Change and Diversity in Neolithic Mortuary Practices on the Isle of Man

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APPENDIX S.1: OSTEOLOGICAL REPORTS

(Michelle Gamble)

This appendix provides a basic summary of the osteological analysis of the skeletal material from the Neolithic sites of the Isle of Man which are listed within the paper. Requests for further details on the archive material accessed and the excavator notes, as well as further comments on the osteology should be made to the Manx Museum.

Methods

The methods of observation and analysis of the human remains in all the analyses are in agreement with the recommendations of Buikstra and Ubelaker (1994) and McKinley (2004). Observations were recorded for skeletal material from a single context in a detailed inventory in the following order: bone element, side (L = left, R = right, A = axial, U = un-sided), the segment of the skeletal element present, the number of fragments or the weight, the completeness score ('Comp' – the percentage of a bone element present using the scores from Buikstra and Ubelaker 1994: where 1 = <25%, 2 = 25–50% , 3 =51–75%, 4= >75% and 5 = 100%), the level of fragmentation ('Frag' where: intact = 0, broken (sizable pieces) = 1, fragmentary = 2, very fragmentary = 3, no recognizable fragments = 4), and the surface preservation level of the skeletal element ('Pres'). For burned skeletal material, two columns are added to describe the colour and surface texture or state. Where a long bone or small bone of the hand or foot is recorded, Buikstra and Ubelaker's (1994) abbreviations are employed to record the segment present (PE = proximal epiphysis, P1/3 = proximal third of the diaphysis, M1/3 = middle third of the diaphysis, D1/3 = distal third of the diaphysis, DE = distal epiphysis, Pend = unfused proximal end, Dend= unfused distal end).The colour ('Crem colour': T = Tan; B= Black and W= White/Blue-Grey) and the nature of the surface texture ('Crem state') as affected by burning process is recorded (L= Longitudinally Split; T= Longitudinal and Transverse Checking; C= Cracking and W= Warping). The length of the bone is recorded where possible and any evidence of pathologies on the bones or teeth is described. Where the bone is highly fragmentary and there is a commingled context with clearly more than one individual present, weights and the minimum number of elements present are given with other details provided in the 'Notes' in the tables.

Standard age and sex assessment scales were used where the fragmentation and preservation of the particular skeletal elements permitted (ie, Moorrees *et al.* 1963; Ubelaker 1989; Buikstra and Ubelaker 1994; White & Folkens 2000; Schaefer *et al.* 2009). In particular, the preservation of particular skeletal fragments such as the mandible or maxilla (with alveoli present) or epiphyseal ends of the bones can be indicative of more accurate age ranges when examining cremated bones.

Burning of skeletal material can cause a number of observable changes to the morphology and structure of the bones and teeth. As noted above, the bone can change colour based on the temperature and length of exposure to the heat source. Bones which are black have been exposed to a lower temperature or for a short period of time and bones which are white or blue-grey have been subject to high heat, or lower heat for a long period of time. The loss of water in the bone can cause it to shrink and warp, which may also cause changes to the bone surface, including longitudinal and transverse checking and curved cracks. Long bones will tend to split apart in a longitudinal manner (as if twisted apart into fragments) and the enamel on teeth will shatter. This last action severely limits the amount and nature of information which can be derived from the teeth of cremated skeletons (ie. with no crowns it is impossible to identify the tooth, discuss pathology or age assessments). Whether burned skeletal material was intentionally fragmented in in the prehistoric past is a matter of debate (ie. Cleary 2018, 344). It seems that even the action of collecting the cremated bone can cause high levels of fragmentation and perhaps in archaeological cases where the bone is highly fragmentary the intention of the action cannot be determined. It can simply be noted that the levels of fragmentation of the cremated remains from the Manx sites is generally quite high and possibly reflects the movement of the material and/or aspects of the burial actions.

With regard to burning of skeletal material, there have been a number of studies which are summarised by Ubelaker (2009) (and further discussed in the more recent publication by Thompson 2015) indicating that there are a number of variables which can affect the appearance of burned bone. Colour change and structural changes such as warping, shrinkage, longitudinal splitting and transverse cracking are used as indicators for aspects of the burning such as the temperature of fire, whether the bones were dry or fleshed and the length of thermal application. Experiments seem to indicate that dry bones tend to display less variation in fracture pattern and more transverse checking while fleshed bones tend to display more warping, more variation in longitudinal splitting and transverse fractures frequently in a curvilinear pattern (Ubelaker 2009, 3).

In general, an inventory was compiled for the cremated skeletal material to assess the number of individuals present and suggest the proportion of the skeleton present. This was achieved through weighing the skeletal material and determining if there are duplicate elements present.

In some cases, skeletal material required some sieving and sorting to separate it from some of the excavation soil. The cleaning of the skeletal material was accomplished using dry brushes and wooden tools. The skeletal material was separated into larger portions which could be identified and sided, fragments which could be determined to be a 'long bone' and indeterminate bone which included fragments which were too small or too warped to identify. There is typically a portion of small bone fragments which could not be separated from the general soil detritus which is not included in overall weights of the cremated material.

Results: Early Neolithic cairn

Ballafayle (2016-0038; MNH NMHER 1078)

Each individual bag of skeletal material was roughly inventoried to determine if any further information regarding burial practice could be determined. The maxilla and mandibular teeth appear to be in occlusion and indicates that perhaps there was some articulation with the material. A clavicle and humerus fragment are also still roughly articulated, though the bones are too fragmentary to be conclusively certain, they are held together with dirt. The maxilla and mandible were not completely excavated for this analysis, as their positioning was deemed more important than the possibility of recovering further burned tooth fragments from within the soil matrix (Fig. S.1).

The bones are all white on the exterior with a tan interior which suggests heat did not fully penetrate the long bones completely. The external surfaces are extremely chalky and friable and heavily fragmented. Table S.1 provides the inventory of the skeletal material from the bulk of the burial from Ballafayle, while Table 2 provides an inventory of the skeletal material which was labeled as the '2nd internment'.

Fig. S.1.
Closely associated mandible and maxilla from Ballafayle
(Photo: M. Gamble).

Considering all the skeletal material together, the overall minimum number of individuals is two based on the presence of two left temporal bones (external auditory meatus); one is possibly female based on the mastoid of a left temporal bone, and no age estimation is possible beyond that they are adults. The overall weight of the cremated material from the bulk of the burial is 662.48 g; while the total weight of the '2nd internment' is 62.57 g.

Overall, there are the minimal remains of two adult individuals, one of which is possibly female. The skeletal material is highly fragmented and required significant cleaning prior to observation. However, this has provided an idea of how the bones were situated in relation to one another when recovered in the 1920s. In this case the osteological assessment seems to support the excavators' observations regarding the articulated nature of the skeletal material.

However, we can only be certain that at least one intact, articulated skeleton is present, suggesting that the body was burned *in situ* and not moved, and there is a second individual present. The state of articulation of the second individual could not be determined by osteological observations, however, given that the excavators refer to it as a 'second interment', perhaps the articulated elements simply did not remain intact during excavation and storage from the 1920s.

TABLE S.1: CREMATED BONE FROM BALLAFAYLE MAIN DEPOSIT

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Calvarial frags	A		123.55 g	1	4	W, C, T	W	
Temporal	L	mastoid, external aud meatus, petrous	1	2	3	W, C, T	W	Possible Female
Temporal	L	external aud meatus	1	2	3	W, C, T	W	
Temporal	R	petrous, external aud meatus	2	1	3	W, C, T	W	
Temporal	U	squama	3	1	4	W, C, T	W	
Occipital	A	cruciform, foramen magnum	5	2	3	W, C, T	W	
Frontal	A	squama	4	1	4	W, C	W	
Zygomatic	R	frontal proc	1	2	2	W, C	W	
Maxilla	R	Alveoli	2+	1	4	W, C, T	W	extremely fragmented but held together with dirt – teeth *in situ*, occluding with R mand
Mandible	A	R and L body	6+	2	4	W, C, T	W	extremely fragmented but held together with dirt – teeth *in situ*
MaxPM1	R	Root	1	2	4			*in situ*
MaxPM2	R	Root	1	2	4			*in situ*
MaxM1	R	Root	1	2	4			*in situ*
ManPM1	R	Root	1	2	4			*in situ*
ManM1	R	Roots	1	2	4			*in situ*
ManC	L	Root	1	1	4			*in situ*
ManPM1	L	Root	1	1	4			*in situ*
ManPM2	L	Root	1	1	4			*in situ*
Roots	U	Root	6	1	4			
ManC	R	Root	1	2	4			*in situ*
C1	A	dens art fact, sup facet	2	1	3	W, C, T	W	
Cervical vert	A	sup and inf facets	1	1	3	W, C, T	W	
Thoracic Vert	A	sup and inf facets	1	1	3	W, C, T	W	
Clavicle	R	sternal 1/3	4	2	2	W, T, L	W	With humerus
Scapula	U	Neck	1	1	4	W, C, T	W	
Humerus	U	diaphysis	20	1	4	W, C, L, T	W	With clavicle
Radius	R	P1/3	1	1	4	W, C, L, T	W	
Radius	U	diaphysis	18	1	4	W, C, L, T	W	
Ulna	R	D1/3	1	1	3	W, C, L, T	W	
Ulna	L	D1/3	1	1	3	W, C, T	W	

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Ulna	U	diaphysis	16	1	4	W, C, L, T	W	
Lunate	L		1	5	0	C	W	
Indet carpal	U		1	2	3	C	W	
Indet MC	U	M1/3-D1/3	1	2	3	W, L, C	W	
Hand Phalanx	U	P1/3-DE	1	3	1	W, C	W	
Hand Phalanx	U	P1/3-D1/3	1	3	1	W, C	W	
Hand Phalanx	U	P1/3-DE	1	3	1	W, L, C	W	
Hand Phalanx	U	M1/3-DE	1	3	1	W, L, C	W	
Distal hand phalanx	U	PE-DE	1	4	1	W, L, C	W	
Indet MC or MT	U	diaphysis	6	1	3	W, T, L	W	
Os Coxa	R	ilium inc. auric	2	1	3	W, C	W	
Os Coxa	U	ilium, ischium	6	1	4	W, C	W	
Femur	U	P1/3, diaphysis	21	1	4	W, C, L, T	W	OxA-36420 (5138±31 BP, 4040–3804 cal BC)
Patella	L	sup 1/2	1	1	3	W, C	W	
Tibia	R	DE	1	1	3	W, C	W	
Tibia	U	diaphysis	26	1	3	W, C, L, T	W	
Fibula	U	diaphysis	13	1	3	W, C, L, T	W	
Long bone	U	diaphysis	74.70 g	1	4	W, C, L, T	W	
Indet bone	U		46.60 g	1	4	W, C, L, T	W	

TABLE S.2: '2ND INTERMENT' FROM BALLAFAYLE CAIRN

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	L	sup aspect of ext. aud. meatus, entoglenoid	1	1	3	W, C	W	rejoins with a fragment from the bulk of the cremated material
Temporal	L	entoglenoid proc with zyg proc	1	1	3	W, C	W	
Temporal	R	supra meatal crest	1	1	3	C	W	
Sphenoid	U	greater wing	1	1	3	C	W	
Cranium	A		26	1	4	W, C	W	
MaxPM1	L	Roots	1	2	2			
Capitate	L		1	4	0	W, C	W	
Hand Phalanx	U	P1/3-D1/3	1	3	2	W, C	W	
Hand Phalanx	U	D1/3-DE	1	2	2	W, C	W	possible peri-mortem fracture, but not certain due to cracking from burning
Indet bone	U		20.19 g	1	4	W, C, L, T	W	

However, we can only be certain that at least one intact, articulated skeleton is present, suggesting that the body was burned *in situ* and not moved, and there is a second individual present. The state of

articulation of the second individual could not be determined by osteological observations, however, given that the excavators refer to it as a 'second interment', perhaps the articulated elements simply did not remain intact during excavation and storage from the 1920s.

Results: Middle Neolithic Cists

Cronk Y Voddee (1967-0306, MNH NMHER 1716)

Only a small amount of bone was present from Cronk y Voddee. This consisted of mixed long bone fragments, which are burned white and cracked but there is very little longitudinal splitting or transverse checking. While there is a discrepancy with the description of *unburned* skeletal material in the archive and excavation record, the bones are labeled well, and thus we assume that they are from the Cronk y Voddee site. Perhaps it is due to the lack of obvious signs of cremation that the excavator simply concluded that they were unburned, inhumed skeletal material; however, this is not the case. This collection is most likely the remains of a single, adult individual based on the thickness of the cortical bone, with less than 1% of a skeleton present, or *c.* 50 g of skeletal material. Two bone fragments were set aside as a sample for AMS radiocarbon dating. Table s.3 presents the description of the material observed. There is only a small portion of a single burned adult individual present.

TABLE S.3: INVENTORY OF THE BURNED SKELETAL MATERIAL FROM CRONK Y VODDEE

Bone	*Side*	*Portion present*	*Weight*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Long bone	U	diaphysis	c.50g	1	4	W, T, L	W	highly fragmented bones – some show some grey edges or interiors, 2 have yellow (unburned) cores and are quite thin – largest frag = 3.5 cm, 5 more at 3 cm, rest at 2 cm or less

West Kimmeragh, Bride (1985-35, MNH NMHER 0397)

The addendum to Garrad's (1987) publication (426) records the excavation of a boulder cist, '12m east of D' containing an inhumation. The bones from this excavation were located in two different boxes and re-united. They include skeletal material which was sent away for analysis by an S. Rubin (no report from Rubin was located). All the material is now together within Box 1510. The bags are all labelled 'W.Kimmeragh 5/3/85' and the material that was examined by S. Rubin seems to have predominantly been the larger fragments while the smaller ones were left in the Manx Museum.

The West Kimmeragh Boulder Cist site was excavated by Garrad in 1985 as part of a rescue excavation once the capstone had been disturbed by ploughing. She describes this site as a boulder cist with no mound visible, and states that it is likely part of cremation cemetery (from archive material at the MNH NMHER 397.2). All the skeletal material that was recovered from this deposit is burned and seems to derive from one individual.

Overall, there is a minimum of one subadult individual present. Approximately 65% of a single child skeleton was recorded. The age-at-death assessment is based on the general size of material as no epiphyses are preserved; however, one tooth root with the root still developing looks like either a mandibular canine or mandibular premolar, which would put the age of the child at approximately 8±2 years, which also fits with the general size of the post-cranial skeletal material. The bone is fragmented and burned with differential burning possible as the majority is white in colour with only minimal warping of most bones, though the cranium is significantly warped and there are some fragments which are black/grey (Table S.4). The total weight of the cremation is 396.44 g. All the skeletal material required sieving and cleaning. There was a small clay or stone bead found within the cremation material (2.9 × 3.2 mm with a central perforation *c*. 1 mm in diameter, cylindrical shape and round in section).

TABLE S.4: INVENTORY OF ALL SKELETAL MATERIAL FROM WEST KIMMERAGH BOULDER CIST

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Pres state*	*Pres colour*	*Notes*
Frontal	A	R orbit rim, squama	7	2	3	W, C, T	W	
Occipital	A	sulcus, foramen magnum	3	1	3	W, C, T	W	
Temporal	R	petrous, crest, external auditory meatus	3	1	3	W, C, T	W	
Temporal	L	petrous, external aud meatus	2	1	3	W, C, T	W	
Temporal	U	petrous pyramid, squama, mastoid	25	2	4	W, C, T	W	
Zygomatic	R	frontal process	1	2	2	C, T	W	
Zygomatic	L	frontal process	1	1	3	C, T	W	
Mandible	A	anterior body	6	1	3	W, C, T	W	
Calvarium	A		98	3	3	W, C, T	W	
Parietal	U	squama with squamosal suture	3	1	3	W, C, T	W	
MaxM1	U	Roots	2	2	1			
Man tooth	U	Root	1	2	1			
deciduous molar	U	Root	1	1	1			
Root	U	Roots	3	1	3			
Crown	U	Crown	1	1	3			
Clavicle	R	acrom 1/3 – stern 1/3	3	4	1	W, C, L, T	W	
Clavicle	U	M1/3	1	1	4	W, C, L, T	W	
Scapula	R	acrom process	1	1	3	W, C, T	W	
Scapula	L	Neck	1	1	3	W, C, T	W	
1st rib	U	Angle	1	2	3	C, T	W	
Ribs 3-10	U	Shafts	41	1	4	W, C, T	B, W	
Vertebrae	A	facets, pedicles and laminae	20	1	4	W, C, T	B, W	
Humerus	R	P1/3-M1/3	3	2	2	W, C, L, T	W	
Humerus	L	P1/3	2	1	3	W, C, L, T	W	
Humerus	U	diaphysis	10	1	4	W, C, L, T	B, W	
Ulna	U	P1/3, D1/3, diaphysis	3	1	4	W, C, L, T	W	
Radius	U	diaphysis	9	1	4	W, C, L, T	W	
Femur	U	diaphysis	7	1	4	W, C, L, T	W	
Tibia	U	diaphysis	9	1	4	W, C, L, T	W	
Fibula	U	diaphysis	19	1	4	W, C, L, T	W	
Os Coxa	U	Ilium	16	1	4	W, C, T	W	
Hand or Foot	U	diaphysis	4	1	4	W, C, L, T	W	
Long bone	U	diaphysis	15	1	4	W, C, L, T	B, W	
Long bone	U	diaphysis	53	1	4	W, C, L, T	B, W	OxA-36598 (4625±32 BP, 3516–3349 cal BC
Indet epiphyses/ tarsal	U		8	1	4	W, C, T	W	
Indet bone	U		98.86g	1	4	W, C, L, T	B, W	

Bishops Demesne (2016-0041, MNH NMHER 1388)

Overall, there is a minimum of one individual present with no duplicate bones. It seems to be a small individual, either a possible female or an older adolescent. It appears that the right mandibular 3rd molar is erupted but post-mortem damage to the mandible through cremation makes it difficult to be certain and there are no complete epiphyses, though several fragments of cranium with sutures seem to be fully fused endocranially, but not necessarily ectocranially. Approximately 85% of a complete skeleton is present with most parts of the body represented. Table S.5 provides an inventory of all the material from Bishop's Demesne. The total weight of the cremated bone is 1252.24 g.

TABLE S.5: INVENTORY OF HUMAN SKELETAL MATERIAL FROM BISHOP'S DEMESNE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Mandible	R	coronoid, body and trigon	1	2	1	W, C, T	W	'from top' – possible female. T L half was with the rest of the bones – RI1-RM3 sockets present – root for RPM2 *in situ* and root apex of RM3 *in situ* – apex closed
Calvarium	A		8	1	4	W,C, T	W	'from top'
Temporal	U	Squama	1	1	3	W, C, T	W	'from top'
2nd Rib	R	Shafts	1	1	2	W, C	W	'from top'
Humerus	U	diaphysis	3	1	4	W, C, L, T	W	'from top'
Os Coxa	U	Ilium	1	1	4	W, C, T	W	'from top'
Femur	U	diaphysis	1	1	2	W, C, L, T	W	'from top'
Tibia	U	diaphysis	4	1	3	W, C, L, T	W	'from top'
Frontal	A	Squama	11	1	4	W, C, T	W	
Occipital	A	squama and foramen magnum	4	2	3	W, C, T	W	
Temporal	R	zyomatic process	1	1	3	W, C, T	W	
Temporal	L	petrous, zygomatic process, squama	3	2	3	W, C, T	W	
Temporal	U		10	1	4	W, C, T	W	
Zygomatic	L	frontal process	1	1	2	W, C, T	W	
Cranium	U	maxilla and endocranial frags	12	1	4	W, C, T	W	
Calvarium	A		169.3 g	3	4	W, C, T	W	
Mandible	L	L condyle and coronoid + body	12	2	4	W, C, T	W	Seems to match R side
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			
Root	U	single root	1	3	4			

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Root	U	single root	1	2	4			
Root	U	single root	1	2	4			
Root	U	single root	1	2	4			
Man M	U	Roots	1	2	4			
Man M	U	Roots	1	2	4			
Roots	U	Roots	30	1	4			multiple tooth roots – broken all roots are white outside with a black core
Crown	U	Crown	4	1	4			
C1	A	dens art fact, sup facet	2	2	3	W, C, T	W	
Cervical vert	A	facet and bodies	3	1	3	W, C, T	W	
Thoracic Vert	A	sup facets and lamina	7	1	3	W, C, T	W	
Vertebrae	A	facets and pedicles	21	1	4	W, C, T	W, G	
Ribs 3–10	U	Shafts	36	1	4	W, C, L, T	W	
Ribs 3–10	L	Facet	1	1	4	W, C, L, T	W	very mild osseous extension of the facet with slight lip
Scapula	U	coracoid	1	1	3	W, C, T	W	
Indet bone	U	cortical bone shaft	1	1	4	C, L	W	small lump of bone which is smooth, oval in shape 5 × 3.2 ×2.5 mm – osteoma?
Humerus	U	DE, diaphyses	5	1	4	W, C, L, T	W	
Ulna	L	P1/3	1	1	3	W, C, L, T	W	
Ulna	U	D1/3	1	1	4	W, C, L, T	W	
Radius	U	diaphysis	1	1	4	W, C, L, T	W	
Scaphoid	U	body	1	2	3	W, C	W	
Proximal hand phalanx	U	D1/3-DE	1	2	3	W, C, L, T	W	
Proximal hand phalanx	U	DE	1	1	3	W, C, L, T	W	
Proximal hand phalanx	U	D1/3-DE	1	2	3	W, C, L, T	W	
Proximal hand phalanx	U	D1/3-DE	1	2	3	W, C, L, T	W	
Proximal hand phalanx	U	PE, diaphysis	2	2	3	W, C, L, T	W	
Intermediate hand phalanx	U	PE, diaphysis	2	2	3	W, C, L, T	W	
Distal hand phalanx	U	PE-DE	1	3	2	W, C, L, T	W	
Distal hand phalanx	U	PE-DE	1	3	2	W, C, L, T	W	

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Distal hand phalanx	U	D1/3-DE	1	1	2	W, C, L, T	W	
Distal hand phalanx	U	P1/3-D1/3	1	2	2	W, C, L, T	W	
Distal 1st hand phalanx	U	P1/3-DE	1	2	2	W, C, L, T	W	
Proximal foot phalanx	U	D1/3-DE	1	2	2	W, C, T	W	
Proximal foot phalanx	U	diaphysis	1	1	2	W, C, L, T	W	
Proximal foot phalanx	U	diaphysis	1	1	2	W, C, L, T	W	
Indet phalanges	U	DE, diaphyses	4	1	2	W, C, L, T	W	
Indet MT	U	diaphysis	2	1	4	W, C, L, T	W	
Os Coxa	U	ilium	10	1	4	W, C, L, T	W	
Femur	U	DE, diaphyses	12	1	4	W, C, L, T	W	
Tibia	U	diaphysis	10	1	4	W, C, L, T	W	
Fibula	U	diaphysis	5	1	4	W, C, L, T	W	
Patella	U	posterior art surface	2	2	3	W, C, T	W, G, B	
Long bone	U	diaphysis	327.9g	1	4	W, C, L, T	W	
Indet bone	U		523.6g	1	4	W, C, L, T	W	

A mandible fragment (right side) was described as being placed on top of the rest of the cremation in the excavation record. This was found bagged separately with several other bones in the bag which were kept separate, despite almost certainly coming from the same individual as the rest of the cremation. These fragments are recorded as 'from top' in the spreadsheet but should be considered with the rest of the skeletal material. The human skeletal material from Bishop's Demesne (or 'the field SW of Magher y Clagh') represents a single, most likely female or possibly an older adolescent, individual. The majority of the skeleton is represented.

Cronk Coar (84-34, 7394, 7395, 77-49, MNH NMHER 0430)

The human remains associated with each accession number from Cronk Coar will be described and inventoried below. Overall, there was a very small amount of human remains recovered from this site across the various accession numbers.

Accession number 7394: 'Cronk Coar, Ballaugh, Plot 741' bag contains pottery and flint as well as two pieces of hand-written paper and a small bag of cremated bone with twelve fragments (Table S.6). These represent at least one probable adult, based on the size and thickness of the cortical bone. There is less than 1% of a skeleton present. This was a field surface find.

TABLE S.6: INVENTORY OF HUMAN SKELETAL MATERIAL FROM ACCESSION 7394, CRONK COAR

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A	frontal?	1	1	4	W	W	
Tibia	L	tuberosity	1	1	4	W, C, L, T	W	
Radius	U	diaphysis	1	1	4	C, L, T	W	
Long bone	U	diaphysis	9	1	4	W, C, L, T	W	Some light blue staining (not metal)

Accession number 7395: 'Cronk Coar, Ballaugh, Plot 741' bag contains pottery, as well as a piece of paper describing the find and a small bag of cremated bone with 18 fragments, the largest of which is 2.53 cm (Table S.7). This represents one possible adult, though age and sex cannot be assessed as there is less than 1% of the skeleton present. This was a field surface find.

TABLE S.7: INVENTORY OF HUMAN SKELETAL MATERIAL FROM ACCESSION 7395, CRONK COAR

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A		3	1	4	W, C	W	
Mandible	A	interior surface of body	1	1	4	C	W	
Ribs 3–10	U	shafts	1	1	4	W, C	W	
Long bone	U	diaphysis	13	1	4	W, C, L, T	W	largest frag = 2.45 cm, 2 cm, rest are less than 2 cm in length

A group of finds was brought in by A. Skillan in 1984 from field walking. This was broken into several groups. *84-34C and 84-34 D* both contained burned human bones. Below are the inventories for the two collections of bones (Tables S.8 and S.9, respectively). All the skeletal material is probably from an adult, however, there is such a minimal amount present that it is difficult to ascertain anything beyond the presence of the material and tentative general age. The total weight of 84-34D is 57.34 g; most likely adult based on one piece of femur.

TABLE S.8: INVENTORY OF THE HUMAN SKELETAL MATERIAL FROM 84-34C, CRONK COAR

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Frontal	A	rim, sulcus	2	1	3	W, C	W	
Scapula	U	Neck	1	1	4	W, C	W	
Vertebrae	A	body	1	2	3	C	W	

TABLE S.9: INVENTORY OF HUMAN SKELETAL MATERIAL FROM 84-34D, CRONK COAR.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	U	supra mastoid squama	2	1	3	W, C, T	W	
Calvarium	A		28	1	4	W, C, T	W	
Ribs 3–10	U	shafts	2	1	4	W, C, L, T	W	
Femur	R	P1/3	1	1	3	W, C, L, T	W	
Phalanx	U	PE, diaphysis	2	2	3	W, C, L, T	W	
Vertebrae	A	body	1	1	4	C	W	
Tibia	U	PE	1	1	4	W, C	W	
Long bone	U	diaphysis	28	1	4	W, C, L, T	W	
Indet bone	U		13.21 g	1	4	W, C, L, T	W	
Mandible	U	body	2	1	4	W, C	W	

The majority of the skeletal material from Cronk Coar is derived from the excavation of the cist by Cubbon in 1977. The material was all within small plastic containers with the excavation dirt and required cleaning. The boxes were labelled 'Corvalley Cist Feb 77' (Accession: 77-49). There is only a small amount of bone, mostly tiny, less than 1 cm, indeterminate fragments of bone. Therefore, the age of individual cannot be assessed, and is possibly mixed, with some that appears to be adult size and some infant-child size but no fragments are conclusive. The total weight of 77–49 is 55.8 g with few identifiable fragments. Table S.10 provides the inventory.

TABLE S.10: INVENTORY OF THE HUMAN SKELETAL MATERIAL FROM 77-49 ('CORVALLEY CIST FEB 77'), CRONK COAR

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	R	petrous	1	1	3	W, C	W	
Calvarium	A		14	1	4	W, C, T	W	
Mandible	U	inferior body	2	1	4	W, C, T	W	
Root	U	Root	1	2	3			
Thoracic Vert	A	sup art facet	1	1	3	W, C, T	W	
Ribs 3–10	U	shafts	2	1	4	W, C	W	
Sacrum	A	sup, R ala	1	1	4	W, C	W	
Scapula	U	lateral border	1	1	4	W, C, T	W	
Humerus	U	diaphysis	2	1	4	W, C, L, T	W, G	OxA-36488 (4489+31 BP, 3347–3036 cal BC)
Fibula	U	diaphysis	5	1	4	W, C, L, T	T, W	
Indet bone	U	diaphysis	2	1	4	W, C, L, T	W	2 small frags of either phalanx or metatarsal
Long bone	U	diaphysis	36	1	4	W, C, L, T	W	
Indet bone	U		18.2 g	1	4	W, C	W	

Overall, based on the quantity of bone and lack of duplicate elements, there is a minimum of one individual over the entire site, but this is highly unlikely given the size of the site and variously recovered objects and bones. There could be as many as five individuals based on the artificial collection methods, but it is impossible to know for certain. It seems reasonable to assume that the skeletal material from the cist (77-49) could represent one individual, however the variable cortical thicknesses of the bones is suggestive of two individuals. Still, the minimal amount of material makes assessment inconclusive.

Results: Middle to Late Neolithic cemeteries

Ballateare (1971-0303a, MNH NMHER 1355)
Each context will be described and discussed independently within this section. In the following section, discussion will focus on the results of this 2016 analysis compared to assumptions and interpretations from the publication. Note that this report covers only the Neolithic remains from Ballateare.

CI: CI is a large Ronaldsway Earthfast jar burial with the base still in situ and a small thumb-pressed cup within it. There were two separate bags: CI with a weight of 39.69 g and contents of the cup (labelled 'pygmy vessel contents CI') with a weight of 29.46 g. It is most likely that there is only one individual in total from CI as there is so little material from the two different bags. It seems unlikely to have been two separate burials, particularly as the cup was found in amongst the cremated remains within CI. Inventories of the bones from both bags are in Table S.11.

- CI bag contains larger fragments, predominantly cranial fragments and several teeth. The cranial thickness is 3.01 mm, and one fragment with sutures still visible but fused. There is a large left first mandibular molar crown and a fused proximal hand phalanx which indicates that there is one adult individual, no age or sex estimation possible (though thickness of mandible and partial mental spines present could suggest a male). Approximately 1% of a skeleton present.
- The bag labelled 'Pygmy vessel contents CI' contains several identifiable long bone fragments and some small unidentifiable fragments of burned bone representing one individual, likely an adult. There is less than 1% of the skeleton present.

TABLE S.11: CI INVENTORY, BALLATEARE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	L	petrous	1	1	3	W, C, T	W	
Temporal	U	mastoid	2	1	3	W, C, T	T, W	
Maxilla	L	zygomatic process	1	1	3	W, C, T	T, W	
Calvarium	A		13	1	4	W, C, T	T, W	
Mandible	A	body and rami	3	1	4	W, C, L, T	T, W	quite thick and robust fragments – sockets for L anterior teeth LI2–LPM1 likely
Root	U	single root	4	2	3			Min. 3 single rooted teeth
Root	U	multi-roots	2	1	3			Min. of 2 multiple rooted teeth
Max M1	L	crown	2	2	3			very large tooth – human? Difficult to tell – possible ondontome? Not very well worn and unusual in shape
Molar	U	crown	1	1	4			molar fragment – likely mandibular

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Molar	U	crown	1	1	4			possibly a deciduous tooth – quite small – retained? Or 2nd individual?
Vertebrae	A	pedicle	1	1	4	W, C, T	T, W	
Ribs 3–10	U	shaft	1	1	4	W, C, T	T, W	
Long bone	U	diaphysis	2	1	4	W, C, L, T	T, W	
1st proximal hand phalanx	U	PE-DE	1	4	1	W, C, T	T, W	
Phalanx	U	DE	1	1	3	W, C, L, T	T, W	
Phalanx	U	DE	1	1	3	W, C, L, T	T, W	
Indet MT	U	P1/3-D1/3	1	2	3	W, C, L, T	T, W	
				Pygmy vessel CI				
Calvarium	A		2	1	4	W, C, T	T, W	
Temporal	U	zygomatic process	1	1	4	W, C, T	T, W	
Mandible	U	condyle	1	1	4	W, C, T	T, W	
Scapula	U	glenoid	1	1	4	W, C, T	T, W	
Long bone	U	diaphysis	8	1	4	W, C, L, T	T, W	
Indet bone	U		19.3 g	1	4	W, C, L, T	T, W	

CIV: CIV is a cremation deposit which was found with no vessel, directly under the modern humus. CIV has a pre-sieved weight of 695.5 g with lots of stones mixed in with the bones. Therefore, there is a proportion of the bone which has remained mixed with the stone, 392.16 g could not be separated. The total weight of the cremated bone is 145.53 g. The bones are highly fragmented and burned, with a maximum cranial thickness of 3 mm. These bones represent the remains of an adult or older adolescent. There is only about 5% of a single individual present and no further age or sex assessment is possible. Table S.12 provides the inventory for cremation CIV.

TABLE S.12: INVENTORY OF CIV, BALLATEARE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Calvarium	A		28	1	4	W, C, T	W	small cranial frags, thin, sutures are still open – adolescent?
Maxilla	A	alveoli	1	1	4	W, C, T	W	
Mandible	A	body	4	1	4	W, C, T	W	
Root	U	single roots	4	1	3			min of 3 teeth
Vertebrae	A	facets	3	1	3	W, C, T	W	
Scapula	U	lateral border	1	1	4	W, C, T	W	
Tibia	U	diaphysis	3	1	4	W, C, L, T	W	
Long bone	U	epiphysis, diaphyses	26	1	4	W, C, L, T	W	
Indet bone	U		98.74 g	1	4	W, C, L, T	W	

CV: CV is a cremation deposit found directly under the modern humus. It had a pre-sieved weight of 226.67 g which is mostly dirt and stones. The sieved bones weigh 13.19 g. The remains are small, highly eroded, and

fragmentary and they have a water worn appearance. The cortical thickness of the long bone fragments suggests an adolescent or adult. There is a minimum of one individual, with less than 1% of the skeleton present, and sex and age cannot be assessed. The maximum cranial thickness is 2.9 mm. Table S.13 provides an inventory of the skeletal material from CV.

TABLE S.13: INVENTORY OF CV, BALLATEARE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A	calvarium	7	1	4	W, C, T	W	no sutures present
Long bone	U	diaphysis	5	1	4	W, C, L, T	W	thickness of the cortical bone suggests an adult
Indet bone	U		31	1	4	W, C, L, T	W	water worn elements

CVII: CVII is a cremation deposit found directly under the modern humus. CVII pre-sieved weight is 288.19 g, with the mixed bone and stone requiring sieving and cleaning. Some of the bone could not be separated from the stones (total weight of 109.06 g), and the total weight of the cremated bone is 163.16 g. The bones are highly fragmented and most are smaller than 2 cm, with the exception of two larger cranial fragments and several long bone frags which are just over 3 cm. There is a minimum of one adult or older adolescent present. A more specific age and sex cannot be assessed. Approximately 5% of a skeleton is present. The brown colour of the bones seems to be due to a lack of burning (either low temperatures or low duration) in some cases and mild soil staining in others. These bones appear less burned than other deposits, and are light tan in colour, though it is possibly partially due to staining from the soil. Table S.14 provides the inventory of human skeletal material from CVII.

TABLE S.14: INVENTORY OF CVII, BALLATEARE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	R	Petrous	1	1	3	W, C, T	T, W	
Sphenoid	L	greater wing	1	1	3	W, C, T	T, W	
Cranium	A	calvarium	3	1	4	W, C, T	T, W	
Thoracic Vert	A	facets and lamina	11	1	3	W, C, T	T, W	
Ribs 3–10	U	shafts	4	1	4	W, C, T	T, W	
Os Coxa	U	ilium	4	1	4	W, C, T	T, W	
Humerus	U	diaphysis	4	1	4	W, C, L, T	B, T, W	
Ulna/Radius	U	diaphysis	5	1	4	W, C, L, T	B, T, W	
Fibula	U	diaphysis	5	1	4	W, C, L, T	B, T, W	
Femur	U	diaphysis	3	1	4	W, C, L, T	B, T, W	
Long bone	U	diaphysis	40	1	4	W, C, L, T	B, T, W	
Indet epiphyses/tarsal	U		11	1	4	W, C, L, T	B, T, W	
Indet bone	U		90.02 g	1	4	W, C, L, T	B, T, W	

CVIII: Bersu records this as a deposit which was heavily disturbed by modern activity which destroyed the pot which was there, returning the sherds to the pit feature with modern ceramic mixed through (Bersu 1947, 165). CVIII pre-sieved weight is 312.48 g and is composed entirely of minute fragments of bone with small stones and it was not possible to manually separate the bones and stones. There are no identifiable fragments. The post-sieved weight is 277.19 g.

CIX: CIX is a cremation deposit found directly under the modern humus with a pre-sieved weight of 576.01 g, including some of the bones on display in the museum under a pot, which were mixed in as part of the overall deposit. The bones on display had a total weight of 104.58 g. There are a lot of small stones mixed in with the cremated bones and it was not time-effective to separate them all. The post-sieved weight of stones and bones

is 418.22 g. The bone fragments are all tiny, with the largest only 3 cm long; and most fragments which could be separated out are 1 cm or less. All the bones are cream/tan coloured rather than pure white, reflecting possibly limited burning, either in duration or temperature. There is a minimum of one individual present, an adolescent or gracile adult and it is not possible to provide any further assessments as there are few diagnostic bones present. Less than 15% of a skeleton is present. The maximum cranial thickness is 3.8 mm. Table S.15 presents the inventory of CIX.

TABLE S.15: INVENTORY OF CIX, BALLATEARE

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	U	articular eminence	2	1	4	W, C, T	T, W	
Calvarium	A		37	1	4	W, C, T	T, W	
Root	U	single root	3	1	4			min of 3 teeth - one root is particularly unusually shaped, possibly a super-rnumerary tooth
Root	U	multi-roots	2	1	4			min of 2 teeth
Vertebrae	A	facets and pedicles	7	1	4	W, C, T	T, W	
Ribs 3–10	U	shaft	1	1	4	W, C, T	T, W	
Ulna/Radius	U	diaphysis	3	1	4	W, C, L, T	T, W	
Humerus	U	diaphysis	1	1	4	W, C, L, T	T, W	OxA-36423 (4521±30 BP, 3360–3101 cal BC)
Tibia	U	diaphysis	8	1	4	W, C, L, T	T, W	
Fibula	U	diaphysis	2	1	4	W, C, L, T	T, W	
Long bone	U	diaphysis	46	1	4	W, C, L, T	T, W	
Indet bone	U		109.84 g	1	4	W, C, L, T	T, W	

CXIV: CXIV is a cremation deposit found directly under the modern humus level. CXIV had a pre-sieved weight of 787.1 g and contains a mixed deposit of small stones and bones. The bones are highly fragmented, therefore some bones could not be separated from the stones. The weight of the mixed stones and bones is 442.73 g, and the total weight of the cremated bone is 168.42 g. Based on the cortical bone thickness, this is probably an adolescent. Approximately 10% of a single skeleton is represented. The tan colour of the bones is likely due to limited burning (either duration or temperature) and soil staining. The bones are heavily fragmented, but not significantly cracked/warped. There was a small flat bone object recovered within the cremation. It seems to be smoothed on both sides but is broken with dimensions: 2.05 × 0.75 × 0.17 cm, 0.31 g. It is burned and warped, white in colour, smoothed and shaped to a rounded point, sub-oval in plan and sub-rectangular in section (looks possibly rib-like with a very thin space between layers of cortical bone). Table S.16 presents the inventory for CXIV.

TABLE S.16: INVENTORY OF CXIV, BALLATEARE

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	R	petrous	1	1	4	W, C, T	T, W	only partial
Temporal	L	petrous	1	1	4	W, C, T	T, W	only partial
Temporal	U	zygomatic processes, articular eminence	6	1	4	W, C, T	T, W	
Cranium	A	calvarium	62	1	4	W, C, T	T, W	quite thin cranial frags and sutures are small and sharp, very visible, no indication of fusion
Root	U	single root	1	2	2			
Vertebrae	A	facets and pedicles	4	1	4	W, C, T	T, W	
C1	A	sup and inf facets	1	1	4	W, C, T	T	
Scapula	U	Spine	2	1	4	W, C, T	T	
Scapula	R	Neck	1	1	3	W, C, T	T, W	
Ribs 3–10	U	Shaft	1	1	4	W, C, T	T, W	
Long bone	U	diaphysis	14	1	4	W, C, L, T	T, W	
Long bone	U	diaphysis	10	1	4	W, C, L, T	T, W	
Fibula	U	diaphysis	3	1	4	W, C, L, T	T, W	
Long bone	U	diaphysis	27	1	4	W, C, L, T	T, W	
Indet bone	U		101.1 g	1	4	W, C, L, T	T, W	

CXV: CXV is a cremation deposit found directly under the modern humus level. CXV has a pre-sieved weight of 1086.0 g with considerable mixed bone and stones. The total weight of the stones is 712.1 g and the overall total weight of the cremated bone is 126.53 g. There is a minimum of one individual present, and it is not a child or infant, but further assessment is not possible as the material is too fragmentary and there is not enough diagnostic material. Less than 3% of the skeleton is present and the tan colour of the bone is likely due to limited burning (either duration or temperature) and soil staining. Table S.17 provides the inventory of the human skeletal material for CXV.

TABLE S.17: INVENTORY OF CXV, BALLATEARE

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A	calvarium	10	1	4	C, T	T, W	thickness = 4.2mm
Vertebrae	A	pedicle	1	1	4	C, T	T, W	
Ribs 3–10	U	Shaft	1	1	4	C, T	T	
Long bone	U	diaphysis	14	1	4	C, L, T	T, W	
Indet bone	U		109.74 g	1	4	C, L, T	T, W	

CXVII: CXVII is a cremation deposit found directly under the modern humus layer. CXVII had a pre-sieved weight of 721.0 g, containing mostly bone with few stones. The weight of stones and bones which could not be separated is 143.48 g. The overall weight of the cremated bone is 500.47 g. There was some charcoal recovered from the cremation. There is a minimum of two individuals present: a child tentatively aged to 1.5 years-at-death, based roughly on the size of the radius. There are other bone elements present, representing approximately 10% of the child's skeleton. The adult material comprises most of the material with around 45% of the skeleton represented. The adult is rather small and gracile though no sex or age diagnostic fragments survive. Table S.18 provides the inventory for CXVII.

TABLE S.18: INVENTORY OF CXVII, BALLATEARE

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Frontal	A	sagital crest	1	1	4	W, C, T	W	
Temporal	R	art eminence, zyg proc, supra meatal crest and ext aud meat	5	2	2	W, C, T	W	
Temporal	L	petrous, zyg process, ext aud meatus	2	2	2	W, C, T	W	
Temporal	U	petrous pyramid, supramastoid crest	5	1	4	C, T	T, W, B	
Occipital	A	cruciform and foramen	2	1	4	W, C, T	T, W	
Sphenoid	A		2	1	4	W, C, T	T, W	
Maxilla	R	frontal proc, zyg proc	2	1	3	W, C, T	T, W	
Maxilla	L	frontal proc	1	1	3	W, C, T	T, W	
Maxilla	U	palate, alveoli	3	1	4	W, C, T	T, B	
Mandible	A	body with alveoli	5	1	3	W, C, T	T, W	
Calvarium	A		70.16 g	2	4	W, C, T	T, W	
Root	U	single root	4	2	1			min 4 teeth
Root	U	multi-roots	6	2	1			min of 3 teeth
Root	U	roots	20	1	2			
Clavicle	L	acrom 1/3	1	2	1	W, C, L, T	W	
Humerus	U	diaphysis	9	1	4	W, C, L, T	T, W	
Ulna/ Radius	U	diaphysis	18	1	4	W, C, L, T	W	
1st proximal hand phalanx	U	D1/3-DE	1	2	1	C, L, T	W	
Proximal hand phalanx	U	P1/3-DE	1	3	1	W, C, L, T	W	
Hand Phalanx	U	M1/3-DE	1	2	2	W, C, L, T	W	
Hand Phalanx	U	D1/3-DE	1	1	3	W, C, L, T	W	
Intermed-iate hand phalanx	U	PE-D1/3	1	2	2	W, C, L, T	W	
Distal hand phalanx	U	PE-DE	1	4	1	C, L, T	W	
Distal hand phalanx	U	PE-DE	1	4	1	C, L, T	W	
Phalanx	U	PE, M1/3	2	1	3	W, C, L, T	W	

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Sesamoid	U		1	4	1	W, C, T	W, B	
Ribs 3–10	U	shafts	12	1	4	W, C, T	W	
Cervical vert	A	body and L facet	1	2	4	W, C, T	W	
Vertebrae	A	body, facets, pedicles	42	1	4	W, C, T	W	
Os Coxa	U	ilium	8	1	4	W, C, T	T, W	
Femur	U	diaphysis	13	1	4	W, C, L, T	W	
Tibia	U	diaphysis	12	1	4	W, C, L, T	W, B	Sample failed
Fibula	U	diaphysis	10	1	4	W, C, L, T	W	
Indet MC or MT	U	DE, diaphysis	21	2	4	W, C, L, T	W, B	
Distal foot phalanx	U	PE-DE	1	5	0	C	W	
1st distal phalanx	U	DE	1	1	3	C, T	W	
Long bone	U	diaphysis	83.54 g	1	4	W, C, L, T	W, B	
Indet epiphyses/ tarsal	U		27	1	4	W, C, T	T, W	
Temporal	R	petrous	1	1	3	W, C	T, W	Subadult
Mandible	A	anterior body	1	1	3	W, C	T, W	Subadult
Occipital	A	cruciform ridge	1	1	4	W, C,T	B	Subadult
Cranium	A	basal, calvarium	17	1	4	W, C, T	T, W	Subadult
Humerus	U	M1/3	1	2	1	W, C, L, T	W	Subadult
Radius	U	M1/3	1	2	1	W, C, L, T	B	Subadult
Ulna/ Radius	U	diaphysis	5	1	4	W, C, L, T	T, W	Subadult
Long bone	U	diaphysis	2	1	4	W, C, L, T	T, W	Subadult
Long bone	U	diaphysis	27	1	4	W, C, L, T	T, W, B	Subadult
Indet bone	U		140.83g	1	4	W, C, L, T	T, W, B	Mixed adult and subadult

CXVIII: CXVIII is a cremation deposit located directly under the modern humus layer. CXVIII had a pre-sieved weight of 62.13 g and contains larger bone fragments with very little dirt or stones, though the bones were dirty and required dry brushing. The total weight of cremated bone is 43.68 g. This represents a minimum of one adult individual with 1% of the skeleton present. No further assessments were possible. Table S.19 presents the inventory of CXVIII.

TABLE S.19: INVENTORY OF CXVIII, BALLATEARE.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A	temporal? Calvarium	4	1	4	W, C, T	W	
Humerus	U	diaphysis	5	1	4	W, C, L, T	W	1 frag complete diameter = 4.46 cm
Ulna/Radius	U	diaphysis	5	1	4	W, C, L, T	W	
Os Coxa	U	sciatic notch	1	1	4	W, C, T	T, W	
Femur	U	diaphysis	1	1	4	W, C, L, T	T, W	possible area of medullary bone resorption and layer of porotic bone growth within the medullary cavity of bone frag
Long bone	U	diaphysis	4	1	4	W, C, L, T	T, W	
Calcaneus	U	ant portion	1	1	4	W, C, T	T, W	
Indet bone	U		18	1	4	W, C, T	W	

There are two deposits of cremated human bone which may be missing: CXIII and CXVI which are listed in Bersu's publication as cremation deposits directly under the modern humus. Bersu also notes that there was cremated bone amongst the modern humus and that the farmer had dug away 'heaps' of bone previously for potato crops (Bersu 1947, 167). Therefore, it seems that the bones examined here, represent only a small portion of the skeletal material which was originally present on the site. Table S.20 provides a synopsis of each deposit.

TABLE S.20: SYNOPSIS OF ALL THE HUMAN SKELETAL MATERIAL EXAMINED FROM BALLATEARE.

Deposit	*MNI*	*Age*	*Sex*
CI (including cup)	1	Adult	?
CIV	1	Adult/adolescent	?
CV	1	Adult/adolescent	?
CVII	1	Adult/adolescent	?
CVIII	1	?	?
CIX	1	Adult/adolescent	?
CXIV	1	Adolescent	?
CXV	1	?	?
CXVII	2	1.5 years & adult	??
CXVIII	1	Adult	?
Total	11	2 adult/4 adult or adolescent/ 2 children or subadults	Sex could not be assessed for any deposit

Bersu's observations on the cremation deposits were quite limited. He notes that there are fragments of bones and skulls in deposits which are children: CV, CVII, CXIII, CXIV. It is difficult to comment on this, as CV, CVII and CXIV could represent adolescents, however CXIII was not present to examine.

In general, the heavily fragmented remains could be due to purposeful fragmentation of the bones, or, more likely, given that most were not stored in a vessel and were found quite close to the modern surface (due to ploughing), taphonomic and environmental conditions may have contributed to their current state. This heavily fragmented bone makes it difficult to discuss demographic, or palaeopathological information about any of the individuals. The bones are almost all stained slightly, which is again likely due to their lack of protection from a vessel and exposure to the soil conditions.

Killeaba (2016-0039, MNH NMHER 231)

Cubbon published Killeaba in 1978, and Crellin (2015) has produced a more recent re-appraisal of the dating and burial programme at the site. Further information can be found in the Manx National Archive (MNH NMHER 231) and in the excavation archive which is also at the Manx Museum (Reference number: MD15069). The skeletal material was examined by Calvin Wells in 1978 as part of the Cubbon publication. This provides an opportunity to compare what was present at (or close to) the time of excavation compared to what is currently observable. Each context will be described and discussed independently within this section. Discussion will include the results of the 2016 analysis compared to assumptions and interpretations from the publication. Note that this report covers only the Neolithic remains from Killeaba.

Cist 1: Cist 1 contains the only inhumation recorded on the site, with only cranial fragments, a femur, and a calcaneus present (see Table S.21 for the inventory). Less than 5% of the skeleton is present and in poor condition, with flaking cortical bone from the long bones, while the cranial bones fare slightly better. The remains represent a single adult individual with no more specific age or sex estimation possible. A sample of cranium was selected for the aDNA and dating analysis, but no genetic material was preserved.

TABLE S.21: INVENTORY OF UNBURNED BONES FROM CIST 1, KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Pres*	*Notes*
Frontal	A	squama with part of the saggital sulcus present	1	1	3	3	9.0 × 4.65 cm in size and thickness varies from 8.2 mm to 6.5 mm. Quite thin cortical bone with wide diploe but no disease
Calvarium	A	parietal and possible frontal frag	5	1	3	3	largest piece = 8.62 × 5.75 cm (likely parietal) Sample set aside for aDNA
Femur	L	P1/3-M1/4	2	2	2	5	
Calcaneus	U	posterior portion	1	2	3	5	Surface of bone is almost completely eroded away making identification difficult. Some consolidant possibly used

The current osteological assessment of the skeletal material from Cist 1 reflects the presence of a single adult individual of unknown age and sex. Wells presents a similar quantity of bone, though perhaps in slightly better condition, as he describes a fragment of right parietal that is 135 × 110 mm, which was not observed here. Wells concludes that these remains belong to a male over 30 years of age based on cranial thickness and the presence of arachnoideal granulations on the inner table of the cranial vault, respectively. He also describes this individual as 'sinewy and lithe' with smallish feet (Cubbon 1978, 91). These observations are considered subjective by modern anthropological methods and are not grounded in accepted methods of assessment. While a method of age assessment using arachnoid granulations was presented at the 1995 American Association of Physical Anthropologists meeting, no further references have been located, suggesting that this technique – primarily used with radiographs and for aging those older than 50 years (Barber *et al.* 1995) – is not widely accepted. While cranial thickness

can be correlated with sex differences, this can only be used when a comparative spectrum has been created for a specific population as it can vary across populations. In addition, cranial thickness can be affected by nutritional and hematological diseases, and therefore is not standardized for sex estimation. The cranial thickness of the bones present in Cist 1 (maximum of 8.2 mm) is within the range of a normal healthy adult.

Cremation I: The bag containing Cremation I is labelled 'Killeaba 1968/9 Cremation I'. The total weight of the cremation is 78.09 g and the bones were highly fragmented. This represents approximately 50% of a subadult skeleton. As the tympanic ring is fused and measures 1.85 × 1.11 cm, this likely represents an infant 0–4 years of age-at-death. An inventory of all the human bone associated with this cremation is in Table S.22. This analysis overlaps with Wells' assessment (Cubbon 1978, 91), who describes a similar amount and type of bone present and provides an age assessment of 2–4 years at death.

TABLE S.22: INVENTORY OF CREMATION I, KILLEABA.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	L	petrous	1	2	3	W, C, T	W	Tympanic ring fused
Temporal	U	petrous	5	1	4	W, C, T	W	
Calvarium	A		36.85 g	2	4	W, C, T	W	
C2	A	dens body and sup art facet	2	2	3	W, C, T	W	Unfused dens body
Vertebrae	A	laminae and pedicles	4	1	4	W, C, T	W	
Ribs 3–10	U	shafts	6	1	4	W, C, T	W	
Long bone	U	diaphysis	5	1	4	W, C, L, T	W	
Long bone	U	diaphysis	19	1	4	W, C, L, T	W	
Long bone	U	diaphysis	56	1	4	W, C, L, T	W	OxA-36490 (4574+30 BP, 3494–3105 cal BC)
Indet bone	U		21.75 g	1	4	W, C, L, T	W	

Cremation II: The bag containing Cremation II was labelled, 'Killeaba 1968/9 Cremation II'. The overall weight of the cremation is 84.91 g and it is highly fragmented. This represents approximately 30% of a subadult skeleton, based on tooth development, likely 2–4 years at death. Wells (Cubbon 1978, 91) describes a similar amount and type of bone present and provides an age assessment of 5–6 years at death. A smooth stone was recovered with the cremation. It is a semi-circular green stone, all edges water worn/smooth (20.7 × 10.4 × 5.4 mm). A complete inventory of the skeletal material from Cremation II is in Table S.23.

TABLE S.23: INVENTORY FOR CREMATION II, KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	R	petrous	1	1	4	W, C, T	W	
Temporal	U	petrous, zygomatic process, squama	7	1	4	W, C, T	W	
Mandible	A	ant body interior	1	1	4	W, C, T	W	portion of a crypt visible = child 2–5 y
Calvarium	A		31.53 g	2	4	W, C, T	W	
Molar	U	crown	1	2	2			adult molar but unable to assess development
Molar	U	crown	1	1	3			
Root	U	root	1	1	3			
Vertebrae	A	pedicles and body	4	1	4	W, C, T	W	
Ribs 3-10	U	shaft	1	1	4	W, C, T	W	
Long bone	U	diaphysis	11.26 g	1	4	W, C, L, T	W	OxA-36491 (4552±31 BP, 3482–3102 BC)
Indet bone	U		29.48 g	1	4	W, C, L, T	W	

Cremation III: Cremation III consisted of two bags: 'Cremation III' and 'Cremation IIIA', total cremation weight 623.9 g. This deposit represents single adult individual, with approximately 30% of the skeleton represented. It is highly fragmented with few identifiable fragments. There were several fragments of wood charcoal mixed in with the bones. No age and sex assessment was possible, however, the cranial fragments are quite thin, which is either due to shrinkage or possibly reflecting a small individual. The fusing sutures suggest an adult individual. A complete inventory of the skeletal material is provided in Table S.24. While the remains described by Wells sound similar in quantity and type to those present for the current study, he suggests the individual was an adult male aged 30–40 years at death, based on the size of the mandibular condyle and a now missing supra-orbital rim, and suture closure, respectively (Cubbon 1978, 92). Once again, while these interpretations are not incorrect *per se*, they are not rooted in current, standardised sex and age assessment methods and are more subjective than scientific. Cranial suture closure can provide a rough estimation of age, but the quantity of cranium present requires a more circumspect determination.

TABLE S.24: INVENTORY OF CREMATION III FROM KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frags*	*Crem state*	*Crem colour*	*Notes*
Temporal	U	supra meatal crest	3	1	4	W, C, T	T, W	
Calvarium	A		102.7 g	2	4	W, C, T	T, W	Sutures appear to be partially fusing, thicker cortical bone with little diploe
Mandible	L	condyle	1	1	4	W, C, T	T, W	
Root	U	multi-roots	1	2	3			
Root	U	single root	7	2	3			min of 5 teeth
Vertebrae	A	pedicles, laminae and facets	9	1	4	W, C, T	T, W	
Ribs 3–10	U	shafts	8	1	4	W, C, T	T, W	
Os Coxa	U	ilium	2	1	4	W, C, T	T, W	
Humerus	U	diaphysis	17	1	4	W, C, L, T	T, W	
Ulna/ Radius	U	diaphysis	36	1	4	W, C, L, T	T, W	
Femur	U	diaphysis	27	1	4	W, C, L, T	T, W	
Tibia	U	diaphysis	17	1	4	W, C, L, T	T, W	
Fibula	U	diaphysis	6	1	4	W, C, L, T	T, W	
Proximal hand phalanx	U	D1/3-DE	1	2	3	W, C, L, T	W	
Proximal hand phalanx	U	M1/3-DE	1	2	3	W, C, L, T	W	
Distal hand phalanx	U	DE	1	1	4	W, C, L, T	W	
Indet MC or MT	U	diaphysis	8	1	4	W, C, L, T	T, W	
Indet epiphyses/ tarsal	U		7	1	4	W, C, T	T, W	
Long bone	U	diaphysis	104.3 g	1	4	W, C, L, T	T, W	
Indet bone	U		231.18 g	1	4	W, C, L, T	T, W	

Cremation IV: Cremation IV could not be located within the stores at this time.

Cremation V: Cremation V consisted of two bags: 'Cist V Cremation V' and 'Cremation VA' with a total cremation weight of 747.1 g and a minimum of two individuals are present. One is an adult possible female based on the occipital protuberance and a general gracility to many of the bone fragments. There was a left maxillary third molar crown present which is unworn and therefore suggests a younger individual. Approximately 20% of the adult skeleton is present. This individual has two interesting genetic variations: a wormian bone (or extra-sutural or Incan bone); and a parietal foramen near the saggital suture. Both are asymptomatic skeletal non-metric variations.

A second, less well-preserved infant is also present, with a developing maxillary first incisor age can be estimated at *c.* 9 months ±3 months. The total weight of the infant cremation is 33.38 g with approximately 70% of the skeleton present. The complete inventory of all the bones from Cremation V can be found in Table S.25.

TABLE S.25: INVENTORY OF CREMATION V, KILLEABA.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
				ADULT				
Occipital	A	squama, condyle and foramen magnum	5	2	3	W, C, T	W	
Wormian bone	A		1	5	0	W, C, T	W	small extra-sutural bone: triangular in shape with sutures
Parietal	U		1	1	3	W, C, T	W	parietal foramen: tiny near suture
Temporal	R	petrous, articular eminence	2	1	3	W, C, T	W	
Temporal	L	petrous, zyg process	2	1	3	W, C, T	W	
Temporal	U	squama	2	1	4	W, C, T	W	
Sphenoid	A	rostrum, lesser wing	2	1	3	W, C, T	W	
Calvarium	A		63	2	4	W, C, T	W	
Maxilla	U	alveoli	1	1	4	W, C, T	W	
Root	U	multi-roots	1	2	2			
Root	U	single root	6	1	2			
MaxM3	L	crown	1	2	1			unworn, tooth crown finished, but tooth possibly still forming: no roots
Mandible	R	condyle	1	1	4	W, C, T	W	
C1	A	L facets and dens facet	2	2	2	W, C, T	W	
C2	A	L facets and dens	2	1	3	W, C, T	W	
Cervical vert	A	sup/inf facets and body	7	2	3	W, C, T	W	
Thoracic Vert	A	facets and pedicles	6	1	3	W, C, T	W	
Vertebrae	A	pedicles and laminae	28	1	4	W, C, T	W	
Scapula	R	glenoid	1	1	3	W, C, T	W	
Scapula	U	lateral border	2	1	4	W, C, T	W	
Clavicle	R	M1/3	1	2	3	W, C, L, T	W	
Clavicle	L	M1/3	1	2	3	W, C, L, T	W	
Clavicle	U	acrom 1/3	1	1	3	W, C, L, T	W	
Humerus	U	DE, diaphyses	22	1	4	W, C, L, T	W	
Ulna	U	diaphysis	6	1	4	W, C, L, T	W	

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Ulna	L	P1/3	1	1	3	W, C, L, T	W	
Radius	U	diaphysis	10	1	4	W, C, L, T	W	
Ulna/ Radius	U	diaphysis	19	1	4	W, C, L, T	W	
Scaphoid	L		1	3	1	W, C, T	G	
Hand Phalanx	U	D1/3-DE	1	2	2	W, C, T	W	
Hand Phalanx	U	M1/3-DE	1	2	2	W, C, T	W	
Hand Phalanx	U	D1/3-DE	1	2	2	W, C, T	W	
Proximal foot phalanx	U	M1/3-DE	1	2	2	W, C, T	W	
MC1	U	D1/3-DE	1	1	3	W, C, L, T	W	
Distal hand phalanx	U	PE-DE	1	3	2	W, C, T	W	
Indet MC or MT	U	diaphysis	3	1	4	W, C, L, T	W	
Ribs 3-10	U	shafts	21	1	4	W, C, L, T	W	
Os Coxa	U	ilium	15	1	4	W, C, T	W	
Indet epiphyses/ tarsal	U		22	1	4	W, C, T	W, G	
Femur	U	DE, diaphyses	16	1	4	W, C, L, T	W	Largest fragments are *c*. 5.5 cm long
Tibia	U	diaphysis	12	1	3	W, C, L, T	W	
Fibula	U	diaphysis	9	1	4	W, C, L, T	W	
Patella	U		2	2	2	W, C, T	W, G	
Long bone	U	diaphysis	66.62 g	1	4	W, C, L, T	W	
Indet bone	U		214.71 g	1	4	W, C, L, T	W	
				INFANT				
Cranium	A	calvarium	17.59g	2	4	W, C, T	W	Very thin
Temporal	R	petrous	1	1	3	W, C, T	W	
Temporal	L	petrous	1	1	3	W, C, T	W	
Temporal	U	zyg process and petrous	3	1	4	W, C, T	W	
MaxI1	U	crown	1	1	0			
Crown	U	tooth bud	1	1	0			
Maxilla	U	palate	1	1	4	W, C, T	W	
Vertebrae	A	facets and pedicles	6	1	4	W, C, T	W	
Ribs 3–10	U	shafts	12	1	4	W, C, T	W	
Os Coxa	U	ilium	2	1	4	W, C, T	W	
Ulna/ Radius	U	diaphysis	1	3	1	W, C, L, T	W	
Ulna/ Radius	U	diaphysis	1	2	1	W, C, L, T	W	
Long bone	U	diaphysis	7	1	4	W, C, L, T	W	
Long bone	U	diaphysis	42	1	4	W, C, L, T	W	
Calcaneus	L	lateral half	1	2	2	W, C, T	W	

This assessment is quite different from that of Wells, who determines that this is a single adult male aged 25–40 years at death within this deposit (Cubbon 1978, 92). His sex assessment is based on the general robusticity of the bones and muscle attachment roughness, which is not a reliable method of sex assessment without seriation. The wide age range he provides is based on the absence of pathological lesions on the vertebrae fragments which again, is more reflexive of lifeways than age. The identification of the parietal foramen and 'Incan' bone or extrasutural bone, ensure that the cremation which is identified as V in the past is the same as that identified as V currently. The fact that Wells does not identify the remains of the infant is somewhat surprising given that he identifies subadult remains in Cremation I and II. Either he deemed the bones too small perhaps, or he simply did not recognise the infant bone amongst the adult.

Cremation VI: Cremation VI consisted of two bags: 'Cremation VI' and 'Cremation VIA' with an overall weight of 967.0 g prior to cleaning. There was quite a bit of soil with the bones and they required cleaning. The bones are extremely fragmented. Much of the skeletal material is too small to conclusively identify. The weight of the cremated bone is 664.0 g. There is a minimum of one adult, possibly female based on orbital rim fragment, present. The tooth roots show that all apices are closed representing an adult and there is some mild osteophytic lipping on small vertebra fragments. The bones appear quite gracile with thin cortical bone. Approximately 30% of a cremated skeleton is present but highly fragmented (Table S.26).

TABLE 26: INVENTORY OF CREMATION VI, KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Frontal	L	orbital rim	1	1	4	W,C, T	W	rim indicates female
Temporal	L	petrous	1	1	4	W, C, T	W	
Temporal	R	articular eminence	1	1	4	W, C, T	W	
Temporal	U	squama, zyg process, petrous	8	1	4	W, C, T	W	
Mandible	U	body	3	1	4	W, C, T	W	
Zygomatic	L	frontal process	1	2	4	W, C, T	W	
Calvarium	A		45.61 g	2	4	W, C, T	W	some sutures are fused, some seem more open
Root	U	multi-roots	2	2	3			min of 2 teeth
Root	U	single roots	9	2	3			min of 8 teeth
Proximal foot phalanx	U	M1/3-DE	1	2	2	W, C, L, T	W	
Proximal hand phalanx	U	D1/3-DE	1	2	2	W, C, L, T	W	
Vertebrae	A	facets, laminae and pedicles + 1 body	14	1	4	W, C, T	W	very mild osteophytic lipping on vertebra body fragment
Ribs 3–10	U	shafts	3	1	4	W, C, T	W	
Os Coxa	U	ilium	4	1	4	W, C, T	W	
Humerus	U	diaphysis	6	1	4	W, C, L, T	W	
Ulna	U	diaphysis	3	1	4	W, C, L, T	W	
Radius	U	diaphysis	5	1	4	W, C, L, T	W	

Bone	Side	Portion present	No. frags	Comp	Frag	Crem state	Crem colour	Notes
Femur	U	diaphysis	3	1	4	W, C, L, T	W	
Tibia	U	diaphysis	4	1	4	W, C, L, T	W	
Fibula	U	diaphysis	5	1	4	W, C, L, T	W	
Indet MC or MT	U	diaphysis	5	1	4	W, C, L, T	W	
Long bone	U	diaphysis	94.31 g	1	4	W, C, L, T	W	
Indet bone	U		439.21 g	1	4	W, C, L, T	W	

These observations are very much in line those of Wells (Cubbon 1978, 92–3). He also observes the osteophytic growth along the vertebral body and suggests that this is a female of possibly more advanced years. He also goes so far as to suggest deliberate fragmentation of the skeletal material based on the extreme levels of fragmentation, which is also plausible. Given the variety of levels of fragmentation observed across the different Manx prehistoric cremations, it is difficult to determine deliberate fragmentation from fragmentation caused incidentally when collecting the bones from the pyre and/or the significant taphonomic damage caused by the environmental conditions on the Isle of Man. Since some remains at Killeaba show lower levels of fragmentation than Cremation VI, it is perhaps a plausible interpretation to suggest deliberate fragmentation in this case.

Cremation VII: Cremation VII was labeled as 'Near bottom of timber lined pit T1' and correlated to CVII through the publication. The total cremation weight is 5.70 g. There is minimal bone from this deposit, and the edges of the bones present are highly eroded and water worn. It seems that there is a single adult individual with less than 1% of the skeleton present. This assessment matches that of Wells (Cubbon 1978, 93). The inventory of all the skeletal material from Cremation VII is in Table S.27.

TABLE S.27: INVENTORY OF BONES FROM CREMATION VII FROM KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Hand Phalanx	U	D1/3-DE	1	2	3	W, C, L, T	W	Adult
Long bone	U	diaphysis	4	1	4	W, C, L, T	W	OxA-36492 (4672+29 BP, 3520–3371 cal BC)
Indet bone	U		1	1	4	W, C, T	W	

Cremation VIII: Cremation VIII could not be located within the stores at this time. Wells describes a poorly preserved cremation with only minimal bone present representing a single individual, an adult or a child down to the age of 6 years at death (Cubbon 1978, 93).

Cremation IX: Cremation IX was labelled as 'from stones east of timber lined pit TIV' and correlated to CIX through the publication. The total cremation weight is 101.29 g. This represents approximately 5% of a possible adult skeleton, but the cranial fragments are very thin. However, the distal epiphysis of the proximal good phalanx is fused. Therefore, it seems that there is only minimal bone present of single adult individual present. Wells also agrees that this is an adult individual, but further suggests that is it a male, based on bone size (Cubbon 1978, 93). Again, this method is more subjective and not grounded in the standardised methods of sex estimation for adult skeletons. Table S.28 presents the inventory of the skeletal material from Cremation IX.

TABLE S.28: INVENTORY OF CREMATION IX FROM KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Temporal	U	supra meatal crest	2	1	4	W, C, T	W	
Mandible	R	coronoid and alveoli	2	1	4	W, C, T	W	
Maxilla	U		1	1	4	W, C, T	W	
Calvarium	A		22	1	4	W, C, T	W	thickness = 3mm
Vertebrae	A	pedicles	1	1	4	W, C, T	W	
C2	A	sup facet	1	1	4	W, C, T	W	
Ribs 3–10	U	shafts	2	1	4	W, C, T	W	
Os Coxa	U	ilium	1	1	4	W, C, T	W	
Humerus	U	diaphysis	2	1	4	W, C, L, T	W	
Femur	U	diaphysis	3	1	4	W, C, L, T	W	
Tibia	U	diaphysis	1	1	4	W, C, L, T	W	
Proximal foot phalanx	U	P1/3-DE	1	3	1	W, C, L, T	W	
Long bone	U	diaphysis	36	1	4	W, C, L, T	W	
Indet bone	U		16.39 g	1	4	W, C, L, T	W	

Cremation X: Cremation X was labelled 'scattered bone frags in unlined pit containing pot 5' and correlated to CX through the publication. The total cremation weight is 89.90 g. This small amount of material contains some slightly water worn and eroded fragments. It is quite fragmentary and difficult to identify fragments. The cranium is thin with a maximum thickness of 3 mm with sutures still visible suggesting an adolescent or younger adult. Less than 5% of a skeleton is present. Wells assessment is similar to this, describing the cranial sutures as well as one of the few identifiable fragments (Cubbon 1978, 93). Table S.29 provides an inventory of the skeletal material from Cremation X.

TABLE S.29: INVENTORY OF CREMATION X, KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Cranium	A		17	1	4	W, C, T	W	portion of the occipital present
Temporal	U		1	1	4	W, C, T	W	
Scapula	U	neck	1	1	4	W, C, T	W	
Vertebrae	A	pedicles	2	1	4	W, C, T	W	
Patella	U	post art surface	1	1	4	W, C, T	W, G	
Long bone	U	diaphysis	36	1	4	W, C, L, T	W	OxA-36493 (4645±29 BP, 3516–3362 cal BC)
Indet bone	U		32.75 g	1	4	W, C, L, T	W	

Cremation XI: Cremation XI was labelled 'scattered bone frags in trench A-D, 0–4ft' and correlated to CXI through the publication. The total cremation weight is 51.28 g. Only minimal skeletal material was recovered but there are possibly two individuals present with some smaller, likely subadult cranium and possible long bone, but they are both heavily fragmented. Less than 1% of this smaller, likely subadult individual is present. The adult or adolescent material within this cremation, contains a rib fragments, two cranial fragments and then several larger long bone fragments, likely due to the fact that this was scattered collection which would prioritise larger fragments being recovered. Less than 1% of an adult or adolescent individual is present, of unknown sex and unknown age. Table S.30 presents the inventory of Cremation XI.

TABLE S. 30: INVENTORY OF CREMATION XI, KILLEABA

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Calvarium	A		2	1	4	W, C, T	W	Possible subadult or small individual? Sutures are wide open. Thin vault
Humerus	U	diaphysis	5	1	4	W, C, L, T	W	Possible subadult or small individual?
Ulna/Radius	U	diaphysis	4	1	4	W, C, L, T	W	Possible subadult or small individual?
Femur	U	diaphysis	1	1	4	W, C, L, T	W	Possible subadult or small individual?
Tibia	U	diaphysis	4	1	4	W, C, L, T	W	Possible subadult or small individual?
Cranium	A		4	1	4	W, C, T	W	Adult
Long bone	U	diaphysis	2	1	4	W, C, L, T	W	Adult
Indet bone	U		12.68 g	1	4	W, C, L, T	W	Unknown?
Ribs 3–10	U	facets and shafts	13	1	4	W, C, T	W	Adult

Wells seemed to struggle with this deposit as well and describes the bones in a similar manner, suggesting the possibility of two, or even three individuals (Cubbon 1978, 93). Wells does assess the skeletal material as belonging to a male based on the 'stout walls of the long bone' fragments, which is, again, not a scientifically grounded assessment (Cubbon 1978, 94). The nature of this deposit which is described by Cubbon as a scatter of bones, with some 19th century disturbance could mean that this deposit, as an archaeological context, contains multiple disturbed burials. Wells does discuss at some length a bone from this deposit which he believes evidences an amputation of the hand, assessing the bone fragment as a radius (Plate 8 in Cubbon 1978, 94). This bone was either not present, or this pathology was not identified in the current assessment. Whether this 'remarkable' bone was perhaps kept separately and subsequently lost or if this is a case of inter-observer error is not currently known.

In general, while the assessments from 1978 and from 2016 tend to have similar results, there were very different methodologies applied. Wells' assessments, while not incorrect, tend to be founded on old-fashioned gross generalisations of 'maleness' versus 'femaleness' which are not grounded in scientific methods or metrics, both of which require seriation and more complete bones to be useful in using post-cranial material in sex estimation. This creates the appearance of more information being gained in the earlier assessment, but with less evidence grounded in scientific methods.

The results from the 2016 osteological assessment reflect that there are a total of eleven or twelve individuals in the existing collection derived from the excavations at Killeaba. There is one unburned inhumation from a cist burial, and ten to eleven individuals from nine different cremation deposits. The remains from the cremation deposits represent three infants or children, one possible subdault, and seven adults or older adolescents. Sex could not conclusively be determined for any of the skeletal material, although two show possible female cranial features, however, shrinkage from the burning process may have impacted these assessments. Table S.31 presents a summary of each of the deposits. No notable pathologies were observed, although this is not unsurprising given the extent of fragmentation of the skeletal material; and the only non-metric traits present are cranial: an extrasutural bone and a parietal foramen. In regards to burial practices, the osteological assessment indicates that individuals of both sexes, and all age groups were present on this site.

TABLE S.31: SUMMARY OF THE DEPOSITS AT KILLEABA (*CBA = CANNOT BE ASSESSED; NP = NOT PRESENT)

Burial Deposit	*MNI*	*Ages*	*Sex*	*Wells (1978)*	*Notes*
Cist 1	1	Adult	CBA	M, 30+years	Smallish feet, sinewy muscle (Wells)
Cr I	1	0–4 years	CBA	Child, 2–4 years	
Cr II	1	2–4 years	CBA	Child, 5–6 years	
Cr III	1	Adult/adolescent	CBA	M, 30–40 years	
Cr IV	NP			Not reported on	
Cr V	2	Adult, infant	F?	M, 25–40 year	Extrasutural bone and parietal foramen
		6–12 months	CBA		
Cr VI	1	Adult	F?	F, 35+ years	Deliberate breaking of bones? (Wells)
Cr VII	1	Adult	CBA	Adult or not young child	
Cr VIII	NP	–	–	Individual over 6 years of age	
Cr IX	1	Adult	CBA	M, adult or adolescent	
Cr X	1	Adult/adolescent	CBA	Lightly built adult	
Cr XI	1–2	Subadult (small adult?)	CBA	5–10 years? (dismissed as unlikely)	Hand amputation based on radial fragment (Wells)
		Adult	CBA	M adult	

Results: Cremated remains associated with Ronaldsway Jar fragments

Ramsey (2003-0102/2)

The remains from this site were discovered by a Ramsey resident who disturbed the burial during an extension of his sun-porch in his back yard. As such there is some modern material within the cremation deposit due to this disturbance. There was only very minimal bone present from the Ramsey cremation deposit, all of which was burned white, and warped. There is a minimum of one adult, with a very tentative sex estimation of possibly male based on the robusticity of the occipital cruciform and zygomatic breadth. While the head, arms and legs are represented, less than 5% of the skeleton is present. The total cremation weight is 171.27 g and most of the fragments are between 2–4 cm in length. Table S.32 presents an inventory of the skeletal material.

TABLE S.32: INVENTORY OF THE HUMAN SKELETAL MATERIAL FROM RAMSEY SUN PORCH EXTENSION.

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Occipital	A	cruciform	1	1	4	W, C, T	W	quite a robust cruciform: no protuberance
Zygomatic	L	frontal proc	1	1	2	W, C	W	wide
Calvarium	A		36	1	4	W, C	W	
Humerus	U	diaphysis	3	1	4	W, C, L, T	W	
Ulna/Radius	U	diaphysis	6	1	4	W, C, L, T	W	
Phalanx	U	diaphysis	2	1	4	W, C, L, T	W	
Femur	U	diaphysis	8	1	4	W, C, L, T	W	OxA-36595 (4358±30 BP, 3084–2902 cal BC)
Tibia	U	diaphysis	3	1	4	W, C, L, T	W	
Long bone	U	diaphysis	50	1	4	W, C, L, T	W	
Indet bone	U		76.64 g	1	4	W, C, L, T	W	

The osteological analysis has revealed that there is a minimum of one, possible male, adult individual present with this disturbed burial. It is heavily fragmented and burned white with significant warping. As the burial was disturbed by construction, nothing can be noted about the burial practices.

Fragments of at least one Ronaldsway vessel were recovered with this skeletal material, although contextual detail about the association is lacking.

West Kimmeragh (1984-0243/12, MNH NMHER 0397)

The site of West Kimmeragh is a Ronaldsway Neolithic Cremation cemetery described by Garrad (1987, 422–3) as a densely cobbled area with indications of burning and burials consisting of small amounts of burned bone in/under areas where a stone has been removed. Garrad (1987, 422) suggests that there were more burials present, possibly indicated by the missing cobbles, but there was no bone found. All of the material which could be conclusively identified with this site was recovered from Box 1510 with accession numbers: 84-0231 and 84-0243. These accession numbers refer mostly to material excavated from the site, but also some spot finds by A. Skillan from this field (Plot 964), which had initially led the archaeologists to excavate here (Garrad 1987, 421).

The provenience of the skeletal material was indicated by the presence of a site plan (Garrad 1987, 423) within the box, with the location of the remains recorded. The only human remains from this site consist of a small aspirin container of cremated bone with accession 84-243/12 on it. The site plan provides the most conclusive evidence of the location of the skeletal material presumably this is letter 'z', the other letters 'x' and 'y' relate to other cremation samples which either were not retained or are not appropriately labeled and cannot be found.

There is only a small amount of bone present, reflecting a minimum of one individual (Table S.33). The age and sex of the individual cannot be assessed, the bone is eroded and worn, and there is less than 1% of a skeleton present with total weight of 12.33 g. A sample of 2.1 g was set aside for C14 dating but represents a large proportion of the overall collection. One small flint flake was found with the bones. All the bones required cleaning.

TABLE S.33: INVENTORY OF HUMAN REMAINS FROM WEST KIMMERAGH (1984-243/12)

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Long bone	U	diaphysis	5	1	4	W, C, L, T	W	Very small frags OxA-36599 (4385±31 BP, 3095–2902 cal BC)
Indet bone	U		47	1	4	W, C, L, T	W	

The site of West Kimmeragh contained the cremated remains of a minimum of one individual, however, the age and sex of the individuals cannot be assessed, the bone is eroded and worn, and there is <1% of the skeleton present with total weight of 12.33 g.

Ballavarry (1983-0295, MNH NMHER 0327)

There were only minimal human remains associated with Ballavarry located in the storeroom. All the bones are highly eroded and worn, burned white and mixed with soil. The pre-cleaning weight was 24.8 g. There is a minimum of one subadult individual present. There is only approximately 1% of a skeleton present. The total weight of the cremation is 15.81 g. Table S.34 provides the inventory of the skeletal material from Ballavarry.

The skeletal material from Ballavarry represents a single individual, most likely a subadult, however there is only a small portion of a skeleton present. The human remains were mixed with other material within three interconnected pits.

TABLE S.34: INVENTORY OF THE HUMAN SKELETAL MATERIAL FROM BALLAVARRY (1983-0295)

Bone	*Side*	*Portion present*	*No. frags*	*Comp*	*Frag*	*Crem state*	*Crem colour*	*Notes*
Maxilla	U	alveoli	1	1	4	W, C, T	W	unusual shape: small root sockets
Mandible	U	body	1	1	4	W, C, T	W	possibly part of the ramus
Calvarium	A		3	1	4	W, C, T	W	very small fragments; thickness = 2–2.6 mm
Ribs 3–10	U	shaft	1	1	4	W, C, T	W	
Indet MC or MT	U	diaphysis	1	1	4	W, C, L, T	W	
Long bone	U	diaphysis	9	1	4	W, C, L, T	W	max length = 2.73 cm, all others smaller, eroded
Indet bone	*U*		*54*	*1*	*4*	*W, C, L, T*	*W*	*very small eroded fragments*

Bibliography

Barber, G., Shepstone, L. & Rogers, J.A. 1995. A method for estimating age at death using arachnoid granulation counts. *American Journal of Physical Anthropology* 20 (Suppl.), 61

Bersu, G. 1947. A cemetery of the Ronaldsway Culture at Ballateare, Jurby, Isle of Man. *Proceedings of the Prehistoric Society* 9, 161–9

Buikstra, J.E. & Ubelaker, D.H. 1994. *Standards for Data Collection from Human Remains.* Fayetteville AR: Arkansas Archaeological Survey

Cleary, K. 2018. Broken bones and broken stones: exploring fragmentation in Middle and Late Bronze Age settlement contexts in Ireland. *European Journal of Archaeology* 21 (3), 336–60

Crellin, R.J. 2015. Tracing changes at Killeaba. *Isle of Man Studies* 13, 29–44

Cubbon, A. M. 1978. Excavation at Killeaba, Ramsey, Isle of Man. *Proceedings of the Prehistoric Society* 44, 69–95

Garrad, L. 1987. A Ronaldsway Neolithic site on West Kimmeragh, Bride, Isle of Man. *Isle of Man Natural History and Antiquarian Society* 12, 421–6

McKinley, J.I. 2004. Compiling a skeletal inventory: disarticulated and co-mingled remains. In M. Brickley & J.I. McKinley (eds), *Guidelines to the Standards for Recording Human Remains*, 14–17. Southampton & Reading: Institute of Field Archaeologists Paper 7

Moorrees, C.F.A., Fanning, E.A. & Hunt, E.E. Jr. 1963. Age variation of formation stages for ten permanent teeth. *Journal of Dental Research* 42, 1490–1502

Schaefer, M., Black, S. & Scheuer, L. 2009. *Juvenile Osteology: A laboratory and field manual.* London: Elsevier

Thompson, T. 2015. *The Archaeology of Cremation: burned human remains in funerary studies.* Oxford: Studies in Funerary Archaeology 8

Ubelaker, D.H. 1989. *Human Skeletal Remains: Excavation, analysis, interpretation* (2 edn). Washington DC: Taraxacum

Ubelaker, D.H. 2009. The forensic evaluation of burned skeletal remains: A synthesis. *Forensic Science International* 183, 1–5

White, T.D. & Folkens, P.A. 2005. *The Human Bone Manual*. London: Elsevier