Plate 1. Skeleton 2043. Porotic hyperostosis of right and left parietal. Lateral View

Plate 2. Skeleton 2043. Cribra Orbitalia. Frontal orbital plates. Anterior view

APPENDIX 1 : Catalogue

Key :

ne	not erupted
pe	partially erupted
DEH	dental enamel hypoplasia
/	lost antemortem
X	lost postmortem
--	jaw missing

Inhumations

Skeleton 2014

Burial type : single inhumation, orientated east-west, supine
Age: young child
Sex: unknown
Preservation: good, mostly complete. Skull fragmentary. Hands, feet and vertebral bodies missing.

Dentition :

ne ne
6 E D / / / | / B / D E 6

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ne ne
6 E D / B A | / / / D E 6

Dental pathology: calculus, caries, and DEH 0/11 ; dental abcess 0/20
General pathology : none

Skeleton 2026

Burial type : single inhumation, orientated east-west, supine
Age : young child
Sex : unknown
Preservation: good, mostly complete. Most bones of hands and feet, right ribs and some vertebral bodies missing. Skull partially articulated.

Dentition :

ne ne
6 E D / B A | A / / D E 6

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ne ne
6 E D / / / | / B C D E 6

Dental pathology : calculus 6/13, caries 0/13, DEH 0/13 ; dental abcess 0/20
General pathology : none

Skeleton 2030

Burial type: single inhumation, orientated east – west, supine
Age: older child
Sex: unknown

Preservation: poor, incomplete. Skull and lower limbs only.

Dentition:

6 E D C B -- | -- B / D E /

---

6 E D / X X | X X / D E 6

Permanent mandibular central incisors and all first molars erupted
Dental pathology (deciduous): calculus 4/14, caries 0/14, DEH 0/14 ; dental abcess 0/22
General pathology: periostitis of right femur and tibia

Skeleton 2031
Burial type: single inhumation, orientated east – west, prone
Age: neonate
Sex: unknown
Preservation: fair, but incomplete. Skull fragmentary. Axial skeleton, hands and feet mostly absent. Both femora missing.
General pathology: orbital, meningeal and sub-periosteal haemorrhage, flared sternal rib ends, increased metaphyseal porosity. Possible scurvy and/or rickets?

Skeleton 2032
Burial type: single inhumation, orientated east – west, supine
Age: infant
Sex: unknown
Preservation: fair, but incomplete. Axial skeleton and upper limbs fragmentary, lower limbs, hands and feet absent.

Dentition:

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ne ne ne pe ne ne
-- E / C B A | A B C D E 6

loose teeth : Maxillary lateral incisors, right central incisor and first molar

Dental pathology: calculus, caries, DEH 0/4 ; dental abcess 0/5
General pathology: Probable anaemia, meningeal reaction. Possible scurvy.

Skeleton 2039
Burial type: single inhumation, orientated east – west, supine
Age: neonatal
Sex: unknown
Preservation: fair, partially complete. Lower limbs and most of hand and foot bones missing. Skull and axial skeleton fragmentary.
Dentition: Unerupted, fragmentary. Crowns of mandibular canine and first molar (loose)

General pathology : none

Skeleton 2040
Burial type: single inhumation, orientated east – west, supine
Age: young child
Sex: unknown
Preservation: fair, mostly complete. Skull fragmentary, foot and some hand bones missing.

Dentition:
ne pe pe
-- E D C / A | ----------

ne ne pe pe
6 E D C B / | / B ----------

loose teeth : deciduous maxillary left central and lateral incisors, canine, second molar. Mandibular left canine. Permanent maxillary right first molar crown, left central incisor crown.

Dental pathology: calculus, caries and DEH 0/5 ; dental abcess 0/6
General pathology: none

Skeleton 2043
Burial type: single inhumation, orientated east – west, supine
Age: young child
Sex: unknown
Preservation: good, mostly complete. Skull fragmented, foot bones missing, partial pelvis.

Dentition:
ne ne pe pe ne
6 E D C / / | / / / D E 6

ne ne pe pe pe ne ne
6 E D C / A | A / / D E 6

Dental pathology: calculus, caries and DEH 0/3 ; abcess 0/12
General pathology: Anaemia

Disarticulated remains

Context 1001
infant : left humerus, two left ribs

Context 1004
adult : left parietal
older child : left parietal

young child : right femur, three left ribs, five right ribs, left radius, left clavicle, mandible
infant : right femur, right scapula

Context 1006
older child : left acromion, left glenoid fossa

Context 1007
adult : cranium (probable female)
older child : left proximal ulna, left midshaft ulna

Context 1009
older child : left femur

Context 1016
adult : sternum, manubrium, carpal, two left ribs, five left metacarpals, five right metacarpals, ten left hand phalanges, nine right hand phalanges, left hamate, right trapezium, right trapezoid, left trapezium, left triquetral, right lunate, permanent tooth root, four permanent teeth

Context 1020
infant : right clavicle, left clavicle, left tibia

Context 2006
young child? : fibula?

Context 2007
adult : left demimandible

Context 2010
older child : left pubis, metatarsal, two metacarpals, hand phalange

Context 2020
neonate : left tibia

Context 2044
juvenile : hand phalange
infant : left femur

Context 2045
neonate : left femur, right femur, right tibia, left ulna, left radius, rib

Context 2046
young child : humerus?

APPENDIX 2: Metric Data

Immature Measurements (L = left ; R = right)										
			Skeleton Number							
			2014	2026	2030	2031	2032	2039	2040	2043
Lesser Wing of the Sphenoid	Length	L	35							27
		R								28
	Width	L						11	16	17
		R						11	16	17
Greater Wing of the Sphenoid	Length	L	41					32		41
		R	37			39		32		42
	Width	L						22		
		R				23		22		31
Body of the Sphenoid	Length		19					13	13	13
	Width							16	22	
Temporal : petrous and mastoid	Length	L	64			48		42	62	57
		R	64			21		42	60	60
	Width	L	20					18	19	21
		R	20					19	18	20
Basilar part of the occipital	Length		17				15	12	15	15
	Width		24				20	14	21	21
Zygomatic	Length	L	39							37
		R	38							38
	Width	L	32							26
		R	32							27
Maxilla	Length	L	38							28
		R	38							29
	Height	L	45							34
		R							35	32
	Width	L	36							31
		R	36							32
Mandible	Length of body	L					49			53
		R	59							53
	Width of arc	L								24
		R	34							23
	Full length half mandible		84				70			61
Clavicle	Length	L	68	81		47	58*	43		58
		R	67			48	60	45	35	58
	Diameter	L	6	6		5	5			6
		R	7			5	5		6	5
Scapula	Length	L	63	80			53*	35		50*
		R	61					35		53
	Width	L	42	49			35*	27		37*
		R	42	48				25		37
	Length of spine	L	49	61			41*	26		43*
		R	49	61				31		43
Ilium	Length	L	60	80				37		
		R	60	80		40		37	56	57
	Width	L	54	68				31		49
		R	54	68		35		31	50	49
Ischium	Length	L	36	39					32	
		R		41					22	
	Width	L	26	30						
		R		29						
Pubis	Length	L								
		R	29							
Humerus	Length	L	116	151		76	93		101	100
		R	118	151		75	92	63	100	100
	Width	L	27	31		19	22	18	24	
		R	27	31		18*	22*	18	24	24
	Diameter	L	11	11		7	8		9	8
		R	12	11		7	8	6	9	9
Ulna	Length	L	99	125				59		83*
		R	99	127		69		59	86	84
	Diameter	L	7	9				4		6
		R	7	9		5		4	10	6
Radius	Length	L	89	112				51	77	
		R	89			62		51	77	76
	Diameter	L	8	7				4	6	
		R	7			4		4	6	6
Femur	Length	L	153	194					128	
		R	154	195					127	126
	Width	L	40	46	45					31
		R	41	46					32	29*
	Diameter	L	12	13					10	
		R	13	13					10	10

APPENDIX 2: Metric Data

			Skeleton number							
			2014	2026	2030	2031	2032	2039	2040	2043
Tibia	**Length**	**L**	126	156	184	76			104	
		R	125	158	184	75			104	101
	Diameter	**L**	11	13	16	9			10	
		R	11	13	16	9			10	9
Fibula	**Length**	**L**	121	153					100	
		R	121	151						
	Diameter	**L**	5	7					5	
		R	6	7						
Cranial measurements for older individuals										
Maximum cranial length										
Maximum cranial breadth										
Bizygomatic diameter				100	91					
Basion - Bregma height										
Cranial base length										
Basion - Prosthion length										
Maxillo - Alveolar breadth				55	53					
Maxillo - Alveolar length				35						
Biauricular breadth				105*						
Upper facial height				52						
Minimum frontal breadth					107					
Upper facial breadth				89	90					
Nasal height				37	39					
Nasal breadth				21	21					
Orbital breadth				35	36					
Orbital height				30	31					
Biorbital breadth					86					
Interorbital breadth				17	18					
Frontal chord				106						
Parietal chord				120						
Occipital chord										
Foramen magnum length										
Foramen magnum breadth				28						
Mastoid length				15	20					
Chin height				21						
Height of the mandibular body				20	24 R					
Breadth of the mandibular body				10	11					
Bigonial width				79						
Bicondylar breadth				101						
Minimum ramus breadth				28	29 R					
Maximum ramus breadth				36	34 R					
Maximum ramus height				43	43 R					
Mandibular length				55						
Mandibular angle				132						

APPENDIX 3 : Palaeopathological descriptions

***Skeleton 2030** – older child*

Striated new compact bone lesions are located on the posterior aspect of distal right femur and proximal right tibia.

Lesion appears mostly plaque-like, although is slightly obscured by post-mortem(PM) abrasion, and is characteristic of periostitis, perhaps caused by localised soft tissue trauma. Also has a carabellis cusp (non-metric trait).

***Skeleton 2031** - neonate*

Diffuse plaques of porous woven new bone on the internal surface of the frontal bone, the right parietal and the occipital. Plaques of new bone were also noted on the external cranium in both orbits and in the glabella region. In addition, the four ribs with sternal ends present had distinct flaring in this region, accompanied by abnormal porosity extending laterally along the rib shaft. The left and right humerus had porous and striated periosteal new bone over much of the shaft. The right ulna also had substantial deposits of new bone on the posterior aspect of shaft, and appeared columnar in shape due to expansion of the inferior part of the shaft. Both the right ulna and radius had increased metaphyseal porosity. The left and right tibia also had substantial periosteal deposits of porous bone over most of the diaphysis, excluding the lateral surface. This is characteristic of tibial involvement in rickets. Both femora were absent and therefore any changes in these bones were not observable. There was no evidence of bending deformity in any of the upper limb bones present and no obvious flaring of long bone metaphyses, which are considered diagnostic features of infantile rickets. However, these changes are unlikely to have had sufficient time to develop in such a young infant. Bone changes associated with rickets are rarely observed in infants under four months if they are born to a healthy mother. However, a woman suffering from dietary lack of vitamin D, or deficiency due to lack of sunlight would pass that deficiency on to the child. A further complicating factor in this case may be that delayed growth caused by rickets has resulted in an underestimation of the age of the individual.

Orbital changes and metaphyseal porosity are very likely the result of scurvy. This is also a dietary deficiency disease, and as a result may occur in the same case as rickets. However, only a tentative diagnosis is put forward here, as some diagnostic elements are unobservable.

***Skeleton 2032** – young child*

Focal, plaque-like porous new bone lesions were observed on the exterior of the right parietal and occipital of 2032, a nine month old infant, in the region of the lambdoid suture (at asterion). Occipital lesion is oval, measures 24 x 9mm, with large pronounced pores. Similar lesion on right parietal. Orbits are absent. Probable iron deficiency anaemia.

Plaques of woven new bone were also noted on the internal surface of the occipital, extending along the sagittal sulcus, and on the remaining fragments of the right parietal, limited to the meningeal blood vessel impressions. These latter lesions were most likely caused by an inflammatory and/or haemorrhagic reaction of the meninges and is perhaps a case of bacterial meningitis.

Alternatively, the external and internal cranial lesions may both be a result of the same haemorrhagic process, secondary to the weakening of blood vessels due to scurvy, and perhaps initiated by a minor trauma.

Post-cranial bone changes comprised diffuse, porous and striated woven bone deposits were noted on the mandibular body, particularly on the mandibular eminence and possibly on the left goneal angle, although preservation here was poor. Diffuse striated and porous woven new bone was also located on the posterior aspect of both humeri, primarily mid-shaft, and on the deltoid tuberosities. The proximal metaphyses had increased porosity. These changes lend some support to a diagnosis of scurvy, with sub-periosteal bleeding resulting in porous new bone formation at muscle insertion sites. However, certain elements that would aid diagnosis are missing (orbits, other cranio-facial elements), and therefore this is noted as a possible case of infantile scurvy.

Skeleton 2043 *– young child*

Focal lesions of porous new bone, located on the supero-medial aspect of both the right and left orbit. Lesions are sub-circular, clearly delineated, slightly raised from the normal bone surface and comprise micro and macro pores. Surface expansion rather than surface plaque. Lesions are consistent with a diagnosis of cribra orbitalia, and may indicate the individual suffered from iron deficiency anaemia. Additional porous lesions are located on the right parietal. One is a pronounced raised area of focal porosity located immediately superior to the mastoid angle. Sub-rectangular, measures 30x15mm. The second is similar but has less dense porosity, is located superior to the lambdoid suture midway between lambda and asterion. An identical lesion is located on the left parietal, although it is more elongated and slightly irregular, extending from asterion along the lambdoid suture to approximately midway. The occipital has two porous lesions identical to those described above. One is posterior to the right lambdoid border close to asterion, and the other is located on the opposite side of the occipital, again just posterior to the left lambdoid border, approximately midway. The latter lesion appears to be healing (remodelling) whilst all of the former lesions appear to have been active at the time of death. These porous lesions affecting the cranium of this young individual are consistent with a differential diagnosis of porotic hyperostosis, and is most likely an indicator of severe iron deficiency anaemia. Parasitic infestation, lack of dietary iron and infectious disease can all result in anaemia.