An investigation into cranial trauma from the Anglo Saxon cemetery at Sedgeford, Norfolk, UK

By Ben Stillwell

N.B. For those of you that decide to use any of this work i ask that you reference me and this pice of work e.g.Stillwell, B. J. 2002. *An Investigation into Cranial Trauma from the Anglo Saxon Cemetery at Sedgeford, Norfolk.* Undergraduate dissertation, Bournemouth University.

This piece of work was carried out as part of an undergraduate degree at Bournemouth University. The material investigated was taken from the Anglo Saxon cemetery at Sedgeford, Norfolk. I believe that if you click the images within the text, a larger picture will appear on a new page. For any more information about the site, excavation, participitating and possible research, please refer to the links below:

Bournemouth University

Sedgeford Historical and Archaeological Research Project

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ABSTRACT

This paper aimed to evaluate the extent, nature and causation of cranial traumatic injury on the skeletal remains from the archaeological excavations at Sedgeford, Norfolk.

The skeletal material examined came from excavations carried out by Dr. Jewell of Cambridge University in 1957 and from six seasons of excavation carried out by the Sedgeford Historical and Archaeological Research Project since 1996.

The 134 crania that are examined in this paper come from the individuals buried between 662AD to 881AD as part of a Christian Anglo-Saxon cemetery. The investigation revealed that twelve of the 134 crania examined had cranial trauma injuries, many of which occurred at, or around the time of death. The trauma identified was caused by sharp-edged weapons, and some of the victims of these attacks met violent deaths. The nature of these injuries has allowed the author to hypothesise as to the cause of death, the weapons that may have been used in the attack, and place the traumatised individuals within the context of 7th to 9th century Anglian society.

ACKNOWLEDGEMENTS

I would first and foremost like to thank the Sedgeford Historical and Archaeological Research Project (SHARP) for allowing me to carry out this research. Pat Reid, Ruth Buckley, Hilary Snelling and Lavinia

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1. Introduction

1.1 **Background to research**

Much of what we know about trauma on the human skeleton has been developed through anthropological and osteological analysis of archaeological remains by established authorities such as Brothwell (1981) and Mays (1998). In addition, a number of contemporary individuals have employed forensic techniques to extend our understanding.

Information about the manner of death is held within the skeletal structure and aspects of disease, trauma, sex, age and much more, can often be interpreted through macroscopic investigation of the skeletal material. Buikstera and Ubelaker (1994) have published 'Standards for the identification and recording of human remains within an archaeological context'. This publication has served as the basis for research at Sedgeford.

Trauma, when identified, occurs through violent encounters between individuals (through both interpersonal conflict and warfare), encounters with environmental hazards, self-mutilation and suicide. Through the analysis of trauma, skeletal remains with traumatic injuries can hold valuable information about past societies and the social context in which they were made (Boylston, 2000: 357).

Recent developments within forensic archaeology have proved to be beneficial in the investigation and interpretation of ancient traumatic injuries. Methods of data collection within modern forensic cases are defined by Hunter, Roberts & Martin (1996) and Maples (1986). Such developments have provided archaeologists with an established protocol for the identification, recording and interpretation of traumatic injuries.

Previous research concluded that, although limitations do occur in relation to the condition of the remains; aspects such as the manner of death, time of death, age, sex and possible implement (weapon) involved, can be determined through the analysis of the skeletal remains and thus reveal important and often previously unknown information about past cultural groups and societies.

1.2 **Previous work in area**

"A forensic anthropologist should simply describe any evidence of bone damage, point out its location in relation to vital centers, explain the possibility of its having been sustained at the time of death or otherwise, and discuss the likely types of objects that produced the damage." (Stewart, 1979)

Trauma, as mentioned by Stewart (1979), has been an area of investigation for some time and was an area of discussion during the latter part of the twentieth century. Earlier publications such as Merbs (1989) have, in recent years, aided the investigation of trauma. More recently examples include Boylston (2000) and Novak (2000) who have used the classification of trauma within an array of past societies (including Anglo-Saxon). A publication by Fiorato, Boylston and Knüsel (2000), examines thirty nine individuals from The Battle of Towton in 15th Century England for trauma and explains how the trauma was identified and how the data was recorded, analysed and interpreted.

Shorter papers have been written in recent years and discuss issues such as hand-to-hand combat, care within a community (trephination), and patterns in trauma and weapon injuries. These papers by Anderson (1996), Jurmain and Bellifemine (1997), Hershkovitz, Bedford, Jellema, Latimer (1996) and Stirland (1996, 1997), have in a similar fashion to the investigation at Towton, applied forensic techniques in order to understand prehistoric warfare and interpersonal aggression.

As suggested by Stewart (1979), "the likely types of object that produced the damage" must be reviewed. Within Christian cemeteries such as Sedgeford, burial-goods do not exist. Helen Geake (1997) investigated grave-goods within Anglo-Saxon burial grounds and focused particularly on 'conversion period' cemeteries (Pagan to Christian). For this investigation, reports by Green (1987) and Boddington (1996) have been consulted for their study into grave-goods and any weapons that were present. Authors such as Embleton (1979), Siddorn (2000) and Underwood (2000) have utilised archaeological grave goods and historical sources to investigate Anglo-Saxon and Viking weapons in order to understand how they were used and exploited.

The main piece of literature is within the Anglo-Saxon Chronicle translated and edited by Swanton (1996). This information has been incorporated by a number of authors into their own work to interpret Anglo-Saxon society and the Vikings - authors include Fisher (1973), Loyn (1977) and Blair & Salway (1992). The period is constantly under review and new archaeological material has led to new interpretations about Anglo-Saxon society. In recent years, aspects of Viking raids have been investigated by Edison (1999), as have aspects of Anglo-Saxon execution sites (Reynolds, 1998), society (Loveluck, 1997) and criminal graves (Halliday, 1998). With the existing literature and expanding archaeological material, more interpretations are being made about Anglo-Saxon society and traumatic injuries.

1.3 **Aims and objectives**

Aims:
To evaluate the extent, nature and causation of cranial traumatic injury in the skeletal remains from the archaeological excavations at Sedgeford.

Objectives:
• To review the literature available relating to the site of Sedgeford.
• To review recent publications pertaining to traumatic injuries.
• To examine the present records to provide information about age, sex, racial affinity and other relevant features associated with the burials e.g. position, orientation, context and phase.
• To examine the sample from Sedgeford for any signs of cranial traumatic injuries.
• To record macroscopic descriptions of any cranial trauma in the form of recording sheets (refer to methodology.)
• To reconstruct the cranium (if necessary) in order to determine the nature of the trauma.
• To photograph, x-ray and undertake Scanning Electron Microscope (SEM) evaluation on the skeletal remains with cranial trauma.
• To analyse the results of the data-gathering and skeletal observations.
• To synthesise the results of the data-gathering and skeletal observations.
• To provide relevant and comparative photographs and illustrations of previously excavated cemeteries with skeletal traumatic injuries.
• To use the literature and publications associated with contemporary sites in order to understand 8th Century Anglian society.
• To make conclusions of the findings at Sedgeford.
• To note any limitations and propose areas for further study.

1.4 **Research Question**

What will an assessment of the skeletal remains from the cemetery of Sedgeford reveal about the presence of cranial trauma and, if present, what might such injuries tell us about the nature of 8th Century Anglian

society?

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2. TRAUMATIC HEAD INJURY

2.1**Introduction**

Trauma can be defined as a condition resulting from a physical wound or external injury. Through the analysis of traumatic injuries to a skeleton it is possible to provide beneficial information about interpersonal relations of past cultural groups and provide some insight into the force, type of weapon used, and the logistics of attack (Fiorato, 2000: 91).

Trauma is recognisable on skeletal remains as a deformity to the original bone matrix. When a human skeleton reacts to violent encounters caused by environmental hazards, or as a result of interpersonal conflicts, warfare, self-mutilation, trephination and suicide; noticeable traumatic features can be determined by examining lesions on the bone surface created by such external forces. Where evidence of trauma does exist it is extremely variable and occurs in a variety of forms, shapes, sizes and severity. When interpreting the trauma it is necessary to classify the type of trauma, diagnose the time of injury, and assess the circumstances under which the injury occurred and what implements created the a lesions.

2.2 **Types of traumatic injury**

One of the principal identifying attributes of trauma is the fracture lines which occur depending on the type and velocity of force employed on the bone surface. In order to identify different trauma patterns, a number of different terminologies have been used prior to this investigation (Ortner & Putschar, 1985). These are used to describe the detail of the trauma. The main forces that cause trauma to cranial bones are:

Compression: this occurs when a force is pressing down on a bone, often crushing it.
Tension/ depression: this occurs when force is pulling on the bone. On the cranium, bone is pressed down into the skull.
Bending: stress is applied to one portion/area of a bone
Shearing: opposite forces are applied to different areas of the same bone.

2.2.1 **Sharp Force Trauma (SFT)**

This type of trauma is by far the easiest to identify due to the linearity of the lesion. Wounds are characterised by a clean edge, a flat and smooth polished bone surface, which also shows parallel scratch marks. Although more easily identifiable than other types of trauma, there are four principal types of SFT wounds.

? Stab wounds can be identified by an incision made to the bone surface by a pointed or edged instrument. Often deeper than they are wide, it is likely that this type of wound made to the cranium would penetrate the endocranium.

? Incised wounds are made by a sharp edged implement drawn across the bone surface. They are identifiable as being longer than they are deep and normally have a superficial beginning and end.

? Chop wounds are created by heavy objects (e.g. an axe) and leave deep grooves and/or comminuted fractures on the bone surface. The instrument length and width can often be indeterminable due to bevelling; mass damage to the bone is likely.

? Diagnostic wounds are made by individuals who attempt to care for the injured individual. These can

take a variety of forms and vary depending on the type and severity of the injury. Sometimes a trephination can take on the appearance of a perimortem injury or as an antemortem wound where healing has taken place.

2.2.2 **Blunt Force Trauma (BFT)**

This type of injury occurs when bone comes into contact with a blunted or non-sharp object. The appearance and severity of any BFT depends on the shape and consistency of the blunt object and the velocity of impact. 'Rapid Loading' forces are sudden and struck with huge velocity. Such a force makes the bone bend in its elastic living form and then snap back causing the bone to fracture and shatter. 'Slow Loading' forces are much slower and less strong and consequently don't cause as much structural damage. The bone's elasticity accommodates the force. It does not snap back, so no comminuting fracturing occurs. The bone will, however, take the appearance of being deformed and cause a tension fracture from compression forces. The types of blunt force trauma are numerous and much harder to identify than SFT.

2.2.3 **Projectile Force Trauma**

This type of injury is due to projectile points such as arrows and spears entering the bone surface. Identifiable as being small areas of impact, piercing of the bone can cause the bone in the struck area to be forced inwards and if the implement is removed the bone can be pulled outwards (Boylston, 2000: 364).

2.2.4 **Fracture Types** (Ortner & Putschar, 1985)

Complete Fracture: is when a bone breaks into two pieces. It is also known as a 'Simple Fracture'.
Linear Fracture: is when the fracture is located away from the primary injury and points towards the injury.
Comminuted Fracture: in this fracture the bone breaks into two pieces and appears to have shattered.
Radiating Fracture: this originates from the site of injury and fracture.
Compound Fracture: This occurs when a piece of bone breaks through the skin and can complicate the healing process.
Partial Fracture: this occurs when the bone is not broken into two separate pieces.
Longitudinal Skull Fracture: this is caused by forces impacting directly to the back or front of the skull. Simultaneous forces to the front and back can cause a compression fracture
Ring Skull Fracture: here, the foramen magnum is detached as the spinal cord is driven up through the skull.
Transverse Skull Fracture: this is caused by blunt impacts made to either side of the skull.

2.4 **Palaeopathological indications of healing**

Antemortem:
This is the term used to describe wounds that occurred earlier in an individual's life and show evidence of healing around the wound. Where healing does exist, the degree of healing can determine to what extent the individual survived the injury. When structural damage occurs, henatoma develops around the damaged area. Any sort of healing develops after several days in the form of a new fibrous bone matrix. Through the close examination of bone redevelopment it is possible to investigate the state of recovery of the individual.

Perimortem:
Most easily identifiable from sharp-edged weapon injuries, perimortem wounds are those that occurred at

or around the time of death. Taking on a shiny appearance with parallel cut marks there is no evidence of healing around the lesion. Associated with fractures adjoining the lesion or fractures at other areas of the cranium, these injuries are the easiest to identify.

Postmortem:
Postmortem fractures can be misleading in that they can be similar to perimortem fractures and be part of an injury. They do, however, have different characteristics which can make them more easily identifiable. When bone is dry and not living the bone breaks more easily and in different forms to living bone. Noticeably the colour of a recent break is lighter than ancient breaks. In the ground, however, taphanomic changes such as ground pressure, rodent gnawing and tunnelling, animal scavenging, and root damage can fragment buried skeletal remains. Postmortem fractures tend to be more regular and rectangular in comparison to fractures that occurred during the individual's life. In sites such as Boneyard (refer to Chapter 3) where plough damage and dry conditions would have affected the bone structure, careful examination must be undertaken so as to not wrongly confuse perimortem fractures with postmortem fractures (Novak, 2000; Boylston, 2000; Ortner & Putschar, 1981: Reichs, 1998; Sauer: 1998).

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3. MATERIALS, METHODS AND LOCATION

3.1 **Archaeological sample investigated**

The skeletal remains to be examined include those excavated since 1996 by the Sedgeford Historical and Archaeological Research Project and those excavated by Dr Jewell of Cambridge University between 1957-8 from the areas known as Boneyard and Reedam on the Southern slope of the Heacham Valley. Based on two initial radiocarbon dates from two inhumations, the cemetery has been dated to 740 ±40 years and has been determined as being Christian (Davies, 2001).

The condition of the skeletal remains varies from each area. Those from Reedam are extremely well-preserved with many skeletons fully articulated. Some have fragmented but retained all cortical bone and revealed very little weathering and postmortem damage. Those from 'The Boneyard', however, have been subject to plough damage since the 1950's. Weathering has discoloured and eroded many bone surfaces, and those that have been fragmented retained very little cortical bone. Remains excavated by Jewell in 1957 are better preserved than those from Boneyard as they were not subject to deep ploughing and recent weathering. Generally the sample is in good condition, and crania still exist for 134 of the burials.

3.2 **Introduction to Sedgeford and its location**

The village of Sedgeford is situated in a rural setting of North-West Norfolk, approximately three miles east of Heacham on the B1454 and six miles SSW of Hunstanton which lies on the North-West Norfolk coastline (fig 1).

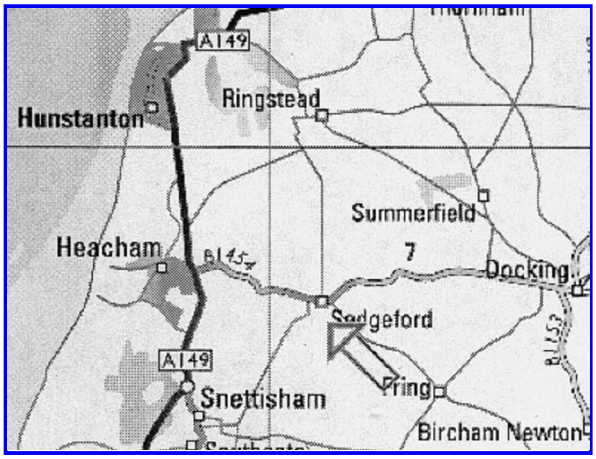

Fig 1: Map of North East Norfolk and Sedgeford.

The Sedgeford Historical and Archaeological Research Project (S.H.A.R.P.) was established in 1996 as a small investigation, and it has grown in the last six years into a long-term, multi-period, research project to investigate human settlement and land use in the North-West Norfolk parish. Funded by volunteers and the public, it is estimated that the project will continue for another 20 years.

The village of Sedgeford is relatively small (population of c.600 people) and various excavations have occurred over the past years in order to understand the past settlement land use. To the south of the river and on the southern slope of the Heacham Valley, the principal excavation into the understanding of Anglo-Saxon Sedgeford is in the areas known as the 'Boneyard' and the 'Reedam'. These two trenches investigated the 8th Century Christian-Saxon cemetery, where the skeletal remains for this investigation were excavated.

3.3 **Archaeology/history of Sedgeford**

The area of archaeological interest has long been known to the local inhabitants as "The Boneyard", due to the bones that were raised through ploughing. In 1957, Dr Jewell of Cambridge University carried out the first archaeological excavations (fig. 2). As he employed natural surroundings as markers for his trenches, it has been difficult to subsequently locate these trenches as the original markers have been removed since 1957. A short summary of his work at Sedgeford was published in 1959. It was noted that he 'lifted 30 something individuals'. In relation to Jewell's site reports and maps, only 22 individuals have been located and recorded from the Department of Biological Anthropology at Cambridge University. The report describes similar features to those found in recent years, including a square structure made from wood. It should be noted that some of his collaborators did not deliver reports about their research. This is evidenced by the 100+ skeletons that are known to be from Sedgeford but were never recorded.

The 1996 excavation focused on a trench 20m by 15m in size, placed between two known inhumations. A complex series of ditches, gullies and pits, dating from Middle-Saxon to Early Medieval periods, were located in addition to a total of 19 skeletons. All lay West to East in a supine position and were stratigraphically determined as being in the topsoil and therefore vulnerable to plough damage. Burials were denser further north down the slope and in some cases had coffin nails associated with the burial (Faulkner, 1997).

In 1997 excavations continued to the East, revealing further ditches and gullies from the Middle-Saxon period. These were orientated North-South. Seventeen skeletons were excavated this season with six partially unearthed. The presence of flint casts, pottery and animal bone in the form of debris, suggested that occupation might have occurred over the cemetery. Occasional metal dress pins were found within burials as was an articulated horse skeleton. Although the horse's cranium and limbs were not present (due to later truncation), the burial of a female resting over the horse's pelvis raised issues about the

cemetery being Anglo-Scandinavian (Cox et al., 1998).

1998 saw continued excavation in Boneyard, with an initial interpretation being made into the relationship of settlement remains with the stratigraphy of the cemetery. Twenty-seven skeletons were lifted that season, all orientated West to East. This brought the total of Boneyard skeletons to 72, and for the first time the grave-cuts could be determined. Through the stratigraphy, it was evident that some burials had been placed within a sandy soil, in contrast to the majority of burials which were cut into a darker silty sand. This distinction raised issues about the cemetery being multi-phased, with those skeletons buried in sandy deposits being later than those that are in the silt deposits. Noticeably, the ditches and gullies orientated North to South were recorded as post-dating the cemetery. Numerous skeletons had been cut by these ditches and therefore marked another phase in Middle-Saxon occupation. This suggests a time of disuse and suggests that Boneyard was associated with prior occupation (Biddulph, 1999).

In 1999, evidence of a structure within the cemetery was found in the form of post-hole deposits. The structure was square in shape and missed one side due to a post-dating gully that cut through the structure. The building underlies seven burials and therefore pre-dated the cemetery. Determined as being Middle-Saxon or earlier due to 'belgic' type pottery, this building emphasised the relatively compact timescale attributed to the site (Twest-van, 1999).

3.4 **The site**

The site plan below shows where each archaeological excavation was carried out on the cemetery site. The SHARP excavations since 1996 have been the largest of the three excavations, and the areas of excavation are expanding. Also illustrated on the map is an area that has recently been opened. Entitled the 'New Boneyard' trench, the area aims at locating Jewell's trenches from 1957 as well as trying to determine the extent of the cemetery to the West. The areas, other than the trenches excavated by Jewell in 1957 examined in this paper are known as Reedam and Boneyard. Work has been carried out in these areas since 1996 and the plan of where some of the skeletons have been located is shown in fig 3.

(No plan)

Fig 2: Drawing of the site and where excavations have occurred.

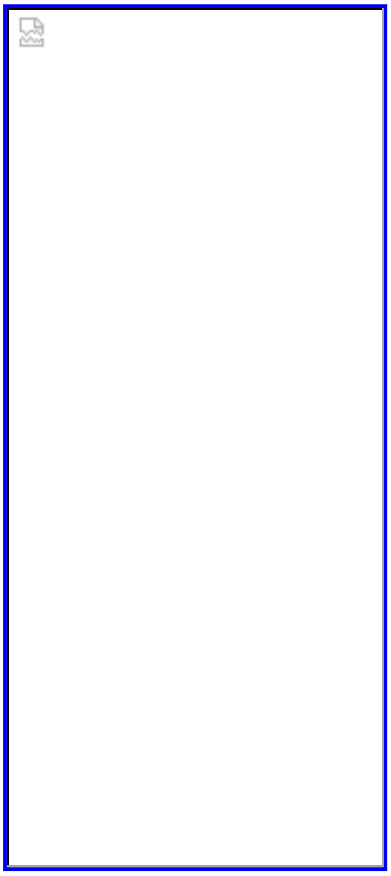

Fig 3: Plan of Boneyard and Reedam showing some locations of burials.

3.5 **Methodology**

A total of 201 individuals have been unearthed and recorded between 1957 and 2001. Of these, a sample of 134 partial or complete crania has been used for this study. The sample incorporates 52 adult males, 62 adult females, 17 juveniles and 3 indeterminable individuals (ambiguous).

The principal diagnosis for evidence of cranial trauma is through macroscopic examination of the crania to determine pathological lesions and any evidence of inter-personal aggression or violence. Determination of cranial injuries and recording of pathological lesions were undertaken according to the protocols set out by Buikstera and Ubelaker (1994: 119ff) and Fiorato, Boylston & Knüsel (2000: 90f). These recording techniques, employed on the skeletal remains from the 'Battle of Towton: AD1461' were used incorporating data already recorded by the Sedgeford Historical and Archaeological Research Project (SHARP) prior to this investigation. The criteria necessary for this investigation were incorporated into a record sheet and subsidiary archive sheet. The areas of cranium investigated for trauma are similar to those recorded on the skeletal remains from Towton (Fiorato, 2000: 96). Other detailed areas of investigation included bones such as the lacrimal, vomer, ethmoid, sphenoid and nasal bones. These are listed on the record sheet.

The results of analyses were recorded using the two recording sheets. The 'Record Sheet' provided details about the burial, the completeness of the cranium and whether there was any evidence of trauma. If trauma was present then a subsidiary record sheet was used to detail the trauma. The record sheet provided details on each of the following:

• Area of the site from which the individual was excavated
• Skeleton I.D. number issued to the individual when recovered
• Record number given to the individual being examined in this study
• Sex and age of the individual determined by a S.H.A.R.P. member prior to this investigation

• Subsidiary record number if trauma was present
• Detail of the recorder and date of recording.

For each individual, the percentage of skull completeness was recorded using macroscopic observations. A total of 22 facial and cranial bones were recorded for their level of completeness and were recorded in by the following categories: 100% - 75%, 75% - 50%, 50% - 25%, 25% and below, not present and/ or fragmentary. Following this, a description and details of the burial were recorded. This information was taken from site record sheets and photographs taken during excavation.

From the macroscopic observations of the cranium, it was important to record whether the sample was fragmentary, as trauma may have been too difficult to determine. The principal issue of cranial trauma was recorded as being present and if so how many lesions were visible on the cranium. Any other relevant comments about the individual and burial were recorded at the bottom of the sheet

The subsidiary archive sheet recorded the information attributed to an individual where cranial trauma had been macroscopically observed and recorded on the main Record Sheet. An ID for the skeleton was included, together with an individual subsidiary archive number. Pathological change was recorded according to the following criteria:

• General location of the trauma (e.g. frontal bone)
• Specific location (e.g. 1cm above the left orbital ridge)
• A description of the trauma. This would include details about the orientation of the lesion and possible interpretations of how the lesion was made
• Measurements of the lesion
• Type of lesion i.e. antemortem, perimortem, postmortem
• The type of force that caused the lesion
• Penetrating injuries
• Evidence of healing
• Evidence of trephination
• State of preservation of bone including bone surface, weathering, post-mortem damage and the quality of the lesion
• The recorder and date recorded
• Illustration of site of trauma
• Additional investigation such as radiography and photography which were undertaken to aid in the interpretation of trauma.

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4. ANALYSIS OF TRAUMA INJURIES

4.1 **Table of Results**

../Dissertation/Skeletal records.htm

Each major category of trauma injury is examined in turn. Within each category a detailed analysis is undertaken of the relevant cranial remains.

Note: Throughout this section the narrative is supported by illustrations. In many cases the size of the illustration makes it difficult to determine some of the detail referred to in the analysis. The reader is referred to the often larger colour illustrations in Appendix 2 which are indexed by the skeletal reference

number. Ideally the Appendix should be to hand for cross referencing throughout.

4.2 **Antemortem Trauma**

S0030 (Record Sheet 23 and Subsidiary Record Sheet 4)

S0030 has been determined as being a male aged 45+. The skeleton was very fragmented and located near the West baulk of the Boneyard trench. Found approximately ten metres further South and four metres further West than S0012, the burial is likely to be from a different period. There were no burial goods and with such fragmentary post-cranial bones, the type of burial was indeterminable.

The area of trauma is on the occipital proturbulence (nuchal crest), where the bone is extremely pronounced and bone growth appears to have developed in an irregular fashion (fig 6). The area of bone growth is 6cm long and 1.5cm wide at its maximum and slopes down towards the basal aspect of the cranium over the right part of the occipital bone. The weathering and fragmentation of the bone surface has made it hard to determine all the trauma. On the right parietal a fracture runs up the right lambdoidal suture, most likely originating between the mastoid process and the occipital bone. The fragmentation and colour of the bone has restricted the interpretation of this fracture, but the trauma is undoubtedly antemortem because of the pronounced bone growth.

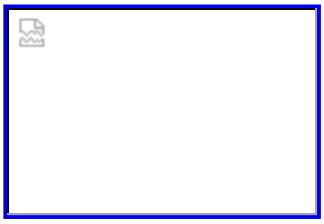

Fig. 6: Right posterolateral view of bone growth on occipital bone of S0030.

S0057 (Record Sheet 48 and Subsidiary Record Sheet 5)

S0057 is a female aged between 34 and 38 and was found in the northern part of the Boneyard trench. Located in deeper soil than more southerly burials, the burial was orientated West to East with no burial goods associated with it. The upper limbs were placed over the pelvis in the form of a shroud burial. The cranium has preserved well and all features except for a few facial features can be identified.

The trauma is in the form of extensive bone growth; a 9mm projection on the left condyle of the ramus (fig 7). This has resulted in a remodelling and flattening of the left TMJ at the base of the cranium. Healing appears to have completed. The cause for such bone growth may have been a pressure fracture on the bone caused by an upward force from below the mandible.

Fig 7: Left lateral view of mandibular ramus with bone growth on the condyle surface.

S1011 (Record Sheet 72 and Subsidiary Record Sheet 11)

S1011 was located in the Northeast corner of Reedam adjacent to S1012 and is a female aged between 50 and 60. Found in a relatively higher location than other Reedam burials, the skeleton had been subject to trampling and much of the cranium was either missing or fragmented. A huge amount of bone was found around S1011 which may have once been associated with the individual. Within the grave cut there were a few deposits including a glass bead, ironwork and an intact pot situated immediately beneath the burial.

The trauma is rather superficial and does not seem to be related to any fracture lines. From the endocranium a lump can be felt as if a slow loading force in the area had depressed the cranium. Although no fractures can be seen, there is an isolated area of bone growth on the right side of the frontal bone (fig. 8) immediately adjacent which overlies the depression. Irregular in shape and form, the healed bone is 1mm in length and 0.5mm in width.

Fig. 8: Frontal view of bone growth on frontal bone of S1011.

S1049 (Record Sheet 100 and Subsidiary Record Sheet 28)

S1049 is a male aged at 45 years old at the time of death. Orientated slightly North of West in a supine position it had been disturbed by later burials thus implying that it was from an earlier period in the cemetery's use. The upper limbs had been placed across the body, and finds within the grave cut included a nail and four pieces of pottery as well as a large pile of disarticulated bone found immediately adjacent to the burial.

The lesion is on the medial part of the frontal bone (figs. 9 and 10) following a similar orientation to the sagittal suture. The cut can be described as a chop wound where immense compression forces have left a substantial cut in the bone. The lesion measures 67mm in length with a constant depth of 2-3mm and a width varying from 3mm at the inferior and anterior ends to 7mm in the mid-section of the lesion. Originally this wound would have penetrated the endocranium but extensive healing (over a long period) implies that S1049 survived the initial wound made to the cranium

Fig. 9: Close up superior view of healed lesion on cranium of S1049

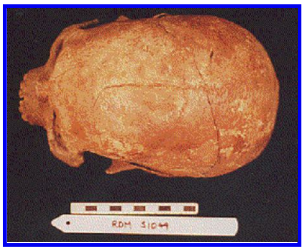

Fig. 10: Superior view of lesion on frontal bone of S1049

S1059 (Record Sheet 106 and Subsidiary Record Sheet 29)

S1059 is a male aged between 25 and 40. Like S1049 he was orientated slightly North of the West to East intended orientation. The facial features faced North and the upper limbs were situated over the pelvis implying a shroud burial. The grave cut was substantially larger than others and contained lots of disarticulated bone and a skull by the pelvis. This grave was perhaps disturbed by a later burial and may potentially signify an area of importance.

The trauma is extremely faint on the frontal bone (fig 11b) but extremely prominent on the occipital (fig 11a). The wound is identifiable by a fracture from the occipital bone to the frontal bone measuring 184mm in length. Although not complete (as the fracture disappears in the mid-section), it is likely that a huge force was placed on this cranium. On the occipital bone there are large amounts of bone growth over the lambda and nuchal crest which has resulted in the profile of the cranium being somewhat irregular and deformed. It is likely that the 184mm long fracture is associated with this area of bone re-growth and can perhaps be described as a contre-coup fracture.

Fig. 11a: Right lateral view of S1059 illustrating occipital bone growth and fracture.

Fig. 11b: Superior view of frontal bone lesion to S1059

4.3 **Perimortem Trauma**

S0012 (Record Sheet 8 and Subsidiary Record Sheet 1)

S0012 is a male aged between 33 and 38 years old at the time of death. S0012 post- dated its adjacent burial by cutting into S0013. Situated on the upper slope of the Heacham Valley, the skeletal material portrayed severe postmortem damage due to plough damage, weathering and post-depositional action. During excavation, a coffin bracket was revealed within the grave cut giving rise to speculation about the status of the individual as most inhumations were simple shroud burials. The upper limbs were, however, placed over the pelvis in the form of a shroud burial. It is possible that the coffin bracket may have been relocated to this grave cut.

The traumatic lesion is on the left parietal and inferior aspect of the frontal bone, where there is evidence of a 14mm wide and 32mm surface wound (fig 12). With a depth of 3mm, there appears to be no disturbance to the coronal suture. A number or postmortem fractures are around the lesion and one in particular seems to have developed over a pre-existing depressed fracture and can be recognised by the new clean break. The lesion itself takes on the appearance of an incised wound with one area having been subjected to a slow loading blunt force where the bone has been depressed by a bending force and has not snapped back and shattered the bone. There does not seem to be any evidence of healing which suggests that this injury was perimortem or possibly postmortem.

Fig 12: Left posteriolateral view of the depressed cut and fracture to S0012. The trauma is visible within the black box.

S0023 (Record Sheet 18 and Subsidiary Record Sheet 2&3)

S0023 is a female aged between 17 and 22. Located approximately 5 metres further East than S0012, this individual appears to have been part of a group of burials being deposited in a gradual line across the cemetery. The burial was orientated West to East and, although extremely fragmented, had not been subject to weathering damage like many other burials in that area. No burial goods were associated with the inhumation and the traumatic injuries were not apparent until reconstruction began.

There are two traumatic injuries on the cranium. The first was made by an extremely sharp implement. The strike was made laterally across the facial features to the left side of the cranium. The lesion is made to the left mastoid process and continues through the facial features including the maxilla (fig 13,14&15), the left mandibular ramus and into the right inferior mandibular ramus where a small incision can be seen (fig. 16&19). The incision is extremely fine and measures 124mm in length with a width of 1.5mm and an unknown depth due to fragmentation (fig. 17&18). The second cut was again made from the same direction and followed the same orientation (fig 17&18). Unfortunately much of the maxilla and zygomatic bones were missing and the length and width of the injury could not be measured. The cut can, however, be seen to have been made to the anterior temporal region, through the zygomatic arch and through the maxilla. This cut appears to be a poor attempt at a strike which was rectified by the cut made lower on the cranium (fig. 17&18). Interestingly there was no post-cranial evidence of injury apart from fine incisions between the third and fourth cervical vertebrae (fig 20). Such evidence has been interpreted as being due to a possible garrotting as the cut is so thin.

Figure 13 (left): Posterior view of lesion to the maxilla on S0023 and figure 14 (right): Inferior view of lesion to maxilla on S0023.

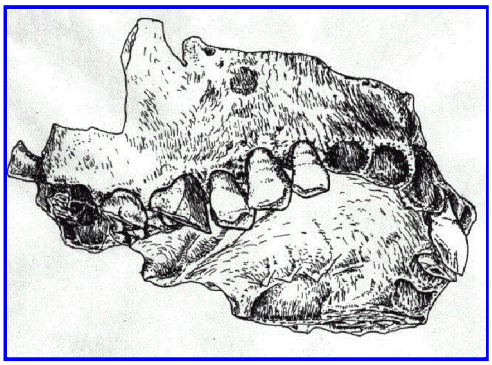

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Fig 15 (above): Drawing from right inferolateral view of lesion to maxilla of S0023

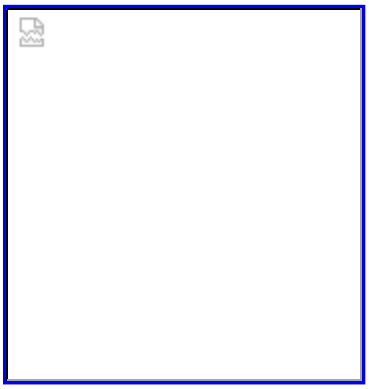

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Fig 16: Left superolateral view. Drawing of lesion made to the mandible which cut through the left ramus and went into the right ramus.

Fig 17: Left lateral view of lesions to S0023

Fig 18: Magnified view of lesions to left lateral side of S0023

Fig 19(above): Anterior view of mandible, The lesion can be seen through the removal of the left mandibular ramus and the incision to the right ramus. The lesion may be better seen in the drawing.

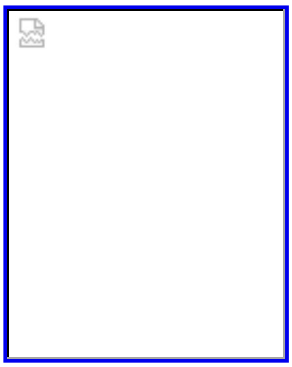

Fig. 20: Anterior views of cervical vertebrae three and four from S0023

S1016 (Record Sheet 77 and Subsidiary Record Sheets 12-18)

S1016 is a male and aged between 35 and 50 at the time of death. Found immediately adjacent to S1018, they both exhibit vast cranial injuries. In the Reedam trench S1012, 1013, 1014, 1015, 1016, 1017, 1018 and 1021 were all exposed at the same time and were buried during the same period as the stratigraphic evidence suggests. The burial was orientated West to East and was in a supine position, buried with one oyster shell within the grave cut.

The trauma on this individual exhibits many unhealed lesions. The majority of injuries are located on the frontal bone and facial bones, but others have been made laterally to the cranium as well as vertically on to the posterior bones. In total there are seven individual and identifiable cases of trauma on this one individual.

On the inferior aspect of the mandible a chop wound has been made with a force great enough to slice through an incisor tooth as well as the mandible (depth of 37mm). There are no visible fractures on the surviving areas of the mandible (although very little of it remains) and the injury did not interlink with any other lesions on the cranium as others do (fig 21).

Fig 21: Anterior view of a cut through incisor tooth and mandible

On the right side of the nasal bone a small superficial incised wound can be seen (fig 22). This cut mark is aligned with a lesion on the mandible. With much of the maxilla and zygomatic bones missing, the length of the cut could not be determined. On the mandible however, a fragment of bone appears to have been sheared off when the strike was made (Fig 21).

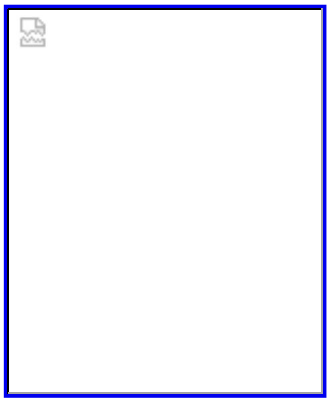

Fig 22: Right inferolateral view of a superficial cut to right side of nasal bone

Another damaging strike was made to the left orbit and the mandible. This was similar to the cut made to the right of the nasal bone and was more damaging causing the eye orbit and brow ridge to be totally dislodged. The cut follows in a straight line to the mental protuberance where an incision of 3mm deep can be seen (figs21&23).

Fig 23: Right anterior view of a deep cut to left orbital ridge

On the left side of the frontal bone there is a cut wound that has been evaluated as being due to a downward vertical force by a sharp edged weapon. This cut did not penetrate the endocranium and no evidence of healing is evident suggesting it was made at the same time as the other injuries. The cut measures 35mm in length, 4mm in width and 2mm in depth. It is possible that it marks the pivoting point in the strike made through the left eye orbit and mental protuberance (fig 24).

Fig 24: Right superiolateral view of non-penetrating cut to the frontal bone of S1016 (Magnified)

On the posterior aspect of the cranium a large angled cut which penetrated the endocranium can be clearly identified. Measuring 62mm in length and 4mm in width at its maximum, radiating fracture lines can be seen on either end of the lesion as well as in the middle of the injury orientated towards the bregma (fig 25).

Fig 25: Left posterolateral view of lesion to the left parietal bone

A vast amount of damage was made to the right side of the frontal bone and was most likely due to traumatic injury. Among the fragmented pieces there are two clear wounds. Almost in the mid-section of the frontal bone an incision measuring 75mm in length and 4mm in depth can be seen to penetrate the endocranium. Radiating fractures appear to have occurred along the coronal suture as well as towards the right orbital ridge. This frontal fracture line coincides with another strike which was made by a force from the left. Cutting up into the frontal bone (fig 27), radiating fractures and postmortem damage make identifying the true extent of trauma in this location very difficult (fig 26).

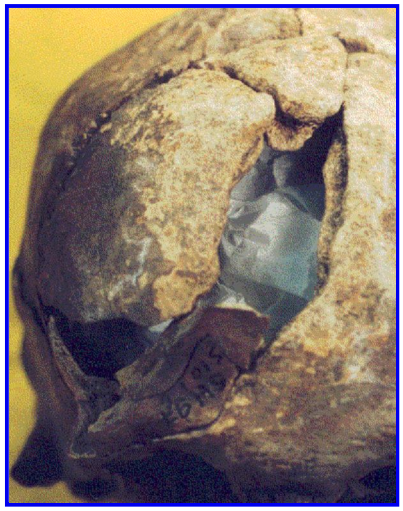

Fig 26: Anterior view of trauma to the right frontal bone

Fig 27: Left anteriolateral view of frontal bone of S1016.

Due to poor re-assemblage of the cranium, certain aspects of the cranial injuries are masked. One potential lesion in particular is located on the left mastoid process and has been glued in place, thus preventing further investigation. It was noted to be flat but without a shiny surface which resembles a sharp weapon injury. This lesion could have potentially cut deep into the cranial vault and damaged facial bones (fig 28).

Fig 28: Left lateral view of a possible edged-weapon cut to the left mastoid process

S1018 (Record Sheet 79 and Subsidiary Record Sheets 19-23)

Situated immediately adjacent to S1016, similar (but fewer) weapon injuries suggest that this individual died at the same time as S1016. The skeleton was 35-50 years old and male. The burial was uncovered in a supine position and had his hands lying over the pelvis. Although the feet had been disturbed no postmortem damage had occurred to the cranium.

A minor injury can be found in the form of a small surface wound above the greater wing of the sphenoid towards the upper frontal bone. This incised wound measures 38mm in length by 0.5mm in width and 0.1mm in depth and appears as a superficial cut.

The second lesion is located on the left parietal, between the parietal chop wound and the coronal suture. The cut is in the form of a stab wound and can be identified by a smoothed edge of length (24.5mm), width (5mm), and depth (6mm) which suggests that it was due to a projectile point or dagger.

On the left side of the cranium, a wound similar to those on S1016, measures 121mm in length and spans from the mandible and mandibular ramus to the left mastoid process. The wound was made by a lateral force causing a deep cut into the mastoid process, a small cut into the ramus and marking the mandible with a distinct edged weapon cut. The parallel marks on the mandible also suggest that the blow was angled up towards the teeth, shearing off a bit of bone (fig 29&30).

Fig 29:Left lateral view of cut to the mastoid process

Figure 30: Left lateral view of cut to left side of mandible

Laterally across the parietal and frontal bone, a traumatic injury measuring 111mm in length and at least 6mm in width has fragmented much of the cranium. The fragments of bone are present but are not illustrated in any of the photographs. When held in place, there is evidence supporting another two cuts to the left lateral side but their lengths and widths could not be measured. Unfortunately much of the left posterior aspect of the cranium is missing and part of this lesion cannot be seen. However, on the frontal bone, occipital bone, and along the coronal suture, radiating fractures exist, expressing the forces employed in this strike. There is no bevelling around the lesions and a depression of the bone towards the left temporal region is most likely associated with this wound (figs.31&32).

Fig 31: Left lateral view of lesions to S1018 to the left side of cranium

Figure 32: Superior view of lesions and radiating fractures on S1018

S1033 (Record Sheet 90 and Subsidiary Record Sheets 24-27)

This male individual is aged between 30 and 35 and was found adjacent to the sump that was constructed to remove the water from Reedam for excavation purposes. The burial was orientated West to East in a supine position with the upper limbs aligned next to the body. It is thought that some damage to the cranium was due to the construction of the sump, but the fractures suggest that this was not the case (as they were not recent) and that taphanomic changes over perimortem injuries is more than likely.

A large cut mark can be seen on the frontal bone. Many of the edges are badly damaged, but one area on the left side of the cut does demonstrate a perimortem cut. It is possible that a cut was made to the left side (fig. 34). However, the apparent lesion across the frontal bone is in fact a radiating fracture that has developed into a complete fracture. The state of preservation to the bone edges makes it difficult to be conclusive about this injury, but if this were a continuous cut mark it would measure up to 117mm long (Fig 33).

Figure 33:Anterior view of radiating fracture to frontal bone.

(no picture)
Figure 34: Cranial temporal fragment, illustrating a sharp weapon injury to the left lateral aspect of the cranium.

On the left lateral side much of the cranium is fragmented and the author has attempted to reconstruct it. The two primary areas of concern are the left eye orbit through to the temporal region (fig 35) and from the squamous part of the temporal region to the ossicle at the asterion. The reason for the possible lesion to the squamous part of the temporal region remains inconclusive, but the angled temporal lesion, although badly weathered, provides evidence of some remaining radiating fractures and an area where an edged weapon may have been struck. This measures 66mm in diameter and 5mm in width, and although lacking determinable evidence such as parallel marks and smooth surfaces, does appear to take on the appearance of being a stab wound (fig 35).

Figure 35: Left lateral view of trauma to S1033

The principal, and perhaps most conclusive evidence of trauma and possible trephination, is on the superior aspect of the cranium spanning over the posterior aspect of the left parietal. The lesion measures 156mm in length and has an average width of 8mm. The average width is due to a semi-circular area in the middle of the lesion. With some smoothed edges, it does tend to resemble a possible trephination, but

weathering prevents any conclusive interpretations. There does not appear to be any depressed areas, but radiating fractures do exist in number. On the posterior aspect of the cranium, there are three radiating fractures and two on the frontal bone (fig's 36&37).

The other cranial injury has been made around the bregmatic ossicle, where a smooth surface and parallel marks suggests perimortem injury. Orientated towards the left frontal bone, the full extent of the lesion is unclear due to bone fragmentation. A radiating fracture can, however, be found on the coronal suture, orientated away from the point of injury towards the area of missing bone on the right lateral side.

Fig 36: Posterior view of the large lesion to the superior aspect and left parietal bone of S1033

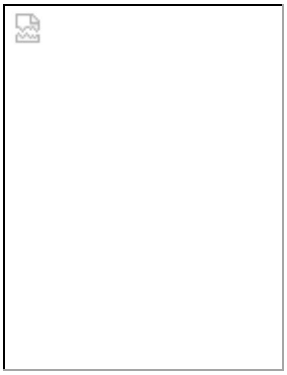

Figure 37: Superior view of the large lesion to the superior aspect and left parietal bones of S1033.

S0086: (Record Sheet 67 and Subsidiary Record Sheets 12-15)

The individual has been determined as being male and aged between 45 and 50 at the time of death. Located at the bottom of the Heacham Valley within the Boneyard trench, the waterlogged conditions are similar to Reedam burials. This has resulted in similar preservation processes to those individuals recovered from Reedam, however, the cranium is in relatively poor conditions despite the better preservation condition. The burial was found with the upper limbs across the pelvis, the cranium fragmented, separate from the vertebrae, and the lower limbs missing. The latter aspect of the burial circumstances was due to a ditch being constructed during a later period which may in turn have disturbed the location of the cranium and influenced its current condition (fig 38).

Fig. 38: S0086 in situ. Truncation through the burial visible below the record board.

The trauma was not easily identifiable. This was due to the number of post-depositional fractures and weathering processes. After reconstruction by the author, three perimortem cranial injuries were identified. The first lesion measured 32mm in length and 4mm in width. Situated on the inferior left side of the frontal bone, adjacent to the coronal suture, the lesion was made in a similar place to the unhealed depression of S0012.

The other two perimortem injuries were identified on the posterior aspect of the cranium. From the photograph (fig 40), the two perimortem lesions can be seen to follow similar orientations, from the inferior left parietal bone towards the right lambdoid suture and lower nuchal line. Although fragmentary in structure, after careful reconstruction a smooth and flat surface on either side of the fragment distinguished the trauma as being perimortem (fig 39). The extent of the lesions is unknown due to missing bone at either end of the lesion (similar to S0067), but the lesions have similar traits to those lesions identified on S1016, S1018, S0067 and S1033.

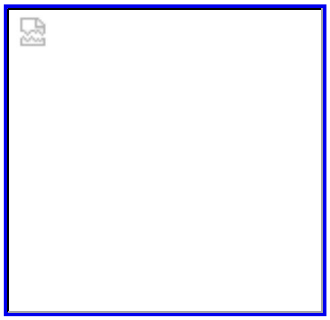

Fig 39: Cranial fragment illustrating the two perimortem lesions made to cranium of S0086.

Fig 40: Posterior view of cranium. One lesion to the left and right parietal and the other on the occipital bone near the nuchal crest of S0086.

S0067: (Record Sheet 57 and Subsidiary Record Sheet 10)

The individual is male and aged between 40 and 45. The cranium of S0067 was heavily weathered and taphanomic changes had obviously distorted and fragmented the cranium. There were two identifiable cranial injuries, both situated on the inferior aspect of the cranium.

The extent of the first lesion is unknown as no bone exists at either end of the lesion. It was identified by the smooth surface on one side of the bone which spanned the length of the lesion that remained. The lesion angles down towards the right side of the occipital, cutting through the lambdoid suture on either side and adjoins with the other likely perimortem cut which was made to the left lambdoid suture (fig's 41 & 42).

Fig 41: Left posterlateral view of the two posterior perimortem lesions with illustrations of the trajectory shown by the dotted lines

The second lesion was identified as the lambdoidal suture had been disturbed. One side of the suture remains, whilst the other side, although not smooth due to weathering, resembles that of a straight incision made on the bone. There is a small radiating fracture measuring 24mm in length (which has increased in size since deposition) and is situated on the inferior aspect of the left parietal bone.

Fig 42: Posterior view of the cranium of S0067. The smooth surface of the first perimortem cut described can be seen. The disturbance to the left lambdoid suture and the straight edged cut can be seen also.

S1059 (Record Sheet 106 and Subsidiary Record Sheet 29)

(Refer to Antemortem trauma (Section 4.2) for details about burial, sex and age of S1059.)

As well as the antemortem trauma, through macroscopic investigation and the use of a left lateral x-ray taken of the cranium (X-ray number 12), radiating fractures were identified. Much of the temporal region and left lateral side is fragmented but on one fragment there is conclusive evidence of edged-weapon trauma. Unfortunately, with the state of preservation, the full extent and nature of the lesion could not be determined.

4.4 **Summary of results**

After careful examination, the skeletal remains revealed that twelve (8.9%) of the 134 examined had either antemortem or perimortem injuries. Overall the skeletal material was in relatively good condition and any evidence of trauma could be recognised. It should be mentioned that the skeletons from the 'Boneyard' were substantially more weathered and had been subject to continuous post-depositional action. In comparison, the skeletal remains from the 'Reedam' area were in a better state of preservation and noticeably less fragmented. This is most likely due to the reedam itself being created during the 11th Century and being located at a lower region where plough damage had not occurred.

Skeleton ID	Age (yrs)	Sex	Type of Trauma
S0012	33-38	MALE	Perimortem
S0023	17-22	FEMALE	Perimortem
S0086	45-50	MALE	Perimortem
S0057	34-38	FEMALE	Antemortem
S0067	40-45	MALE	Perimortem
S1016	35-50	MALE	Perimortem
S1018	35-50	MALE	Perimortem
S1033	30-35	MALE	Perimortem
S1049	45-50	MALE	Antemortem
S1059	25-40	MALE	Antemortem/Perimortem
S1011	50-60	FEMALE	Antemortem
S0030	45-50	MALE	Antemortem

Table 1: Chart of Skeleton ID, age, sex and type of trauma.

From table 1 the age and sex of each individual with cranial injuries can be seen. 75% of the injuries identified can be attributed to males. With the exception of S0023, the majority of cranial injuries have occurred on mature male adults (35-50 years old) and occasionally on younger male adults (aged 25-40).

	LESION				DIRECTION			
	# Wounds	%	# Penetrate	%	Anterior L.	Lateral R.	Lateral Posterior	
Sharp	24	82.8	22	91.6	11	6	1	6
Blunt	5	17.2	0	0	3	0	0	2
Total	29	100	22	75.9	14	6	1	8

Table 2: Chart illustrating total number of wounds and the direction they were made.

Table 2 summarises the types of wounds identified and the direction the lesions were made from. There were a total number of 29 wounds, 24 (82.8%) of which were classified as sharp and 5 (17.2%) as blunt force. Twenty-two (91.6%) of the sharp wounds penetrated the skull, whereas, none of the blunt injuries did so. Thus, of the 29 wounds identified, 22 (75.9%) were penetrative.

From the trauma identified, an analysis of the position of the lesions was carried out. The study found that of the sharp force injuries, 11 (45.8%) were situated on the anterior aspect; six (25%) on the left lateral side; one (4.17%) on the right lateral aspect and six (25%) on the posterior part of the skull. Blunt injuries, as mentioned, only accounted for 17.2% of the total number of lesions identified. These trauma injuries were focused on the anterior and posterior aspects of the cranium, with three (60%) occurring on the anterior aspect and 2 (40%) occurring on the posterior aspect.

In total, 201 individuals have been unearthed within the cemetery and 134 of these (66.7%) were used in this study. The twelve individuals with cranial injuries represent a small minority (9%) of the 134 examined. They do, however, provide valuable information about 8th century Anglian society. A discussion of the implications of these results, positions of each individual within the cemetery and the likely weapons used, are to be found in Chapter 5.

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5. DISCUSSION

The excavation revealed that twelve of the 134 skulls examined had cranial injuries. In order to understand the traumatic injuries in their entirety, this chapter will discuss the patterns in trauma that has been identified and demonstrate the significance of each burial within the cemetery.

5.1 **Implications of burial location within cemetery**

The cemetery has been radiocarbon dated to Cal AD 662-881. From the archaeological evidence and recent phasing of the cemetery, certain patterns can be seen in the burials. Some are contemporary with one another; others post-date earlier burials, suggesting that they occurred later on in the cemetery's use from certain areas being re-used (Geake, 1997: 16). From what has been excavated from the cemetery so far, the evidence suggests that burials were orientated around certain features and that the burials progressed South from the river, up the slope of the Heacham Valley over time.

Reedam has been determined as having six phases of burials within the excavated trench area. Trauma injuries have been found on remains attributable to phases two to four implying violent death was an ongoing feature of the society throughout these phases. It must be taken into account that only a small area of the Reedam has been investigated (10m x 5m) and that the true extent of the cemetery is unknown. It is known, however, that burials will continue in all directions in the Reedam area as bones can be seen in all the baulks. With this evidence in mind, one must ask what percentage of the cemetery has actually been excavated and how many more individuals with cranial trauma are yet to be found (fig 44)?

The second phase in Reedam contains the burial of S1049 (FIG. 45) which exhibited evidence of antemortem trauma. This burial suggests that conflict in the region was common from an early period. The lesion was well healed and the individual had obviously survived from the conflict for some time.

In the third phase of Reedam the burial of S1059 can be found (fig 46). With antemortem and perimortem injuries, the phasing suggests that the individual, like S1049 was involved with some conflict and survived for a period of time. Unlike S1049 however, S1059 exhibited perimortem injuries as well. Buried in a similar place to S1049, the author suggests that conflict was present from the early phase of the cemetery's use (AD 660's) to the third phase of Reedam use.

S1033, S1016 and S1018 are buried in the opposite side of the Reedam trench and have been attributed to a later phase (fig 47). These three individuals exhibit extremely violent cranial injuries, characteristic of a massacre. Buried in relatively close proximity to one another, it is likely that they were buried at the same time and their deaths were due to the same conflict. However, the orientation of the burials gives rise to some uncertainty as to the validity of this hypothesis. S1016 and S1018 are buried next to each other within the same grave cut and are noticeably buried at a different orientation to S1033 (fig 47). Surely, if they were buried at the same time the graves would follow the same geographic orientation and position relative to each other. With S1018 and S1016 the issue of the grave being one grave cut requires examination. Excavation revealed them facing the same direction and they had been placed in the same supine position. It can perhaps be said that the grave was knowingly and purposely dug for the two individuals who closely resemble one another and may possibly have been related. There is no doubt that S1016 and S1018 not only died at the same time and because of the same conflict, but that they were buried at a different orientation to other burials probably because the burials took place at a different time of year.

It is thought, but is by no means conclusive, that the burials of Boneyard are of a later date to the burials in Reedam. With similar radiocarbon dates, the general view is that the burials move up the hill away from Reedam over time and orientate around a different feature in the Boneyard trench (fig 43).

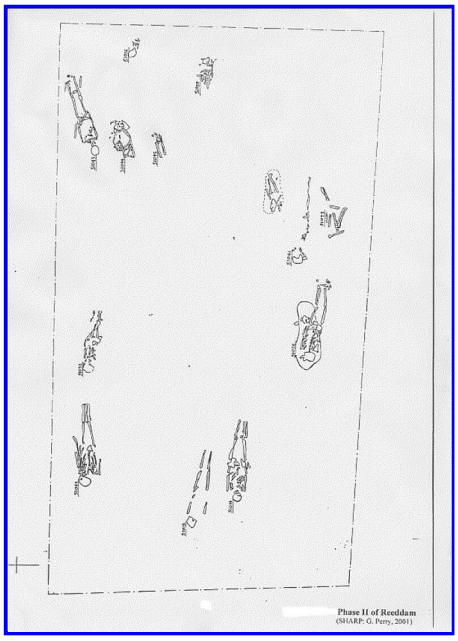

Figure 45: Second Phase of Reedam

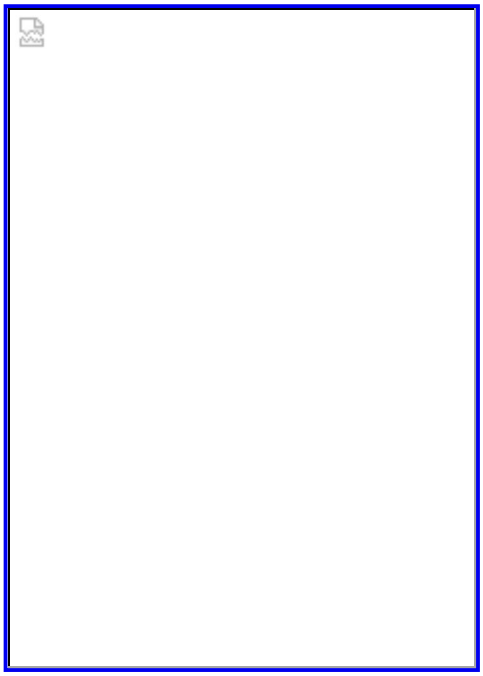

Figure 46: Third Phase of Reedam

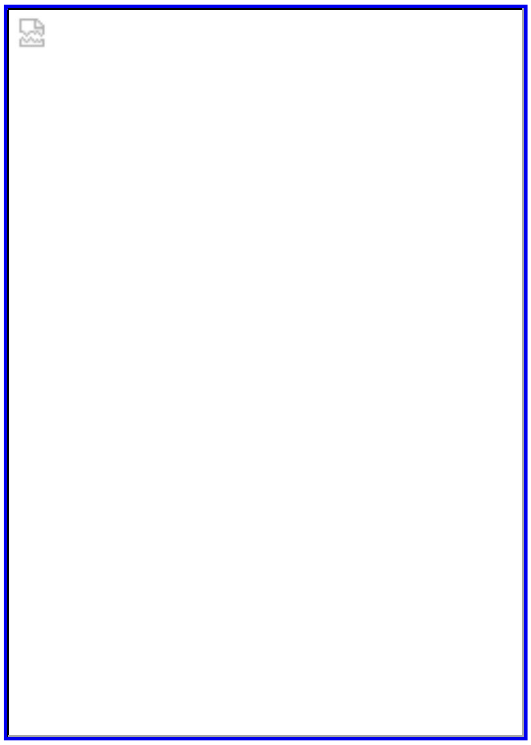

Figure 47: Phase four of Reedam

Unlike Reedam, the area of burials in Boneyard is more spread out and the inter-cutting of graves is uncommon. However, those with perimortem trauma not only appear to have been buried in similar places, but three of the individuals who died of their injuries are cut into earlier burials. S0023 was found near S0067 and they were both buried at similar times as the stratigraphy and the presence of a later ditch suggests. S0023 cuts into S0026, and S0067 cuts into S0065 & S0031. With burials generally being spread about in the Boneyard, the inter-cutting of burials seems somewhat strange. Moreover, S0067 and S0012 appear to have had their graves cut into other burials deliberately. This can be seen by the use of bones around the burial as a 'perimeter' to the grave cuts (figs 48 and 49). It is submitted that this may be significant, not only for the dating of the cemetery, but also in understanding the social practices of 8th Century Anglian peoples. The inter-cutting of graves is common in cemeteries where space was limited. It is known that areas were re-used once the first generation of the cemetery had been fully used. It is mentioned in a recent survey that linings of stone were used in grave building (Geake, 1997: 17). In relation to this, North Norfolk had different, unexplained burial rites, and the use of bones as a perimeter

may be such an example (ibid., 1997: 19). These burials of S0023, S0067 and S0012 were all in the same area of the Boneyard trench and appear to have been deliberately buried over existing burials. Noticeably, the area in which they were buried was close to a suspected area of importance (fig 43). Furthermore the evidence of coffin brackets suggested it is near an area where higher status burials occurred.

The only other individual with perimortem trauma found in Boneyard is that of S0086. Found at the bottom of the southern slope near Reedam, it is not possible to phase this burial as a baulk passes between it and the Reedam trench. Nevertheless, it is more than likely associated with the phases of Reedam rather than the later burials of Boneyard. The phases determined in Reedam and the burials that cut into pre-existing burials in Boneyard, suggests again that conflict and violence was a common factor in Anglo-Saxon society.

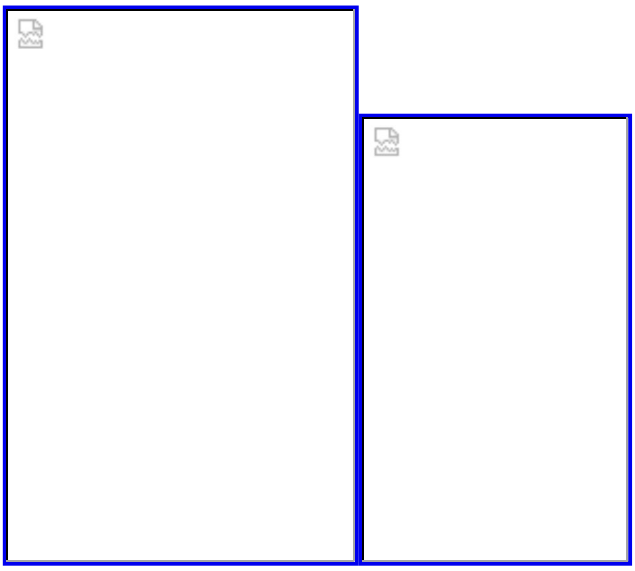

Fig 48 (left): Use of long bones around S0067 and fig 49 (right) shows use of long bones to the right of the cranium of S0012

5.2 **Traumatic Head Injury at Sedgeford**

Patterns in cranial injuries have certainly been identified on the twelve individuals. The results imply that those involved in conflict were adult males (with the exception of S0023)(female), and that certain individuals were killed during confrontations with other individuals. Twelve of the 134 crania examined exhibited evidence of trauma. Realistic scenarios about each of the traumatised individuals can be hypothesised although clearly it is not possible to be conclusive

The results indicate that the majority (82.8%) of the 29 lesions were caused by sharp implements. 91.6% of these penetrated the endocranium and were certainly fatal. These lesions, however, not only indicate that the injured were involved in hand-to-hand combat, but that many of the individuals had multiple fatal cranial injuries that have characteristics of a battle or massacre.

One of the most interesting burials and cases of cranial trauma can be attributed to S1016 and S1018 who both have multiple cranial injuries. Interestingly, they both exhibited post-cranial perimortem lesions to the upper limbs which can be described as ‘defence wounds’ (Novak, 2000: 93). The cranial lesions, however, on these two individuals are similar in that they were all caused by a sharp edged weapon, but dissimilar, in that they occurred in noticeably different places. It is the author’s hypothesis that the aggressor was a different person for each individual and that the attacks were carried out with such aggression that once the victims had fallen (or were falling) the strikes with the weapons were still being made. This hypothesis derives from the trauma visible on S1016, who, although having lesions to the left

lateral side and posterior aspect of the cranium, has at least three cuts through the facial bones. The lesions to the anterior side of the cranium were certainly carried out with a long bladed implement, but the angle at which they were struck indicates that the victim must have been falling or was on the ground when the strikes were made. In light of the trauma that was identified on S1016 and S1018, all of the strikes identified were potentially fatal. S1018 has three penetrating cuts to the left lateral side of the cranium. Any one of these cuts could have been fatal (fig 50). S1016 has so many lesions on all aspects of the cranium that the aggressor not only attacked the individual whilst he was standing and fighting, but once the victim had fallen, he was continuously struck with a sharp weapon in what can best be described as a frenzied attack.

(no drawing)
Fig 50: Reconstruction of the death of S1018 (Copyright: Dominic Andrews, SHARP)

S1033, like S1016 and S1018, had multiple cranial injuries caused by an edged weapon. With two cuts to the left lateral side and one to the superior aspect of the cranium, it is thought by the author that the two perimortem cuts to the left lateral side were made prior to the larger cut to the superior aspect of the cranium. It is likely that this individual was involved in hand-to-hand combat. All three lesions penetrated the endocranium and were all potentially fatal. However, due to the severity of the cut to the superior aspect of the cranium, it is more than likely that this injury was the ultimate cause of the individual's death. The angle that this injury was made suggests that it was either a result of a strike made from behind S1033, thus implying that more than one opponent may have been involved, or that the S1033 had fallen and turned his head to the left when the injury was made. There is an area of bone that appears to have been sheared off around the larger injury which gives rise to some doubt about the circumstances of death. This lesion may have been caused by an earlier strike of a weapon that sheared a piece of bone off prior to the large injury being made, but there is thought by the author that a possible trephination may have occurred in the same area as the lesion. This is by no means conclusive as bone fragments are missing and the bone surface around the lesion is weathered and discoloured.

S0086 and S0067 both have two perimortem cuts to the posterior aspect of their craniums. Unfortunately, both of the individuals are missing much of the facial bones, frontal bones and lateral bones (i.e. temporal regions). It is quite possible that the individuals being discussed may have potentially had more injuries to the cranium. These would have thrown light on the circumstances surrounding their deaths. With the lesions identified, however, the author has found it difficult to speculate as to the manner of death. There is no doubt that a long sharp implement caused the injuries and that the lesions are similar to those identified on S1016, S1018 and S1033. With the exception of S1016 who had an injury to the posterior aspect of the left parietal, none of the other individuals had perimortem cuts to the posterior aspect of the cranium. S0086 is similar to S1018 in that strikes were made repeatedly with a weapon in the same area (left lateral side), but on S0086, the strikes were made repeatedly to the posterior aspect. With the information available, the author believes that S0086 and S0067 were either ambushed by someone who delivered the blows, or that in an attempt to get out of the way turned their back on their opponent and were attacked twice to the back of the head.

S0023, although determined as being buried around the same time as S0067, does not cut into existing burials. The trauma on S0023 is, however, very violent in nature and most likely corresponds to a fine cut identified on the anterior side between cervical vertebrae's three and four. The author suggests that, due to S0023 being a female and aged between 17 and 23, she died under different circumstances to the adult males with perimortem trauma identified in this investigation. It is possible that S0067, being an adult male aged between 35 and 50, attempted to protect S0023 from an aggressor. In the course of doing so was killed, along with S0023, who was struck with a sharp edged weapon (like S0067) twice across the face. The injuries to both the individuals are similar in that a very sharp edged weapon caused them, but the killing of S0023 may have further implications due to there being the cut to the vertebrae. The author and other members from the S.H.A.R.P. team believe that a possible garrotting may have occurred and it is probable that the trauma to the neck and head are closely related.

An individual from the earlier phases of the cemetery's use (S1049) revealed evidence of an antemortem

cranial injury to the frontal bone. The lesion was in mature stages of healing and the individual had obviously survived for some time. Aged between 45 and 50 at the time of death, not only does this reveal that the individual was involved with conflict during the early period, but it also suggests that individuals were fighting as younger males. The lesion was very severe on S1049 and no sign of perimortem injury can be seen. This implies that he didn't fight again, perhaps not through choice, but through the lesion actually rendering him incapable of fighting.

S1059 suggests that injuries received from an earlier age in the individual's life can heal and fighting can be possible again. The antemortem healed fracture and bone growth around the occipital region deformed the cranium slightly, but a perimortem injury to the left lateral side implies that he later died of further battle / conflict related injuries. Situated in the middle phases of Reedam, S1059 is a good indicator that people were fighting during the 8th and 9th centuries. Young adult males like S1049 and S1059, to mature adult males, like S1033, S1016 and S1018, may have had the responsibility to fight for the region against what appears to have been violent and aggressive opposition.

5.3 **Warfare and Weaponry of the period**

War was endemic to the kingdoms of the sixth, seventh and eighth centuries in Britain and accounts of a society accustomed to strife, banditry and lawlessness are found within the Anglo-Saxon Chronicle (Reynolds, 1998; Swanton, 1996). Radiocarbon evidence dates the cemetery at Sedgeford from Cal AD 662-881. From the seventh century, conflict changed from battles fought against native tribes, to battles between the various Anglo-Saxon kingdoms (Underwood, 2000:19). From written sources, it is known that the scale at which warfare occurred ranged from small scale skirmishes to full-scale battles. In the 'Laws of Ine' it is stated,

Less than seven men shall be called thieves,
From seven to thirty five are a band,
More an army. (Ibid., 2000: 122)

During the period in question, the King of the East Angles at any given time could call upon nobles and warbands to support him in battle. Many men would fight as part of the kingdoms fyrd. A young man could earn and pay for land by serving time to the lord in the warband and fight in battle; noblemen were expected to fight for the king. Refusal to fight for the king resulted in fines of various magnitudes.

Despite this evidence of extensive contemporary conflict from minor skirmishes to major battle (Ibid., 2000: 122), it is not possible to be definitive about the nature of the violence which resulted in the cranial trauma of the 12 ex 134 crania examined from Sedgeford. It is more likely that the recorded cranial trauma was attributable to social violence or minor skirmishes. This view may need to be revised if further excavation of the graveyard reveals a significantly larger number of crania with trauma.

Weaponry was by no means available to everyone involved in conflict but in a time of constant violence, a shield could be easily carried around (Ibid., 2000: 89). With so many incapacitating wounds to some individuals from Sedgeford, the implications are that those wounded had very primitive weapons, which afforded little or no defence. (Ibid.,2000) suggests that defensive equipment would have been available and most importantly necessary in this violent society. Shields were generally made of wood with an iron 'boss' in the middle and the abundance of such objects are depicted in many Pagan cemeteries such as Morning Thorpe (Green, 1987). Other defensive armour such as helmets and body guards would have been limited, and although law 54 of Ina indicates that armour was becoming common in the 8th century, it would have only been available to the richer members of society (Oman, 1991; 67-69).

As no grave-goods exist in Christian cemeteries, our understanding of weaponry from Anglo-Saxon times derives from historical records and earlier Pagan cemeteries where grave-goods are present. These are repeatedly used in the interpretation of warfare and society. Morning Thorpe in Norfolk is such a Pagan cemetery, and although from an earlier period, provides information about the weapons available in an

early Anglo-Saxon society as well as providing an insight into the status of individuals that were buried with warfare related grave-goods (Green et al., 1987). With the Sedgeford sample, it can only be speculated as to what weapons were available to them. Through the lesions revealed in this study, however, an understanding of the weapons that inflicted the injury can be discussed.

Sharp edged weapons such as swords, knives, axes and seaxes caused the majority of injuries identified. During Anglo-Saxon periods, the most common weapon was the javelin and spear (Embleton, 1979: 10). Used for hunting, throwing and thrusting in hand-to-hand combat (Underwood, 2000: 23), no lesions appear to have been caused by such weapons. This does suggest that the opponents were not using their javelins in combat, but rather using a sharp-edged weapon in hand-to-hand combat. The use of javelins and spears must not be ruled out, however, as a known use of them was stabbing the opponent in the chest. As post-cranial bones have not been investigated for trauma, the presence of this weapon being involved in the killing of an individual is quite possible.

The lesions to S1033, S0086, S0023, S1016, S1018 and S0067 are deep and penetrating lesions. Some of their lesions would have been caused by a sword evidenced by the length and depth of the cuts. This type of weapon would normally be associated with high status individuals, for example noblemen. Beowulf stated,

'…angrily struck
so that it bit hard by the neck
the ribcage broke the sword passed straight through
the doomed body'. (Underwood, 2000: 47)

'Angrily struck' is certainly apparent within the Sedgeford sample. S0023 had a cut from the left mastoid process to the right mandibular ramus. S1018 had three cuts to the left lateral side, including one to the left mastoid process and left side of the mandible. S1016 had a deep cut made to the left mastoid process. S0086 and S0067 had two cuts made to the posterior aspect of the cranium. All of these lesions were certainly 'angrily struck' and the evidence suggests that it was a common technique to aim for the neck.

Recent studies within Anglo-Saxon cemeteries at Dover and Eccles, Kent, revealed that cranial injuries of this nature were similar to the lesions identified at Sedgeford. At Dover, one of the two individuals investigated had a sword cut to the left parietal measuring 98mm in length and 36mm in width (Anderson, 1996). At Eccles, six skeletons showed cranial injuries. Three had long sword cuts to the left lateral side of the cranium. One had been cut three times to the left hand side of the cranium (like S1018) and another individual revealed at least seven cuts to the head (like S1016) (Underwood, 2000: 65; Boylston, 2000: 369). Dated to the Early Anglo-Saxon period, trends in warfare and techniques of combat were obviously widely used extending from Norfolk to Kent.

The lesions to S1016 and S1033 suggest that strikes were made in downward motions to the cranium as well as laterally. The indication is that a strike to the superior aspect of the cranium would have been just as fatal. From the Battle of Maldon in AD 920-1 (Swanton, 1996: 100-101), a source reveals,

'I heard that Edward struck one,
so fiercely with his sword the swing not
withheld that he fell at his feet the doomed warrior'
(Underwood, 2000: 62)

This scenario could possibly explain the trauma to the face of S1016. If the strikes to the top and both sides of the head knocked him to the ground, the three cuts to the facial bones may have resulted.

The lesions on many of the individuals are certainly caused by a sword. On S1033 on the left lateral side and on S1016 to the posterior and frontal bones, the lesions are characteristic of a seax or scramasax determined from the length and damage of the lesions. These weapons, although not widely used, were used when nothing else was available. The weapon had a single blade and was essentially a short knife. The lesion to S1033 on the temporal region is certainly characteristic of the seax.

The only incident of an axe being used was through the identification of a healed lesion around a bevelled cut. Axes were rarely used in Anglo-Saxon times and caused less damage than swords due to the width of the weapon. Identified on S1049, the opponent either did not strike the weapon hard enough, or S1049 was wearing a helmet- indicating higher status.

There is an alternative interpretation of the findings. The date and location of the cemetery, both near the coastline and on a river, could suggest that the individuals identified with trauma might have been subject to Viking raids. As early as the 8th century, Viking presence was known. Historical records state that in AD789, Wareham in Dorset was attacked by the Vikings; Frankish property was attacked in AD799 by Vikings; and in the mid-ninth century, Danes were wintering in Britain (Oman, 1991). During the Anglo-Saxon period, the inhabitants of Britain withstood, and eventually repelled the ravagings of the Vikings (Underwood, 2000: 18). In AD866, 'a great army came to the land of the East Angles and there was the army a-horsed' (Swanton, 1996: 68-69). Viking (Danes) raiders often used waterways to navigate themselves inland and land their boats. Sedgeford stands on the River Heacham, and it is quite possible that some of the trauma identified at Sedgeford is associated with previously unrecorded Viking attacks prior to the Viking army landing in East Anglia in AD865-AD866. It has been suggested, however, that trade and interaction with the continent occurred prior to AD 866, and that the landing and presence of the Danes would not have been either alien or unwelcome among the local inhabitants (Carver, 1989).

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6. CONCLUSION

It is evident that some of the individuals buried between the 7th and 9th centuries at Sedgeford were involved in warfare, and sometimes very violent encounters, characteristic of society during this period.

134 crania were examined of the 201 individuals excavated so far. 67 individuals either remain in situ or were without crania (disarticulated) when lifted. The full extent and number of burials within the cemetery is still unknown. For these reasons it is uncertain whether the twelve individuals identified with cranial trauma truly represent the full extent of cranial trauma within the Sedgeford site.

At present, those with severe cranial injuries, caused by swords and other edged-weapons, provide indicative evidence about the scale and nature of violence. Extended excavation of the cemetery, in both Reedam and Boneyard, may yield more cases of cranial trauma. This will increase the sample size and possibly allow more definitive conclusions to be reached.

The cranial weapon injuries which have been identified in this paper provide a good framework for further work in the same or related areas. When more skeletons are excavated and the sample size is greater, the same study should be carried out again and the results of this paper incorporated into that study.

An investigation into the geographic orientation of the burials of the traumatised individuals identified in this study may also prove beneficial. Such a study may provide information regarding Viking raids. The orientation of burials changed throughout the year (tracking to the sun's position). A preponderance of summer burials might land weight to the hypothesis that some of the injuries could be attributable to Viking raids. Such raids took place in the summer months when the seas were calmer.

Lastly, an investigation into post-cranial (body) trauma should be carried out. A few areas of perimortem trauma were identified (by chance) on some individuals in the likely form of 'defence wounds'. Injuries to post-cranial bones, although not fatal as often as cranial injuries, could provide important information. For

example, lesions to the lower limbs are often associated with someone striking a weapon below a shield in order to incapacitate the opponent. This type of injury alone could suggest that the individuals with cranial trauma had a shield as defence. Another example is lesions to the shoulder bones. Such incapacitating strikes could disable a person from using a weapon for example and possibly explain some of the causes for the cranial injuries.

This study has been a success. The aim was met. However, the excavations at Sedgeford are still far from complete and much information relating to this study is still buried within the cemetery. There are plenty of areas for related studies and this same research question should be reviewed when the cemetery is fully excavated.

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