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**A multidisciplinary study of anti-vampire burials
from early medieval Culmen, Poland:
were the diseased and disabled regarded as vampires?**

Abstract. The definitions and interpretations of anti-vampire burials have provoked impassioned discussion in archaeology over the last century. That the diseased and disabled were sometimes perceived as vampires is very intriguing and worth investigating because historical and ethnographic materials and archaeological studies indicate a connection between disease (e.g. tuberculosis and anaemia) and vampirism. Until the development of germ theory in the 19th century, some people explained the phenomenon of disease and death as its consequence by connecting it with beliefs in vampires. We investigate if the diseased and disabled were buried in anti-vampire graves based on materials from early medieval Culmen in Poland. We selected 574 skeletons from 566 graves for our analysis. The research allowed the identification of 13 anti-vampire graves, which include 14 skeletons. Of 574 skeletons, 299 indicate pathological lesions associated with diseases and 8 skeletons indicate lesions associated with disabilities. Among the individuals buried in anti-vampire graves (N=14), 11 had pathological lesions associated with diseases and one – lesions associated with disability. We analyse each disease and condition separately to see if it was a reason for burying individuals in anti-vampire graves. Our analyses have shown that the diseases and conditions that were identified on skeletons in anti-vampire graves were common in the past populations, including Culmen, and apparently not connected with the appearance of a vampire. Therefore, we conclude that diseases and disabilities were not the reason for perceiving someone as a vampire in Culmen.

Keywords: anti-vampire burials, disease, disability, bioarchaeology, paleopathology, ethnography, history, Poland.

Introduction

Historical evidence suggests that after death, some people were believed to have become vampires who could then cause harm or death to the living (e.g. Wojtucki 2016). Consequently, people became afraid of vampires and tried to render them harmless through elaborate anti-vampire burial practices, which can be identified in the archaeological record. The definitions and interpretations of anti-vampire burials have provoked impassioned discussion in archaeology over the last century (Aspöck 2008; Gardęła, Kajkowski 2013). Scholars have proposed that those who broke social taboos or died without sacraments (e.g. those who committed suicide, the unbaptised, criminals), the diseased, the disabled, those who died as a result of epidemics, slaves sacrificed for their masters, or strangers were all regarded as vampires (Sledzik, Bellantoni 1994; Stanaszek 1999; 2007; 2016; *Deviant burial* 2008; Gardęła, Kajkowski 2013; Betsinger, Scott 2014; Gregoricka *et al.* 2014). Yet, despite all the research, there is no consensus about who the so-called vampires were.

The interpretation that the diseased and disabled were perceived as vampires is very intriguing and worth further investigation because historical and ethnographic materials (e.g. Łęga 1961; Baranowski 1965; Moszyński 1967) and archaeological study (e.g. Sledzik, Bellantoni 1994; Stanaszek 2007; 2016; Tsaliki 2008) indicate a connection between disease and vampirism. Understanding sickness and disability varies according to knowledge (professional medical or unprofessional) and the cultural context (Cross 1999; *Disability and archaeology* 1999; Roberts 1999; 2000; Barnes, Mercer 2010). In pre-industrial societies, people did not have so much detailed medical knowledge as we do (Betsinger, Scott 2014) and disease and death were an unknown and inexplicable phenomenon. Religious beliefs played a crucial role in adaptation to otherness and the unknown (Pałubicka 1983). For this reason, a significant part of religious beliefs was connected with the perception of health, disease, medicine and death. People did not understand the causes of diseases and death as their result and they explained the phenomenon of disease and death by connecting them with the actions of demons (e.g. vampires or a demon called *gościec*), evil, and God (e.g. Udziela 1891; Moszyński 1967). Until the development of germ theory in the 19th century some people explained the phenomenon of disease and death by connecting it with beliefs in vampires (Betsinger, Scott 2014). As a result of a lack of advanced medical knowledge, those regarded as vampires became societal scapegoats who were blamed for the misfortune of the living and inexplicable phenomena connected with disease and death (Barber 2010; Betsinger, Scott 2014).

Disability is a sociobiological condition that results from the limitation of movement due to physical deficiencies and the attitude of a society towards a physically challenged person (Cross 1999; Knüsel 1999; Roberts 1999; Zakrzewski 2014; 2015; Tilley 2015; Boutin 2016). The World Health Organization definition of disability

within the ‘biopsychosocial model’ and multifactorial model indicates that ‘disability and functioning are viewed as outcomes of interactions between health conditions (diseases, disorders and injuries) and contextual factors’ (*Towards* 2002, p. 10)¹. This definition is especially suitable in bioarchaeology, which examines the physical dimension of impairment, the archaeological context and the mentality of the epoch in the (re)construction of the disability experience. There are different social responses to the disabled in societies in different cultures and periods of time. A response might vary from care and compassion through treating the disabled as productive members of a society to brutalisation and abuse or fear, social exclusion and inequality (Dettwyler 1991; Hawkey 1998; Roberts 1999; Hubert 2000; Tilley 2015; Boutin 2016)². One of the responses towards the disabled could have been fear and rejection in pre-industrial societies.

Previous archaeological research on the connection between disease and vampirism has been solely carried out using case studies of individuals buried in anti-vampire graves (Sledzik, Bellantoni 1994; Stanaszek 2007). As a result, we do not know whether people suspected of being vampires were sick with rare diseases in a particular society or with diseases that marked the skin and set the individual apart as an ‘other’ and whether that could impact the anti-vampire burial. We do not know from which diseases people buried in normative graves suffered from compared to those buried in anti-vampire graves. There are simply no population-based studies of anti-vampire graves and disease. This article revisits this problem and investigates whether the diseased and disabled could have been considered vampires using the data from the whole population. This is the first article that discusses the connection between disease, disability and vampirism in such an extensive way based on the historical and ethnographic descriptions of vampires and medical descriptions of diseases and archaeological and osteological findings. We extensively discuss the features of anti-vampire burials based on historical, ethnographic, and archaeological materials. Next, we investigate historical and ethnographic sources to see which diseases were caused by vampires in the past. We analyse data from 566 graves which contain 574 skeletons from early medieval (10th–13th century) Culmen in Poland using interdisciplinary quantitative (chi-square test) and qualitative analyses of graves and pathological lesions³. We observe

¹ There are two other models of disability: medical and social (Barnes, Mercer 2010). The medical model emphasizes that the disabled are dependent on others because of their physical or mental deficiency and their lack of full ability to participate in the culture of able-bodied people. The social model of disability underlines the fact that it is able-bodied people who create physical or social barriers (high stairs, social marginalisation) for people with disabilities, which do not allow them to fully participate in social life.

² Discussion on disability in archaeology – see Matczak *et al.* 2019, pp. 35–57.

³ This article presents full and updated results of interdisciplinary research. The preliminary results were published in Matczak *et al.* 2015, pp. 633–656.

pathological lesions on skeletons that were found in anti-vampire and normal graves and use a chi-square test to see if certain diseases could have had an impact on the burial of some of the people in anti-vampire graves. In this way, we also analyse perceptions of the diseased and disabled to see if they were marginalised in their societies because of their afflictions.

The history of the concept of the vampire

The term ‘vampire’ came from Serbia in the first half of the 17th century and was adopted in other European languages (Kolczyński 2003). Although the word ‘vampire’ is recent, the concept of a demon or the dead doing harm to the living is much older and comes from the second millennium BC (Petoia 1991). This concept originated in ancient Mesopotamia and then spread to Greece and from Greece to Rome. The archetypal vampire beings include Lilith (an Assyrian female demon), empusa, lamia, larvae, lemurs, and striga (Petoia 1991; Tsaliki 2008) who are mentioned by e.g. Horace in *Ars Poetica* and Philostratus in *Life of Apollonius of Tyana*. According to Pliny the Elder’s *Naturalis Historia*, larvae and lemurs were demons or people who broke social rules, died badly and came back from the underworld (Petoia 1991). A striga (Latin *strix*, *strigis*), on the other hand, was a demon that took the form of a tawny owl and sucked people’s blood and ate their organs according to, e.g. Petronius in *The Satyricon* (Moszyński 1967; Brückner 1980).

The belief in vampires continued and was strong in medieval Europe despite Christianisation. The change of burial customs from cremation to inhumation in the early Middle Ages strengthened the fear of vampires and contributed to a flourishing of beliefs in them. People did not practice anti-vampire burials from the 5th century BC to the beginning of the early Middle Ages in Europe because the cremation ritual, a characteristic feature of Roman times, guaranteed the spirit’s passing to the other world. People probably started using anti-vampire practices when inhumation was introduced in Christian times. The inhumation ritual, characteristic of Christianity, resulted in uncertainty about what would happen to the spirit of the dead person (Żydok 2004; Barber 2010). Therefore, the cultural change associated with a belief in the further existence of the spirit after death made the fear of dead people more intense and led to the use of practices that were aimed at protecting the living against the dead. Cremation was practiced on Polish lands during pre-Christian periods, called Roman influence period and Migration period, and even in the beginning of medieval times, though no anti-vampire graves were practiced. Inhumation was introduced in the Middle Ages, and this is also the time when anti-vampire burials appeared on Polish lands (Żydok 2004). Anti-vampire practices may have been ‘the result of the clash of native Slavic culture with Christian culture’ (Żydok 2004, p. 57).

Vampires are mentioned in numerous works, e.g. in *Historia Rerum Anglicarum* by William of Newburgh, in *De Nugis Curialium* by Walter Map (archdeacon of Oxford) and in *Danica Historia* by Saxo Grammaticus from the 12th century (Petoia 1991). Other citations come from Romania and the Slavic countries (Petoia 1991). However, early medieval texts from Poland do not mention vampires. Based on the linguistic and ethnographic analysis, researchers (Moszyński 1967; Brückner 1980; Gieysztor 2006) assume that the Slavs who inhabited the Polish lands in the Middle Ages called a vampire a striga (Polish *strzyga*). The striga lore was an element of old, pagan Slavic beliefs that were still vivid in the Christian Middle Ages. The Slavs believed that a striga was a person born with two souls and that a priest would only baptize one of the souls. After death, the baptised soul would leave and the unbaptised soul would stay on Earth, make the dead leave the grave and kill people and animals. Baptism as a sacrament was a powerful ritual that protected a person from becoming a vampire. Its absence – as seen in the case of a person's second soul – risked the person becoming a striga.

Despite Christianisation, vampire and striga lore, as a relic of pagan beliefs, remained strong among Slavs, Romanians and Hungarians (e.g. Łęga 1961; Petoia 1991). In the 18th and 19th centuries – a time of development in ethnography – many Polish ethnographers (e.g. Kolberg 1882) collected and recorded stories about demons, which significantly increased the number of textual accounts of vampire lore. The Slavic vampire – *wampir* – comes from the Old Slavic *wąpir*. This was a demon (Slavic *upiór*) or a dead person who could fly and suck people's blood (Brückner 1980). Texts mention that *strzyga* and *zmora* were kinds of demons (*upiór*) with features resembling those of a vampire (e.g. Kolberg 1874). For this reason, in this article we use *strzyga*, *zmora*, *upiór* and vampire interchangeably. Ethnographic sources mention more than 50 reasons for a person becoming a vampire, e.g. committing suicide, being an unbaptised child, being a mother who died shortly after childbirth, having a specific appearance (e.g. Kolberg 1882; Fischer 1921; see also Kolczyński 2003; Barber 2010). This high number shows the importance of belief in vampires and that the risk of becoming a vampire was very high. The European tradition of belief in vampires was so strong that it emigrated with Europeans in the 18th and 19th centuries to the part of the United States known as New England at that time (Sledzik, Bellantoni 1994; Barber 2010). As recently as the first half of the 20th century, people still employed elaborate anti-vampire burial practices in Central and Southeast Europe (e.g. Łęga 1961). As stated above, the perception of some people as vampires has *longue durée*. For this reason, archaeologists (e.g. Stanaszek 2007; 2016) use ethnographic texts to research vampires from the medieval period in Poland and we are following this path.

Anti-vampire burials in texts

Textual sources provide an extensive description of anti-vampire graves and activities that people undertook to neutralize 'vampire' after death. Historical and ethnographic texts from Poland indicate the features of anti-vampire burials that might be observable at archaeological sites (Table 1) (Chmielowski 1754; Kolberg 1882; 1884; 1886; 1888a; 1967a; 1967b; 1970; 1971; Fischer 1921; Hilferding 1965; Moszyński 1967; see also Brückner 1980; Gieysztor 2006; Wyrwa 2008; Barber 2010). Cutting off a body part, especially the head, and placing it between the legs was meant to prevent the dead from finding the head and other body parts and coming back to the community (Chmielowski 1754; Kolberg 1882; 1884; 1886; 1888a; 1967a; 1970; 1971; Fischer 1921; Hilferding 1965; Moszyński 1967). Placing stones directly on the body was aimed at keeping the dead in the grave (e.g., Fischer 1921). Setting a body face down was meant to allow the dead to bite the earth and to prevent the deceased from escaping from the grave (e.g. Kolberg 1882; Fischer 1921). The lack of anatomical arrangement of the bones might indicate the cutting off of body parts (especially the head) or that the grave had been opened after the soft tissues had decayed and the bones had been relocated (especially the skull) to prevent the dead from collecting their body parts and rising from a grave (e.g. Kolberg 1886; 1888a; Fischer 1921). Hands and feet were tied to prevent the dead from digging an exit from the grave. Coins were to ensure the safe transfer of the dead to the underworld (e.g. Kolberg 1882; Moszyński 1967) by paying to the God of Hell for entrance and to ensure buying of a plot of land there. People put sickles on the deceased's body, especially on the throat, because they thought that when the dead tried to get up, a sickle would slit the dead vampire's throat and kill it once and for all (e.g. Kolberg 1882; Moszyński 1967). Burning was meant to destroy the body of the dead. When a vampire was suspected of causing a plague, the most radical way to get rid of it was to kill the live person who was suspected of being this demon (Kolczyński 2003). Some people suspected of being a vampire were burnt alive at stake, e.g. at the beginning of the 18th century in the Samborska region in present-day Ukraine, close to the border with Poland (Kolczyński 2003). Stabbing the skull was also aimed at killing a vampire. Saint Benedict was a patron of a 'good death', which happened when people reconciled themselves and took sacraments before death (Wyrwa 2008). Putting a medallion with an image of Saint Benedict to a grave was to ensure that the dead would not come back to life because they had to reconcile themselves and take sacraments. Those features are the most interesting for archaeologists because they might be identified at cemeteries (Table 1).

Other features of anti-vampire graves from texts are more challenging to identify in the archaeological record (Wyrwa 2008). A feature like burying the dead outside of a cemetery (in bogs, forests, on crossroads) is hard to identify because such graves are placed outside of archaeological sites. Injuring heels and tendons is

Table 1. Features of anti-vampire burials identified in historical and ethnographic sources and in the archaeological record in Poland

Features of anti-vampire burials	Features identified in historical and ethnographic sources from Poland that might be observable at archaeological sites		Features identified in the archaeological record in Poland	
	Presence	References	Presence	References
Atypical orientation of a grave			x	Żydok 2004
Grave placed outside of a cemetery	x	Kolberg 1888a; Moszyński 1967	x	Żydok 2004
Grave placed far away from others within a cemetery			x	Żydok 2004
Bonfire above a grave			x	Żydok 2004
Deep burial pit			x	Żydok 2004
No grave goods			x	Żydok 2004
Reopening of a grave	x	Kolberg 1886; 1970; Hilferding 1965	x	Żydok 2004; Sikorski 2008
Putting stones on or into a grave or the body of the deceased	x	Fischer 1921; Moszyński 1967	x	Żydok 2004; Sikorski 2008; Betsinger, Scott 2014; Gregoricka <i>et al.</i> , 2014
Sickles on the body	x	Kolberg 1882; Moszyński 1967	x	Betsinger, Scott 2014; Gregoricka <i>et al.</i> , 2014
Knives, arrowheads and other sharp tools between or near bones of a skeleton			x	Żydok 2004
Stone tile, brick floor slab under or in the jaw			x	Wyrwa 2008
Stone in the jaw	x	Moszyński 1967		
Brick in a coffin	x	Fischer 1921		
A clod of clay between jaws			x	Żydok 2004
Flint in the jaw	x	Kolberg 1874; 1886		
Coins	x	Kolberg 1882; Moszyński 1967	x	Żydok 2004; Wyrwa 2008
Rosary and/or medallion of Saint Benedict in the grave	x	Wyrwa 2008	x	Wyrwa 2008
Charm			x	Wyrwa 2008
Prone position of the body	x	Kolberg 1882; 1874; 1888a; 1970; Fischer 1921; Moszyński 1967	x	Żydok 2004; Wyrwa 2008
Skeleton set on its side or in a huddled position			x	Żydok 2004; Sikorski 2008
Tied upper or/and lower limbs or/and the rest of the body	x	Kolberg 1884; Fischer 1921; Moszyński 1967	x	Żydok 2004
Decapitation	x	Chmielowski 1754; Kolberg 1884; 1886; 1888a; 1970; Fischer 1921; Hilferding 1965; Moszyński 1967	x	Żydok 2004
Skull outside the anatomical order	x	Chmielowski 1754; Kolberg 1882; 1884; 1886; 1888a; 1967a; 1970; 1971; Fischer 1921; Hilferding 1965; Moszyński 1967	x	Żydok 2004; Sikorski 2008

Table 1 (continued)

Features of anti-vampire burials	Features identified in historical and ethnographic sources from Poland that might be observable at archaeological sites		Features identified in the archaeological record in Poland	
	Presence	References	Presence	References
Disarticulated bones			x	Sikorski 2008
Dismemberment of the body	x	Kolberg 1888a	x	Żydok 2004; Wyrwa 2008
Broken jaw			x	Żydok 2004
Open and clogged jaw			x	Żydok 2004
Burnt skeleton	x	Chmielowski 1754; Kolberg 1970	x	Żydok 2004; Sikorski 2008
Stabbed skull	x	Wyrwa 2008	x	Żydok 2004
Stabbing the body by the stake, stakes between or near bones of a skeleton	x	Kolberg 1884; 1888a; Fischer 1921; Moszyński 1967	x	Żydok 2004
Stabbing the body by iron nails, iron nails nearby knees or in a skull	x	Moszyński 1967	x	Żydok 2004
Cut off or broken limbs	x	Chmielowski 1754	x	Żydok 2004

not observable because of the decay of soft tissues. The features that involve using organic materials, e.g., cultivating thorn bushes on and throwing poppy seeds (a symbol of sleep and death) in the grave of a ‘vampire’ (Fischer 1921; Moszyński 1967; Barber 2010), also cannot be observed in the archaeological record because of decay of organic material.

Anti-vampire burials in archaeological record

Anti-vampire graves are also called ‘atypical’, ‘deviant’, ‘unusual’ or ‘irregular’ (Geake 1992; Żydok 2004; Reynolds 2009; Millela *et al.* 2015). In Central and Southeast Europe, several hundred so-called anti-vampire burials are known from early medieval to modern times, at places such as Kałdus (Poland), Sozopol and Perperikon (Bulgaria), Taxiaris Myrintzou, Lesbos (Greece; Tsaliki 2008), Serbia, the Czech Republic, Romania and on Nuovo Lazzaretto island (Italy; Nuzzo, Borrini 2010). Archaeologists also discovered anti-vampire burials in Walton Cemetery in Griswold, Connecticut, USA (Sledzik, Bellantoni 1994). There are more than 50 anti-vampire burials in Poland that were found e.g. in Adolfin, Brześć Kujawski, Buczek, Cedynia, Dębczyno, Drawsko, Gruczno, Gwiazdowo, Iwno, Kałdus, Legnica-Zamek, Łekno, Milicz, Niemcza, Poznań Rynek Śródecki, Radom, Sandomierz, Stary Brześć Kujawski, Stary Zamek, Strzykocin, Tarnowo Pałuckie, Wolin-Młynówka and Złota Pińczowska (e.g. Chmielowski 1950; Miśkiewicz 1969; Stanaszek 1999; 2007; Żydok 2004; Sikorski 2008; Wyrwa 2008; Betsinger, Scott 2014).

Przemysław Żydok suggests first defining what typical burial customs are in a particular society; and second, defining what an atypical burial is and considering it as anti-vampire (Żydok 2004; see also Reynolds 2009; Betsinger, Scott 2014). The features of anti-vampire graves in Poland that have been proposed in archaeology are presented in Table 1 (Chmielewski 1950; Miśkiewicz 1969; Stanaszek 1999; 2007; Żydok 2004; Sikorski 2008; Wyrwa 2008; Betsinger, Scott 2014). Disarticulated bones are a distinctive feature of anti-vampire burials in Europe and the USA (Sledzik, Bellantoni 1994).

We estimate the most and least distinctive features based on textual sources and the archaeological record from Poland. The most distinctive features of anti-vampire burials in Poland are those present in textual sources and the archaeological record. Table 1 shows which unique features of anti-vampire burials that are mentioned in Polish textual sources are used to identify anti-vampire graves in the archaeological record from Poland (e.g. Miśkiewicz 1969; Stanaszek 1999; 2007; Żydok 2004; Wyrwa 2008; Betsinger, Scott 2014).

Ethnographic and historical texts do not mention several distinctive features archaeologists use to identify anti-vampire graves in Poland (Table 1) (Chmielewski 1950; Miśkiewicz 1969; Żydok 2004; Wyrwa 2008). For example, P. Żydok categorised a grave placed far away from others within a cemetery as a distinctive feature of an anti-vampire grave (Żydok 2004). Some texts, however, mention that an anti-vampire grave should be placed outside of a cemetery. Of the features, the S–N orientation of the grave and the body on its side are the most frequently used in the archaeological record (Żydok 2004). However, these should be the least distinctive features of anti-vampire graves in the archaeological record, if any.

We argue that the features of anti-vampire graves that are mentioned in textual materials should be used by archaeologists to identify such burials. However, even such features as a coin, a stabbed body and decapitation might indicate other funeral practices. Placing a coin between the jaws is frequently visible in the archaeological record from the Middle Ages to the 20th century in Poland. A coin in a grave is interpreted as a tribute to pay for a transfer to the underworld and life after death (Suchodolski 1998; Wyrwa 2008), a devotional item or a substitute for all the possessions of the dead individual (Miechowicz 2011). The features of anti-vampire graves that are not mentioned in textual materials might indicate funeral practices other than anti-vampire (Żydok 2004; Matczak 2014; Matczak *et al.*, 2015). Let us now take a closer look at who was buried in anti-vampire graves.

Previous investigations

Researchers have reported many conditions identified on skeletons from anti-vampire graves from different periods and locations. For example, an adult male suffered from spondylitis and facial trauma while another adult male had a cranial trauma in the 9th–8th century BC in Capo Colonna, Italy (Tsaliki 2008). It is interpreted that people feared them and wanted to stop them from rising from the grave.

Ten individuals buried in 11th–13th century Wharram Percy display evidence associated with burning and mutilation, which might indicate the burial of revenants (Mays *et al.* 2017). Those individuals had a degenerative joint disease, periostitis, and in one case Paget's disease, which did not impact the method of burial. Simon Mays *et al.*, report that they identified *cribra orbitalia* and *porotic hyperostosis*, which might be considered as a lesion caused by anaemia, on the bones of individuals who were probably mutilated or partially burnt at Wharram Percy (Mays *et al.* 2017). However, authors argue that *cribra orbitalia* and *porotic hyperostosis* are seen more often on skeletons from normative graves so anaemia was not a cause of being suspected as a vampire in Wharram Percy.

Łukasz M. Stanaszek distinguishes types of pathological lesions that may have significantly affected the way people were perceived in the early Middle Ages in Poland (Stanaszek 2007; 2016); these are: injuries, in vivo trepanations, specific and non-specific infectious diseases (poliomyelitis, tuberculosis, leprosy, syphilis, periosteal reactions and osteomyelitis), degenerative lesions of joints, systemic diseases/conditions (rickets, anaemia), developmental conditions (e.g. hip dysplasia) and masticatory diseases. Łukasz M. Stanaszek reports five cases of individuals from anti-vampire graves who had pathological lesions from medieval Poland (Stanaszek 2007). First, the skeleton of the male buried in an anti-vampire grave 24/57 at Culmen (10th–13th century) had scoliosis and lameness resulting from breaking his tibia. An individual who was buried in an anti-vampire grave at Złota Pińczowska had osteophytes, two joined thoracic vertebrae, thoracic kyphosis and scoliosis. An individual buried in an anti-vampire grave at Legnica Zamek had eight vertebrae from thoracic and lumbar sections fused together, which created a gibbous. An individual from Wolin-Młynówka had achondroplasia and was 133 cm in height⁴. Another individual from the 14th century in Stary Brześć Kujawski had abnormally positioned premolars. According to Maria Miśkiewicz, the disabled were buried in prone position – an indicator of an anti-vampire burial (Miśkiewicz 2010). However, the author does not provide any archaeological evidence for her statement. On the other hand, research from the Polish site Drawsko 1 from the 17th–18th century has

⁴ Describing this case of an individual with dwarfism from grave 16/31 in Wolin-Młynówka, Łukasz M. Stanaszek (2007) refers to Franciszek Wokroj (1967). However, F. Wokroj does not describe such an individual and a grave (Wykroj 1967).

not revealed a statistical dependence between pathological lesions and anti-vampire burials (Gregoricka *et al.* 2014).

The skeleton of a 60-year-old at death male who was buried in a cist grave with three spikes (possibly an anti-vampire grave) at Taxirahis Myrintzou on Lesbos Island in the 18th–19th century AD displayed the following lesions: frontal sinusitis with a large cloaca formation to the right of the nasion, which resulted in the asymmetry of the supraorbital ridges. The skeleton has nasal, mandibular and maxillary deformities caused by paralysis due to neurological problems of the facial and trigeminal nerves or biomechanical adaptation of the maxilla during occlusion and mastication. The skeleton displays a healed linear fracture over the left eye orbit. Anastasia Tsaliki suggests that deformities might have been a reason for burying this individual in an anti-vampire grave (Tsaliki 2008).

Paul S. Sledzik and Nicholas Bellantoni argue that those with tuberculosis were regarded as vampires in the 19th century in Griswold in New England (nowadays part of the USA) (Sledzik, Bellantoni 1994). The researchers investigated the skeleton of a 50–55-year-old male with signs of pulmonary tuberculosis on the ribs. The skeleton was disarticulated in a grave after decomposition was complete, which was one of a vampire's burial features. The reason for this is that the sick could have contaminated family members with the disease (Sledzik, Bellantoni 1994). After the relative's death, the family member could have displayed the symptoms of tuberculosis and eventually died. People could have interpreted this as vampirical behaviour, reopened the grave, observed the features of 'vampire appearance' and employed anti-vampire practices to stop the disruptive actions. Visible blood expelling from the mouth as a sign of a disease and sudden and unexpected deaths made the belief in vampirism stronger (Barber 2010).

David Dolphin suggested that people perceived as vampires could have been sick with porphyria because in his opinion the symptoms of the disease fit well with the appearance of a vampire: avoidance of sunlight and drinking blood (Dolphin 1985). However, he has not provided any evidence from historical or ethnographic texts that this was the case, and that drinking blood alleviates the symptoms of porphyria (Cox 1995; Barber 2010). Let us now take a closer look at the vampire's appearance and who was buried in anti-vampire graves.

The vampire's appearance in Slavic beliefs

The appearance of alive and dead people who become vampires is a key to understanding just who were regarded as demons. According to Slavic beliefs in the 19th century, the features of people who become vampires include: a big head, big eyes or one eye, no nose, and a lack of or joined eyebrows. Teeth were also a significant feature especially having two rows of teeth, canines pushed forward too much,

or being born with teeth. Other unusual features included harelip, thin skin on the face, a livid and swollen face, ginger hair, hairy palms, lack of hair under the armpits, more than 20 fingers in total, and a tail (Baranowski 1965; Moszyński 1967; Stanaszek 1999; 2007; Kolczyński 2003; Barber 2010).

The skin colour of a person was a significant indicator for recognising who becomes a vampire after death in Poland. A person who became *upiór* after death was pale when alive (Chmielowski 1754). Female *strzyga* and male *strzygoń* also had pale faces when they were alive (Kolberg 1874). Additionally, females were tall, cadaverous, and had long dishevelled hair (Kolberg 1888b). Children of *strzygoń* resembled the parent's appearance and were pale, peaky, skinny, and additionally, they died young (Kolberg 1874). They mugged and suckled blood from sleeping people who died as a result (Kolberg 1884). *Zmora* was a female who was a maiden or married woman or a male or female who was someone's lover. A female *zmora* also was pale, skinny, and tall.

Additionally, she had puffy and collapsed eyes, bold and grey-blue lips, and a floppy lower lip (Kolberg 1874; 1967a). Villagers also believed that *upiór* was red in the face when it was alive (Kolberg 1884). This belief was so strong that people used the proverb 'as red as *upiór*' to name others who were ruddy (Kolberg 1882; 1884, p. 94; Moszyński 1967). When people thought that a striga or vampire had left the grave, they reopened it to observe the characteristic features: red face, red lips, red fingernails, a well-preserved and fresh body, and blood flowing from the mouth (Kolberg 1884; 1888b; Moszyński 1967; Brückner 1980). Ethnographers (Kolberg 1882; 1884; Moszyński 1967) noted that those who were very pale when alive and who became red in the face after death aroused the interest of villagers to whom this facial colour change was an extraordinary phenomenon. Slavs explained this to themselves with the notion that if blood was as an essential element of life and vitality, demons and the dead also needed it because of their ailment. For this reason, demons were suckling blood from sleeping people and, as a result, their faces were red (Moszyński 1967).

Paul Barber argues that descriptions of a vampire after death in historical texts resembles features of the dead body's decomposition (Barber 2010). After digging up the grave of a vampire, villagers observed vastly bloated corpses which lacked rigor mortis and if punctured lost air and bled and whose eyes were open (Barber 2010; compare with Chmielowski 1754; Kolberg 1882; 1884, 1888a; 1970; Hilferding 1965). Villagers associated those features of the dead body's dissolution with a vampire's appearance. Thus, the appearance of a vampire after death originated in a lack of scientific understanding of the dead body's decay. However, this concept does not fully answer the question of why people who were pale were considered vampires when they were alive. There must have been a reason to suspect someone of being a vampire and digging up the dead body; and this reason was disease.

Diseases, disabilities and vampires

According to Horace and Philostratus, Lilith, empusa and lamia were doing harm to the living by, for example, causing diseases and the death of people, especially children, during hot days (Petoia 1991). According to Slavic beliefs, *upiór* and *strzygoń* were the cruellest demons of all because they caused diseases, especially epidemic or plagues and the deaths of animals and people (Chmielowski 1754; Moszyński 1967; Kolczyński 2003; Barber 2010). When several people got sick and then died one after another in a single family, people suspected the first dead person of being a vampire who caused the death of the others (Moszyński 1967). As a result, the others were victims of a vampire who was their relative.

Ethnographic texts indicate that Slavs believed that healthy new-born children were taken by demons who turned them into disabled children or that a disabled child was born from a woman who had intercourse with *upiór* (Moszyński 1967; Kolczyński 2003). Such a child could not walk, was miserable, pale or grey-blue, and had long and thin hands and a big head. They often died before the age of seven and even if they survived until age 21, they did not grow but remained the size of a child. *Zmora* intruded on someone who they did not like during the night and sucked blood from and choked this person (Kolberg 1884). As a result, the person became weakened, motionless and could not wake up because they were in a deep daze, were moaning and growling until *zmora* left (Kolberg 1874). They felt an enormous weight on their chests, which made breathing difficult, were sweating, and could not scream (Łęga 1961). When they awakened, they were disordered and unable to work. If *zmora* intruded often, the victim's appearance would start to resemble *zmora's* appearance in terms of paleness, weakness, being thin and miserable. Those features became so characteristic of *zmora* that when people saw someone with such features, they called them 'as pale as *zmora*' (Kolberg 1874, p. 74; 1967a, p. 478). People attacked by *zmora* would have those features despite eating and drinking a lot (Kolberg 1884). Blood suckling caused dyspnoea and eventually death; after that, victims became *upiór* themselves (Moszyński 1967).

Ethnographers have suggested that beliefs in vampires explained a physiological condition associated with problems with blood circulation, breathing and restless sleep in Poland (Łęga 1961; Moszyński 1967). Bohdan Baranowski (1965) mentions that a male with heart disease who was grey-blue in the face and had irregular, laboured breathing was considered to be a vampire in a village in Poland. Bohdan Baranowski (1965) also describes the case of a girl who had tuberculosis, which was diagnosed by a doctor in a Polish village. The mother of the girl did not believe in the doctor's diagnosis and thought that the condition of her daughter was a result of blood being sucked from her by her mother-in-law, who had passed away recently. Tuberculosis is infectious and develops in 30% to 50% of those who have extended, close, indoor contact with people who have the active disease. The likelihood of

transmission from one person to another depends on the infectiousness of a person with infectious tuberculosis, the length of exposure to an infectious person, the surrounding environment, and the functioning of an exposed person's immune system (*Tuberculosis* 2001). The symptoms of tuberculosis include coughing, sputum, haemoptysis, headache, chest pain, backache (in the case of spinal tuberculosis), weakness or fatigue, listlessness, malaise, fever, sweating, loss of appetite, nausea, weight loss, dyspnoea, paleness, erythema nodosum, conjunctivitis and photophobia (in case of tuberculous meningitis) (*Tuberculosis* 2001; Longmore *et al.* 2004; Heemskerk *et al.* 2015; Auguste *et al.* 2016). Vaccination and multi-drug therapy which developed in the 20th century, helped to decrease morbidity. However, when those did not exist, tuberculosis was a common cause of death. Symptoms of tuberculosis such as weakness or fatigue, malaise, paleness, chest pain, sweating and dyspnoea are similar to the features of people regarded as vampires described in historical and ethnographic sources (Chmielowski 1754; Kolberg 1874; Łęga 1961; Moszyński 1967).

Łukasz M. Stanaszek cites texts from the 18th–20th century that mention paleness indicating anaemia as a possible reason for perceiving someone as a vampire (Stanaszek 2016). Anaemia can manifest itself as pale skin, mucous membranes and conjunctiva, weakness, fatigue, tenderness, reduced exercise tolerance, headaches and sleep disorders (Aufderheide, Rodríguez-Martín 2006; Zahorska-Markiewicz, Małecka-Tendera 2009; Roberts, Manchester 2010), worsening of memory, apathy, depression, a cold sensation, and constipation (Kotschy 2009). Lack of adequate red blood cells causes the heart to work harder to deliver oxygen, which can lead to arrhythmias, including tachycardia, functional systolic murmur, cardiac hypertrophy, and even congestive heart failure, which is usually a cause of death if untreated (Pegelow *et al.* 1977; Brittemham 2000). The following can also appear, dyspnoea, enlarged spleen, hypokalaemia, upper respiratory tract infections, seizures, nasal bleeding, vomiting with blood, skin infections, adenopathy, weight loss and anorexia. In advanced form, anaemia leads to the inability to work (Brittemham 2000). It should be noted that the symptoms of anaemia and their severity vary widely and depend on the rate of development of anaemia, the age of a person, and cardiovascular conditions (Schnall *et al.* 2000). In some cases, especially early in development, which can even last a few years, the disease can be asymptomatic. Sometimes, even in severe cases, the patient does not exhibit symptoms (Schnall *et al.* 2000). Paleness, weakness, problems with breathing and weight loss are in line with those associated with vampires as described in ethnographic and historical texts (Chmielowski 1754; Kolberg 1874; Łęga 1961; Moszyński 1967).

Ethnographers have suggested that other diseases may have had a negative impact on people's perceptions, including mental illness, lethargy, cataleptic trance, humps, dwarfism, gigantism, macrocephaly or hypertension (Baranowski 1965; Moszyński 1967; Kolczyński 2003; Barber 2010). Łukasz M. Stanaszek cites texts

that mention dental abnormalities (e.g., teeth pushed backward too much), which might have been linked to vampirism (Stanaszek 2016). In the following sections, we investigate the above-mentioned diseases and conditions that could be associated with vampirism based on materials from medieval Kałdus.

Early medieval Culmen

To investigate the problem if the diseased and disabled were buried in anti-vampire graves, we selected materials from sites 1, 2 and 4 in Kałdus in Poland. Kałdus is identified as early medieval Chełmno – Culmen in Latin (Chudziak 2003; *Wczesnośredniowieczne cmantarzysko* 2006; 2010). Located in the western part of Chełmno Land within Gdańsk Pomerania, which is part of the West Slavic lands, Culmen was situated on the edge of a moraine upland and the lower valley of the Vistula River, at the very intersection of two main routes leading from Ruthenia and the Polish interior towards the Baltic Sea. The whole settlement complex at Culmen was used between the second half of the 7th century and the first quarter of the 13th century (Chudziak 2003). Initially, Culmen was beyond the borders of the Piast state (Fig. 1), then it became *sedes regni principales*, i.e., one of many capitals of Poland, and in the 12th and 13th centuries, it served as a castellany. At the beginning of the 13th century, the stronghold in Culmen belonged to prince Konrad I of Masovia, who gave it to the Teutonic Knights, who then burned the stronghold and changed the location of Culmen (Chudziak 2003).

The settlement complex at Culmen covered 14–16 hectares. Culmen consisted of a stronghold (site 3), extensive settlements (site 2) and one of the biggest cemeteries in this part of Europe with more than 1,000 burials (sites 1, 2, and 4; Fig. 2). The cemetery was used from the fourth quarter of the 10th century until the first quarter of the 13th century (*Wczesnośredniowieczne cmantarzysko* 2006; 2010). The cemetery was probably composed of several sepulchral fields that covered an area of several hectares (*Wczesnośredniowieczne cmantarzysko* 2010). The oldest field was used during the first stage of Christianisation, which resulted in the E–W orientation of the graves.

The materials from Kałdus were chosen for this study for three reasons. First, the cemetery was fully excavated. Archaeological recovery started in the 19th century and continued until World War II. Then archaeologists conducted rescue excavations in 1957. Large-scale excavations were performed between 1997 and 2011 by an interdisciplinary team led by Wojciech Chudziak from the Institute of Archaeology at the Nicolaus Copernicus University in Toruń (*Wczesnośredniowieczne cmantarzysko* 2006; 2010). Second, during the second half of the 20th century and in the 21st century, excavations were performed using state-of-the-art tools, which allowed for the creation of detailed documentation. Third, the cemetery is one of

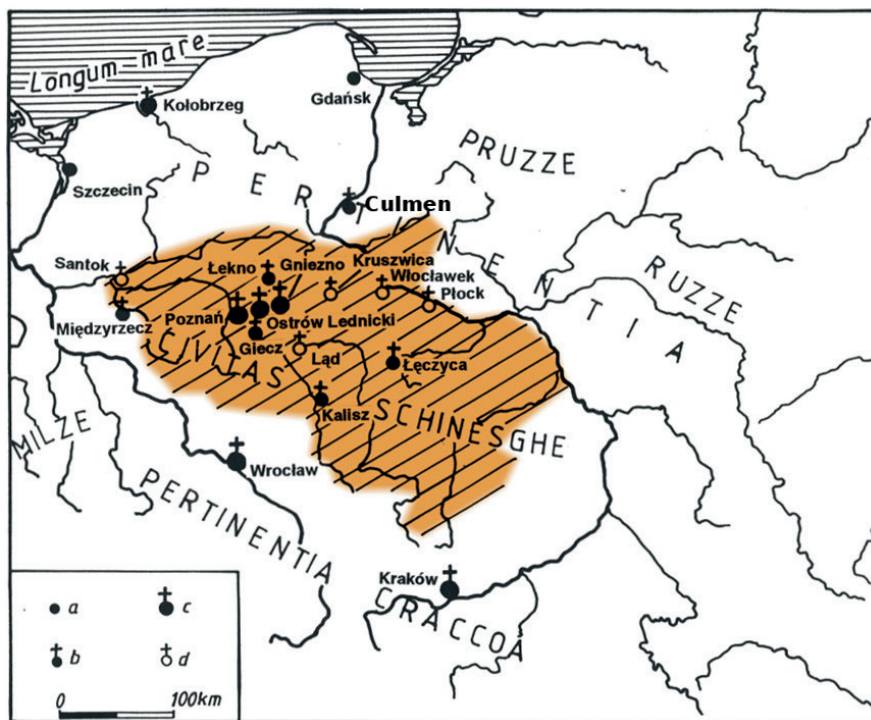


Fig. 1. The borders of the Gniezno state (Civitas Schinesghe) at the turn of the first and the second millennia AD. Legend: a – main strongholds, b – sacral buildings, c – sacral buildings in the main strongholds, d – supposed sacral buildings (after Chudziak 2003)

the largest in this part of Europe. In total, around 1,000 graves were excavated. We selected 574 skeletons from 566 graves that were excavated in 1957 and 1997–2011 for our analysis. The skeletons are curated in the Faculty of Biological and Veterinary Sciences at the Nicolaus Copernicus University. We chose graves for which we have a well-preserved, relatively complete skeleton along with information on body position. Overall, 13.7% (N=79) of the skeletons were complete; 86.3% (N=495) were incomplete. Nearly half of the skeletons were well-preserved (N=254; 44.2%) with 320 (55.8%) less well-preserved. Unavailable for study were materials that had been excavated in the 19th century and destroyed during the World Wars. Additionally, the skeletons from 117 graves excavated in the 20th century had decayed or were too fragile for study.

The osteological analysis was conducted by Tomasz Kozłowski (2012). The biological sex of the individuals was determined on the basis of skull and pelvis morphology using the scale after György Acsádi and János Nemeskéri (1970) and Tim D. White and Pieter A. Folkens (2005). Adults' age at death was estimated

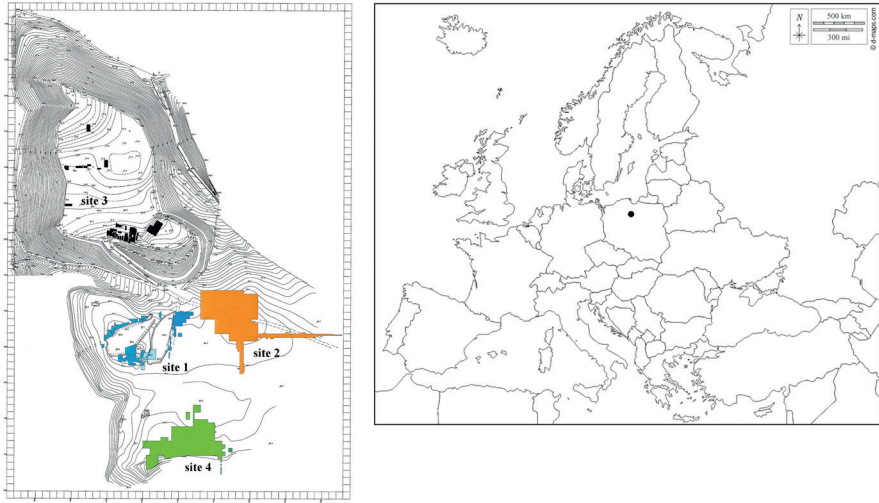


Fig. 2. The location of remains of medieval Culmen at archaeological sites in Kaldus, Poland. The left inset depicts the location and height plan of the settlement complex with trenches marked within particular archaeological sites (exploration in 1957, 1996–2009) (after Bojarski 2003; Kozłowski 2012). The right inset depicts the location of Kaldus in Poland (www.d-maps.com)

based on the pubic symphyseal surface according to Sheilagh Brooks and Judy M. Suchey (1990), facies auricularis of the pelvis according to the scale of Jane E. Buikstra and Douglas H. Ubelaker (1994), the fusion of cranial sutures after the Data Collection Codebook (Steckel *et al.* 2006), dental attrition after Owen Lovejoy (1985), and the sternal rib end (Krogman, İşcan 1986; Bass 1987). Age of subadults was additionally estimated based on ossification of long bones, pelvis, and vertebrae (Buikstra, Ubelaker 1994). Age at death of children was estimated based on dental development stage of deciduous and permanent teeth and tooth buds (Ubelaker 1989), long bone lengths of limbs, and size of pelvis and scapula (Florkowski, Kozłowski 1994). Osteological analysis was done using the Data Collection Codebook (Steckel *et al.* 2006). We use the chi-square test to determine whether or not certain diseases and disabilities were more common in anti-vampire graves than one would expect by chance.

Anti-vampire burials at Culmen

The Culmen bodies had been interred supine, with straight upper limbs along bodies or positioned on the femora, the os coxae or under the os coxae (Stawska 2006a; Stawska *et al.* 2010). The graves were orientated mainly W–E and E–W,

(N=541; 96.4%). Grave goods, mainly coins, temple rings, beads, knives and rings, were associated with 305 skeletons, constituting 53.1% of the total sample.

Eight graves: 24/57, 26/00, 48/00, 131/00/01, 164/01, 256/01, 358/02 and 383/03 from medieval Culmen were already identified as anti-vampire based on the distinctive features described in Table 2 (e.g. Stanaszek 1999; 2007; Bojarski 2003; Żydok 2004; Stawska 2006a; Janowski, Kurasiński 2010; Koperkiewicz 2010; Stawska *et al.* 2010; Kozłowski 2012; Gardęła, Kajkowski 2013; Bojarski 2020)⁵. Further research allowed the selection of seven more anti-vampire burials, 14 in total, which include 16 skeletons (Table 2) (Matczak 2014). Graves 32/57 and 256/01 are double. In the case of grave 32/57, only the male had undergone anti-vampire practices. In the case of anti-vampire grave 358/02, the skeleton has not been sufficiently well preserved to carry out osteological analyses. As a result, we selected 13 anti-vampire burials and 14 skeletons for our research. Anti-vampire burials have been identified at sites 1 and 4 and are dated from the fourth quarter of the 10th century to the first half of the 13th century.

The four distinctive features of so-called anti-vampire burials: significant changes in the location of the skull (skull outside the anatomical order; N=6); skeleton in a prone position (N=5); decapitation (N=2); and stones placed directly on the body (N=2) are most applicable to the materials from medieval Culmen (Table 2) (Matczak 2014; Matczak *et al.* 2015). They are mentioned in textual sources and are frequently encountered in anti-vampire burials in Poland. Ethnographic texts indicate that any of the above-mentioned features could have been used alone for the creation of an anti-vampire burial from the 18th to the 20th century in Poland (e.g. Łęga 1961). Since the vampire and anti-vampire burial tradition is deep in Poland, such distinctive features could have been used to create an anti-vampire burial in medieval times. The lack of a normal skeletal anatomical arrangement was noted in six graves from medieval Culmen: 112/99, 116/99, 122/99, 130/99, 133/99, and 134/99 (Chudziak *et al.* 2006; Stawska 2006b; Bojarski 2020). In two cases (graves 112/99, 116/99), the skull lay perpendicular to the skeleton (Fig. 3). In another two cases (graves 122/99, 133/99), the skull lay near the humeri. In grave 134/99 the skull was placed on the os coxae, and in grave 130/99 it was not found at all. In five examples, the deceased was interred in a prone position (24/57, 26/00, 131/01, 383/03, 358/02; Stawska 2006b; Bojarski *et al.* 2010; 2020). In grave 48/00, a stone block of sandstone was found in the central part of the pit (Bojarski *et al.* 2010; Bojarski 2020). In grave 32/57, a flat stone was placed on the os coxae of skeleton B (Stawska 2006b). The double burial in 256/01 included the decapitated

⁵ Jacek Bojarski (2020) published a monography, which analysed in detail the layout of atypical burials at the Kaldus cemeteries and addressed the problem of its interpretation in terms of anti-vampire practices, after this article was submitted for publication.

Table 2. The catalogue of anti-vampire burials from medieval Culmen

No.	Grave number	Grave orientation	Anti-vampire distinctive features	Grave goods	Number of skeletons, sex and age	Pathological lesions	Preservation and completeness of skeletons	References
1	24/57; site 1	SEE–NWW	skeleton in a prone position	none found	1: male, 45–55	the inflammatory reaction of the periosteum: probably resulted from a healed fracture of the right tibia; fracture of the tibia and fibula: healing of the diagonally broken tibia and fibula with dislocation of bone fragments and deformation of the bone axis; degenerative changes: osteophyte formation on the thoracic spine, extensive osteophyte formation on the lumbar spine	bones well-preserved, complete skeleton	Stawska 2006b; Kozłowski 2012; this research
2	32/57; site 1	E–W	A: in the position on the left side from the skull to the thoracic part of the spine, the rest of the spine, os coxae and bones of the lower limbs in the supine position, B: on the right side, a flat stone is on the os coxae	B: a ceramic spindle whorl at the os coxae of the male skeleton	2: A: female, 30–40; B: male, 35–45	A: depressed fracture of the external surface of the squama of the frontal bone, healed; B: degenerative changes: osteophyte formation on the cervical spine	bones well-preserved, complete skeleton	Stawska 2006b; Kozłowski 2012
3	112/99; site 1	N–S	in the supine position; skull outside the anatomical order: the skull laid out perpendicularly to the skeleton	none found	1: ?, 5–9	not identified	bones not well-preserved, not complete skeleton: a skull with mandible, parts of os coxae and diaphysis of long bones were only unearthed	Chudziak <i>et al.</i> , 2006
4	116/99; site 1	W–E	in the supine position; skull outside the anatomical order: the skull laid out perpendicularly to the skeleton	none found	1: ?, 4–8	scurvy	bones not well-preserved, not complete skeleton: lack of ribs, humeri, ulnae, radii, and bones of hands and feet	this research

Table 2 (continued)

No.	Grave number	Grave orientation	Anti-vampire distinctive features	Grave goods	Number of skeletons, sex and age	Pathological lesions	Preservation and completeness of skeletons	References
5	122/99; site 1	W-E	in the supine position; skull outside the anatomical order; the skull laid out crosswise to the skeleton's axis, at the height of the humerus	iron knife	1: female, 30-40	cancer and tumour-like lesions (multiple myeloma); the inflammatory reaction of the periosteum of multiple bones; fracture of the long bone; degenerative changes: osteophyte formation on the thoracic vertebra; teeth root abscess	bones not well-preserved, not complete skeleton: lack of mandible, part of ribs, vertebrae, left ulna and radius, part of bones of hands and feet	Chudziak <i>et al.</i> , 2006; Kozłowski 2012; this research
6	130/99; site 1	W-E	in the supine position; lack of the skull, the rest of the skeleton without anatomical order with an exception to bones of lower limbs	brown buckle	1: male, 25-55	fracture of the ulna bone	bones well-preserved, not complete skeleton: lack of the skull, mandible, ribs, right humerus, ulna, and radius, and left ulna, and radius	Chudziak <i>et al.</i> , 2006; Kozłowski 2012
7	133/99; site 1	W-E	in the supine position; skull outside the anatomical order and disarticulated bones: the skull near the humerus, mandible between left humerus and os coxae	none found	1: male, 40-50	not identified	bones not well-preserved, not complete skeleton: lack of ribs, thoracic and lumbar vertebrae, left ulna and radius, bones of hands and partially feet	Chudziak <i>et al.</i> , 2006
8	134/99; site 1	W-E	in the supine position; skull outside the anatomical order; the skull in the place of the os coxae	none found	1: ? 30-40	<i>porotic hyperostosis</i> (anaemia)	bones well-preserved, not complete skeleton: part of the skull and bones of lower limbs were only unearthed	Chudziak <i>et al.</i> , 2006; this research
9	26/00; site 4	W-E	skeleton in a prone position	a piece of an iron knife	1: female, 50-60	degenerative changes: osteophyte formation on vertebrae of all the spine sections	bones well-preserved, not complete skeleton: lack of ribs, tibiae, fibulae and bones of feet	Bojarski <i>et al.</i> , 2010; Kozłowski 2012

Table 2 (continued)

No.	Grave number	Grave orientation	Anti-vampire distinctive features	Grave goods	Number of skeletons, sex and age	Pathological lesions	Preservation and completeness of skeletons	References
10	48/00; site 4	NW–SE	the skeleton in a huddled position on its left side; a stone block of sandstone is in the central part of the burial pit	the remains of rotten wood – remains of a stake are at the height of the right orbit	1: female, 50–60	fistulas within the alveolar section of the mandible due to abscess of periapical tissues (near the left, second premolar and the right first molar)	bones not well-preserved, not complete skeleton: lack of part of ribs, right ulna, radius and bones of hand and feet	Bojarski <i>et al.</i> , 2010
11	131/01; site 4	NW–SEE	skeleton in a prone position	none found	1: male, 25–35	<i>porotic hyperostosis</i> (anaemia); degenerative changes: Schmorl's nodes on vertebrae	bones well-preserved, complete skeleton	Bojarski <i>et al.</i> , 2010; this research
12	256/01; site 4	NW–SE	A: skeleton on its left side; the skull strongly bent back, decapitation; B: skeleton on its right side, decapitation	none found	2: A: female, 35–45; B: male, 35–40	A: an attempt to decapitate; degenerative changes: osteophyte formation on vertebrae of the cervical and the thoracic spine; B: an attempt to decapitate; the inflammatory reaction of the periosteum (markedly accentuated longitudinal striations); degenerative changes: osteophyte formation on vertebrae of the thoracic and the lumbar spine	bones well-preserved, complete skeletons	Bojarski <i>et al.</i> , 2010; Kozłowski 2012; this research
13	358/02; site 4	?	skeleton in a prone position	a piece of silver coin	1: ?; adult	impossible to conduct pathological analysis	bones not well-preserved, not complete skeleton: calvarium, tibiae, fibulae, and bones of feet were only unearthed; the fragments of bones were too small and fragile, and after lifting disintegrated into small pieces	Bojarski <i>et al.</i> , 2010
14	383/03; site 4	SW–NE	skeleton in a prone position	none found	1: male, 35–45	degenerative changes: Schmorl's nodes on vertebrae	bones, not well-preserved, complete skeleton	Bojarski <i>et al.</i> , 2010

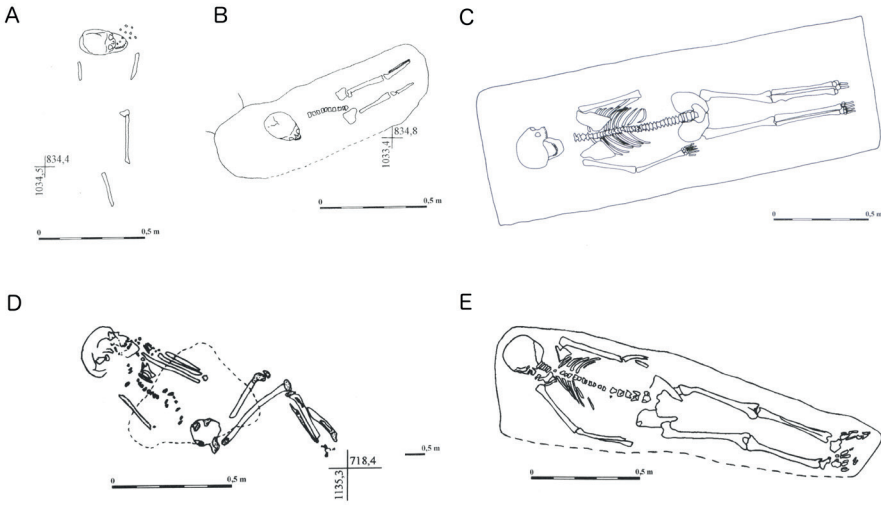


Fig. 3. Anti-vampire graves from medieval Culmen. A – grave 112/99, B – grave 116/99, C – grave 24/57 (after *Wczesnośredniowieczne cmentarzysko* 2006), D – grave 48/00: dotted line marks a stone block of sandstone, E – grave 131/01 (after *Wczesnośredniowieczne cmentarzysko* 2010)

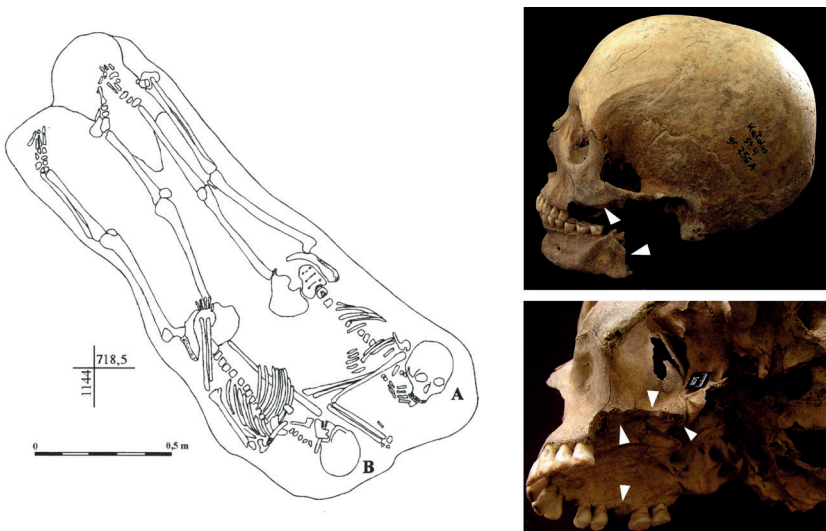


Fig. 4. Grave 256/01 from medieval Culmen. The left inset depicts A: a female, B: a male both decapitated and buried on their sides (after *Wczesnośredniowieczne cmentarzysko* 2010). The right upper inset depicts the left side of a female skull. Visible injuries to the maxilla bone and the mandible were made during an attempt to decapitate the body. The right lower inset depicts the alveolar process of the left maxilla in the section from the first to the third chopped-off molar tooth (photo by T. Kozłowski)

skeletons of a female and a male (Fig. 4) (Bojarski *et al.* 2010; 2020)⁶. A male from grave 24/57 might have been identified as decapitated because his skull lay 14 cm from cervical vertebrae and the position of the mandible indicated that the skull originally laid on the occipital bone (Stawska 2006a; Gardęła 2017). However, there are no cutmarks or other osteological evidence that would support the statement about decapitation (Kozłowski 2012) and the distance of the skull from the spine could have been a result of taphonomic processes. Therefore, we do not consider that an individual from grave 24/57 was decapitated.

Two children (graves 112/99, 116/99) and 12 adults in different stages of adulthood were buried in anti-vampire graves in Culmen. Four females and seven males were buried in anti-vampire graves. A chi-square test indicated no statistical difference between the sexes of individuals buried in anti-vampire graves: chi-square=0,793(1), p=0,373. In three cases, it was impossible to identify the sex.

Anti-vampire burials, diseases, and disabilities at Culmen

Of 574 skeletons, 299 indicate pathological lesions associated with diseases and 8 skeletons indicate lesions associated with disabilities⁷. Among the individuals buried in anti-vampire graves (N=14), 11 had pathological lesions associated with diseases and one with disability. At the same time, 288 individuals with pathological lesions indicating diseases and 7 individuals indicating disabilities were buried in normative graves.

Diseases and conditions

Each condition will be considered separately. Among the diseases, conditions and pathological changes, anaemia, scurvy, periosteal reactions, degenerative joint disease (DJD), injuries, and dental caries were identified on the skeletons of individuals buried in an anti-vampire manner (Fig. 5). As Table 2 presents, anaemia was identified in two cases: a male (grave 131/01) and an adult whose sex is unknown (grave 134/99). Most (N=130) individuals with anaemia were buried in a normative way.

⁶ It is also possible that these individuals were decapitated as a punishment (Gardęła 2017). However, based on textual sources (e.g. Chmielowski 1754; Fischer 1921; Moszyński 1967) we cannot exclude that decapitation was an anti-vampiric remedy.

⁷ The detailed description of the pathological lesions in Culmen – see Kozłowski 2012. The description of the diseases and disabilities – see Matczak 2017.

Only one individual (grave 116/99) with scurvy was buried in an anti-vampire grave, while the majority of individuals suffering from scurvy (N=23) were buried in a normative way, so the frequencies are too small to test the association.

Two males (graves 24/57, 256/01) and a female (grave 122/99), who were buried in anti-vampire graves, were identified as having suffered from periosteal reactions (Table 2). Most individuals with periosteal reactions (N=127) were buried in normative graves.

Five males (graves 24/57, 32/57, 131/01, 256/01, 383/03) and three females (graves 122/99, 26/00, 256/01) from anti-vampire graves were identified as having suffered from degenerative disease (Table 2). Analysis of the relationship between burial type and degenerative disease indicated statistical significance: chi-square=6,924(1), $p=0,009$, which means that a relatively large number of individuals buried in anti-vampire graves (N=8) had those pathological lesions, while 113 individuals with the degenerative joint disease were buried in normative graves.

Three individuals buried in anti-vampire graves had fractures (Table 2). A male from grave 24/57 had a healed fracture of the right tibia, a male from grave 130/99 had a fracture of the ulna and a female from grave 122/99 had a fracture of a long bone (Chudziak *et al.* 2006; Stawska 2006b; Kozłowski 2012). Most individuals with injuries (N=37) were buried in normative graves and small number (N=3) were buried in anti-vampire graves ($\chi^2=4,628(1)$, $p=0,031$).

Teeth root abscesses were identified in two females (grave 122/99, 48/00) from anti-vampire burials (Table 2). Most individuals with tooth abscesses (N=39) were buried in normative graves.

Other diseases and conditions identified on skeletons of individuals buried in normative graves include tuberculosis (N=4), rickets (N=3), hyperostosis frontalis interna (N=1), meningitis (N=1), thoracic disc herniation (N=1), enthesopathy (N=7), osteochondritis dissecans (N=5), osteochondrosis (N=2), spondylolysis (N=1), spondylolisthesis (N=1), hip dysplasia (N=1), developmental foot defect (N=1), and deep tooth caries (N=13). Additionally, four individuals buried in normative graves underwent trephination (Fig. 5).

Disability

Based on textual, paleopathological and medical analyses we proposed that Pott's disease, leprosy, osteomyelitis, paralysis, multiple myeloma and amputation could have been regarded as disabilities in early medieval Culmen (Matczak 2017)⁸. As

⁸ We consider long-term diseases and conditions that had a significant impact on functioning as disability. Only such conditions could have a significant impact on the perception of a given person. Fractures leading to behavioral and activity limitations might be considered as temporal disability, however, in this article we focus on long lasting conditions. Moreover, texts that were analysed (Matczak 2017) do not indicate that fractures were perceived as disability in medieval Poland.

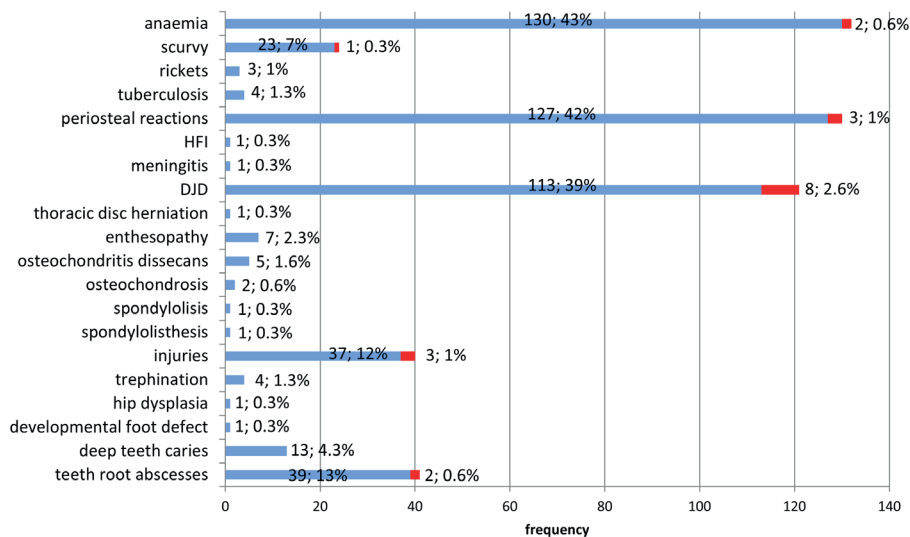


Fig. 5. Numbers and percentage of diseases, conditions and pathological lesions that were identified on the skeletons from anti-vampire graves (marked in red) and typical graves (marked in blue) in medieval Culmen. HFI – hyperostosis frontalis interna. DJD – degenerative joint disease. Note that one individual could have several diseases and conditions. (development by M. D. Matczak)

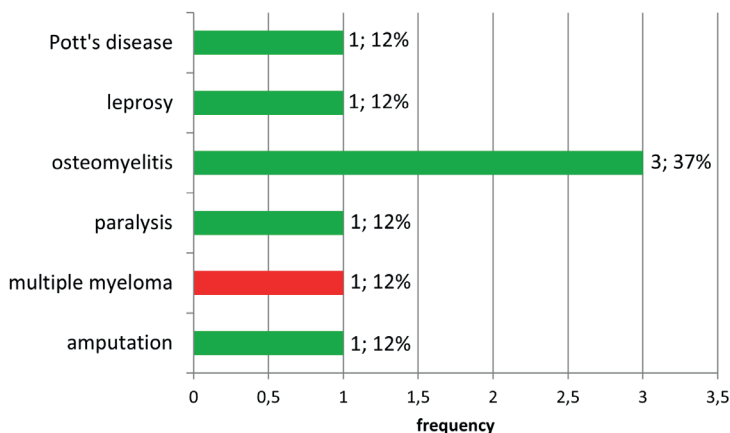


Fig. 6. Numbers and percentage of disabilities that were identified on the skeletons from anti-vampire graves (marked in red) and typical graves (marked in green) in medieval Culmen. (development by M. D. Matczak)

previously mentioned, one individual buried in anti-vampire grave (122/99) had disability while 7 disabled individuals were not given anti-vampire burials (Fig. 6). The skeleton of the female from grave 122/99 probably displays similar lesions to one the most characteristic features of a malignant tumour – multiple myeloma (Kozłowski 2012; Matczak 2017). Individual 122/99 was the only one that was identified with a malignant tumour in Culmen (Fig. 6).

The individuals with the following disabilities were buried in normative graves. Spinal tuberculosis – popularly known as Pott's disease – was identified on the skeleton of a child from grave 42/00 (Kozłowski 2012). A male from grave 41/00 had amputated distal parts of the left tibia and fibula, which were shorter by about 7 cm than the right tibia and fibula (Kozłowski 2012). Osteomyelitis was identified in three skeletons from graves 56/98, 52/00 and 31 (Kozłowski 2012). A female from grave 101/98 was infected with leprosy, which was confirmed using molecular analysis (Kozłowski 2012; Matczak, Kozłowski 2017). Based on the pathological lesions, it was concluded that it was of the form *Lepra lepromatosa*. Paralysis was identified as atrophy of the left femur, patella, tibia, fibula and foot bones in the case of a female (30-40 years old at death) individual from grave 5/03 (Kozłowski 2012).

Discussion

Historical and ethnographic texts indicate that tuberculosis or disabilities might have been connected with vampirism. Archaeological record also provides evidence that tuberculosis was a reason for perceiving someone as a vampire in the 19th century in what is now the USA (Sledzik, Bellantoni 1994). However, our research does not indicate that this was the case in Culmen. The aforementioned hump – identified in the case of an individual from grave 42/00 as Pott's disease (spinal tuberculosis) and tuberculosis – identified in the case of individuals from graves 29/00 and 82/01/05 and associated with paleness, weakness and spitting blood, did not cause the anti-vampire burial of these individuals in Culmen. Our research on the connection between anaemia and vampirism in Culmen aligns with the findings from medieval Wharram Percy, where individuals with anaemia were not perceived as revenants (Mays *et al.* 2017).

Five males and three females buried in anti-vampire graves in Culmen had the degenerative disease. Their age and the hard work they performed (as warriors, artisans or farmers) could have predisposed them to the development of the observed pathological changes. Our analysis indicated that three individuals buried in anti-vampire graves had fractures. Historical and ethnographic texts (e.g. Chmielowski 1754; Moszyński 1967; Kolczyński 2003) do not mention that individuals with injuries were predisposed to being vampires.

When Ł. Stanaszek was analysing the bones of individuals buried in a vampire manner in Poland in the 1990s, he investigated the skeleton of a male buried in grave 24/57 at Culmen and stated that he might have been considered to be a vampire because of his scoliosis and lameness resulting from breaking his tibia (Stanaszek 2017). However, the latest research that was aimed at investigating the whole population from Culmen (Kozłowski 2012) has not indicated scoliosis and 'lameness' in the case of that individual. The breaking of the tibia did not shorten the lower limb of that individual (Kozłowski 2012). 'Lameness' definitely concerned the female from grave 5/03 because of the atrophy of all the bones of her left lower limb resulting from flaccid muscle paralysis, likely due to poliomyelitis; and the male from grave 41/00 because of the amputation of his left foot and part of his tibia. However, none of these individuals were buried in an anti-vampire way. The same concerns individuals suffering from hip dysplasia (grave 319/02; Bojarski *et al.* 2010), scurvy and individuals who had undergone trepanations of their skulls (graves 18/04, 14/00, 304/02, 308/02; Kozłowski 2012). A female who suffered from hyperostosis frontalis interna (HFI) and a female suffering from leprosy were buried in a typical grave. We have not identified any teeth abnormalities (e.g. two rows of teeth, teeth pushed backward) on skeletons from Culmen.

The archaeological and osteological evidence we present here shows that certain diseases and disabilities which might be identified in osteological materials were not the cause of anti-vampire burials in Culmen. The people of Culmen had possibly become used to the different appearance and behaviour of the diseased and disabled. Relatively, there could have been many disabled people, as a proportion of the total number of the living population, which may have resulted in the treatment of such phenotypes as 'natural'. Also, the physically challenged people might have adapted to their conditions (Roberts 2000). For example, a man with one hand or one leg could still ride a horse and fight during battles (Jones 2012). This means that some of the disabled could have participated fully in daily life. Therefore, we argue that diseases and disability could not have raised greater anxiety or fear and the negative perception of some of these people as vampires at Culmen. Research from the Polish site Drawsko 1 into anti-vampire burials has not revealed a statistical dependence between those burials and pathological lesions (Gregoricka *et al.* 2014). The disabled were also given normative burials at other sites (Murphy 2000; Tubb 2000). The types of diseases and disabilities that leave traces on the bones develop over a very long time. Thus, society could get used to the appearance of people with a physical difference. However, we have only a few examples of each condition at Culmen so we cannot conclude this with certainty. Only part of the disabilities leave pathological lesions on bones and many of them concern only soft tissues (e.g. blindness).

Historical and ethnographic sources (e.g. Chmielowski 1754; see also Kolczyński 2003) indicate that people regarded as 'vampires' could have been social scapegoats

for an epidemic outbreak, for example, of cholera. Society could have blamed them for bringing epidemic, plague and death. Diseases that occur during an epidemic or plague (e.g., cholera) affect soft tissues and cause acute infections, which, most probably, were common causes of death in the past and do not leave lesions on bones (Ortner, Putschar 1985; Roberts, Manchester 2010). We cannot investigate these using osteological and archaeological materials and no textual sources directly discuss what was happening in early medieval Culmen. Only chronic diseases (lasting over years or decades) lead to osteological changes, which nowadays can be identified. As the osteological paradox indicates: it might be probable that those skeletons that do not have pathological lesions belonged to the people who were sick with infectious diseases or/and died earlier than people who died later in life and whose skeletons display pathological lesions (Wood *et al.* 1992).

Conclusions

Historical and ethnographic sources indicate that vampires were causing diseases (e.g. Chmielowski 1754; Baranowski 1965; Moszyński 1967; Kolczyński 2003). Using archaeological and osteological materials from Culmen we investigated if people with diseases such as e.g., tuberculosis and anaemia and disabilities were regarded as vampires after death and buried in anti-vampire graves. We considered each disease separately to see if it was a reason for burying individuals in anti-vampire graves because many of them were not associated with the appearance of a vampire and were common. We have observed that most individuals suffering from each disease and disability were not given anti-vampire burials in Culmen. Because of that, diseases and disabilities that might be identified on bones were not the reason why some individuals were perceived as vampires in early medieval Culmen. Those who were sick from certain diseases and the disabled were buried more frequently in typical graves. Society may have been used to the different appearance and functioning of the diseased and disabled who were a common element of society in Culmen. Therefore, they did not raise particular aversion and fear, and thus, they were not given anti-vampire burials.

The problem of why some people were regarded as vampires needs to be investigated further using an interdisciplinary approach and preferably materials from sites that come from more modern times for which we have textual sources. Only integrating historical and ethnographic texts with archaeological and osteological materials might shed light on who were regarded as vampires and why.

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