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Violence at Verteba Cave, Ukraine: New Insights into the Late Tripolye Period from Ukraine.

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INTRODUCTION

The Tripolye cultural group occupied territory stretching from eastern Romania across western Ukraine to east of the Dnipro River (Korvin-Piotrovskiy, 2012). The aspect of Tripolye archaeology garnering the attention of many scholars has been the "megasite" phenomenon of the Middle Period (4300-3600 calBC) (Videiko, 2004). Very large settlements in the Bug-Dnipro interfluve of central Ukraine (Kruts, 2008) include, Talyanki (~340 hectares) with 2,000 residential structures (Diachenko, 2012) and Maidanetske estimated to have had ~2,700 residential buildings (Rassman et al., 2014). These settlements were the largest in Europe at the time, and have even been referred to as the continent's "proto-cities" (Videiko, 2004). Many hypotheses have been advanced to explain the "megasite" phenomenon, the majority focusing on violent intergroup conflict. Prior to the establishment of the megasites, the forest-steppe region was essentially devoid of settlement (Kruts, 2012a). However, rapid population growth supported by the agropastoral subsistence system eventually necessitated the exploitation of this available land (Kruts, 2012a). Ceramic evidence suggest migration of western Tripolye into the forest-steppe zone (Ryzhov, 2012a).

In addition to the megasites, other archaeological data suggest the Tripolye experienced violent intergroup conflict. Artifacts interpreted as weapons, including polished-stone mace heads, have been recovered from Tripolye sites (Ciuk, 2008). Furthermore, fortifications have been documented at smaller Tripolye sites such as Zhvanets-Schovb, Costesti, and Kazarovichy (Kruts, 1977; Markevich, 1981; Movsha, 1985), including ditches ~1-4m in width and 1.5-2.5m in depth surrounding settlements (Milisauskas and Kruk, 2002: 235). Some settlements also mounds built around them for protection, over time rebuilding is observed and reinforcement with stone. Additionally, many settlements were located on high terraces near large rivers placing them at a strategic vantage point for defense (Tringham, 1971: 174; Zbenovich, 1996).

Verteba Cave, located on a high terrace near a river, has a good vantage point a suggestive defensive strategy shared with other archaeological sites used to infer fortification/defense. Although the archaeological evidence is suggestive of intergroup hostilities, traumatic skeletal injury is the most direct evidence of interpersonal violence and warfare (Walker, 2001). To date, few human skeletal remains associated with the Tripolye early-middle periods have been recovered, with most burials found under house floors (Zbenovich, 1996). This limited the knowledge of many aspects of their life course, including violent trauma. In this paper, skeletal material from Verteba Cave (Figure 1), located in western Ukraine, will be discussed regarding the social role of interpersonal violence. From this period in western Ukraine, Verteba Cave represents the largest number of human remains allowing for skeletal analysis of violence. Crania will be the focus as they provide the most direct evidence of violent conflict (Walker, 2001; Lovell, 1997) that may corroborate or refute the archaeological evidence of conflict.

MATERIALS AND METHODS

Site Background

Verteba Cave is a gypsum cave near the Siret River in Ukraine (Figure 2), and is part of a karst system that makes up large labyrinths of tunnels running beneath the surface. However, Verteba Cave is the only one that has evidence of human occupation

prior to modern times (Kadrow and Pokutta, 2016). Tripolye artifacts, including diagnostic ceramics and anthropomorphic figurines, as well as human and faunal bones were excavated between 1997 and 2012 from a region in the cave designated Site 7. Radiocarbon dates place the Tripolye use of site 7 between 3950-2573 calBC, consistent with the very late BII or early CI phase Tripolye (Kadrow et al., 2003; Ledogar, 2017; Nikitin et al., 2010).

Burials

Site 7 contains two zones designated Area 1 and 2 (Figure 2), which held the human remains included in this analysis from excavations in 2008 and 2012 led by Sokhatsky and Madden. Of the 1095 comingled human skeletal remains excavated from site 7, 16 partial and 9 complete crania are well preserved, making this population conducive to addressing the role of cranial trauma in interpersonal violence.

Burials have been found in two stratigraphic layers from Area 1 separated by 20cm of culturally sterile sandy clay suggesting that these burials are separated by an indeterminate amount of time. The older of the two has been designated as Stratum B, while the more recent stratum is referred to as Stratum A. Stratum A and B have not been dated directly, however, dates have been determined for the surrounding strata. The oldest Eneolithic dates from site 7 come from Stratum B and are 3805-3707 calBC and 3946-3774 cal BC (Ledogar, 2017). Calibrated dates of human remains from 2005 and 2007 excavations from site 7, just above Stratum A, range between 3950 and 2578 calBC (Nikitin et al., 2010:14). Statistically these dates are not significantly different (T=1.43E-20, χ^2=15.5 at $\alpha = 0.05$; df = 8).

Five partial and six complete crania were excavated from Area 1, Stratum B in 2008, along with comingled postcranial elements, faunal remains, fragments of ceramic vessels, three flint tools, one ceramic anthropomorphic figurine, and a good deal of ash and charcoal. Four complete crania and one partial crania were clustered (Figure 4) toward the west wall of Area 1 and the other six crania were distributed close to cave walls (Figure 3). Only one cranium (*VC.HR.11*) had a directly associated mandible.

In 2012, Area 1 Stratum A, three complete and one partial crania were closely associated in two units near the opening to the larger eastern cavern (Figure 3). Another complete cranium was located at the entry to the western cavern in Area 1.

Burials from 2012, Area 2, held 14 partial crania. This area presented the only articulated post-cranial elements found to date, including two left hands, the thoracic and lumbar portion of a vertebral column, a right complete arm of unidentified sex, a left distal arm of unidentified sex, and a left complete articulated arm of a male. Additionally, there were one right and left completely articulated arm both identified as female. The articulated post-cranial remains were in a heap, piled on top of one another. Faunal remains, ceramic sherds, ten flint tools, two stone ax heads, four spindle whorls, one stone weight, one ceramic sheep, one ceramic bull, one torso portion of a human female ceramic figurine, three anthropomorphic figurines, two pieces of red ochre, and ten bone and antler tools were found in the matrix in and around the “heap” of postcranial remains (circled in Figure 3).

Methods

Demographic data was collected for individual skeletal elements, except when articulated. Dental development was used to estimate age-at-death for subadult individuals (Ubelaker, 1989), and dental attrition and cranial suture closure to assess adult age (Lovejoy, 1985; Meindl and Lovejoy, 1985). Sex was estimated for crania based on morphological traits and general robusticity (Buikstra and Ubelaker, 1994; Walker, 2008). In the case of comingled post-cranial remains age and sex were estimated after Buikstra and Ubelaker (1994). Minimum number of individuals (MNI) was determined based on age, sex, side, size, and location of burial for individual bones.

All remains were observed for presence or absence of fractures, sharp force trauma and cut marks. Identified cranial fractures were classified after Lovell (1997). Fractures were examined for evidence of healing, internal beveling, radiating fractures, adhering bone fragments, and patination to determine if fractures occurred perimortem (Bennike, 2008; Lovell, 1997). Location of cranial trauma was examined as evidence for attacker location during assault (Wahl and Konig, 1987; Walker, 2001). Guyomarc'h et al.'s (2010) method for differentiating accidental falls from blunt force injury was also applied.

RESULTS

An MNI of 36 individuals was established (Table 1). Cranial trauma was observed in 11 of the 25 crania (Figure 3). From Area 1, three female and six male adult crania display perimortem trauma (Table 2). Of these one young female and four of the males were placed in a cluster, under/in contact with *VC.HR.10* was the right frontal of a subadult. Inside of *VC.HR.11*'s cranium a left unfused humerus of a 6 month to one and a half year old was also found (Bass, 1994). Orbits of the four adult crania were facing in opposite directions. One male and one female with trauma were found to the north of the passageway to the eastern cavern. An older male displaying trauma was found in Area 1, in the smaller passageway leading to the western cavern. One female and an individual of indeterminate sex associated with the "heap" in Area 2 presented cranial trauma. Three of the 11 individuals exhibited two or more perimortem cranial fractures, totaling 18 cranial fractures. Unhealed cranial trauma was identified primarily on the occipital and the parietals. Only two fractures displayed signs of healing, suggesting that most of the injuries occurred at or near the time of death (Table 2; Figure 5).

Cut marks were observed on three of the 11 crania with depression fractures. *VC.HR.9*, an adult female had four cut marks, and two males *VC.HR.12* and *VC.HR.171* had one cut mark each.

Post-Cranial Trauma

Little post-cranial trauma was observed. An adult of indeterminate sex displayed a healed right radial fracture near midshaft. A healed fracture was noted on a right humeral head of an adult female, and another on a second metacarpal near midshaft. A few post-cranial bones displayed sharp force trauma, including a sternal body near the third rib attachment on the anterior surface. A fibula, radius and femur plus six vertebrae and two ribs displayed cut marks (Figure 7; cervical vertebra).

DISCUSSION

Trauma Patterns

Ten (55%) fractures were located on the posterior aspect of the skull indicating the victims were hit from behind (Table 2). Five of these were located centrally on the lower squamous occipital. The low position of the traumatic lesions suggest that the individuals may have been lying on the ground or bending over with the neck exposed. Three fractures were observed on the top of the crania (17%) suggesting that either the attacker was above the victim or the victim was kneeling when struck by a standing attacker. One (6%) fracture on a right parietal may indicate either a blow from behind or a frontal attack from a left handed assailant. Another fracture on the anterior of the crania (6%) and one on the maxilla (6%) suggest possible face-to-face combat with a right handed attacker. Ten of the fractures penetrated the endocranium, show no remodeling, and are large enough to have been fatal (Table 2). According to Guyomarc'h et al. (2010), depressed fractures such as these, especially the three individuals with more than one perimortem fracture, are suggestive of blows not accident. However, the length of the fractures does not meet the 7 cm criteria as the largest at Verteba Cave is 63 mm, with a range of 23-63 mm (average of 44 mm). Although, it should be noted that Guyomarc'h et al.'s (2010) modern sample used modern weapons. The two healed injuries are on the faces of males suggesting face-to-face conflict occurred at times, but not necessarily with lethal intent. Lethal cranial trauma does not follow the expected pattern for face-to-face combat as only two perimortem and one healed lesion were found on the left side of the skull (Tiesler and Cucina, 2012).

Fractures associated with violent interactions are much more likely to be seen on the cranium than the post-cranial bones (Fibiger et al. (2012), as the head is the prime target of identification of an individual (Guyomarc'h et al; 2010). As the cranium is the prime target many it is not surprising that few postcranial injuries were observed (Milner 2005; 150).

Sharp force trauma at Verteba Cave is noted on the cranium, sternum, and vertebrae, all locations that would be expected during a violent interaction. Healed fractures were also noted on the nasals, a metacarpal, a radius and a humeral head providing potential evidence of interpersonal violence. Guyomarc'h et al. (2010) suggest all of these post-cranial injuries are likely associated with violent interaction, not accident. As more than one individual showed evidence of perimortem trauma, Schulting (2009) suggests that all other burials must be observed within the bounds of violence.

Previous studies have demonstrated the tendency of injuries from warfare to affect adult males (Jiménez-Brobeil et al., 2009; Maschner and Reedy-Maschner, 1998). The demographic profile of victims from Verteba Cave indicates that adult individuals of both sexes acted in violent conflict. Additionally, the presence of women and children in the burial(s) show that they were not taken alive as slaves. The demographics of the victims and the perimortem nature of the trauma are consistent with intergroup violence, where all members of an opposing group are targeted with lethal intent (Milner et al., 1991; Wahl and Trautmann, 2012), but opposed to intragroup violence, which tends to

manifest as non-lethal trauma impacting certain segments of the population (Lambert, 1997; Smith, 2003; Walker, 1989).

The higher frequency of blunt-force trauma on the posterior and top of the crania is more consistent with raiding than face-to-face battles (e.g., Teschler-Nicola, 2012; Wahl and Trautmann, 2012). At the Linear Pottery Culture (LBK) site of Asparn/Schletz (5000 calBC) in Austria, crania from 67 males, females, and subadults were recovered, all with perimortem injuries primarily from blunt force and sharp force trauma (Teschler-Nicola, 2012). Teschler-Nicola (2012) concludes that the individuals buried at Asparn/Schletz were victims of a large-scale attack. Similarly, 34 males, females, and subadults showing perimortem trauma were uncovered at the LBK settlement site of Talheim in Germany (Wahl and Trautmann, 2012). The positioning of blunt and sharp force trauma on the posterior of these skulls led Wahl and Trautmann (2012) to conclude the population was killed during a surprise attack. Golito and Keeley (2006) examined a western LBK sample to observe violent trauma, of the individuals in these populations 32% displayed evidence of trauma, comparable to the most violent known societies (Golito and Keeley, 2006; LeBlanc and Register, 2003). Cranial trauma at Verteba Cave exceeds that seen among the LBK, at 30-44% this places these Tripolye burials in the most violent societal category.

An alternative explanation for trauma observed mainly on the posterior of the cranium is systemic killing for political or ritual purposes. It has been observed that emerging states or polities have used systematic violence to manipulate power (Swenson, 2003). Serious cranial injuries associated with ritual violence are well documented among the Inca, Maya, Aztec, and Moche (e.g., Klaus et al., 2010; Serafin and Peraza Lope, 2007; Sutter and Cortez, 2005). Of interest, depression fractures on the occipital appear consistent with patterns observed on executed individuals from the Khmer Rouge regime in Cambodia (Ta'ala et al, 2006). Ta'ala et al. (2006) hypothesize these individuals were executed by blows to the back of the head and neck with blunt objects such as axe handles, poles, sticks, or shovels. This interpretation is difficult to support for Verteba Cave without more knowledge on the political and religious life of the Tripolye. No evidence exists in Tripolye imagery or ethnography to use to support this hypothesis.

Penetrating cranial wounds are generally understood to be caused by objects with sharp edges (Lovell 1997; 156). Two stone axe heads were found in association with the "heap" in Area 2, measuring 85 mm x 45 mm and 106 mm to 52 mm. No direct association can be made between the axe heads and the cranial trauma. Ciuk (2008) suggests stone maces, and hammers and maces made from red deer (*Cervus elaphus*) antlers as possible weapons used to create the observed blunt force trauma at Tripolye sites.

Disposal patterns

Most burials of the Tripolye during this period were found under house floors (Zbenovich, 1996), burial at Verteba Cave suggests use of a new or non-normative type of burial. Secondary cave burials are present but less common than cemetery burials during the Neolithic and Eneolithic in central and Eastern Europe (Orschiedt, 2012). A few hypotheses may explain the cave burials, non-normative burial may have been used due to the violent acts associated with their death. It has been observed that cave burials

are more difficult to interpret than traditional cemeteries, and often represent special individuals such as ritual sacrifices, criminals, the unbaptized, or victims of violence (e.g., Buckberry, 2008; Lucero and Gibbs, 2007; Prufer and Dunham, 2009; Weiss-Krejci, 2012). High incidence of trauma in the Verteba Cave Site 7 sample supports the idea that these individuals were deposited therein due to violence.

The cave may have been used to aid in development of group identity (Parker-Pearson 1999), a literal rooting into the soil to establish land ownership. Pressure was being placed on populations as exhaustion of land caused groups to push into new territories (Kruts, 2012b). A more concrete territorial marker was needed to form a social tie to the land (Parker-Pearson, 1999), burial style was likely used to play on these structural tensions (Wason, 2004; 92). Rise of inequality and differential access to resources may have been the source of tension. This change to cave burial displays a higher level of energy appropriated to the mortuary ritual and more formalization of the burial rite (Goldstein, 1981), therefore indicating a greater significance in this burial type. The most significant evidence for formalized ritual is the presence of the stones brought in from outside that stand between Area 1 and Area 2, separating the articulated from the non-articulated remains. This hypothesis ties into changing burial patterns in other Neolithic communities in Europe along with many social systems, due to change in use of the land and identity formation associated with agriculture (Leach, 2008). A final hypothesis could be that this was simply a variant of mortuary practice carried out by individuals of this locale and represents diversity in burial patterns for the Tripolye (Holloway, 2008).

Evidence of exposure shows either the "normative" burial pattern, or that individuals were left on the battlefield until their kin were able to find and collect them (Madden, 2009). Crania separate from the post-crania and few articulated remains are likely due to transport after collection (Leach, 2008). Although, general lack of mandibles, as seen at Verteba Cave, has been suggested to represent the final stage in processing of the dead (Leach, 2008). In that case, the crania that appear to be clustered may just be the most recent deposits in the cave, explaining the random placement of post-cranial materials as older deposits were swept aside to make room for the newest remains (Wason, 2004). Placement of "grave goods" for specific individuals cannot be determined, although presence of closely associated artifacts, faunal remains, and large amounts of ash and charcoal likely represent remnants of ritual visits to the burial area, at the time of deposition and after.

Taphonomic observations and the comingled nature of the remains confirms they were secondary internments. A few skeletal elements had puncture marks associated with scavenging activity of carnivores, rodent gnawing, and one cranium displayed sun bleaching suggesting the remains were allowed to decompose prior to their interment in the cave. The location of puncture marks on the femoral and humeral heads supports the idea that the remains were left exposed during the postmortem interval and were partially disarticulated by animal activity (Binford, 1981). Furthermore, in Area 2, there are two cranial fragments from two individuals, a rib, a partial mandible, two femora, a tibia, associated fibula, and a right os coxa all showing evidence of having been burned. Some have argued that this represents a multi-component burial pattern where bodies were finally interred at Verteba Cave (Kadrow and Pokutta, 2016; Ledogar, 2017). Due to the nature of secondary burials, it is difficult to reconstruct the primary component of the

burial process and the specifics of depositional events. While destructive testing on the remains may offer insight regarding the timing of depositional events, radiocarbon dates have margins that are likely to overlap and the significance of the remains make destructive testing undesirable.

The deceased may have been placed in the cave as part of a multi-component burial practice, or the individuals may have died in singular events such as a raid, warfare, multiple sacrificial events, or as the result of murder or punishment. One element that does not fit the hypothesis that the complete group was killed in a single raid are the treatment of the human remains. The Verteba Cave burials are different to the LBK raid sites of Asparn/Schletz and Talheim. At Asparn/Schletz, the disarticulated remains were disposed of in a defensive ditch surrounding the settlement (Teschler-Nicola et al., 1996). At Talheim there was a mass grave with articulated bodies stacked upon each other, devoid of grave goods (Wahl and Trautmann, 2012). Invasions at Asparn/Schletz and Talheim resulted in hasty burials without dressing or grave goods. In contrast, the burials at Verteba Cave are intentional. The treatment of individuals from Verteba Cave may be more akin to burials at Eulau (2677– 2495 cal BC), a Corded Ware Culture site in Germany, where raid survivors interred the dead. Meyer et al. (2009) suggest that the careful burial of related individuals supports the notion that survivors of the invaded community buried their dead rather than the attackers. If their deaths were due to intergroup raids or warfare it would be important to the living to retrieve remains for ultimate burial as they represent the social death of the individual (Weiss-Krejci, 2011). The radiocarbon dates from Strata A and B indicate that the deposits occurred within a relatively short time. We suggest that due to the presence of 20cm of sterile clay between the strata that these deposits represent at least two potential depositional events.

The trauma observed at Verteba Cave supports the hypothesis that violence was part of the life course for these individuals living in the later phase of Tripolye culture. The Tripolye were the last of a group of Danubian Neolithic cultures recognized by some scholars as “Old Europe” (Anthony, 2007; Gimbutas, 1974). Many Old Europe archaeological cultures similar to the Tripolye, had been wiped out around 3800 calBC following the arrival of the pastoralist Suvorovo culture into the Danubian River Valley from the steppe (Anthony, 2007). The Tripolye survived this early clash between sedentary farmers and nomadic steppe dwellers, possibly through the creation of intimidatingly large megasites and previously established, mutually beneficial trade relationships across the agriculturalist-pastoralist frontier (Anthony, 2007; Ellis, 1984).

Peaceful relations between the Tripolye and their steppe neighbors to the south and east probably came to an end sometime in the Late Tripolye Period. By around 3300 calBC the Tripolye megasites in the Bug-Dnipro interfluve were abandoned, and Tripolye settlements, which were once located throughout the forest-steppe zone of the Dniester River Valley, retreated to the north (Anthony, 2007). At this same time, a new steppe-dwelling pastoral culture, known as the Usatovo, became established in the steppe zone along the Dniester. Recent paleogenomic studies have indicated that the nomadic pastoralists of the Pontic-Caspian steppe were involved in large-scale population movements at precisely this time, expanding westward farther into continental Europe (Haak et al., 2015). Such a massive population movement likely resulted in lethally violent interactions between indigenous populations and the newly arriving migrants.

CONCLUSIONS

Evidence of cranial trauma at Verteba Cave adds to the growing literature on violence in Neolithic Europe. The perimortem nature of the fractures suggests that the violence was carried out with lethal intent. Accidental injuries may account for the cranial trauma, however, the lethal force and location of the lesions suggest that interpersonal violence is a more plausible explanation. Specifically, the cranial trauma and purposeful burials at Verteba Cave appear to be evidence of raiding and burial by survivors of the Tripolye community. Skeletal remains at the cave reveal patterns of cranial trauma similar to sites elsewhere in Europe that have been interpreted as reflecting intergroup conflict. The documentation of violence at Verteba Cave, when added to the defensive nature of the megasites and fortifications at Tripolye settlements supports the notion that this culture experienced significant violent intergroup conflict.

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Tables

Table 1. Minimum number of individuals.

Table 2. Summary of cranial trauma.

Figure Legends

Figure 1. Map of Tripolye territory and location of Verteba Cave in western Ukraine

Figure 2. Location of excavation site in Verteba Cave, Areas 1 and 2 noted

Figure 3. Site 7 with location of all 25 skulls

Figure 4. Cranial cluster in Area 1

Figure 5. Healed naso-frontal fracture on VC.HR.12

Figure 6. Multiple depression fractures on VC.HR.171, top of cranium fracture showing beveling and circular ring

Figure 7. Depression fracture with beveling on VC.HR.152

Figure 8. Cut mark on VC.HR.266, cervical vertebra

Figure 1. Map of Tripolye territory and location of Verteba Cave in western Ukraine.

Figure 1. Map of Tripolye territory and location of Verteba Cave in western Ukraine

29x28mm (600 x 600 DPI)

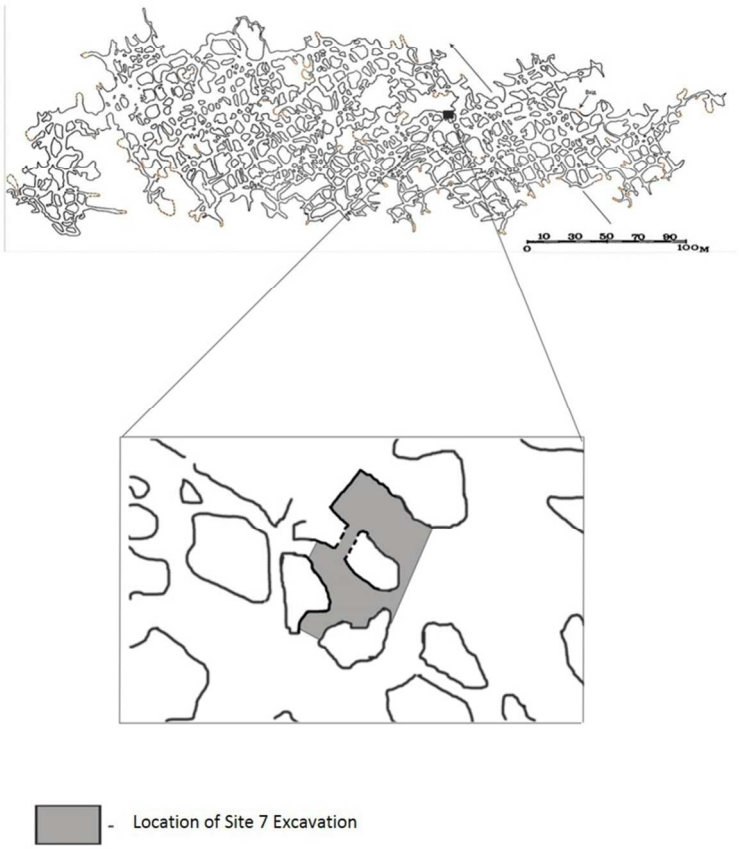

Figure 2. Site 7 Area 1 and Area 2, Verteba Cave.

Figure 2. Location of excavation site in Verteba Cave, Areas 1 and 2 noted

44x65mm (600 x 600 DPI)

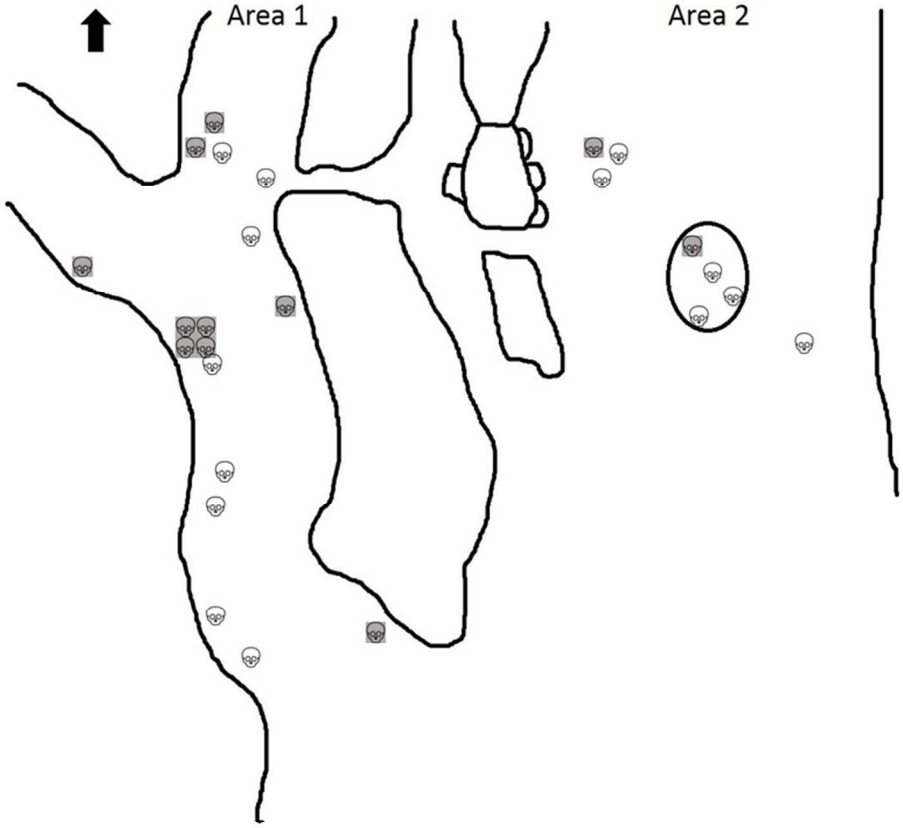

Figure 3. Site 7 with location of crania, not to scale.
Individuals with trauma shaded gray.

Figure 3. Site 7 with location of all 25 skulls

36x34mm (600 x 600 DPI)

Figure 4. Cranial cluster in Area 1

188x155mm (300 x 300 DPI)

Figure 5. Healed naso-frontal fracture on VC.HR.12

321x283mm (300 x 300 DPI)

Figure 6. Multiple depression fractures on VC.HR.171, top of cranium fracture showing beveling and circular ring

73x118mm (300 x 300 DPI)

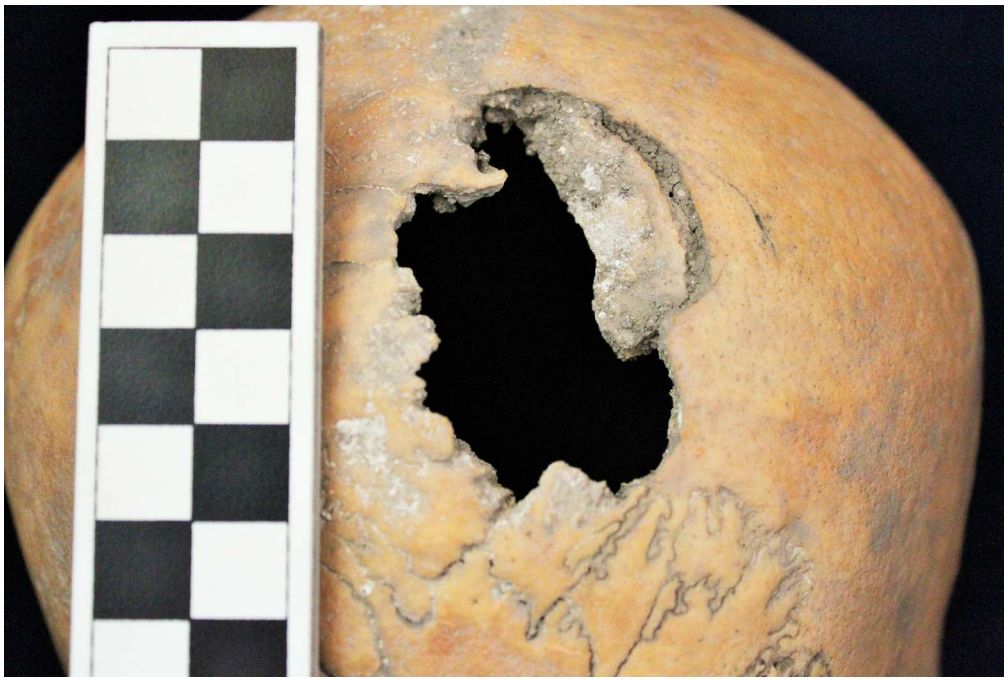

Figure 7. Depression fracture with beveling on VC.HR.152

427x286mm (300 x 300 DPI)

Figure 8. Cut mark on VC.HR.266, cervical vertebra

265x188mm (300 x 300 DPI)

MNI	Sex	Age Category	MNI	Sex	Age Category
	AREA 1			AREA 2	
1	Unknown	Infant	0	Unknown	Infant
3	Unknown	Subadult	4	Unknown	Subadult
1	Unknown	Adolescent	1	Unknown	Adolescent
1	Male	Young Adult	0	Male	Young Adult
4	Male	Adult	9	Male	Adult
2	Female	Young Adult	1	Female	Young Adult
1	Female	Adult	4	Female	Adult
1	Unknown	Unknown	3	Unknown	Unknown
14			22		

ID	Sex	Age	Location	Year Excavated	Perimortem Location (*lethal)	Antemortem (healed) Location
VC.HR.9	Female	20-30	Site 7 - Area 1, stratum B	2008	inferior to lambda*	
VC.HR.10	Male	30-45	Site 7 - Area 1, stratum B	2008	maxilla	left naso-frontal
VC.HR.11	Male	25-35	Site 7 - Area 1, stratum B	2008	inferior occipital*	
VC.HR.12	Possible Male	20-40	Site 7 - Area 1, stratum B	2008	occipital*	right frontal
VC.HR.13	Female	17-25	Site 7 - Area 1, stratum B	2008	between parietals* inferior occipital*	
VC.HR.14	Male	25-35	Site 7 - Area 1, stratum B	2008	inferior to lambda*	
VC.HR.152	Female	20-30	Site 7 - Area 1, stratum A	2012	lambda*	
VC.HR.171	Male	30-50	Site 7 - Area 1, stratum A	2012	frontoparietal* right parietal right parietotemporal right temporal	
VC.HR.316	Indeterminant	Adult	Site 7 - Area 2, stratum B	2012	right parieto-occipital	
VC.HR.344	Male	35-50	Site 7 - Area 1, stratum A	2012	left temporal* right temporal	
VC.HR.960	Female	18-30	Site 7 - Area 2, stratum B	2012	left parieto-occipital*	

Size/Type	Cut Marks
30 mm x 19 mm/depression	
32 mm	left sphenotemporal
12 mm	right temporal
1 deep (28 mm), 2 shallow	posterior left mastoid
crush	
depression	
63 mm/depression	
75 mm x 54 mm/depression	
23 mm/depression	
26 mm x 7 mm	inferior to lambda
23 mm/depression	
59 mm/depression	
31.7 mm/depression	
49 mm x 33 mm	
29 mm/depression	
8.5 mm/depression	
15.mm x 5 mm/depression	
11 mm x 16 mm/depression	
12 mm	right mastoid
linear	
62 mm x 37 mm	
44 mm x 35 mm/depression	
depression	