so the medal/cross included letters from the prayer of Saint Benedict on one side, and the prayer of Saint Zacharias on the other (Szczaniecki 2016: 55). It is curious that the figure of Saint Benedict was placed on the side of the cross with the blessing of pope Zacharias. P. Guèranger criticised such medals:

> Thus, you need to be careful about some of the medals [of Saint Benedict] struck in Germany, [...] on which an amulet based on the so-called medal of Saint Zacharias is placed. This medal has nothing to do with the Saint Benedict Medal (Guèranger 1869: 172–173).

The main accusation was lack of the image of Saint Benedict on the side with letters being the shortened form of his prayer. He also criticised the use of letters in the blessing as they do not correspond with individual words but whole sentences, which he believed made the whole cross incoherent (Guèranger 1869: 173). According to the source indicated, devotional items were manufactured in different places of Europe and modified in each of the regions individually.

The life and the cult of Saint Benedict

Having learnt the symbolism of the medal of Saint Benedict, we should now consider it from the perspective of the life of the saint. There are two basic sources related to Saint Benedict: his life written by Gregory the Great and *The Rule* (Grzegorz Wielki 2000; Hiżycki 2011: 8). *The Rule* was known in Poland from the eighteenth century from the manuscript kept in the Cistercian abbey in Kamieniec Ząbkowicki, and today it can be found in the Wrocław University Library (Szczaniecki 2019: 29). However, it only contains the thoughts of Saint Benedict and recommendations other monks should follow, which resulted from the austere

life of monks[9] in Benedict's times. He resigned from many practices and instead recommended shaping the spirit through obedience and humility, so that each monk following his *Rule* would ultimately become a blessed man (Hiżycki 2011: 9–10). The life written by Gregory the Great is problematic for a different reason: Saint Gregory presents Benedict as a miracle-worker and describes his life in the context of biblical events (Hiżycki 2011: 9).

Saint Benedict was born in 480 in Norcia, into a landowning family. He lived in a time of unrest. When he went to Rome to study, he saw the moral corruption of the society and chose the life of a hermit living in a cave. Around 529, he decided to settle on Monte Cassino together with his followers and to build a church and a monastery (Szczaniecki 1976: 228). Soon, the Benedictine Order was founded there; it is considered to be one of the oldest Western orders (Seibert 2007: 47). Benedict died in 547 at the age of 67. He was a cult figure already at the time of his death, however, as the Benedictine Order spread, he was more and more glorified (Szczaniecki 1976: 228).

The first representations of Saint Benedict are the thirteenth-century frescos from the Basilica of Saint Ermet in Rome (Wiewióra 1995: 436). From the sixteenth century onwards, he was presented in Italy as a middle-aged man with a beard and white hair. However, this image only became popular in other parts of Europe in the baroque art (Seibert 2007: 47).

In the territory Poland, it is difficult to assess the popularity of Saint Benedict's teachings. One of the oldest sources is the sermon of Nicholas of Błonie from the reign of Władysław II Jagiełło. It is known from the oldest Polish incunables, including some from 1494 (Szczaniecki 2019: 23). Unfortunately, in the turbulent history of our country, the Benedictine literature was nearly lost. The first preserved information comes from the Świętokrzyskie abbey, where Nicholas of Koźmin lived at the close of the Middle Ages. His life includes two mentions of Saint Benedict. As a fervent monk, he strictly followed *The Rule* (Szczaniecki 2019: 24). At the time, all written sources concerning Saint Benedict were kept in the Świętokrzyska Library, including a few copies of *The Rule*, the second book of *Dialogues* by Saint Gregory (copied by the already mentioned Nicholas of Koźmin), commentaries to his works, legends, and even a poetic version of *The Rule of Saint Benedict* (Szczaniecki 2019: 24). Other information was provided by chronicler Jan Długosz. He discussed Benedictine issues, which – considering the scarcity of sources on the cult of Saint Benedict in Poland – is of great significance. The chronicler was interested in the monastic life, however, he spoke harshly of the Benedictines. According to Długosz, Benedictine monks of old had pursued the hermit's ideal, but those contemporary to him forsook the former values.

9 This can be exemplified by many days of fast or sleep deprivation (Hiżycki 2011: 9).

He accused them of being isolated from people and of limiting the contemplative lifestyle (Szczaniecki 2019: 25–26).

The first information about the symbol of the cross of Saint Benedict, as it is depicted on devotional items, dates back to the Middle Ages. Naturally, as there are no preserved written sources, it is impossible to determine when the medal of Saint Benedict was first used (Guèranger 1869: 46).

In the European sources, one of the first mentions of the cross can be found in an account of a witch trial that took place in 1647 in Nattremberg in Bavaria. The interrogated witches allegedly said that they had not been able to use their powers against the abbey in Metten as on its walls were crosses with letters still known today from the medal of Saint Benedict (Guèranger 1869: 47; Szczaniecki 2016: 39). The Benedictine monks from the abbey no longer remembered what these letters meant. The mysterious abbreviations were only deciphered after an Evangelion written in 1415 had been found[10]. One of the drawings in it was supposed to depict Saint Benedict holding a staff with a cross on which the mysterious letters were explained (Guèranger 1869: 48). Thus, it can be concluded that the lines from the medal of Saint Benedict were known as early as at the beginning of the fifteenth century.

The first written sources concerning the medal with the prayer of Saint Benedict come from an information leaflet dated to 1664. It depicts Saint Benedict in a gesture of benediction and a medal with a characteristic cross and letters. As we can learn from the leaflet, at that time devotional items connected with Saint Benedict were made of any metal, and the German name for the medal was 'phennig', while in Poland it was simply called 'metal' (Szczaniecki 2016: 33–34).

Another crucial work on the symbolism of Saint Benedict was the already mentioned study by Prosper Guèranger from 1862. It was very well received in the former territory of Poland, and the text translated into Polish had as many as ten editions in Warsaw, Cracow, and Lviv over fifteen years (Szczaniecki 2016: 44–46). The study has not lost any of its value and it is still reissued, with the latest edition coming from 2018[11].

In the past, it was commonly believed that the medal of Saint Benedict had special powers as it was able to ward off diseases, evil spirits, and devil's temptations (Szczaniecki 1976: 229). Guéranger distinguished their different forms, such as healing the soul, healing the body, the change of the course of events, and casting out demons[12] (Hawryłeczko 2018: 19).

10 This was probably one of the versions of the Paupers' Bible (Guèranger 1869: 48).

11 The book is still published today. In Polish, it is published by Tyniec Wydawnictwo Benedyktynów, with an additional preface by G. Hawryłeczko.

12 Guèranger devoted a considerable part of his work *Szkic o pochodzeniu…* to stories of different people who supposedly experienced miracles through the medal of Saint Benedict (Guèranger 1869: 61–138).

Great popularity of medals of Saint Benedict and the fact that they were treated as talismans[13] could not go unnoticed by the Church. The medal was well received by the Holy See despite problems with deciphering the letters (which aroused suspicions about sorcery[14]). Pope Benedict XIV, having thoroughly examined the symbolism of the cross of Saint Benedict, gave his approval. On March 12, 1742, he issued a breve sanctioning the formula of the blessing and granting indulgences to those who wore it[15] (Guèranger 1869: 139; Szczaniecki 2016: 42–43).

A high demand for devotional items among the faithful required a properly optimised manufacturing process. Crosses, medals, and other metal devotional items were typically cast or imprinted on both sides of a plate, with items devoted to Saint Benedict being mostly struck. The cross of Saint Benedict from Gniew was also struck, which is proved by some elements unevenly pressed due to the material being moved and by uneven cuts. Such issues, contrary to appearances, are quite common in archaeological material (Chudzińska 1998: 15), and so is the case here. One can see that the cross die was moved a few millimetres, which allows to assume that it was mass produced, as mass production sometimes resulted in small defects. However, the presence of the artefact in the cemetery may indicate that even such items were successfully sold.

In the case of medals/crosses of Saint Benedict, one of the controversial issues is the place of their manufacturing. It is difficult to identify workshops producing such devotional items due to limited research and high anonymity of such centres (Chudzińska 1998: 15). However, on account of great popularity of devotional items connected with the cult of Saint Benedict and frequent mistakes in inscriptions, it is presumed that they were produced by secular workshops that tried to maintain strictly determined types of representations on the plates (Chudzińska 1998: 32). On the other hand K. Białobłocki places them in the main Benedictine centres, in Italy and Austria (Białobłocki 1991/1992: 179). Perhaps both these versions are true, particularly if one considers the already mentioned Guèranger's account of 'unoriginal' medals of Saint Benedict from Germany. Thus, it can be assumed that due to great popularity of devotional items connected with Saint Benedict, they were produced close to large Benedictine centres regardless of the country. However, further research is necessary to formulate final conclusions.

13 For example, in Pelplin, the medal of Saint Benedict was placed on the cathedral tower to protect it against thunder (Szczaniecki 2016: 42; Liedtke 1932: 257–259).

14 Such suspicions were spread by, among others, Jean-Baptiste Thiers in his Treaty of Superstitions (Guèranger 1869: 139).

15 More than 224 years later, during the Second Vatican Council on October 24, 1964, pope Paul VI named Saint Benedict patron saint of Europe (Hiżycki 2011: 67–70).

Saint Benedict medals and crucifixes are known from many inventories of artefacts compiled during research conducted in graveyards, mostly from the Modern Era. Saint Benedict crosses similar to the one found in Gniew were excavated in, for example, Maniowy in Podhale (Chudzińska 1998: Table VI), Lubiń near Kościan (Białobłocki 1991/1992: Fig. 2), and Toruń (Stawarz 2014: 20, 22). The most popular medals are oval and hexagonal or octagonal, with an image of Saint Benedict on the observe and a cross with the prayer of Saint Benedict on the reverse. Such medals were found in the already mentioned places and in Lubiąż (Witkowski 1990: Fig. 26), during research in a monastery complex in Trzemeszno (Wiewióra 1995: 433), at Collegium Gostomianum in Sandomierz (Rostkowska 1996: 405–406), in the churches of St. George and St. Michael in Wawel (Chudzińska 1998: 32), in the cemetery in Gliwice (Furmanek, Michnik 2004: 412, Fig. 2:1, 2), in the graveyard at the Church of St. Barbara in the Old Town in Częstochowa (Młodkowska-Przepiórowska 2018: 218–220), in Gdańsk (Trawicka 2007: 58–59), in Chojnice (Kołyszko 2008), and in the grounds of the graveyard at the Church of St. Matthias in Wrocław (Wachowski 2010: 168–169). Similar medals devoted to Saint Benedict were also found at the Church of St. Joseph in Pułtusk during clearance of the Wessel chapel (Kołyszko 2007: 68). It is worth mentioning an oral account given by Józef Gaweł, who was a gravedigger in Tyniec for many years. He said that medals of Saint Benedict were found at burials (Szczaniecki 2016: 82).

In European countries, these medals are known from, for example, the historic material obtained from the Church of St. George in Prague in the Czech Republic (Borkovský 1975: Fig. 91:5), the monastery graveyard in Kraśna in Slovakia (Polla 1986: 196, Table XXVI:5, 9), and the territory of Baden in Germany (Faßbinder 1993: 222–223).

Conclusions

Equipping the dead, sometimes at their request, with different devotional items including crosses, medals, rosaries, reliquaries, and scapulars, was connected with the confession of faith, proof of devotion, and protection of the soul (Grupa et al. 2015b: 29–30). This resulted from a Christian view that death is only a 'momentary sleep' until the Judgement Day (Grupa et al. 2015b: 27). Saint Benedict medals and crosses in the grave did not always mean that the buried person was a monk. The saint was even considered a patron of the lay dead and was supposed to protect them after death (Szczaniecki 2016: 81). This is related to the so-called good death (*Ars Moriendi*), when the dead is lying on the deathbed among their relatives[16] (sometimes even having accepted their fate and planned their funeral) (Chrościcki

16 A good death was perceived the same by both Catholics and Protestants (Grupa 2005: 28).

1974: 64; Grupa 2005: 28). The need to die well resulted from the high death rate at the time, with death taking a heavy toll due to hunger, war, epidemics, or natural disasters. Unlike today, one of the rarest causes of death was old age (Grupa et al. 2014: 13). The cult of Saint Benedict as a patron of the happy death started with the revelations of Saint Gertrude, who lived in the fourteenth century. She was supposed to be promised good, happy death for all who prayed to Saint Benedict and reminded him of his own death: it is said that he died standing and praying in an oratory (Szczaniecki 2016: 83).

Based on the information quoted in the paper, it can be said that the artefact found during archaeological research in Gniew is a cross despite the fact that it resembles medals and despite the different terms used in the literature. What also matters is the long and unique history of this small cross struck on a thin plate. Despite the three and a half centuries that have passed since the first information about the medal appeared, and the six centuries since the first mention of its symbolism, it is still very popular among Christians. Most probably, information about the miracles happening thanks to it are no longer the main reason why it is worn but it can be a kind of an amulet protecting against evil. Despite rather scarce literature on Saint Benedict devotional items found at archaeological sites, one should expect that as research progresses, doubts about the manufacturing places or more detailed relationships between the appearance of crosses and medals will be dispelled.

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Summary

The Saint Benedict Cross or the Saint Benedict Medal Based on a Find from Archaeological Research in Gniew (Pomerania Province)

In 2015, during archaeological research conducted around the church in Gniew (Pomerania Province), a small fragment of a metal plate was found. After it was cleaned as part of restoration it turned out to be a cross. The excavation was located outside, near the chancel wall. Research conducted there confirmed the conclusions drawn in previous years, i.e. that the church grounds had been used as a graveyard. The fact that the graveyard had been used for a long time was proved by numerous burials, overlapping grave pits and ossuaries, meaning places where human remains were gathered after earlier burials in the graveyard and the church had been emptied.

Devotional items, including medals, crucifixes, scapulars, and prayer ropes, have been long connected with the Christian tradition. The fact that they are found during excavations in churches and graveyards may indicate that they were popular in Late Middle Ages and in the Modern Era.

Unfortunately, the cross has not been preserved whole. It is difficult to determine whether the missing loop and two fragments of the horizontal bar were damaged

when it was used by its owner or as a result of corrosion taking place after it had been deposited in the ground.

The first written sources concerning the medal itself come from an information leaflet dated to 1664. It depicts Saint Benedict in a gesture of benediction and a medal with a characteristic cross and letters. One of the most important works on the Saint Benedict Medal is the work by Prosper Guèranger from 1862.

Saint Benedict medals and crucifixes are also known from many inventories of artefacts compiled during research conducted in graveyards, mostly from the Modern Era. Saint Benedict crosses in a form resembling a knight's cross were found in, among others, Maniowy in Podhale, Gliwice, Lubiń near Kościan, Wrocław, and Częstochowa.

Despite the three and a half centuries that have passed since the first information about the medal appeared, and the six centuries since the first mention of its symbolism, it is still very popular among Christians. Most probably, information about the miracles happening thanks to it are no longer the main reason why it is worn but it can be a kind of an amulet protecting against evil. Despite rather scarce literature on Saint Benedict devotional items found at archaeological sites, one should expect that as research progresses, doubts about the manufacturing places or more detailed relationships between the appearance of crosses and medals will be dispelled.

Keywords: archaeology, modern era, Gniew, devotional items, cross, St. Benedict, Benedictine monks, St. Zacharias, the cross of Saint Zacharias, epidemics

Streszczenie

Krzyżyk czy medalik św. Benedykta na podstawie znaleziska z badań archeologicznych w Gniewie (woj. pomorskie)

W 2015 r., podczas badań archeologicznych wokół kościoła w Gniewie (woj. pomorskie), znaleziono drobny fragment blaszki, która po oczyszczeniu w czasie zabiegów konserwatorskich okazała się być krzyżykiem. Wykop zlokalizowany był na zewnątrz, niedaleko ściany prezbiterium. Badania w tym miejscu potwierdziły wnioski wysunięte w poprzednich latach badań, że teren wokół kościoła użytkowany był jako cmentarz. O długim użytkowaniu cmentarza świadczyły licznie odkryte pochówki, przecinające się jamy grobowe i ossuaria, czyli miejsca w których gromadzono szczątki ludzkie po oczyszczeniu z wcześniejszych pochówków z obszaru cmentarza i kościoła.

Dewocjonalia, czyli między innymi medaliki, krzyżyki, szkaplerze czy sznury modlitewne, są związane z religią chrześcijańską długą tradycją. Ich znaleziska podczas badań wykopaliskowych w kościołach i na cmentarzyskach mogą świadczyć, że były one popularne wśród społeczeństw późnego średniowiecza i nowożytności.

Niestety, krzyżyk nie zachował się w całości. Trudno jest ustalić czy brakujące uszko oraz fragmenty dwóch belek uległy uszkodzeniu w czasie jego użytkowania przez właściciela, czy też stało się to przez procesy korozyjne po zdeponowaniu w ziemi.

Pierwsze źródła pisane o samym medaliku pochodzą z ulotki informacyjnej datowanej na 1664 r. Przedstawia ona świętego Benedykta z gestem błogosławieństwa i medalik z charakterystycznym krzyżem i literami. Jedną z najważniejszych prac o medaliku świętego Benedykta jest dzieło z roku 1862, autorstwa Prospera Guèrangera.

Medaliki i krzyżyki św. Benedykta są także znane z wielu inwentarzy zabytków z badań cmentarzysk, gównie z okresu nowożytności. Krzyżyki św. Benedykta w formie zbliżonej do krzyża kawalerskiego zostały odnalezione między innymi w Maniowach na Podhalu, Gliwicach, Lubiniu pod Kościanem, Wrocławiu czy Częstochowie.

Mimo upłynięcia ponad trzech i pół wieku od pojawienia się pierwszej informacji o medaliku, a ponad sześciu od pierwszej wzmianki o jego symbolice, to nadal medalik cieszy się dużą popularnością wśród chrześcijan. Zapewne informacje o cudach, jakie dzieją się za jego pośrednictwem, nie są już głównym motywem osób go noszących, tak może stanowić on swego rodzaju amulet, który ma chronić noszącego przed złem. Pomimo nadal dość skromnej literatury odnośnie do dewocjonaliów św. Benedykta pozyskanych ze stanowisk archeologicznych, należy liczyć, że wraz z postępem badań zostaną rozwiane niejasności odnośnie do miejsc produkcji, czy też bardziej szczegółowych zależności w wyglądzie między samymi krzyżykami i medalikami.

Słowa kluczowe: archeologia, nowożytność, Gniew, dewocjonalia, krzyżyk, św. Benedykt, benedyktyni, św. Zachariasz, karawaka, epidemia cholery

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Temperature and Humidity in the Base-floors of Three Northern Finnish Churches Containing 17th–19th-century Burials

Introduction

The medieval and early modern practice of burying the dead beneath churches has been responsible for preservation of funerary attires and soft tissues in association of several burials still found in old Finnish churches (Paavola 1998; Núñez et al. 2008). Traditionally the mechanism behind the phenomenon is believed to be related to the cessation of decomposition due to a mixture of the coldness in the subarctic regions and low humidity connected to it, while efficient ventilation is considered an additional factor. Particularly remains of those who died during winter were probably exposed to suitable conditions in terms of soft tissue

Fig. 1. The old stone church of Keminmaa was built in the mid-16th century. (photograph by Tiina Väre).

Fig. 2. The old wooden church of Kempele dates to the last decade of the 17th century. It is currently under renovation that will take the preservation of the burials as well as the structures of the church into consideration. (photograph by Titta Kallio-Seppä).

preservation (Calamnius 1868: 201; Núñez et al. 2008). Generally, the mean winter temperatures particularly in northern Finland remain near zero and the loosely laid stone foundations of some old churches surrounding the coffins allow the air to move removing the moisture from the coffins (Kallinen 1990; Núñez et al. 2008; Aufderheide 2010: 64–65).

Fig. 3. The church of Haukipudas is still in active use. It was built in the 1760s to surround the older church that had located at the same site since the 1640s (Vahtola 1980: 17, 78–80). Most of the burials beneath the current church of Haukipudas were originally made under the previous church. (photograph by Titta Kallio-Seppä).

The aim of this paper is to take a look at the conditions in church burials by observing the temperature and humidity conditions in three relevant churches (Fig. 1–3) located in three early modern period parishes on the coast of Botnian Bay, Kempele, Keminmaa, and Haukipudas (Fig. 4). Additionally, the significance of the macrofossils found in the coffins will be briefly considered.

Bacterial proliferation significantly slows down at temperatures below 10°C and practically ceases at 4°C (Laiho 1981: 137; Quigley 2006: 19; Aufderheide 2010: 42–45, 48, 61). Globally, there are several examples of cold induced mummification such as the Siberian Pazyryk Burials (Rudenko 1970), the mummified child remains of the Andes (Wilson et al. 2007), the Eskimo remains from Alaska (Zimmerman, Smith 1975) or the famous Ötzi from the Italian Alps (Pernter et al. 2007). Desiccation, as well, causes mummification as enzymes responsible for decomposition require moisture. The lower the temperature, the more insignificant the desiccation required for preservation becomes. While extreme coldness may cause

Fig. 4. Map featuring the three relevant parishes with old churches that contain burials with mummified human remains. (Tiina Väre).

desiccation through sublimation, also ventilation or porous soils covering the remains may aid evaporation. Moreover, the desiccating effect of ventilation has been documented to successfully induce mummification. It is not uncommon to find several factors simultaneously participating in the process of mummification (Aufderheide 2010: 64–65; Zimmerman 1996).

Normally decomposition begins immediately after death through enzyme induced autolysis followed by bacterial putrefaction after which larvae and later scavenging species consume the corpse. Buried soft-tissues typically perish within a decade while dissolution of skeletal elements usually takes much longer, although the timeline of these processes depends on several factors. Changes in the conditions may cause the soft tissue decomposition to cease at any point during the process, which may lead to mummification. External factors such as clothing, the position of the corpse and the type of matrix or internal factors like body composition and size, or the state of health affect the rate of decomposition. For instance, presence of microbes due to perimortem infections may hasten decomposition while bacteria-poor corpses of infants are more prone to mummification (Laiho 1981: 135–137, 139; Fiedler, Graw 2003; Aufderheide 2010: 41–42; Prahlow 2010: 169–177; Dix, Graham 2000: 13–14; Janaway et al. 2009: 329).

Under-church-floor burials in the churches of Haukipudas, Keminmaa and Kempele

All the studied churches were inventoried noninvasively in 1996 and preliminarily re-examined in 2013–2014. In the old church of Keminmaa (Fig. 1) 60 preserved coffins were observed of which 35 were opened and documented with photographs and written descriptions. The base floor of the old church of Kempele (Fig. 2) holds a minimum of 15 and the church of Haukipudas (Fig. 3) 19 coffins. At these sites,

altogether 26 remains have mummified to some extent, and 17 of those belong to children. Preservation varies from almost full mummification to several cases in which mere patches of skin cover parts of the otherwise skeletonized remains, such as skull and fingers. Generally, funerary attire, despite made of organic materials, has preserved better than the human remains and may be found also on the skeletonized remains (29 remains recorded at the studied sites). In each location more are found that are inaccessible without excavations or other invasive research methods (Joona, Ojanlatva 1997a; 1997b; Joona et al. 1997; Kangasvuo, Pöppönen 1997; Marjomaa, Ruonakoski 1997; Ojanlatva 1997; Tikkala 1997; Väre et al. 2014; Lipkin et al. 2020).

The base floors of each church have been visited several times for different purposes, which may have altered the conditions and interfered the process of mummification and preservation. For instance, in Haukipudas, during a renovation in 1908, the coffins were moved around, opened and the remains within them touched and admired – and sadly, even harmed by the villagers. What is more, when the base floor was cleaned in 2010, unfortunately, researchers visiting the premises noticed that one of the coffins containing well preserved remains was not in its previous place. This raised concerns of the mummified remains having vanished (Ojanlatva 1997; Koskela 1997; Paavola 2012). Alternatively, the coffin may simply have accidentally become coated with the subsoil sands in connection to the cleaning.

The first person known to have been buried under the old church of Keminmaa is the early 17th-century vicar, Nikolaus Rungius, who died in 1629. There still were others before him. In fact, the first burials under churches in Kemi parish dates to the period preceding the old stone church (Koivunen 1997: 45; Paavola 1997; 2009: 241; Lipkin et al. 2018). The last burial made in the old church during its active use dates to 1784. From the period between 1698, when the parish started recording the burials sites, and 1784, there are records of about 90 burials (Paavola 1997; 1998: 40–43, 77–79; 2009: 242).

Following the construction of a new church in 1799, the old church, now emptied of furniture, was deployed as a winter depository for the burials. It was no longer considered a permanent gravesite, although removing the coffins in spring was often neglected. As a result, some of them until this day have remained where they were once discarded. While officially prohibited, the practice of burying in the old church was continued at least until 1894 – and according to folklore, as late as the early 20th century (Cajanus 1927: 29–30; Itkonen 1976: 21; Satokangas 1997; Paavola 1997; 1998: 77–78, 86–87; 2009: 242–247).

In Kempele burying under the church began in 1695 and went on for nearly 90 years. Four chamber tombs under the church housed most of the burials. Two of them, located beneath the chancel in the east, were made of stone, while the

others, located west from the afore mentioned, were of wood. By 1782, when the floor was opened for a burial for the last time, at least 134 burials had been made beneath it (Hiltunen 1982: 140; Pettersson, Hyvönen 1991: 30; Joona et al. 1997; Paavola 1998: 53–54).

In Haukipudas, two subsequent churches have stood on the same location and more than 200 individuals have been buried beneath them. The burials probably began as soon as the first church was completed in the 1640s, although exactly when, is uncertain. The popularity of the custom of burying under church faded rapidly after the current church was built in 1760s. Only five burials were made under it of which the last in 1765 (Koskela 1997; Paavola 1998: 63–64, 67; 2012).

Observing the conditions in churches and coffins

It has been generally believed that both the coldness and low humidity contributed to the occurrence of mummification in under-floor graves. During the 1996 inventory in Haukipudas, in August, temperature of 13°C was measured a metre under the floor level and although the humidity was not checked up on, a remark was made of it probably being rather low (Ojanlatva 1997). We monitored (Ebron EBI 20TH1) the base-floor relative humidity (%rH) and temperature (°C) twice-daily (4 a.m./p.m.) to conclude about the processes affecting the soft tissue preservation in the old churches of Keminmaa and Kempele, and in the church of Haukipudas. These obtained values were compared to the temporally corresponding humidity and temperature observations collected from the nearest weather stations using the open data source of Finnish Meteorological Institute to assess how the base floor conditions are afflicted by the changes in outside weather conditions. The weather stations in question were Kemi-Tornio airport, Oulunsalo airport, and Oulu Vihreäsaari, respectively.

In Keminmaa the complete data covers the period of 16. Sep. 2013 to 31. Jan. 2016, in Kempele, 27. June 2013 to 29. Sep. 2014, and in Haukipudas 1. April 2014 to 30. June 2015, apart from some missing values in the data from the weather stations. In Keminmaa and Kempele the year-long periods chosen for closer observation were temporally corresponding – from the beginning of October 2013 to the end of April 2014. Due to different measuring periods it was impossible to get data of a full year from the same period from all the churches. The data logging in Haukipudas began a half year later than the selected year-long observation period in the other churches.

The minimum and maximum temperatures as well as monthly averages in the base-floor conditions were observed. Moreover, independent Samples T-Test (95% level of confidence; IBM SPSS 22) were utilized to compare the conditions in the churches and to find out how the relative humidity differed between winter

(October to March) and summer months (April to September). Additionally, we observed the periods the temperature had dropped below 4°C and 10°C to assess the proportion of time the conditions are hostile to the bacteria causing decomposition.

In addition to the temperature and humidity, we made observations concerning other factors significant in terms of preservation and decay. These include the funerary attire and furnishing of the coffin as various qualities of fabrics as well as plants utilized for the purpose sometimes induce preservation. Additionally, the surrounding conditions and mummification stage correspond to the found insect remains, as each species specialize in certain habitats limited for example by temperature and nutrition. By observing which insect species that participate in *postmortem* processes are most commonly found in association with the burials, it may be possible to shed light on the issue of whether mummification occurred mainly during the colder months. Insects are used in forensic research to determine, *inter alia*, post-mortem intervals (Amendt et al. 2004). Insects are limited to certain living conditions and their existence or absence tells about mummification. The insect population beneath church floors was studied by sporadic sample taking. A more thorough sampling methods to maintain a general view could not be used due to the temporal and practical restrictions. Accurate analysis is not possible because we do not know contemporary local insect population (Prado e Castro et al. 2012; Grassberger, Frank 2004; Grassberger, Reiter 2002: 181), and modern sampling has been sporadic.

Representativeness of the logged data

The logged data may offer clues to the conditions under which mummification occurred. Nevertheless, it mainly reveals how the human remains in our churches are currently stored and not necessarily the conditions under which mummification took place. Firstly, the climate during the period under which burials were made beneath church was not similar to that today. Dendroclimatological research based on tree-ring growth is used in defining past climate variables for smaller localities but also for larger regions. The tree-ring data from older trees can give centennial or even millennial old valuable information on past climate variables from the times when the weather was not observed or information on it recorded with any instruments (Helama et al. 2005). For Finnish Lapland a more than 7 600 year-long ring-width chronology has been put together by sampling living and subfossil Scots pines (*Pinus sylvestris L.*) (Eronen et al. 2002; Helama et al. 2002). This chronology reveals that a long warmer period (Medieval Warm Period, MWP) prevailed in northern Finland between the 10th and the 14th centuries. The warm period ended in a cooler period known as the Little Ice Age (LIA) that lasted until the beginning of the 20th century. In the Lapland chronology, the

coolest 250-year period occurred in 1601–1850. The Little Ice Age did not mean that the weather was always colder, and the period contained also warmer decades (Helama et al. 2009: 452; Mielikäinen et al. 2012: 38–39). Tree-ring based research on summer temperatures in Scandinavia has shown that during the 17th and 18th centuries the warming was most pronounced around 1660 and 1780. Cooling on the other hand was most intense during the first half of the 17th century with the coldest summer in 1633 (Büntgen et al. 2011: 3–4). During the coldest period of the 17th century, the summers were approximately two degrees cooler compared to the last 2000 years average (Büntgen et al. 2011; Mielikäinen et al. 2012: 48).

Additionally, it is good to bear in mind that modern renovations in the churches may have altered their conditions. The interior of the wooden old church of Kempele is currently heated during special occasions, but otherwise the temperature has been stabilized at 12°C. Currently, its soil-embedded foundation is air-tight. Yet, if the weather suddenly gets drastically colder, the inside temperature may temporarily drop near zero degrees (Raappana 2017). The church of Haukipudas is still in active service and normally kept warm during winter (Vahtola 1980: 192, 194). The dry-laid foundation is not air-tight, but has see-through holes between the stones. However, the floor at Haukipudas is insulated. The old church of Keminmaa has walls of stone and is kept cold, the foundation is air-tight and embedded into the soil. It, however, probably has remained the most unchanged of the three although it, too, was thoroughly renovated on few occasions during the 20th century and after the church burial practice formally ended its crypt has been filled up with sandy soil (Núñez et al. 2008), which may have altered humidity. Additionally, as it no longer is in active use: during the church burial period, even the body heat generated by the parishioners, may have contributed to the underfloor conditions. However, the measurements made there may be the most representative in terms of concluding about the original mummification processes, while the contrast to the other churches may reveal the effect of the heating systems installed in Kempele and Haukipudas during the 20th century.

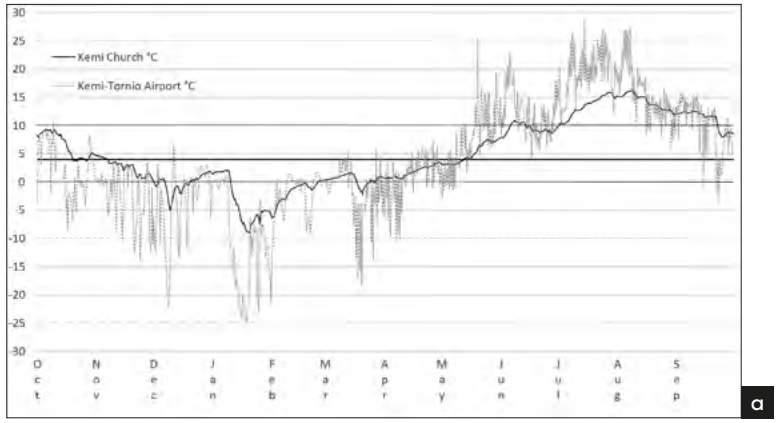
Some preliminary observations

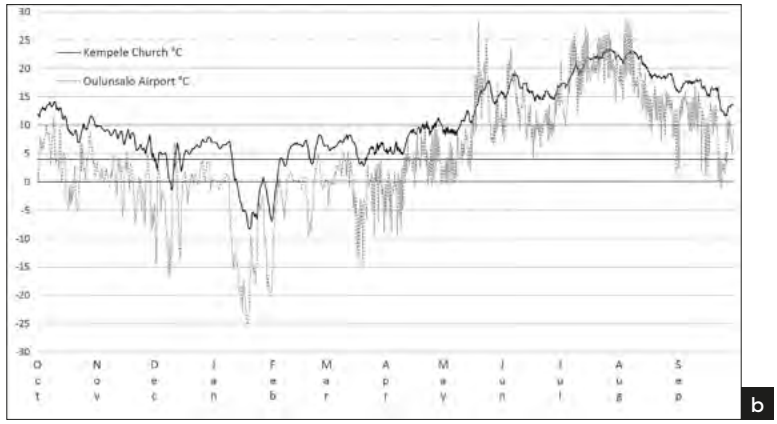
Conditions under the floors

The conditions in each church are different (Tab. 1). Nevertheless, all buildings even out the effects of the daily changes observed in outdoor conditions and protect the base floors from the weather extremes (Fig. 5–8). Of the tree churches, Keminmaa is the coldest with less short-term variation in temperature (5a, 7a) while Kempele is the warmest (Fig. 5b, 7a; Tab. 1). The values measured in Haukipudas generally fall between those of the other churches (Fig. 5c, 7a). This is substantiated by the yearly average temperatures in each church (Keminmaa 5.0°C, Kempele 10.7°C,

Tab. 1. Temperature and humidity during winter and summer. As the mummifications likely took place during colder months, the winter months and the summer months were looked at separately.

	Max	Min	Mo	Md
Temperature °C				
Church Keminmaa (Oct–Mar 2013–14, 2014–15)	9.2	-9.0	2.0	0.7
Church Kempele (Oct–Mar 2013–14)	14.2	-8.3	6.9	6.4
Church Haukipudas (Oct-Mar 2014–15)	10.3	-4.8	3.6	3.7
Kemi-Tornio airport (Oct–Mar 2013–14, 2014–15)	10.7	-26.6	0.6	-0.9
Oulunsalo airport (Oct–Mar 2013–14)	11.6	-25.1	0.1	0.1
Vihreäsaari, Oulu (Oct–Mar 2014–15)	10.3	-20.9	0.5	0.0
Humidity %rH				
Church Keminmaa (Oct–Mar 2013–14, 2014–15)	93.5	80.9	92.9	92.2
Church Kempele (Oct–Mar 2013–14)	71.4	40.7	65.7	61.1
Church Haukipudas (Oct-Mar 2014–15)	81.5	51.4	76.2	72.6
Kemi-Tornio airport (Oct–Mar 2013–14, 2014–15)	100.0	34.0	100.0	95.0
Oulunsalo airport (Oct–Mar 2013–14)	100.0	46.0	100.0	94.0
Vihreäsaari, Oulu (Oct–Mar 2014–15)	100.0	40.0	91.0	90.0
	Max	Min	Mo	Md
Temperature °C				
Church Keminmaa (Apr–Sep 2014, 2015)	16.1	0.5	12.4	10.4
Church Kempele (Apr – Sep 2014)	23.4	4.8	17.2	16.2
Church Haukipudas (Apr–Sep 2014)	18.5	1.3	10.5	12.1
Kemi-Tornio airport (Apr–Sep 2014, 2015)	28.8	-10.7	15.4	11.2
Oulunsalo airport (Apr–Sep 2014)	28.5	-9.6	4.1	11.2
Vihreäsaari, Oulu (Apr–Sep 2014)	27.3	-9.7	14.3	11.9
Humidity %rH				
Church Keminmaa (Apr–Sep 2014, 2015)	94.4	87.8	92.9	92.2
Church Kempele (Apr–Sep 2014)	72.1	44.2	66.4	60.9
Church Haukipudas (Apr–Sep 2014)	89.0	53.3	83.5	77.8
Kemi-Tornio airport (Apr–Sep 2014, 2015)	100.0	28.0	100.0	81.0
Oulunsalo airport (Apr–Sep 2014)	100.0	24.0	100.0	77.0
Vihreäsaari, Oulu (Apr–Sep 2014)	99.0	28.0	81.0	79.0





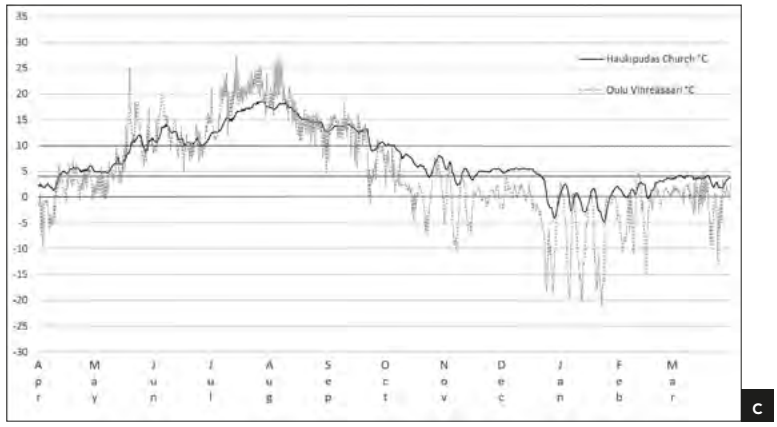


Fig. 5 (a–c). Temperatures in the old churches of Keminmaa and Kempele and in the church of Haukipudas.

Haukipudas 7.4°C). Only when the outdoor temperatures drop very low, the temperatures in the base-floor of old church of Kempele begin to resemble those in the old church of Keminmaa.

The temperatures of all churches follow a pretty similar pattern. Interestingly, this is despite the measurements in Haukipudas are not temporally corresponding with those of the other churches. At Haukipudas the winter temperatures used in the comparison of temperature and later the humidity values represent the winter 2014–2015, while the spring and summer temperatures, beginning from April, were measured during 2014. The temperatures during the winter do not fit the overall pattern that otherwise runs neatly between the two other churches (Fig. 7a). This may be because the mid-winter from November 2014 to January 2015 was generally slightly warmer than the corresponding period a year earlier, which is when the measurements in Keminmaa and Kempele were made.

As mentioned, the bacterial proliferation essentially ceases when temperature drops to 4°C or below (Laiho 1981: 137). While looking at the monthly average temperatures from October to April, the outdoor temperatures stay lower than that. This is reflected to the base floor of the old church of Keminmaa so that the monthly mean temperature does not exceed this point between November and April (Fig. 8a), while in Haukipudas the same is true between the months of December to March (Fig. 8b). In Kempele, on the other hand, only the average temperature of January would be cold enough to cease the decomposition (Fig. 8a).

Nevertheless, even in temperatures of 10°C and below the decomposition begins to significantly slow down (Quigley 2006: 19). In the old church of Keminmaa, the monthly averages remained lower than this from October to June, in Kempele from November to April (Fig. 8a), and in Haukipudas October to May (Fig. 8b). In the old church of Keminmaa church, during the year-long observation period the temperature remained at 10°C or below in 75.1% of the twice-daily loggings and at 4°C or below in 52.6% of them, while the temperature dropped below the freezing point in 18.9% of the measurement points. In Kempele church the corresponding proportions were 53.6%, 11.4%, and 5.6%, and in Haukipudas, 71.2%, 30.8%, and 7.6% respectively (Tab. 2).

The churches are different in terms of the relative humidity in their base floors, as well (Fig. 6, 7b). In general, however, it is safe to say that each of them appears surprisingly humid in consideration that they contain mummified remains. Beneath the old church of Keminmaa the relative humidity during the observation period between October 2013 and September 2014 on average remained very high at 91.2%, while in the driest Kempele church it was only 59.5%rH. Haukipudas, with %rH of 73.5, again falls between the two other churches. The variance in the humidity result is likely tied to the differing structural compositions of the churches: the most humid old church of Keminmaa is made of stone, the base-floor of the church

Tab. 2. The proportions of measurement points when the conditions remained hostile to the bacteria responsible for decomposition in each church during the selected year-long observation periods.

1st October 2013–30th September 2014		
	Kemi Church	Kempele Church
Total of measurement points	730.0	730.0
Temperature ≤ 10°C	548.0	391.0
% ≤ 10°C	75.1	53.6
Temperature ≤ 4°C	384.0	83.0
% ≤ 4°C	52.6	11.4
Temperature ≤ 0°C	138.0	41.0
% ≤ 0°C	18.9	5.6
1st April 2014– 31st March 2015		
	Haukipudas Church	
Total of measurement points	730.0	
Temperature ≤ 10°C	520.0	
% ≤ 10°C	71.2	
Temperature ≤ 4°C	225.0	
% ≤ 4°C	30.8	
Temperature ≤ 0°C	52.0	
% ≤ 0°C	7.1	

of Haukipudas is enclosed by a foundation of large loosely laid stones allowing air movement but also influence of weather conditions, and the base-floor of the old church of Kempele is rather tightly insulated. These structural differences must be significant in terms of the differences in base-floor humidity.

During winter, on average, the relative humidity in the old church of Keminmaa is actually very similar to the average outdoors and even exceeds it (Tab. 3). The base floor is sheltered from the extreme humidity of outdoors, while on the other hand, it remains rather moist even when the weather gets drier. In the churches of Kempele and Haukipudas, the humidity varies much more rapidly according to the outdoor conditions although, again, the extremes are avoided. While dry in comparison to the Keminmaa church and the outdoor humidity, both the other churches still are rather humid in comparison to normal insulated and heated indoor conditions in Finland (Tab. 1, 3; Fig. 6, 7b).

The weather stations recorded notable daily variation in relative humidity, but this would not reflect in the base floor conditions in Keminmaa church where the humidity remains rather stable during the whole observation period (Fig. 6a). Nevertheless, slight but statistically significant difference in relative humidity can been observed between winter (October–March) and summer months (April–September). This is true not only in the Keminmaa church but also in the two other churches, although the difference is not as clear as it is between the winter and summer measurements at the weather stations (Tab. 3).

Some of the differences between the churches presented above may be related to the indoor heating (the base floor is not heated) in Kempele and Haukipudas churches. It may even be responsible for the less humid air in both locations although probably also the different building materials play a role in this. Only in Haukipudas church, where the heating is permanently on during the winter months, the air is dryer during the winter than summer.

As the conditions in the churches are not very similar, one interpretation may be that neither the humidity nor temperature explain the phenomenon alone, but ventilation could be an important factor as well. Unfortunately, monitoring the ventilation in the churches' premises was not performed during the measurements. Nevertheless, if ventilation is ineffective, the moisture that is locked in humid air will condense on wooden structures – and presumably other organic materials such as mummified remains. It is likely that some of the current structures that may be harmful in terms of excess humidity and proper ventilation are a result of later renovations, sinking of the buildings and simultaneous accumulation of cultural layers around them. As these probably were not causing issues during the period of church burials, we may presume that the ventilation at that time was much more efficient.

Tab. 3. Comparison between the average summer and winter temperatures and relative humidity averages throughout the measuring periods.

	Keminmaa Church	Kempele Church	Haukipudas Church	Kemi-Tornio Airport	Oulunsalo Airport	Vihreäsaari Oulu
%rH Oct-Mar	92.1 (SD 1.3)	63.7 (SD 6.7)	70.8 (SD 6.0)	90.8 (SD 10.3)	91.2 (SD 10.4)	87.7 (SD 9.5)
Oct-Mar N	974	364	364	960	364	364
%rH Apr-Sep	91.9 (SD 1.5)	59.2 (SD 8.2)	76.3 (SD 7.6)	78.1 (SD 17.9)	74.5 (SD 20.1)	76.9 (SD 13.7)
Apr-Sep N	761	557	547	758	558	547
t	-3.872	9.222	12.123	-17.516	-13.928	-14.061
df	1509.318	878.484	879.769	1143.709	893.285	907.470
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000

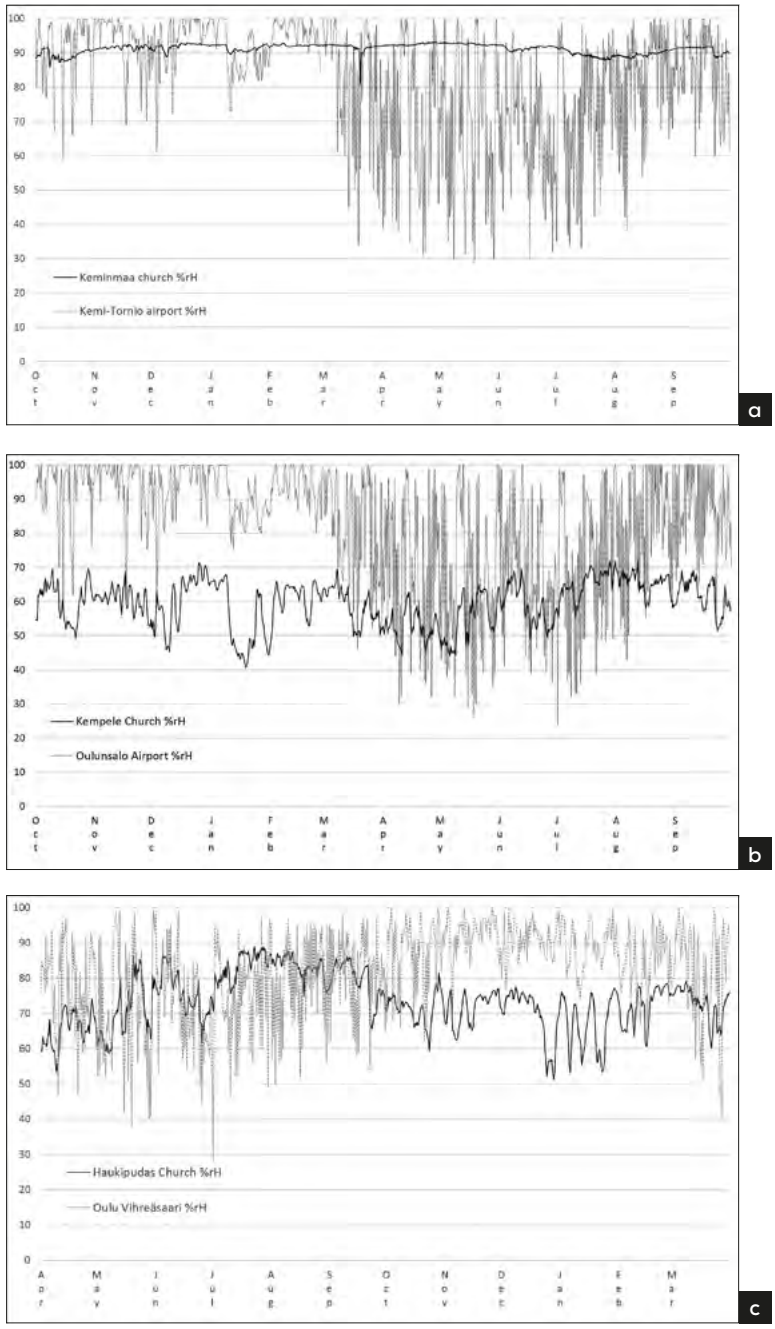


Fig. 6 (a–c). Humidity in the old churches of Keminmaa and Kempele and in the church of Haukipudas.

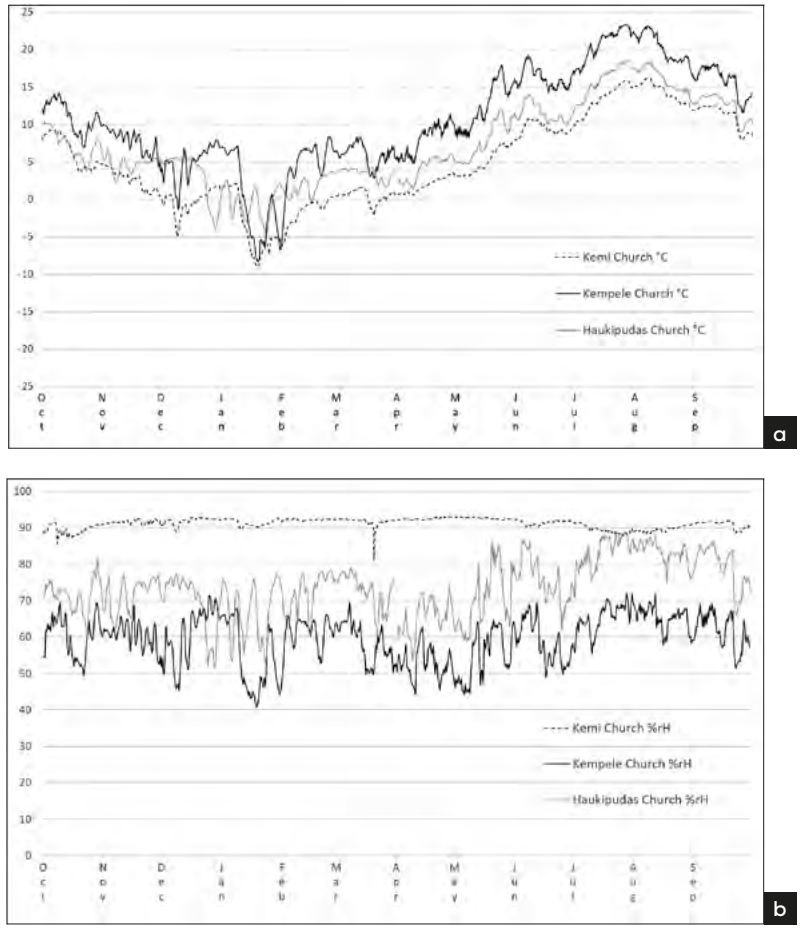
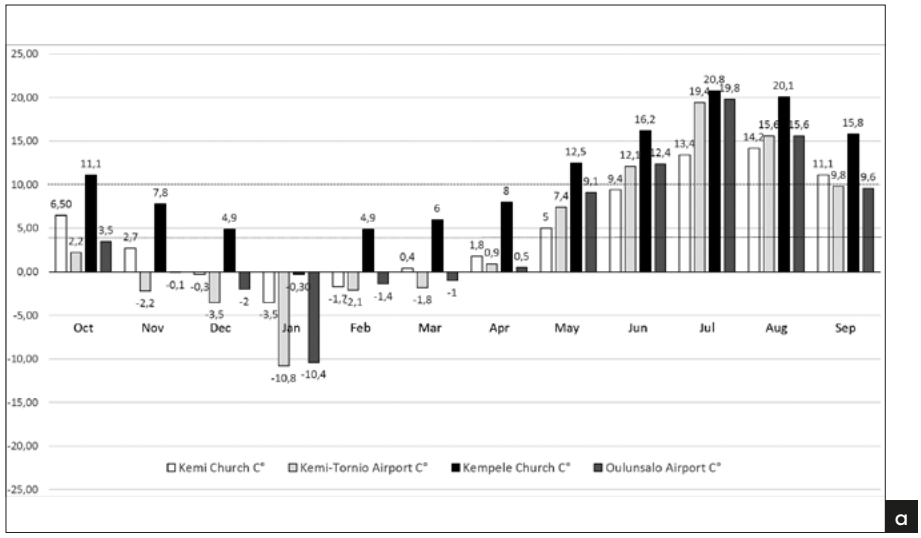


Fig. 7 (a–b). Comparison of temperature and humidity on the three churches.

Several experiments have been conducted to better understand the natural mummification process seen under church floors of northern Finland. Nurminen and colleagues (2017) performed a 109 day-long experiment in spring 2017 to study potential effects of cold air, dry sand, coffin, and burial textiles on mummification. This experiment clearly demonstrated that good ventilation, dry sand and certain textiles may have beneficial effects on mummification process. However, they also noticed that freeze drying is nothing that automatically occurs in Finnish winter. Further experiments were performed in laboratory conditions and they have confirmed the importance of constant air flow in addition to cool temperature (Nurminen et al. submitted).

The surprisingly high humidity measured beneath churches must for some reason be tolerated by the mummified remains. Relative humidity (%rH) expresses



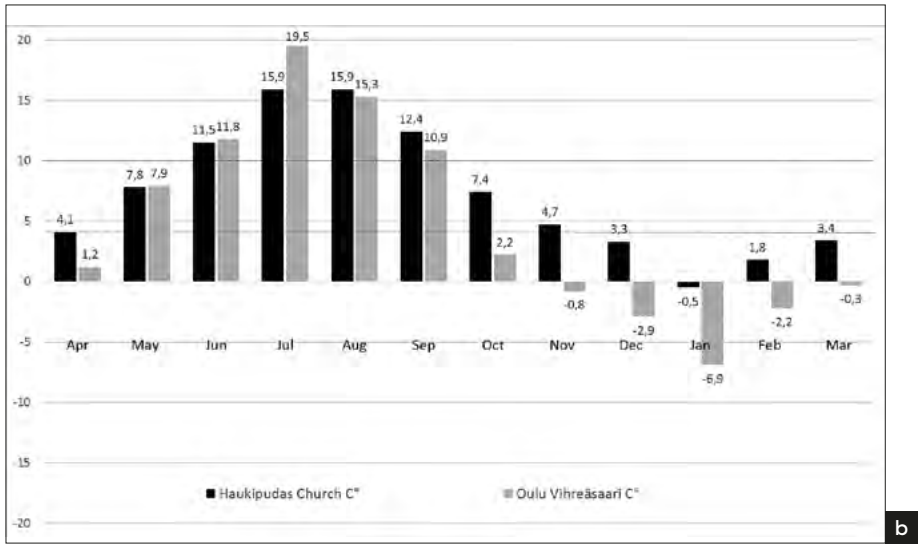


Fig. 8 (a–b). Temperatures in the base-floors of the old churches of Keminmaa and Kempele and in the church of Haukipudas in contrast to the outdoor temperatures. Note the differences in the dates.

the measure of vapor in relation the holding capacity of air at a certain temperature. Evaporation, which allows materials to dry, is not possible in 100%rH and it slows down as relative humidity raises. Thus, drying of soft tissues is less efficient when the relative humidity is high.

Conditions inside coffins

There are yet other factors that may have influenced the mummification process, such as the planks used to build the coffins, as unprocessed wood materials have antibacterial qualities that may have affected the process (Vainio-Kaila 2017; Lipkin et al. 2020), as well as, the funerary practices that sometimes involved long death watches (Kuusisto 1929: 78). Additionally, the circumstances surrounding the death as well as the physical qualities of the deceased or simply storing the deceased in cold, drafty environments prior to the burial probably played a role in producing mummies (Laiho 1981: 135–137, 139; Dix, Graham 2000: 13–14; Janaway et al. 2009: 329; Prahlow 2010: 175, 177).

Coffin furnishing and funerary attire may also aid mummification. Inside the coffin, the mattress material has often absorbed the liquid, which may have aided the preservation. The plants have helped to dry and, in some cases, to kill the bacteria. Plants have often been placed in the coffin – sometimes for their smell. Some of them have been used both in burials and mummification process for thousands of years. Interestingly, a great part of the identified species have antiseptic, or insect-repelling properties, and such effects were known already in the 17th century (Lagerås 2016: 15–28; Abdel-Maksoud, El-Amin 2011: 134; Buckley, Evershed 2001). In fact, their antibacterial qualities often helped to control odour formation by inhibiting bacterial and fungal activity. Whether these plants were selected because of their antimicrobial effects or their odour, they impacted the decomposition; some of them even by absorbing body liquids or moisture from the surrounding environment, which contributed to balancing the moisture content (Kallio-Seppä, Tranberg 2020; Lipkin et al. 2020). For example, conifer sawdust – a constant long-lasting ingredient in mummification – is commonly found in early modern under-floor-burials in Swedish churches as well (Hagberg 1937). Parts of Norway spruce, birch bark, hay, mosses and herbs are the main grave plants in the research area (Tranberg 2015; Lipkin et al. 2020).

Adults provide more bodily liquids with more bacteria than newborns and infants, which may be the reason for children to be mummified more often than adults. On the other hand, in the burials with skeletonized remains, the preservation of the textiles is likely due to immersion of bodily liquids. Additionally, the preservation of the human remains and associated textiles is affected by certain in-burial-factors, such as metal artifacts, dye processes of the fabrics of funerary attire, and tar used to coat the coffin. Mold has been observed in many northern Finnish church burials as well as rodent disturbance. However, the effect of soil is the most fundamental cause for the decay of both remains and textiles (see more for the textile preservation and decay in northern Finnish burials in Lipkin et al. 2020).

Season of the burial may be revealed by examining both the state of mummification and the presence of insects. Their development stages are geographically

and seasonally different. Temperatures, humidity, whether outdoors or indoors, and underwater influence affect the insect colonization, how fast it is and how long the various stages of flies develop. In summer conditions (21°C, 30% humidity), the hair of a corpse of an adult begins to fall within three days. Northern Finnish mummies often have hair. Under normal conditions, the putric phase begins within 24 hours and the bloated phase is reached in four days. Blowflies do not oviposit in dehydrated or mummified tissue. The colonization starts right after dead, firstly from the cavities and wounds. In summer conditions a body may become dry in two weeks (Prado e Castro et al. 2012: 425) and an infant may skeletonize after five days (Catts, Coff 1992: 262).

The invasion may be delayed in certain circumstances. Except for *Phoridae*, most of the flies cannot enter the corpse through the soil (at least 30 cm) over the burial. *Phoridaes* can be found from buried corpses and coffins (Amendt et al.

Tab. 4. Insect species sampled from randomly chosen coffins found in Haukipudas and Keminmaa (Lipkin et al. 2020).

Haukipudas				Faunal remains
Coffin 1	7-year-old	Female	Mummified	Protophormia terraenovae; Monopis laevigella
Coffin 2	Newborn	Female	Skeletonized	Megaselia; Muscina; Fannia (scalaris); Protophormia terraenovae; Anthrenus museorum
Coffin 3	2 year-old	Male	Skeletonized	Calliphora; Monopis laevigella
Coffin 4	Mature	Male	Skeletonized	Calliphora (Lucilia?); Heleomyzidae (Heleomyzini, Neoleria); Protophormia terraenovae
Coffin 6	Newborn		Skeletonized, preserved badges of skin	Heleomyzidae (Heleomyzini, Neoleria); Myodes glareolus (droppings)
Coffin 10	Adult	Male	Skeletonized	Fannia scalaris/coracina
Coffin 11	Child		Skeletonized	Myodes glareolus (droppings); Anthrenus museorum; Calliphoridae
Keminmaa				
Coffin 10	Infant		Mummified	Heleomyzidae (Heleomyzini, Neoleria);
Coffin 11	Adult	Male	Mummified	Heleomyzidae (Heleomyzini, Neoleria);
Rungius	Mature	Male	Mummified	

2004: 54). Coffin 2 in Haukipudas had among other things remains of (*Phoridae*) *Megaselia* (Lipkin et al. 2020; Tab. 4). *Phoridae* species tend to come to the body later and prefer older carcasses (Campobasso et al. 2004: 1). Because of its small size it can enter coffin using even narrow cuts. Funerary attire may also delay the colonization.

The duration of each decomposition stage and the species may differ, but the order of taxonomic families is constant. Blowflies come first, then flesh flies and after those, for example, *Fannia scalaris* (Campobasso et al. 2004: 2; Catts, Coff 1992: 260, 262), which were found in some coffins at Haukipudas Church (Tab. 4). The presence of this species automatically refers to the advanced stage of putrefication and it requires warmer weather than *Protophormia terraenovae* and *Heleomyzidae* species. The presence of northern blowfly, *Protophormia terraenovae*, refers to moisture and shade. It arrives to corpse first, especially in northern Finland, if it is not prevented by a tightly sealed coffin (Nuorteva 1977; 1987; Smith 1986; Rognes 1991: 137).

On the other hand, presence of some species automatically implies dry or mummified body (Soszynska-Maj, Woźnica 2016), similar to Heleomyzidaes found on Keminmaa mummies (Lipkin et al. 2020). *Protophormia terraenovae* and *Heleomiyzidae* species overwinter and settle near food ready to appear in the spring. In northern Finland *P. terraenovae* is the most dominant blowfly in every season and the immature stages may overwinter also, not just adults (Nuorteva 1987: 137).

It is indeed likely that the mummification under the church-floor took place during the colder months, which is indicated by the insect remains found in connection to the burials. In coffins of the mummified individuals, no remains of insect species typical for summertime could be found, nor do any of the found ones refer to putrefaction. Insect species that are typical for colder seasons were common. Associated with mummified remains, the insect remains consisted of winter species either consuming the corpse immediately after the death (winter blowfly, *Protophormia terraenovae*, the most commonly occurring species in our study), or only once it has dried (*Heleomyzidae*) (Warren 2006; *Carrion Ecology*… 2015; Soszynska-Maj, Woźnica 2016). In many cases, the findings are consistent with a burial in cold environment and subsequent drying of the tissues rather soon after the death. However, as indicated by the first stage insect activity interrupted since, some of the mummified corpses had initially been exposed to warmer environments (>~9°C observed in laboratory conditions) for a considerable period prior to the cold conditions ceasing the decay process. This may either be due to the seasonal fluctuation in temperature in spring or autumn or the treatment of the deceased (Warren 2006: 79).

In the coffins containing skeletonized remains, the situation was expectedly a little different. The species of flies found in them normally refer to the warmer season and advanced putrefaction. Only in one, containing an elderly male presenting with some remnants of preserved soft tissues, remains of *Heleomyzidae* (*Heleomyzini*)

utilizing dry tissues were found. Additionally, these coffins contained remains of latrine fly (*Fannia scalaris*) – a species that infest the body once the decay has progressed to liquefaction of tissues, which occurs at the late stage of putrefaction.

Conclusions

The temperature and humidity data obtained in the target churches reveals the conditions in which the mummified human remains representing our valuable cultural heritage are currently stored. The information, however, may in part also reflect those circumstances under which the mummification originally occurred during the period of under-church-floor burials. The renovations realized in the churches have altered their condition. Their effect in some churches is more pronounced than in others. The heating of the church halls in Kempele and Haukipudas is likely significant determinant of the temperature and humidity of their base-floors – even when the floor in Haukipudas is insulated. The overall climate today, however, is probably not very different from it was during the burial period. Although it coincides with the "Little Ice Age", according to the analyses of tree-rings, the period between 1660 and 1780, during which most of the burials were made, the climate was slightly warmer and probably on average only a few degrees cooler than today.

According to the rather high humidity in each of the churches, dry environment may not be one of the main components explaining mummification in Finnish churches. We cannot be sure that the mummification took place in such cellar like conditions measured currently beneath our old churches. What is more, we have so far not managed to explain, why the rather high humidity does not seem to disturb the preservation of the mummified remains.

In the old church of Keminmaa, where the temperature is probably closest to that of the burial period, during most measurements, it remains under the point (10°C) over which decomposition accelerates. It is likely that cool winter temperatures that have also prevailed in the other churches before installing the heating systems played a major role in soft tissue preservation. This is even suggested by the division of the insect remains found near the remains preserved in varying degrees.

Both variables – temperature and humidity – exhibit different values although especially temperature in each church follows rather uniform trends. In addition to the heating the differences may be partially explained by the different base-floor structures and building materials. These differences may further imply that other factors beside humidity and temperature must have influenced the soft tissue preservation encountered underneath our old churches. Although ventilation was not monitored, we believe that steady and brisk air movement did efficiently remove moisture from the remains, and thus, was one of the main contributors to the phenomenon. In previous studies of mummification, it has been named an important factor behind preservation.

Not only the micro-climate conditions in the base-floors of the studied churches were significant in terms of the unusual preservation observed in connection to the burials. For example, the materials used to dress the deceased as well as to furbish and even build the coffins often hosted antibacterial qualities. Some of them contributed in absorbing the liquefied remains of decomposition thus inhibiting the process. Further contributors may have been the events before burial, such as long death watches or storing in cool premises. Even the more personal qualities of the deceased may have been significant as preservation is influenced by factors such as perimortem health or body composition.

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Summary

Temperature and Humidity in the Base-floors of Three Northern Finnish Churches Containing 17th–19th-century Burials

Natural mummification occurs in various favorable conditions. Cold environments have produced mummified human remains in northern Finland. These remains buried under the church floors mummified naturally probably through a process resembling freeze-drying. This chapter explores the conditions that led to the mummification of dozens and potentially hundreds of human remains. To conduct our study, we installed logging temperature and humidity measuring devices under the floors of three churches located by the shore of Bothnian Bay in northern Finland. Even our preliminary results show that the humidity and temperature conditions differ between these churches. It is also clear that relative humidity remains very high under the floors of each church. It appears

that mummification has occurred in almost "cellar like" conditions. The preservation process was probably aided by the loose laid constructions allowing the air to freely move in the graves carrying the moisture from the remains.

Keywords: Early modern, Church archaeology, mummification, Finland

Streszczenie

Temperatura i wilgotność w podziemiach trzech kościołów na północy Finlandii, zawierających pochówki z okresu od XVII do XIX w.

Do mumifikacji naturalnej dochodzi pod wpływem różnego rodzaju korzystnych warunków. W północnej Finlandii szczątki zostały zmumifikowane w chłodnym środowisku. Szczątki te, pochowane pod posadzką kościołów, zostały naturalnie zmumifikowane prawdopodobnie w procesie przypominającym liofilizację. Niniejszy tekst analizuje warunki, które doprowadziły do mumifikacji dziesiątek, a być może setek szczątków ludzkich. Na potrzeby badania pod posadzkami trzech kościołów na wybrzeżu Zatoki Botnickiej w północnej Finlandii zainstalowaliśmy urządzenia pomiarowe rejestrujące temperaturę i wilgotność. Już wstępne wyniki naszych badań wskazują, że wilgotność i temperatura różnią się w zależności od kościoła. Wyraźnie też widać, że wilgotność względna pod posadzką każdego z kościołów pozostaje bardzo wysoka. Wygląda na to, że do mumifikacji doszło w niemal piwnicznych warunkach. Proces konserwacji prawdopodobnie ułatwiły luźno rozmieszczone struktury, które umożliwiły swobodny przepływ powietrza w grobach, odprowadzając wilgoć.

Słowa kluczowe: wczesna era nowożytna, archeologia kościelna, mumifikacja, Finlandia

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A Few Words About the Ice House of the Konsum Store in the Nineteenth-Century Priest's Mill Factory and Residential Complex in Łódź

I

People gathered, stored, and used real ice for purposes connected with business activity and food already in the antiquity and, according to Adrian Wessel Reinink (1995: 80n), 'the line of development' of such activity

> ...bei China begänne (für das es die ältesten Daten gibt) und dann über den Iran, die anderen Ländern des Islam, Spanien, Sizilien, dem übrigen Italien, Frankreich, England und den anderen Ländern Europas führte...,

where it was still conducted before the end of the sixteenth century. The 'other countries' include Poland, where the term 'lodownia' ('ice pit' or 'ice house'[1]) was first used in Polish sources during that period[2]. Admittedly, Bartłomiej of Bydgoszcz did not know it yet, or at least did not include it in his 1532 and 1544 dictionaries (*Słownik Bartłomieja*... 1999–2019[3]), but at the same time, in 1543, it appeared in crown land books, in a statement of expenditures on the Wawel

1 In Polish, the term 'lodownia' is used to describe the objects discussed in this article, regardless of their construction or materials used. I will use the latter of the two English terms consistently.

2 On the other hand, as Andrzej Kola wrote (1989: 103) *a simple… way to use ice was most probably known to peoples living in our land in the prehistory and the Middle Ages…*

3 He does know, however, as does Jan Mączyński in 1564, the relevant Latin term – 'frigidarium', translated by them as 'chłodnica' (Mączyński 1564: 137; *Słownik Bartłomieja…* 1999: 101).

Royal Castle (*Wawel...* 1913: 311)[4]. It seems that it soon grew in popularity, and so 'lodownia pewna' ('a certain ice house') is to Jakub Ponętowski (1937: 142), who died in 1586, an indispensable element of a perfect manor. On the other hand his contemporary Anzelm Gostomski believed it was important

> lodownie w dworzech, gdzie Pan bywa mają być opatrywane, aby lód nie ginął, a na czas zime był chowan
>
> to keep ice houses in manors, where the Lord stays, supplied so that ice is not wasted and it is stored cold (Gostomski 1588: 70),

while Duke Krzysztof Radziwiłł, in an instruction manual from 1621, ordered the administrator of his Vilnius palace

> do lodowniej czasu swego lodu dostatek nagotować, kądz w nię włożyć tak, jakom ukazał, ażeby była zawsze zamczysta lodownia, naprawić
>
> to prepare enough ice for the ice house in time and to put a vat in it like I have shown; and to repair the ice house so that it is always properly locked (*Instrukcijos...* 1985: 1).

However, it should be emphasised that all men mentioned above were representatives of the Polish gentry, so they most probably expressed the views of this class. It is difficult to say something about the presence of ice houses in the manors of middle and petty nobles. Perhaps their interest in ice houses was smaller as they are only occasionally mentioned in the seventeenth- and eighteenth-century inventories of smaller estates. If so, this might by why 'ice houses' cannot be found in popular works by Jan Krzysztof Haur (1675; 1679; 1693) addressed to a wider audience. However, he was familiar with such structures as he mentioned cooling drinks with ice in the summer, at the same time expressing an opinion that drinking them was not healthy (Haur 1679: 109).

There are few mentions of ice houses in royal estates used by the gentry. They are more frequently referred to in the case of church estates, mostly in towns belonging to bishops, and particularly in those with bishop's courts.

Moreover, the form of inventories, and especially their succinctness with regard to elements of property that were of lower economic significance, makes it no easier to get to know the objects described better. Typically, they only provide the location of the ice house within the manor or the farm, rarely also the village. We are sometimes informed about the state of the object (particularly when it is poor), and only sporadically about some details of its structure. However, even then we

4 There are numerous references to Wawel ice houses in this collection of sources (*Wawel...* 1913: 311, 365, 410, 417, 418, 419, 431, 438, 440, 450, 454, 459, 474, 509, 517, 557, 741).

learn little, just like in the case of the ice house in Gródek on the Bug in Podlasie, where in 1604 it was noted that *lodownia przy tej piwnicy z kamienia murowana, w której lodów dobrze bywa. To budowanie słomą poszyte* (*there is masonry ice house at the cellar, in which lots of ice is stored. It is thatched*), or in Kompina in Mazovia, where in 1685 there was *lodownia w ziemi kopana, dylami obłożona z wierzchu snopkami poszyta* (*an ice house dug out in the ground, covered with wooden beams and sheaves*). Manor accounts provide even more succinct information, which usually concerns payment for the construction or demolition of the structure, repairs, worn or missing elements (e.g. *Wawel…* 1913: 365, 410, 417, 418, 438, 450, 454, 459, 474), and *people chopping ice for the ice house* (e.g. ADPł, B–4: 81v; B–341: 130; B–344: 102; AGAD, APP, 81: 43; *Wawel…* 1913: 311, 410, 417, 438, 479, 509).

Such accounts do not leave readers much room for interpretation. Particularly, readers cannot say much about the reason behind the construction of each of these ice houses. They could be used for storing food cooled with the ice, at the same time ensuring that the food was easily available whenever necessary. However, they could only be places where ice was stored, protected against the weather[5]. In fact, we are clearly informed about their use in Poland at the time for the first of the purposes listed by guide-like descriptions of such structures, which seem to have first appeared in Poland at the end of the first half of the eighteenth century. One of the oldest can be found in *Informacja matematyczna…* (Bystrzonowski 1743), which is a compilation of earlier texts, mostly from the Historical and Political Calendar published by the Jesuits from Lublin. We can learn from it that

> lodownią łatwo bez wielkiego kosztu sporządzisz w ten sposób. Na suchym miejscu wybierz loch głęboki, szyję mu dawszy na północ bez żadnego oddechu. Ku końcu zimy gdy lody pierwsze schodzić mają; zbierz w tafle porąbany. Słomą prostą wysławszy loch, lód w nim złóż i szyję chrustem ziemią załóż aby wiatr nie dochodził. Będziesz miał w najgorętsze lato dla wygody lód i lodownią, w której mięsiwo, zwierzyny, jak w pół zimy konserwować możesz
>
> you can easily, without high cost, make an ice house as follows. Choose a deep dungeon in a dry spot, with a northern part without any draught. When the first ice is to break at the end of winter, collect it cut into sheets. Having covered the dungeon with simple straw, place ice there, and cover the opening with earth and brush so that no wind gets inside. In the hottest summer you will have ice and an ice house, in which meat and game you can preserve as in the middle of winter.

Though brief, the description lists all basic conditions that had to be met to ensure proper functioning of the building. Later descriptions of ice houses, meant for

5 Using ice houses for storing ice to be used in other, nearby places, or even building ice mounds instead was still recommended in the second half of the twentieth century by Wiktor Kurpisz (1952: 111–120; 1956: 212–233).

Polish readers and found in the works of Piotr Świtkowski (1782) and Franz Rausch (1788), are much longer and more exhaustive. However, more studies concerning the issue – even if some are very short – only appear in the nineteenth and twentieth centuries, mostly in magazines published at the time (e.g. *O lodach…* 1822: 241–243; Kostrzecki 1840: 264–265; *Lodownia wiejska…* 1865: 100), less frequently in encyclopaedic entries (e.g. *Encyklopedja rolnicza…* 1889: 380–381), and naturally in the form of passages in how-to books (e.g. Harres 1883: 187–192; Iwanicki 1917: 247–251; Holewiński 1919: 131–133). However, they are no match to similar, particularly German, studies (a list of such works see: Heintze 2014), which they were usually based on both in terms of text and illustrations[6]. As a whole, Polish works are unique on account of one aspect: the remarks they contain typically refer to home and farm ice houses, with very few discussions of industrial and service ice houses (e.g. Ostrzeniewski 1902; 1906), and a few more brief mentions of existing or newly-built structures (e.g. Kamler 1910). It is a bit surprising as this happened even despite the fact that starting at least in the 1870s, ice, also in Poland, was used on a large scale in breweries, municipal and private cold stores, slaughterhouses, markets, poorhouses, and hospitals, which were all institutions that needed a lot of ice throughout the year. For the same reason, demand for it appeared in eating establishments and some shops. The building discussed in this work belongs to the last category.

II

Researchers got interested in it in the autumn of 2014, when the Łódź press published reports of an accidental discovery of two 'mysterious' brick structures in the grounds of a workers' housing estate Priest's Mill (that also had had a German name Pfaffendorf), which used to belong to Karol Scheibler's cotton plant (cf. Pierzchała 2014: 6; 2014a: 5). Both were found directly at a building that had been erected as a store, mostly for the plant workers, and originally called Konsum, and later Konsumy. One of them – adjacent to the foundation of the southern wall of the building – was soon identified as a settling tank for waste from the store (Piechrzała 2014a: 5). The function of the other one, adjacent to the northern wall of the building and described either as hidden right under the turf *rings of red brick, one* […] *within the other*, the distance between which *is usually only 8 cm* (Pierzchała 2014: 6) or as *a double brick ring being a foundation of a mysterious building in the shape of a rotunda* (Pierzchała 2014a: 5), remained unknown at the time. The daily press typically came up with more or less fantastical ideas suggesting that *this could have been a gazebo, a food facility, or a storage room connected with the factory delicatessen*

6 There are also some translations of foreign works (cf. Rausch 1779; Harres 1882).

(Pierzchała 2014: 6). It seems, however, that this did not arouse great interest among readers, which is why the issue only returned to the press after nearly a year, when, on the initiative of the municipality and conservation services, the feature was investigated by employees of the ARCOS company, under the supervision of archaeologists Maciej Milczarek and Zbigniew Rybacki. The archaeologists, even though their work was limited to the exploration and documentation of the interior of the structure, soon identified it as a store ice house (Magnuszewska 2015: 4; IZJ 2015a: 1, 3; 2015b: 3; M. Kwiatkowski 2015: 4; Pietrzak et al. 2015).

The ice house – apart from analysis of the results of the archaeological research mentioned above (Pietrzak et al. 2015) – has not been described in the literature concerning the establishment and the functioning of the Priest's Mill estate (e.g. Popławska 1964: 298–306; 1972; 1992: 68–69, 94–99; Szyburska 1976; Turowski 1976; 1976a; Puś 1979; Pytlas 1979; 1998; Markiewicz-Kozańska 1982; 1984: 137–141; 1991; Kobojek 1998; Salm 1998; 2001; 2007; Stefański 2001: 97–101; 2003: 58–59; Walczak 2007; 2010: 103–105, 230; Tomczak 2012) or mostly unpublished conservator's studies (e.g. Szyburska 1972; Kajzer 1981; Pawłowski et al. 2001; Filipowicz 2012). Moreover, some of the above works fail to mention the store, while others only acknowledge its existence (Szyburska 1976: 106, 107, 112; Markiewicz-Kozańska 1984: 134, 136; Pytlas 1979: 72, 166; Salm 2001: 49; 2007: 75; Szymański 2006: 58; Tomczak 2012: 12; Walczak 2007: 63; 2010: 103, 104, 230), and only few devote more attention to it from different scientific perspectives

Fig. 1. The factory and residential complex Priest's Mill; **a**. – As of approx. 1873; source: APŁ, Zb.kart. 527 (fragm.); **b**. – According to measurements from 1894–1896 with later improvements from 1904–1906; source: APŁ, Zb.kart. 1 (fragm. sekc. XXXVIIII, XXXIX, XLV, XLVI). Legend: X1 – location of the Konsum building; X2 – the Konsum building; X3 – the ice house.

Fig. 2. The factory and residential complex Priest's Mill; **a**. – As of the period between 1897 and 1899; source: APŁ, Zb.alb.ikon., sygn. A-103, k. 2, photo 1.

(Kajzer 1981; Kobojek 1998: 78–79; Pawłowski et al. 2001: 11, 14, 5B, 6B; Salm 1998: 66–67; Filipowicz 2012), however, none is exhaustive[7].

We know little particularly about the operation of the store, and our knowledge of the history of its construction is not full. However, in the case of the latter issue, field research and archival surveys conducted allow to formulate some hypotheses. First of all, it can be unequivocally stated that it was not built in the first years of the construction of Scheibler's factory estate, which started as early as in 1873 (Pawłowski et al. 2001: 5B; Pytlas 1979: 77) or only two years later (e.g. Popławska 1964: 301; 1973: 86; 1992: 96; Kobojek 1998: 78; Stefański 2001: 98; 2003: 59). What allows to conclude that the store was built a bit later is the fact that it was not included by Rudolf Miciński on the city map (or, in fact, a supplement to his older map) he drew in 1877, which also, or even mostly (as it was created for Karol Scheibler), showed the development of all properties owned by Scheibler at the time (Fig. 1a) (APŁ, Zb.kart.: 527; cf. Kajzer 1981: 2). Moreover, it can be assumed that it was built even later than it is usually suggested in the literature, according to which it was erected around 1877 (Kajzer 1981: 2; Kobojek 1998: 78; Filipowicz 2012: 5), before 1878 (Walczak 2010: 104), or in 1879 (Pawłowski et al. 2001: 5B). Only Stefan Pytlas (1979: 166; cf. Tynecki 1988: 49; Kulesza 2013: 17) reported that *the store for factory and office workers* was established in 1882. And this date is also given in a short description of the first years of the store's operation found in an account of the Industrial and Agricultural

7 The facility has been divided for some time now into two separate properties, with the following addresses: 14 Księży Młyn Street (plot no. 92/1, section W–25) and 16 Księży Młyn Street (plot no. 92/2, section W–25). In 2012, Paweł Filipowicz conducted architectural research there (Filipowicz 2012), and today both parts are subject to conservator's renovation of elevations and roofs conducted by the ATIK sp. z o.o. company based on a design created in the ARTA sp. z o.o. company by Danuta Włodarska and her colleagues (Włodarska et al. 2016; 2016a).

Fair organised in Warsaw in 1885. The account also makes the date more specific as its anonymous author writes that

> The development of the store was so unexpectedly rapid that within only a few months the building erected for this purpose by the Association [Scheibler's Associations – J.P.] turned out to be too small and had to be extended in two ways… (*Wystawa Przemysłowo-Rolnicza…* 1885: 113).

And as we know thanks to field research, such a considerable extension of the store building took place along with the implementation of the proposals outlined in the preserved plans of the facility extension dated April 28 (May 10), 1883 (APŁ, RGP, WA 1661: 156; cf. Filipowicz 2012: 5), so it should probably be assumed that the original store was built (or at least opened) not later than in the middle of 1882[8].

Moreover, considering the fact that a store – usually a grocery – was an integral element of many European factory and residential complexes supplementing their functional programme, particularly on estates located in the country or far from the city centre (Walczak 2010: 230–231), it is seems plausible that it was included in the original design of the Łódź complex. However, it is difficult to determine whether this was the case. There is no doubt that the original store in the Priest's Mill was relatively small, created mostly to provide for the basic needs of the residents. Such a purpose is confirmed by the already mentioned account of the fair, according to which *the Association opened a grocery in order to* […] *provide workers with healthy and cheap foodstuffs* (*Wystawa Przemysłowo-Rolnicza…* 1885: 113).

Initially, it occupied a one-storey building without a basement, covered with a low gable roof. It was approx. 12.4 x 25.8 m, and its floor space was approx. 263 m^2 (Fig. 3 – Stage I). It was built of mechanically made, well-fired solid clay bricks arranged in English cross bond (Dutch bond), joined with lime and sand mortar, and measuring 63–68 x 128–138 x 268–279 mm, which was close not only to standard dimensions used in the Tsarist Russia (including Congress Poland) at the turn of the twentieth century, but also to the Polish Standard introduced in 1927 (cf. Ostap. 1911: 168; Domaniewski 1929; Bochenek 2003: 454)[9].

8 The design was signed by the then city planner Hilary Majewski, which is why Grażynak Kobojek (1998: 78) concluded he was the author of the whole facility. However, research conducted by Krzysztof Stefański (1994; 1997; 2015: 59) and Jacek Strzałkowski (1997: 8–9, 90–97) indicates that while in office, H. Majewski frequently attributed works of other architects to himself, so it is impossible to take a definite stand on the issue.

9 A similar material and a similar technique were used to build walls during all stages of the extension described below. Later, mechanically made clay bricks were still used but with different dimensions, including solid bricks, cellular bricks, and chequers. The situation is similar in most buildings in the residential part of the Priest's Mill.

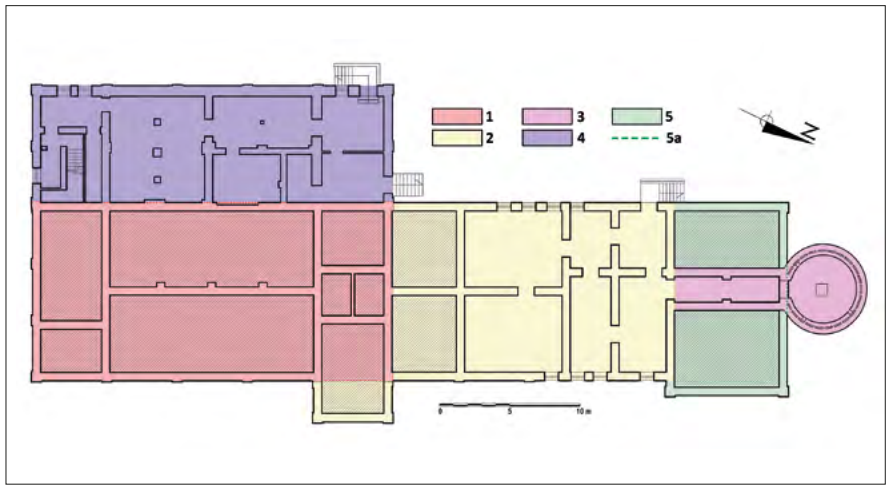

Fig. 3. The Konsum building. The basement plan, construction and extension stages. Legend: **1** – Stage I (1882); **2** – Stage II (1883/1884); **3** – Stage III (between 1883/1884 and 1889); **4** – Stage IV (1890/1891); **5** – Stage V (after 1897–1899); **5a** – The extent of the northern wall of Stage V on the ground floor level; Author's own work based on the results of research carried out by P. Filipowicz (2012).

The building did not survive long in its original form because, as it was already mentioned, its extension was planned very soon, i.e. in the spring of 1883 (APŁ, RGP, WA 1661: 156; cf. Kajzer 1981; Filipowicz 2012), and the already cited press article allows to assume that the work was carried in the same year (*Wystawa Przemysłowo-Rolnicza...* 1885: 113). In consequence, the original building was extended towards the north with a one-storey section with a partial basement[10], so that it became approx. 46.40 m long, with the width unchanged. A porch with a gable roof was also added (with a projection approx. 2.80 x 5.70 m) along the axis of the new, elongated eastern elevation, as a result of which the floor space increased to approx. 474 m^2, while the basements in the annexe extended it further by approx. 143 m^2 (Fig. 3 – Stage II; Fig. 4a).

Another extension of Konsum (Fig. 3 – Stage III) involved the construction of the ice house we are interested in (Pietrzak et al. 2015). It will be discussed further in this paper but two remarks have to be made now.

Firstly, we do not know when exactly it was built, and considering the present state of preservation – and partially also identification – of Scheibler's archives, we can only say that it was completed before July 29/August 10, 1890, when the existence of

10 Nearly all basements created at different stages of the extension had arched brick floors on steel beams, and the above-ground rooms – wooden-beam floors.

this structure was marked in a layout drawing attached to the design concerning the area near the storehouse (APŁ, RGP, WB 1569). Moreover, the fact that the ice house is not marked in a similar drawing to a design of an adjacent storehouse drawn up on July 15/27, 1889 (APŁ, RGP, WB 1569) seems to indicate that it was constructed between these dates. Unfortunately, it is excluded by the fact that no significance was attached to updating the layout drawing when creating plans for Scheibler's plants and submitting them to authorities for approval. For example, the ice house in question was marked on a plan dated February 22/March 6, 1891, but it is missing from the plans from August 25/September 6, 1891 and from July 19/31, 1893 (APŁ, RGP, WB 1867; 2248; 3358).

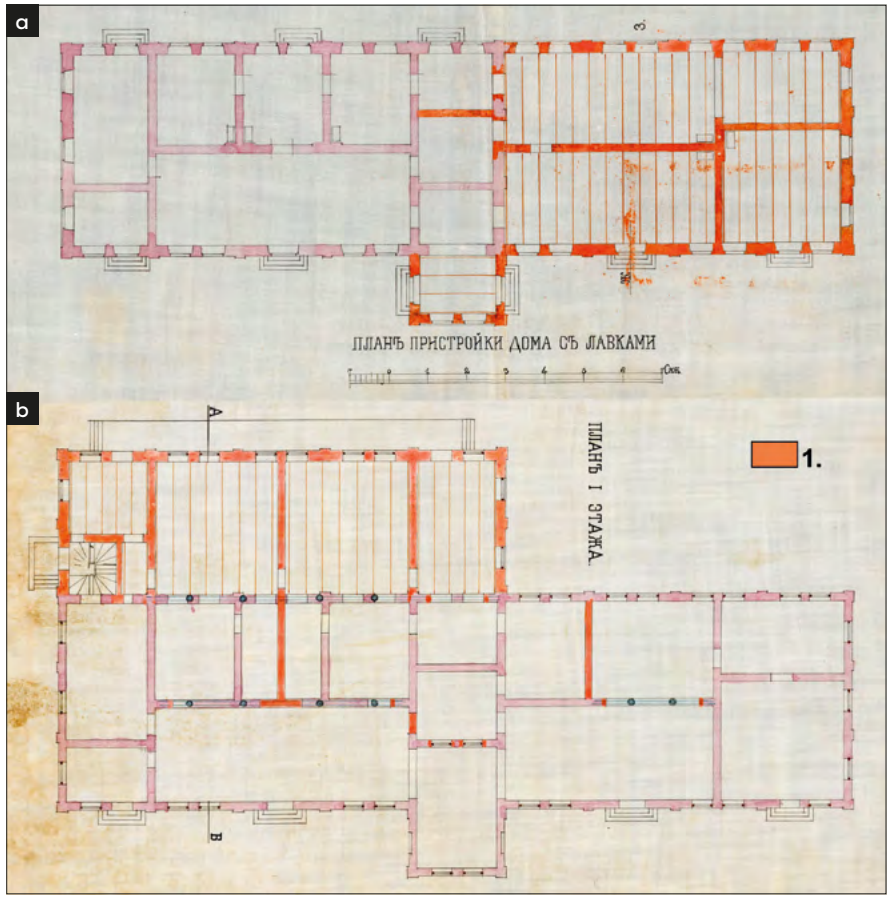

Fig. 4. The Konsum building; **a**. – A ground floor plan on the design of the first extension (Stage II), 1883, source: APŁ, RGP, WA 1661: 156; **b**. – A ground floor plan on the design of the third extension (Stage IV), 1890, source: APŁ, RGP, WB 1586. Legend: **1**. Newly planned elements of the building.

Fig. 5. The Konsum building on an aerial photograph from the Second World War, source: BFM, fm9319127 (fragm.).

Secondly, there is no data that would allow us to determine the date of demolishing the structure. The archival survey did not provide any relevant information about it. The fact that the ice house is marked on the map of Łódź published by Kazimierz Jasiński in 1917 (APŁ, AMŁ, WT 21142) seems to suggest that it still operated at the time, however, this map is only a re-edition of an older map of Władysław Starzyński (Fig. 1b), which reflected the situation from the beginning of the last decade of the nineteenth century (APŁ, Zb.kart. 1), i.e. soon after the ice house had been built. Community interviews did not provide any useful information either as despite some opinions that the structure was liquidated when electric store freezers became popular in the 1960s[11], people who had lived in the Priest's Mill for a few decades much more frequently said that they did not recall any such feature in this part of the estate. The last information seems to be confirmed by analysis of barely legible German aerial photographs taken during the Second World War, which suggests that the ice house might have been

11 The opinions were voiced already after the press had published information about the purpose of the structure.

Fig. 6. The Konsum building. A view from the south-east as of the end of the nineteenth century (c 1885?), source: APŁ, Zb.ikon. SiG: 239.

Fig. 7. The Konsum building. Interior of the shop floor as of the end of the nineteenth century (c 1885?), source: APŁ, Zb.ikon. SiG: 240.

gone at the time, and there was another, unknown to us, structure in its place (particularly: BFM fm931972) (Fig. 5)[12].

Before the ice house was demolished, however, the store had been extended twice. The first extension (Fig. 4 – Stage IV; Fig. 4b, 6) was based – with a few modifications – on the preserved design created in August 1890 (APŁ, RGP, WA 1586) and it most probably took place before the end of August of the following year, when the new element was marked in a layout drawing created along with a construction plan of, among others, one-storey sheds with laundry rooms and toilets (APŁ, RGP, WB 2248). It was added from the west to the Konsum section erected during Stage I. It was built of brick, on a rectangular plan, measuring 8.55 x 26.30 m, with floor space of approx. 551 m^2, including approx. 175 m^2 on each of the two above-ground storeys and approx. 165 m^2 in the basement.

Both sections of the newly created building were merged in spatial and functional terms on the ground floor, thus forming a large sales floor (Fig. 7), and the first floor of the added part was used for residential purposes.

During the last of the clearly Scheibler's extensions – conducted after 1897–1899 (see Fig. 2–3, 10 and below) – the ground floor of the store was extended towards the north, where a new one-storey brick section was added between the building wall and the ice house, virtually without a basement, measuring approx. 8.20 x 12.70 m, with floor space on the ground floor of approx. 94 m^2 (Fig. 3 – Stage V). It was built so that it formed a shallow wall projection in the north-eastern part of the eastern elevation, and its northern wall included a fragment of the ice house wall. It was also placed above the corridor linking the ice house with some of the store basements. Moreover, the ridge line of its gable roof was at right angles to the ridge lines of the roofs of the main building parts.

Thus, the Konsum building received the form we can basically see today, except for the demolished ice house. This does not mean, however, that it was not altered later as today, on the northern elevation of the one-storey part of the building, one can still see traces of two smaller annexes built after the ice house had been liquidated. The existence of the older one is proved by a regular, quadrangular patch of traditional stucco and a passage bricked up with cellular bricks joining its interior to a room in the store building. What remained of the other, younger and smaller annexe, is the mark of a gable roof 'painted' on plaster with roof cement. Other secondary elements, at least in the latest form, are (or, today, partly 'were') concrete ramps located along the western elevation. And finally, both interiors and elevations show traces of numerous small cuts-off and masonry rebuildings as well as larger alterations[13].

12 The ice house could have been enclosed by a new structure.

13 This activities will be discussed in a paper prepared by Paweł Filipowicz and the Author.

III

The main part of the ice house was built approx. 7.75 m to the north away from the store building extended during Stage II, and it was linked with its basements with an underground corridor mentioned above. It was built on a circular plan, with diameter of approx. 6.3 m, with a foundation depth of 207.39–207.41 m above sea level, i.e. approx. 1.8 m below ground as of 2015, when the excavation works started. This ground level (i.e. approx. 209.20 m above sea level) was most probably similar to the one from the time of the construction.

Virtually the only part of this structure that has survived until today is the underground section (Fig. 8). Paradoxically, this allowed to determine the method of building the perimeter wall of the main part. It consists of two concentric brick rings with outside diameter of up to 6.34 m. The external one is 0.40 m thick (which corresponds to 1.5 brick lengths), while the internal one is 0.27 m thick (which is the length of one brick). The first of these two rings seems to have English bond brickwork, while the other – header bond. Both are separated with a space of approx. 0.10 m and they are joined with regularly spaced, one-brick tie-beams staggered every two layers. Both external and internal wall faces originally had no

Fig. 8. The remains of the ice house at the Konsum building. A view from the north as of 2015, photograph by Z. Rybacki and M. Milczarek.

coating. Over time, however, the latter was sponge-painted with a thin layer of lime with traces of cement. Three openings were found in it. One is located 1 m above the floor, measures approx. 0.28 x 0.28 m, reaches the expansion joint, and could have been made when the structure was built. The remaining two openings[14] have similar dimensions but are located directly above the floor and they are definitely effects of later works. They are connected with air ducts (?) created by cutting the internal ring of the wall and lining thus created cavities.

The double wall surrounds cylindrical space with a diameter of 4.80 m (and floor surface of approx. 18 m^2), with the bottom lined with clay bricks later (?) covered with a layer of bitumen adhesive mixed with coarse gravel. The flooring lies on a bedding with thickness of approx. 0.30 m, mixed with crushed brick sand, which, in turn, lies on fine natural sand. It is nearly horizontal, and it only slightly (by about 1%) inclines towards the centre of the structure. In this place, one can see a shallow – approx. 0.03 m deep (207.36 m above sea level) – square hollow, measuring 0.80 x 0.80 m, the bottom of which is the crest of a spot footing made of bricks located at least 0.60 m below the floor level. On the crest, one can see traces of a mounting of a cast-iron or steel column.

In the southern part of the double ring, there is a bricked-up[15], segmentally-arched passage that used to be linked to the already mentioned corridor under the central part of the one-storey part of the store building erected during the last extension stage (Fig. 4 – Stage III). The corridor, which today is rather useless space closed on one end, used to serve as an airlock, with double doors on both ends. It consisted of two chambers of the same length, separated with doors. Today, the corridor is covered with reinforced formwork cast slabs sitting on steel beams. However, it seems plausible that this structure was only created during Stage V of the extension as before that the roof – according to some nineteenth-century site plans of the estate (APŁ, RGP, WB 1569; 1867) – was most probably located above the ground.

Over the bricked-in opening, there is a relatively small fragment of the above-ground section of the ice house wall, specifically its outer ring (Fig. 9), being a part of today's northern wall of the one-storey section of the building, approx. 3.30 m long and 4.40 m high (213.60 m above sea level)[16]. It does not, however, offer us much information as we can only conclude that up to approx. 211.80 m above sea level the wall consisted of two rings separated with a wide, thermal

14 They were covered with a fine steel mesh.

15 The bricks used were similar in size to the ones used to build the ice house and the store walls but they were fired far less thoroughly.

16 It was only excavated in 2020 during conservator's renovation of the elevation conducted by ATIK sp. z o.o.

Fig. 9. The Konsum building. The northern elevation of the one-storey part with the remains of the ice house wall. A view from the north as of the summer of 2020, photograph by J. Pietrzak

insulation space[17], and above them the ice house wall was a solid brick wall.

The last solution most probably involved covering the building with a vault the form of which we are unable to determine today (e.g. Brückner, Spillner 1904: 254–255, Abb. 356–357). It is impossible to say how high it was, and so it is impossible to determine the volume of the ice house. It can only be supposed that it was more or less 100 m^3. It can be said with reasonable certainty that the space was divided into two levels separated with a floor slab supported on the wall ring and additionally on a steel or cast-iron column. Moreover, there is no doubt that the upper chamber was used as an ice warehouse, while the lower was the store's cold storage, which is proved by the fact that in the latter there is no drainage for melting ice. Such a reversal of layout typical of an ice house was not unusual as it was also commonly used in the USA as well as in Europe, though mostly in industrial facilities, such as breweries. This solution ensured good air circulation[18] as heavy cold air falling down to the floor of the warehouse displaced warmer air (Geul 1884: 409; Plank 1954: 100, 134; Ellis, 1982: 19–20; Tangires 1991: 37, 42; Heintze 2008). This was extremely important not only because it ensured proper storage temperature but also because it allowed to maintain adequate humidity in the storage chamber; too high humidity would favour the development of microorganisms, while too low humidity would speed up the drying of the products stored and aromatic substance evaporation, which would lead to mass loss and, in consequence, financial losses (e.g. Brożkiewicz 1946: 16–17). On the other hand, this required a complete change in the management of melting ice, and this aroused some doubts about drainage effectiveness (*Ulepszenia…* 1867: 39).

17 Numerous cases of such solutions adopted in the United Kingdom are presented by Sylvia P. Beamon and Susan Roaf (1990).

18 In this case it was most probably insufficient as to improve it the internal wall ring was cut and the already mentioned air ducts were created.

Fig. 10. The ice house at the Konsum building. A view from the north-east as of the period between 1897 and 1899, source: *Zjednoczone zakłady…* (fragm.).

The general appearance and operation of the ice house described here can be to a certain extent supplemented with observations made based on its representation in a perspective veduta of the Priest's Mill estate showing its state between 1897 and 1899 (Fig. 2). Unfortunately, we only know this image from photographs of the original with signatures of ECKERT & PFLUG, Kunstverlag LEIPZIG – MŰNCHEN (e.g. APŁ, Zb.alb.ikon. A–103, k. 2, photo 1) and its later adaptations (e.g. *Zjednoczone Zakłady...*). Moreover, even though it is seemingly quite detailed, it also contains some inaccuracies. Without listing these mostly minor mistakes, it should be noted that one of them concerned the form of Konsum, which had different elevations but was visualised as two separate one-storey buildings (Fig. 2; 10). The ice house in the veduta was depicted as a polygonal building with a pyramid-shaped, perhaps eight-plane, roof, which seems to be topped with a ventilation chimney. Possibly, there is an entrance to the ice house marked on the wall (Fig. 10).

However, nothing in the preserved remains of the ice house suggests that it used to be polygonal. Moreover, the already mentioned layout drawings and maps all depict it as a round structure. Its polygonal form may only be an illusion resulting from the fact that the author schematically marked panels on the wall of a round building, which were characteristic elements decorating brick elevations of the buildings in the Priest's Mill.

IV

Having discussed the issues indicated by the title of this paper, we can move on to conclusions. This time, however, they will not be limited to the object of the discussion. I am sure that Readers have noticed that the paper includes virtually no references to the state of research into ice houses in Poland. The is simply because this issue is almost absent from the scientific literature, which was already noted nearly twenty years ago by Andrzej Wilk (2000: 37–38) in a short article published in *Spotkania z zabytkami* within a series under a telling title *To też są zabytki* (*These Are Also Monuments*). Nothing has changed in this respect, which is surprising considering the fact that old manor and farm buildings included a considerable, though constantly falling, number of preserved, even if abandoned

and demolished, ice houses. At the same time, they are elements of sites that are very popular research subjects among representatives of many fields. It is similar in the case of another considerable, though definitely smaller, group of ice houses, i.e. those connected with industrial facilities (mostly plants) and other institutions that in their production processes or activity first used real and then synthetic ice. However, the interest in whole complexes did not translate into a considerable increase in knowledge of their ice houses. It mostly resulted in many mentions of them in dozens or even hundreds of publications, but it is very difficult to find any in-depth study on the issue. Probably the only researcher that studied it closely was Renata Gubańska (2009: 50–53, 89), who devoted it some attention when investigating Lower Silesian manors and their buildings. Unfortunately, her findings only to a small extent went beyond nineteenth-century encyclopaedic studies. Others, like Małgorzata Rozbicka (1999: 76, 88, 90, 248, 252) and Bartłomiej Kwiatkowski (2012: 119–120, 155–156) discussed the issue only briefly or, like Jarosław Szewczyk (2019: 127, 162), focused on narrow, technical aspects. Of course, there are works providing some new observations and information about ice houses but they also repeat old common opinions (e.g. Kowecka 1991: 214; Sieradzka 2001: 53, 72, 144; Baraniewski 2004: 43–44; Zaprutko-Janicka 2017). On the other hand, in Western Europe and in the United States, ice houses have long constituted significant, stand-alone research issues. A number of monographs have been published (e.g. Reinink, Vermeulen 1981; Ellis 1982; Reinink 1995; Martin 1997; 2000; Lütgert 2000; Aterini 2007; Heintze 2014). They are of different quality but they well reflect the scale of the problem. At the same time, even though many of the theses advanced in these works seem to largely correspond with our realities considering the current state of knowledge of Polish ice houses, it is an a priori opinion that should be verified through extensive research. In order to conduct it, we need to know what we have. Thus, I will repeat the appeal of the already mentioned A. Wilk (2000: 38) *to quickly start inventorying them* [i.e. ice houses – J.P.] […] *but mostly to* […] *popularise them, show their value, and prevent their decay*. This appeal should or even must be supported with a remark that in order to effectively popularise something, it should be at least slightly known.

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Ref. no. 2248 O postrojkě 1no ètažnyh″ čulanov″ s″ pračešnâmi i othožimi městami, perestrojkě kryši na kotel´nom″ pokoě i dostrojkě kladovoj vo dvorovom″ městě akcìonern[ogo] obŝ[estva] bum[ažnyh] manufaktur″ K. Šejblera No 961 i 969 po ul[ice] Sv[âtoj] Èmilìi v″ g[orode] Lodzi.

Ref. no. 3358 Ob″ utverždenìi plana na postrojku firmoů K[arl] Šejbler″ v″ g[orode] Lodzi po ul[ice] Sv[âtoj] Èmilìi kamennoj pristrojki i podvala.

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Summary

A Few Words About the Ice House of the Konsum Store in the Nineteenth-Century Priest's Mill Factory and Residential Complex in Łódź

The issue of ice houses, both those found among manor and farm buildings and those connected with industrial plants, is a research issue frequently raised in many countries of Western Europe and in the United States. In the Polish literature, however, it does not attract much interest, which is why knowledge of it – or at least the knowledge shared – is usually limited to the awareness of the existence of ice houses and their purpose, and only occasionally do they become subjects of more extensive research. This also concerns the very material substance of such buildings.

In 2015, on the Priest's Mill estate in Łódź, erected along with the extension of Karol Scheibler's cotton plant at the beginning of the 1870s, rescue excavations were conducted under the supervision of archaeologists Maciej Milczarek and Zbigniew Rybacki. They concerned the remains of an ice house built for the estate general store (including a grocery) called Konsum. Its preserved form is a result of a few construction stages completed in quick succession. During the third one (between 1883/1884 and 1889) the ice house we are interested in was built. It was not big as its capacity was approximately 100 cubic metres, and its structure was rather typical of larger industrial ice houses, with the upper (aboveground) chamber used as an ice warehouse, and the lower (underground) chamber

serving as the store's cold storage. Most probably, it was not used for long, however, there is no data that would allow to determine the time of its liquidation.

Keywords: Priest's Mill in Łódź, industrial archaeology, ice house

Streszczenie

Kilka słów o lodowni sklepu „Konsum" w dziewiętnastowiecznym zespole fabryczno-mieszkalnym: Księży Młyn w Łodzi

Zagadnienie lodowni, tak tych spotykanych wśród zabudowań dworskich i folwarcznych, jak i związanych z zakładami przemysłowymi, jest tematem badawczym często podejmowanym w wielu krajach zachodniej Europy oraz w Stanach Zjednoczonych. Natomiast w polskiej literaturze naukowej nie budzą one większego zainteresowania, w efekcie czego wiedza o nich – przynajmniej ta przekazywana – najczęściej ogranicza się do świadomości ich istnienia oraz przeznaczenia i tylko sporadycznie stają się one przedmiotem nieco szerzej zakrojonych badań. Dotyczy to także samej, materialnej substancji obiektów.

W 2015 r. w na łódzkim osiedlu „Księży Młyn", zrealizowanym wraz z mającą swój początek w latach 70-tych XX w. rozbudową zakładów bawełnianych Karola Scheiblera, pod kierunkiem archeologów Macieja Milczarka i Zbigniewa Rybackiego przeprowadzone zostały ratownicze badania wykopaliskowe. Ich przedmiotem były relikty lodowni wzniesionej dla potrzeb funkcjonującego tu w przeszłości wielobranżowego (m.in. spożywczego) sklepu osiedlowego, zwanego Konsumem. W swej zachowanej do dziś bryle powstał on w efekcie kilku szybko następujących po sobie etapów budowy, a w trzecim z nich (między 1883/1884 a 1889 r.) powstała interesująca nas tu lodownia. Nie był to obiekt wielki, gdyż jego kubaturę ocenić można na zbliżoną do około 100 m^3, otrzymał zaś on dyspozycję typową raczej dla większych lodowni przemysłowych, w których to górna (nadziemna) komora służyła jako skład lodu, zaś dolna (zagłębiona w grunt) była „zimnym" magazynem sklepowym. Nie funkcjonował on zapewne zbyt długo, brak jednak podstaw dla próby dokładnego określenia czasu jego likwidacji.

Słowa kluczowe: Księży Młyn, archeologia przemysłowa, lodownia

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The Use of Chemical Weapons on the Eastern Front of World War One (1915) and its Material and Discursive Remains – the Challenge and Stimuli for Attentive Travel, Systematizing, Storage, Connecting, *in situ* Preservation and Making Public Real Virtual and Digital Heritage of Weapons of Mass Destruction

Introduction

> It was truly the end of the world. Heaps of bodies lying in the streets. Just one look at those poor wretches made one weep in despair. Those in their death throes were tearing their uniforms. Young boys. What for? What is this war about?

– the author of those words, the sensitive writer Paweł Hulka-Laskowski (1881–1946)[1] wondered in his description of the situation when

> ...one beautiful May day, hundreds of soldiers poisoned with gases were laid at the courtyards of Żyrardów schools. Those poor people were lying side by side on the ground, still wearing their worn-out, dirty greatcoats, and a few doctors and nurses from the Red Cross were walking among them, spreading their arms helplessly. There was not enough dressing and trained medical staff to save the poisoned. They were dying on ground – quietly, peacefully, without a word of protest, all dozens of them (after Hulka-Laskowski 1934: 181).

The above account refers to May 1915 when victims of one of the earliest, massive German chemical attacks on the Eastern Front of World War One were brought from the battlefield located about 25 km away, to Żyrardów, a city in Central Poland in the Masovian Voivodeship, on the Łowicz-Błońska Plain. P. Hulka-Laskowski did not try to conceal his emotions when recollecting those events. His descriptions leave no place for doubt that, even considering the aberration such as war itself, the contact with chemical weapon itself and with those poisoned by them one was a particularly intense,

1 Also a translator, book-lover and pedagogue, known for his Polish translation of Jaroslav Hašek's *The Good Soldier Švejk* and publication of the first Żyrardów newspaper.

disquieting and deeply depressing experience. As such, it gave rise to 'gas psychosis' rapidly spreading first in the battlefields on which the German army had experimented with chemical weapons since the beginning of 1915, then to the towns, villages and settlements close to the war-zones, and with time among entire populations shrouded in poisonous gas cloud dread. As the result, using chemical weapon (CW) – both on the Western and the Eastern Fronts of World War I – started to be perceived 'as the psychological weapon rather than physical weapon'[2] and as the mysterious and unpredictable weapon rather than those that were well-known and conventional.

The so far largely excluded from the 'grand narrative' of the Great War – social and material specificities and consequences of the uses of CW on the WWI Eastern Front are poorly known – including aspects of the 'novelty' in the wide range of methods of killing people in the battlefield, the mass death toll, the number of poisoned soldiers, civilians and animals etc. While the issues of a military nature of chemical attacks have already been approached (see for example Kaliński 2015; Zalewska, Czarnecki 2016), the above problems are still difficult to be considered as known. This is due to numerous factors of both epistemological and axiological nature. Written and visual records of direct experiences are rather rare, which is one of the reasons why I decided to look for 'substitute witnesses' such as the material carriers of knowledge and memory about the use of CW on the Eastern Front.

In this article I attempt to create a framework for perceiving, along with the discursive one, the material remains (such as landscapes, war cemeteries etc.), that are burdened with the experiences of CW as lasting insights that undergo continuous changes (both physically and semantically) and are constantly gaining and/or losing (depending on context) their power, agency and scientific, historical and social value. The article has four sections: the first one introduces, from the anthropological perspective, the spatial and temporal conditions of creating the specific phenomena of the *gasscape* rooted in 1915 and present in contemporary central Poland[3]. That specific *gasscape* as well as many other *gasscapes* – the list of which is unfortunately very long – are worth to be perceived as the challenges and stimuli for systematizing, storage, connecting, preservation and making public real virtual and digital heritage of weapons of mass destruction. The core of the second section is resulting from the application of historical perspective, which is helpful in getting a dense description of the primary process to the real material entities that can be perceived as triggers for reflection on the specificity of chemical weapons that have been used through history and on the selective nature of our knowledge of CW. The third section introduces the concept of *attentive travel* as

2 See: *Understand the development of chemical weapons during World War I and its hazardous impact* at https://www.britannica.com/technology/chemical-weapon; see also Rozdżestwieński 2011.

3 The term was coined by combining the English words 'landscape' and 'gas' (attacks), and was introduced and explained elsewhere cf. Zalewska 2013; 2016.

helpful in stressing the value of active and causative remains (material and discursive) that are worth being documented, protected and presentified and presented in the contemporaneous contexts. The fourth section of the article refers to the specific material remains present on the historic battlefield, between Sochaczew in the north and Skierniewice in the south. It is an area located on Błonie Lowlands in central Poland, extending across the border between present-day Mazovian and Łódź Provinces. Thus, I point out several specific locations where there are material remains of the use of chemical weapons. This section focuses on the overview of the actions aimed at making available to the general public knowledge of a difficult past, including initiation of the use of weapons of mass destruction on a massive scale and in a combat situation.

That can help in activating such traces/places in real and/or virtual repository of knowledge on CW. Also, that might result in the elevation of the historic sites (selected places (in) memory)[4] of World War I in the Eastern Front to the rank of 'archaeological sites'[5], which can contribute to the establishment of 'cultural park'[6] or even 'Historic Monument'[7].

4 Places (in) memory have or can have the features of classically understood places of memory (sites of memory, *lieu de mémoire*), but they go beyond the schematic understanding of the latter category (I explain this problem in more detail elsewhere: Zalewska 2015a).

5 Providing arguments for the establishment of "archaeological sites" in the formula developed by the monument protection services is one of the objectives of the project titled "Archaeology of the Eastern Front of the Great War and Heritage of Military Conflicts as a Cognitive, Social and Conservation Challenge" (English abbreviation: AEF, Polish abbreviation: AFW). Other, equally important research objectives of the AFW project include:
– comprehensive study of research results concerning archaeological findings and movable and non-movable historical objects interpreted as traces of military actions in central Poland in the period between 1914 and 1915 as part of the research conducted in 1998–2018 and developing, on the basis of a specific group of findings and movable and non-movable historical objects (over 20,000 items and the area of 250 sq km) from the period of World War I, a proposal for an interpretation key that would be potentially helpful in valorization, categorization and conservation of the remains of World War I (cf. archeomemory.pl.).

6 Establishing the 'cultural park', according to Polish law (Act on the Protection of Monuments and Guardianship of Monuments (Dziennik Ustaw 2003, No. 162, item 1568)), can provide the protection and guardianship to the relic zones that constitute the cultural landscapes. That cover immovable monuments, regardless of the state of preservation (article 6 of the Act). The 'cultural park' may be established by the Commune Council (Rada Gminy) following the opinion of the Voivodeship Inspector of Monuments. In the specific case discussed here, in my opinion, it should take place immediately, at least in relation to all surviving war cemeteries, including those where the victims of chemical weapons are buried and to the distinctive landscape grounds with the immovable monuments, where the relics of the Great War have been perfectly preserved (these are the vicinity of the villages of Joachimów Mogiły and Wola Szydłowiecka in the Bolimów commune). Then the gasscape – presented here as the case study – would become object of legal protection and guardianship provided by the Polish law, for the benefit of future generations – as a warning.

7 'Historic Monument' (in Polish: *pomnik historii*), the term introduced into Polish law in 1990, is one of several categories of objects of cultural heritage and the highest form

Finally, on the background of the reflections on circumstances and effects of the initial use of the CW on the Eastern Front the entangled discursive and material remains are placed in the position of challenges and stimuli for systematizing, connecting, storing, preserving and making public, noticed as occurring in the contemporary world, material, virtual and digital traces of past uses of CW.

Spatial and temporal conditions of the use of chemical weapons in the territory of present-day central Poland in 1915

At the end of 1914 and the beginning of 1915, after bloody manoeuvre combat near Łódź, military actions in the Eastern Front reached a more static phase, defined as stationary warfare. Since autumn 1914, the soldiers of the Russian Empire had been preparing a reserve defence line, stretching from the outlet of the Bzura into the Vistula as far as the Pilica. The total length of the Eastern Front was at the time around 1200 km, from which 800 km crossed the area of present-day Poland where, at the section of around 17 km, the events discussed below took place (Fig. 1).

On the Russian side, that section of the front line was held, in the most part, by the 2nd Army under command of General Vladimir V. Smirnov and partially by the 1st Army under command of General Alexander I. Litvinov. The units fighting on the German side belonged to the 9th Army, initially under command of General August von Mackensen, and then, since April 1915, under command of Prince Leopold of Bavaria. Over 3 million Poles, conscripted into the armies of the invaders, took part in fratricidal fighting in the territory of present-day Poland (cf. *Archeologiczne przywracanie...* 2019: 9–10, further reference provided therein).

The commanding officers of the Army of the German Empire, having learnt the lesson of experience in the Western Front, did not want to allow the Russian defence lines to fully stabilize. Thus, they persistently tried to break the stabilizing front line at several crucial sections. One of such key sections of the front line was located around 60 km to the west from Warsaw. The Russians took defensive positions on high eastern banks of the rivers Bzura and Rawka, as relatively easy to hold. However, at the several-kilometre-long section stretching from the outlet of the Rawka into the Bzura, the low and marshy eastern bank was not suitable for defence and the Russians had to move the front line back by around 3 km from the Rawka. Thus, it ran through the villages of Zakrzew, Sucha, Borzymów, Humin, Wola Szydłowiecka and Mogiły, which were fortified. That section of the front line was considered crucial by the Supreme Army Command

of protection under Polish law. There are many arguments in favor of establishing this rank of protection and significance in relation to the *gasscape* described here.

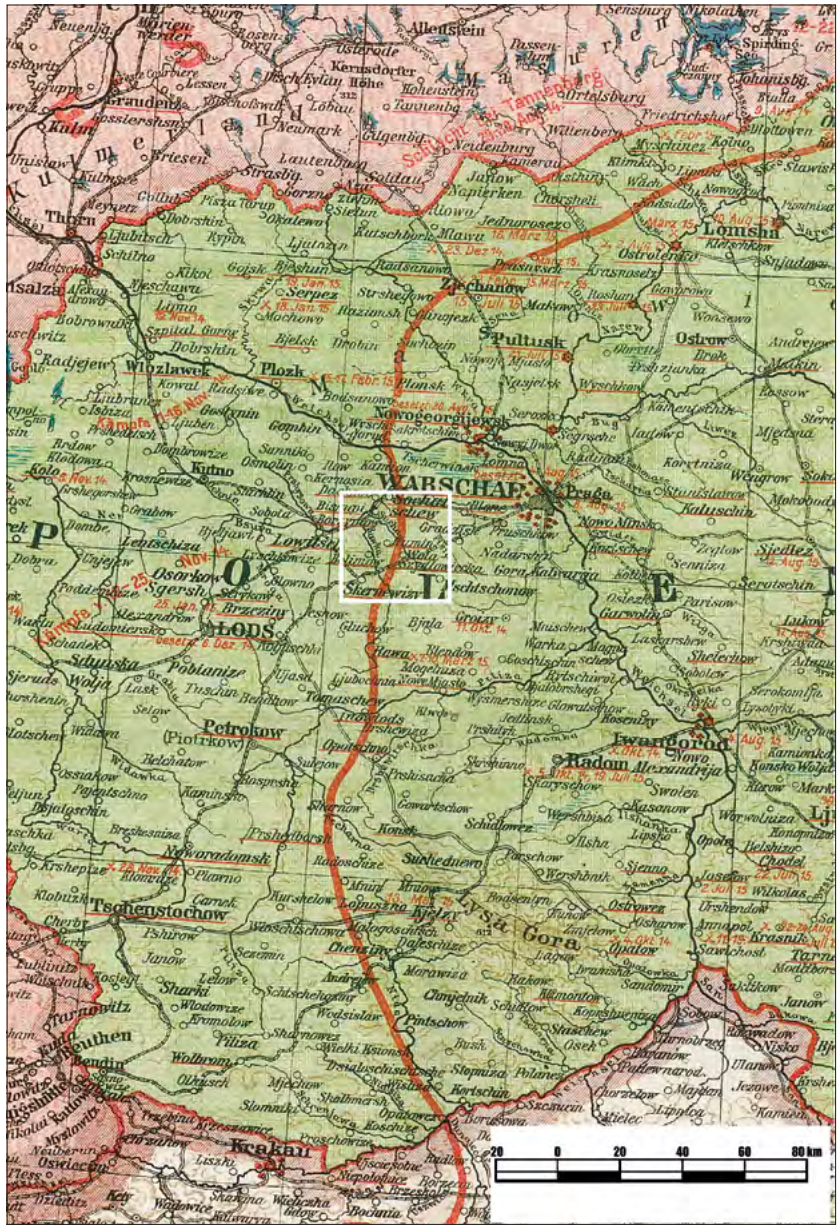


Fig. 1. Schematic course of the Eastern Front line in 1915, in the section from Skierniewice (south) to Sochaczew (north). In the area marked with the white line the Germans carried out gas attacks in the period between January and May 1915 (Author's elaboration of data on the German map from 1915, from the private collection of J. Czarnecki).

(Oberste Heeresleitung, OHL) due to the relative vicinity of Warsaw[8]. It was also thought to be the most convenient spot to make a breach. Therefore, for the entire January 1915, the Germans tried to penetrate the enemy lines there, but without success (for more details on the historical background of the events cf. Zalewska 2013: 69–73; 2016; *Archeologiczne przywracanie...* 2019; Kaliński 2015; Zalewska, Czarnecki 2016; 2019).

As early as in January 1915, the German army decided to use chemical weapons at the discussed section of the Eastern Front in the region of the rivers Bzura and Rawka. The Germans stocked up with at least 18,000 shells containing irritants (hereinafter referred to as "tear gas") (see details at Zalewska, Czarnecki (in print)). Similar firing tests with the use of then-pioneering weapon of mass destruction took place in the areas south to Sochaczew (several kilometres away from the town), near the villages of Zakrzew and Boryszew, and 1 km to north of the village of Humin. Gas shells were used by the Germans several times, especially during the fire attack on the forest-covered area of the so-called Hill No. 95) (see details concerning the landscape conditions of the Humin key point and "Wzgórze 95" in: Zalewska et al. 2019: 82–92). It was one of key defence positions of the Russian army in the region of Bolimów. The south end of Bolimów lodgement, in the region of Mogiły cottage, was probably another target of the so-called 'stinky shells' (see details concerning the Joachimów Mogiły key point in: Zalewska et al. 2019: 65–78).

In the period between January 31 and February 5, 1915, during the 6-day battle at this section of the front line, in addition to gas shells fired at the positions of the Russian army – from the Borzymów Forest (in the vicinity of present-day village of Reduta) to Borzymów (present-day village of Borzymówka), Humin and Wola Szydłowiecka, and further to the west, in the direction of Mogiły – German artillery shot also many thousands of conventional shells of various calibres (from 7.7 cm to the heaviest 30.5 cm). During that battle the Russians lost around 40,000 soldiers (wounded, killed and missing), while German losses were several times lower.

As a result, the Russians deployed in the vicinity of Humin and Wola Szydłowiecka, as well as those holding positions to the west of those villages, retreated to the east by several hundred meters to over one kilometre. However, neither the heavy, many day's long cannonade, nor the use of gas shells, nor even attacks by the German infantry repeated every few hours, managed to breach the Russian defence. Finally, in January, the Army of the Russian Empire, having defended their positions, initiated stationary warfare that in that particular region lasted

8 Warsaw, the capital of Poland since the 16th century, and then-capital of province in the part of the country occupied by tsarist Russia, was in that time also an important economic and communication centre.

until July 1915. The combat that evolved into static trench warfare stayed that way untill July 1915 and became similar to the stalemate of the Western Front (Zalewska, Czarnecki 2019). Also, similarly to the Western Front, the warring parties, over time used not only conventional weapons, but also chemical weapon. After January attacks with tear gas shells, wave attacks with the use of poisonous substances, in particular chlorine (and phosgene?), took place (for more details cf. Zalewska 2013; 2016; *Archeologiczne przywracanie...* 2019; Kaliński 2015). Currently, the fact of using chemical weapons by the Germans at the beginning of January 1915 is often marginalized and/or questioned.

Chlorine and phosgene (?) on the selected episode on the Eastern Front in 1915

In spring of 1915, the Army of the German Empire were still trying to breach the Russian defences and put an end to the exhausting and bloody stationary warfare. One of the methods that was also supposed to minimize their own losses was the use of poisonous gases. The originator of the idea of using chlorine as a military agent was prof. Fritz Haber, later Nobel laureate in chemistry (Friedrich, James 2017).

WMD used by the Germans was at the time the most technologically advanced non-conventional weapon, perceived as a potential solution to make a breakthrough. Its use in combat situations required breaching conventions that limited the possibilities of using chemical weapons. However, this was often a disputable issue (cf. Spiers 2016; *Innocence Slaughtered...* 2015).

Wave attacks, also called 'gas cloud attacks', based on releasing the gas simultaneously from many cylinders containing liquid chlorine, required special preparations. The cylinders were placed in such a way so as to make sure that the released gas would create a uniform cloud of an appropriate, lethal concentration, moving with the wind in the direction of enemy trenches. That method was selected due to the impossibility of applying any other effective technique of killing the enemy with gas. It was the most unpredictable weapon in the arsenal of the German army. However, despite its shortcomings, only several months after the first German attacks, in spring of 1915, the solution was also adopted by British, French and Russian armies (Lepick 1998; Spiers 2016).

In order to carry out a successful gas wave attack, at least four elements were required: tools, people, favourable landscape conditions and optimal weather (Bartel 1928; Martinetz 1996). Preparation and/or adaptation of an enormous number of gas cylinders that could be used for a wave attack, along with special equipment, required trained staff who knew how to handle that new weapon. In mid-January of 1915, the first unit assigned to operate gas cylinders was formed. Initially, the unit consisted of 500 soldiers under command of colonel Peterson,

a sapper officer from Königsberg. To hide its true purpose, it was called 'Pionierkommando' or 'Desinfektiontruppe' (Stoltzenberg 1994). Military conditions and the specific character of gas attacks in the discussed area have already been described (cf. Kaliński 2015; Zalewska 2019; in addition, the issue of *tools* and nature-cultural conditions of the so-called dirty weapons will be discussed in the next volume of this journal).

Only several days after the gas attack near Ypres in Belgium, which took place on April 22, 1915, the soldiers of the 36th Pioneer Regiment, formed for military actions in the Eastern Front, were deployed in the vicinity of Gorlice. OHL planned to launch a massive strike there to break through the Russian lines. However, officers of the 36th Regiment decided that landscape conditions of the Low Beskids made it impossible to carry out a gas attack with the use of chlorine. They were afraid that the hilly and mountainous terrain, covered with dense forest, could be an obstacle for a successful wave attack, i.e. according to then-applicable gas using tactics.

The next place selected by the German command for the use of WMD was the battleground by the Bzura and Rawka, more precisely the so-called Bolimów lodgement on the eastern banks of those rivers. That section of the front line stretched from the village of Zakrzew (by the Bzura) in the north to the vicinity of Mogiły cottage (by the Rawka) in the south. The land offered optimal conditions for an effective wave attack – it was relatively flat and the line of the planned attack would cross forested areas in only three spots. The issue of terrain/landscape conditions that provides a spatial context for wave attacks in 1915 has been already discussed in detail elsewhere (cf. Zalewska et al. 2019).

The documents of the 9th Army of the German Empire reveal that the Germans depended on the lethal effect of poisonous combat agents and prepared for an attack with two corps in the direction of Błonie (around 30 km away from Warsaw). In terms of landscape conditions, the area selected for the use of poisonous gases was not much different from that which had been previously cannonaded with tear gas shells. Haber once again chose chlorine as an active substance, since it was inexpensive and produced on a mass scale as part of many manufacturing processes. The first gas attack with the use of chlorine in the Eastern Front took place at a section of the front line around 14 km long that stretched between Zakrzew and Sochaczew in the north in the direction of Humin in the south and Wola Szydłowiecka in the south-west, reaching as far Majdan Bolimowski (present-day surroundings of the village of Joachimów Mogiły). Soldiers of the 9th Army of the German Empire deployed 12,000 steel cylinders filled with chlorine. They assumed the usage of around 240 tonnes of gas, i.e. 100 more tonnes that had been used at Ypres!

After many days of waiting for favourable wind conditions, the wave attack was finally carried out on **the 31st of May 1915**. The gas used during that attack

was lethal chlorine. However, according to some sources, instead of using pure chlorine, a mixture of chlorine and 5% of phosgene was used by the Germans at the Rawka (Haber 2002: 37; Lepick 1998)[9]. It was supposed to increase the lethal effect. After opening the valves, when the gas cloud passed over the Russian positions and Russian soldiers still resisted the attacks, the German command was convinced that gas, carried with too strong gusts of wind, did not cause significant damages in the ranks of the Russian army. Apart from the wind, the apparent "failure" was ascribed to "eggheads", especially to professor Fritz Haber, who was personally present at front line (cf. Prinz Leopold von Bayern 1915: 176). Lack of artillery involvement was also considered a serious mistake.

Nevertheless, for the Russians those wave attacks with the use of gas cylinders were something totally unexpected and never seen before, as proven by Liddell (1916: 2) and his multiple mentions of *gas shells*, not *gas cylinders*, in his straight-from-the-front accounts published in a book and numerous articles written for British newspapers.

> Let me look back and tell you of some incidents.
>
> On the night of May 30 and early morning of May 31, 1915, and again on July 6 and 7, the Austro-German forces attacked with gas shells. The Russians lost twelve thousand men. Later on you will read of these attacks. I saw the dead and dying men lying amongst the men who coughed and gasped for life. One bearded giant lay at the edge of a Red Cross camp. I bathed his head with water and gave him milk to drink and rearranged his pillow. "Neechevo!" he said to me, and smiled bravely with his fine blue eyes, full as they were of dreadful pain.

After the retreat of the Russian Imperial Army in July 1915, the German command realized how great a mistake was committed in their assessment of the effects of the May wave attack. The commanding officer of the 9th Army noted that inscriptions found at Russian cemeteries situated behind the front lines. proved there were a great number of victims of that particular attack. Thus, by 1915 cemeteries had already bore testimony to and provided material evidence of the tragedy that, *in statu nascendi*, proved to be problematic to interpret even for eyewitnesses of military actions with the use of weapons of mass destruction. Unless such an eyewitness was on the other side of the front line, like Liddell, who wrote:

> We dug graves for the men next days. One very large one and another. In the former were buried one hundred and eight men, and in the latter, thirty-five. Such graves are called

9 Olivier Lepick mentions two versions of that mixture. According to French authorities investigating the events after the war, the gas used for the attack contained 20% of phosgene. On the other hand, L.F. Haber, referring to German sources, describes a mixture with 5% phosgene content.

> "fraternal". The men were buried in their clothes – just as they had died. But first we took their belongings from their pockets, in order, if possible, to send them to their relatives. They were pathetically interesting. Almost every man had a purse, but very little money. The whole number had not a hun (Liddell 1916: 55).

The reporter, despite being a very keen observer, as proven by his book and articles, was not particularly precise as regards the locations of the described events and proper names. His notes – especially those concerning the events of May and June 1915, which are very useful in interpretation of material remains of using chemical weapons in the Eastern Front, can be found in the chapter titled "Staro-Radziwiłłów" (Liddell 1916). In that account, he describes the reality of the area right behind the front line, focusing on the functioning of field hospitals and Red Cross camps, as well as the activity of the 7th voluntary group of the Red Cross and the quarters of sisters of the Red Cross, located around 0.5 km away from the hospital. According to Liddell, one of those hospitals was situated at the edge of a forest near Radziwiłłów station. Tracks of a narrow-gauge railway, used to transport people, ammunition and the wounded, ran across the fields in that area. That makeshift railway (using 2 horses as the pulling power) "each hour" brought the wounded from the battlefield. Its tracks were laid on bare ground and reached the back trenches of the Russian army. They were located around 5 km from the hospital (according to: Liddell 1916: 48, 52, 58).

Another important subject in the accounts of the war reporter were funeral circumstances and cemeteries where soldiers, including the victims of gas attacks, were buried. The deceased were buried in their uniforms and boots (although accounts from other sections of that part of the front-line mention burials in underwear only). Graves – both mass and individual – were dug in sandy soil (Liddell 1916: 53, 58). Those were the resting places of victims of the use of chlorine with possible addition of phosgene by the German army. Although material traces of those camps and field hospitals have not been precisely located yet as part of a field survey carried out for that purpose[10], two cemeteries have already been discovered and documented in the area behind the Russian front line. Those are most probably hospital cemeteries described by Liddell. Their remains, increasingly more difficult to discern in the field, can be found *in situ*. The war cemetery in the village of Jesionka in the commune of Wiskitki have been, unfortunately, transformed to a great extent as a result of forest management (Fig. 2).

10 Surface examination in the area covered by the 61–60 sheet of the Archaeological Photograph of Poland (Archeologiczne Zdjęcie Polski – AZP), carried out as part of the project "Archaeological Restoration of The Memory of the Great War. Material Remainders of Life and Death in the Trenches of the Great War in the Region of the Rivers Rawka and Bzura" was one of stages in the research project No. 2013/10/3/00406 financed from the resources of the National Science Centre in the period 2014–2018.

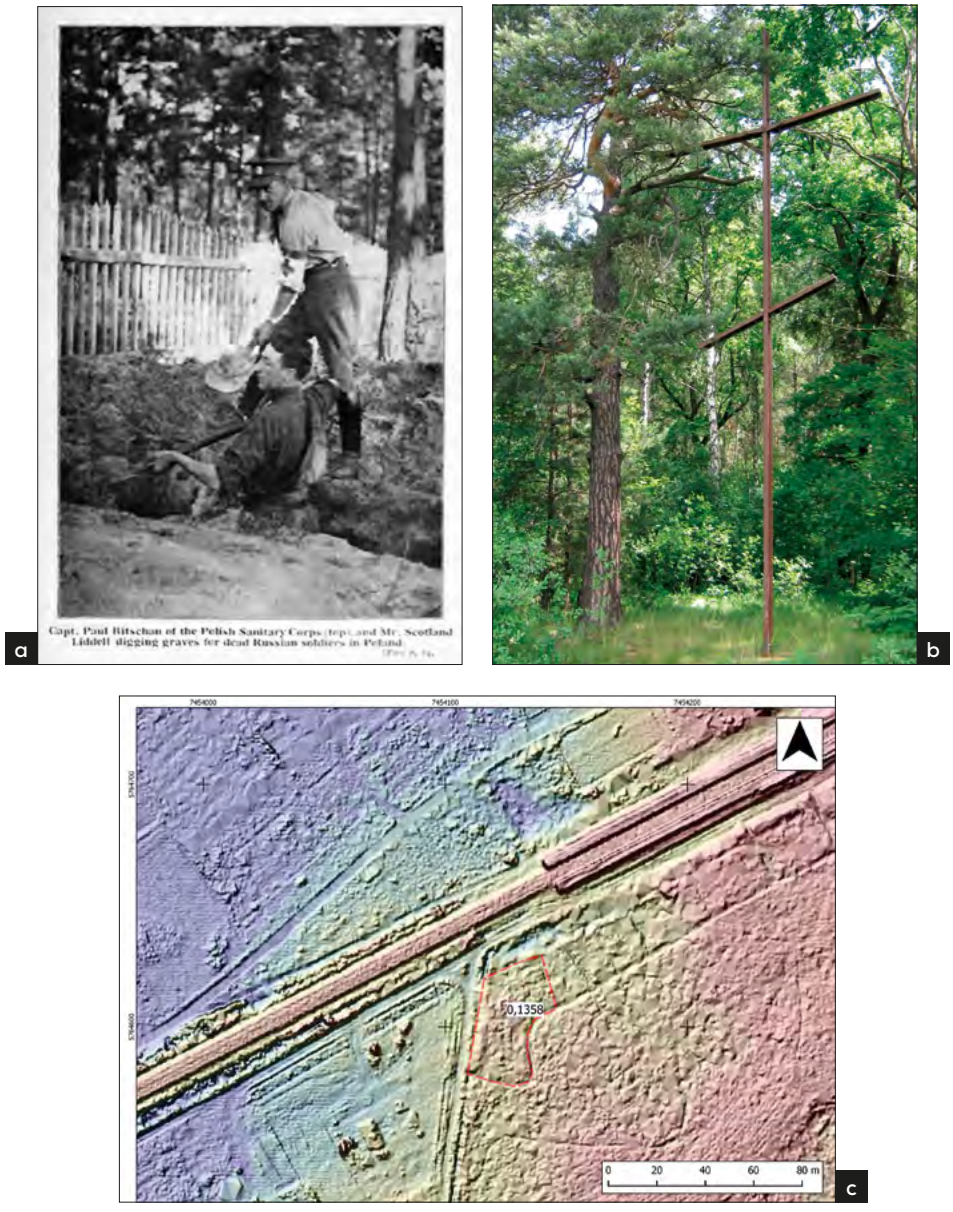


Fig. 2. War cemetery in the village of Jesionka: **a**. Archive photograph of R.S. Liddell digging a grave, printed in the publication *On the Russian Front* (1916); **b**. Present-day view of the ploughed and forgotten war cemetery with a cross; **c**. Digital Terrain Model showing the scale of topographic destruction in the area of the cemetery (DTM by G. Kiarszys). Developed by A.I. Zalewska.

However, due to the palimpsest character of that cemetery, i.e. overlapping layers from the first and the second world wars, as well as a very unique cross, the place still remains evocative. The original shape of the second of the above-mentioned cemeteries, probably located in Franciszków, is also not evident.

The second gas attack with chlorine occurred on **the 12th of June 1915**. Due to logistical problems, the section of the front line selected by staff officers of the 9th Army as the location for the attack was considerably shorter than the previous one. On the 9th of June, the commander of the 36th Pioneer Regiment reported to the command of the 9th Army that he had 18,000 cylinders at his disposal and was ready to carry out another gas attack. In addition, the attack was to be accompanied by "concentrated actions of the artillery". Artillery preparations began on the 11th of June, around 9 a.m., and the gas release was planned for the afternoon. However, an approaching storm forced the command to change their plans. Thus, the cylinders were not opened until 3.30 the following morning, after an intense artillery preparation of the 4 km long front-line section in the vicinity of Sucha and Zakrzew villages. As the weather conditions changed yet again, prof. Haber tried to cancel the attack, but he did not fully succeed. Gas release from the cylinders was partially stopped at the southern section, but the northern wing did not receive the order in time.

As a result, the gas cloud passed first through German positions, and only after some time was it carried by the wind in the direction of Russian lines. The event was described in such sources as the chronicle of the 128th Infantry Regiment:

> In the front trench, Stieberitz played loudly the March of the 128th Regiment. The soldiers began the storm. However, they barely managed to make a few steps when the gas cloud drifted back to our ranks. The wind changed. People were unable to catch a breath. Carrying on with the attack, we risked yet another failure. This caused confusion among the sub-units. They pulled back. We suffered losses in connection with the gas. The music stopped abruptly. Only one soldier remained at his post with a machine gun, in the middle of the gas cloud [...] (Richter 1931: 123 et seq.).

Russian soldiers fighting in the front line fell lifeless to the ground or suffered such heavy poisoning that were unable to fight on. Many of them, realizing that a wave gas attack had started, fled from the field. The chronicler of the 128th Infantry Regiment also wrote that:

> On the other side of the front line, people saw Russians trying to save themselves by climbing up trees and the railway embankment (Richter 1931: 123).

The soldiers of the 175th and the 128th Infantry Regiments breached the Russian lines and proceeded towards further enemy positions. At the same time, soldiers of the 8th Reserve Infantry Regiment crossed the Bzura and attacked the Russian

forces from the flank. The June gas attack was so effective that, for the first time in 6 months, German soldiers managed to penetrate deep into Russian positions – as far as 3 km! – at a 6 km long section of the front line, even though the Germans used 'only' 4500 small gas cylinders. One day after the attack, the newly-acquired positions near the village of Zakrzew were visited by the supreme commander of the 9th Army, Prince Leopold of Bavaria[11], who described the event in the following words:

> Nearby, there was located the most-protruding Russian trench. A few dead bodies of enemy soldiers were still lying there. One could notice the effects of poisonous gases that passed through the area. Most of dead Russians had black faces and hands. Their mouths and noses were covered with cotton bands, faces pressed to the ground, metal elements of their weapons bleached, high crops withered, tree leaves and grass burnt brown and gold; I have even spotted a dead dog cuddled up to his dead master (Prinz Leopold von Bayern 1915).

Part of German soldiers killed in the June attack were probably buried in the Kozłów Forest near Zakrzew, to the north of the village of Nowa Sucha (see: details concerning landscape conditions of the key point near Zakrzew village and the outlet of the River Sucha to the Bzura, marked out as a result of archaeological and remote sensing research, *vide* Zalewska et al. 2019: 113–126). That cemetery was ploughed in the course of execution of the forest management plan in the surrounding area. Hence, its surface shape is barely noticeable (Fig. 3). Within present-day administrative boundaries of the commune of Nowa Sucha, there are still present war cemeteries with graves of possible victims of chemical attacks. Currently, the most noticeable is the one in Borzymówka. Detailed information on war cemeteries in the commune of Nowa Sucha has been provided elsewhere (see: Zalewska et al. 2018).

The third and last gas attack with the use of chlorine in the region of the rivers Bzura and Rawka took place on **the 6th of July 1915**. It was originally planned for the 17th of June, but during artillery preparations the wind direction kept changing. So, it was not until almost three weeks later that the valves of chlorine cylinders were opened. The gas was supposed to be released along the section of the front line between Borzymów and Humin. Prince Leopold of Bavaria, as the commanding officer of the 9th Army, did not conceal his frustration at the fact that gas was being released without an attack plan and without any chance to breach the Russian defence. Finally, the gas was released at the section of the front line between Wola Szydłowiecka and Borzymów, although the cylinders were also

11 It should be also emphasized that, two days after the attack, the conquered Russian positions in the vicinity of Zakrzew were visited by Emperor William II, who was bursting with pride in the successes of his army.

Fig. 3. War cemetery, close to the villages Kozłów Biskupi amd Zakrzew in the area of Nowa Sucha Commune: **a**. Present-day view (2020) of that war cemetery – a memorial site for victims of chemical weapons from June 1915, that started to be restored as a result of archaeological research; **b**. Digital Terrain Model (DTM by G. Kiarszys). Developed by A.I. Zalewska.

deployed to the north of Borzymów. Once again, due to a change in the wind, chlorine (or its mixture with phosgene) was not released from all cylinders. The wind pushed the poisonous cloud in the direction of German positions, causing serious casualties:

> At 9.45 p.m., the entire front was illuminated with red balls of light. Valves were opened and gas started to flow in the direction of the Russians. But what is that? It seems that the gas cloud is going back to our positions. [...] Eyes start to water, we have terrible fits of coughing. What shall we do!? (Gebhardt 1933: 33–34).

The regiment chronicle also mentions that the attacking soldiers entered a cloud of chlorine fumes when its further movement was hindered by unharvested crops in the approaches to the enemy lines. That factor had not been previously taken into account as an obstacle for a gas attack. As a consequence of blocking the chlorine by crops and releasing the gas against changing wind, many soldiers of the German army were poisoned. Their graves act as reminders of those events. There is some evidence that German casualties of chemical weapons by the German army were buried in such places as the war cemetery in Humin, and next to the Church of St Anne in Bolimów, that served as quarter for the so-called Gassregiment (although currently there are no visible surface traces of burials close to the church).

During the July attack, the Russian army suffered heavy losses in men. In one of the reports of the 218th Regiment, the adjutant of the regiment wrote:

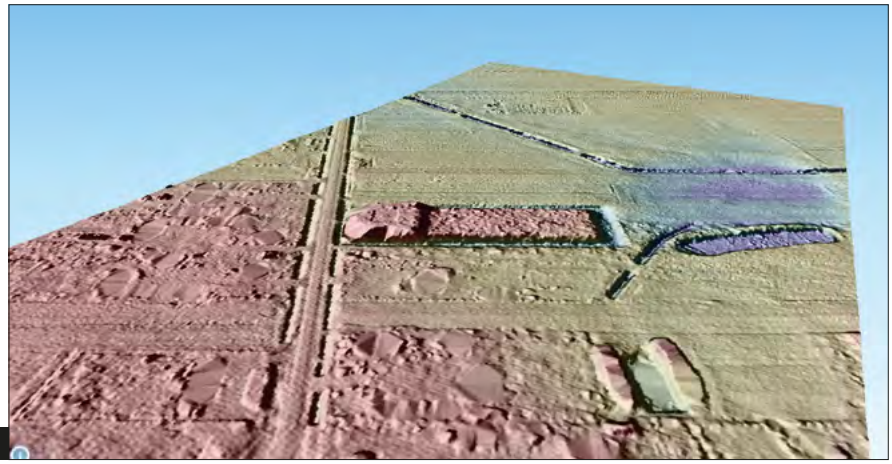
> A huge amount of gas spread along the entire front line held by the Regiment, killing everything on its way [...] The Regiment was unable to hold its positions due to heavy losses in men. Casualties: 10 officers and 151 privates killed, 1992 soldiers missing in action... (as cited in: РГВИА, Ф: 2019 0:1 д:84).

Despite losses suffered by the Russian army, exposed to gas and artillery attacks, German forces did not make an advance. They followed the order of the commander of the 9th Army not to take over Russian trenches, but only penetrate them. In the village of Humin and the surrounding area, there still can be found numerous graves, including those in the war cemetery with an unfinished monument (Fig. 4).

***

The total number of soldiers of both armies who lost their lives as a result of the use of chlorine (and possibly phosgene) in the Eastern Front in the first half of 1915 and the complete list of places where victims of chemical weapons are buried in the lands of today's central Poland is still unknown. Any attempt at making such calculation with respect to the victims of chemical attacks by the Bzura and Rawka – apart from realizing how problematic it is to conduct such research

a



b

Fig. 4.
War cemetery in Humin in the area of Bolimów Commune:
a. Present-day view of that war cemetery restored as a result of grassroots activities with the support of entities responsible for caring for war cemeteries in Poland;
b. 3D Digital Terrain Model. (DTM by Grzegorz Kiarszys). Developed by A.I. Zalewska.

when all one can find are concealed facts, denials and manipulations, and those few available accounts are very often written in the spirit of then-prevailing ideology – can only result in an estimation.

Nevertheless, in-depth research conducted as part of the Archaeology of the Eastern Front of the Great War project allows researchers to come to the conclusion that there is some evidence to support the following estimation: in the Eastern Front, in the region of the rivers Rawka and Bzura, in the section of the front line between Sochaczew and Skierniewice, at least 22,000–25,000 soldiers of both armies fell victims to German chemical wave attacks with the use of poisonous chlorine, with possible admixture of phosgene. That number includes at least 4000 soldiers of the Russian army who were lethally poisoned at the battlefield[12]. However, that estimation is hardly precise, as it is based on numerical data in archive documents and secondary data reconstructions.

Soldiers poisoned with gas were buried in both individual and mass graves in the area taken over in the course of military actions of the Army of the Russian Empire, including such locations as Guzów, Kozłów Biskupi, Jesionka, Kurdwanów, Miedniewice Wola Szydłowiecka, or even Szymanów, but also further from the battlefield, e.g. in Warsaw or Żyrardów. Other graves can be also found in the area seized by the Army of the German Empire in 1915, including Bolimów, Borzymówka, Humin and Wola Szydłowiecka.

'Face to face' with the materiality of *gasscape* and/or virtual walk into a digital repository of knowledge on CW

At many levels, remains of using chemical weapons (as for example remains from the World War One Eastern Front), constitute a serious cognitive, conservator and social challenge. As the significant reasons for the cognitive complications can be pointed the volatile nature of the traces of the uses of chemical weapon and deliberate concealment of activities and outputs related to CW, especially in the initiation phase (as in the actions of 1915). Despite that, remains of volatile 'dirty weapons' are still accessible today, such as places that can be treated as the carriers of memory, since they allow the still rudimentary social and historiographic knowledge of the initial phase of introduction of chemical weapons in combat

12 This is only estimated calculation by the author of this article, made on the basis of available data from Russian and German sources, the most helpful of which proved to be materials collected by Rossijskij Gosudarstvennyj Voenno-Istoričeskij Arhiv (RGVIA – РГВИА) and German archives: Hauptstaatsarchiv Stuttgart (HStAS), Bundesarchiv-Militararchiv Freiburg and Br. (BArch) and BayHStA – Bayerisches Hauptstattsarchiv in Munich. I also would like to thank Jacek Czarnecki for his cooperation in searching for and translating data concerning the victims of gas attacks found in source materials.

situations in the Eastern Front of World War I to be materialized. They are also supra-local symbols of difficult heritage that, despite their significant transnational value, have not been previously subjected to a systematic analysis.

Attentive travel is one of the potential forms of interaction with such remains. It can form difficult heritage of weapons of mass destruction, including material remains of using chemical weapons. It seems especially appropriate in relation to the issues discussed herein, as it both falls within and deepens and expands the scope of understanding of that type of activity as cultural tourism whose general subjective definition is as follows:

> the journey of people to specific destinations that offer cultural attractions, including historic sites [...] with the aim of acquiring new knowledge and experiences that meet the intellectual needs and individual growth of the traveller (McKercher, duCros 2003).

Cultural tourism in itself is a multi-aspect phenomenon, only seemingly easy to define and plan (see for example the very valuable reflections on the complexity of that social phenomena from a geographic perspective, contained in the publication Kowalczyk 2008, there also further literature). As recorded therein, since the very beginning of tourism as a social phenomenon, cultural tourism has comprised cognitive (educational) tourism (according to the typology proposed by K. Przecławski 1979), however some of its forms expand the framework of the definition. Detailed definitions of cultural tourism can be divided into four categories: definitions focusing on destination's resources; definitions focusing on tourists' motivations; definitions focusing on empirical or aspirational aspects; and definitions that have fundamental importance for specific research objectives (see: McKercher, DuCros 2003). As regards those four dominating types of definitions, particular attention is given herein to issues arising from the one that focuses on the characterization of tourist destination. This can be done among other ways by defining and widely presenting 'destination's resources' such as for example the specific group of material remains – places that bear testimony to the use of chemical weapons (such as *gasscape* on the Eastern Front from 1915), whose detailed descriptions were provided as a result of making them the focus of archaeological, historical, landscape and memory studies. Those remains are characterized by their great historic and scientific value.

Assuming that the practice that I propose to call *real and virtual attentive travelling* slightly exceeds the existing framework of cultural tourism, as well as other useful and expected activities for the purposes of outreach and education, including establishing a connection with and understanding of painful heritage of CW, the problem requires further elaboration. It is worth doing, as deepening the methodological and methodical reflection might contribute to social appreciation and protection of experienced places such as *gasscapes*, as areas of potential

positive impact on the future of humanity. With that in mind I suggest to take on the general level the following measures:

- more serious and attentive treatment of spatial and materials aspects of places of historic events of high scientific and social value;
- more intensified outreach and educational actions aimed at popularization of knowledge of cultural heritage (including painful transnational heritage) and
- effective connection (cross-linking) of the actual reality (elements that are still physically present in the landscape) with subjects of discourse and recognition (included in archive documents, studies, etc. that can together make up a possibly entangled virtual (incl. digital) and real (incl. material) repository/repositories of knowledge on CW and WMD and potentially many other related experiences from recent past that shaped us and shape our future.

Material remains of using chemical weapons by the German Empire in the Eastern Front (1915) as a stimuli for systematizing, storage, connecting, preservation and making public real, digital and virtual cw heritage

The material remains of using chemical weapons, including gas shells and wave attacks, by the German army in January, April, May and July of 1915, which are the subject of this study, so far were discussed idiographically[13]. However, I suggest to consider attributing also the nomographic character to some conclusions arising from the implemented research into the above-mentioned issue, i.e. that stimulation of historical consciousness and sensitivity could and should encourage the development of in-depth historical awareness and the feeling of safety, not fear. At the same time I am trying to convince archaeologists, historians and the local stakeholders of the painful heritage that can be actively engaged in though the process of outreach and education on CW and BMR, by spreading knowledge about the history, the potential threats and the mission and activities of entities involved in the process of minimizing the threats of weapons of mass destruction in the modern world, such as the Organisation for the Prohibition of Chemical Weapons (OPCW).

13 The reflections presented below are based mainly on the case study from the region of the rivers Bzura and Rawka which was the subject of research "Archaeological Restoration of the Memory of the Great War. Material traces of the life and death in the trenches of the eastern front and the transformations of the battlefield landscape in the region of Rawka and Bzura" carried out in 2014–2018 (English abbreviation: ARM; Polish abbreviation: APP). The research was dedicated to studying the daily lives and deaths, as well as the material and social memories of those engaged in the fight during WWI. The ARM project was financed with the grant from the National Science Centre awarded under decision number DEC-2013/10/E/HS3/00406 (see *Archeologiczne przywracanie…* 2019).

Currently, the history of gas attacks in the Eastern Front finds very little support in material traces (cf. Śliwakowski, Chałas 2019). As regards written sources, such as reports, journals, archive documents and later studies (dating back to the twenties and thirties of the previous century), information concerning the use of weapons of mass destruction in 1915 often has to be extracted from *tacit verbis*. However, as I try to show in this article, after 105 years it is still worthwhile to reflect for a moment on the peculiar nature of weapons of mass destruction from the perspective of purely human, spatial and material aspects of their use in the territory of present-day Poland in 1915. In addition, an opportunity to directly confront the material (geospatial) aspect of gas attacks, including the landscape that bore witness to those events, along with burial sites of victims of chemical weapons, is particularly precious. This provides an important basis for making the local history take on a global dimension. It is possible in both physical and virtual space. However, it would require a repository to store the collected, systematized data on individual locations of gas attacks, including their geospatial characteristics and source data, along with iconographic and text contents, and in several cases also video or even audio materials – registered interviews with witnesses of gas attacks (in the 1980s) and descendants of residents of the area of the battlefield (in the period 1915–1920).

An insight into the specific character of the area of gas attacks, including its landscape could be provided with the use of many generally accessible tools that would allow travel across the *gasscape* in both physical and virtual reality. Our previous efforts could be characterized as 'analogue-based'. However, the wealth of knowledge contained in already published works and other durable media, shared by means of museum exhibitions and information boards, could be elevated from the local material (real) level to the transnational virtual (digital) dimension with the use of appropriate tools and technologies.

The basis for creating such repository of knowledge could be geospatial data combined in digital space (cross-linked with metadata resources dedicated to individual places and events), as well physical places as such, especially graves and war cemeteries (see: Zalewska, Cyngot 2017; 2020). Localization of the latter could be facilitated for example by the *in situ* boards marking an educational and historical path created on the initiative of "Przydrożne Lekcje Historii" ("Roadside History Lessons") Foundation, titled *Gas Attacks by the Rawka and Bzura in 1915*. The historical path was planned and implemented via related activities such as: *in situ* workshops using active learning methods; placing information boards located (with active participation of landlords and/or site managers) at the sites of events, with minimal interference in them; publishing the popular science book on *traces and testimonies of the Great War on Rawka and Bzura* (see: Zalewska, Czarnecki 2016), and production and printing a tourist map issued in a significant amount. All those activities, which can be treated as manifestations of engaged archaeology,

Fig. 5. War cemetery in Guzów in the area of Wiskitki Commune: **a**. Archive photograph of victims of gas weapons before their burial (1915), courtesy of B. Jagiełło; **b**. Present-day view of a well-kept war cemetery with crosses restored as a result of grassroots activities with the support of entities responsible for caring for war cemeteries in Poland. The frame from the film "Buried Memories" directed by Eric Vander Borght for OPCW; **c**. Digital Terrain Model (DTM by Grzegorz Kiarszys). Developed by A.I. Zalewska.

Fig. 6. The mass grave of soldiers of the Russian army in Miedniewice, where rest the victims of use of chemical weapons in the area of Wiskitki Commune. Foto by A.I. Zalewska (2020).

contributed to the pro-social and educational projects, as for example *Archaeology of Reconciliation*... (see: Zalewska 2015b: 166 et seq.). Also some remains were presented at exhibitions in local memorial halls in Bolimów and Nowa Sucha as well as in Polish Army Museum in Warsaw.

The current length of the path is around 25 km. It runs across the area of the communes of Bolimów (in Łódź Province) and Nowa Sucha (in Mazovian Province). There is also a longer variant, around 36 km long, with additional section running through Sochaczew commune (in Mazovian Province).

Virtually, the repository could be composed of geospatial data, allowing to precisely locate a particular place in the field, and factual data, including iconographic, text and audio content, etc. Such data could be activated/called-up by potential users e.g. via virtual geolocations of individual points of interest or, in case of direct *in situ* contact, via QR or similar codes. There is still much to be done in this regard.

In reality, on the material level, the January gas shells attacks as well as three wave attacks carried out by the army of the German Empire with the use of chlorine (and possibly phosgene) left *in situ* (i.e. at the place of their implementation) only indirect traces. These include, first of all, the very location of those events, (i.e. the landscape that, especially in the northern part of the area discussed herein,

underwent a radical transformation), as well as graves of fallen soldiers, including victims of gas attacks. They still serve as a powerful reminder of the past. Thus, it would be a good idea to ensure that information on those material remains are documented, collected and systematized in the form of a digital repository of knowledge (here on gas attacks on the Eastern Front) before they disappear completely by natural decay. Such a repository could be composed of geospatial data, allowing to precisely locate a particular place in the field, and factual data, including iconographic, text and audio content, etc.

Data related to the CW could be also activated/called-up by potential users e.g. via virtual geolocations of individual points of interest or, in case of direct *in situ* contact, via QR or similar codes. A good example of the complexity of (dis)appearance of one of the last 'substitute witnesses' to the event from 1915 could be the area within the present-day administrative boundaries of Wiskitki Commune, where many cemeteries with graves of victims are located (for details concerning war cemeteries in the area of Wiskitki Commune see: Zalewska et al. 2018). These are at a relatively short distance from each other where simultaneously last the war cemetery in the village of Guzów (Fig. 5) and the mass graves in Miedniewice (Fig. 6). The first one is the most well-kept and visible on the surface from among all burial sites of the fallen victims of the CW located within that commune), while the second one – the largest in the area remain very problematic, both due to their defective official status (they are currently parts of private recreational plots of land) and gradual (not only natural) decay (material traces of lack of care and respect are clearly observable in their state of preservation). Relating to that observation, it is necessary to emphasize here, that certain activities aimed at documenting, consolidating, systematizing and disseminating knowledge about the experiences related to CW in Central Poland should be undertaken immediately. Some disappearing material remains including war cemeteries – resting places of the victims of chemical weapons – prove it.

Summing up, at present, the area (in present days Poland) of a former battlefield, where the army of the German Empire repeatedly used chemical weapons in 1915, still conceals the bodies of – until recently – almost completely forgotten victims of CW. Attentive travellers can choose – depending on their preferences and possibilities – 4 stops/lessons (basic route) or 12 stops, including the section of Path No. 1 titled "Life and Death in the Trenches of the World War I by the River Rawka", as well as the *Stop of Memory of the Great War on the Way to Independence (1918–2018)*, created in 2018. That stop was established on the initiative of the Commune Cultural Centre and the authorities of Nowa Sucha, in cooperation with an archaeologist and polemologist. It presents educational content concerning gas attacks in the form a board exhibition.

In addition, it should be emphasized that the state of preservation of those *in situ* material remains is in many cases very poor (due to agricultural and forest

land management, as well as very intense treasure hunting with metal detectors in the area, including war cemeteries). They need support, prostheses of memory, prior preparation to make them more evocative. However, even they are still able to support actions aimed at presentification of the reminders of using chemical weapon of mass destruction over century ago. Thanks to the analysis of remote sensing data, including the Digital Terrain Model, created as a derivative of LiDAR scanning and surface examination, the exact locations of some resting places of CW victims was possible to be determined (Zalewska, Kiarszys 2015; 2017).

Considering the difficult subject matter and sensitive character of material signs encountered by anyone potentially interested in contact with *in situ* traces of gas attacks, it seems that considerable efforts should be invested in making the message of places, objects and collected data concerning the use of weapons of mass destruction in the territory of present-day Poland fully understandable for contemporary people, especially the youth (i.e. with the use of modern, digital technologies, but also with showing an appropriate respect for those places-witnesses and *gasscape* as such).

Conclusion

The use of chemical weapon on the Eastern Front in 1915 in the region of the rivers Bzura and Rawka confirmed how cruel, and at the same time unpredictable, that weapon was and can be. The passing of time has shown in turn how fleeting the contemporary desire to remember about some episodes of dreadful history can be, and how and how it affects the condition of its last witnesses — the material remains. Conclusions arising from the analysis of both the depositional context and post-depositional processes can provide a stimulus for reflection on the volatility (in both metaphorical and literal sense) of even one of the most extreme and abnormative events form cultural and material memories. Direct contact with the real and mental *gasscape* experienced by multiple rounds of gas shells fired in January and February 1915, or wave attacks with poisonous chlorine in May, June and July of the same year is a good motivation, or starting point to trigger the desire to know more, to reflect on the escalation in WMD use and war in general. It should be also emphasized that experiments with and combat use of various active chemical agents in the Eastern Front in 1915 contributed, either directly (in the first stage of war) or indirectly, to escalation in the global use of dirty weapons.

Material remains of history of weapons of mass destruction (here chemical weapon on the Eastern Front of the Great War that deserve particular attention due to their specific, volatile nature as well as moral and formal conditions at the stage of the primary process i.e. in 1915 and immediately after the war) – are not easy to comprehend. They cannot be treated as ready-to-use history and/or

peace education material or proposal for cultural tourism – even reflexive cultural tourism (promoted here as an optimal form of interaction with a difficult heritage such as *gasscapes* and understood here as demanding significant prior knowledge, above-average commitment incl. engaged preparation covering both the process preceding the contact experience with peculiar witnesses of history and during this type of meeting). On the contrary, they require (cognitive) effort and care (attention and protection). They also constantly need support, 'memory surrogates', to make the message slightly more clear, as some meanings cannot be conveyed through words and, in order to understand them, one must get involved in the material, sensual, corporeal dimension of the world, its very 'presence' or 'substance'.

In this article, I have tried to promote the legitimacy of the pursuit of greater presentification of traces of using chemical weapons from the past – wherever they still exist. This harmonizes with the inalienable necessity of relentless pursuit towards permanent and verifiable elimination of chemical weapons.

I assume that such presentification can be constructively achieved by means of:

- searching for, systematizing and digitalizing source data, e.g. in the form of a digital repository of knowledge on using chemical weapons in the past;
- taking into account and documenting all accessible – as well discursive as material data (including spatial one such as *gasscapes*), that still bear testimony to the events that took place within at least last century;
- making the areas recognized as testimonies of CW' uses in the past – the protected zones (e.g. registered historic sites) in order to put them under actual protection and conservator's care to make sure they will be preserved for future generations[14] andmaking *gasscapes* and information about them more noticeable, readable and available, according to the cultural context of potentially interested parties, using both direct and indirect information channels at local and global levels, as appropriate;
- interpretating and representating (as much as possible) textual, visual, audial, and material (incl. spatial) carriers of memories and post-memories entangled with the aspects of still partially noticeable traces of using chemical weapons through application of historic, archaeological and scientific research methods;
- taking pro-social actions aimed at treating material signs of using CW in the past as triggers for reflection, deepening historical sensitivity and awareness and as potential reflective cultural tourism destinations.

Such activities are here perceived as the valuable element of working together for a world free of chemical weapons. Such goal is promoted mainly by the OPCW – the

14 In Poland, preservation of locations in the Eastern Front of the Great War that are marked with WMD, listed further in this article, could take place in accordance with the provisions of Art. 3, section 1, and Art. 3, section 4 of the Act of July 23, 2003 on protection and care of historic monuments (Journal of Laws of 2003, No. 162, item 1568, as later amended).

implementing body for the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction[15].

The set of places and contents providing a stimulus for reflection on the history of weapons of mass destruction can and should be open, constantly broadened and supplemented, as well as generally accessible. Presentification should possibly be accompanied with a set of generally accessible information (e.g. via the Internet), helpful in reaching the goals of people interested in history of CW and actions taken in order to stop the still the ongoing process of proliferation of chemical weapons, as well as difficult heritage and attentive travel or reflective cultural tourism. This could be supported by way of making the data available on the Open Access principles, but with consideration for intellectual property of individuals previously engaged in collecting and interpreting that data.

Establishment of a repository of CW heritage could take place in both virtual and physical space (depending on the needs and skills). It could be either selective, i.e. providing reference at the local level (e.g. to gas attacks in Poland in 1915), or inclusive, i.e. taking into account all recognized places that are important for transnational memory and history of the use of chemical weapons.

While systematizing, storage, connecting, preservation and making public real virtual and digital heritage of chemical weapon we should keep looking for new channels of knowledge transfer (such as audio, visual[16], etc.), targeted at widening the audience and proving how useful in learning, interpreting, experiencing and gaining awareness can be as well discursive as material remains. These unique warnings, including carriers of memory and knowledge on local history of global significance have the power (potential) for stimulating and encouraging us to think, to actively show empathy and finally to be more attentive to the events of the 20th century that have strongly marked our world, and which still threaten the world today.

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15 See details on the Chemical Weapons Convention and OPCW mission on https://www.opcw.org/.

16 See for example results of very interesting and stimulating initiative for outreach and education by OPCW – a series of short documentary videos depicting the intersection of people and chemical weapons – *The Fires* (https://www.opcw.org/fires). There, among other things, an insight into the issues discussed in this article Buried Memories at the https://www.opcw.org/fires, https://youtu.be/u7b5fmoe5qi.

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Summary

The Use of Chemical Weapons on the Eastern Front of World War One (1915) and its Material and Discursive Remains – the Challenge and Stimuli for Attentive Travel, Systematizing, Storage, Connecting, *in situ* Preservation and Making Public Real Virtual and Digital Heritage of Weapons of Mass Destruction

The article includes a theoretical and practical proposal for perceiving and treating material and discursive remains of using chemical weapons – wherever they still exist – as stimuli for reflection on weapons of mass destruction and as warnings. Based on the specific example of the outcomes of the archaeological and historical research conducted in the historic battlefield – the section of the Eastern Front between Sochaczew in the north and Skierniewice in the south, the following more general appeals have been formulated: – for inalienability of collecting, systematizing and interpreting source information and studies that could together make up a real and digital repository of knowledge on material and discursive remains of historical uses of chemical weapons (CW) and potentially further on of weapons of mass destruction (WMD); – for documenting, digitalising and protecting *in situ* remains of the past that, despite representing a challenge for contemporary people, constitute a part of important, however difficult, transnational painful heritage; – for undertaking more intense, systematic and coordinated activities to disseminate knowledge about past use of CW and about the mission and activities of individuals and organisations involved in the process of minimizing the threats of weapons of mass destruction in the modern world (such as the Organisation for the Prohibition of Chemical Weapons – OPCW).

It is worth exploration, as well as documentation and protection (with the aid of archaeology, history, memory studies, ethnology, landscape studies, educational studies – especially on

Peace Education, tourism studies etc.) e.g. by means of transdyscyplinary research and working on establishing real and virtual repositories of knowledge on CW, OPCW, outreach, education on transnational painful heritage, reflective cultural tourism, attentive travel etc.

The historical *gasscapes* (landscape marked with gas attacks) – such as an element of the landscape of today's central Poland, sketched in this article, that bore witness to the very first mass use of gas shells in January 1915, as well as wave attacks with poisonous chlorine (possibly combined with phosgene) in the battlefield, has been presented as particularly predestined to serve as a symbols of CW painful heritage, triggers for reflection on BMR and carriers of even though weaker and disappearing living memories. Additionally, the attention was drawn to the fact that certain activities aimed at documenting, consolidating, systematizing and disseminating knowledge about the experiences related to CW (or more broadly, WMD) should be undertaken immediately. Some disappearing material remains prove it. The area (in present days Poland) of a former battlefield, where the army of the German Empire repeatedly used chemical weapons in 1915, still conceals the bodies of – until recently – almost completely forgotten victims of CW. Hence the emphasis put on the significance of that area and other similar places as destinations for *attentive travel* (real and virtual) following evocative remains will not leave us indifferent and uninterested.

Keywords: weapons of mass destruction (WMD), chemical weapon (CW), material and discursive remains of CW, World War I, Eastern Front, 1915, central Poland, *gasscape*, war cemeteries, archaeology, memory, transnational painful heritage, real and virtual repositories of knowledge on CW, OPCW, outreach, education, reflective cultural tourism, attentive travel

Streszczenie

Użycie broni chemicznych na Froncie Wschodnim I wojny światowej (1915) oraz materialne i dyskursywne pozostałości jako wyzwanie i stymulator dla uważnego podróżowania, ochrony *in situ* oraz systematyzacji, przechowywania i upubliczniania realnego, wirtualnego i cyfrowego dziedzictwa broni masowego rażenia

Artykuł zawiera teoretyczną i praktyczną propozycję postrzegania i traktowania materialnych i dyskursywnych pozostałości po użyciu broni chemicznej – wszędzie tam, gdzie jeszcze istnieją – jako bodźców do refleksji nad bronią masowego rażenia i jako ostrzeżeń przed jej stosowaniem. Na konkretnym przykładzie wyników badań archeologiczno-historycznych prowadzonych na historycznym polu bitwy – stanowiącym pozostałość po odcinku Frontu Wschodniego między Sochaczewem na północy a Skierniewicami na południu – sformułowano następujące argumenty (wykraczające poza omawiane tu studium przypadku) i przemawiające za:

- zasadnością i niezbywalnością gromadzenia, systematyzowania i interpretowania informacji źródłowych i badań, które mogłyby przyczynić się do zaistnienia repozytorium wiedzy o materialnych i dyskursywnych pozostałościach historycznych zastosowań broni chemicznej (CW) i broni masowego rażenia (BMR);
- potrzebą dokumentowania, digitalizacji i ochrony *in situ* pozostałości przeszłości, które są częścią ważnego, choć trudnego, transnarodowego bolesnego dziedzictwa;
- koniecznością podjęcia bardziej intensywnych, systematycznych i skoordynowanych działań upowszechniających wiedzę o stosowaniu broni chemicznej w przeszłości oraz

- celowością upowszechniania wiedzy o misji i działalności osób i organizacji zaangażowanych w proces minimalizowania zagrożeń wynikających ze stosowania broni masowego rażenia we współczesnym świecie, jak np. Organizacja ds. Zakazu Broni Chemicznej (OPCW – skrót od ang. Organisation for the Prohibition of Chemical Weapons).

W artykule zaprezentowane zostały argumenty przemawiające za tym, że warto badać, dokumentować, zabezpieczać, interpretować i uobecniać w przestrzeni publicznej wiedzę o stosowaniu broni chemicznej, np. poprzez tworzenie repozytoriów (z wykorzystaniem przestrzeni realnych i wirtualnych oraz materialnych i cyfrowych danych), refleksyjną turystykę kulturową i uważne podróżowanie. Mogłoby to następować poprzez transdycysplinarne działania np. z udziałem archeologii, historii, studiów nad pamięcią, etnologii, krajobrazoznawstwa, pedagogiki (zwłaszcza edukacji dla pokoju), studiów nad turystyką itp.

Historyczne krajobrazy gazowe (krajobrazy naznaczone atakami gazowymi określane tu jako *gasscapes*) – jak m.in. naszkicowany w tym artykule element krajobrazu dzisiejszej centralnej Polski, który był świadkiem pierwszego masowego użycia przez armię niemiecką pocisków gazowych w styczniu 1915 r., a także ataków falowych z wykorzystaniem trującego chloru (prawdopodobnie z fosgenem), zostały w artykule przedstawione jako predestynowane do tego, by służyć nam i przyszłym pokoleniom jako symbole bolesnego dziedzictwa broni chemicznej.

Dodatkowo zwrócono uwagę, że pewne działania mające na celu poznawanie, dokumentowanie, utrwalanie, obejmowanie formalną ochroną i opieką śladów i świadectw, systematyzowanie i upowszechnienie wiedzy o doświadczeniach związanych z bronią chemiczną (czy szerzej bronią masowego rażenia), powinny zostać podjęte niezwłocznie. Przemawiają za tym m.in. bezpowrotnie znikające pozostałości materialne (jak np. cmentarze wojenne, na których spoczywają ofiary zastosowania broni chemicznej), będące ostatnimi świadkami. Teren dawnego pola bitwy (na Równinie Łowicko-Błonskiej), na którym armia Cesarstwa Niemieckiego wielokrotnie użyła broni chemicznej w roku 1915, nadal kryje szczątki do niedawna prawie całkowicie zapomnianych ofiar broni masowego rażenia. Stąd nacisk kładziony na znaczenie tego obszaru i innych podobnych miejsc jako destynacji uważnych podróży (realnych i wirtualnych), które nie powinny nas pozostawiać obojętnymi i niezainteresowanymi.

Słowa kluczowe: broń masowego rażenia (BMR), broń chemiczna (CW), materialne i dyskursywne pozostałości broni chemicznej, I wojna światowa, Front Wschodni, 1915, Polska Centralna, krajobraz (po)gazowy, cmentarze wojenne, archeologia, pamięć, bolesne dziedzictwo transnarodowe, rzeczywiste i wirtualne repozytoria wiedzy o CW, OPCW, upowszechnianie wiedzy, edukacja dla pokoju, refleksyjna turystyka kulturowa, uważne podróżowanie

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