A re-assessment of Early Bronze Age human remains in Tyne and Wear Museums: results and implications for interpreting Early Bronze Age burials from North-East England and beyond

Michelle Gamble and Chris Fowler

SUMMARY

The North East of England has yielded a rich array of Early Bronze Age burial evidence over 200 *years of recorded excavations by antiquaries and archaeologists, much of it reported in* Archaeologia Aeliana. *Yet few of the human remains have been consistently examined and analysed and there has been little attempt to produce a synthesis of the burial evidence for the region. This article presents a re-analysis of the human remains from several Early Bronze Age burials in the care of Tyne and Wear Archives and Museums. Osteological re-analysis of these remains was undertaken by the lead author, and was considered by both authors alongside the contextual evidence from the original excavations and a broader corpus of over 350 burials from the period c. 2500–1500 cal BC recently compiled and analysed by the second author. Selected remains were also subjected to radiocarbon dating, and the results of most of these analyses are discussed here alongside relevant contextual information (most notably remains from burials at Allerwash, Reaverhill, Hollybush Field, and Hasting Hill). The results provide important information on variation in mortuary practices in the Early Bronze Age.*

INTRODUCTION

Much of our understanding of Early Bronze Age burials in the North East of England is derived from excavations which took place in the late nineteenth and early twentieth centuries. During this period, the human remains themselves were often discarded, sometimes after a preliminary osteological analysis and sometimes with no analysis at all, forcing modern researchers to rely on the reports from this period. In some cases, records amount only to a note that human remains were present. In others, fairly detailed reports were prepared using the assessment methods available at the time. In order to judge the reliability of existing information, and to provide additional detailed information, an osteological re-analysis of the human remains from several Early Bronze Age burials from the North East of England was undertaken by the first author. This paper provides results of the analysis or re-analysis of the human skeletal remains from all those burials which could be located in the Tyne and Wear museum collections (including Sunderland Museum, the Great North Museum, and Arbeia). As such it provides the most comprehensive synthesis of the human remains from the Early Bronze Age in the North East of England (here defined as Northumberland, Tyne and Wear and County Durham).

The implications of the complex histories of the human remains during excavation and collection, initial analysis, storage by finders, donation, accessioning, curation and display, and wider conclusions about the reliability of earlier reports on human remains will be

discussed elsewhere (Gamble and Fowler, in prep.). However, in cases where there are specific events which have affected the remains and impact on the analysis and re-interpretation of burial practice, these will be presented here. Whilst the human remains from a range of depositional contexts were examined, this article contains only the information on remains recovered from cist burials, from the round barrow at Hasting Hill, from cremated remains buried in an urn, and from cases where the remains likely date to the Early Bronze Age but for which there is little contextual information. Cremated remains recovered from the henge monuments at Whitton Hill were also examined; those results will discussed elsewhere along with a reinterpretation of the sequences of activity and the chronologies of those sites (Fowler and Gamble, in prep.). The purpose of the osteological analyses of the corpus of Chalcolithic and Early Bronze Age skeletal material from North East England was to inform a new synthesis of mortuary practices in this area during this period, utilising the contextual evidence from the original excavations of over 350 burials from the period *c.* 2500–1500 cal BC recently compiled by the second author (Fowler, in press a; *cf.* Fowler 2013). Some of the conclusions of Fowler's work, relating to the burials discussed in this article, are outlined below alongside the osteological results and interpretations.

OSTEOARCHAEOLOGICAL TECHNIQUES AND RECORDS

Over the last thirty years osteological techniques and methods of assessment have been — and continue to be — constantly refined, particularly through the systematic study of skeletal remains where the age at death and sex is known (e.g. Cardoso 2007; 2008a, b; Cardoso and Rios 2011; Cardoso and Severino 2010; DiGangi *et al*. 2009; Grauer 2007; Rogers 2009; Vlak *et al*. 2008) and the testing of older methods to determine their reliability. Since results have become more reliable, detailed and accurate through these methodological refinements, there is a need to reassess remains reported on in earlier osteological reports, using older methods, techniques and knowledge-bases, alongside analysis of any remains that have not been reported on before. A statement of the osteological methods deployed in this study can be found in the appendix, while full inventories of each surviving bone can be found online via the Archaeology Data Service (Gamble and Fowler 2013). This article summarises the key results of the osteological analysis of the human remains from fourteen locales, and radiocarbon dating of six of those sets of remains (summarised in Table 1). The discussion will consider what is learnt from combining these results with the contextual information from site reports, and what this adds to interpretations of life, death and burial practice in the Early Bronze Age of North East England and further afield.

EARLY BRONZE AGE MORTUARY PRACTICES IN BRITAIN

The treatments of human bodies prior to and during burial within the terminal Neolithic/Chalcolithic[1] and Early Bronze Age periods in Britain were extremely varied, including: the burial of single, or more rarely multiple, bodies in cists; burials in graves; cremation before deposition in cists, pits, and/or ceramic vessels; and in some cases the deposition of body parts rather than intact bodies. There may also have been some variation in the treatment of remains following deposition, including the (relatively rare) re-opening of burial features in order to add and/or remove remains. At the same time other practices which are not observed directly from the archaeological recovery of remains must be inferred, such as

Table 1 Summary of the human remains selected for radiocarbon dating, associated artefacts, laboratory reference and radiocarbon date results.

Site/deposit reference (osteological identification and bone sampled)	Diagnostic artefacts present	Lab. Reference	Uncalibrated result BP ($\delta^{13}C$)	Calibrated radiocarbon date (cal BC, 2σ/95.4%) [single highest probability]
Hollybush (adult male 23–57 years old, left ulna)	–	OxA-26258	3751±27 (-21.06)	2279–2041 cal BC [2211–2121 cal BC 68.2%]
Allerwash (adult, male?, left talus)	Masterton flat riveted bronze dagger blade	OxA-26253	3713±28 (-21.23)	2199–2030 cal BC [2153–2030 cal BC 79.9%]
Hasting Hill (adult male 40–55, left rib)	HBSP Beaker	OxA-26255	3686±28 (-21.21)	2194–1977 cal BC [2145–2009 cal BC 86.5%]
Reaverhill (adult male in 30s, intermediate hand phalanx)	Ridgeway variant bronze flat-riveted dagger blade	OxA-26254	3660±28 (-20.86)	2135–1951 cal BC –
Warden Law (subadult, *c.* 3–6 years old, long bone fragment)	Food Vessel Urn with cordon	OxA-26257	3593+27 (-24.40)	2025–1887 cal BC –
Hasting Hill (infant *c.* 1 year old, left ulna)	Vase Food Vessel	OxA-26256	3524±28 (-20.70)	1931–1756 cal BC –

cremation and dispersal of the remains, or the exposure of cadavers (Gibson 2004; 2007; Fowler, in press, a). Where recovery has occurred, human remains were buried in isolated cists (i.e. where only one cist has been located in the vicinity), or in cemeteries of cists and sometimes pits, with or without covering mounds of earth and stone (variously called barrows or cairns), or in pits (especially containing pots holding cremated remains). Later in the period burials were located at rock shelters, at circular spaces enclosed by a ring of stones or by an earthen bank and ditch, and at barrows or cairns which sometimes cover earlier burial enclosures or cemeteries of cists or pits. The general chronological pattern (see Fowler, in press, a and b; Garwood 2007; Needham 2005) is that from *c.* 2500–2300/2250 cal BC burial was extremely rare and consisted of isolated burials accompanied with Beaker pottery. By *c.* 2300/2250–1950 cal BC burial was more common and widely dispersed throughout the landscape. During this period most burials were crouched bodies placed in short cists. Grave goods diversified, and some bodies were buried with copper alloy daggers or (especially in County Durham) flint knives. Other burials in short cists were without artefacts that have survived to the present, making it difficult to place them in chronological sequences. Whilst those buried with Beaker pottery continued to be placed in a crouched position in isolated cists throughout this period, by 2150/2100 cal BC others were buried with Vase Food Vessels (and occasionally Bowl Food Vessels), and burials often formed small cemeteries, sometimes covered by a cairn or barrow. Possibly during this period, and certainly between *c.* 2000 and *c.* 1750 cal BC, Vase, Bowl and Urn Food Vessels also accompanied cremated human remains in cists or in small pits, again often accumulating at cemeteries, cairns or barrows. By this time Beakers were rarely placed with the dead, but where they were, the burial practice had changed to cremation or to inhumation in a grave rather than in a cist. Many of the crouched burials in North East England from the period *c.* 2250–1950 cal BC are oriented East-West and

facing in a southerly direction: this is particularly so for burials with Beakers from this period, whilst those with Food Vessels were more varied in orientation; North-South burial emerged locally in northern Northumberland towards the end of this period (Fowler in press, a, chapters four and six). 'Directing the dead' arguably formed a significant part of mortuary practices at this time, perhaps related to ideas about identity and/or cosmology. There are also some burials in isolated cists which could date as late as 1750 cal BC, but cist sizes were reduced and eventually no more cists were built. After *c.* 1700 cal BC remains were cremated and only buried in urns or pits. Whilst syntheses of this period in Britain often accentuate a long-term shift from inhumation (focussing on the deposition of single, intact bodies) to cremation, the changing patterns in nucleation of the dead are equally important (Fowler, in press, a and b) , and the full picture of mortuary practice is more varied (Fowler 2005; Gibson 2004; 2007): in particular, special attention needs to be paid to the deposition of partial bodies or body parts, to the application of fire both to the human remains and to features and mortuary sites, and any evidence for the exposure of remains prior to deposition or re-accessing of mortuary features. Indeed, one set of remains examined here, Allerwash, has already been cited as a nationally-important example where bodies were subject to complex post-mortem treatment (Fowler, in press, a; Gibson 2007; Newman and Miket 1973). A combination of re-analysis of human remains, radiocarbon dating of those remains, and re-assessment of the descriptions of stratigraphy and materials at the burial ground can provide new insights on the changing nature of funerary and other mortuary activities in particular centuries of the period.

THE SITES AND THE RESULTS OF THE OSTEOLOGICAL ANALYSIS

ISOLATED CISTS

Hollybush, Gunnerton

The isolated cist burial at Hollybush, Gunnerton, Wark (NY894746), was discovered through the course of ploughing in October 1975 and excavated by T. G. Newman (1977). The cist was found to be partly filled with sand, which the excavators described as 'presumably brought from the North Tyne, ⅓ mile to the South' (Newman 1977, 39). The body was placed in a crouched position on its left side, with the head to the North East and the feet to the South West. The human remains were initially examined by Joan Weyman, who determined that the remains represent a single inhumation of a male aged 35–45 years at death who was 184 cm (6 ft 0 in) and who had suffered from a broken leg. She provided a written summary of the bones present, though not a complete inventory (Newman 1977, 44–5).

The re-assessment of the human remains from Hollybush (accessioned as MOA 1975.18 and kept in Box 761) agrees closely with Weyman's analysis. The remains are all those of an adult (probably male) individual, aged roughly 23–57 years at death, based on features of the left pubic symphysis of the os coxa. An estimated living stature of 184.22 cm±3.27 cm (roughly 6 ft 0 in) can be confirmed, based on the length of the right femur. Approximately 20 per cent of a single skeleton is present. Further confirming Weyman's observations, a healed fracture of the distal third of the left fibula and an inactive bone callous on the left tibia were closely examined. The callous was caused by the splinters of the fibula becoming infected in close proximity to the tibia. This individual suffered a serious break to the upper ankle which became infected. The infection healed, as did the break to the fibula, but the splintered fragments of the fibula did not re-align properly during healing (fig. 1). The original fracture

likely occurred on the posterior-lateral side of the leg with fibular fragments angled medially. As the epiphyses were fully fused and both fibulae were probably the same length, it is most likely the break occurred during adulthood, though since no new bone growth was active at death, the break is likely to have taken place some years before. Having survived the infection, this individual would have almost certainly walked with a limp. As Weyman also noted, none of the human remains shows evidence of burning and have fair surface preservation, with the cortical bone relatively intact. The excavator recorded the poor conditions of preservation on site, and this, combined with the drawing of the bones *in situ* (fig. 2) suggests that decay affected the bones and that this is responsible for the recovery of such a small percentage of the skeleton. On the other hand, the surface condition of the bones is good enough to suggest that the missing elements of the skeleton may not have been destroyed through taphonomic processes and could either have not been deposited into the cist, or removed from the deposit, or not recovered during excavation.

Fig. 1 Left fibula with fracture and bone callous from Hollybush. Medial-posterior view, proximal aspect is towards the left, distal is towards the right and medial aspect is towards the top. Note the splintered bones. Photo: M. Gamble.

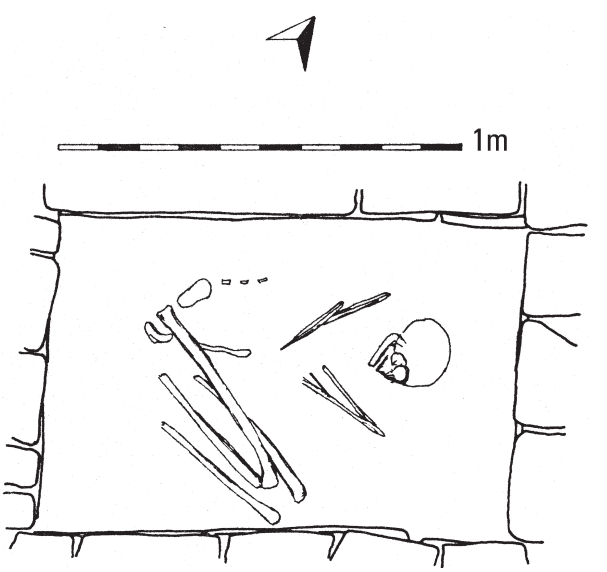

Fig. 2 Excavation drawing of the remains in the cist at Hollybush upon discovery. Source: Newman 1977, p. 40, reproduced by kind permission of the Society.

Weyman described a skull in fair condition stating that 'the left temporal and parietal area was missing and the maxilla was detached', including six maxillary teeth (see below), and a mandible with the right mandibular premolars and first molar in place (Newman 1977, 44–5). None of the cranial or dental material was located with the other remains examined in 2011. Given the similarity in age assessment and description of the pathology to the tibia and fibula, it seems that the rest of the remains examined in 1977 and 2011 are the same, and that Weyman's description and analysis of the dentition and skull can be trusted. Weyman noted that there is no evidence of dental decay but there is moderate bone resorption due to periodontal disease, accounting perhaps for loss of the right maxillary first molar (Newman 1977, 45). She described crowding of the maxillary dentition with the left first premolar overlapping with the left canine, and mentioned the small fragment of the right mandible with teeth in place which was recovered (Newman 1977, 45).

The left ulna of the skeleton from Hollybush was submitted for radiocarbon dating, and this returned a result of 3751±27 BP, or 2279–2041 cal BC (2σ or 95.4% probability), confirming the remains are of Early Bronze Age date. It was important to obtain a radiocarbon date for this skeleton since few crouched burials in cists which were not accompanied by any enduring grave goods have been dated. Whilst recent research has been able to provide detailed chronologies for Chalcolithic and Early Bronze Age burials, those with no surviving grave goods often remain outside of those chronologies. Even though there is only one radiocarbon date, the dating of the Hollybush skeleton to *c.* 2250–2050 cal BC places this burial within the peak period for burials in cists accompanied by Beaker pottery or flat-riveted copper alloy blades, and possibly within a period when some crouched burials in northern Britain were accompanied by Food Vessel pottery. This underlines the diversity of choices regarding artefacts placed in cists with the dead within a short period of time near the beginning of the Early Bronze Age in northern Britain.

Allerwash, Newbrough

The isolated cist burial at Allerwash (NY871673) was discovered through the course of ploughing on a gravel knoll in 1972 and excavated soon afterwards. The excavators observed that, when found, the bones were displaced from a normal anatomical arrangement. A flat-riveted bronze dagger of the Masterton type lay near where the individual's hand would have been had this been an intact crouched burial (Newman and Miket 1973). The bones were originally examined by G. W. I. Hodgson who indicated that the remains probably belonged to a 'young female adult less than five feet one inch in height' (Newman and Miket 1973, 94). Hodgson reported that 'the bones are from the pelvic girdle and hind limbs only' and he provided a list or basic inventory of the remains found.

According to the 2011 assessment of the bones from Allerwash (accession number MOA 1972.4 and stored in Box 1003), approximately 10 per cent of the skeleton is present, exclusively from the lower half of the body. In contrast to Hodgson's analysis, the femoral head diameter places the individual into the male range (49 mm: Bass 1995, 220). Whilst the right femoral head appears smaller it is somewhat damaged. There is a margin for error in sex estimation based on femoral head measurements, but the best preserved evidence suggests that the individual was an adult male. The wear and tear on the joints possibly indicate an adult of more advanced years, though if physical labour was a regular part of life such wear may occur in earlier adulthood. No further age estimation is possible. There is no evidence of

pathology. Overall the remains are in very poor preservation with the cortical bone surface flaking away, high levels of fragmentation, incompleteness and very fragile structures. It is not possible to estimate height on the basis of such fragmentary and incomplete remains.

Across Britain, copper-alloy flat-riveted daggers usually accompany crouched burials of male adults, and the attribution of a female sex to the Allerwash burial made it notably unusual (Needham 2011). The Allerwash burial remains unusual for the positioning of the bones in the grave, even though the identification as female must be revised. The excavators state that the skeletal material was in a flexed position with portions of the pelvis where the skull should have been and a portion of the tibia in place of an arm bone (Newman and Miket 1973, 90; fig. 3). Different taphonomic processes can occur even within the limited area of a cist burial so it is not possible to determine with any certainty the overall completeness of the skeleton when it was placed in the cist. Given that the excavation report specifies that there were rushes among the plant remains and that wood from the dagger was still adhering to the rivets it seems unlikely that all of the 'missing' bones would have disintegrated through

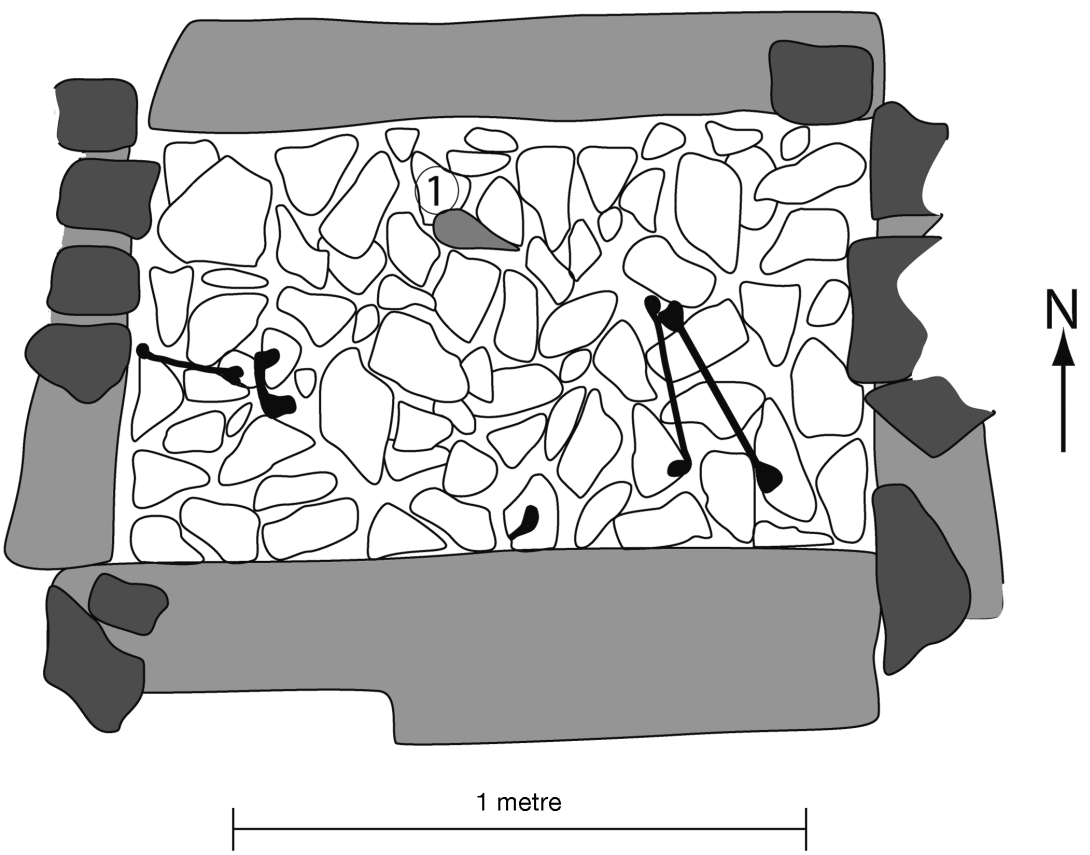

Fig. 3 The location of large human remains and the dagger blade during the excavation of Allerwash short cist burial. Drawing by Sheila Severn Newton (after Newman and Miket 1973). The Masterton-style flat riveted blade is marked '1'.

time. The most likely explanations for the partial remains are either that portions of a body already in skeletal form were selectively deposited (as the excavators proposed), or that portions of the skeleton may have been removed following the burial of remains in the cist. A combination of both explanations is possible, but the lack of small bones (phalanges, metatarsals, metacarpals, and carpals) suggests that it is more likely that bone elements were introduced to the cist, rather than that bone elements were removed. It therefore remains possible that the remains placed in the cist were collected from a previous burial location, gathered up following exposure of a corpse to the elements, or were the partial remains of a (potentially preserved) curated body — though the bones preserve no clear evidence for gnawing or weathering, and the possibility that bones were removed from the cist some time after burial cannot be ruled out.

The left talus from the Allerwash skeleton was selected for radiocarbon dating and yielded a result of 3713±28 BP, or 2199–2030 cal BC (2δ, or 95.4% probability; OxA-26253). At Gask Hill, Fife, a flat-riveted dagger of the Masterton type was found with cremated human remains dated to 2210–1940 cal BC (GrA-19054) recovered from under cairn material in a kerbed cairn (Baker *et al*. 2003, 117). Given that these two burials can be taken as *broadly* contemporary then the results hint at diversity in funerary and mortuary activities across northern Britain, even when very similar objects were deposited with those remains. The Allerwash date also confirms the usefulness of the typology for flat-riveted daggers devised by Gerloff (1975), and lends strength to the view that daggers of the Masterton type were in circulation within a fairly narrow chronological period.

Reaverhill Farm, Barrasford

The isolated cist burial at Reaverhill Farm, or Riverhill Farm on Reaver Hill, (NY907737) was discovered on the summit of a hill through the course of ploughing in 1964, and was excavated by Jobey, Smith and Tait that same year (Jobey *et al*. 1964). The cist is in the vicinity of a stone circle at Nunwick Park reported by Jobey *et al*. (1964, 65) as having been *c.* 20 m in diameter but which had been destroyed by the mid twentieth century. The burial is described as 'previously disturbed' with 'most of the skeleton missing and the bones remaining in disorder,' and is most noteworthy for the inclusion of a copper alloy flat-riveted dagger of the Ridgeway group (Auchterhouse-Barrasford variant) within the grave (Gerloff 1975, no. 101; Jobey *et al*. 1964, 66). The human remains were examined by Weyman in 1964. She provided a partial inventory, with specific focus on the mandible, maxilla and the teeth, and a description of the age and sex of the individual (Jobey *et al*. 1964, 67). Weyman reported that the skeletal material was that of a male, aged 30–35 years at death, with an estimated living stature of 5 ft 5 in to 5 ft 7 in (*c.* 158–170 cm; Jobey *et al*. 1964, 68). Weyman did not include a complete inventory and it is not specified how she derived her height estimation.

The 2011 re-assessment of the Reaverhill bones (accession number MOA 1964.2, stored in box 102A) indicates that these are the remains of a single burial of an adult male individual aged 25–50 years at death, with the age most likely between 30–40 years. Approximately 45 per cent of the skeleton is present, including partial longbones of the upper and lower limbs, ankles, hands and pelvis. Sex is determined based on the mental trigon and robust morphology of the mandible along with the right femoral head diameter (49.5 mm; Bass 1995, 220). Age assessment is complicated by heavy wear on the posterior teeth and minimal wear on the anterior teeth, creating a wide possible range of 25–50 years at death, with a more probable

age of 30–40 years at death (Lovejoy 1985). It was not possible to assess living stature accurately as none of the long bones is completely intact due to post-mortem damage.

Alveolar recession is the only pathology which was observed in 2011. This is likely due to periodontal disease which would have inflamed the gums and most likely involved tartar build up which would mineralise to form calculus. Weyman reported that there was evidence of calculus on the dentition (Jobey *et al*. 1964). This is no longer present, possibly due to post-excavation cleaning of the dentition. Weyman radiographed the maxilla and mandible and took thin sections of a molar to determine if there was evidence for growth disruptions that might indicate further health problems. However, she recorded no further observations of pathologies. Re-assessment identified mild bone growth on the lateral margins of the palmer aspect of the hand phalanges which is most likely a non-pathological accentuation of the tendon attachments for the fingers due to extensive and/or heavy use. The specific actions that created these accentuated margins cannot be determined with any certainty (Weiss 2003).

The mandible is in excellent condition. However, most of the post-cranial skeletal material is in fair to poor surface condition with some flaking of the cortical bone. An important result

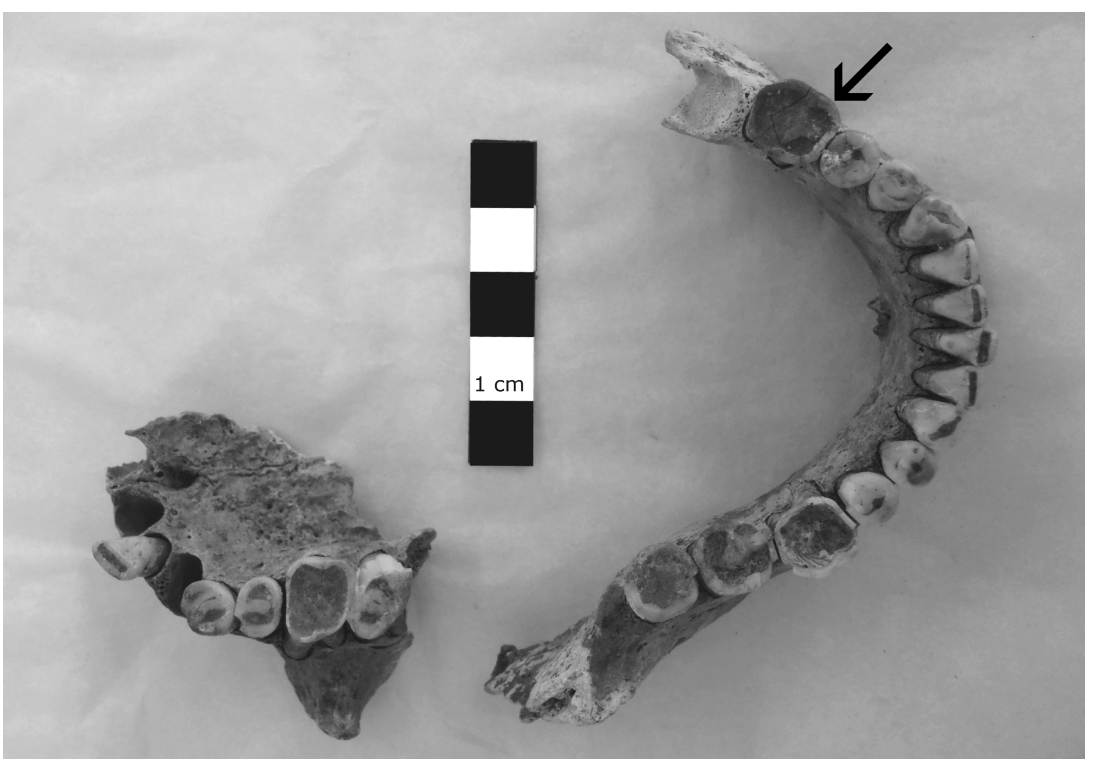

Fig. 4 Maxilla (left) and mandible (right) from Reaverhill Farm. Occlusal view, right side is towards the bottom, left site is towards the top and the anterior aspect of the mandible is towards the right and the anterior aspect of the maxilla is towards the left. Note the blackening of the posterior mandible teeth and heavy wear of the molars. Photo: M. Gamble.

of the re-analysis is the detection of evidence of scorching on several bones: the left humerus (in a very localised section of the distal third of the diaphysis), un-sided os coxae fragments (which are quite small and thoroughly burnt), and the left mandibular first molar (which displays cracked enamel and blackening of the exposed dentine — fig. 4). It seems possible that some of the bones were subject to low levels of heat, particularly on the left side, perhaps under or just beside the body (either in the centre of the body or to the left side). Whilst soil conditions can also discolour bones to a dark brown or purple, blackening associated with transverse cracking and splitting indicates a possible thermal application to particular areas of the bones. Based on the localised nature of the burnt areas on several of the bones, it seems plausible that the application of a heat source occurred *after* the flesh was gone, and affected the bone directly. Where there are fragments of entirely burnt bone, it is not possible to tell whether these fragments are conclusively associated with this individual or whether they may represent a portion of the skeleton which was burned more thoroughly. There is also some green staining on the left humerus and posterior aspect of the right os coxa which may be due to sustained contact between the bones and one or more copper-alloy objects, though other taphonomic processes may be responsible for the staining, and chemical analysis would be required to test this. Given that the excavators state that the burial had been disturbed, it is difficult to determine the extent to which taphonomy or human intervention can account for the different states of bone surface preservation or the incompleteness of the skeleton. The possibility of manipulation of human remains prior to burial, or relatively soon after, cannot be ruled out, although there is no clear evidence for it.

An intermediate hand phalanx was selected for radiocarbon dating and yielded a result of 3660±28 BP, or 2135–1951 cal BC (2σ or 95.4% probability; OxA-26254). The closest comparison to the dagger which was found at Reaverhill was found in one compartment of a two-compartment cist at Hill of West Mains, Auchterhouse, Angus (Gerloff 1975, number 100), along with cremated bones which have been radiocarbon dated to 2030–1880 cal BC (68.2%; GrA-19990: Baker *et al*. 2003, 117). The date obtained for Reaverhill suggests that both blades may have been in circulation at roughly the same time, and whilst this does not necessarily indicate that both blades were made within a few years of one another it again suggests that daggers of this specific type were current within a relatively short time period.

Denton Burn

Remains examined in 2011, labelled as being from Denton Burn, were thought to be derived from the Denton Burn cist burial (NZ1965), which was discovered during the course of road works in 1935. Wake (1936) recorded that the workmen had cleared the cist before any member of the Society of Antiquaries had been able to examine it but that a 'fragment, much decayed, of human jawbone, and three molars very little worn were recovered'. This description is not consistent with the skeletal material observed in 2011 (accession number GNM 1936.14/1934.22 and kept in box 30), which is extremely fragmentary, consisting of 2.7 g of indeterminate bone in fragments of 2–4 mm in size and no dentition. The bone is not burnt, however it cannot be determined macroscopically that these remains are indeed human due to their small quantity and high fragmentation. As there are inconsistencies between the description of the skeletal material on recovery and that which was examined in 2011, nothing further can be said about the skeletal remains or mortuary practices based on the Denton Burn human remains.

Hexham Golf Course

The Hexham Golf Course cist burial (NY922649) was discovered during the formation of a golf green in 1921. The remains were found within a short cist *c.* 1 m long on a North-South axis. No artefacts were found. William Cocks (*PSAN*[3], 10, 139–40) described the burial as having been disturbed and that the bones were 'much broken and the skull was absent'. He noted that the individual was perhaps 15 years of age at death. Cocks provided no description of how this conclusion was reached. No further description of the skeletal remains was given in the original publication.

Approximately 10 per cent of a single skeleton of unknown sex, aged 22–28 years at death (based on molar wear), was examined in 2011 (accession number MOA 1956.46, and kept in box 136). The only pathology observed is a mild supragingival line of calculus on a left maxillary premolar. The left maxillary premolar is well-preserved but is the only surviving tooth from the left side, whilst the rest of the teeth are from the right maxilla and appear to have been exposed to heat causing the enamel to crack. It is possible that only the right side of this individual's maxilla was subjected to heat, as the levels of burning have cracked but not shattered the enamel. Among the bones, only the right maxilla with dentition and an unsided humoral diaphysis shaft fragment display evidence of heat exposure including transverse cracking, but the bones are generally in quite poor condition and highly fragmented. Burning within the cist seems likely at a time when the bones and teeth were free from flesh. This site, therefore, reflects another example of possible thermal application to skeletal material.

West Wharmley

The site at West Wharmley was recorded as an isolated East–West cist burial with a single inhumation excavated by R. and W. Hedley in 1928 after the covering slab was moved to facilitate ploughing (Hedley and Hedley 1929). The human remains and associated artefacts were removed by workmen prior to the Hedleys' arrival. This implies incomplete recovery of the skeleton, and means that the original position of deposition is unknown, with only 'an urn' and few skeletal remains recovered. The vessel is in fact a Tall Short-Necked Beaker, likely dating to *c.* 2300–2200 cal BC (Fowler, in press, a; *cf.* Needham 2005; Wilkin 2009). The cist was only 70 cm long; although this is short, it is not outside the range for crouched burials, which are present in the North East in cists ranging in length from less than 60 cm to 1.8 m (most being between 80 cms and 1.2 m in length; Fowler, in press, a).

A minimum of two adult individuals were identified and examined in 2011 in the skeletal material from the West Wharmley cist burial (accessioned as MOA 1928.16 and stored in box 313). Approximately 20 per cent of each adult skeleton is present: only long bones, all of which came from adult individuals (based on the size of the skeletal elements and the fused epiphyses). It is only possible to tentatively suggest that a right humerus and a left humerus may have been from the same individual. It is not possible to associate any of the other skeletal material with a particular individual. There is duplication of the right humerus, right and left femora and right tibia. In general, the surface preservation is fair and the bones are fairly complete. The right femur is the only bone which can be assigned a possible sex determination of female (based on femoral head diameter), and a possible living stature of 158 cm (5 ft 2 in, based on Trotter 1979) for one individual is calculable from this bone. There is no evidence of pathology on any of the bones. Several of the long bones are reconstructed with an unidentified clear adhesive. The two right femora, a left femur and a right tibia appear to

have blackening caused by low temperature/low time period of exposure to heat on the bone (fig. 5). This is more likely to have occurred on the bare bones as the blackening is rather localized and has not significantly altered the morphology of the bones.

Whilst there was no complete skeletal report within the 1929 publication, there was a summary which describes remains from one individual, listing the recovery of: a tibia; an occipital and a temporal fragment; 'a few fragments — all very imperfect, of radii and ulnae'; 'fragments of the pelvis which are too much broken and incomplete to enable the sex to be determined'; and a single tooth (Hedley and Hedley 1929, 188–9). The Hedleys' report supplied interpretations on the morphology of the bones and teeth and an estimate of the age at death of 25–30 years for a single individual, with descriptions of the right second mandibular molar by a dentist, Mr Currie (Hedley and Hedley 1929, 188–9). The Hedleys also made some rather conjectural comments, such as the observation that the radial fragments are somehow twisted most likely as a result of the method of carriage by the mother in childhood. The only radius examined in 2011 is fairly complete with no apparent morphological changes.

The duplication of the long bones should have been easy for the Hedleys or Mr Currie to spot, yet they did not report it. This may suggest that some bones have been added to this collection subsequently from an unknown source. On the other hand, the comparable levels of preservation and similar coloration of all the bones mean it is feasible that they were subjected to the same taphonomic processes in the same local environment. Given the level of description within the report, it seems highly unlikely that the Hedleys would not recognise the duplication, and perhaps more likely that all of the remains examined in 2011 are from a different site altogether. The latter theory is also consistent with the fact that the 1929 text mentions pelvic bones and a tooth which were not located in 2011. On the other hand, the shortness of the cist and the fact that Tall Short Necked Beakers in eastern Scotland have been found with dual or multiple burials (Wilkin 2009, 43–5) lends some weight to the possibility that the material examined in 2011 was from the West Wharmley cist, and Mr Currie and the Hedleys were in error. Radiocarbon dating may help to confirm or refute that these remains were associated with the Beaker, and thus from the cist, but funds for the research were limited and this has not been attempted.

Fig. 5 Fragment of a right femur from West Wharmley with evidence of blackening and some mild transverse cracking due to low level (temperature or duration) burning on the proximal posterior aspect. Posterior aspect with lateral side to the top, medial side to the bottom and proximal end towards the left side of the image. Photo: M. Gamble.

CIST CEMETERIES

The term cist cemetery is used where several cist burials are found within close geographical proximity to each other, usually within 100 m — though such cemeteries may also include other features and other kinds of mortuary deposits. Summerhill, Blaydon, and Bewes Hill, Stargate, may have been part of a larger or dispersed cist cemetery extending over *c.* 500 m, though these may have been two or three isolated clusters of burials associated with specific places and communities. It is possible that the distinction between isolated cists, pairs of cists, and cemeteries is as problematic as it is useful, but it does seem that cist burials only nucleated into tight cemeteries after *c.* 2200/2150 cal BC.

Mill Field, Bedlington

Five cist burials were discovered and excavated at Mill Field, Bedlington (NZ262814), during the preparation of land for the construction of council houses between 1934 and 1935; they were recorded by Purvis (1946) a decade later. It is uncertain from which cist the limited amount of remains surviving in the museum collections and examined in 2011 were derived. They may have come from Cist 1, which was 'rifled' by those whom Purvis (1946, 323) called 'venturesome ghouls', apparently looking for treasure once the cist was uncovered, or from Cist 3, which contained 'a handful of fragments of human bone and a flint knife'; or they may be a fraction of those from Cist 5 (Purvis 1946, 322–4). The 2011 analysis only located a small quantity of unburned human bone (398 g). Small fragments of an unidentified arm long bone, an unidentified leg long bone and os coxae were examined. The bone is all stained black-brown with no apparent cracking or splitting, is very fragile and represents a minimum of one adult individual. The general thickness of the cortical bone suggests an adult. As the contextual information for this skeletal material is not conclusive, nothing further can be learned about burial practice during the Early Bronze Age.

Summerhill, Blaydon, and Bewes Hill, Stargate

There are two reasons to deal with Summerhill, Blaydon, and Bewes Hill, Stargate, together: the first is the proximity of these two sites and the problem of defining an extent for a cemetery; the second is that it appears that some bones from the two sites have been commingled since they were excavated in the early twentieth century.

There are four recorded cist burials from Summerhill, Blaydon (NZ177635) which were excavated in the 1930s. One was uncovered in 1930, one on 5 August 1937, and two more were excavated in November 1938 (Bulmer 1938; 1939). In 2011 three sets of remains from Summerhill were located in the Great North Museum: MOA 1973.4H in box 167D; skeletal material on display at the Great North Museum, and; a wooden box labelled 'Bones from Summerhill Cist 36'37'. However, none was recorded as deriving from a particular cist. An attempt has therefore been made to associate a particular set of remains with a specific cist from Summerhill, through an analysis of the documentation.

Cist 1 was discovered by schoolboys in 1930. They apparently excavated the remains 'and traces of a second burial' and took them to the Hancock Museum (Miket 1984, 24). Bulmer (1939, 260, n.1) stated that Cist 1 (excavated in 1930) was 'unpublished [and] re-erected in the Hancock Museum'. There is a skeleton and cist from Summerhill on exhibition in the Great North Museum (GNM), previously displayed in a case on Claremont Road. The Beaker

within the cist in the GNM is a Short Necked Beaker (*c.* 2300–2100 cal BC), Tait's number 61 (Tait 1965, 49). There is a letter in the GNM archive to Tony Tynan, Curator of the Hancock Museum, from Dr David Smith, the Keeper of the Museum of Antiquities, dated 25 June 1973, confirming the transfer of 'the beaker and skeletal remains from the cist that you had reconstructed in Claremont Road'. However, there is no description of the skeletal material from Cist 1. The skeletal remains now on display in the Great North Museum, and examined in 2011, are those of an adult female (based on femoral head diameter). Approximately 15 per cent of the adult skeleton is present and the remains have all been treated with a consolidant which may have stained the bones, though the colour may also be a result of soil conditions. All broken edges of the bones are heavily worn making the breaks smooth. Several fragments of subadult cranium which are not reported in previous accounts were also examined with this skeletal material. However, it cannot be confirmed that the bones on display are those from Cist 1; all that is known is that they are from the Blaydon group of cists (Allason-Jones, pers. comm.). It is possible that the bones from Cist 1 cannot be located at present or are among those in box 167.D or accessioned as MOA 1971.34 (see below).

Cist 2 was uncovered by quarry workers on August 5th in 1937 and was excavated by G. Temperley of the Natural History Society of Newcastle (Bulmer 1938, 218). Bulmer (1938, 220) described the human remains within Cist 2 as a fragile 'adult skeleton in a contracted position with the head at the northern end'. It was accompanied by a flint knife. Two sets of material from Summerhill (those labelled Summerhill '36'37' and those with the accession number MOA 1973.4H), examined in 2011, could be consistent with his statement that only 'about one-third of the skull and the ends of the larger bones remain'. The Summerhill 36'37 box contained a set of remains which seems most likely to be derived from Cist 2: the base of the box is lined with sheets of *The Newcastle Journal* dated 12 July 1937. The remains in this box consist of approximately 10 per cent of a single skeleton of a male aged 26–39 years at death, based on the morphology of the os coxa and molar wear respectively. Supragingival calculus and a dental caries are the only pathological lesions observed. Only small fragments of skeletal elements are present, including the skull, teeth, arm and leg long bones, a vertebra, and portions of the sacrum and os coxae. There are only two tarsals present; as with several other sites examined for this study, most small bones are absent. The bones had been treated with a consolidant and are a dark brown colour similar to those from the cist on display at the Great North Museum.

Both Cists 3 and 4 were uncovered by workmen from the sand quarry and were excavated by G. Temperley and members of the Hancock Museum (Bulmer 1939, 263). Cist 3 contained a Bipartite Vase Food Vessel (Gibson's number 20 — Gibson 1978, 58), now in Sunderland Museum, accompanying an adult individual, crouched on their left side with the head to the North-North East, facing the South East (Bulmer 1939, 261). The remains in Cist 4 were those of an adult, lying crouched on its left side with the head to the East facing southwards, and with the hands originally placed over the face (Bulmer 1939, 262). This individual was accompanied by a High-Bellied S-Profile Beaker, probably dating to *c.* 2250–1950 cal BC (Tait 1965, 16, 45 no. 49), which is now in the Great North Museum. The positioning of the hands in front of the face is rare for the region, but is shared by three burials at Hasting Hill round barrow (Trechmann 1914; Fowler, in press, a; see below). Bulmer (1939, 261–2) reported burnt bone from above the collapsed cover-stones of Cist 3, and in the upper fills of Cist 4 which he interpreted as deliberately backfilled before the cover slab was in place. Box 167D from the Great North Museum has the accession number MOA 1973.4H and is accessioned under the

'Summerhill' or 'Blaydon' site name; a great deal of already collected material was transferred into the Museum of Antiquities in 1973 and provided with 1973 accession numbers, so the code is unlikely to match the date of discovery. The skeletal remains in box 167D, examined in 2011, consist of *c.* 5 per cent of a single skeleton, possibly female based on the mental trigon of the mandible and aged around 18 years at death, based on the stage of eruption of the third molars. However, there is a duplicate right second mandibular molar, from an adult possibly aged 40–45 years at death, based on wear. Mild grooves on the canine teeth reflect linear enamel hypoplasias, and a heavily worn, likely retained, deciduous right second mandibular molar with mild supragingival calculus were the only pathological lesions or abnormalities observed on the skeletal material. Burnt bones (most likely from cremation) were also present from *c.* 5 per cent of a skeleton, which may be from either of this individual or another individual. The presence of a small amount of cremated bone may tally with the burnt bone Bulmer mentioned as present in the upper fills of Cists 3 and 4.

Details of the cist burial at Bewes Hill, Stargate (NZ170630), were never published. However, archival material from the Great North Museum indicates that the remains were found in 1939 and donated to the Natural History Society of Northumberland, Durham and Newcastle upon Tyne in March 1941. The cist stones (including a cover slab with unusual grooving) spent the intervening years in the garden of W. A. Cocks, who excavated the cist, and it is not known what happened to the skeletal remains during this period (Great North Museum Archives 1972.34). A hand-written note on an envelope in the Great North Museum archive (1972.34) states '16 June 62 Robert [?.?] Cowper L.D.S. tells me this BA skeleton is a male with an upper age limit of twenty five years', and another hand adds 'This may be true of one of them [??]W 7/1/72'. A report on the bones which was 'received 3.9.71' via Dr D. J. Smith cites a minimum of four individuals in this collection (Great North Museum Archive; MOA 1971.34). According to this report, there were 'three skulls present, two fairly complete and one with anterior parts only. Three mandibles were also present and two of these could be fitted to two of the skulls, but the third did not fit . . .' along with a number of post-cranial bones, only a portion of which could be located for the 2011 analysis. All the skeletal remains examined in 2011 from MOA 1971.34 are unburnt and consist of two crania, three mandibles and a small number of post-cranial bones. According to the 2011 analysis, a minimum of three individuals are represented by the skeletal remains with a high probability that there are a total of four individuals, based on tooth wear patterns.

One skull consists of consolidated facial bones and some calvarial fragments with a mandible glued on with a ribbon used to hold the mandible and maxilla together (fig. 6). Approximately 25 per cent of the cranium is present and the mandible is complete. The left maxillary third molar was in the process of erupting at death but the right maxillary third molar is not observed, whilst the mandibular third molars are both fully erupted and have seen some mild wear, suggesting an age of *c.* 18–24 years. This discrepancy in third molar eruption may indicate that the maxillae and mandible do not belong to the same individual or that there is congenital absence or delay in the maxillary third molar eruption. Further age assessment based on tooth wear was not possible as the mandibular and maxillary teeth are glued together. Cranial and mandibular features indicate that both skeletal elements are male. There is slight porosity and thickening of the brow ridge of the frontal bone which may indicate a possible hematopoietic, infectious or metabolic disease or disorder or vitamin deficiency, however there is no further evidence of this on the skeletal material present. Both the mandibular and maxillary teeth display mild calculus accumulation. The mandible has

Fig. 6 Cranium 1 with mandible glued to the maxilla from Bewes Hill. Anterior view, inferior aspect to the bottom, superior aspect to the top. Photo: M. Gamble.

'Blaydon 15.16.1938' written on it, and it seems likely these skull portions belong to individuals buried in Cist 3 or 4 at Summerhill, Blaydon. Indeed, the four sets of remains may potentially include bones from Cists 3 and 4 at Summerhill, and possibly even Cist 1. It seems most likely that the comingling of the skeletal material occurred after Cowper examined the remains in 1962. As was concluded on the accession record at the Museum in 1972, 'one of' the individuals accessioned under 1971.34 might be from Bewes Hill; 'but which?'

Cranium 1 was in a box with Mandible 1[2] but there are distinctly different tooth wear patterns between the mandibular and maxillary teeth and they do not occlude properly. The left maxillary teeth appear to be more heavily worn than the right maxillary teeth. Cranium 1 is almost complete (90 per cent present), though it has been reconstructed and a tag is glued

onto the right parietal, stating 'Found in sandpit Newburn'. The occipital protuberance suggests that the individual is probably female, but the mastoid processes are inconclusive as to sex. The tentative age, based on cranial suture closure, is 30.3–48.5 years at death, whilst age (based on molar wear) is affected by the heavy wear on the teeth, corroborating the older end of the estimated cranial suture age range. Mandible 1 also has a tag on the right side, 'Found in sandpit Newburn' and there is a wooden dowel drilled into both gonial angles to stabilize the mandible. Sex determination based on the mental trigon and general robusticity of the mandible indicates a possible male individual, aged 30–50 years at death based on molar wear. Both third molars appear to have been lost prior to death as there is porous remodelling of the bone at the location of the third molars, though a radiograph is required to be conclusive. Several teeth display calculus accumulation and heavy wear, both possibly due to diet. Despite the apparent differences in the sex assessment of Cranium 1 and Mandible 1, it is possible these two are from the same individual based on age estimation and unusual tooth wear patterns.

Mandible 2 had no associated cranium. It appears that some of the teeth from the right side were forced into the sockets following discovery. The tooth which is in the position of the right third mandibular molar is a left first mandibular molar, suggesting that at least this tooth has been inserted into the wrong socket and may not belong to the same individual as the mandible. However, other teeth in the jaw may belong to the mandible in question and may have over-erupted (and been glued back into position); the alveolar recession observed on the mandible may support this. The morphological features of the mandible indicate a probable male individual aged 22–32 years at death. The teeth which are securely associated with this mandible display calculus accumulation, and the right first mandibular molar has a small carious lesion on the occlusal side. This is the closest fit to the description of the age and sex of the remains examined by Cowper in 1962.

Cranium 1 and either Mandible 1 or Mandible 2 could have derived from the Bewes Hill cist. Whilst it is not possible to deduce which, since both mandibles are likely to derive from an adult male it seems reasonable to confirm Cowper's identification of the burial as that of an adult male.

The post-cranial bones accessioned as 1971.34 are all adult but cannot clearly be associated with a particular cranium. The minimum number of individuals based on the post-cranial bone is two (based on a duplicate second cervical vertebra). At least some of the post-cranial bone belongs to one or more individual with mild degenerative changes, and indications of wear and tear on the skeleton reflect possible osteoarthritic changes.

It seems highly unlikely — given the labelling, the fact that Cocks thought that he found a single skeleton, and Cowper's analysis — that all of this material derives from the cist at Bewes Hill. The skull labelled 'Blaydon 15.16.1938' and the skull consisting of Cranium 1 and Mandible 1 are likely to have come from Cists 3 or 4 at Summerhill. None of the material from Bewes Hill or Summerhill has been subjected to radiocarbon dating.

BARROW WITH MULTIPLE UNBURNT BURIAL DEPOSITS

Hasting Hill

The barrow at Hasting Hill (NZ35275435; fig. 7), on the south-western edge of Sunderland, is located on the summit of a hill at the edge of the East Durham Magnesian Limestone plateau, overlooking the lower reaches of the Wear Valley (Trechmann 1914; Young 1980). It is roughly

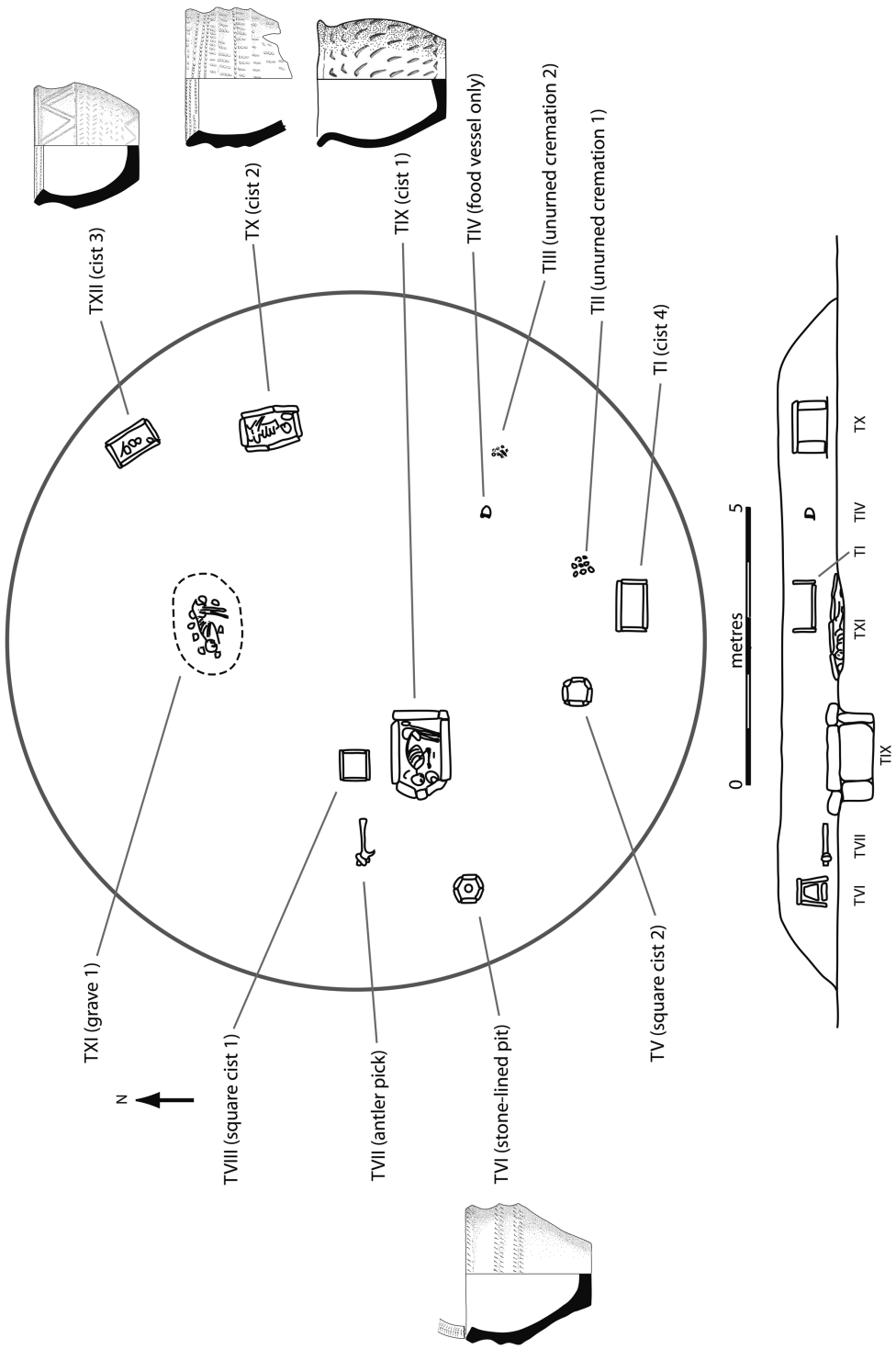

Fig. 7 Burials at Hasting Hill barrow and associated pottery. Trechmann's finds are numbered according to his 1914 scheme preceded with 'T'. Drawing by Sheila Severn Newton after after Trechmann (1914), with additions after Clarke (1970) and Gibson (1978).

10 m in diameter and was excavated by Trechmann in 1911. A full discussion of the sequence of activity at the site can be found elsewhere (Trechman 1912; 1914; Fowler, in press a, chapter five), but, in brief, the barrow contained a minimum of 'ten definite internments . . . comprising six burnt and four unburnt burials' (Trechmann 1914, 135–156). The medical doctor who examined the bones from the excavation also identified seven human maxillae which he noted were 'scattered through the mound' (Coke Squance 1914, 174). The site is characterized by exceptional preservation conditions with antler-tine picks found in one burial and under the monument, whilst animal and fish bones were found, along with human skeletal remains in one cist, a sheep tooth in a second, and snail shells surrounded a third.

Only two of the ten burials recorded at Hasting Hill could be located and examined for the 2011 study. The skeletons are both on display at Sunderland Museum in their reconstructed cists. Based on the descriptions of the human remains from Hasting Hill given by Coke Squance (1912; 1914) and Trechmann's note about the two cists that were 'secured entire and reconstructed in the Sunderland Museum', the remains in the two cists seem to be Find IX[3] (adult male TWCMS 2008-1953) and Find XII (infant TWCMS 2008-3075) (Trechmann 1912; 1914). Coke Squance (1912, 6–9) described Find IX as an adult male, about 5 ft 4 in tall and around 50 years old at death. Trechmann (1914, 146–53) described this as a man lying on his right hand side, facing south, with his hands raised in front of his face. A Globular S-Profile Beaker (probably in use *c.* 2050–1850 cal BC; Needham 2005) was placed in front of his hands and a flint knife in front of the raised forearm, whilst a bone pin was found behind his shoulders. What Trechmann identified as some fish bones, mammal bones, and five periwinkle shells, were recovered from the floor of the cist, along with an antler tine.

The 2011 analysis indicates there is a minimum of three individuals present within the skeletal material examined from the cist display containing Skeleton 2008-1953. Skeleton 2008-1953 itself is an adult male with an estimated age at death of 40–55 years (based on cranial and pelvic morphological traits, and on dental wear). The estimated living height of the individual, based on the femora, is 169.93–177.81 cm (5 ft 6 in to 5 ft 8 in; Trotter 1970). Approximately 90 per cent of the skeleton is present. The spine, right shoulder, left elbow and right big toe all display mild evidence of degeneration of the joint surfaces which are typically age related (Waldron 2009, 31–9). A diagnosis of osteoarthritis is unlikely as there is no evidence of widespread porosity of the joint surfaces or eburnation and subchondral sclerosis cannot be assessed. The left first metatarsal (left foot bone on the big toe side) exhibits a bone callous on the medial side of the diaphysis which possibly represents a healed trauma to the bone. There is no sign of the fractured rib identified by Coke Squance (1912, 9). Two bones — the left tibia and the left humerus — show slight signs of animal gnawing, the freshness of which suggest that the bones were free of flesh at the time (e.g. when they had been in the cist for some time). Whilst they are in excellent condition, many bones show efforts of conservation and repair, and holes were drilled into them for attaching string or wire to link the bones together, presumably for display. A left rib was selected from this individual for radiocarbon dating, and a result of 2194–1977 cal BC (2σ or 95.4% probability) was obtained.

Importantly, included within the cist display of Skeleton TWCMS 2008-1953 was a small pile of mixed animal and human, burnt and unburnt bones. This pile was described by Trechmann as: 'some bird bones and a few calcined mammalian (non-human) bones. . .' (1914, 150). The material examined in 2011 included the partial remains of a minimum of two human individuals, not previously identified. One of these individuals was a cremated adult; these bones were highly fragmentary. At least eight bones (a right ulna, right radius,

Fig. 8 Subadult remains from the pile of bones within the cist containing Skeleton 2008-1953, Hasting Hill. Photo: M. Gamble.

metatarsal, mandible fragment and several vertebrae) from this collection reflect a second individual — a child aged around five years at death. Although these bones were unburnt, they are bleached white and cracked as if weathered (fig. 8). One metatarsal from this subadult exhibits small punctures on the diaphysis which suggest animal gnawing. Given that two bones from the adult male in the same cist were also gnawed it is unclear whether this occurred in each case before or after the remains were placed in the cist, but, given the weathering, it seems most likely the child's bones were exposed to the elements for a period prior to deposition within the cist. There is no mention of the remains of a five year old child elsewhere at Hasting Hill in Trechmann's reports, and it seems likely that the material currently in the cist display does derive from Trechmann's 'Find IX' cist. The animal bones

have not yet been examined by a specialist. None of the animal remains, the antler tine, nor the two newly-identified sets of human remains have yet been radiocarbon dated.

Coke Squance (1912, 10–11) described the skeleton from Find XII as being fragmentary, with most body parts of an infant of *c.* 18 months present. Trechmann (1914) stated that Find XII was lying with the head to the South, on its right side, with the face to the East. A Food Vessel was placed behind the head in the south-western corner of the cist, whilst a 'flint' and an 'ox tooth' were also found in the cist. According to the 2011 analysis, Skeleton TWCMS 2008-3075 is an infant with an estimated age at death of nine to sixteen months, and most probably around one year old, based on the fusion rate and size of the postcranial bones (Schaefer, Black and Scheuer 2009). Overall, roughly 25–30 per cent of the infant skeleton is present. Surface preservation of the skeletal material is fair to poor, with most of the bones fragmentary and brittle. Coke Squance's (1912, 11) observation of rickets in one tibia was not confirmed by the 2011 analysis. An adult thoracic vertebra and adult indeterminate bone were also found within this cist display in 2011; these may be intrusive from other burials at Hasting Hill, a deliberate addition during the Early Bronze Age, or a result of some commingling of skeletal material following recovery. The left ulna was selected from the infant for radiocarbon dating, which yielded a result of 1931–1756 cal BC (at 2σ or 95.4% probability). This suggests that at least some time had passed between the initial burials at the site (including the adult in Trechmann's Find IX), and this burial. Taken as a whole, the mound at Hasting Hill seems to be a burial ground which accumulated in fits and starts over hundreds of years — and perhaps continued to be used after the mound was constructed — during which time some features of mortuary practice changed significantly (Fowler, in press, a, chapter five).

URNED CREMATIONS

There are several sites which contained cremated human remains placed in urns which were then buried (henceforth 'urned cremations'). These deposits are sometimes found with other burials, at cemeteries, or within barrows.

Corby's Crags, Edlingham

There is a limited amount of cremated skeletal material, examined in 2011, from the rock shelter at Corby's Crags (NU12800965), derived from the 1975 excavation by S. Beckensall. Beckensall (1976) excavated the entire floor of the rock shelter, finding an upright Bipartite Food Vessel Urn which contained cremated remains and which was covered with a stone slab. In 2011, the material from Corby's Crags consisted of a single bag of soil with a tiny amount of cremated bone. Macroscopic analysis was not possible.

Humbledon Hill, Sunderland

The cremated human remains from Humbledon Hill (NZ381551) were recovered in 1873 by Robert Hodgson, after they were discovered during the construction of the reservoir of the same name. Records of the excavation are limited. There was a mention of a barrow at Humbledon Hill in Trechmann's synopsis (1914, 137) of prehistoric burials in County Durham. A diary excerpt from the excavator describes the finding of three urns over four days along with a small heap of bones. Two of the vessels were donated to Sunderland Museum (*Antiquities of Sunderland*, 12, 33; Trechmann 1914, 137), and are Enlarged Food Vessel Urns.

(One is Gibson's no. 107 which has accession number TWCMS F2594: Gibson 1978, 126; *cf.* Miket 1984, 60; the other is TWCMS F2595). Overall, whilst there were no duplicate skeletal elements amongst both sets of cremated remains, it is best if they are treated as independent contexts; there is therefore a minimum of one individual per urn.

The remains labelled TWCMS 2011.1136, associated with Food Vessel TWCMS F2594, represent a minimum of one adult individual (based on the size of identifiable bone fragments), for whom no sex or age assessment is possible. The bone is highly fragmentary with an average fragment size around 2–4 mm; 358.8 g of bone was present. The relatively small amount of bone may indicate that only some of the skeletal material from an adult individual was recovered after cremation or that the individual was extremely small; the fragment size cannot conclusively be linked to any post-cremation activity, such as crushing (McKinley 2000, 408–16). The remains consist of fragments from all body parts, indicating that this is most likely to have been the product of the cremation of a single body. There is no evidence of pathology. All the bones are tan to black to blue-grey, suggesting the bones were subjected to different intensities or durations of heat during cremation.

The skeletal material labelled TWCMS 2011.1137, associated with Food Vessel TWCMS F2595, represents a minimum of one probable male adult individual (based on cranial features). Two vertebrae fragments, two indeterminate phalanges and a patella seem to indicate either an older adult or an individual who undertook labour which resulted in mild degenerative changes to the articular surfaces. The cranial sutures observed are partially closed, but still very visible, reflecting an adult who was most likely to have been over 20 years, but under 40 years, of age at death (roughly based on cranial suture closure). The bone fragments are considerably larger than those from context TWCMS 2011.1136, with a typical bone fragment size around 5 cm. The total weight is 1159.9 g. There were remains identified from all parts of the body, indicating that a complete individual was probably cremated with the majority of the skeletal material collected post-cremation (McKinley 2000, 404). As there was no prior description of the skeletal material from these urns, it is not possible to provide a comparison with any earlier analysis.

Enlarged Food Vessel Urns are relatively rare in the North East. Of eight others for which there are good contextual records, four contained the remains of at least two individuals, with the minimum number of individuals unknown from another two. In seven cases where the placement of the vessel was described, it was inverted, either within a pit (as at Blawearie: Hewitt and Beckensall 1996) or on a land surface (as at Goatscrag rock shelter: Burgess 1972). Reliable dates are yet to be published for this mode of burial in the region.[4] No radiocarbon dating of the human remains from Humbledon Hill has yet been undertaken, but this might be profitable in refining our knowledge of the chronological range for the deposition of cremated remains with Enlarged Food Vessel Urns.

Warden Law, Sunderland

Several Early Bronze Age monuments have been excavated at Warden Law (NZ372505). The material discussed here is a cremation deposit within an inverted Food Vessel Urn, with a single cordon, which was recovered in 1979 from a cist under a low mound that had been disturbed by quarrying (Ford and Miket 1979). Some cremated bone was apparently brought with the urn to Sunderland Museum by the finders, and more was recovered by Ford and Miket (1979, 53) at the site. Weyman identified the remains of a child aged 3–6 years at death,

and provided a summary of the remains present (Ford and Miket 1979, 58). Two separate bags of cremated skeletal material were located in 2011: one was labelled NZ372505, along with the accession number TWCMS T423, and the other was labelled as TWCMS F2607 and the same accession number, TWCMS T423. The latter sample was most likely to have been the bone that was brought to the museum in the urn, whilst the former sample was probably recovered by the archaeologists from the site; it seems that both the urn and bones brought to the museum by the finders were originally given the accession code TWCMS F2607, but the bones were later given their own code (Alex Croom, pers. comm.). In order to ensure accurate recording, these two bags were kept separate during the 2011 analysis. Whilst it seems as though they derive from the same burial there are discrepancies between the remains described by Weyman and the bone in the bag labelled both F2607 and T423, which suggests she did not have access to it for her analysis. The skeletal material from T423/NZ372505, examined in 2011, represents the cremated remains of a single subadult individual with an approximate age between 2–10 years at death (based on unfused long bone elements). Approximately 20 per cent of the skeleton is present. It is likely that this is the material examined by Weyman. The skeletal remains from bag T423/F2607 represent a single subadult cranial (parietal) fragment and fragments of an adult individual. Approximately 3 per cent of the adult skeleton is present. All of the cremated material is highly fragmented and predominantly white or tan with some black fragments, indicating that the bones were unevenly affected by high temperatures.

The age estimation provided by Weyman in the original report is comparable to that determined by the 2011 study for T423/NZ372505, although she recorded the presence of teeth which were not present for the current analysis. While this is curious, it seems that Weyman, by profession a dentist, occasionally retained teeth and mandibles from the prehistoric remains she studied for a period of time. For example, the jaw from Reaverhill was returned after a period with Weyman (as observed on the accession records for the skeletal material which notes that Weyman still held the mandible at the time of packaging). It is possible that she retained the teeth from Warden Law and these were either not returned or not reunited with the rest of the remains. A similar fate may have befallen the teeth and maxilla Weyman reported for Hollybush which could not be located in 2011.

A long bone fragment from the *c.* 3–6 year old was submitted for radiocarbon dating, which produced a result of 3593±27 BP, or 2025–1887 cal BC (at 2δ, or 95.4% probability; OxA-26257). This date is consistent with other dates for Food Vessel Urns from the region (e.g. Whitton Hill henge 1: Fowler and Gamble, in prep.) and elsewhere in northern Britain (e.g. Sheridan 2004; 2007b, 169), and Ireland (Brindley 2006, 274–81).

POSSIBLE EARLY BRONZE AGE REMAINS

The skeletal remains from two sites, examined in 2011, have been cautiously attributed to the Bronze Age, but this could not be confirmed. One site, Ryhope Cave, Tyne and Wear, did not yield any artefacts from the period, there are few excavation records, and there has been no attempt to date the human remains directly. Although the bones were examined, results are not described here but have been lodged with the Tyne and Wear Archives and Museums at Sunderland Museum and on the ADS. Radiocarbon dating of some of these remains would identify when a number of the individuals died, but given the lack of contextual information this might be an expensive exercise for limited results.

Fulwell, Sunderland

There is very little published information about the site at Fulwell (NZ3959). The only information which could be obtained is from an entry about an exhibition in the Society's *Proceedings* (*PSAN*[3], 2, 78–9) which states that in 1901 a 'skeleton was found about four feet below the surface in a sand bed; it was covered with shells ... and a large stone on the top. ... The urns were broken by the workmen, and the grave cover used for the cement foundations of the new street footpath'. The presence of what appear, from a photograph, to be Collared Urns (described as 'cinerary urns') at the same location is interesting — Longworth's corpus of Collared Urns in Britain and Ireland lists only 25 inhumations with such vessels, and while none are this far north, 12 are from North Yorkshire or Humberside (Longworth 1984, 47, 138). It is possible that the Fulwell burial was one such unusual case, but since the vast majority of Collared Urns in funerary contexts contained cremated remains it is also possible that multiple burial deposits were present. The further possibility of some non-funerary activity involving Collared Urns on the site of an earlier burial or burials cannot be ruled out.

The skeletal material from Fulwell (TWCMS H18130), examined in 2011, indicates a minimum of three adult individuals (based on multiples of several bones), none of which was burnt. A total of 46 skeletal elements were examined. This predominately consists of the long bones of the arms and legs. The differences in the size of the various bones made it possible to tentatively associate groups of bones together as representing discrete individuals; the state of preservation suggests that these individuals may have come from more than one grave. These three (heuristically labelled A, B and C) reflect: a robust male (Skeleton A), approximately 35 per cent complete with an estimated living stature of 176 cm (*c.* 5 ft 8 in); a female, with no age assessment possible (Skeleton B); and a gracile female with a possible age of 30–34 years at death, based on the os coxae (Skeleton C). One of the females had an estimated living stature of 170 cm (*c.* 5 ft 6 in). A single unfused metatarsal could indicate the presence of a younger individual or a genetic variation in an adult. There is at least one, and more likely two, individuals with osteoarthritic changes to at least one joint. The bones that are more robust and which have been assigned to Skeleton A display mild osteophytic growth on the scapulae and woven bone in the acetabulum (reflecting possibly osteoarthritic changes to the shoulder and hip). Skeleton B displays mild bone growth on the left scapula and left radius (possibly reflecting osteoarthritic changes to the shoulder and elbow).

Since workmen carried out this excavation, and since the note on the excavation is vague regarding the position of the skeletal remains recovered, it is not possible to confirm that the bones in the box with accession number TWCMS H18130 are from this excavation at Fulwell. It is difficult to assess whether the workmen or the collectors would have noticed the presence of three different individuals. However, the three adults identified are distinctly different in size and there is clear bone triplication. The possibilities appear to be that: the bones were disarticulated or the skeletons were present only very partially in the grave; little attention was paid to recording them; there was more than one grave but this was not recorded; or that some or all of the bones do not originate from this site. The preservation of the skeletal material is quite good overall, with some variation across the bones, yet most of the small bones of the hands and feet are missing, which may indicate a lack of thoroughness in recovery or reflect the pattern of deposition.

DISCUSSION AND CONCLUSIONS

The osteological and archival re-analysis has identified features of the deceased individuals and produced results useful for interpreting Early Bronze Age mortuary practices, as well as highlighting issues arising from the more recent histories of these bones. In some cases there was the possibility that the remains examined were not representative of the original burial due to the addition or removal of bones, or the complete replacement of the original bones with others that have been mislabelled (e.g. West Warmley, Fulwell), but it is also possible that the initial identifications and descriptions of the remains were inaccurate. Analysis has required investigation of the history of the recovery, transfer, and storage of the bones as well as their original deposition. It is necessary to consider as much of this history as possible in order to account for all the variables that may have led to the retention of a set of bones in a specific condition in museum storage. The authors are especially grateful to all of the staff at Tyne and Wear Archives and Museums who provided every assistance in piecing these histories together. It is now possible to consider how best to include the bones in these collections as part of further research.

In addition to new information provided by analysing remains which have never been fully inventoried, the re-analysis of skeletal remains provided new information both about the individuals within the graves (e.g. Allerwash) and about the range of mortuary practices present during the Early Bronze Age in North East England (e.g. the presence of bones exposed before deposition at Hasting Hill). Improved age estimation and sex determination techniques provide a more reliable picture of which people were buried according to specific burial modes in the North East during this period. Drawing together the remains from 14 sites also highlights some patterns that would be missed by focussing on individual sites alone. For instance, very few small bones from the extremities (carpals, tarsals, metacarpals, metatarsals, and phalanges) were present in the unburnt remains. Indeed, the only tarsals which survive for any of these sites are the talus, calcaneus, and the occasional navicular — the largest and densest of the small bones — from Allerwash, Bewes Hill, Fulwell, Hasting Hill, Reaverhill, and Summerhill Cist 2. The general absence of such bones is possibly a factor of taphonomic processes related to the burial practices. Water flooding and draining within cists which were not filled with soils may potentially result in the lighter, smaller bones and teeth being displaced (e.g. Roksandic 2001, 105–9), and it has been noted that the vast majority of cist burials in North-East England were not backfilled once the body was deposited and before the cover slab was put in place, though it seems that backfilling became more common later in the period when cists were used for crouched burials (Fowler, in press, a, chapters four and six). However, this taphonomic process would need to be extreme for all of these small bones to be absent, and at least two of the cists from which bones were examined were certainly backfilled (Hollybush Field, and Summerhill Cist 4), whilst the joints between the slabs at the base of the Allerwash cist were sealed with clay (Newman and Miket 1973, 87). Furthermore, whilst the chemistry of the local geology at many of these sites is likely to have been detrimental to human remains, there is no reason why small bones would be affected more than large ones, and where bone preservation is particularly good the absence of small bones is suspicious. All in all, this suggests that whilst small bones may have decayed away, in at least some cases (such as the lack of carpals from the adult male at Hasting Hill) either such small bones were never introduced to the cist, or they were removed following deposition, or were not identified and recovered during excavation. The latter may be especially

likely where environmental actions separated heavier and lighter bones. The possibility that *some* bodies, such as at Allerwash, were buried only after some exposure to the elements, removal from previous resting places, or after a period of curation, or were interfered with in the prehistoric past, cannot be excluded.

The sample of bones examined is too small a proportion of the known corpus to draw general conclusions for specific burial modes, but the results have fed crucial information into an analysis of a corpus of 355 burials from the region which is being published elsewhere (Fowler, in press a). A few conclusions of that analysis, which combines the results of the osteological analysis and radiocarbon dating outlined in this paper with wider contextual information and synthesis, merit brief summary here.

The re-identification of the individual from the Allerwash cist as a probable male now correlates with the broader pattern of flat-riveted copper-alloy dagger blades accompanying adult males well known from elsewhere in Britain and no longer constitutes a special exception in this area (cf. Needham 2011). At both Allerwash and Reaverhill partial and/or disturbed remains were accompanied by a copper alloy dagger blade — as occurred elsewhere in the region at West Lilburn (or Lilburn South Steads — Collingwood *et al*. 1946). The fact that the small pile of periwinkle shells and 'animal bones' accompanying the adult male, in what was previously seen as a 'single grave', in the cist of Trechmann's Find IX cist at Hasting Hill contained what are likely to be the weathered remains of a five-year-old child and the cremated fragments of another adult, underlines the variability in mortuary practices during the period. This burial demonstrates clear deliberation in the specific placement of the corpse of the adult male and accompanying objects in the grave, and the inclusion of the partial remains of two further individuals cannot be dismissed as accidental in this context. It resonates with the suspicions of some recent authors that too much emphasis has been placed on the deposition of single, intact bodies in cists and graves immediately after death (Brück 2003; Fowler 2005; Gibson 2004; 2007). Poor recognition may explain why so few bones from these two additional individuals were recovered and kept in the display at Sunderland Museum, and why the adult male was missing most of his carpals, but it also seems likely that only a few bones from the other two individuals were deposited. These may have been the remains of loved ones, ancestral relics, trophies, talismans, or they may have been present for another reason. They may have been buried with the adult male, or at a later time, or were the remnants from a previous use of the cist. Further radiocarbon dating here may be rewarding.

This research also adds to the degree of refinement in the chronological resolution for specific burial modes during the Early Bronze Age. The radiocarbon dates from Allerwash and Reaverhill confirm the emerging detailed chronologies for specific types of copper alloy artefacts (e.g. Sheridan 2007), whilst dates from Hasting Hill and Warden Law do the same for ceramic chronologies (e.g. Needham 2005; Sheridan 2004). Although there are no surprises in these radiocarbon results, it confirms that funerary practices in the period *c.* 2250–1750 were varied, and yet exhibited consistent trends which were probably confined to certain centuries. For example, both of the dagger burials date to between 2200 and 1950 cal BC, and the burial from Hollybush Field, for which no grave accompaniments survived, dates to a similar period, *c.* 2280–2050 cal BC. Indeed, the period *c.* 2300–1900 was probably the peak period for deposition of crouched bodies in short cists. Such seemingly 'unaccompanied' burials may well have included a range of organic artefacts, clothing, coverings and so on — as demonstrated by the recent, exceptionally well preserved find of the remains

of a woman 'wrapped in the hide of a brown cow or bull' and accompanied by a rod of hazel and some basketry, dating to *c.* 2200–1880 cal BC, at Langwell Farm, Strath Oykel (Lelong 2012).

Three burials included various elements of skeletal remains which appeared to be blackened or scorched (Hexham Golf Course, Reaverhill, West Wharmley: figs. 4 and 6). Bones may be blackened by soil discolouration but, in these cases, transverse cracking or splitting (in addition to the blackening) indicates that heat was probably applied to the bone. In each case the burning was localised on the bone and typically indicative of low heat or short periods of exposure. This is particularly interesting as there are a number of cases in North East England where signs of burning have been recorded in the fills of cists, on the cist slabs, or on the soil around cists covered by cairns or barrows (Fowler, in press, a, chapter four). For instance, the joints between slabs at Summerhill Cist 4, Blaydon, were packed with small stones and sealed with clay, suggesting that the sandy fill, complete with charcoal and burnt bone, was deliberately introduced (Bulmer 1939, 262). There are records, in the wider corpus, in which the cist itself seems to have been subjected to fire. For instance, Trechmann (1914, 132) reported the presence of charcoal in a cist at Brandon, County Durham, which yielded a Short-Necked Beaker as well as a skeleton, and stated that there were 'some signs of fire in the interior and also at the top of the grave. Some of the bones also appear to have been partly calcined'. In other cases the vicinity of the cist seems to have been burnt prior to the construction of the cairn, as seems likely at Dour Hill (Jobey and Weyman 1977, 204). Furthermore, there are hints that the bones at other sites were affected by such burning. Bones found with five Beakers (mainly Short-Necked Beakers) from two cists at Dilston Park were also described as 'partially burnt' (Gibson 1906, 142). These bones were not accessioned into the museum collections. Taken together, the osteoarchaeological analysis and the evidence from the archaeological sites suggest that, in certain cases, some time after individuals were buried and skeletonised, but before the site was buried beneath a cairn or barrow, the immediate vicinity was set alight. This has profound implications for understanding the duration between burial and monumentalisation of the burial site, and the nature of Early Bronze Age mortuary activity. Some acts of burning may have been a part of periodic funerary rituals at the location of burial, perhaps purifying the grave in preparation for further activity (such the construction of a mound), or perhaps marking the end of a certain state of existence for the deceased and close mourners, and the beginning of another (Fowler in press a, chapters 4, 5 and 6). In other cases, or even in tandem with this, burial sites may have been cleared for new uses by deploying fire. Further scrutiny of site reports from Early Bronze Age burials across Britain for similar traces of activity may prove rewarding.

To conclude, this article has summarised the key results of the osteological analysis of the human remains from fourteen locales and the radiocarbon dating of six of those sets of remains. This re-analysis or analysis of the human remains held in Tyne and Wear museum collections has not only provided more detailed insight into burial practices in the Early Bronze Age in North-East England, but also the first complete reports on all of the surviving skeletal material from this period in this region in these collections. It has highlighted the diversity of burial practices throughout the Early Bronze Age and has underlined the value of re-evaluating archaeological remains in museum collections when conducting interpretations of local, regional or national patterns in prehistoric mortuary practices. Further analysis and re-analysis of Early Bronze Age human skeletal remains in Great Britain, considered alongside archaeological information for the contexts in which they were discovered, should

continue to provide more detailed, accurate and revealing interpretations regarding life, death and burial practice in the Early Bronze Age.

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APPENDIX

SUMMARY OF OSTEOLOGICAL METHODS

All the human remains examined for this study are derived from fourteen different sites in Northumberland and Durham and are all stored at the Great North Museum in Newcastle upon Tyne, Sunderland Museum and Wintergardens in Sunderland, or Arbeia Museum and Roman Fort in South Shields. Other than the remains from Hasting Hill, which were examined at Sunderland Museum as they are on display at the museum, the rest of the skeletal material was removed from its museum storage and taken to the Wolfson Laboratory at Newcastle University for examination. The skeletal material from Early Bronze Age burials is both cremated and unburned, with varying degrees of burning observed on the skeletons from some sites. While there are a great number of Early Bronze Age burials recorded for these regions, the remains described and recorded here (and in Fowler and Gamble, in prep.) were all those that could be located within the Museum stores at this time. This section will briefly describe the steps of examination and the methods used for this particular study.

The methods of observation and analysis of the human remains in this report are in agreement with the recommendations from Buikstra and Ubelaker (1994). Observations were recorded in a detailed inventory in the following order: bone element, side, the segment of the skeletal element present, the number of fragments, the completeness score and the surface preservation level of the skeletal element. Preservation levels are roughly based on McKinley (2004). The colour and the nature of the surface texture as affected by the burning process is recorded when dealing with cremated bone. The length of the bone is recorded where possible and any evidence of pathologies on the bones or teeth are described.

Age, sex and stature assessment

Standard age estimation methods were used, as recommended by Buikstra and Ubelaker (1994) and Schaefer, Black and Sheuer (2009). The accepted methods of ageing adult skeletons based on degenerative changes to the os coxa (i.e. Lovejoy *et al*. 1985; Brooks and Suchey 1990; Todd 1920) and/or the sternal ends of the ribs (Iscan and Loth 1986) were employed where possible and in correlation with dental wear. Miles (1963) and Lovejoy (1985) were used to estimate age at death based on dental wear. As a last resort, age estimation based on cranial suture closure was used. However, due to issues with accuracy and reliability these are taken as tentative (Meindl and Lovejoy 1985; Key, Aiello and Molleson 1994). Dental development (Ubelaker 1985) and epiphyseal fusion (Schaefer, Black and Sheuer 2009) were used, where applicable, to estimate age-at-death for subadult skeletal material.

The recommended methods to determine sex of adult human skeletal remains once again use the os coxae for the greatest accuracy and precision (Phrenice 1969; Schwartz 1995). This was used in conjunction with sexually dimorphic features of the skull to determine sex (Buikstra and Ubelaker 1994; White and Folkens 2005). Where this was not possible, post-cranial measurements were used (as within Bass 1995). Living stature was estimated, where possible, for adult individuals using the length of the long bones and Trotter's (1970) equations and where this was not possible, metatarsal length was used if they were present (Byers *et al*. 1989).

It must be kept in mind that these charts, for age, sex and stature, are not based on prehistoric British populations and diet and natural variation across populations can affect the precision of estimation. However, as there is currently no chart for prehistoric British populations these standards were systematically and consistently used to present the best possible result.

Preservation

The assessment of surface preservation is subjective, but an evaluation of the surface condition of the remains puts the assessment of age, sex and pathologies into context. Skeletal preservation is partly a factor of the age and sex of the individual and of the size, shape and robusticity of the bone, while taphonomic processes such as the burial environment, excavation and the curation of the skeletal material may significantly impact on the condition of the bones and the amount of the skeleton recovered. Excellent preservation implies that there is no bone surface erosion and clear surface morphology, while extremely poor preservation reflects severe erosion of the bone surface and complete loss of bone surface morphology making it impossible to assess for pathology or other features of the bones. The amount of a single bone present or its completeness, will also affect the ability to obtain information from the bone element and overall skeleton and has been recorded using Buikstra and Ubelaker (1994).

Burned skeletal material

Burning of skeletal material can cause a number of observable changes to the morphology and structure of the bones and teeth. The colour of burnt bone varies according to burning time and temperature, with black or brown indicating a lower temperature or less burning

time, up to white or blue which can indicate a calcined fragment (Ubelaker 2009). Bones which do not bear flesh when burnt tend to display less variation in fracture pattern and more transverse cracking, whilst fleshed bones tend to display more warping, more variation in longitudinal splitting and transverse fractures, frequently in a curvilinear pattern (Ubelaker 2009, 3). During burning, long bones tend to split apart in a longitudinal manner (as if twisted apart into fragments) and the enamel on teeth shatters. This severely limits the amount and nature of information which can be derived from the teeth of cremated skeletons (i.e. with no crowns it is impossible to identify the tooth, discuss pathology or age assessments). The degree of fragmentation has been recorded but it is difficult to interpret whether this is caused by the action of collecting the cremated bone or fragmentation (deliberate or otherwise) following collection.

Minimum Number of Individuals and palaeopathology

The minimum number of individuals (MNI) within a burial is calculated by counting all the long bone ends and distinctive bones present taking side, age and sex into account. The largest number of the same aspect of a skeletal element present is then taken as the MNI. Whilst standard, this method is not infallible and does not preclude the possibility that there may have actually been more individuals present. Pathological lesions represent evidence of a physiological stress during life which has affected the skeleton. Trauma, osteoarthritic changes, dental pathology and lesions representing a disease or disorder are all commonly included within a skeletal analysis.

NOTES

[1] The period *c.* 2500–2250 cal BC could be referred to as the terminal Neolithic or as the Chalcolithic.

[2] These numbers were arbitrarily assigned in the 2011 analysis.

[3] In the 1912 publication both Trechmann and Coke Squance refer to this as Find 8, but by the 1914 publication is has become Find IX.

[4] There is a radiocarbon date of 3860±45 BP (2490–2200 cal BC, 2 sigma, GU-9624) from cremated bone found in a vessel at Turf Knowe North, but this is extremely early, effectively pre-dating any other Food Vessel pottery in the British Isles. Since the vessel was inserted into a round cairn which has otherwise yielded dates of 2130–1880 cal BC and later, the date from the Enlarged Food Vessel seems unlikely to date the initial currency of the vessel type. However, interpretation must await full publication of the site which is currently underway (Peter Carne, *pers. comm.*).

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Michelle Gamble and Chris Fowler, School of History, Classics and Archaeology, Newcastle University, Newcastle upon Tyne NE1 7RU.

gamble.michelle@gmail.com chris.fowler@ncl.ac.uk