

Skeletal Trauma Analysis of an Early Bronze Age Population at Wadi Faynan 100, Jordan

by

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### **Author's declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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## **Abstract**

The analysis of the frequency and pattern of trauma observed in a sample can help with interpreting aspects of life in past communities, including occupations, levels of interpersonal violence, and caregiving. Human skeletal remains from Wadi Faynan 100, an Early Bronze Age IB (3600-3000 B.C.E) site in Jordan with multiple charnel houses containing commingled remains were assessed for indicators of trauma. Examination of 465 elements (MNI=35), including cranial fragments, long bones, vertebrae, and innominate fragments from 13 charnel houses was conducted. All elements were analyzed visually for indicators of trauma and all trauma was recorded and described using recording forms. Trauma was most frequently observed in the skull (6/61 elements, 9.83%), with a low frequency of trauma (10/465 elements, 2.15%) observed in the sample overall. Multiple blunt-force traumatic injuries to the skull and two sharp-force injuries indicated a lower-than-expected level of interpersonal violence. A lower frequency of interpersonal violence is observed when the WF100 data is compared to the published data from Bab edh-Dhra, an Early Bronze Age IA site in Jordan. The presence of only two antemortem injuries in an advanced state of healing indicates some level of caregiving within the community due to the types of antemortem trauma observed; the injuries would have needed time to heal, affected day-to-day activities, and required some level of care from others. A low frequency of vertebral fractures (1/240, 0.42%) indicates a less physically demanding and hazardous lifestyle. Based on the overall low frequency of trauma, it can be said that individuals at WF100 did not often suffer traumatic injuries related to hard labour, accidents, or interpersonal or large-scale violence.

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## List of Abbreviations

Ant	Anterior
BC	Before the Common era
BFT	Blunt Force Trauma
EBA	Early Bronze Age
Fx	Fracture
Inf	Inferior
L	Left
MNI	Minimum Number of Individuals
MLNI	Most Likely Number of Individuals
Pos	Posterior
R	Right
SFT	Sharp Force Trauma
Sup	Superior
WF100	Wadi Faynan 100

## 1. Introduction

Recent excavations of Wadi Faynan 100 (WF100), an Early Bronze Age IB (3300-3000 B.C) site in the Wadi Faynan region in Jordan, have revealed 13 charnel houses with more than 11,500 fragments of commingled remains. The Wadi Faynan area in southern Jordan is said to be one of the oldest, largest, and best-preserved industrial landscapes, with the development of metallurgy occurring during the EBA (Adams *et al.*, 2017). Wadi Faynan 100 site combines houses, metallurgy structures, and a cemetery, possibly surrounded by a large enclosing wall (Adams *et al.*, 2019; Barker *et al.*, 2007). The excavated tombs at WF100 were charnel houses containing commingled remains of an estimated 92 individuals, of all ages and sexes.

Examining the frequency and patterning of trauma in a population can allow interpretations to be made on the daily activities and the general lifestyle of the population. *Lifestyle* can mean many different things and depends on many factors. These factors include socioeconomic status, occupation, inter- and intra-personal violence, environmental interactions, etc. (Mant *et al.*, 2021). Due to the commingling of the WF100 remains, many of these factors will be difficult to identify, including the distribution of trauma in sex and age categories. However, aspects of the sociocultural environment such as violence (Fibiger *et al.*, 2013), labour-intensive activities (Agnew & Justus, 2014), environmental hazards (Judd, 2004), and evidence of healing (Jurmain, 2001), can be interpreted based on the type and frequency of trauma observed.

Trauma pattern analysis allows the elements rather than the individuals to be examined, which is beneficial when working with commingled remains. By analyzing the bones affected, the type of fractures, the location, and the state of healing, interpretations can be made of the overall likely causes of the trauma, allowing explanations of the lifestyle that produced the trauma. Several

questions about the Wadi Faynan individuals can be investigated using trauma pattern analysis. These include, did the people at WF100 have hazardous or physically demanding work? Was there any inter or intra-personal violence? If so, who did the violence affect the most? Is there any evidence of healing? Would the injuries have drastically affected the individual's daily life? Overall, who in the population suffered from trauma the most? Answering these questions will allow an interpretation of the type of life lived at WF100 during the EBA.

## 2. Background on Jordan

### 2.1 Jordan during the EBA

The Early Bronze Age (EBA) in Jordan is known for its intensification of agriculture, pastoralism, and craft specialization, an increase in social stratification, and the start of major copper mining and smelting activities (Chesson, 2018). There are four major periods within the EBA: EBA I (3600-3000 B.C.E), EBA II (3000-2750 B.C.E), EBA III (2750-2300 B.C.E), and EBA IV (2300-2000 B.C.E) (Palumbo, 2008; Philip, 2008). This period in the Southern Levant saw increased settlement and population sizes, with intensified food production and craft specialization to compensate (Barker *et al.*, 2007; Chesson, 2018). There is always regional variability in populations, however, EBA I-III has been summarized as non-urban agricultural communities, middle-ranged societies with kinship-based groups (Philip, 2008). EBA IV has been summarized as rural, pastoral nomadism with tribal societies (Palumbo, 2008). Throughout the four periods, there were many variations in ceramic types, buildings, funerary structures, and the scale of copper mining (Barker *et al.*, 2007; Palumbo, 2008; Philip, 2008).

Daily activities at this time would have included tending to animals, agricultural fields, and irrigation systems, and producing ceramics, flint, and copper artifacts (Barker *et al.*, 2007; Ullinger *et al.*, 2012). The funerary architecture varied greatly throughout this period, from shaft tombs, charnel houses, and megalithic monuments, but commingled secondary burials were consistently commonplace (Palumbo, 2008; Philip, 2008; Sheridan, 2017). The social structure was based on kinship relationships and was relatively egalitarian (Barker *et al.*, 2007; Philip, 2008). The development of social stratification in the EBA II has been hypothesized based on the larger settlements and evidence from other locations, such as the need for leaders in control of major aspects of society, including land, water, labour, and specialized crafts (Barker *et al.*, 2007; Chesson, 2018). A previous study examining the history of the southern Levant has claimed it has

a violent past (Cohen *et al.*, 2014), and there is evidence of violence during the EBA in Jordan at Bab edh-Dhra (Gasperetti & Sheridan, 2013). Social differences emerging during this time are a plausible cause of the violence observed. Much of the information known about the EBA in Jordan is based on one site, Bab edh-Dhra, as this site spanned all four phases and has been studied extensively (Gasperetti & Sheridan, 2013; Ortner, 1979; Ortner & Frohlich, 2007; Sheridan, 2019; Sheridan *et al.*, 2014; Ullinger *et al.*, 2012). Jericho, a site in Palestine, has several burials dated to EBA I and has several similarities to Bab edh-Dhra (Duell-Ferguson, 2018; Nigro *et al.*, 2021). At Bab edh-Dhra and Jericho, burial practices included secondary commingled burials, with the post-cranial remains in a pile and the craniums placed together in a line (Duell-Ferguson, 2018; Gasperetti & Sheridan, 2013; Ortner, 1979; Ortner & Frohlich, 2007; Sheridan, 2019; Sheridan *et al.*, 2014; Ullinger *et al.*, 2012). At Jericho, like other EBA sites, there has been minimal discussion or evaluation of the human remains (Duell-Ferguson, 2018).

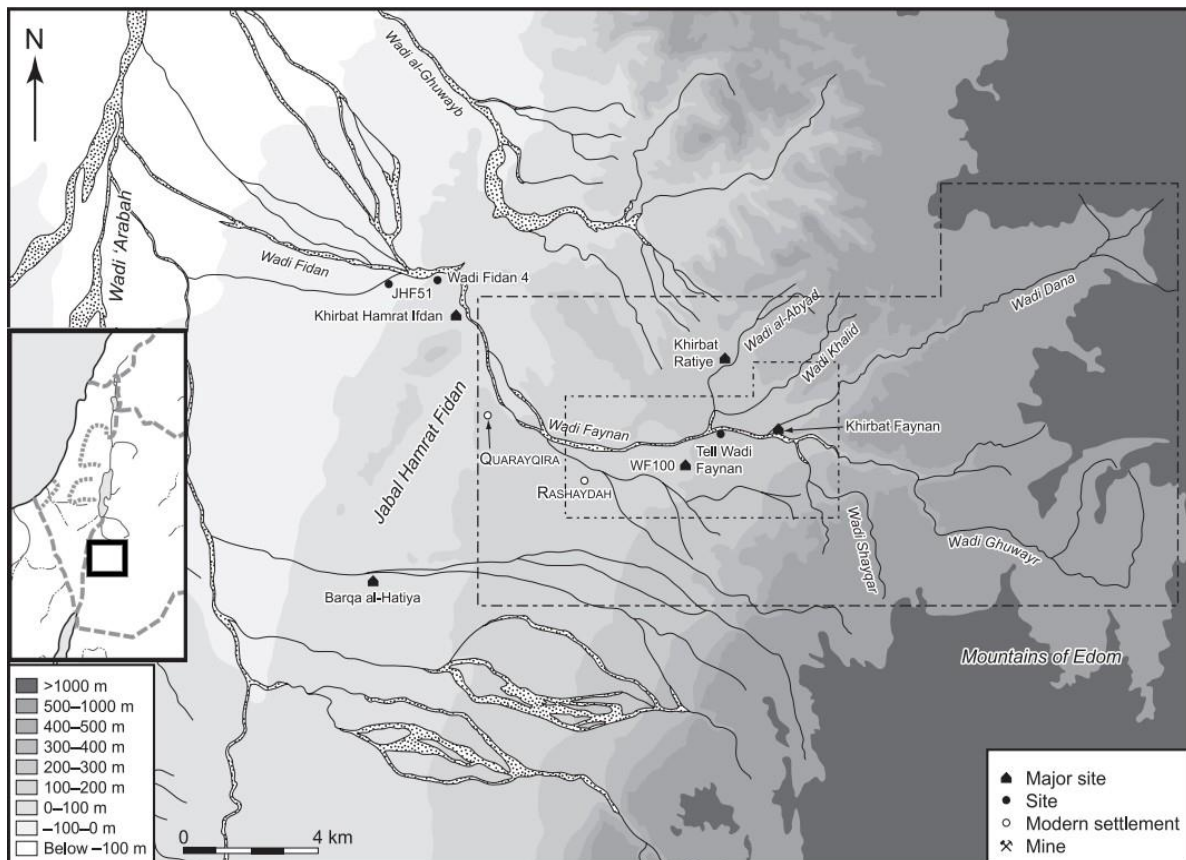
### *2.1.1 Jordan during the EBA IB*

The EBA I period can also be separated into two phases, with WF100 dating to EBA IB, 3300-3000 B.C.E (Adams *et al.*, 2019, 2023; Chesson, 2018). In the EBA IB, large villages that were verging on towns started to assemble. Intensification of food and craft production was needed to feed the larger populations. As the intensity of each specialization increased, the likelihood that everyone contributed to all aspects of society decreased; in most likelihood, these were separate activities completed by different groups in the society, most likely different kinship groups (Barker *et al.*, 2007; Chesson, 2018). Based on the level of cultivation and craft specialization seen in the Faynan region during EBA IB, it is most likely that some individuals controlled different aspects of society, organizing the production, investment in labour, and trade of the goods produced (Barker *et al.*, 2007; Chesson, 2018). However, there is little evidence of an elite social class due

to the lack of material variation between individuals' grave goods, revealing that even if there were some social differences, they were still egalitarian (Chesson, 2018).

## 2.2 Wadi Faynan 100

The Wadi Faynan region is the major area of copper smelting and production in Jordan during the EBA, with small-scale smelting occurring during the EBA I and large-scale production starting in EBA II (Barker, 2000; Barker *et al.*, 2007; Dolphin & Adams, 2023; Wright *et al.*, 1998). Wadi Faynan 100 is one of the largest and most elaborate sites in the Wadi Faynan region (Barker *et al.*, 2007; Wright *et al.*, 1998). **Figure 1** depicts the location of WF100 in Jordan and the Faynan region. The site was named in 1996 during the survey conducted by Wright, where they located a large site with ‘*tombs*’, houses and courtyard settlements, with large walls surrounding the site, all



**Figure 1:** the location of WF100 in Jordan. Adapted from Barker *et al.* (2007, p. 228-229).

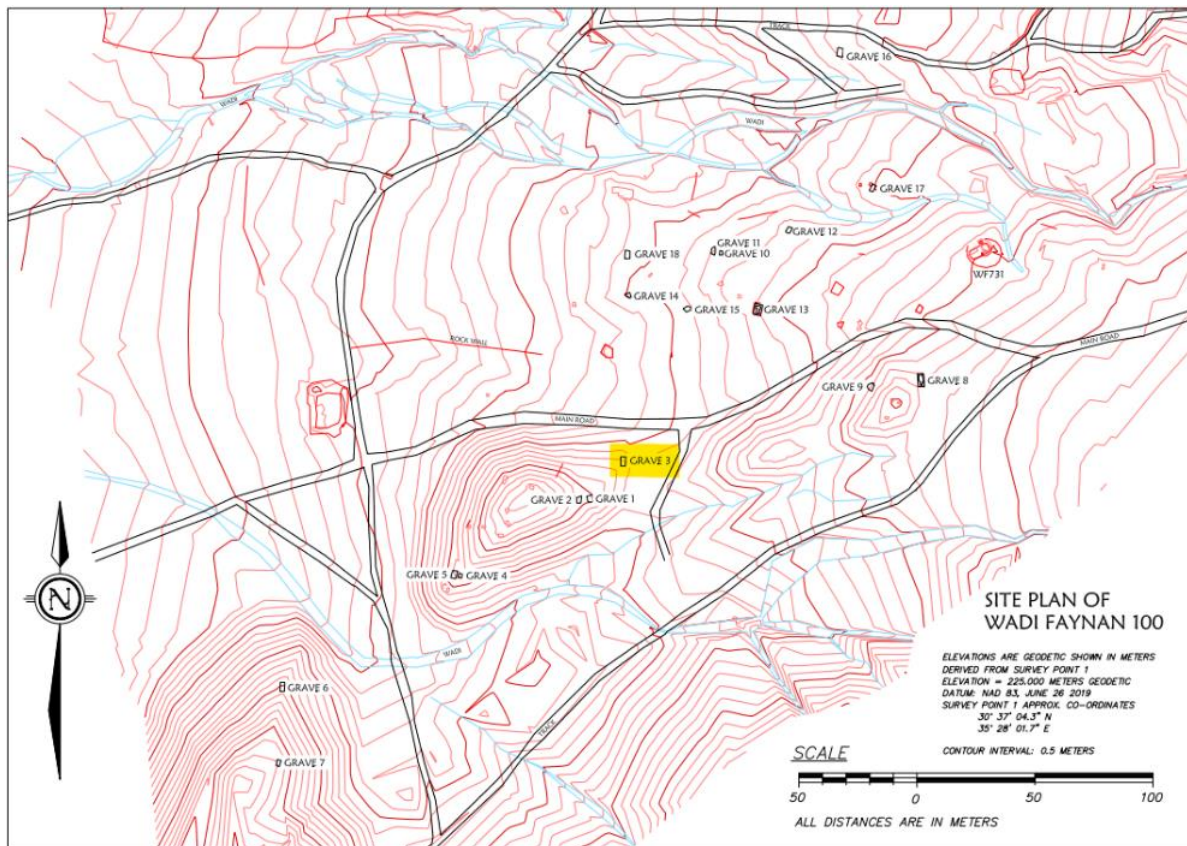
dating to the EBA I (Adams *et al.*, 2019, 2023; Barker, 2000; Barker *et al.*, 2007; Dolphin & Adams, 2023; Wright *et al.*, 1998). Some of the settlement's archaeological remains included middens, storage bins, and evidence of smelting (Barker, 2000; Wright *et al.*, 1998).

### 2.2.1 WF100 Cemetery Excavation

During the initial excavation, Wright identified ‘*tombs*’ but the excavations in 2019 and 2023 done by anthropologist Dr. Alexis Dolphin and archaeologist Dr. Russel Adams and their team revealed that these were ‘*charnel houses*’, which typically date to EB II-III in Jordan (Adams *et al.*, 2019, 2023; Dolphin & Adams, 2023). Charnel houses are large, above-ground structures built for the interment of multiple individuals (Adams *et al.*, 2019, 2023; Sheridan *et al.*, 2014; Ullinger *et al.*, 2012). The charnel houses are located on raised knolls to the south of the main Faynan settlement and have not been found elsewhere in the Faynan region (Adams *et al.*, 2019, 2023; Dolphin & Adams, 2023). The architecture of the charnel houses varied but consisted of a roughly rectangular shape made of mud or rock-brick walls, rocks set in *pisé*, clay earth mixture used in building, a subterranean floor, and a north-facing entrance with *orthostats*, tall rectangular stone blocks, standing upright on either side (Adams *et al.*, 2019, 2023; Dolphin & Adams, 2023). A photograph of one of the charnel houses can be seen in **Figure 2**. The charnel houses vary in size, depth, number of walls, number of rows of stone, degree of *pisé*, and more. Grave 3 was previously identified to be WF1439 by Wright in Barker *et al.* (2007) and its location along with the other graves is illustrated in **Figure 3**.



**Figure 2:** Photograph of Charnel house 8 showing rectangular shape, rock-brick wall, subterranean floor, and north facing entrance flanked by two large orthostats. Taken from Adams *et al.* (2023, p.10).



**Figure 3:** Grave locations at WF100, with Grave 3 (or WF1439) highlighted. Adapted from Adams *et al.* (2023, p. 1).

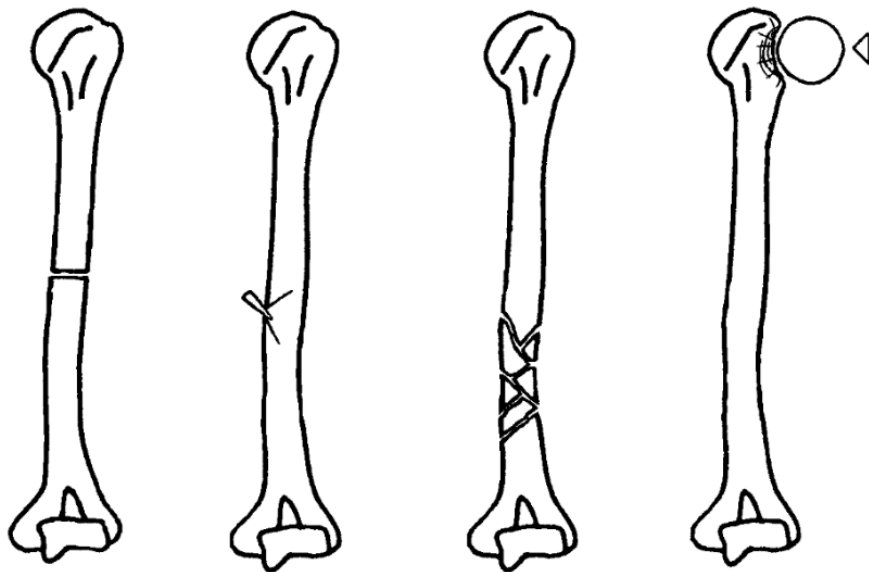
A total of 17 structures were excavated at WF100 in 2019 and 2023. Out of these structures, those labeled Graves 2, 4, 14, and 15 were identified as structures due to the lack of artifacts and human remains recovered. The rest of the structures were identified as graves. The architecture and inventory of the graves can be viewed in **Table A** (see Appendix A). Evidence of looting was observed in all graves, but the extent varied. In some, only 1 or 2 loci were affected, with the bottom layers untouched, while for others, whole portions of the graves were looted, with other sections left untouched. During excavations, Locus 1 contained the back dirt pile in and around the grave from the looting, whether in antiquity or recently. The remains were recovered in a commingled secondary deposit with no pattern in placement (Adams *et al.*, 2019, 2023). The preservation of the elements was low, with many of the elements being very fragmented.

During the EBA, the social structure was influenced by kinship groups. Research on the Bab edh-Dhra charnel houses dating to EB II-III has argued that each charnel house was used for different kinship groups (Sheridan *et al.*, 2014). It is possible that WF100 had a similar kinship-based social system and that kinship groups were buried together. This would also explain the differences in construction, as the kinship groups themselves likely constructed the charnel houses for their kin, rather than one faction building charnel houses for all. Similar artifacts were recovered in each grave at WF100, further depicting an egalitarian lifestyle. The differences seen in artifact type may represent the kinship group's different roles in society. It is also possible that further artifacts were removed by the community during the movement of the remains from primary to secondary burial locations. By analyzing the trauma observed in each grave, further information can be gathered on the possible kinship groups at WF100. As each kinship group possibly was in control of different aspects of society, differences in trauma patterns can help interpretations of what each kinship group did in the society.

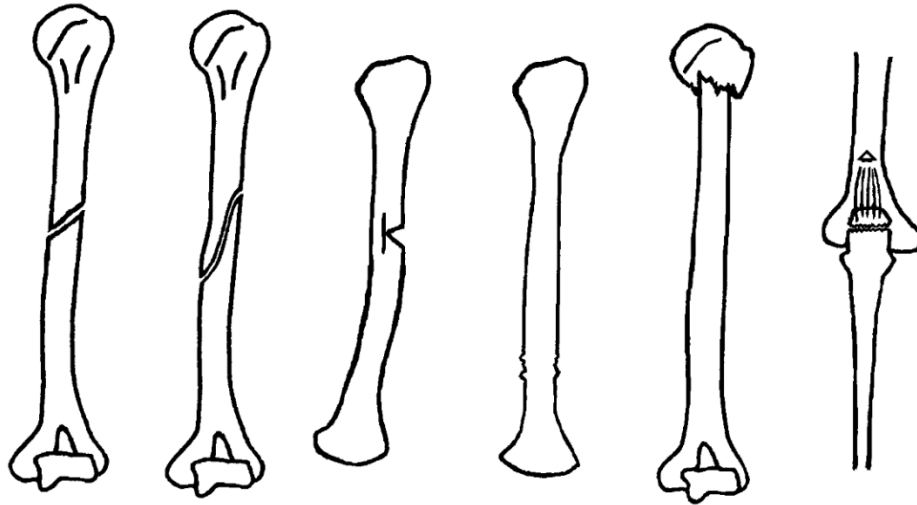
### 3. Background on Trauma

#### 3.1 Trauma

In bioarchaeology, trauma is one of the most common pathological conditions observed (Murphy & Juengst, 2020). Trauma can be described as damage to bone or tissue caused by a slow or rapid force or mechanism on the body (Lovell, 1997; Passalacqua & Rainwater, 2015; Symes *et al.*, 2015). It can also be described as “*the intersecting result of biological, histomorphological, sociocultural, and behavioural factors*” (Mant *et al.*, 2021, p. 583). Trauma can be easily separated into fractures and dislocations, with fractures being the most common (Lovell, 1997). Fractures are described as a discontinuity in the bone, while dislocations are displacement of bones at a joint (Lovell, 1997; Wedel & Galloway, 2014). When describing fractures, the mechanism of injury, or how the bone initially fractures, is important and can be separated into indirect and direct. *Direct* trauma occurs when the fracture develops at the point of impact, while *indirect* trauma occurs when the fracture develops in a location other than the point of impact (Lovell, 1997; Symes *et al.*, 2015). The different types of direct and indirect trauma can be viewed in **Figures 4 and 5** (Lovell, 1997).



**Figure 4:** Fractures caused by direct trauma. From left to right: transverse, penetrating, comminuted, and crush. Taken from Lovell (1997, p. 142).



**Figure 5:** Fractures caused by indirect trauma. From left to right: oblique, spiral, greenstick due to angular force, greenstick due to compression, impaction, and avulsion. Taken from Lovell (1997, p.143).

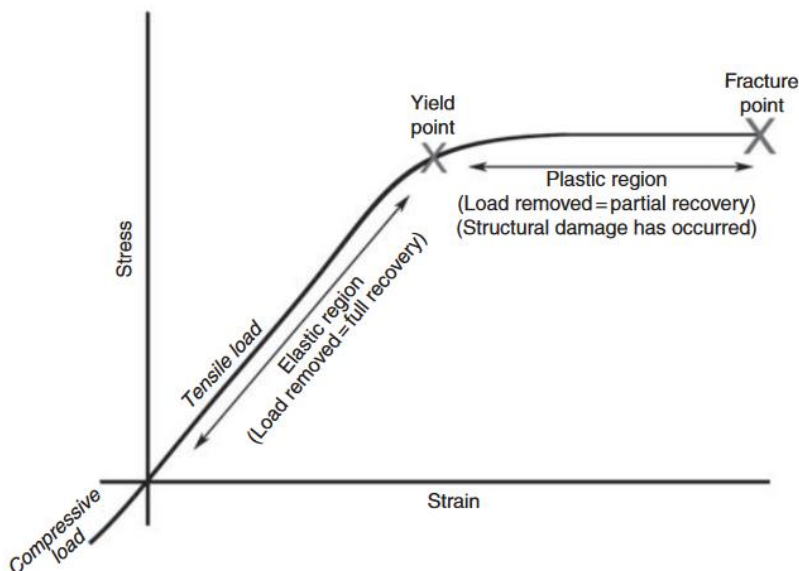
Assessing the timing of trauma is necessary as this will provide further information on the cause and impact on the individual. *Antemortem trauma* occurs before death and shows evidence of healing, *perimortem trauma* occurs around the time of death, shows no evidence of healing, and occurs on wet bone, while *postmortem trauma* occurs after death on dry bone (Burns, 2007; Byers, 2017; Lovell, 1997). Trauma timing can be identified by assessing the fracture morphologies, as wet and dry bone will fracture differently (Symes *et al.*, 2015). The final step in describing trauma is to interpret the ultimate cause of the injury (Symes *et al.*, 2015). Caution is needed when interpreting trauma as many fractures can be caused by accident or intentional actions, and when focusing on archaeological material, the ultimate cause of the injury will almost always be unknown (Judd & Redfern, 2011).

There are three major classes of human-induced trauma; blunt force trauma, sharp force trauma, and high velocity trauma (Symes *et al.*, 2015). *Blunt force trauma* occurs due to slow-loading conditions in a focal area, causing damage and plastic deformation of the bone

(Passalacqua & Rainwater, 2015; Symes *et al.*, 2015). The level of deformation depends on the amount of force, the surface area of the bone, and the bone's ability to absorb the impact without breaking (Symes *et al.*, 2015). *High-velocity trauma*, or gunshot trauma, occurs due to high-velocity force to the bone that does not cause plastic deformation (Symes *et al.*, 2015). While gunshot trauma is less often seen in the archaeological record, injuries from arrowheads are more often identified. *Sharp force trauma* is caused by a sharp-edged instrument damaging the bone and can include incisions, punctures, and chopping wounds (Symes *et al.*, 2015).

### 3.2 Biomechanics of Broken Bones

The bone's role in the human body is to provide weight bearing, strength, and support, and due to its 65% inorganic components, it is relatively strong and resilient (Symes *et al.*, 2015). The other 35% of bone is its organic material that provides bone its elastic properties to absorb energy and be ductile (Symes *et al.*, 2015). When a bone is placed under immense stress that goes beyond its elastic properties, a fracture is produced (Symes *et al.*, 2015; Ubelaker & Montaperto, 2013). This can be understood using a stress-strain curve, which shows the bone's ability to absorb energy until the fracture point is reached, which can be seen in **Figure 6** (Browner *et al.*, 1992; Symes *et*



**Figure 6:** Simple stress-strain curve to demonstrate yield and fracture point. Taken from Symes *et al.* (2015, p. 347).

al., 2015). Before the yield point, bone is under *elastic deformation*, allowing it to return to its original orientation and shape once the stress is released (Symes *et al.*, 2015; Wedel & Galloway, 2014). *Plastic deformation* occurs once the yield point is reached, causing permanent bone deformation (Symes *et al.*, 2015; Wedel & Galloway, 2014). If the stress is not removed, a fracture will be produced. The pattern of the fracture will depend on intrinsic and extrinsic factors. *Intrinsic* factors include bone geometry, density, suture location, sex, and age, while *extrinsic* factors include the impacting object, load velocity, load weight, culture, and living conditions (Fibiger *et al.*, 2012; Love & Wiersema, 2016; Passalacqua & Rainwater, 2015; Steyn *et al.*, 2010; Wedel & Galloway, 2014).

How bones break is a universal truth (Knüsel & Smith, 2013), therefore allowing it to be studied and understood, as there is only a finite number of ways bone is capable of breaking. This, however, leads to multiple causes and mechanisms of injury that produce similar fracture patterns. The stress applied to bone can be dynamic or static; *dynamic* stress is sudden high levels of stress, while *static* is a low, gradual increase of stress over some time (Ortner, 2003). There are five types of forces bone is subjected to, compression, tension, shear, torsion, and bending. *Compression* is when force is applied to the bone from opposing sides, and due to the nature of the skeleton, it is strongest under compression (Byers, 2017; Love & Wiersema, 2016; Symes *et al.*, 2015). Bone, however, is weakest in *tension*, which occurs when a pulling force is applied away from the bone (Byers, 2017; Symes *et al.*, 2015). *Shear* force is applied from opposing directions parallel to the surface of the bone (Byers, 2017; Symes *et al.*, 2015). *Torsion*, or twisting, occurs when a force twists one side of a bone while the other is stationary (Byers, 2017). The *bending* force is applied approximately at a right angle to the long axis of the bone, with bending being the most common

force applied to bone (Byers, 2017). As fracture events are irregular and variable, a combination of forces is more likely the case in the events of trauma (Ortner, 2003; Symes *et al.*, 2015).

### **3.3 Trauma Pattern Analysis**

Trauma pattern analysis is the process of identifying the location, frequency, and patterning of trauma within a population, revealing cultural and environmental factors that have caused or led to the trauma. The information analyzed includes the timing of trauma, location on the body, type of trauma observed, frequency per person, population, and per element (Arkush & Tung, 2013; Jurmain, 2001). More information can be gathered by analyzing the pattern of trauma observed rather than the individual fractures (Jurmain, 2001). By analyzing the types and patterns of trauma observed, interpretations of the causes of the trauma and the effects on the population are possible (Domett & Tayles, 2006). The patterning of fractures by element and region will depend on past societies' events and overall lifestyle (Agnew & Justus, 2014; Baustian *et al.*, 2012). Understanding the extrinsic and intrinsic factors that cause trauma can help identify patterns of exposure to traumatic events in the archaeological record (Steyn *et al.*, 2010). For example, interpersonal violence (Brink *et al.*, 1998; Cohen *et al.*, 2014; Fibiger *et al.*, 2013; Gasperetti & Sheridan, 2013), physically demanding work (Agnew & Justus, 2014), gender roles (Brink *et al.*, 1998; Novak & Slaus, 2012; Steyn *et al.*, 2010), hazards of the environment (Judd, 2004; Mant, 2014), and healing and healthcare (Jurmain, 2001; Serra, 2023; Tilley & Cameron, 2014) can all be ascertained using trauma pattern analysis. An important factor to consider is that “*the mistake of inferring too much from too little is one of the greatest problems in an anthropologist’s routine analysis of bone injuries*” (Symes *et al.*, 2015, p. 382). It is important not to overstate any interpretations that can be made or infer too much from little evidence. The use of clinical and forensic data facilitates the recognition of specific trauma patterns such as blunt force and sharp force trauma, allowing

interpretations to be made of similar patterns viewed in archaeological samples (Ambade & Godbole, 2006; Brink *et al.*, 1998; Fibiger *et al.*, 2012; Kremer *et al.*, 2008; Symes *et al.*, 2015; Ubelaker & Montaperto, 2013). It should be noted that cross-culturally, patterns of violence can and will differ based on the culture and traditions (Brink *et al.*, 1998), and this therefore should always be considered when interpreting the cause of trauma based on modern patterns.

#### 4. Public Issues Anthropology

Public anthropology allows for the application of anthropological knowledge and skills to issues affecting the public, pushing the field outside of the academic sphere into public spaces (Borofsky & De Lauri, 2019). The type of issues that are discussed and focused on depends on who the intended public is. For this research, there are two main publics, anthropologists, and the communities in Jordan, including the government and the local communities. For the people and government in Jordan, further investment, preservation, and understanding of archaeology in Jordan have been a large concern (Abu Dalou *et al.*, 2014; Abu-Khafajah, 2011; Kersel & Hill, 2019; Kersel & Hill, 2020; The Hashemite Kingdom of Jordan, n.d.). The main issue this research can elaborate on is the treatment and importance of bioarchaeological material in the archaeological field in Jordan. The issue pertaining to anthropologists this research emphasizes is the use and significance of commingled remains and expanding the knowledge and understanding of the EBA in Jordan.

The local people in Jordan have stated the importance of the archaeological sites, not only for the knowledge of history that is gained but the resources in tourism and job opportunities that they produce (Abu-Khafajah, 2011; Kersel & Hill, 2019). The Jordanian government has emphasized the importance of preserving archaeological sites and materials for cultural heritage and tourism in a multitude of ways, including designating multiple archaeological sites as cultural heritage locations (Abu-Khafajah, 2011), requesting a US cultural property bilateral agreement (Kersel & Hill, 2020), enforcing anti-looting laws and educating youth on the negative impacts of looting (Kersel & Hill, 2019). This, however, has not expanded towards bioarchaeological material. The Jordanian government has a webpage dedicated to the *Department of Antiquities*, discussing the importance of archaeology and what they are doing to help preserve archaeological

material and sites (The Hashemite Kingdom of Jordan, n.d.). Throughout this page, there is only one line discussing human remains; “The Laboratory Division also deals with human bones discovered during archaeological excavations. It carries out the necessary anthropological studies on the skeletons, whether they are complete or partial” (The Hashemite Kingdom of Jordan, n.d.). In the 4 volumes of the *Archaeology of Jordan Journal*, 9 out of the 204 articles briefly discuss burials and the human remains recovered, mainly focusing on the archaeological structures and materials. In journals that center on bioarchaeological material, such as the *Bioarchaeology of the Near East Journal*, in 16 volumes there was only one article about bioarchaeology in Jordan (Abu Dalou *et al.*, 2014). This shows the lack of focus bioarchaeology has on Jordanian archaeology. It is not due to the lack of human remains but the focus on archaeological material rather than human remains.

There has also been mistreatment of human remains from archaeological sites in Jordan. Ahmad Abu Dalou *et al.*, (2017) discuss a skeleton excavated in 1982 and kept incorrectly at the Jordanian Museum of Cultural Heritage until conservation treatment was done by Abu Dalou and their team. The individual was first displayed on a dirt surface that had insects present, with the temperature and humidity not adequate for the preservation of organic material (Abu Dalou *et al.*, 2017). There have been other cases of human remains from Jordan not being housed in adequate conditions, and being lost or discarded (Sheridan, 2017). These examples show how the government of Jordan needs to emphasize the importance of the bioarchaeological material recovered from Jordanian sites. The Jordanian government and communities must care for the archaeological sites, materials, and knowledge gained, but it is an issue if this does not extend to the human remains recovered from the sites as well. By bringing this issue to light and showing

what can be discovered from the bioarchaeological material, changes in the treatment of the human remains from Jordan can start to occur.

One thing that may impact the lack of bioanthropological knowledge from Jordan and the Near East is the common occurrence of commingled burials in this area. Commingled remains are common in the Near East and are composed of mixed fragmentary and incomplete bones that are frequently not in an anatomical position or articulated (Sheridan, 2017; Osterholtz *et al.*, 2014). Commingling can be caused by the population moving individuals to make more space in the burial, moving individuals to a secondary location, looting, environmental movement, or a combination of these factors (Perry & Osterholtz, 2020). Due to the multiple factors affecting the state of a commingled collection, there is no one way to analyze it, with the best method involving multiple techniques (Glencross, 2014; Osterholtz *et al.*, 2014). Differing from other bioarchaeological analyses, individual analysis is not possible, but information on the community can still be gathered; what is being analyzed when assessing commingled remains is not the individual but the community (Fox & Marklein, 2014; Glencross, 2014; Osterholtz *et al.*, 2014).

Bioarchaeological analysis of commingled collections is important, as it increases the understanding of the ancient Near East by examining the impacts of society and the environment directly on the human body (Sheridan, 2017, 2019). In the Near East, sites with human remains are often under-studied, possibly due to the commingled nature of the burials. If commingled remains are not analyzed, a full understanding of the archaeological record cannot be gathered, and any information gained will be incomplete (Sheridan, 2019). This is especially true with the individuals from WF100 in Jordan, as most of the knowledge about the EBA comes from one site, Bab edh-Dhra, and it is used to infer and represent the whole area of Jordan (Gasperetti & Sheridan, 2013; Ortner & Frohlich, 2007; Phillip, 2008; Sheridan *et al.*, 2014; Ullinger *et al.*, 2012). This

creates issues in the assumption that all EBA communities lived in the same way, with Bab edh-Dhra being the standard for archaeological information. It may be so that during the EBA, communities in different areas across Jordan lived in similar ways, but it is incorrect to apply what is known of Bab edh-Dhra to all other EBA sites in Jordan without further investigations of these other sites. Furthermore, Bab edh-Dhra burials date to EB IA, and EB II-III, skipping EBA IB due to the low recovery of remains from this period (Ortner & Frohlich, 2007; Philip, 2008). As WF100 is dated to EBA IB, it can further fill gaps in knowledge for this period in the EBA. Even at Bab edh-Dhra, large commingled burials are ignored for more individualized burials for ease of analysis; for example, many of the articles that study Bab edh-Dhra samples focusing on the same shaft tombs and charnel houses (e.g. Charnel house A22) due to the lower level of commingling or individual skulls that were recovered (Gasperetti & Sheridan, 2013; Ortner & Frohlich, 2007; Sheridan, 2017; Sheridan *et al.*, 2014; Ullinger *et al.*, 2012).

Limitations do exist when working with commingled remains, which may be the reason they are often ignored and not studied, but by understanding the limitations, important information can still be gathered (Fox & Marklein, 2014; Glencross, 2014; Osterholtz *et al.*, 2014; Sheridan, 2017). It is important to understand and remember that these individuals are human and deserve to not be lost or forgotten but fully understood. To correctly understand the past, all types of information and material need to be looked at, and excluding commingled samples allows for gaps of knowledge and possible overstating of information.

## 5. Material & Methods

### 5.1 Sample

In total, 34 boxes of fragmentary human remains totalling approximately 11,500 fragments from the 13 graves were examined for trauma. As a result of the variable level of preservation and the commingled nature of the burial, most elements could not be included in the study. Elements analyzed included cranial bones, long bones, innominates, and vertebrae. To be included, elements needed to be 50% or more complete. This was decided based on the level of fragmentation and to avoid the same element being included in the study twice due to fragmentation which has been done in other studies (Agnew & Justus, 2014; Gasperetti & Sheridan, 2013; Judd, 2004; Jurmain, 2001; Novak & Slaus, 2012, Tung, 2007). If two or more fragments could be refit, they were counted as one element. In trauma analysis, cranial and long bones are the most common bones included in studies (Fibiger *et al.*, 2013; Gasperetti & Sheridan, 2013; Jurmain, 2001; Novak & Slaus, 2012; Paine *et al.*, 2007). However, trauma in the torso can provide information on the occupation and possible hazards seen in the community (Agnew & Justus, 2014; Steyn *et al.*, 2010). No age exclusion was used in this study, therefore subadult elements were included. Any subadult remains were noted, and age was estimated, but due to preservation level, not many could be included in the sample. Due to commingling, sex estimation was not done on any of the elements. **Table 1** depicts the number of elements included in the study from each grave.

The elements that were not included were the basicranial bones, ribs, phalanges, metacarpals, carpals, metatarsals, tarsals, and patellae. These elements were not included due to the commingling of the remains and time constraints. The inclusion of all remains is important, as all remains can give information on the possible causes and lifestyle of the population (Brickley, 2006). This can only be done, however, if the most information can be gathered from the elements. For example, rib fractures can give plenty of information on the cause of the trauma based on the

**Table 1:** The number of elements that fit the inclusionary criteria in each Grave. **T**=Total

Grave	1	3	5	6	7	8	9	10	11	12	13	16	17	T
Elements	4	13	13	404	0	25	0	0	2	3	1	0	0	465

location (Brickley, 2006). This information can only be gathered if the ribs are well-preserved and the side and number are known (Brickley, 2006). As the remains from WF100 are fragmented and commingled, the information from the ribs cannot be gathered. As for the hand and foot bones, they are important in observing fracture patterns for different occupations (de la Cova, 2010; Judd & Roberts, 1999; Lee *et al.*, 2017), however, the ability to individualize is important. Due to the number of phalanges, metacarpals, and metatarsals, it is not possible to state if only a few individuals suffered from multiple fractures in their hands and feet or if hand and foot fractures were relatively common for multiple individuals. Carpals and tarsals were not examined as they are commonly not analyzed in trauma analysis, and when they are included, fractures are relatively uncommon (Judd, 2004). Hand and foot bones were the most plentiful elements recovered due to their small size aiding in preservation. They could not be included in this study as identification and sorting are beyond the scope of this study.

### 5.1.1 Inventory

Each box and bag from each grave were examined to determine if it could be included in the sample. Due to the degree of fragmentation, a very limited number of elements were included in the sample. All elements that fit the criteria were included in a spreadsheet. The spreadsheet details included the grave, locus, bone, portion of the bone, side, completeness level, if trauma was visible, and any notes about the element. Completeness level was detailed as I= Incomplete, 50-

90% of the element was there, and C= complete, 90-100% was present. Notes on the elements included postmortem trauma, possible pathologies, and how many fragments made up the element.

## ***5.2 Minimum Number of Individuals***

The MNI or the Minimum number of individuals was calculated to estimate how many individuals were recovered from WF100. MNI was estimated rather than MLNI or the Most Likely Number of Individuals due to fragmentation, with MNI calculations being the best technique in this instance (Adams & Konigsberg, 2008). MNI is calculated by sorting the most repeated elements by side, with the greatest number equalling the MNI (Adams & Konigsberg, 2008). Upon intake of the human remains from Jordan, an inventory of the remains was completed, consisting of the grave number, locus, date, bag number, element counts per bag, and siding. This inventory was used to calculate each grave's overall MNI. The most common element and side were determined using the general inventory created upon intake. As the main aspect of this thesis was the trauma analysis and the MNI was done for standardization of the data collection, the MNI is strictly an estimate. The complete inventory of siding and calculating the MNI was not within the scope of this thesis. Bones that were sided were the first option to be used for the estimation, but in the case where there were no side-able bones, the MNI was calculated using other identifiable fragments. Some elements that were included in the inventory were not sided, in these cases, MNI was calculated by dividing the unsided elements by 2. As the most prevalent element was almost fully intact tarsals, the landmark method was not used (Adams & Konigsberg, 2008). The inventory only included adult fragments and noted the number of subadult fragments. A fellow student did the MNI for subadult remains for Grave 6, and their numbers were added to the adult MNI calculated for that grave, for all other graves, MNI=1 has been arbitrarily assigned if subadult

elements were recovered in that grave. The MNI was also calculated for the sample using the same method of the most common element and side.

### ***5.3 Trauma Analysis***

Each bone was visually examined for indicators of trauma, along with microscopic assessment. Due to the low preservation at the site, the majority of the elements were fragmentary. Indicators of trauma including the overall shape, angle, fracture edge, fracture morphology, and colour were examined for each element.

#### ***5.3.1 Antemortem vs. Perimortem vs. Postmortem***

All damage was stated as antemortem, perimortem, or postmortem in nature. Antemortem trauma was identified by uniform colouration, signs of remodeling, rounded edges of the fracture, and abnormal angle or shape of bone (Kranioti, 2015; Lovell, 1997; Ubelaker & Montaperto, 2013). Perimortem trauma was identified by uniform colouration, incomplete or greenstick fractures, sharp fracture edges at acute or oblique angles, and the presence of concentric or radiating fractures (Kranioti, 2015; Lovell, 1997; Ubelaker & Montaperto, 2013). Postmortem damage was identified by the lighter colouration of the trauma, blunt fracture edges, fractures at right angles, and rough fracture margins with many small fragments (Kranioti, 2015; Lovell, 1997; Ubelaker & Montaperto, 2013).

#### ***5.3.2 Sharp Force Trauma***

Sharp force trauma was identified by linear lesions on the element (Brickley & McKinley, 2004; Symes *et al.*, 2015). Incised wounds were identified by relatively shallow or deep simple straight wounds with clean edges that were longer than depth (Brickley & McKinley, 2004; Symes *et al.*, 2015). Puncture wounds were identified by compression of the outer table of bone in a localized area, with a depth longer than the width (Symes *et al.*, 2015). Chopping wounds were

identified based on the mixed presence of sharp force trauma and blunt force trauma characteristics, including an incised cut in the bone with clean edges, flaking and rough edges on opposing side, and radiating fractures (Brickley & McKinley, 2004; Symes *et al.*, 2015).

### *5.3.3 Blunt Force Trauma*

Blunt force trauma was identified by the observation of plastic deformation of the bone, internal beveling of the cortex, delamination of the bone, and fractures typical of direct impact (Lovell, 1997; Symes *et al.*, 2015). Blunt force trauma to the cranium was identified by radiating and concentric fractures around a localized location, the impact site, a depression of the ectocranial or internal beveling of the endocranial (Brickley & McKinley, 2004; Symes *et al.*, 2015). Cranial blunt force trauma was categorized as linear, depression, or other, such as hinge fracture, Le Fort fractures, etc. (Kranioti, 2015). Depression fractures were then categorized as stellate, pond, and comminuted (Brickley & McKinley, 2004). Stellate fractures are star-shaped with radiating fractures, pond fractures are shallow depression fractures and comminuted fractures include multiple radiating and concentric fractures causing fragmentation (Kranioti, 2015; Lovell, 1997; Passalacqua & Rainwater, 2015). Based on the presence of these features, the point of impact and the minimum number of impacts was determined (Symes *et al.*, 2015).

### *5.3.3 Recording Form*

All antemortem and perimortem trauma was analyzed and described further using recording forms. The recording forms were created using Lovell's (1997), Wedel & Galloway's (2014), and Brickley & McKinley's (2004) guidelines on identifying and describing trauma. These established methods were chosen as they are referenced in multiple papers in the method sections and provide descriptive yet conclusive methods for recording trauma. The recording forms included the bone affected, the location on the bone, the type of fracture, evidence of healing, and

much more. Antemortem trauma was scored on a scale of 0 to 3, with 0 meaning no signs of healing and 3 being fully healed (Baustian *et al.*, 2012). Lovell's (1997) three-step method was used when identifying fractures; first, the fracture type was identified, followed by the mechanism of injury, and lastly, the interpretation of the cause of the injury. Apposition was the horizontal displacement of the fracture fragments and was recorded in antemortem trauma (Lovell, 1997). Angulation is the level of displacement of the fracture fragments from the midline and was noted in antemortem trauma (Lovell, 1997). If two injuries occurred on one element, they were counted as one for the frequency of trauma.

The interpretation of the ultimate cause was the last step after fully describing the trauma and analyzing possible differential diagnoses. Overall and close-up photographs of the ante- and perimortem trauma were taken with a scale. Radiographs and photographs taken with a microscope were utilized for some elements for further detail and analysis. X-rays were taken at the Department of Kinesiology and Health Sciences on the Waterloo campus. Once all the bags and boxes for each grave had been examined, all bones identified with trauma were examined again for additional detail and clarification.

## 6. Results

### *6.1 Minimum Number of Individuals*

Using the inventory from WF100, the MNI for each grave and the overall MNI could be estimated. For Grave 1, the most prevalent element was the glenoid fossa of the scapula, with 2 lefts being identified; therefore, the MNI is 2. For Grave 3, a total of 13 unsided tali and a few subadult remains were recovered. To calculate the MNI, the 13 tali were divided by 2, and 1 was added for the subadult fragments, giving an MNI of 8. Grave 5's most prevalent element was the atlas, the first cervical vertebra, providing an MNI of 4. In Grave 6, 28 left and 26 right tali were recovered, and the subadult MNI was found to be 15 by a fellow student (Amanda KUBIAK personal communication, 2024); therefore, the MNI for Grave 6 is 43. In Grave 7, 2 right calcanei were recovered, giving an MNI of 2. Within Grave 8, 32 tali and multiple subadult fragments of at least 2 different ages were recovered; by dividing 32 by two and adding the subadults, the MNI is 18. The MNI for Grave 9 is 1 as only 1 identifiable element type was recovered, with 1 lateral and 1 intermediate cuneiform recovered. In Grave 10, only 9 cranial vault fragments were recovered, therefore the MNI is 1. Five mandibular fragments were recovered in Grave 11, giving an MNI of 2 as it cannot be determined if the fragments are from one or multiple individuals. In Grave 12, 3 unsided calcanei and several subadult fragments were recovered, by dividing 3 by 2 and adding the subadults, an MNI of 3 is estimated. Grave 13 recovered 5 unsided proximal ulnar heads and a small amount of subadult fragments, giving an MNI of 4 by dividing 5 by 2 and adding 1 for the subadult fragments. In Grave 16, 4 unsided tali and several subadult fragments were recovered, by dividing 4 by 2 and adding 1 for the subadult fragments, and MNI of 3 is estimated. Only one element for different landmarks was recovered, such as 1 pisiform and 1 proximal ulna, which was found in Grave 17, giving an MNI of 1.

The MNI for the sample of 465 elements is smaller due to the inclusion criteria. In Grave 1, only 4 vertebrae were recovered, and it is impossible to say if they were from 1 individual or 4. Using the rules for MNI calculations, the MNI for Grave 1 in the sample is 1. In the sample from Grave 3, 1 juvenile radius and 2 adult ulnae were included, with 1 being a left and the other being a right; therefore, the MNI is 2. For Grave 5, multiple skulls were recovered, allowing for a more accurate MNI to be estimated. Three individual skulls were recovered, with the MNI for Grave 5 being 3. Grave 6 was the largest charnel house excavated, making up most of the sample in this study. A total of 32 humeri were included in the survey, with 12 identified as lefts and 17 as rights. There were 4 right subadult femurs, 3 lefts, and 3 that could not be sided. With this, the MNI for Grave 6 is 23, adding together the 4 right subadult femora, 2 unsided subadult femora, and 17 right adult humeri. In Grave 8, 1 subadult thoracic vertebrae and 4 adult radii were included in the study, with 2 being lefts and 2 being rights, giving an MNI of 3. Grave 11 only recovered two different elements that could be included in the study, leaving the MNI at 1. Three bones were included in the sample from Grave 12, and as they are all different elements, the MNI is 1. Only one element was included from Grave 13, giving an MNI of 1. Due to the fragmentation level, no elements from Grave 7, 9, 10, 16, and 17 could be included in the sample (no long bones, cranial fragments, vertebrae, or innominate over 50% completed), leaving the MNI at 0 for the sample. **Table 2** depicts the MNI counts for each grave using the overall inventory and from the sample. **Table 3** displays the elements and numbers from each grave included in the study.

**Table 2:** MNI for each Grave based on overall inventory and the sample of 465 elements examined for trauma.

Grave	1	3	5	6	7	8	9	10	11	12	13	16	17	T
MNI Inventory	2	8	4	43	2	18	1	1	2	3	4	3	1	<b>92</b>
MNI Sample	1	2	3	23	0	3	0	0	1	1	1	0	0	<b>35</b>

**Table 4:** Number of elements in the sample from each grave. **G**=Grave. **T**=total. Where relevant, values have been presented as (Left/Right), Total count.

Elements	G1	G3	G5	G6	G8	G11	G12	G13	T
Frontal			3	8					11
Parietal			(3/1), 4	(5/4), 13					17
Occipital				5					5
Temporal			3	7			1		11
Maxilla		1	1	2					4
Zygomatic			1	2		1			4
Mandible				9					9
Scapula									0
Clavicle				(9/11), 21	(1/0), 1				22
Manubrium				2					2
Humerus		(1/0), 1		(13/17), 32		1			34
Ulna		(1/1), 2		(7/14), 21	(1/2), 3		(0/1), 1		27
Radius		1		(6/3), 10	(2/2), 4				15
Femur				(12/5), 21					21
Tibia			(1/0), 1	(11/3), 18	(1/1), 2				21
Fibula				(2/4), 6					6
Cervical	1	4		61	10		1		77
Thoracic		4		90	5				99
Lumbar	3			60				1	64
Sacrum				2					2
Innominate				(12/2), 14					14
<b>Total</b>	<b>4</b>	<b>13</b>	<b>13</b>	<b>404</b>	<b>25</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>465</b>

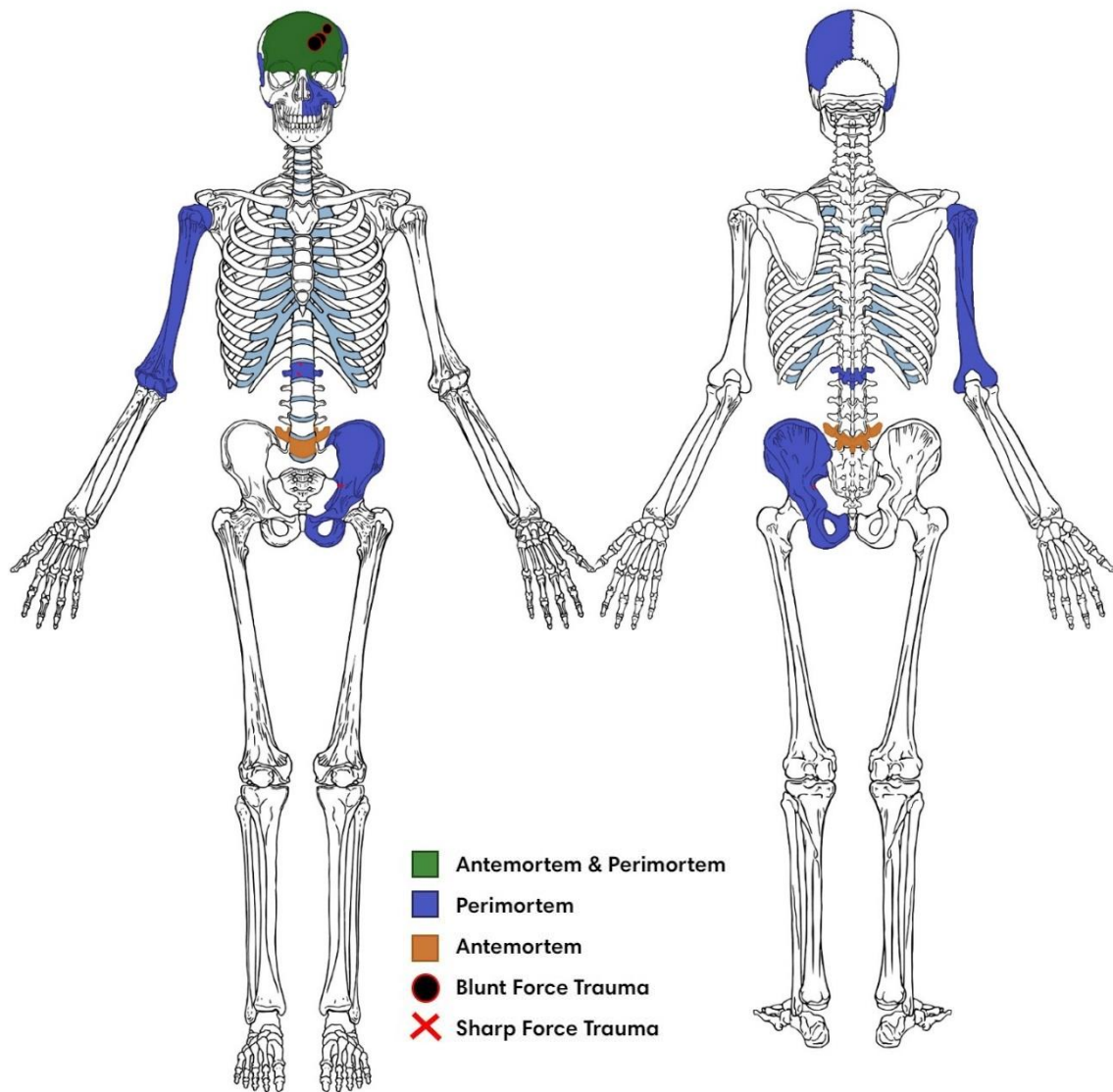
## 6.2 Overall Pattern

The elements where trauma was identified from each grave can be viewed in **Table 4**. Trauma was observed in 10 of 465 elements. Trauma was only observed in Grave 5 and Grave 6, with Grave 6 having the greatest frequency of trauma (8/10, 80%), however, it also had the greatest number of elements included in the sample.

**Table 6:** Number of traumatic injuries observed in the sample within each grave by element. %-percent of elements with trauma compared to the total seen in the sample.

Elements	G1	G3	G5	G6	G8	G11	G12	G13	T	%
Frontal			2	1					3	27.27%
Parietal				1					1	5.88%
Temporal				1					1	9.09%
Maxilla				1					1	25.00%
Humerus				1					1	2.94%
Lumbar				2					2	3.13%
Innominate				1					1	7.14%
<b>Total</b>	0	0	2	8	0	0	0	0	10	2.15%

Trauma was frequently observed on the frontal, with 3 out of the 11 (27.27%) frontal bones included in the sample being identified with trauma. The region of the body most affected by trauma was the skull, with 6 out of 10 injuries being located on the cranium (60%). For comparisons with other studies, long bone fractures were seen in 1/124, and trauma in the thorax was seen in 2/244 elements. **Figure 7** depicts the pattern of trauma throughout the body, detailing what type of trauma was most prevalent and where.



**Figure 7:** Location of antemortem, perimortem, BFT, and SFT trauma to the commingled remains of WF100. No definite level for vertebra. BFT only shows direct trauma location.

Only fractures and sharp force trauma were identified, with no evidence of dislocations. This is unsurprising as identifying dislocations in skeletal remains is uncommon in bioarchaeology (Judd, 2004; Jurmain, 2001; Lovell, 1997). A total of 58 subadult elements were included in the study, with none showing evidence of trauma. **Table 5** describes all the trauma observed, summarizing the information on the trauma analysis forms.

**Table 8:** Descriptions of the elements where trauma was observed and the reasoning for the determination of the type of trauma. **BFT**= blunt force trauma. **SFT**= sharp force trauma. **Fx**=fracture. **Ant**=anterior. **Inf**=inferior. **Sup**=superior. **L**=left. **R**=right.

<b>G</b>	<b>Bone</b>	<b>Type</b>	<b>Description</b>	<b>Why</b>
5	Frontal	BFT	Perimortem comminuted depression fx with radiating fx to the L portion of the frontal	Radiating and concentric fx are uncommon in postmortem trauma.
5	Frontal	BFT	Perimortem comminuted depression fx with radiating fx to the L portion of the frontal	Radiating and concentric fx are uncommon in postmortem trauma.
6	Parietal (L)	BFT	Perimortem endocranial hinge fx with radiating fx through meningeal grooves	Radiating fx following meningeal grooves- perimortem
6	Maxilla (L)	BFT	Perimortem Le Fort I fx, two portions still attached	Postmortem to the thin bone causes more fx. No evid healing
6	Vertebra (Lumbar)	Fx	Possible antemortem trauma of the L lamina of the neural arch	Doesn't match pathology, visual defect in the neural arch
6	Frontal	BFT	Antemortem pond depression to the L portion sup to the orbital	Not pathological- not correct area. Not trepanation- doesn't affect the endocranial table
6	Temporal (R)	BFT	Transvers fx of the petrous portion	Sharp fx edges, smooth surface- perimortem
6	Humerus (R)	Fx	Perimortem lateral lambda fx of the supracondylar area	Sharp fx margins, follows fx pattern, dark colouration
6	Innominate (L)	SFT	Incised perimortem lesion between the sacral notch & ischial spine	Straight lesion, colouration, and sharp edges perimortem
6	Vertebra (Lumbar)	SFT	Two perimortem stab wounds, one ant and one inf on the body	Straight lesions, sharp edges, colouration

### 6.3 Antemortem

Antemortem trauma was seen on 2 elements from Grave 6, on one frontal and one lumbar vertebra. Antemortem trauma was described using a ranking of 0 to 3; both elements were rated a three for fully healed. **Figures 8 & 9** depict the bones with antemortem trauma. The depression fracture to the frontal bone is difficult to image but can be perceived in the radiograph in the shadow. The trauma to the lumbar vertebra was not able to be fully identified. Visual observations revealed an abnormal neural arch with bone growth on the left lamina and misalignment of the spinous process. It appears to be a healed fracture of the left lamina, akin to spondylolysis. However, radiographic imaging showed no signs of healing in the neural arch.



**Figure 9:** Frontal bone with healed depression fx on L portion. Radiograph of frontal bone showing the depression fx (arrow).

The radiographs of the lumbar vertebrae also revealed a Schmorl node in the vertebral body. Schmorl nodes have previously been included in trauma analysis (Lovell, 1997), but further research has shown that the cause is varied and can not always be linked to trauma, but can be caused by congenital, degeneration, and pathological conditions (Brito & Santos, 2024; Faccia *et al.*, 2008; Dar *et al.*, 2010). Studies have also shown no connection to any occupation or physical labour (Brito & Santos, 2024; Faccia *et al.*, 2008; Dar *et al.*, 2010).



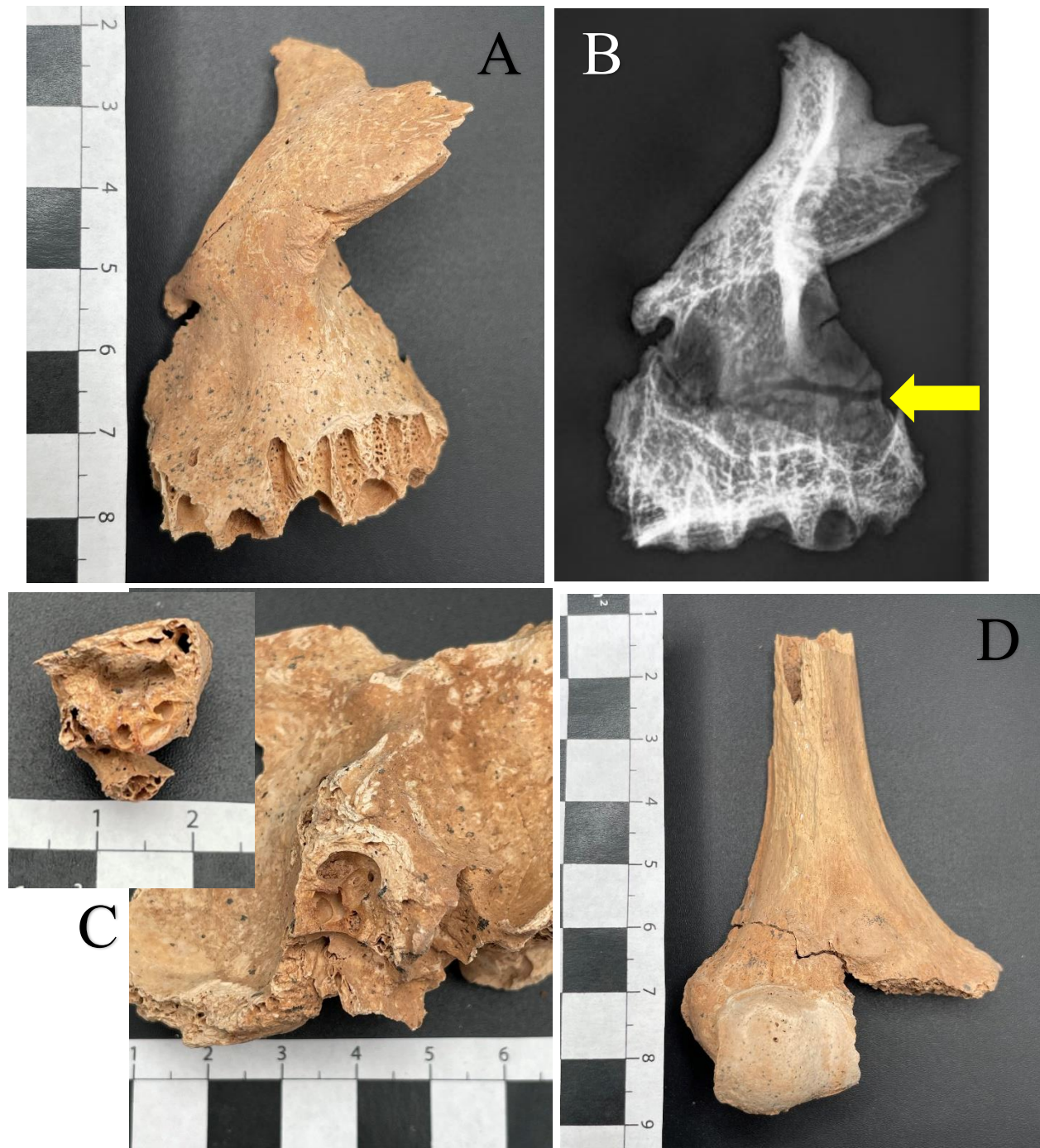
**Figure 10:** Lumbar vertebra with possible healed trauma. Radiograph of lumbar vertebra showing no evidence of healing in the neural arch.

#### ***6.4 Perimortem***

Perimortem trauma was the most common form of trauma observed, making up 80% of the trauma, and being seen in 8 of 10 elements. **Figure 10** depicts the perimortem trauma observed in the sample. Trauma was observed on the innominate, maxilla, frontal, parietal, humerus, and temporal bone. These include blunt force trauma, sharp force trauma, supracondylar fracture of the humerus, and interior hinge fracture of the parietal. The temporal bone fracture may be antemortem, but it is impossible to say due to the bone's difficulty in healing (Ishman & Friedland, 2004; Zehnder & Merchant, 2004).

There were also a few cases of broken edges that showed morphology for both perimortem and postmortem trauma. It is possible that these fractures occurred around the time of death, but postmortem damage occurred in the same location, obscuring the perimortem damage. It is also possible that the damage occurred after death when the bone was in a state where it was both wet

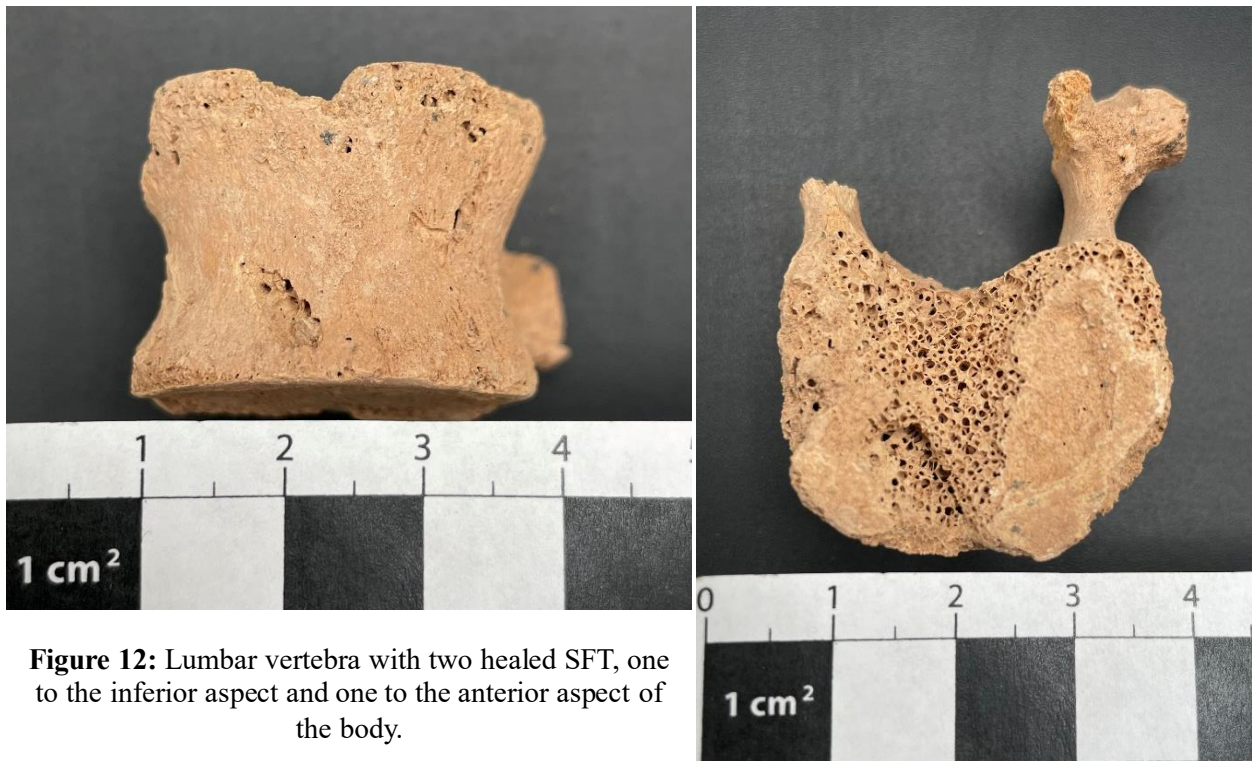
and dry. In these cases, the damage was categorized as postmortem as it obscured the perimortem trauma, and therefore, any descriptions or interpretations would be incomplete or inaccurate.



**Figure 11:** A & B- Perimortem Le Fort I fracture of the left maxilla. The radiograph shows the fracture location above the alveolar process. C- Transverse fx of the right temporal bone. D- Lateral supracondylar humerus fx.

### 6.5 Sharp Force Trauma

Sharp force trauma was observed on 2 bones, an upper lumbar vertebra, and the left innominate, both being perimortem. Two sharp force traumas were observed on the lumbar vertebra (**Figure 11**). Both wounds are indicative of stab wounds due to the location, the size of the trauma, and the depth of the wound. The injury occurred to the anterior or frontal portion of the vertebral body, indicating a frontal insertion. The injury to the anterior body is 7.8mm long, and 3.8mm wide, and the injury to the inferior body is 10.4mm long, with both being a few mm deep. The incision to the innominate is 11.9mm long and approximately 3mm deep, located between the sacral notch and the ischial spine (**Figure 12**). The incision could have occurred posteriorly, most likely also affecting the sacrum, or occurred anteriorly, directed downwardly through the pelvic cavity. It appears diagonal in orientation, but the lesion is horizontal when orientated in anatomical position. A long sharp-edged weapon would have been needed to produce the sharp force trauma observed on both elements.



**Figure 12:** Lumbar vertebra with two healed SFT, one to the inferior aspect and one to the anterior aspect of the body.



**Figure 13:** Incision on the left innominate between the sacral notch and ischial spine from two angles.

### ***6.6 Blunt Force Trauma***

Blunt force trauma was observed in 6 of 10 elements including the frontal bone, maxilla, temporal, and parietal. Two cases of blunt force trauma that are significant are two skulls recovered from Grave 5, Individuals 2 & 3. The two skulls were photographed after removal but only held together by the cement-like soil (**Figure 13: A-B**). Once the soil started to be removed, the skulls fragmented into a multitude of small fragments, with the piecing together of these fragments being very unlikely. In the photos of these skulls before the fragmentation, blunt force trauma depression fractures can be observed on the left portion of both frontal bones. They can be identified by concentric fracturing in the localized area of impact with radiating fractures surrounding the impact. A similar blunt force trauma was seen on the frontal bone from Grave 6 (**Figure 8**) but was

antemortem in nature. The trauma was in a similar location, but the impact may have been lesser as there is no evidence of radiating fractures, only a slight depression from the impact. In these three cases, the direct location of impact can be determined. Blunt force trauma was also observed in the parietal from Grave 6 with an internal hinge fracture (Figure 13: C). There was no evidence of an impact on the endocranial surface.



**Figure 14:** A- Individual 2 cranium showing BFT to left portion of the frontal bone. B- Individual 3 cranium showing BFT to left portion of the frontal bone. C- Hinge fx (thick arrow) on the inner table of the parietal with radiating fx's through the meningeal grooves (thin arrow).

### ***6.7 Postmortem***

While examining the remains, a considerable amount of postmortem damage was observed. The most note-worthy trauma was multiple cases of small incision marks along the cortex of the remains in Grave 6. These markings were on the humerus, femur, tibia, clavicle, radius, and frontal bones, of adult and subadult remains; in total, 33 bones exhibited these markings. They varied from singular long incisions to multiple short parallel incisions, all shallow in depth. The examination and analysis of these markings are beyond the scope of this research; therefore, they are only noted in the inventory spreadsheet and briefly mentioned here.

## 7. Discussion

### 7.1 Interpretation

The minimal presence of trauma observed in this sample provides important insights regarding the lives of those living at WF100 in EBA IB. Given that research on life in the EBA I in the Southern Levant has demonstrated the possibility of differences in squatting or grinding positions compared to other EBA periods (Ullinger *et al.*, 2012), indicators of care (Ortner, 1979), and a high prevalence of interpersonal violence (Gasperetti & Sheridan, 2013), a similar pattern of trauma at WF100 might be assumed. Previous research shows an increase in accidental injuries of the arms due to hard labour and animal husbandry (Cogbill *et al.*, 1991; Gorucu *et al.*, 2022; Judd & Roberts, 1999; Lee *et al.*, 2017), and as the craft specialization with copper smelting and animal husbandry started to increase from the beginning of the EBA, a similar fracture pattern could be assumed. Injuries in agriculture included machine accidents, falls, and injuries caused by animals (Cogbill *et al.*, 1991; Gorucu *et al.*, 2022). For the mechanism of injuries, adults were commonly injured by animals, with children being injured by falls, with falls causing head injuries in 42% of injuries (Cogbill *et al.*, 1991). Upper extremity injuries are also common in construction work, with falls causing 22% of injuries (Dethlefsen *et al.*, 2022; Konda *et al.*, 2016). Head injuries were the next most common area, commonly causing traumatic brain injury (Konda *et al.*, 2016). In agriculture, construction, and trauma overall, those injured the most were males (Bolandparvaz *et al.*, 2017; Cogbill *et al.*, 1991; Dutton *et al.*, 2010; Gorucu *et al.*, 2022; Konda *et al.*, 2016; Tomas *et al.*, 2023; Verma *et al.*, 2013). The leading causes of trauma overall are motor vehicle accidents and falls, with the head, neck, and limbs being frequently injured (Bolandparvaz *et al.*, 2017; Dutton *et al.*, 2010; Tomas *et al.*, 2023; Verma *et al.*, 2013).

Based on the low frequency of fractures, the community lived in an environment with few occupational or environmental hazards leading to traumatic bone injuries. Although only a few healed injuries were observed, the type of injuries discovered would have required some form of care from others to be in the state of healing observed, showing that some small-scale care occurred within the community. The healed depression fracture to the frontal and the possible antemortem trauma to the temporal bone would have possibly affected the individual's day-to-day life and required care from others in the community. Overall, the WF100 sample had a low level of trauma, with all injuries occurring in adult individuals. The two skulls from Grave 5 affected by blunt force trauma were identified as most likely adult females, but due to the commingling, providing biological profiles for other individuals in the charnel houses is not possible.

Due to the commingling of the remains, it is difficult to determine the MNI with trauma compared to those without. For Grave 5, this is simple, as the two forms of trauma were on the frontal bones of the skull. For Grave 5, the MNI for the sample was 3, with two of these individuals having trauma (66.67%). Grave 6 had an MNI of 23 within the sample, with 8 cases of trauma. These cases were all in different elements, meaning that it is possible that all the trauma observed was from one individual. In this case, the MNI with trauma in Grave 6 is 1 out of 23 (4.35%). If all trauma occurred in different individuals, then a maximum of 8 out of 23 (34.78%) individuals in the sample had trauma. The total MNI in the sample was 35, and using the MNI with trauma, 3 out of 35 (8.57%) individuals at WF100 were observed with trauma, with a maximum of 10 out of 35 (28.57%). It is important to acknowledge the limitations of MNI calculations and how they vastly underestimate assemblage size (Adams & Konigsberg, 2008; Sheridan, 2017). Instead of taking the MNI as a factual number, it should be used for discussion and estimation. In this case,

the MNI has been used to compare the number of individuals in the sample that possibly had trauma to the maximum number of individuals in the sample that could have had trauma.

### *7.1.1 Occupation*

Life in the EBA I would have included the production of ceramics and copper artifacts, tending to animals, agricultural fields and irrigation systems, and production of structures (Barker *et al.*, 2007; Ullinger *et al.*, 2012). As the population during the EBA I increased into large villages, craft and food production would have also increased (Barker *et al.*, 2007; Chesson, 2018). This increase in craft and food production would decrease the likelihood that all individuals contribute to all aspects of society (Barker *et al.*, 2007; Chesson, 2018). Instead, separate activities, such as tending to agricultural fields, mining and smelting of copper, and controlling the water irrigation systems, are separated and given to individual groups to complete (Barker, 2000; Barker *et al.*, 2007; Chesson, 2018).

Using skeletal trauma, occupational or behavioural markings is hard to identify, but it is possible (Agnew & Justus, 2014; de la Cova, 2010; Lee *et al.*, 2017; Ullinger *et al.*, 2012). The one lumbar vertebral injury can help indicate possible behavioural patterns in occupation. Frequent vertebral fractures are associated with physical labour or a rigorous lifestyle (Agnew & Justus, 2014). The lack of trauma seen in the vertebra, the most common element observed, can allow interpretations of the community's behavior. As only 0.42% (1/240) of the vertebra in the sample had fractures, an understanding can be made that much of the population examined was not involved in labour-intensive activities. The increased water irrigation and agricultural technology possibly allowed for an easier life with less physical labour (Barker, 2000; Barker *et al.*, 2007; Chesson, 2018). It is also important to note that due to the nature of burst and compression fractures

to be comminuted and contain many small fragments, they may have been excluded from the sample, explaining the low frequency of vertebral trauma.

### 7.1.2 Violence

Identifying blunt force trauma and sharp force trauma in the sample allows the interpretation that some form of violent activity occurred in the sample. Sharp force trauma is more definitive proof of violence than blunt force trauma due to the nature of the injuries (Novak & Slaus, 2012). To identify the pattern of violence in bioarchaeological samples, modern forensic data is commonly used (Ambade & Godbole, 2006; Brink *et al.*, 1998; Fibiger *et al.*, 2012; Kremer *et al.*, 2008; Symes *et al.*, 2015; Ubelaker & Montaperto, 2013). This is due to the common focus of the head and chest historically in altercations but as patterns of violence can vary in different cultures, this should always be considered when using interpretations based on modern trauma patterns (Brink *et al.*, 1998). Forensically, sharp force trauma is seen in the chest 72.5% of the time, followed by the abdomen in 42.9% of cases (Ambade & Godbole, 2006). With sharp-force trauma, it is important to note that most injuries caused by projectiles or weapons do not affect the bone; therefore, in the archaeological record, sharp-force trauma will always be underestimated (Judd & Redfern, 2012). A total of 2 sharp force traumas were observed in the WF100 sample of 10 elements bearing trauma, with sharp force trauma being 20% of the trauma seen in the sample. Both elements observed were in the abdomen, fitting the pattern of sharp force trauma. Based on the location and depth of the injuries, both wounds were most likely directed to severely harm the individual(s) (**Figures 11 & 12**). The low prevalence of sharp force trauma is more indicative of instances of interpersonal violence rather than large battles or wars. A long sharp weapon would have been needed to cause the injuries in both cases.

Accidents commonly cause blunt force trauma and can not always be attributed to violence, however, blunt force trauma to the cranium is more common with interpersonal violence than accidents (Byers, 2017; Cohen *et al.*, 2014; Fibiger *et al.*, 2012; Kranioti, 2015; Lovell, 1997). The location of the trauma can assist in interpreting whether the trauma was accidental or violent. Based on forensic data, during interpersonal violent altercations, the head, neck, and face are targeted 69% of the time, with the head being the focus of blunt force trauma 80% of the time (Ambade & Godbole, 2006; Brink *et al.*, 1998). Linear cranial fractures and fractures in the hat brim line are commonly due to accidents, while depression fractures and fractures above the hat brim line are more indicative of interpersonal violence (Kranioti, 2015; Kremer *et al.*, 2008). The hat brim line is an area of the skull lying above the auditory meatus, the ear canal, and below the supraorbital ridge, or the eyebrows (Kremer *et al.*, 2008). In physical altercations, the left side of the face or body is frequently targeted based on right-hand dominance (Brink *et al.*, 1998; Kremer *et al.*, 2008). This similar pattern of trauma is seen in the sample from WF100, as four cranial blunt force traumas were observed on the left portion of the cranium above the hat brim line, with three being depression fracture's (**Figure 8 & Figure 13: A-B**). Localized, or singular depression or puncture wounds to the cranium are not common in falls (Judd, 2004); however, due to the fragmentation and commingling of the remains seen at WF100, it cannot be said if the blunt force traumas seen in the sample in Grave 6 were localized or not. Blunt force trauma was also seen with the Le Fort I fracture to the maxilla, which is the result of an impact on the alveolar process, but the impact can also be caused by falls or violence (Adserias-Garriga, 2019; Wedel & Galloway, 2014). Similarly, blunt force trauma to the temporal bone is mostly commonly caused by falls, followed by violent assaults (Ishman & Friedland, 2004). In both cases, it is not possible to state the ultimate cause and link either of these injuries to interpersonal violence.

Bab edh-Dhra had a high level of trauma observed in the cranium, with 15 out of the 63 crania from the EBA IA being identified with trauma (23.8%), with seven being located on the frontal bone (36.8%), and 14 of the EBA II-III crania having trauma (20.9%), with 8 located on the frontal bone (47.1%) (Gasperetti & Sheridan, 2013). Using multiple studies from other areas and periods, a high frequency of cranial trauma ranged from 15-30%, moderate frequency ranged from 7-13%, and low frequency ranged from 1-4% (Gasperetti & Sheridan, 2013; Judd, 2004; Jurmain, 2001; Paine *et al.*, 2007; Tung, 2007). The rate of cranial trauma at WF100 was 9.83% (6/61), but a direct comparison to other studies cannot be fully made as their frequencies are based on complete skulls, while the frequency at WF100 is based on individual elements. All lesions from Bab edh-Dhra were above the hat brim line and included blunt force trauma and sharp force trauma (Gasperetti & Sheridan, 2013). From this study, it was determined that at Bab edh-Dhra during the EBA, violence was a major social aspect (Gasperetti & Sheridan, 2013). More trauma was observed at Bab edh-Dhra than at WF100, but similarities can be viewed in the mechanism of trauma. At both sites, trauma to the skull occurred commonly to the frontal bone, above the hat brim, and on the left anterior portion of the skull (Gasperetti & Sheridan, 2013).

The frequency of violence at WF100 is more akin to individual acts of violence rather than battles or wars. The cause of interpersonal violence is hard if not impossible to determine. Due to the few healed injuries and the location of the blunt force trauma to the crania, it is possible that instead of acts of violence intended to kill, these violent acts occurred as punishment or occurred during a sporting or sparing activity, but it is impossible to determine. Domestic violence against women is also a possibility and is identified by healed trauma to women, as women were often not included in battles (Murphy & Juengst, 2020). Two of the cases of blunt force trauma to the skull occurred to individuals 2 and 3, who were identified as most likely female.

### 7.1.3 Health

By analyzing the number and location of antemortem trauma seen in the sample, interpretations of the health and care that occurred at WF100 can be created. The *Index of Care*, created by Tilley & Cameron (2014), is a four-step procedure that includes documenting the individual and the injury, determining if the person would have required daily assistance, creating a 'model of care', and finally, discussing the social implications of the care that would be given. Due to the commingling of the remains, it is impossible to document individuals. In this case, the antemortem injuries will be analyzed based on the possible care the individual would have needed. In total, 2 antemortem injuries were seen in the sample, with one possible antemortem injury.

The antemortem depression fracture to the left frontal bone may have caused traumatic brain injury (**Figure 8**). The frontal lobe is responsible for executive functions and trauma to this area can have long-term consequences for the individual (Tornberg & Jacobsson, 2018). Common symptoms of traumatic brain injuries are dizziness, blurred vision, sensitivity to noise, fatigue, and impairments in attention, learning, and memory (Tornberg & Jacobsson, 2018). Trauma to the left frontal lobe is also known to affect language (Tornberg & Jacobsson, 2018). The injury would have required intensive care immediately after the injury occurred, and the short or long-term symptoms would have caused a need for daily assistance from somebody in the community (Tornberg & Jacobsson, 2018). Based on the state of healing, it can be interpreted that the individual did receive care immediately after the injury occurred, as there are no signs of infection, and the fracture healed very well. It is not possible to state which symptoms the individual may have experienced or what kind of care they would have needed. It can be said, however, that some level of care would be needed and was obtained based on the level of healing, indicating they lived long after they sustained their injury. Another probable case of care can be seen in the transverse fracture of the

petrous portion of the right temporal bone (**Figure 10: C**). Transverse fractures of the temporal bone are less common than longitudinal fractures and are commonly caused by trauma to the occipital or frontal bone (Ishman & Friedland, 2004). This fracture did not have any evidence of healing, but this is common in temporal bone fractures, which commonly show no signs of healing, regardless of the time since the injury occurred (Zehnder & Merchant, 2004). Death due to temporal fractures is uncommon, seen in approximately 19% of cases, but as temporal fractures commonly occur along with other fractures, these deaths could be due to other injuries (Ishman & Friedland, 2004). It is therefore not possible to state if the individual who suffered from this injury at WF100 died around the time the injury occurred or lived for some time afterward, but it is more likely they lived. Transverse fracture to the petrous portion has been noted to cause vertigo, sensorineural and conductive hearing loss, as well as facial nerve paresis in 50% of cases (Ishman & Friedland, 2004; Zehnder & Merchant, 2004). Therefore, the individual may have suffered any or all of these symptoms. Depending on the daily activities done by this individual, the hearing loss may or may not have affected their everyday life. Facial paralysis or weakening could have affected their blinking, speaking, or swallowing ability. In this case, they may have received help from other individuals in the community with everyday activities.

Even though only two antemortem and one possible antemortem injury were observed, they would have produced life-altering effects on the individuals themselves as well as the individuals who cared for them. The type of injuries observed, and the level of healing indicate that some form of health-related care occurred in this community.

## ***7.2 Limitations***

Due to the level of fragmentation, it is important to acknowledge that there could be many traumatic injuries to the bones of WF100 individuals that were not observed in this study. This can

be based on the requirements of the sample (e.g. 50% completeness of elements), or from postmortem damage obscuring the perimortem trauma. As well, not all trauma affects the skeleton, and therefore it will not be seen in the archaeological record (Judd & Redfern, 2011). It is also not possible to identify if most of these traumas occurred on one individual or all occurred on separate people in Grave 6. It is possible that multiple traumas occurred to one individual who lived a more hazardous or violent lifestyle compared to others in the community. It should therefore be noted that the frequencies seen in this study will be less than the actual trauma that occurred in the EBA IB at WF100.

Comparing trauma frequencies and locations from each grave would allow more insight into the kinship groups of the time and the roles each had in society. However, based on the unequal representation of elements included in the sample from each Grave, it is not possible to compare the frequencies and types of traumas seen in each. As the overall comparison can not be completed, this limits the interpretations that can be made. Any information and interpretations that have been made are based on the community at WF100 rather than individual graves.

Due to the commingling of the remains, the identification of patterns of expression within different subgroups in the population was not possible. As only individual elements were able to be analyzed, the individuals they belonged to could not be fully identified. It is not possible to state if males or females had more trauma or which age group trauma was more common. One thing that can be stated is that no trauma was observed in the subadult remains. It can be interpreted then that the children during the EBA IB were not involved in hazardous activities, but further interpretations are limited.

### ***7.3 Future Directions***

Due to the time restraints of this research and the ongoing excavation of the site, there are multiple areas this research can be expanded on in the future. Further analysis of the hands and feet bones will allow further interpretations of hazards due to occupation and the environment. The analysis of the postmortem sharp force damage to multiple elements from Grave 6 will allow for further knowledge to be gained on the treatment of human remains during interment. Lastly, as the excavation of WF100 continues, further graves can be examined to see if consistent interpretations of trauma are made and this research is corroborated, or if these graves represent outliers and other patterning of trauma is viewed in future graves.

## 8. Conclusion

During the EBA IB in WF100, the increase in population size, craft, and food production, and technological advancements compared to EBA IA and the previous Chalcolithic period, would have greatly impacted the social interactions between individuals in the community. With these changes, it could be assumed that interpersonal violence increased as a response to growing tensions within the community (Gasperetti & Sheridan, 2013). Examining the individuals from WF100 has revealed that this is not the case. With a low frequency of both sharp force and blunt force trauma, there is little evidence of interpersonal violence at WF100.

The overall low frequency of trauma observed can also inform us of the lack of environmental or occupational risks or hazards seen in the community. It could be argued that as individuals increased craft specialization with copper smelting and increased animal husbandry, the likelihood of more injuries occurring would also increase due to the hazardous work (Judd & Roberts, 1999; Lee *et al.*, 2017). This, however, was not observed at WF100. Based on the overall low frequency of trauma, it can be said that individuals at WF100 did not often suffer traumatic injuries related to hard labour, accidents, or interpersonal or large-scale violence.

Despite the limitations imposed by the commingled nature and level of preservation of the human remains from WF100, this research has identified several examples of various forms of traumatic injury in this EBA IB community. While the prevalence of trauma was low, it does indicate the presence of some interpersonal violence, instances of care, and the minimal impact of physical hazards from labour or the environment.

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### Appendix

Grave	Architecture	Artifacts	Human Remains	Notes
1	180x120cm, depth of 25cm	2 vessels		
3	300x150cm, depth of 100cm,	Ceramic sherds, beads, 2 small vessels		Orthostats approximately 80cm in height
5	200x120cm, depth of 35cm, double wall, 25cm between each wall	Pot, fragments copper casting mould, copper awl, beads		Two intact skulls- Both laid on their left side, facing East. Indi 2 face directly abutted the posterior cranium of Indi 3
6	428x327cm, depth of 60-80cm.	60 beads, 2 clam shells, 1 vessel	78 bags, 103 bags of teeth	L6 very well preserved
7	335x288cm, depth of 20cm, double wall	1 tan bead	5 bags, 3 bags of teeth	No pisé in wall construction
8	563x204cm, depth of 36cm, 2 symmetrical stone platforms SW & SE corners	Ceramic sherds, 52 beads, 2 vessels	33 bags, 22 bags of teeth	
9	375x317cm, depth of 29cm, D-shaped	Ceramic sherds	4 bags, 4 bags of teeth	Relatively empty.
10	354x302cm, depth of 69cm, rounded	1 white bead	3 bags, 4 bags of teeth	
11	386x370cm, depth of 18cm, rounded	1 tan bead	6 bags, 7 bags of teeth	L3- layer of thick, flat, white stones laid interlocking
12	396x368cm, depth of 39cm	4 vessels	6 bags, 7 bags of teeth	E half fully looted, W untouched
13	309x481cm, depth of 18cm, double walled	Vessel, several small pieces of copper	4 bags, 3 bags of teeth	Stone floor of grave, with a step down in the southern end
16	536x450cm, depth of 29cm, complex multi-wall structure	Ceramic sherds, 4 beads	7 bags, 10 bags of teeth	
17	438x252cm, 29cm deep, D-shaped	Ceramic sherds	5 bags, 3 bags of teeth	

**Table A:** Description and Inventory of each Grave from WF100



06/20/24  
Date: 05/13/23  
Bone ID: 06 L5 CF3

Recording Blunt Force Trauma (Cranium) Form

**Bone Affected:** Left portion of frontal, 30mm L of top of frontal crest

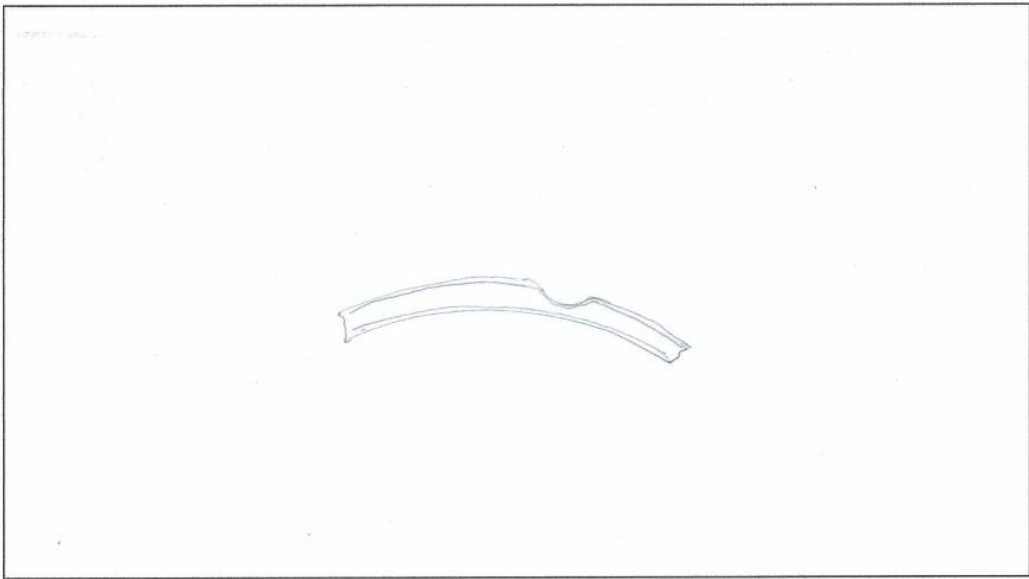
**Part of Bone:** outer table of bone show depression of bone, no affect to inner table viewed.  
fully healed, only slight depression & thin table viewed due to postmortem damage

**Type of Fx:** Depressed (pond)      Depressed (stellate)      Depressed (comminuted)  
Expressed

**Point of Impact:** above orbital, approx 18.2mm diameter,

**Evidence of healing:**      0      1      2      3

**Presence of concentric or radiating fx** none



Created using Roberts & Connell (2004), Lovell (1997), and Baustian et al. (2012) standards and methodology.  
no healing=0, minimal healing=1, less then complete healing=2, complete healing=3

**Appendix C: Recording form for depression fx to frontal.**



Date: 05/14/23  
Bone ID: 06L5T1

Recording Blunt Force Trauma (Cranium) Form

**Bone Affected:** R Temporal

**Part of Bone:** Petrous portion

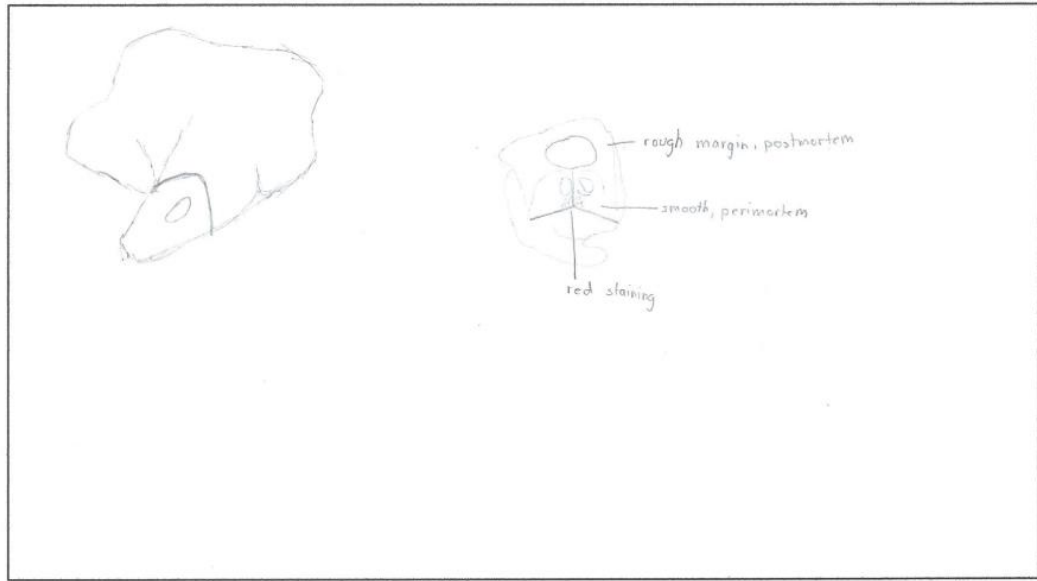
**Type of Fx:** Depressed (pond)    Depressed (stellate)    Depressed (comminuted)  
Expressed    Transverse

red staining on inf fx.  
inf fx in V formation.

**Point of Impact:** indirect trauma

**Evidence of healing:**    0    1    2    3

**Presence of concentric or radiating fx** none, but postmortem damage could be disguising radiating fx



Created using Roberts & Connell (2004), Lovell (1997), and Baustian et al. (2012) standards and methodology.  
no healing=0, minimal healing=1, less than complete healing=2, complete healing=3

**Appendix E: Recording form for temporal fx.**





Date: 06/12/24  
 09/20/23  
 Bone ID: Indi 7 (?)  
 G6L5CP1

Recording Blunt Force Trauma (Cranium) Form

**Bone Affected:** Parietal (L)

young adult, other pieces not fused so fell apart at sutural lines (other parietal, frontal, temporal)

**Part of Bone:** inferior internal portion of parietal

**Type of Fx:** Depressed (pond)  
 Expressed

Depressed (stellate)

Depressed (comminuted)

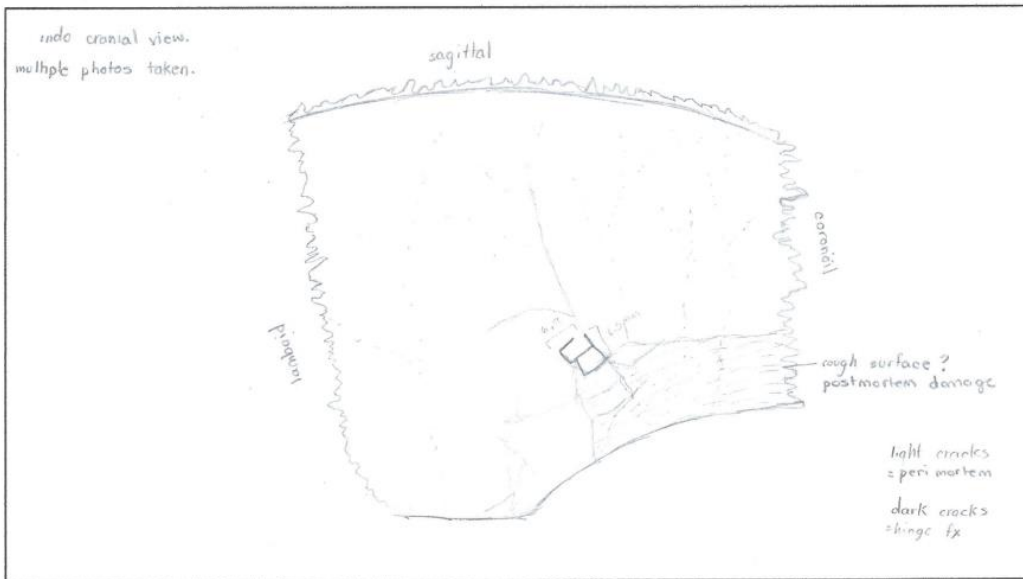
hinge fx or beveling of inner table  
 -rough outer edge under micro but cant see edge of fx - smooth fx edge (hinge fx broke off)

**Point of Impact:** X

outer edge - damage to outer portion were peri trauma is, looks more post mortem - v. frag, brittle, looks like some glue & dirt in wound, possible slight depression/linear fx

**Evidence of healing:** 0 1 2 3

**Presence of concentric or radiating fx** - possible through meingcal vein groove (around)



Created using Roberts & Connell (2004), Lovell (1997), and Baustian et al. (2012) standards and methodology.

no healing=0, minimal healing=1, less then complete healing=2, complete healing=3

**Appendix H: Recording form for parietal hinge fx.**

Date: 07/09/24  
05/10/23  
Bone ID: G6L5 H2

Recording Fracture Form

**Bone Affected:** *Humerus (R)*

**Part of Bone:** Proximal Epiphysis    Proximal 1/3 Shaft    Intermediate 1/3 Shaft  
Distal 1/3 Shaft    Distal Epiphysis    Other:

**Type of Fx:** Spiral    Comminuted    Transverse    Linear  
Oblique    Compression    Depression    Butterfly  
Radiating    Greenstick    Impacted    Burst  
Avulsion    Penetrating  
Indirect or Direct

*dark coloration of fx  
smooth fx margins  
some bl*

**Measurements:**

**Probability of simple or compound:**

**Angular or Spiral deformity:** *none*

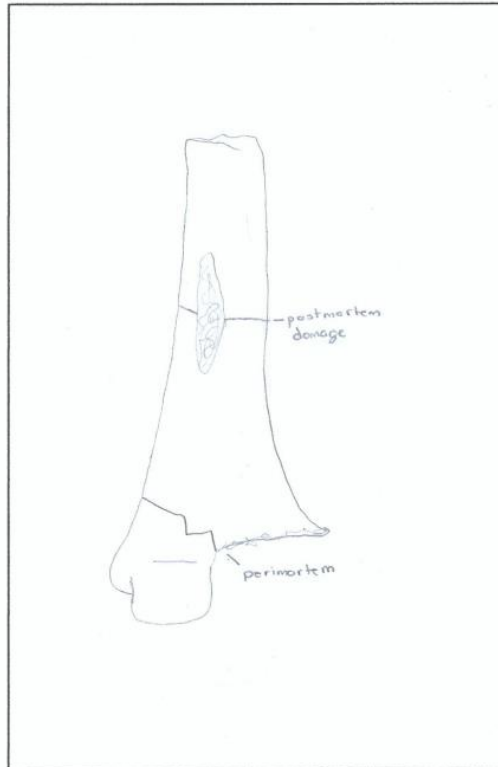
**Apposition of the fx frag:** X

**Amount of overlap:** 0 %

**Evidence of healing:** 0    1    2    3

**Evidence of complications:** X

**Interpretation?** *postmortem?  
low lat condylar fx*



Created using Roberts & Connell (2004), Lovell (1997), and Baustian et al. (2012) standards and methodology.  
no healing=0, minimal healing=1, less than complete healing=2, complete healing=3

**Appendix I: Recording form for humerus fx.**



**Appendix J:** Additional image of humerus with distal fx.



**Appendix K:** Additional image of innominate with SFT.



**Appendix L:** Additional image of antemortem lumbar vertebra with trauma to neural arch.



**Appendix M:** Additional image of parietal with hinge fx.

**Appendix N:** Inventory Spreadsheet.

Date	Grave	Locus	Bone	Portion	Side	Completeness	Trauma	Note
7/9/2019	5	4	Parietal		L	I		Individual 2; Bone # 19.5.040
7/9/2019	5	4	Temporal		L	I		Individual 2; Bone # 19.5.042. in 2 frag with missing frag
7/9/2019	5	4	Frontal			I	Y	Individual 2; Bone # 19.5.038. in many frag, photo of excavation shows possible depression fx of L frontal with radiating fx.
7/5/2019	5	4	Temporal		L	C		Individual 3; bone # 19.5.055. in 2 frag.
7/5/2019	5	4	Temporal		R	I		Individual 3; bone # 19.5.054. in multiple frag. All postmortem damage
7/5/2019	5	4	Zygomatic	frontal proc	R	I		Individual 3; bone #19.5.050.
7/5/2019	5	4	Parietal		L	I		Individual 3; bone #19.5.053, in multiple frag, all postmortem damage
7/9/2019	5	4	Frontal			I		Individual 1; bone #19.5.027, in 30+ frag, all postmortem damage
7/9/2019	5	4	Maxilla		R	I		Individual 1; bone #19.5.022. in multiple frag, all postmortem damage
7/9/2019	5	4	Parietal		L	I		Individual 1; bone#19.5.029. in multiple frag, all postmortem damage
7/9/2019	5	4	Parietal		R	I		Individual 1; bone#19.5.028 in 2 frag. Postmortem damage
7/9/2019	5	5	Tibia	3/3 shaft, distal	L	C		bone# 19.5.075. in 5 frag, all postmortem in box. Possible sharp force trauma distal end.
5/1/2023	6	1	Femur	2/3 distal shaft	L	I		Trab not affected, possible antemortem postmortem damage to base
5/3/2023	6	1	Occipital			I		postmortem damage to base
5/4/2023	6	3	Occipital			I		postmortem damage to base
5/4/2023	6	3	Parietal		R	I		postmortem damage to frontal and sagittal suture edge
5/5/2023	6	3	Vertebra	cervical		I		postmortem damage to posterior neural arch
5/5/2023	6	3	Vertebra	thoracic		I		postmortem damage to body and transverse proc
5/5/2023	6	3	Parietal			I		postmortem damage. In 2 frag
5/5/2023	6	3	Vertebra	cervical		C		slight damage to spinous proc.

5/5/2023	6	3	Vertebra	thoracic			I	postmortam damage, only R portion of body and arch present.
5/5/2023	6	3	Parietal			L	I	postmortem damage. Sagital and lambdoid suture present (sagital suture connects to other parietal, less than 50% complete)
5/5/2023	6	3	Mandible				I	in box; postmortem damage to L ramus (possible R portion found in close prox)
5/5/2023	6	3	Parietal			L	I	in box; postmortem damage to anterior portion- fused with small section occipital and R parietal.
5/5/2023	6	3	Inominate	illium		L	I	juvenile, postmortem damage
5/5/2023	6	3	Ulna	2/3 shaft		R	I	postmortem damage to head and distal end in 4 frag, missing dist epiph-postmortem damage
5/5/2023	6	3	Ulna	prox head, shaft		R	I	missing R portion, all postmortem damage. In 2 frag
5/3/2023	6	2	Frontal				I	missing small portion of body and 2/3 neural arch-postmortem damage
6/26/2019	3	1	Vertebra	cervical			I	missing neural arch- postmortem damage
7/3/2019	3	1	Vertebra	axis			I	bone#19.3.325. more R than L section- 2 premolars in place. Postmortem damage
7/2/2019	3	6	Maxilla				I	bone #19.3.362. in 7 frag. Missing some of olecranon proc. All postmortem damage
7/3/2019	3	6	Ulna			R	C	bone#19.3.333. in 2 frag, postmortem damage to L sup facet & ant arch
7/3/2019	3	6	Vertebra	atlas			C	bone#19.3.160. only slight neural arch, postmortem damage to body
7/4/2019	3	1	Vertebra	thoracic			I	bone#19.3.255. postmortem damage
6/30/2019	3	4	Ulna	prox head. 1/2shaft		L	I	bone#19.3.298. postmortem damage
7/4/2019	3	4	Humerus	dist 2/3, epiph		L	I	Indi-6. no base- postmortem damage
5/8/2023	6	5	Occipital				I	Indi-6. complete, no damage
5/8/2023	6	5	Parietal			L	C	

5/8/2023	6	5	Parietal		R	C			Indi-6. slight damage- some areas covered in dirt with external beveling, most likely postmortem.
5/20/2023	6	5	Frontal				C		Indi-7. younger indi, sutures very open- not fused (20ish).
5/20/2023	6	5	Parietal		L	C		Y	Indi-7. internal damage, small hinge fx- radiating fx (with postmortem damage around), outer portion-most likely postmortem damage
5/20/2023	6	5	Occipital				I		Indi 7. most of base and suture present. postmortem damage
5/20/2023	6	5	Temporal		R		I		Indi-7. no petrous portion, postmortem damage
5/20/2023	6	5	Parietal		R		C		Indi 7. no damage.
7/9/2019	3	99	Vertebra	cervical				I	postmortem damage to transverse procs & sup body.
7/8/2019	3	99	Vertebra	thoracic				I	19.3.566-569. postmortem damage to L transverse proc & spin proc.
7/8/2019	3	99	Vertebra	thoracic				I	19.3.566-569. postmortem damage to L transverse proc & spin proc.
7/8/2019	3	99	Vertebra	thoracic				I	19.3.566-569. in 2 frag, missing L tran sproc & spin proc.
7/8/2019	3	99	Radius	prox head, 1/2 shaft				I	Juvenile- 19.3.531. in 2 frag. No prox head. Postmortem damage.
6/16/2019	1	2	Vertebra	cervical				I	in 2 frag. Only small section of neural arch present. Postmortem damage
6/13/2019	1	2	Vertebra	Lumbar				I	in 2 frag. Postmortem damage, missing spinour proc.
6/13/2029	1	2	Vertebra	Lumbar				I	in 2 frag, postmortem damage, damage to tran proc.
6/14/2019	1	2	Vertebra	Lumbar				I	missing tran proc. Postmortem damage
5/13/2023	6	3	Clavicle	shaft		R		I	missing med and lat portion, all postmortem damage
5/9/2023	6	3	Parietal					I	sagittal suture present with small portion other parietal. Postmortem damage

5/9/2023	6	3	Vertebra	cervical		I			dens and body of C2. postmortem damage slight damage to spinous proc, trans proc and body-postmortem damage. Osteoporotic lipping
5/9/2023	6	3	Vertebra	cervical		I			postmortem damage to body & trans/spin proc.
5/8/2023	6	3	Vertebra	Lumbar		I			subadult. Epiph not fused. Postmortem damage
5/8/2023	6	3	Femur	dist 2/3, epiph	L	I			postmortem damage to body, trans/spin proc. Very compressed. Osteoporotic lipping
5/8/2023	6	3	Vertebra	Lumbar		I			postmortem damage, missing trans proc
5/8/2023	6	3	Vertebra	Lumbar		I			postmortem damage to body, missing trans proc
5/8/2023	6	3	Vertebra	thoracic		I			postmortem damage to body, tran/spin proc.
5/8/2023	6	3	Vertebra	Lumbar		C			postmortem damage trans proc/spin proc slight postmortem damage to body and R trans proc.
5/8/2023	6	3	Vertebra	Lumbar		C			postmortem damage to body & trans/spin proc.
5/8/2023	6	3	Vertebra	Lumbar		I			postmortem damage to squama
5/8/2023	6	3	Temporal			I			postmortem damage to tran/spin proc & body
5/7/2023	6	3	Vertebra	Lumbar		I			Maxilla w/ teeth D. fused to zygomatic. Postmortem damage to nasal portion. Fx across bone
5/7/2023	6	3	Maxilla		L	I		Y	fused to maxilla
5/7/2023	6	3	Zygomatic		L	C			Mandible w/ teeth C. postmortem damage to ramus.
5/7/2023	6	3	Mandible			I			no base. Postmortem damage
5/7/2023	6	3	Occipital	Squama		I			only body and start of neural arch. All postmortem damage. Osteoporotic lipping
5/6/2023	6	3	Vertebra	Lumbar		I			only body and 1 start of neural arch. Postmortem damage
5/6/2023	6	3	Vertebra	thoracic		I			postmortem damage to trans proc.
5/6/2023	6	3	Vertebra	Lumbar		I			

5/6/2023	6	3	Vertebra	cervical		I		lower C. articulated with another. Postmortem damage to body & trans proc. bone spur on lat body L.
5/6/2023	6	3	Vertebra	cervical		C		lower C. articulated with another. Slight postmortem damage to body. in multiple frag-most glued together. Some smooth fx edges on inner table but all right angle, most likely postmortem damage.
5/6/2023	6	3	Frontal		L	I		with paired humerus. Postmortem damage in 2 frag. Postmortem damage to dist end, no epiph.
5/7/2023	6	3	Humerus	dist 2/3, epiph	R	I		postmortem damage to shaft in 3 pieces. Huge. Circular hole in lesser trochanter-bug. Postmortem damage to shaft.
5/8/2023	6	3	Femur	prox 3/3, epiph	L	I		Radiating fx on head, thin, goes into postmortem fx, doesn't match any fx pattern.
5/8/2023	6	3	Humerus	dist 2/3, epiph	L	I		in multiple frag, all postmortem damage in 2 frag. Missing L trans proc. Postmortem damage
5/8/2023	6	3	Humerus	prox 1/3, epiph	L	I		postmortem damage to trans/spin proc. Osteoporotic lipping. Healed fx of neural arch near spinous process?
5/8/2023	6	5	Tibia	prox 3/3, epiph		I		postmortem damage to petrous portion & squama
5/9/2023	6	5	Vertebra	Lumbar		I		subadult. Approx 5. Multiple sharp force lacerations. Postmortem damage to shaft postmortem damage. Only body and small portion R neural arch. Osteoporotic lesions postmortem damage to neural arch & trans proc.
5/9/2023	6	5	Vertebra	Lumbar		I	Y	slight postmortem damage to body & L trans proc.
5/9/2023	6	5	Temporal		L	I		subadult. postmortem damage to body & trans/spin proc. Still fusing
5/9/2023	6	5	Femur	prox 1/2, no eiph		I	S	
5/9/2023	6	5	Vertebra	cervical		I		
5/9/2023	6	5	Vertebra	cervical		I		
5/9/2023	6	5	Vertebra	thoracic		I		
5/9/2023	6	5	Vertebra	thoracic		I		

5/13/2023	6	5	Femur	prox 1/3, epiph	L	I		postmortem damage to greater trochanter and shaft
5/13/2023	6	5	Humerus	dist 1/2, epiph	L	I		postmortem damage to shaft and capitulum
5/13/2023	6	5	Humerus	prox 1/2, epiph	L	I		postmortem damage to shaft. Almost complete fusion of head
5/13/2023	6	5	Femur	prox 1/3, no epiph		I		subadult. Approx. 1-4. postmortem damage to shaft and fusion greater trochanter
5/13/2023	6	5	Inominate	illium	L	I		in 2 frag. All postmortem damage
5/13/2023	6	5	Vertebra	thoracic		I		in 2 frag. Postmortem damage to body & trans/spin proc.
5/13/2023	6	5	Vertebra	thoracic		I		postmortem damage to body and post neural arch
5/13/2023	6	5	Radius	prox 1/2, epiph	R	I		postmortem damage to shaft
5/13/2023	6	5	Vertebra	thoracic		I		postmortem damage to body, spin proc.
5/13/2023	6	5	Vertebra	thoracic		I		Missing trans proc.
5/13/2023	6	5	Vertebra	thoracic		I		postmortem damage to L spin proc, inf body
5/13/2023	6	5	Vertebra	cervical		I		missing post neural arch. Postmortem damage
5/13/2023	6	5	Vertebra	thoracic		I		subadult. Missing trans proc. Postmortem damage to body & spin proc.
5/13/2023	6	5	Frontal	squama		I	Y	in 2 frag-postmortem. L above orbital (not present) depression in bone- healed fx.
5/14/2023	6	5	Vertebra	Lumbar		I		postmortem damage to body & trans procs.
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & trans/spin procs.
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to R trans proc & body.
5/14/2023	6	5	Clavicle	lat 1/2		I		missing acromion facet, postmortem damage
5/14/2023	6	5	Temporal		L	I		missing zygomatic proc & some petrous portion, postmortem damage
5/14/2023	6	5	Humerus	dist epiph, 1/3	R	I		postmortem damage to med condyle. Postmortem damage to shaft- looks like trans fx.

5/14/2023	6	5	Ulna	prox 1/3, epiph	R	I		postmortem damage to shaft postmortem damage to body, trans/spin proc. Osteoporotic lesions
5/14/2023	6	5	Vertebra	Lumbar		I		
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to trans/spin proc.
5/24/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & neural arch
5/14/2023	6	5	Manubrium			C		postmortem damage to L facets
5/14/2023	6	5	Clavicle	shafts	R	I	S	postmortem damage to both ends. Multiple sharp force trauma on sup and ant surfaces.
5/14/2023	6	5	Humerus	prox 1/2, epiph	R	I		postmortem damage to shaft
5/14/2023	6	5	Tibia	dist 1/2, epiph	R	I		postmortem damage to shaft- 2 frag slight postmortem damage to R trans proc & spin proc. Extreme osteoporotic lipping/bone growth
5/14/2023	6	5	Vertebra	Lumbar		C		
5/14/2023	6	5	Vertebra	cervical		C		postmortem damage to spin proc.
5/14/2023	6	5	Vertebra	Lumbar		I		postmortem damage to L body, trans/spin procs.
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to L body, L trans proc, spin proc.
5/14/2023	6	5	Vertebra	Lumbar		I		postmortem damage to body, R trans proc, spin proc.
5/14/2023	6	5	Vertebra	thoracic		I		subadult. Postmortem damage to R neural arch.
5/14/2023	6	5	Vertebra	Lumbar		I		in 2 frag. Postmortem damage to body, trans/spin proc.
5/14/2023	6	5	Temporal		R	I	Y	in 2 frag. Transverse fx of petrous portion.
5/14/2023	6	5	Humerus	dist 1/3, epiph	L	I	S	multiple sharp force trauma along shaft and epiphysis
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & trans proc.
5/14/2023	6	5	Vertebra	Lumbar		I		postmortem damage to body, trans/spin proc
5/14/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & trans proc.
5/14/2023	6	5	Vertebra	Lumbar		I		postmortem damage to body & trans proc.

5/14/2023	6	5	Temporal		L	I		scavenging marks on petrous portion. Small linear depression inside bone. Possible healed trauma on mastoid.
5/14/2023	6	5	Clavicle	shaft	L	I	S	missing ends. A few scarpes- most likely postmortem as lighter in colour, on sup surface
5/14/2023	6	5	Vertebra	thoracic		I		subadult. postmortem damage to L neural arch
5/14/2023	6	5	Vertebra	thoracic		I		subadult. postmortem damage to body & L neural arch
5/14/2023	6	5	Clavicle		R	I	S	subadult. No fused epiph. Slight grooves & scavenging marks.
5/14/2023	6	5	Humerus	shaft		I	S	in box. Possible incisions along shaft towards distal end. Frag of dist and prox ends in box. Took microscope images but not overall.
5/14/2023	6	5	Tibia	prox 2/3, epiph	L	I		in box. Multiple frag. All postmortem damage
5/14/2023	6	5	Mandible	body		I		in box. in 2 frag, missing ramuses & middle. Postmortem damage
5/14/2023	6	5	Inominate	ilium, ishium, acetabulum	L	I		in box. In multiple frag. Postmortem damage. Large ischial tuberosity
5/14/2023	6	5	Inominate	ilium, pubis, acetabulum	L	I		in box. Multiple frag. All postmortem damage
5/14/2023	6	5	Vertebra	thoracic		I		in box. Articulated. Postmortem damage to body, trans/spin procs
5/14/2023	6	5	Vertebra	thoracic		I		in box. Articulated. Postmortem damage to body, trans/spin procs
5/14/2023	6	5	Vertebra	thoracic		I		in box. Articulated. Postmortem damage to body, trans procs
5/14/2023	6	5	Vertebra	thoracic		C		subadult. in box. Postmortem damage to R trans proc.
5/14/2023	6	5	Inominate	acetabulum, ischium.	R	I		subadult. In box. Postmortem damage.
5/14/2023	6	5	Inominate	acetabulum, ilium, ischium	L	I		subadult, in box. 3 frag. Postmortem damage.
5/15/2023	6	5	Radius	prox 2/3, epiph	L	I	S	in 2 frag. Postmortem damage. Scrape marks near radial tuberosity
5/15/2023	6	5	Vertebra	cervical		I		postmortem damage to body & trans proc.

5/15/2023	6	5	Vertebra	thoracic		I			postmortem damage to body
5/15/2023	6	5	Humerus	prox 1/2, epiph	L	I	S		multiple sharp force trauma along shaft.
5/15/2023	6	5	Vertebra	Lumbar		I			postmortem damage to trans procs
5/15/2023	6	5	Vertebra	cervical		I			postmortem damage to body and R neural arch
5/15/2023	6	5	Humerus	prox 1/2, epiph	L	I			postmortem damage. 1 small scrap
5/15/2023	6	5	Vertebra	Lumbar		I			postmortem damage to L trans & spin proc
5/15/2023	6	5	Vertebra	thoracic		I			postmortem damage to trans proc & body
5/15/2023	6	5	Clavicle		R	C	S		slight postmortem damage. Med not fully fused- young adult. Small incisions inf side medial facet
5/15/2023	6	5	Mandible			I			mandible w/ teeth R. in 3 frag, all postmortem damage
5/16/2023	6	5	Vertebra	thoracic		I			postmortem damage to trans/spin proc
5/16/2023	6	5	Vertebra	Lumbar		I			postmortem damage to body and trans/spin proc
5/16/2023	6	5	Frontal	squama		I	S		postmortem damage to orbital ridge. 1 incision on R
5/16/2023	6	5	Parietal			I	S		postmortem damage to sutures. Grooves/incisions around squamosal suture
5/16/2023	6	5	Femur	dist 1/2, epiph	L	I	S		postmortem damage to shaft & lat condyle. Slight scraping
5/16/2023	6	5	Femur	prox 1/2, epiph	L	I			postmortem damage to shaft
5/16/2023	6	5	Femur	prox 1/2, epiph	R	I			postmortem damage to shaft and greater trochanter
5/16/2023	6	5	Ulna	prox 1/3, epiph	R	I			postmortem damage to shaft
5/16/2023	6	5	Ulna	shaft	L	I			postmortem damage to shaft
5/16/2023	6	5	Radius	dist 2/3, epiph	L	I			in 2 frag. Postmortem damage to shaft
5/16/2023	6	5	Vertebra	thoracic		I			subadult. Postmortem damage to trans/spin proc
5/16/2023	6	5	Tibia	prox 1/3		I	S		subadult. Scrapes on shaft. Parts of shaft fx looks peri

5/16/2023	6	5	Zygomatic		L	I			small portion of maxilla fused. Postmortem damage to infraorbital process
5/16/2023	6	5	Vertebra	cervical			C		slight postmortem damage
5/16/2023	6	5	Vertebra	thoracic			I		postmortem damage to body, trans/spin proc. osteoporotic lipping
5/16/2023	6	5	Vertebra	Lumbar			I		postmortem damage to body & spin proc. osteoporotic lippingn
5/16/2023	6	5	Tibia	prox 1/2, epiph			I	S	in box: subadult. Multiple scratches/ SF on shaft
5/16/2023	6	5	Femur	dist 2/3, epiph			I		in box: multiple frag, postmortem damage on endocranial surface, multiple scrapes/SF
5/16/2023	6	5	Frontal				I	S	(no photos taken)
5/16/2023	6	5	Parietal		R	I			lamboid & squamosal sutures presenyt, postmortem damage
5/16/2023	6	5	Clavicle	shaft	L	I			postmoretm damage to facets
5/16/2023	6	5	Vertebra	thoracic			I		in 2 frag. Postmortem damage
5/16/2023	6	5	Vertebra	thoracic			I		postmortem damage to L neural arch & R trans proc
5/16/2023	6	5	Vertebra	cervical			C		slight postmortem damage. Bifid spinous proc
5/16/2023	6	5	Tibia	prox 2/3			I		in box, subadult: in 4 frag. Postmortem damage
5/16/2023	6	5	Frontal				I		in box, in many frag: almost complete. Round fx but most likely postmortem
5/16/2023	6	5	Mandible				I		in box, in 3 frag: mandible F. postmoretm damage
5/16/2023	6	5	Frontal		L	I			in box, multiple frag; with mandible F all postmortem trauma. Metopic stuture present- where bone ends
5/16/2023	6	5	Femur	prox 3/3	L	I		S	in box, subadult: in 3 frag, missing epiph. SF on neck. A lot of cortex is missing
5/17/2023	6	5	Radius	shaft	L	I			missing head & dist epiph, postmortem damage
5/17/2023	6	5	Ulna	prox 2/3, epiph	L	I			in 2 frag, postmortem damage.

5/17/2023	6	5	Vertebra	Lumbar		C	in 3 frag. Postmortem damage to R trans/spin proc
5/17/2023	6	5	Vertebra	thoracic		I	postmortem damage to body & trans proc
5/17/2023	6	5	Vertebra	thoracic		I	in 2 frag. Postmortem damage to body missing most of neural arch. Bulge in vertebral body. Pathology?
5/17/2023	6	5	Vertebra	thoracic		I	subadult; postmortem damage to body & trans/spin proc
5/17/2023	6	5	Vertebra	thoracic		I	
5/17/2023	6	5	Clavicle		L	C	in 2 frag, postmortem damage to lat epiph subadult: postmortem damage to trans/spin proc
5/17/2023	6	5	Vertebra	thoracic		I	
5/17/2023	6	5	Vertebra	thoracic		I	postmortem damage to L trans & spin proc
5/17/2023	6	5	Vertebra	Lumbar		I	Postmortem damage to body. Sacrilization axis. Slight postmortem damage
5/17/2023	6	5	Vertebra	cervical		C	
5/17/2023	6	5	Vertebra	cervical		I	atlas, L neural arch, postmortem damage
5/17/2023	6	5	Vertebra	cervical		I	postmortem damage, missing L neural arch
5/17/2023	6	5	Clavicle	med 1/2	R	I	postmoretm damage
5/17/2023	6	5	Vertebra	Lumbar		I	postmortem damage to L neural arch.
5/17/2023	6	5	Humerus	prox 1/2	R	I	subadult; no epiph, postmortem damage
5/17/2023	6	5	Femur	prox 2/3	L	I	subadult: postmortem damage.
5/18/2023	6	5	Vertebra	cervical		C	axis. Slight postmortem damage
5/18/2023	6	5	Vertebra	cervical		I	postmortem damage to spin proc.
5/18/2023	6	5	Vertebra	cervical		I	postmortem damage to f.
5/18/2023	6	5	Vertebra	cervical		I	atlas, L neural arch, postmortem damage. In 2 frag
5/18/2023	6	5	Parietal			I	in 2 frag, postmortem damage
5/18/2023	6	5	Vertebra	thoracic		I	subadult: postmortem damage to body, L trans proc, & spin proc
5/18/2023	6	5	Temporal		R	I	in 2 frag, postmortem damage
5/18/2023	6	5	Vertebra	thoracic		I	postmortem damage to L trans & spin proc
5/18/2023	6	5	Maxilla		L	I	labelled A. in 2 frag. Damage to zygomatic proc.postmortem
5/19/2023	6	5	Vertebra	Lumbar		I	postmortem damage, only R portion

5/19/2023	6	5	Humerus	prox 1/2	R	I	S	subadult: in 2 frag, no epiph, multiple scraps/SF on mid shaft
5/19/2023	6	5	Ulna	dist 2/3, epiph	R	I		postmortem damage to shaft subadult: postmortem damage to trans/spin proc
5/19/2023	6	5	Vertebra	Lumbar		I		proc
5/19/2023	6	5	Vertebra	cervical		C		C2; slight postmortem damage
5/19/2023	6	5	Vertebra	cervical		C		slight postmortem damage
5/19/2023	6	5	Vertebra	cervical		C		slight postmortem damage
5/19/2023	6	5	Vertebra	cervical		I		C2: postmortem damage to pos neural arch
5/19/2023	6	5	Vertebra	cervical		I		postmortem damage to R neural arch
5/19/2023	6	5	Vertebra	cervical		C		slight postmortem damage
5/19/2023	6	5	Vertebra	thoracic		I		postmortem damage to R neural arch
5/19/2023	6	5	Vertebra	Lumbar		I		postmortem damage to trans/spin proc in box, articulated: postmortem damage to trans/spin proc
5/19/2023	6	5	Vertebra	Lumbar		I		in box, articulated: postmortem damage to trans/spin proc
5/19/2023	6	5	Vertebra	Lumbar		I		in box, articulated: postmortem damage to neural arch
5/19/2023	6	5	Vertebra	cervical		C	S	C2; slight postmortem damage. SF/scraps on R ant articular surface
5/19/2023	6	5	Vertebra	cervical		I		postmortem damage to R neural arch
5/19/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & neural arch
5/19/2023	6	5	Vertebra	thoracic		I		postmortem damage to body & neural arch subadult, in box. 3 frag. Postmortem damage to prox epiph
5/19/2023	6	5	Radius		L	C		
5/19/2023	6	5	fibula	prox 2/3, epiph	R	I		subadult, in box. 3 frag. Postmortem damage in box, SF/scraps on shaft, postmortem damage to shaft
5/19/2023	6	5	Tibia	dist 1/2, epiph	L	I	S	
5/19/2023	6	5	Radius	shaft	L	I	S	in box; in 3 frag. SF/grooves on prox shaft subadult. Postmortem damage to trans/spin proc
5/20/2023	6	5	Vertebra	Lumbar		C		proc
5/20/2023	6	5	Vertebra	thoracic		I		subadult. Postmortem damage to trans proc

5/20/2023	6	5	Humerus	dist 1/2	R	I	subadult. postmortem damage to shaft. Not sure on ID
5/20/2023	6	5	Clavicle	shaft	R	I	missing epiph. Postmortem damage
5/20/2023	6	5	Vertebra	thoracic		I	postmortem damage to body & spin. 2 frag. Postmortem damage to trans/spin proc,
5/20/2023	6	5	Vertebra	thoracic		I	postmortem damage to shaft
5/20/2023	6	5	Ulna	prox 1/2, epiph	R	I	postmortem damage to facets
5/20/2023	6	5	Clavicle	shaft	R	I	subadult; in 2 frag, postmortem damage
5/20/2023	6	5	Tibia	prox 1/2	L	I	subadult; postmortem damage to spin proc
5/20/2023	6	5	Vertebra	thoracic		C	subadult: postmortem damage to body & neural arch
5/20/2023	6	5	Vertebra	thoracic		I	bifid spin proc. Slight postmortem damage
5/20/2023	6	5	Vertebra	cervical		C	large. Slight postmortem damage
5/20/2023	6	5	Vertebra	cervical		C	postmortem damage body, trans/spin proc.
5/20/2023	6	5	Vertebra	thoracic		I	in box; postmortem damage to shaft
5/20/2023	6	5	Ulna	prox 2/3, epiph	L	I	in box; multiple frag, postmortem damage
5/20/2023	6	5	Humerus	prox 2/3, epiph	R	I	in box; in 3 frag. Postmortem damage to shaft9
5/20/2023	6	5	Ulna	prox 2/3, epiph	R	I	in 3 frag, all postmortem damage
5/20/2023	6	5	Ulna	complete	R	C	postmortem damage to facets
5/20/2023	6	5	Clavicle	shaft	L	I	C2; slight postmortem damage to spin proc
5/20/2023	6	5	Vertebra	cervical		C	slight postmortem damage to trans proc/body
5/20/2023	6	5	Vertebra	thoracic		C	postmortem damage to neural arch.
5/20/2023	6	5	Vertebra	thoracic		I	postmortem damage to neural arch
5/20/2023	6	5	Vertebra	thoracic		I	postmortem damage to L neural arch. Slight osteoporotic lipping
5/20/2023	6	5	Vertebra	Lumbar		I	possible postmortem butterfly fx- missing frag. Only 2 frag
5/20/2023	6	5	Ulna	prox 3/3, epiph	R	I	subadult- no epiph, postmortem damage to shaft
5/20/2023	6	5	Clavicle	lat 1/2	L	I	in 2 frag, postmortem damage to spin proc
5/20/2023	6	5	Vertebra	cervical		I	postmortem damage to trans proc
5/20/2023	6	5	Vertebra	thoracic		I	postmortem damage to body, trans/spin proc
5/20/2023	6	5	Vertebra	thoracic		I	

5/20/2023	6	5	Vertebra	Lumbar		I			postmortem damage to body & L trans proc
5/20/2023	6	5	Clavicle	complete		R	C	S	postmortem damage to lat facet. SF on sup surface
5/20/2023	6	5	Mandible				C	S	in box; in 2 frag, postmortem damage.
5/14/2023	6	5	Inominate	pubis, ishium	L	I			Possible scavenging/ grooves
5/14/2023	6	5	Femur	dist 1/2	R	I		S	in box, subadult; fully fused. Postmortem damage to ilium
5/14/2023	6	5	Femur	dist 2/3.	R	I			in box, subadult: SF on shaft. Larger.
5/14/2023	6	5	Tibia	prox 1/2	L	I			in box, subadult: larger.postmortem damage to shaft
5/14/2023	6	5	Femur	prox 1/3, epiph	L	I			in box, subadult; no epiph. Possible mix ante/peri oblique fx.
5/14/2023	6	5	Femur	prox 1/2, epiph	L	I			in box; postmortem damage to shaft
5/15/2023	6	5	Parietal		L	I			in box; 3 frag, postmortem damage
5/15/2023	6	5	Inominate	ilium, ishium, acetabulum	L	I			in box; postmortem damage.
5/15/2023	6	5	Tibia	prox 2/3, epiph	L	I			in box; in 2 frag. Iliac crest almost fully fused. Postmortem damage.
5/15/2023	6	5	Vertebra	cervical			C		in box; postmortem damage to shaft and prox epiph
5/15/2023	6	5	Vertebra	cervical			C		in box; articulated C1-slight postmortem damage, bone spur near odontoid facet
5/15/2023	6	5	Vertebra	cervical			C		in box; articulated C2- slight postmortem damage
5/15/2023	6	5	Vertebra	cervical			C		in box; articulated C3- slight postmortem damage
5/15/2023	6	5	Humerus	dist 2/3, epiph	R	I			in box; postmortem damage to shaft
5/15/2023	6	5	Humerus	dist 2/3, epiph	R	I		Y	in box; in 3 frag. Some smooth fx margins & sharp edges.
5/14/2023	6	5	Vertebra	Lumbar			I		in box; subadult- articulated. Postmortem damage to trans proc
5/14/2023	6	5	Vertebra	Lumbar			I		in box; subadult- articulated. postmortem damage to trans proc & body
5/14/2023	6	5	Vertebra	Lumbar			I		in box; subadult- articulated. postmortem damage to trans proc & body

5/14/2023	6	5	Inominate	ilium, ishium, acetabulum	L	I			in box; in multiple frag, all postmortem damage. Large ishical tuberosity
5/14/2023	6	5	Vertebra	thoracic			C		in box; subadult. Slight postmortem damage to R trans & spin proc
5/14/2023	6	5	Inominate	ilium, ishium, acetabulum	L	I		S	in box; subadult. In multiple frag. Postmortem damage. Bone growth above acetabulum, some slight SF
5/13/2023	6	5	Humerus	shaft			I		in box; subadult. SF on shaft
5/13/2023	6	5	Femur	prox 2/3	R	I		S	in box; subadult. multiple frag. SF on neck
5/13/2023	6	5	Humerus	dist 3/3, epiph	R	I		S	in box; 3 frag, postmortem damage. Some SF on shaft
5/13/2023	6	5	Tibia	prox 1/3, epiph	L	I			in box; in 3 frag, postmortem damage
5/13/2023	6	5	Tibia	prox 2/3, epiph	R	I			in box; postmortem damage to shaft
5/13/2023	6	5	Tibia	prox 1/2, epiph	L	I			in box; postmortem damage to shaft
5/13/2023	6	5	Humerus	prox 1/2, epiph	L	I		S	in box; postmortem damage to shaft. SF on head
5/20/2023	6	5	Tibia	prox 2/3	L	I			subadult; no epiph, postmortem damage
5/20/2023	6	5	Vertebra	thoracic			I		subadult; postmortem damage to body & L trans proc
5/20/2023	6	5	Mandible				I	S	in 3 frag. Postmortem damage, SF to body
5/20/2023	6	5	Vertebra	cervical			C		slight postmortem damage, bifid spin proc.
5/20/2023	6	5	Vertebra	cervical			C		Osteoporotic lippin
5/20/2023	6	5	Vertebra	cervical			I		slight postmortem damage.
5/20/2023	6	5	Vertebra	thoracic			I		postmortem damage to trans proc
5/20/2023	6	5	Vertebra	Lumbar			I		postmortem damage to trans/spin proc
5/20/2023	6	5	Clavicle		L	I			postmortem damage to body, trans/spin proc
5/20/2023	6	5	Vertebra	cervical			I		subadult; postmortem damage to facets
5/20/2023	6	5	Vertebra	cervical			I		in 2 frag, postmortem damage to spin proc
5/20/2023	6	5	Vertebra	cervical			I		in 2 frag, postmortem damage to body & L trans proc
5/20/2023	6	5	Vertebra	thoracic			I		in 2 frag, postmortem damage to body & trans proc
5/20/2023	6	5	Vertebra	Lumbar			I		postmortem damage to body

5/20/2023	6	5	Vertebra	Lumbar		C			postmortem damage to spin proc. in box; postmortem damage. Some SF on
5/20/2023	6	5	Inominate	ilium, ishium, acetabulum	L	I	Y		ilium. Large SF
5/20/2023	6	5	Mandible			C			In box; in 3 frag, all postmortem damage
5/21/2023	6	5	Vertebra	cervical		C			slight postmortem damage.
5/21/2023	6	5	Radius	prox 1/2, epiph	R	I			postmortem damage to shaft & head
5/21/2023	6	5	Vertebra	cervical		C			subadult- slight postmortem damage
5/21/2023	6	5	Vertebra	Lumbar		C			subadult- slight postmortem damage
5/21/2023	6	5	Humerus	dist 1/2	L	I	S		subadult- postmortem damage to shaft. SF on shaft
5/21/2023	6	5	Vertebra	thoracic		I			potmortem damage to body & trans proc
5/21/2023	6	5	Vertebra	Lumbar		I			postmortem damage to spin proc.
5/21/2023	6	5	Vertebra	Lumbar		I			postmortem damage to spin proc. Slight osteoporotic lipping
5/21/2023	6	5	Vertebra	cervical		C			articulated- slight postmortem damage
5/21/2023	6	5	Vertebra	cervical		C			articulated- slight postmortem damage. Bifid spin proc
5/21/2023	6	5	Vertebra	cervical		C			articulated- slight postmortem damage. Bifid spin proc
5/21/2023	6	5	Vertebra	cervical		C			articulated- slight postmortem damage
5/21/2023	6	5	Humerus	shaft	R	I			in box; subadult- 2 frag. No epiph, postmortem damage to shaft & prox head
5/21/2023	6	5	Inominate	ilium, ishium, pubis	L	I			in box; in mny frag, all postmortem damage
5/21/2023	6	5	Radius	complete	L	C			shaft in 2 frag, postmortem
5/21/2023	6	5	Humerus	prox 1/2, epiph	R	I			postmortem damage to shaft & head
5/21/2023	6	5	Humerus	dist 2/3, epiph	R	I			postmortem damage to shaft
5/21/2023	6	5	Vertebra	Lumbar		I			postmortem damage to body & pos neural arch
5/21/2023	6	5	Vertebra	thoracic		C			slight postmortem damage to L trans proc
5/21/2023	6	5	Vertebra	thoracic		I			postmortem damage to trans proc
5/21/2023	6	5	Vertebra	thoracic		I			2 frag. Postmortem damage to R trans proc
5/21/2023	6	5	Vertebra	cervical		I			postmortem damage to body & spin proc.
5/21/2023	6	5	Clavicle	med 2/3	L	I			postmortem damage to lat facet

5/21/2023	6	5	Ulna	complete	R	C	in box; in 3 frag, all postmortem damage
5/21/2023	6	5	Tibia	complete	L	C	in box; in multiple frag, all postmortem damage
5/21/2023	6	5	Humerus	complete	R	C	in box; in 2 frag, postmortem damage to lat condyle
5/21/2023	6	5	Femur	dist 2/3, epiph	R	I	in box; multiple frag, postmortem damage
5/21/2023	6	5	Tibia	prox 1/2, epiph	L	I	in box; 2 frag. Postmortem damage
5/21/2023	6	5	fibula	dist 3/3, epiph	L	I	in box; 2 frag. Postmortem damage
5/21/2023	6	5	fibula	complete	R	C	in box; 4 frag. Postmortem damage
5/21/2023	6	5	Humerus	dist 2/3, epiph	L	I	in box; postmortem damage
5/21/2023	6	5	Ulna	prox 3/3, epiph	R	I	in box; 2 frag. Postmortem damage
5/21/2023	6	5	Radius	shaft 2/3		I	in box; 2 frag. Postmortem damage
5/21/2023	6	5	Humerus	dist 2/3, epiph	L	I	in box; 2 frag. Postmortem damage
5/21/2023	6	5	fibula	complete	L	I	in box; 3 frag. Postmortem damage
5/21/2023	6	5	Vertebra	Lumbar		I	subadult; postmortem damage to trans proc.
5/21/2023	6	5	Clavicle	lat 1/2	R	I	postmortem damage to med facet
5/21/2023	6	5	Vertebra	thoracic		I	postmortem damage to trans proc
5/21/2023	6	5	Vertebra	thoracic		I	postmortem damage to body, trans/spin proc
5/21/2023	6	5	Vertebra	thoracic		I	postmortem damage to trans/spin proc
5/21/2023	6	5	Vertebra	Lumbar		I	postmortem damage to body & trans proc.
5/21/2023	6	5	fibula	dist 2/3, epiph	R	I	in box; 3 frag, in box; 1 fused together- pathology. Fused bodies & facets
5/21/2023	6	5	Vertebra	Lumbar		C	
5/21/2023	6	5	Femur	prox 3/3, epiph	L	I	in box; 4 frag. postmortem damage
5/21/2023	6	5	Inominate	ilium, ishium, acetabulum	R	I	in box; multiple frag. Postmortem damage
5/21/2023	6	5	Vertebra	Lumbar		I	in box; articulated spine. Postmortem damage to body, post neural arch
5/21/2023	6	5	Vertebra	Lumbar		I	in box; articulated spine. Postmortem damage to trans/spin proc
5/21/2023	6	5	Vertebra	Lumbar		C	in box; articulated spine. Postmortem damage to trans proc
5/21/2023	6	5	Vertebra	Lumbar		C	in box; articulated spine. Slight postmortem damage to trans proc

5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. 2 frag. Postmortem damage to body
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. 2 frag. Postmortem damage to body & L trans proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body, trans/spin proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body, trans/spin proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. 2 frag. Postmortem damage to body & L trans proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body & spin proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body & spin proc
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body
5/21/2023	6	5	Vertebra	thoracic	I	in box; articulated spine. Postmortem damage to body
5/21/2023	6	5	sacrum		I	in box; articulated spine. 1 big frag, multiple small. Postmortem
5/21/2023	6	6	Vertebra	cervical	I	C2; postmortem damage to centrum & pos neural arch
5/21/2023	6	6	Vertebra	cervical	C	very slight postmortem damage
5/21/2023	6	6	Vertebra	thoracic	I	2 frag. Postmortem damage to trans proc. Slight osteoporotic lipping
5/21/2023	6	6	Vertebra	thoracic	I	postmortem damage to body & trans proc.
5/22/2023	6	6	Vertebra	cervical	C	slight postmortem damage
5/22/2023	6	6	Vertebra	cervical	I	2 frag. Postmortem damage to body, missing post neural arch
5/22/2023	6	6	Vertebra	cervical	C	postmortem damage to spin proc
5/22/2023	6	6	Vertebra	cervical	C	postmortem damage to f.
5/22/2023	6	6	Vertebra	thoracic	I	2 frag. Postmortem damage to body, trans/spin proc
5/22/2023	6	6	Vertebra	thoracic	I	postmortem damage to body & trans proc

5/22/2023	6	6	Vertebra	thoracic		I		postmortem damage to body & trans proc
5/22/2023	6	6	Vertebra	thoracic		C		slight postmortem damage to body in 2 frag. Postmortem damage to pos neural arch. Osteoporotic lipping
5/22/2023	6	6	Vertebra	Lumbar		C		postmortem damage to body, trans proc
5/22/2023	6	6	Vertebra	Lumbar		C		postmortem damage to body & trans proc
5/22/2023	6	6	Vertebra	Lumbar		C		slight postmortem damage to body & trans proc
5/22/2023	6	6	Vertebra	Lumbar		C		proc in box; multiple frag, all postmortem damage.
5/22/2023	6	6	sacrum			I		sacral hiatus to S2.
5/22/2023	6	6	Vertebra	thoracic		I		in box; articulated. postmortem damage to body & trans proc
5/22/2023	6	6	Vertebra	thoracic		I		in box; articulated. postmortem damage to body & L trans proc
5/22/2023	6	6	Clavicle	shaft	R	I		in box; 3 frag.no med facet. Postmortem damage
5/22/2023	6	6	Mandible			I		2 frag, postmortem damage to body & R ramus subadult; postmortem damage to shaft. Some SF on shaft
5/22/2023	6	6	Humerus	prox 1/2, epiph	L	I	S	subadult; no epiph. postmortem damage to shaft. Some SF on shaft
5/22/2023	6	6	Femur	prox 1/2, epiph		I	S	subadult. 3 frag. No fused epiph. Slight grooves on shaft.
5/22/2023	6	6	Humerus	shaft		I	S	very slight postmortem damage
5/22/2023	6	6	Manubrium			C		postmortem damage to shaft & med facet
5/22/2023	6	6	Clavicle	med 1/2	L	I		postmortem damage to shaft & lat facet
5/22/2023	6	6	Clavicle	lat 1/2	R	I		postmortem damage to shaft
5/22/2023	6	6	Humerus	dist 2/3, epiph	R	I		slight postmortem damage to dist epiph.
5/22/2023	6	6	Ulna	complete	R	C		postmortem damage to dist epiph.
5/22/2023	6	6	Ulna	prox 3/3, epiph	L	I		slight postmortem damage
5/22/2023	6	6	Vertebra	cervical		C		postmortem damage to R neural arch
5/22/2023	6	6	Vertebra	cervical		I		postmortem damage to R neural arch
5/22/2023	6	6	Vertebra	cervical		I		postmortem damage to R neural arch

5/22/2023	6	6	Vertebra	cervical		C	slight postmortem damage to body & spin proc 2 frag. Postmortem damage to trans/spin proc,
5/22/2023	6	6	Vertebra	thoracic		I	postmortem damage to trans proc. Lower T postmortem damage to R trans proc & spin proc. Lower T. osteoporotic lipping
5/22/2023	6	6	Vertebra	thoracic		I	box 29: in 2 frag, possibly butterfly vert. postmortem damage to body & R trans proc.
5/22/2023	6	6	Vertebra	thoracic		I	
5/22/2023	6	6	Vertebra	Lumbar		I	
5/22/2023	6	6	Humerus	dist 3/3, epiph	R	I	in box; 5 frag. Postmortem damage in box; in 2 frag (missing frag midshaft), postmortem damage
5/22/2023	6	6	Tibia	complete	R	I	
5/22/2023	6	6	Tibia	dist 2/3, epiph	L	I	in box; 2 frag. Postmortem damage
5/22/2023	6	6	fibula	dist 2/3, epiph	R	I	in box; 3 frag. Postmortem damage
5/22/2023	6	6	Humerus	dist 2/3, epiph	R	I	in box; 3 frag. Postmortem damage
5/22/2023	6	6	Ulna	prox 2/3, epiph	L	I	in box; 3 frag. Postmortem damage in box; 2 frag. Postmortem damage, missing portion dist epiph
5/22/2023	6	6	Radius	complete	R	C	
5/22/2023	6	6	Ulna	prox 2/3, epiph	L	I	in box; postmortem damage to shaft
5/26/2023	6	6	Clavicle	shaft	L	I	postmortem damage to facets postmortem damage to dist epiph & lat prox facet
5/26/2023	6	6	Ulna	prox 2/3, epiph	R	I	subadult; postmortem damage to shaft. Some SF on shaft
5/26/2023	6	6	Femur	dist 1/2	L	I	S subadult; postmortem damage to neural arch- missing
5/26/2023	6	6	Vertebra	thoracic		I	postmortem damage to R neural arch
5/26/2023	6	6	Vertebra	cervical		I	postmortem damage to trans/spin proc
5/26/2023	6	6	Vertebra	cervical		I	postmortem damage to L trans & spin proc
5/26/2023	6	6	Vertebra	Lumbar		I	2 healing traums to ant & inf body- most likely sharp force
5/26/2023	6	6	Vertebra	Lumbar		I	Y
5/26/2023	6	6	Inominate	ilium, pubis, acetabulum	L	I	in box; 4 frag. Postmortem damage
5/26/2023	6	6	Ulna	complete	L	C	in box; 2 frag. Postmortem damage to shaft & dist epiph

5/26/2023	6	6	Ulna	complete	R	C	in box; 4 frag. Postmortem damage to dist shaft
6/5/2023	8	2	Radius	prox 2/3, epiph	R	I	2 frag. Postmortem damage to shaft & head
5/22/2023	6	6	Vertebra	thoracic		I	box 29- articulated. Postmortem damage to trans proc.
5/22/2023	6	6	Vertebra	thoracic		C	box 29- articulated. Postmortem damage to R trans proc.
5/22/2023	6	6	Vertebra	thoracic		C	box 29- articulated. Postmortem damage to R trans proc, intend on body- compensation for butterfly vert
5/8/2023	8	3	Vertebra	cervical		I	cluster 1. postmortem damage to neural arch. Perimortem tear drop fx
5/8/2023	8	3	Vertebra	thoracic		I	cluster 1. subadult. Postmortem damage to neural arch
5/8/2023	8	3	Vertebra	cervical		I	cluster 1. postmortem damage to R neural arch
5/8/2023	8	3	Vertebra	cervical		I	cluster 1. postmortem damage to neural arch.
5/8/2023	8	3	Tibia	dist epiph, 1/3	L	I	cluster 1. postmortem damage to shaft & dist epiph
5/8/2023	8	3	ulna	prox epiph, 2/3	L	I	cluster 2. 2 frag, postmortem damage
5/8/2023	8	3	Radius	prox 1/2	R	I	cluster 2. 2 frag, postmortem damage
5/8/2023	8	3	Radius	prox 2/3	L	I	cluster 2. 5 frag, postmortem damage
5/8/2023	8	3	Clavicle	lat 1/2	L	I	cluster 2. postmortem damage to epiph and shaft
5/8/2023	8	3	Vertebra	cervical		C	cluster 2. slight postmortem damage
5/8/2023	8	3	Ulna	prox epiph, 1/3	R	I	cluster 2. postmortem damage to shaft/ lots of scavenging
5/8/2023	8	3	Vertebra	cervical		I	cluster 2. postmortem damage to body & trans proc
5/8/2023	8	3	Vertebra	cervical		I	cluster 2. postmortem damage to L body
5/8/2023	8	3	Vertebra	thoracic		I	cluster 2. 2 frag, postmortem damage to body & trans proc
5/8/2023	8	3	Vertebra	thoracic		I	cluster 2. postmortem damage to body, trans/spin proc

5/8/2023	8	3	Tibia	prox epiph, 1/2	R	I	cluster 2. in box. Multiple frag. Postmortem damage
5/13/2023	8	3	Vertebra	thoracic		I	cluster 2. postmortem trauma to body & spin/trans proc
5/14/2023	8	3	Vertebra	cervical		I	cluster 2. C1- in 2 frag. Slight postmortem damage
5/14/2023	8	3	Vertebra	cervical		I	cluster 2. C2- postmortem damage to body
5/14/2023	8	3	Vertebra	cervical		I	cluster 2. missing spin proc
5/14/2023	8	3	Vertebra	cervical		I	cluster 2. postmortem damage to body
5/14/2023	8	3	Vertebra	thoracic		I	cluster 2. postmortem damage tp body & R trans proc
5/14/2023	8	3	Ulna	prox epiph, 3/3	R	I	cluster 2. in 2 frag. Postmortem damage to shaft
5/14/2023	8	3	Radius	prox epiph, 1/2	L	I	cluster 2. in 3 frag. Postmortem damage to shaft
5/18/2023	11	2	Zygomatic		R	I	postmortem damage to infraorbital proc.
5/18/2023	11	1	Humerus	2/3 shaft		I	postmortem damage to shaft
5/19/2023	12	1	Vertebra	cervical		C	postmortem damage to ant body
5/20/2023	12	1	Temporal		L	I	slight postmortem damage to petrous portion.
5/20/2023	12	1	Ulna	prox epiph, 1/2	R	I	postmortem damage to shaft
5/21/2023	13	1	Vertebra	Lumbar		I	postmortem damage to body & neural arch
7/5/2019	5	4	Frontal			I	Individual 3; in multiple frag. Photo of excavation shows depression fx with raditaing fx