

**Appendix 5.4.2**

**OSTEOLOGICAL ANALYSIS  
OF  
DISARTICULATED HUMAN REMAINS  
PARNELL SQUARE NORTH  
LICENCE: 15E0361**

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## CONTENTS

<b>CONTENTS</b> .....	i
List of Tables.....	ii
List of Charts.....	ii
<b>1. INTRODUCTION</b> .....	1
1.1 General.....	1
1.2 Methodology .....	1
1.3 Preservation .....	2
1.4 Demography .....	2
<b>2 OSTEOLOGICAL ANALYSIS</b> .....	3
2.1 Identification .....	3
2.2 Minimum Number of Individuals (MNI) .....	7
2.3 Pathology/ Trauma.....	9
2.4 Non-metric traits .....	11
<b>3 DISCUSSION &amp; CONCLUSIONS</b> .....	12
<b>4 REFERENCES</b> .....	13

**LIST OF TABLES**

- Table 1 Layout of numbering system for dental analysis  
Table 2 Breakdown of fragment type, number and size by element  
Table 3 Minimum Number of Individuals (MNI) by element

**LIST OF CHARTS**

- Chart 1 Breakdown of identifiable elements by fragment number  
Chart 2 MNI represented by element

## 1. INTRODUCTION

### 1.1 GENERAL

The following report details the osteological analysis of disarticulated human remains retrieved during test investigation at Parnell Square North in Dublin City by David McIlreavy in June 2018 (Licence 15E0361). The analysis was undertaken by Maeve Tobin of Irish Archaeological Consultancy Ltd. The remains were retrieved from a single deposit (DSk 1) of mixed material exposed within Test Trench 2. The deposit contained commingled disarticulated human remains and animal bone. A fragment of mid-shaft adult humerus (5g) has returned a two-sigma calibrated date of AD 692–961 (UBA 38764) indicating activity between the 8th and 10th centuries AD.

### 1.2 METHODOLOGY

Prior to analysis the bone samples were removed from the surrounding matrix as part of post-excavation processing. The material was analysed according to the standards laid out in the guidelines produced by the IAI (Buckley, Ó' Donnabhaín and Reilly 2004), the IFA (Brickley and McKinley, 2004) and Buikstra & Ubelaker (1994).

Each element was examined macroscopically and an attempt was made to identify the bone to four main skeletal elements, i.e. skull, trunk, upper limb and lower limb. Identified elements were separated and recorded in detail. A full inventory of all the remains was maintained and a discussion of the results are included in this report.

Where possible biological sex was assessed using morphological assessments skeletal features as described in Bass (1967), Buikstra & Ubelaker (1994), as well as metrical analysis of post-cranial elements (Bass 1995). Where possible age was assessed using standard techniques as described in Buikstra & Ubelaker (1994), White (2000) and Schwartz (1995) including changes to the auricular surface and pubic symphysis. Non-metric traits described by Buikstra & Ubelaker (1994) and Finnegan (1978) were recorded. The dentition was inventoried using Buikstra & Ubelaker (1994) and Van Beek (1983); dental pathologies were recorded using Brothwell (1981) and White (2000).

The dental remains were examined and recorded using an individual two digit number. The first digit represents the location in the mouth (1–4) and the second digit represents the element (1–8). For deciduous dentition a similar method is followed however the quadrants of the mouth are numbered 5–8. In addition, incidences of calculus, caries lesions, hypoplastic defects, and abscesses were recorded using Ortner (2003) and White (2000).

**TABLE 1:** Layout of numbering system for dental analysis

UPPER RIGHT QUADRANT							UPPER LEFT QUADRANT								
<i>Juvenile</i>	55	54	53	52	51	61	62	63	64	62	<i>Juvenile</i>				
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28

48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
<i>Juvenile</i>			<i>85</i>	<i>84</i>	<i>83</i>	<i>82</i>	<i>81</i>	<i>71</i>	<i>72</i>	<i>73</i>	<i>74</i>	<i>75</i>	<i>Juvenile</i>		
LOWER RIGHT QUADRANT								LOWER LEFT QUADRANT							

### 1.3 PRESERVATION

Skeletal preservation depends upon a number of factors, including the age and sex of the individual as well as the size, shape and robusticity of the bone. Burial environment, post-depositional disturbance and treatment following excavation can also have a considerable impact on bone condition. Preservation was assessed using a grading system of five categories: very poor, poor, moderate, good and excellent. Excellent preservation implied no bone surface erosion and very few or no breaks, whereas very poor preservation indicated complete or almost complete loss of the bone surface due to erosion and severe fragmentation.

The preservation of remains retrieved from Parnell Sq. North was heavily impacted by the level of fragmentation and historic disturbance. Despite this a large portion of the bone fragments were rated as moderate or good condition which aided in the identification to specific element and features.

### 1.4 DEMOGRAPHY

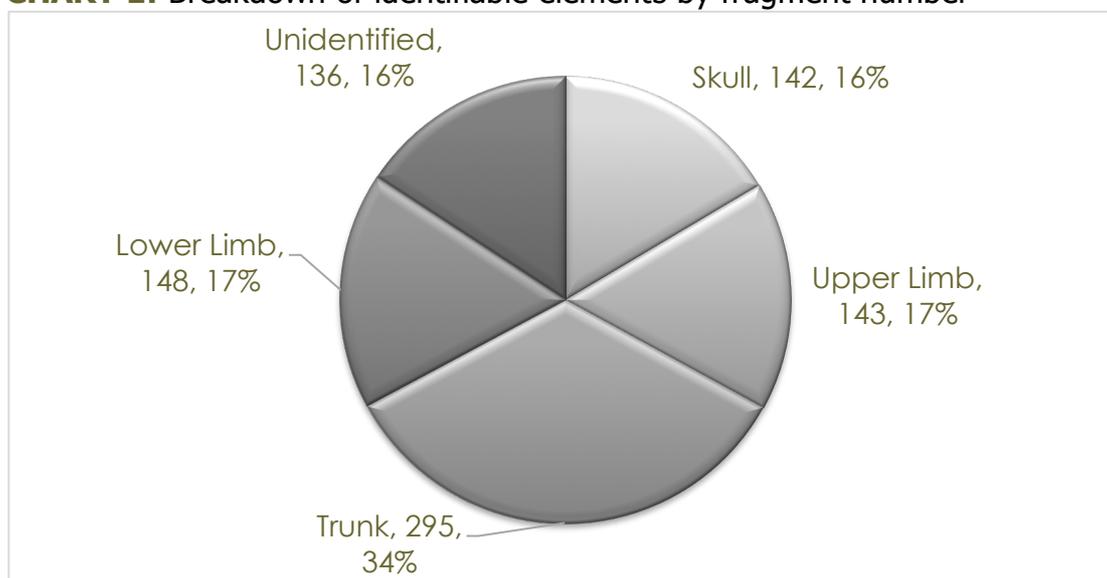
The remains appeared to represent all broad age categories within the population, ranging from infant, young child, adolescent, and adult. Sexually diagnostic elements of the skull and pelvis and indicative metrics from long bones suggest the presence of males and females; although without confirmation of other known associated skeletal elements it was not possible to make definitive statements about sex prevalence.

## 2 OSTEOLOGICAL ANALYSIS

### 2.1 IDENTIFICATION

Of the 864 fragments submitted for analysis it was possible to identify 84% (n=728 fragments) of the remains to skeletal element. The largest quantity of fragments were identified as elements of the vertebrae and ribs (34.2%, N=295), although all regions of the body were well represented. No complete long bones were present, although 55 elements were recorded as complete, comprising lumbar vertebrae, patellae, tarsals, metacarpals, metacarpals and phalanges of the hands and feet. While it is unsurprising that the small bones of the hand and feet survive complete, the presence of complete vertebrae suggest that there was no significant effort to crush the bone so that it was unrecognisable.

**CHART 1:** Breakdown of identifiable elements by fragment number



**TABLE 2:** Breakdown of bone type, number and size by element

BONE ELEMENT	NO. OF FRAGMENTS	MAX. FRAGMENT SIZE	NO. COMPLETE BONES
FRONTAL	27	71mm	
OCCIPITAL	26	80mm	
PARIETAL	44	79mm	
TEMPORAL	11	76mm	
SPHENOID	3	43mm	
ZYGOMATIC	5	49mm	
MANDIBLE	11	86mm	
MAXILLA	6	49mm	

<b>BONE ELEMENT</b>	<b>NO. OF FRAGMENTS</b>	<b>MAX. FRAGMENT SIZE</b>	<b>NO. COMPLETE BONES</b>
<b>LOOSE TEETH</b>	9		6
<b>SCAPULA</b>	33	114mm	
<b>CLAVICLE</b>	17	144mm	
<b>HUMERUS</b>	27	193mm	
<b>RADIUS</b>	9	195mm	
<b>ULNA</b>	21	242mm	
<b>CARPALS</b>	9	26mm	
<b>METACARPALS</b>	13	69mm	5
<b>HAND PHALANGES</b>	13	46mm	10
<b>RIBS</b>	116	136mm	
<b>STERNUM</b>	1	37mm	
<b>VERTEBRAE</b>	139	80mm	10
<b>INNOMINATE</b>	39	113mm	
<b>FEMUR</b>	31	240mm	
<b>TIBIA</b>	42	205mm	
<b>FIBULA</b>	15	117mm	
<b>PATELLA</b>	4	47mm	3
<b>TARSALS</b>	23	83mm	10
<b>METATARSALS</b>	28	77mm	5
<b>FOOT PHALANGES</b>	6	29mm	6
<b>UNIDENTIFIED FRAGMENTS</b>	136	-	
<b>TOTAL</b>	<b>864</b>	<b>240mm</b>	<b>55</b>

### 2.1.1 The skull

A total of 142 fragments, or 16.4% of the total assemblage, were identified as representing the skull. The majority of these (n=108) comprised of cranial vault fragments, including frontal, parietal, occipital and temporal. The remaining elements represented the facial bones (zygomatic, mandible and maxilla) and dental remains. None of these elements, with the exception of the teeth, were complete. The largest fragment size comprised an almost

complete adult occipital bone measuring *c.* 80mm in width; the non-expression of a nuchal crest suggestive of a female sex.

The frontal remains represented at least four adult individuals, of which two were identified as possible female and two as possible males. A large quantity of parietal fragments were identified (n=44) however it was only possible to accurately side 9 of these fragments. They ranged in depth and development representing adults and juveniles. Temporal remains largely comprised of the petrous portion (n=7), all of which relate to mature individuals. The occipital was largely represented by vault fragments (rather than the robust basilar portion) although the variance in thickness suggests both mature and juvenile remains.

Mandibular fragments accounted for one of the more complete skeletal elements, which indicated a MNI of three adults or late adolescents. Maxillary remains were, understandably more fragmented although this too indicated the presence of at least three mature individuals. In all eight fragments of mandibular body and four maxillary fragments contained 16 *in-situ* teeth. In addition nine loose teeth were present, which largely comprised molars and incisors. All of the dental remains were permanent dentition, largely displaying mild to severe wear. Only three of the teeth displayed slight calculus on the lingual and distal surfaces. One of the larger mandibular fragments, identified as a possible male (protruding mental eminence) displayed evidence for moderate periodontal disease. While a complete dental arcade is required to make estimations of age the dentition present suggest at least one late adolescent or young adult and one middle adult.

### **2.1.2 Trunk**

A total of 295 bone fragments, or 34.2% of the total assemblage, were identified as trunk remains. The majority of these (n=139) comprised vertebral fragments. The cervical vertebrae were represented by a partial adult C1, C2 and C6/7, and a right infant neural arch fragment from a C6 or C7. The thoracic vertebrae (n=36) were heavily fragmented, and as such were difficult to identify to specific element. The remains of the damaged centra suggest the presence of immature remains, of a young child and adolescent. The lumbar vertebrae (n=20) were much more complete, with 6 complete vertebrae noted representing at least two adult individuals. The sacrum was also partially represented by several large fragments of S1 centra and spinous process of S1-4.

Of the rib cage, 116 fragments of ribs were noted. None of the elements were complete and although they largely representing fully matured elements, some minor evidence for juvenile individuals were also noted (n=3). Given the presence of partial heads and tubercles it was possible to side 13 ribs as right and 11 as left. One of the left elements was the first rib.

Only a single fragment of mature sternum (corpus) was identified, although this is not surprising given the general survival rates for this element from known excavated cemeteries.

### **2.1.3 Upper Limb**

A total of 143 bone fragments, or 16.5% of the total assemblage, were identified as upper limb remains. The majority of these comprised fragments of the scapula, humerus and ulna. The fragments from the upper limb were largely in moderate condition with low levels of surface wear.

Of the scapular remains (n=33) the majority of fragments represent undiagnostic blade however six complete or partial glenoid fossa, six partial acromion process and three partial or complete coracoid process were noted. It was possible to get complete dimensions from two glenoid fossa suggesting at least one male identity.

The clavicle was represented by 17 fragments displaying the medial and lateral articulations. It was not possible to garner any metrical data although all of the remains appeared mature.

The long bones of the upper limbs were well represented with humerus (n=27), radius (n=9) and ulna (n=21) suggesting the presence of at least four adults, one young child and one infant. Metrics were possible regarding four humeral heads, three distal humeral epiphyses and one radial head; suggestive of male and female individuals. The hands and wrists were represented by a small number of largely complete elements, including 9 carpals, 14 metacarpals and 13 proximal phalanges; all but five elements relate to mature remains with some evidence for bones of a young child.

### **2.1.4 Lower Limb**

A total of 148 bone fragments, or 17.2% of the total assemblage, were identified as lower limb remains. Although all long bone fragments were assigned to an element, some of the mid-shaft fragments remain un-sided, given the fragment size.

The pelvis or innominate was represented by 39 fragments representing ilium, ishium and pubis (to a lesser degree). These elements represent at least two young children, a middle adult and a young adult. While heavily fragmented and abraded the partial remains of four auricular surface, five sciatic notches, three pubic symphysis and six acetabulum were present for recording. It was only possible to make sex estimation for one element, that representing a female.

The femur is represented by 31 fragments which reflect a MNI of three adults and two juveniles. Metrical assessment of semi-complete femoral heads suggest two females are represented and a possible male. These elements are heavily fragmented when compared with the upper limb long bones, hindering analysis. The tibia is the most represented long bone of the lower

limb with 42 fragments present. This element identified a minimum number of five individuals also but differentiates from the femur in the age range. The tibial remains suggest the presence of at least four adults and a late adolescent. Two of the tibial shafts displayed evidence for infection, although this is a common occurrence in archaeological populations. The fibula was less well represented however given the slender nature of the bone it is subject to more pressure than the tibia or femur. A total of 15 fibula fragments were note, largely relating to un-sided mid-shaft, although at least two adults are represented. It was not possible to gain any metrical data from the tibia or fibula which would indicate sexual identity. No evidence for degeneration of the joints in the lower limbs was noted.

Four largely complete patellae (MNI=2) were identified in the assemblage, all of which appear to represent late adolescent or adult individuals. The very low identification rate for patellae is unusual however the composition of trabecular bone would make the element prone to crushing and fragmentation.

The feet and ankles were represented by a relatively large number (n=58) of complete or partial elements. These included 23 tarsals (9 calcaneus, 7 talus, 3 navicular, 1 cuboid and 3 cuniforms), 28 metatarsals (MT1–5) and 6 proximal phalanges. The talar bones indicate two juveniles (young child) with one calcaneus of equal age. Some of the metatarsals and phalanges indicate partial fusion of the heads and proximal epiphyses suggestive of an adolescent age range.

## 2.2 MINIMUM NUMBER OF INDIVIDUALS (MNI)

Taking all of the above data on board the minimum number of individuals recorded in the remains is 8; which includes five late adolescents or adults, two young children juveniles and 1 infant (Table 3). The most re-occurring skeletal elements are the proximal ulna, proximal tibia, clavicle, and calcaneus. Ageing and sexing of the mature remains was limited by the fragmentation and condition of the remains however at least two females and two males are indicated, with one young adult and one middle adult suggested. These identifications cannot be confirmed due to the commingled nature of the remains however they provide some insight to the potential demogrphay of this assemblage. Juvenile remains are represented by cranial vault, upper limb (ulna), lower limb (femur, tibia and tarsals) and torso (ribs and vertebrae). Identifiable infant remains comprised of a perinatal humerus and cevical vertebra.

**TABLE 3:** Minimum Number of Individuals (MNI) by element

ELEMENT	ADULT/ LATE ADOLESCENT	JUVENILE/ YOUNG ADOLESCENT	INFANT
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	L	M	R	L	M	R	L	UNSI DED	R
<i>Frontal (orbits)</i>		4	4						
<i>Occiptal (Cruciate)</i>		2			2				
<i>Occipital (Pars basilaris)</i>	1		1						
<i>Temoral (Petrous)</i>	4		3						
<i>Zygomatic</i>	3		2						
<i>Maxilla</i>			3						
<i>Mandible</i>	1		1						
<i>Medial clavicle</i>	1		4			1			
<i>Lateral clavicle</i>	3		4	1					
<i>Scapula (Glenoid)</i>	1		2			2			
<i>Scapula (Acromion)</i>	2		2	1		1			
<i>Sternum (Corpus)</i>		1							
<i>Prox. Humerus</i>	4		1						
<i>Dist. Humerus</i>	3		2				1		
<i>Prox. Radius</i>	1		1						
<i>Prox. Ulna</i>	5		4	1		1			
<i>Dist. Ulna</i>			2						
<i>Prox. Femur</i>	3		1	2					
<i>Dist. Femur</i>	2		1		1				
<i>Prox. Tibia</i>	3		3		2				
<i>Dist. Tibia</i>	1		5		1				
<i>Prox. Fibula</i>			2						
<i>Dist. Fibula</i>			2						
<i>Patella</i>	2		2						
<i>Ilium (Aur. Surface)</i>	1		1	1		2			
<i>Pubis (Pub. Sym.)</i>	1		2						
<i>Ishium</i>	2		2						
<i>Capitate</i>	1		1						
<i>Lunate</i>			2						
<i>Hamate</i>	2								

ELEMENT	ADULT/ LATE ADOLESCENT			JUVENILE/ YOUNG ADOLESCENT			INFANT		
	L	M	R	L	M	R	L	UNSIDED	R
<i>Triquetral</i>	1		1						
<i>Pisiform</i>			1						
Metacarpal 1			1						
Metacarpal 2			1						
Metacarpal 3	2								
Metacarpal 4			1						
Metacarpal 5	2		1						
Proximal Hand Phalanges		1			1				
Middle Hand Phalanges		1							
<i>Calcaneus</i>	5		2			1			
<i>Talus</i>	2		3			2			
<i>Navicular</i>	1		1			1			
<i>Cuboid</i>	1								
<i>First Cuneiform</i>	1		1						
<i>Second Cuneiform</i>	1								
Metatarsal 1	2								
Metatarsal 2	3		2						
Metatarsal 3			3						
Metatarsal 4	2		2						
Metatarsal 5	2		2						
Proximal Foot Phalanges		4							

### 2.3 PATHOLOGY/ TRAUMA

Of the 864 fragments of bone only 8 displayed evidence for pathology or trauma. The affected elements include the cranial vault, ribs, tibia and lumbar vertebrae. These findings are discussed below but any meaningful interpretation or diagnosis of individual health is restricted by the disarticulated nature of the remains.

### 2.3.1 Infection

Infectious disease was a primary cause of death in past populations. The re-emerging nature of infection is aided by poverty, climate and the trade and migratory patterns of humans and animals (Roberts and Manchester 2005, 165). Factors in determining a person's vulnerability to infection include age, sex, genetic predisposition, nutritional factors, and immune status. For the purposes of osteological analysis it is possible to differentiate between non-specific infection such as Osteomyelitis, Periostitis, Sinusitis, and Endocranial changes and specific infection such as Tuberculosis, Leprosy, and Treponemal disease. The only recorded evidence for ill health was non-specific infection, indicated by moderate periostitis (pitting) on two tibial mid-shafts (lateral and posterior surfaces). It appeared that the infection had healed by the time of death, although it is not possible to say in this case what the implications of this may have been.

### 2.3.2 Metabolic Disease

These can be loosely defined as being caused by the deficiency or excess of both dietary elements and hormones (Roberts and Manchester 2005, 221) and are often seen as indicators of stress. Only a small portion of these significantly alter the composition of bone to allow the proper identification during osteological analysis including anaemia, Vitamin B and C deficiency to name a few.

The most frequently recorded metabolic disease in archaeological populations is iron deficiency anaemia; indicated by changes in the orbits (*cribra orbitalia*) and the cranial vault (*porotic hyperostosis*). The presence of the condition has been considered evidence that a past population suffered chronic or episodic malnutrition. Evidence for healed *porotic hyperostosis* was noted on two fragments of mature parietal bone however none of the orbital remains (MNI 4) displayed an evidence for *cribra orbitalia*.

### 2.3.3 Degenerative Joint Disease (DJD)

The term joint disease encompasses a large number of conditions with different causes, which all affect the articular joints of the skeleton. Factors influencing joint disease include physical activity, occupation, workload and advancing age, which manifest as degenerative joint disease and osteoarthritis. Alternatively, joint changes may have inflammatory causes, such as septic or rheumatoid arthritis. Different joint diseases affect the articular joints in a different way, and it is the type of lesion, together with the distribution of skeletal manifestations, which determines the diagnosis.

Two lumbar vertebra, from a mature individual, indicated evidence for schmorls nodes on the inferior centra. Given the disarticulated nature of the remains it is not possible to discuss the extent or significance of the disease for the individual. No evidence for any degeneration of other joints on the upper or lower limbs was noted.

#### **2.4 NON-METRIC TRAITS**

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur in a minority of skeletons and are believed to suggest hereditary affiliation between skeletons. The origins of non-metric traits have been extensively discussed in the osteological literature and it is now thought that while most non-metric traits have genetic origins, some can be produced by factors such as mechanical stress or environment. While there are hundreds of non-metric traits currently known only a selection of 8 cranial and 11 post-cranial traits were examined in this study. None of the recordable traits were observed in these remains however the high level of fragmentation means that the available specimens were low.

### **3 DISCUSSION & CONCLUSIONS**

Disarticulated human bone was retrieved during archaeological test trenching at Parnell Square North in Dublin City. A total of 864 fragments of human skeletal remains were retrieved from a deposit (DSk 1) exposed in Test Trench 2. The remains were washed and subject to full osteological analysis by the author. This involved visually inspecting the bone and sorting into skeletal regions, following which detailed analysis of each fragment was carried out in order to ascertain information regarding the individuals they represent (e.g. sex, age at death, pathology, etc.).

Given that the remains were disarticulated and commingled in the deposit it was not possible to make conclusive statements about individual health however the assessment indicated that a minimum number of eight people are represented. These include at least five late adolescents or adults, two young children and an infant. Both male and females are indicated in the mature remains. All regions of the body were represented equally with no evidence for preferential selection or exclusion of bones in the deposit. Some evidence for non-specific infection and degenerative joint disease was noted but nothing out of the ordinary for a historic population. It is likely that these remains represent clearance of a burial area in the surrounding landscape, given the profile of individuals represented.

The systematic use of charnel pits is a regular feature of densely filled medieval and post-medieval urban graveyards, due to demand for space (Tarlow 2011). It is possible that in this case burials may have been disturbed during historic construction in the area and the bones deposited together. Further investigation would be required to determine the nature of the disturbance and the context of the deposition. A sample of bone was submitted for radiocarbon dating which indicates activity between the 8th and 10th centuries AD, a period of significant development for the area. The layer containing bone at Parnell Sq. North has only been partially excavated to facilitate testing and it is possible that further skeletal remains may survive outside of the investigated trench. There was no apparent order to the deposition of the bone. The remains were heavily fragmented with none of the larger limb bones surviving in-tact, however several vertebrae and smaller bones of the hands and feet were complete indicating that the remains were not intentionally damaged to avoid recognition of body parts during clearance.

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*\* A full inventory of the disarticulated remains has been compiled by the author.*