Society of Antiquaries of Scotland

Darkness Visible

The Sculptor's Cave, Covesea, from the Bronze Age to the Picts

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Chapter 6

HUMAN REMAINS

6.1 Introduction

Human remains were recovered from all three recorded excavation programmes at the Sculptor's Cave: Benton's work in 1928–30, the Shepherds' excavations in 1979 and the spoil heap investigations in 2014. Together, these represent a minimum count of 1748 bones and bone fragments (tables 6.1, 6.2). Unquantified human bones were also found during antiquarian excavations in the 1860s (Anon 1868a) and further human remains from the Sculptor's Cave are probably contained among unpublished and poorly provenanced material from 'the Covesea Caves', collected by Mr Leslie Darge during the 1960s.

Table 6.1
The Sculptor's Cave human bone assemblage by excavation season

Excavator	Year	No.
Benton	1928	294
	1929	1252
	1930	52
Shepherds	1979	46
Büster/Armit	2014	104
Total		**1748**

Despite being by far the most substantial assemblage, the material recovered by Sylvia Benton is especially problematic since the majority survives only as 'bone lists' hand-written by the anatomists who assessed it. With the exception of seven vertebrae, the rest of the collection appears to have been discarded or lost after only a fairly cursory examination (see box section 4). Furthermore, human bone from the 1930 season was retrieved only selectively, the majority being discarded on site; some, but not all, of this material was recovered in 2014 (box section 2). Meanwhile, the 1979 assemblage represents only a small amount of material, mostly deriving from stratified deposits left by Benton in the two entrance passages, though it is possible that additional material remains in the lowest unexcavated deposits of the West Passage and the unexcavated portion of the spoil heap (see section 2.3.4; box section 2).

The assemblages can thus be split into two broad groups: a 'core' assemblage, comprising the 1928–9 and 1979 material, which represents *all* of the material recovered in those seasons; and the 1930 and 2014 assemblages, which likely represent only *part* of the excavated material.

The next few sections describe the overall characteristics of the assemblage as reconstructed from the bone lists and other sources. It then presents an osteoarchaeological analysis of the surviving material before considering the implications of bone element representation for the sorts of mortuary treatments that might have been carried out at the Sculptor's Cave in the Late Bronze Age and Roman Iron Age.

6.2 Terminology

The vast majority of the Benton human bone assemblage is unavailable for osteoarchaeological analysis and we must bear in mind the many uncertainties in the surviving bone lists. Nevertheless, broad discussion of the nature of the total human bone assemblage permits general trends to be observed.

The terminology used by the anatomists examining the bone assemblage from the 1928–30 excavations is rather different to that which we would use today, both in terms of the names given to certain bone elements and the age categories employed. In relation to bone elements, the terms used here (and in the associated tables and illustrations) are taken directly from the bone lists. Where different terms have been used for the same element, for example, os calcis and calcaneus, these element totals have been grouped. In other instances, however, where different levels of specificity are recorded (for example, 'pelvis' or 'hip bone' rather than ilium, ischium or pubis, or 'tarsal' rather than any further specification of the particular tarsal bone present), this has not been possible, and we are left with a number of overlapping categories. In addition, different methods of cataloguing bone elements have meant that further amalgamation of categories has been necessary for the purposes of element index comparisons (see section 6.10).

In terms of age attribution, Professor Thomas Hastie Bryce, University of Glasgow, who examined the 1928 bones, divided them into 'immature' and 'adult' categories, based on whether or not epiphyseal plates were fused (Bryce nd). Within this 'immature' category he uses terms such as 'infant', 'child' and 'young', not always giving specific age ranges; he also refers to the scapula and mandible of a 'foetus' or 'newborn'. Professor Alexander Low, University of Aberdeen, who examined the 1929 and 1930 assemblages, uses terms including 'child', 'adolescent' and 'adult',

Table 6.2
The Sculptor's Cave human bone assemblage by age group and element. Age group ranges have been reconstructed from those most commonly used in the 'bone lists' (see table 6.3). Due to differential recording of vertebrae in the various assemblages, all have been grouped under a general vertebra category, including unfused sacral vertebrae. For the 'young' age category, it is possible that two bones classed as 'sacrum' are in fact unfused sacral vertebrae

Bone element	**Age group**						**Total**
	Adult	**Sub-adult (undifferentiated)**	**'Young' (15–25 years)**	**'Child' (3–14 years)**	**'Infant' (<3 years)**	**Unknown**	
Cranium	25	1	9	6	9	2	**52**
Mandible	3	0	6	7	4	0	**20**
Tooth	5	3	0	1	0	10	**19**
Vertebra	209	4	311	52	17	2	**595**
Sacrum	3	0	5	0	0	0	**8**
Pelvis element (undifferentiated)	2	0	0	2	1	0	**5**
Ilium	0	0	4	14	0	0	**18**
Ischium	0	0	0	15	2	0	**17**
Sternum	7	1	7	1	2	0	**18**
Clavicle	12	2	20	10	1	0	**45**
Scapula	6	0	6	13	4	0	**29**
Rib	156	4	229	66	6	7	**468**
Humerus	6	0	12	7	0	1	**26**
Radius	9	0	13	5	0	0	**27**
Ulna	16	0	13	10	1	0	**40**
Femur	7	0	9	5	0	1	**22**
Patella	5	0	2	6	0	0	**13**
Tibia	8	0	6	5	0	0	**19**
Fibula	12	0	5	0	0	0	**17**
Long bone	0	0	0	0	0	1	**1**
Talus	4	0	0	0	0	0	**4**
Calcaneus	10	2	4	1	0	0	**17**
Scaphoid	1	0	1	0	0	0	**2**
Cuneiform	2	0	0	1	0	0	**3**
Carpal (undifferentiated)	3	0	2	0	0	0	**5**
Metacarpal	43	0	16	9	1	2	**71**
Cuboid	8	0	1	0	0	0	**9**
Tarsal (undifferentiated)	21	0	4	1	0	0	**26**
Metatarsal	94	1	15	4	1	0	**115**
Hand phalanx	9	2	3	4	1	1	**20**
Foot phalanx	7	0	0	0	0	2	**9**
Phalanx (undifferentiated)	2	0	3	0	0	0	**5**
Not identified	0	0	0	0	0	3	**3**
Total	**695**	**20**	**706**	**245**	**50**	**32**	**1748**

Table 6.3
Age categories and their respective age ranges reconstructed from the Bryce and Low 'bone lists'. Note that these do not correspond with modern osteological uses of the terms

Age group	Broad age range
Infant	<3 years
Child	3–14 years
Young	15–25 years
Adult	25+ years

likewise not always specifying age ranges (Low nd; 1930a; 1930b). Virtually all bones examined by Bryce and Low can be assigned to one or other of these categories and, by charting the use of the terms where they are quoted in association with specific age ranges, it has been possible to retrospectively reconstruct the age brackets they represent (table 6.3). It should be stressed, however, that the two anatomists are not always consistent with each other, and this schema can be no more than a 'best fit'. It is also important to note that modern osteoarchaeologists would undoubtedly be more cautious in assigning specific ages to bones within the sub-adult category.

In order to carry out analyses on the total human bone assemblage, it is necessary to 'retrofit' age ranges assigned by modern osteoarchaeologists who have examined the smaller 1979 and 2014 assemblages to those age groupings used by Bryce and Low (table 6.3) despite the differences in terminology. The 'young' category is, for example, especially problematic, since the age range of 15–25 years spans what we would now conventionally regard as the division between 'adults' and 'sub-adults'. Where modern osteological assessment attributed bones only to 'sub-adults', with no age or age range assigned, these have been listed separately under an undifferentiated 'sub-adult' category.

6.3 Minimum number of individuals (MNI)

The Benton assemblages originally contained around 1600 separate bones (table 6.1). The exact figures are irrecoverable due to the unspecific way in which many of the fragments were recorded, and those given here are probably rather minimal. Using a combination of vertebrae and lateralised elements, and retaining the age divisions represented in the bone lists, the MNI for the combined Sculptor's Cave bone assemblage is thirty-three (nine adults, thirteen 'young' individuals, nine 'children' and two 'infants'; table 6.4); undifferentiated sub-adults have not been included. The nature and context of the assemblage, however, suggests that the true number of individuals present in the cave is likely to exceed this conservative estimate. As with other analyses of the 'lost' human bone assemblage, the MNI should be regarded as essentially heuristic rather than definitive.

At birth, the body contains 270 separate bones, decreasing to 206 in adulthood due to the fusing of elements such as vertebrae and long bone epiphyses. These bones fuse at different times and so it is difficult to be specific about how many bones each individual at the Sculptor's Cave might originally have comprised.

Table 6.4
Estimated minimum number of individuals (MNI) based on age breakdown as outlined in tables 6.2 and 6.3. MNI for adults and 'young' are based on the total number of surviving vertebrae. Infants are equally represented by left ischia and right scapulae. Sub-adults not included

Age group	Element	MNI
Infant (<3 years)	Ischium/scapula (left/right)	2
Child (3–14 years)	Ilium (right)	9
Young (15–25 years)	Vertebra (n/a)	13
Adult	Vertebra (n/a)	9
Total		**33**

We must also bear in mind the partial nature of the 1930 and 2014 assemblages and the loss of other elements from the assemblage through taphonomic and post-depositional processes (natural or anthropogenic) or the fragmentation of bones into multiple pieces. If we take an arbitrary average of 238 bones per individual, our assemblage of 1748 bones represents 22% of the bones we would expect to be represented by an MNI of 33 individuals.

6.4 Age representation

When the core assemblage (ie the 1592 bones excavated in 1928, 1929 and 1979) is broken down by the major age categories, 'young' (15–25 years) represent the majority (42.5%), followed by 'adults' (39%), children (3–14 years; 14%) and infants (<3 years; 3%) (illus 6.1). Combining the infant and child categories and amalgamating 'young' with the adult bones (to compare categories that we might expect to approximate to social categories of adult and non-adult) produces a pronounced split between adults/young (83%) and juveniles (17%) (illus 6.2), although we must bear in mind the possibility of recovery bias affecting small bones of the latter age group.

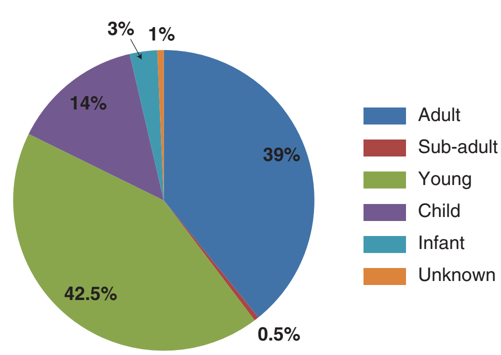

Illustration 6.1
Age breakdown of core bone assemblage (1928–9 and 1979); see table 6.3 for age ranges

Box section 4

THE BENTON BONES

When Sylvia Benton first visited the Sculptor's Cave in 1928, she found 'the floor . . . strewn with human bones' (1931: 177). Yet her report contains remarkably little information on the human remains recovered during the excavations, beyond a mention that 'there are a prodigious number of human bones to be explained and . . . nine of them show beheadings' (ibid: 206). The sections of her report dealing with 'Human Bones' is, however, sufficiently short to be quotable in full:

> Professor Bryce kindly examined some of the human bones in 1928. He made the same observation which was subsequently made independently by Professor Low that there was a preponderance of children's bone. There were human bones in both layers, but many more in the mixed layer than in the bronze layer (Benton 1931: 206)

An appendix by Professor Alexander Low adds:

> In this collection the human bones are so fragmentary and mixed that it is not possible to observe any characteristics of racial significance or differences between the bones of the respective layers. The large proportion of bones of young individuals is noteworthy (Benton 1931: 207)

A further extract from Low's 'detailed report' lists six cervical vertebrae with cut-marks characteristic of decapitation and a footnote mentions that a 'Dr Dodgson discovered three more vertebrae similarly cut' (Benton 1931: 207).

Elsewhere, there is mention of 'at least one crushed skull' in Layer 2, just inside the cave between the two passages (Benton 1931: 181), a further 'crushed skull' found next to a pot containing a 'mutton bone' in grid square '–B1/2nd', and a further pot containing 'big bits of skull' (ibid: 190).

The relatively minor role played by the human remains in Benton's published report hides the real scale and rather problematic history of the assemblage. As Sylvia Benton's unpublished papers, held in Marischal College, University of Aberdeen, make clear, the published descriptions represent only a fraction of what was originally found. From these papers it is possible to reconstruct something of the tangled history of the human bone assemblage.

From Benton's letters, it appears that the human bones from the first season of excavation (1928) were sent initially to a Dr Ritchie. According to a letter from Benton dated September 1929, however, no report had been produced by that time. At some unspecified time, some part of this assemblage also passed to a certain Dr Dodgson, whose discovery of three cut-marked vertebrae is mentioned in Benton's report (1931: 207). No other mention of Dodgson appears in the surviving papers. Ultimately, this assemblage seems to have passed to Professor Thomas Hastie Bryce at the University of Glasgow. His undated manuscript, now held by Marischal College, catalogues the human bone from the 1928 season and provides comments that give rather more detail than the published report:

> The several deposits are taken as they happened to be examined as no relation between them is signified. I separated the animal bone from the human and sent them to Dr Ritchie. The absence of certain items in the numbered parcels is probably explained by this. I have arranged the bones in two classes – 1. those in which ossification is complete ie adult bones and 2nd, those in which one is sure the epiphyses have not joined ie immature bones.
>
> No attempt has, in most instances, been made to give the exact age for the immature bones. This could have been done at the cost of a great deal of work, but it did not seem necessary in the circumstances – nor calculated to throw light on the circumstances under which the bones were deposited into the cave. It seems sufficient to provide the evidence that the bones belong to all ages from newborn to adult life. Although the result could only be a very rough one, and subject to objectives, I have counted all the separate items in the two columns to find that the immature bones considerably exceed the adult bones in number.
>
> In spite of fallacies (?) it may be stated that the young bones predominate and if this be confirmed by the investigations of the second season's collections, it would constitute a factor in the problem of the nature of this cave ossuary.
>
> In the underground dwelling at Rennibister in Orkney, the bones which I examined included many young bones giving occasion to the same speculations as in the case of your cave.
>
> There is nothing to indicate any arrangement of bones of single individuals in what you have sent to me, but of course one knows nothing about the relative positions of your lettered and numbered areas.
>
> As they have been submitted to me the whole appears a chaotic mixture of bones of persons of all ages. There is a remarkable absence of skulls and skull bones, unless you have reserved these from my inspection – this is a factor of possible significance.
>
> (Bryce nd: 8–10)

The human bone from the second (1929) excavation season travelled a different path. During 1928, Benton seems to have been introduced to Professor Alexander Low, Regius Chair of Anatomy at the University of Aberdeen. After some prodding, he was persuaded to catalogue that season's assemblage of human remains, and a hand-written list of bones, ordered by grid square, survives among the Marischal College papers (Low nd). Unfortunately, however, Low appears to have persuaded Benton to be much more selective in her recovery of human remains during the final (1930) season. In a letter to Low dated 14 July 1930, Benton writes:

> I am keeping all skulls & leg-bones & I am carefully noting all bones in the 2nd layer. You will be glad to hear that the rest goes into the dump

Benton appears to have been true to her word and, unsurprisingly, Low's subsequent catalogue of the 1930 human bone assemblage (1930a) is much shorter than its predecessor, containing only 52 bones compared to 1252 in the previous year.

Throughout her correspondence with Professor Low, Benton remained extremely curious about the human bones and raised a number of questions which Low does not appear to have addressed. She asked, for instance, why the 'human bones in Layer 1 have a 'reddish tinge' while animal ones have not' suggesting, conceivably, the use of ochre, or at least the differential treatment of human and animal bones. More curiously still, she asks 'what have they done to skulls to make them turn blue, white and black like a new kind of pottery?' (perhaps suggesting exposure to flame). Low's side of the correspondence unfortunately does not survive.

Benton's letters also hint at omissions in Low's catalogue. For example she questions the apparent omission of a skull from the 1929 catalogue, saying 'perhaps it crumbled to pieces before you saw it. I remember thinking as I dug it out that it had been decapitated but I think I destroyed the evidence as I extracted it' (14 July 1930).

Despite their obvious shortcomings, however, these documents together catalogue around 1600 human bones (the exact number is impossible to determine), entirely transforming the scale of deposition suggested by the published excavation report. Of these, the only bones known to survive are four cervical vertebrae held by National Museums Scotland and a further three in Elgin Museum. Despite extensive searches, the whereabouts of the three additional cut-marked vertebrae mentioned in the published report is unknown, as is the fate of the remaining 1928 material catalogued by Bryce. As for the bones recovered in 1929, Benton wrote to Professor Low requesting that 'unless any anatomist would like them, perhaps you would be kind enough to throw them away for us' (letter dated 16 January 1931). Most likely this instruction was carried out.

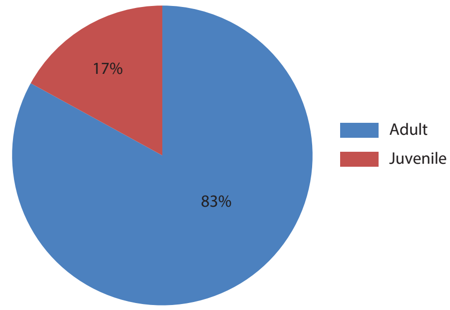

Illustration 6.2
Core assemblage broken down by adult and juvenile age categories; 'young' (15–25 years) included in 'adult' category; undifferentiated sub-adults omitted

6.5 Chronology

AMS dating has revealed that the human bone assemblage represents at least two distinct periods of mortuary activity within the Sculptor's Cave: one dating to the Late Bronze Age and one to the Roman Iron Age (see chapter 4; table 4.1; Armit et al 2011). Without dating every bone, it is impossible to disentangle the bone assemblages representing each of the two chronological periods. All of the stratified human bone from the Shepherd excavations, however, with the exception of mandible fragment SF1121, either returned a Late Bronze Age AMS date (SF225, SF235) or was otherwise associated with deposits which are stratigraphically Late Bronze Age in date (tables 4.1, 6.5). Meanwhile, five of the seven cut-marked vertebrae from the Benton assemblage (CV2–6) returned Roman Iron Age dates, as did an adult tibia fragment (SF1100) retrieved from Benton's spoil heap in 2006, a left temporal fragment recovered as part of the spoil heap excavations in 2014 (SF1130) and an unstratified thoracic vertebra from the Shepherds' excavations (SF1101; table 6.6). Since Bayesian modelling of the dated cut-marked vertebrae suggest that they may represent a single decapitation event (see section 6.8.3; chapter 4; illus 4.5), the undated examples have also been included in table 6.6, as has SF1121, which was recovered from a Phase 2/3 deposit during the Shepherds' excavations.

Comparison of the age profiles between the Benton and Shepherd material making up the core assemblage (1928–9 and stratified 1979 material) demonstrates the very different demographic profile of the two (illus 6.3), with juveniles predominating in the Late Bronze Age (Shepherd) assemblage and adults/young in the chronologically mixed (Benton) assemblage. Though illus 6.3 omits undifferentiated sub-adult bones, their inclusion (five bones; 22% of the Shepherd assemblage) would accentuate this pattern still further. Furthermore, 90% of the human bone known to date to the Roman Iron Age belongs to the adult/young categories (table 6.6).

While not conclusive, this raises a strong suspicion that the Late Bronze Age assemblage from the cave comprised predominantly juveniles (ie 'child' and 'infant' categories), while the Roman Iron Age assemblage comprised predominantly older individuals (ie 'adult' and 'young' categories). This possibility will be explored further in section 6.10.

Table 6.5
The stratified Shepherd Late Bronze Age human bone assemblage, excluding teeth (SF111, SF116a, SF116b, SF226, SF1123, SF1129) and bones too small for identification (SF1111–15). *SF232 and SF233 are ascribed to IIb17/18 (Block 2.2) in the original archive but IIb16/17 (Block 2.3) in Bruce's 1981 report and in the NMS archive; the latter context attribution has been adopted here

No.	Block	Context	Element	Detail	Age	Side	Pathology/ trauma	AMS date (95% confidence)	Notes
SF312	1.2	Ia22	Mandible (complete)	Central 2 incisors, both canines, 1st right premolar and molar, left 1st and 2nd molar present; right lateral incisor present (but damaged)	14–16 years	–	–	Failed	Radiographs show that third molars are partly formed but enamel is not completely developed; root formation of lower 2nd molar not complete. The missing teeth have probably been lost post-mortem. Teeth are caries-free and show only early attrition (Bruce 1981)
SF342	1.2	Ib23	Cranial fragment	Occipital (squamosal portion)	11–12 years	–	–	–	*Pars lateralis* of occipital still unfused. New bone formation on internal surface of cruciform area. Much less thickening of the trochlear region than SF233
SF1120	1.2	Ib23c	Metatarsal	2nd	Adult	L	–	–	–
SF225	2.2	IIb17	Mandible (complete)	With deciduous molars	4–6 years	–	–	1120–910 cal BC	Right condylar and coronoid process broken off. Teeth are caries-free and possess early signs of attrition of enamel
SF231	2.2	IIb18	Cranial fragment	Frontal	*c* 2 years	–	Multiple striations/ possible peri-mortem fracture	Failed	Metopic suture completely fused. Unusual brown colouration suggests damp environment.
SF234(a-b)	2.2	IIb17	Cranial fragments (×2)	Occipital	Sub-adult	L lateral	–	–	Sutures are open
SF243	2.2	IIc23	Cranial fragment	Temporal (with greater wing of sphenoid and 3 ossicles in middle ear cavity)	Sub-adult (<5–6 years)	L	–	–	Mastoid process is poorly developed and there is a patent foramen of Huschke which usually closes by the fifth or sixth year. Well-marked groove (of Lucas) on the medial aspect of the spine of the sphenoid (Bruce 1981). Same individual as SF244 and SF245?
SF244	2.2	IIc23	Cranial fragment	Occipital	Sub-adult (<5–6 years)?	–	–	–	Same individual as SF243 and SF245?
SF245	2.2	IIc23	Cranial fragment	Temporal (squamous and tympanic portion)	Sub-adult (<5–6 years)?	R	–	–	Patent foramen of Huschke. Irregular external surface. Stained patches on external surface similar to that previously observed in spoil heap assemblage. Same individual as SF243 and SF244?

Table 6.5 (continued)
The stratified Shepherd Late Bronze Age human bone assemblage, excluding teeth (SF111, SF116a, SF116b, SF226, SF1123, SF1129) and bones too small for identification (SF1111–15). *SF232 and SF233 are ascribed to IIb17/18 (Block 2.2) in the original archive but IIb16/17 (Block 2.3) in Bruce's 1981 report and in the NMS archive; the latter context attribution has been adopted here

No.	Block	Context	Element	Detail	Age	Side	Pathology/ trauma	AMS date (95% confidence)	Notes
SF227	2.3	IIb16	Mandible (fragment)	With surviving molar (M1) and premolar (PM2)/2nd deciduous molar	*c* 7 years	R	Some porosity	–	3rd molar not erupted
SF232(a-c)	2.3	IIb16/17	Cranial fragments (x3)	Parietal	2 years	R?	–	–	Parts of fronto-parietal and occipito-parietal sutures present
SF233	2.3	IIb16/17	Cranial fragment	Occipital (cruciform area)	3–3.5 years	L	–	–	Very thickly buttressed internally
SF235	2.3	IIb16/17	Mandible (complete)	All lower deciduous teeth present except for right canine (lost post-mortem?). Permanent first molar crown visible on both sides	2–4 years	–	Bilateral damage to gonial region; probably recent	1120–910 cal BC	–
SF1103	2.3	IIb16/17	Humerus	Complete but missing epiphyses	6–7 years	–	–	–	–
SF1104	2.3	IIb16/17	Ulna	Complete but missing epiphyses	*c* 1 year	R	–	–	–
SF1105	2.3	IIb16/17	Ulna	Diaphysis only; upper and lower ends missing	*c* 12 years	R	–	–	–
SF1106	2.3	IIb16/17	Radius	Distal 1/3 and epiphyses missing	*c* 12 years	L	–	–	–
SF1107	2.3	IIb16/17	Ulna	Central part of diaphysis only	2–3 years	R	–	–	–
SF1108	2.3	IIb16/17	Rib	12th? (head only)	–	L?	–	–	–
SF1109	2.3	IIb16/17	Rib	One of the central ribs (part of diaphysis)	–	–	–	–	–
SF1110	2.3	IIb16/17	Rib	One of the central ribs (part of diaphysis)	–	L	–	–	Post-mortem damage
SF1116	2.3	IIb16	Clavicle	Complete except for lateral end	Sub-adult	R	–	–	–
SF1117	2.3	IIb16	Humerus	Distal half without epiphyses	–	L	–	–	–

Table 6.6
Human bone from the Sculptor's Cave assemblage dated to the Roman Iron Age directly, stratigraphically or by association

No.	Museum reference	Excavator	Element	Block/context/ grid square	Age	Pathology	Trauma	Date (95% confidence)
CV1	Elgin C7 1929 1931.14	Benton	Atlas vertebra	C7	Adult	None	Single cut mark	–
CV2	Elgin 1 1931.14	Benton	Axis vertebra	Unknown	Adult	None	Single cut mark	cal AD 120–340
CV3	Elgin 2 1931.14	Benton	Axis vertebra	Unknown	Sub-adult (<16–17 years)	None	Single cut mark	cal AD 220–400
CV4	HM 159	Benton	Axis vertebra	D4	Adult	Yes	Single cut mark	cal AD 230–400
CV5	HM 160	Benton	Axis vertebra	D7	Adult	None	11 cut marks	cal AD 80–320
CV6	HM 161	Benton	Axis vertebra	B4	Sub-adult (<16–17 years)	None	Single cut mark	cal AD 220–400
CV7	HM 162	Benton	Axis vertebra	Unknown	Adult	Yes	Fracture?	–
SF1100	–	Schulting 2006	Tibia fragment	Unstratified (Benton spoil heap)	Adult	None	Spiral fracture	cal AD 130–350
SF1101	–	Shepherd	Thoracic vertebra	Unknown	Sub-adult (<15–16 years)	None	None	cal AD 130–380
SF1121	–	Shepherd	Maxilla with deciduous molars (M1, M2)	2.7 (IIa5)	<10.5 years	None	None	–
SF1130	–	Büster/Armit	Left temporal	Unstratified (Benton spoil heap)	Unknown (aDNA: male)	None	None	cal AD 255–411

6.6 Element representation

A wide range of skeletal elements is represented across the various assemblages from the Sculptor's Cave, including the recovery by Benton of several 'wisps' and 'plaits' of human hair from grid squares A6 and C7 (Benton 1931: 197, 207), the latter found in association with two bone pins (SF807, SF808; illus 5.15). In terms of bone elements within the core assemblage, vertebrae are the most commonly represented (37%), followed by ribs (29%; illus 6.4; table 6.2). Isolated teeth, assuming that they were found, appear not to have been catalogued in the Benton assemblage, and teeth from the Shepherd assemblage have therefore been omitted from the comparative analyses.

The presence of significant numbers of small bones, like metacarpals (4%) and metatarsals (7%), suggests that at least some whole, articulated bodies were originally present in the cave. Nevertheless, Benton does not mention the recovery of articulated skeletons or body parts. One caveat to this is Low's reference to two 'individuals' in his assessment of the 1929 material: an 'adolescent under 18' and a 'child about 5 years', both apparently recovered from grid square C6. Furthermore, two unstratified hand phalanges (SF1125, SF1126) and a fourth right metacarpal (SF1127) recovered from 'rear gravel' during the Shepherd excavations (and extracted from the marine mollusc assemblage during the recent post-excavation programme) could belong to the same individual, aged around 4 years.

Breaking down element representation by age reveals further patterns (illus 6.5), with crania and pelvic bones better represented among the juveniles (ie 'child' and 'infant'

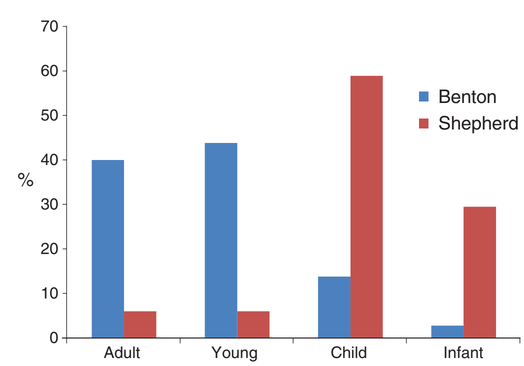

Illustration 6.3
Comparison of age groups represented in the Benton (1928–9; n=1546) and stratified Late Bronze Age Shepherd (1979; n=17) human bone assemblages; teeth not included. Bones from the Shepherd assemblage assigned to 'unknown' or 'undifferentiated sub-adult' categories omitted for the purposes of comparison

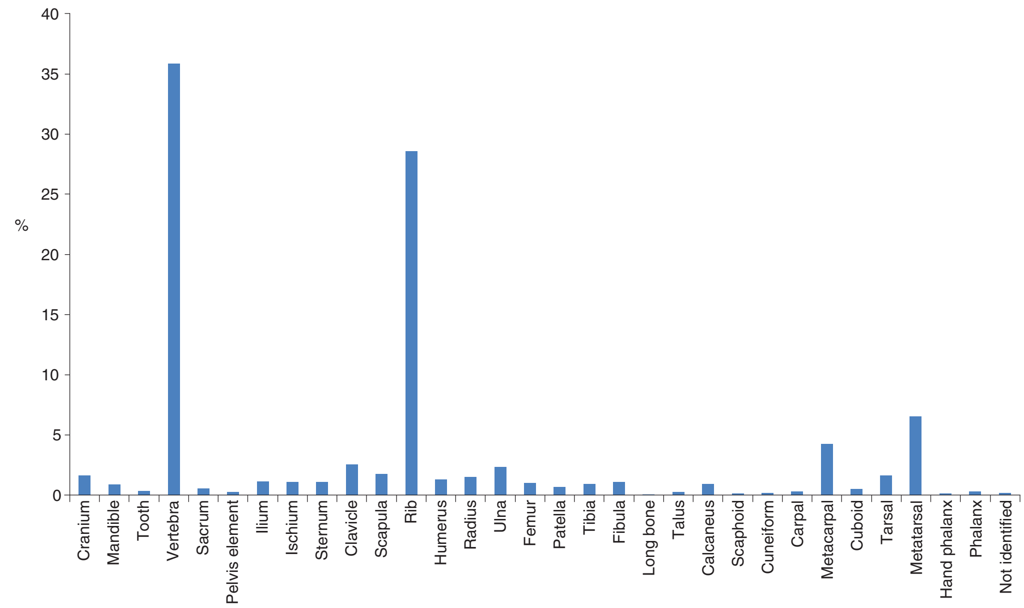

Illustration 6.4
Elements represented as a percentage of the total core assemblage. Pelvis includes 'hip bone'; calcaneus includes os calcis

Table 6.7
Table showing elements included within generalised 'body zones'; teeth and non-identifiable bones omitted. Cranium includes maxilla.

Body zone	**Bone elements included**
Head	Cranium, mandible
Torso	Vertebrae, sacrum, pelvis element (undifferentiated), ilium, ischium, sternum, clavicle, scapula, rib
Limbs	Humerus, radius, ulna, femur, patella, tibia, fibula
Extremities	Talus, calcaneus, scaphoid, cuneiform, carpal (undifferentiated), metacarpal, cuboid, tarsal (undifferentiated), metatarsal, phalanx (undifferentiated)

categories) and certain post-cranial elements, particularly metacarpals and metatarsals, better represented among the adult assemblage, a pattern which is further enhanced if we group elements by 'body zone' (ie head, torso, limbs, extremities; table 6.7; illus 6.6). Taking the pattern of body part representation between adults and infants, for example, crania are much better represented (26%) within the infant assemblage, in comparison to 1% representation in the adult assemblage. The higher proportion of cranial elements in the stratified Shepherd assemblage (illus 6.7) indicates that many of these are likely to be Late Bronze Age in date. Conversely, extremities (29%) are better represented within the adult assemblage, compared with only 2% representation in the infant assemblage. As a caveat, we should remember that infant crania are unfused, so more fragments need not represent more crania; it is also possible that small elements (such as sub-adult hand and foot bones) were overlooked during excavation.

Bearing in mind the chronological distinction between a predominantly juvenile Late Bronze Age population and a predominantly adult Roman Iron Age population (section 6.5), these age-based differences in element representation may reflect chronological differences in treatment of the dead. This possibility will be explored further in section 6.10.

All age categories in the core assemblage, with the exception of infants (represented by a small overall sample size of 47 bones), show larger percentages of right-sided elements than left (illus 6.8), particularly in the 'young' (64%:36%) age group; in large part this is a result of the preponderance of right clavicles (see table 6.8). While this difference cannot be demonstrated to be statistically significant, it might suggest a bias towards the removal of certain left-sided elements from the cave or, conversely, selective deposition biased towards right-sided elements (or the preferential survival of bones if bodies were consistently placed in the same position, for example, on their left or right sides).

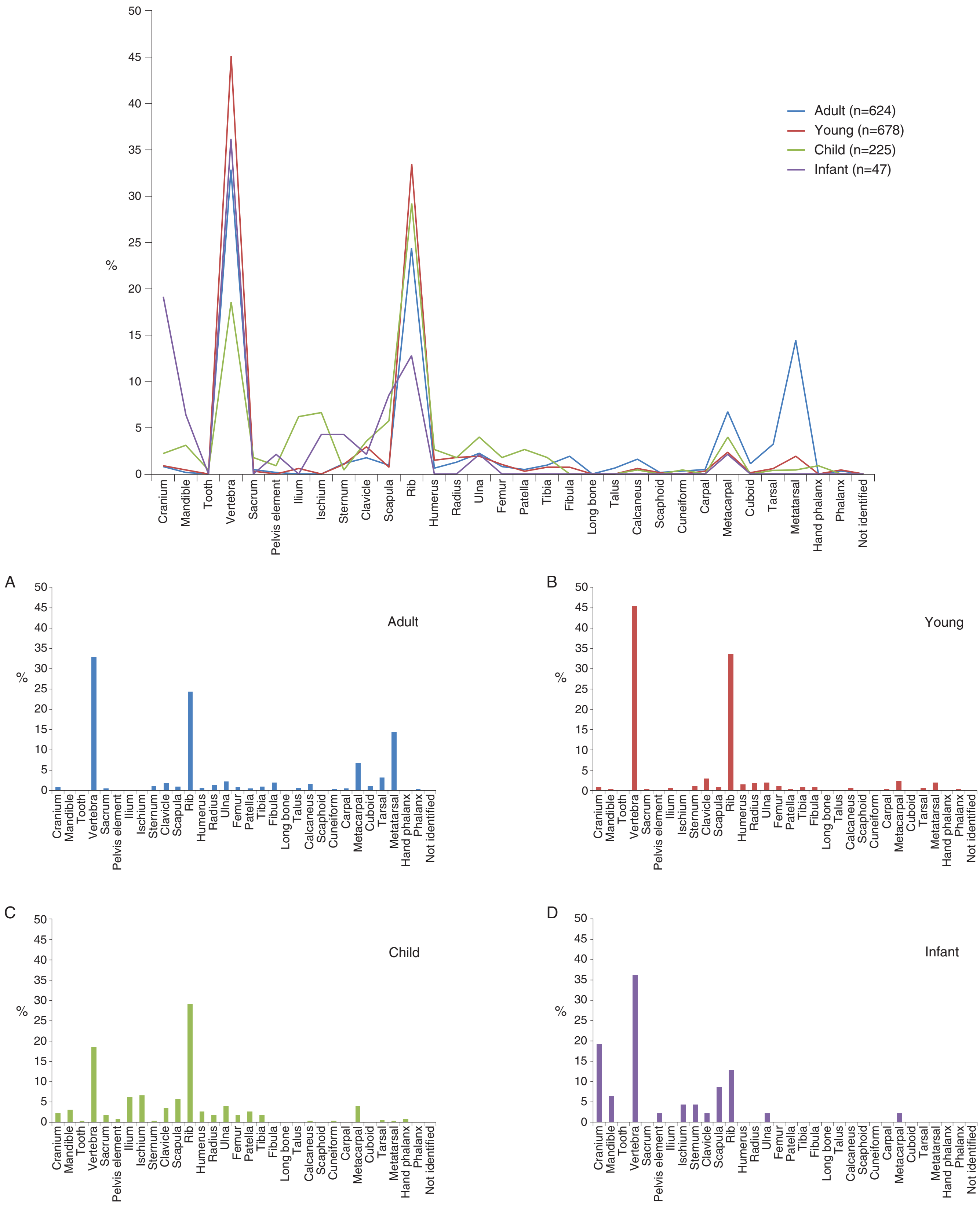

Illustration 6.5
Element representation of core assemblage as a percentage of each age category; ‘unknown’ age category omitted

6.7 Spatial distribution

The spatial distribution of the bones from Benton's excavations was not recorded systematically, but we can reconstruct it partially from the 1929 bone list (Low nd; the 1928 bone list (Bryce nd) is impossible to relate to Benton's site grid). This represents 72% of the total assemblage and can be combined with 11 stratified bones from the 1979 Shepherd excavations for which a location was plotted. Although each of Benton's grid squares is 10 feet (*c* 3m^2), broad patterns can be observed.

Bone was found in most of the excavated grid squares and has a generally wide spatial distribution (illus 6.9; see illus 2.2 for grid square concordance). It does appear, however, to have been more densely distributed in the centre of the cave, through rows B and C, with notable concentrations in grid squares C3 and D4. Plotting the distribution of the largest (femur, humerus) and most frequently encountered (clavicle) elements in the bone assemblage (illus 6.10) suggests no clear patterning as we might have expected had there been any sorting or ordering of bones into concentrated secondary contexts; instead, the concentration of femora and clavicles in grid squares C3 and D4 mirrors the overall distribution of human bone within the cave (illus 6.9).

Breaking the plots down by age, however, reveals some subtle patterns (illus 6.11). Adults and 'young' individuals have a fairly even distribution across the cave interior, with relatively few bones in the entrance passages and a notable concentration in grid square D4. Children's bones have a much more central distribution, avoiding the periphery of the cave interior, though also with a concentration in grid square D4; they are also present in the outer entrance passages and entrance canopy. Most striking of all, however, are the infant bones, which cluster in rows A and B, in the west half of the cave interior, with a particular concentration in grid square A3. Like the children's bones, they also have a subsidiary concentration in the entrance passages.

Breaking down the distribution of bones by body zone enhances the picture (illus 6.12). Heads (cranial and mandibular fragments), unsurprisingly, mirror the distribution of younger individuals (ie children and infants) – the age group in which this part of the body is best represented (see illus 6.5, 6.6) – being absent from the east part of the cave interior but densely concentrated in the East Passage. Meanwhile, bones of the limbs, torso and, to some extent, extremities cluster in the same grid squares as the adult remains, suggesting the deposition of at least

Table 6.8
Percentage representation of lateralised (left- and right-sided) elements in the core assemblage. The sided elements represent 17% of the total assemblage for those elements (n=148). Undifferentiated sub-adults and bones which could not be assigned an age category are not included

Element	Adult		Young		Child		Infant	
	L	R	L	R	L	R	L	R
Ilium	0	0	2	1	0	9	0	0
Ischium	0	0	0	0	7	7	2	0
Clavicle	2	8	3	7	3	3	1	0
Scapula	3	1	0	2	5	3	1	2
Humerus	1	1	1	3	2	2	0	0
Radius	0	5	2	4	2	0	0	0
Ulna	4	5	2	4	3	4	0	1
Femur	3	1	1	1	1	3	0	0
Tibia	2	1	1	1	1	1	0	0
Fibula	0	0	0	1	0	0	0	0
Rib	0	0	0	0	0	0	0	0
Talus	5	1	2	1	1	0	0	0
Metacarpal	0	0	0	0	0	1	0	0
Metatarsal	1	0	0	0	0	0	0	0
Total per age group	21 (48%)	23 (52%)	14 (36%)	25 (64%)	25 (43%)	33 (57%)	4 (57%)	3 (43%)

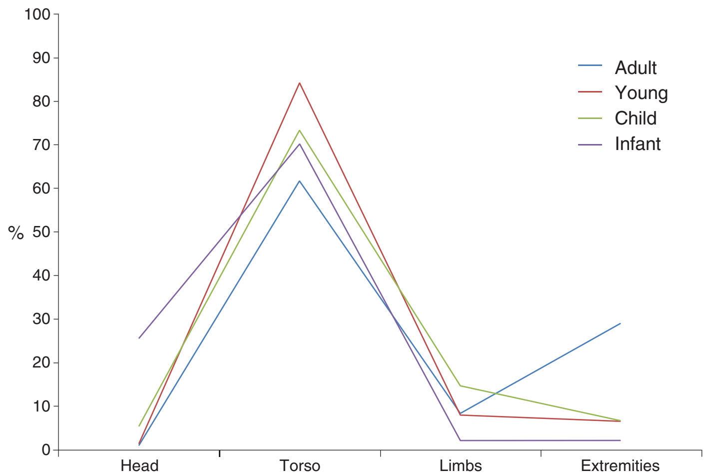

Illustration 6.6
Percentages of different 'body zones' within different age groups. Note that undifferentiated sub-adults have been omitted due to the low number of bones (minus teeth, n=5) represented

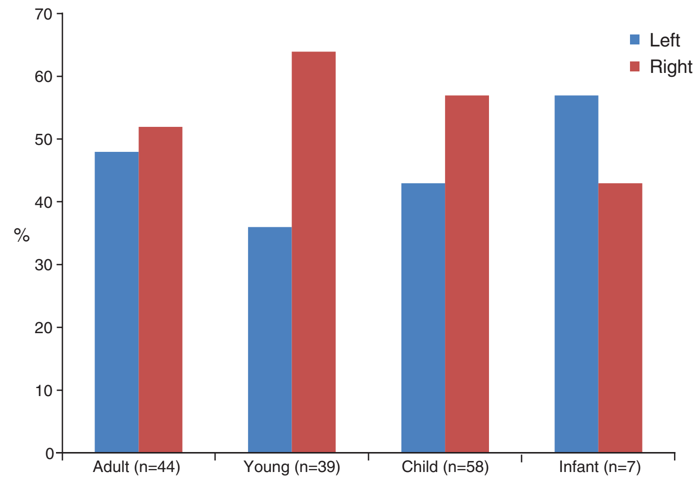

Illustration 6.8
Percentage of lateralised (left- and right-sided) elements within each age category. Sub-adults omitted due to low sample number (n=2); bones assigned to the 'unknown' age category also omitted

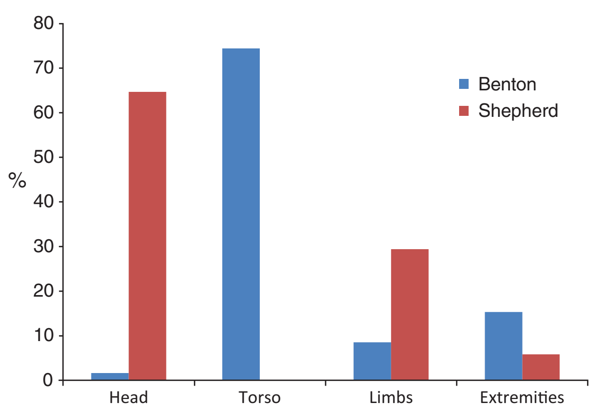

Illustration 6.7
Comparison of body part representation in the Benton (1928–9; n=1546) and stratified Shepherd Late Bronze Age (1979; n=17) human bone assemblages (minus teeth). Bones from the Shepherd assemblage assigned to 'unknown' or 'undifferentiated sub-adult' categories omitted for the purposes of comparison

some articulated bodies of adult individuals, which became disarticulated over time. Again, the generally wide distribution of most body zones provides further evidence against the sorting of disarticulated bones by element.

Interestingly, the marked concentration of extremities in grid square C6 (illus 6.12) correlates with Low's 1929 report, which refers to two 'individuals' in this location (see section 6.6). The concentrations of extremities here may thus reflect the former presence of complete bodies. Interestingly, however, this grid square does not contain any cranial or mandible fragments, suggesting that, if these were complete bodies, the heads were (at some point) removed.

6.8 Osteological analysis

Rick Schulting, Christopher Knüsel and Ian Armit

6.8.1 Introduction

Modern osteological analysis of the human remains from the Sculptor's Cave is obviously limited in scope, given that the vast majority of the bones from the site are now lost or discarded. Nonetheless, some indications of the character of the assemblage can be drawn from the following groups:

- An assemblage of 35 stratified human bones and teeth recovered from the Shepherd excavations, all but one of which can be attributed to the Late Bronze Age through a combination of direct and stratigraphic dating (chapters 2 and 4). Identifiable elements, excluding teeth, are shown in table 6.5. A small amount of unstratified human bone (12 elements) was also recovered.
- Seven cervical vertebrae from the Benton excavations, now known to date to the Roman Iron Age (tables 4.1, 6.6).
- One hundred and four human bones retrieved from Sylvia Benton's spoil heap during excavations in 2014 (box section 1) and an additional bone from surface collection in 2006 (SF1100). These are likely to represent a mix of Late Bronze Age and Roman Iron Age individuals.
- A lumbar vertebra (SF1102) donated to Elgin Museum in 1994 and provenanced to the Sculptor's Cave (reported to have been recovered from the area around grid square B5). This is of unknown date.

6.8.2 Late Bronze Age

Of the 34 Late Bronze Age human bones from the Shepherd excavations (table 6.5), 29 were recovered from the East Passage and 5 from the West Passage. As discussed in chapter 2, however, this imbalance between the passages may be partly due to recovery

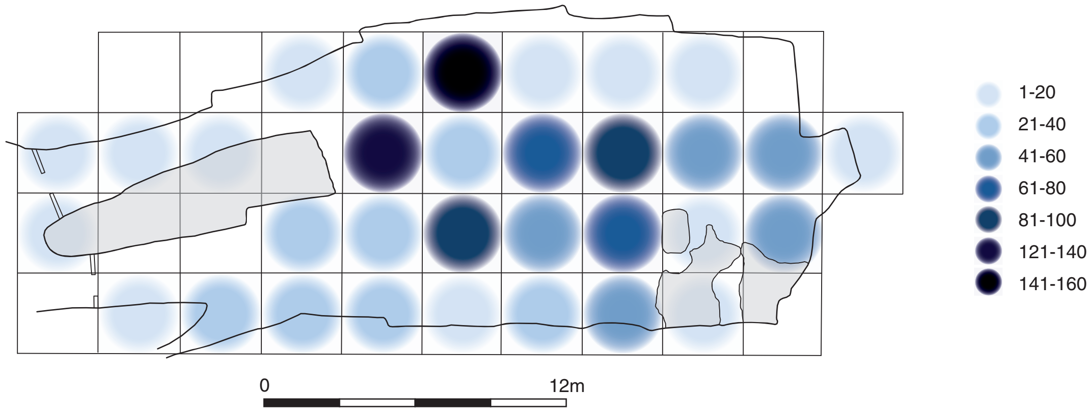

Illustration 6.9

Spatial distribution of Benton's 1929 human bone assemblage, based on Low's 'bone list' (see illus 2.2 for grid square concordance). Stratigraphic information regarding the 'layers' from which the bone was recovered has been omitted due to its chronological unreliability

Illustration 6.10

Spatial distribution of right clavicles, humeri and femora in Benton's 1929 human bone assemblage, indicating a lack of sorting of bone by element

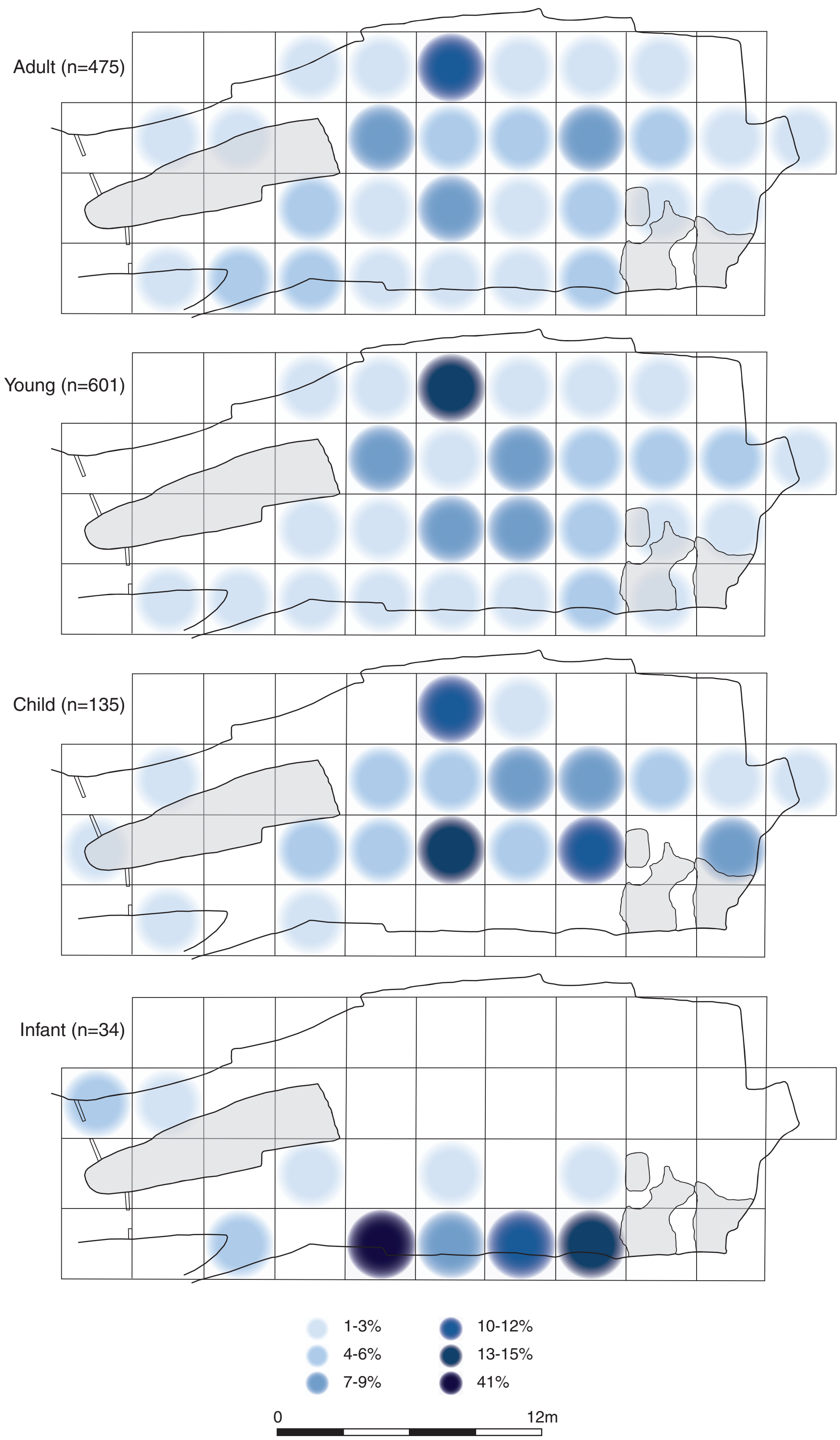

Illustration 6.11

Spatial distribution of Benton's 1929 and Shepherd 1979 human bone assemblages broken down by age category (see table 6.3); values represented as percentages of each age category. Undifferentiated sub-adults from Shepherd assemblage (SF234) omitted for the purposes of comparison. Some 99% of the total 1929 Benton bone assemblage and 29% of the Shepherd bone assemblage (minus teeth) could be located to grid square

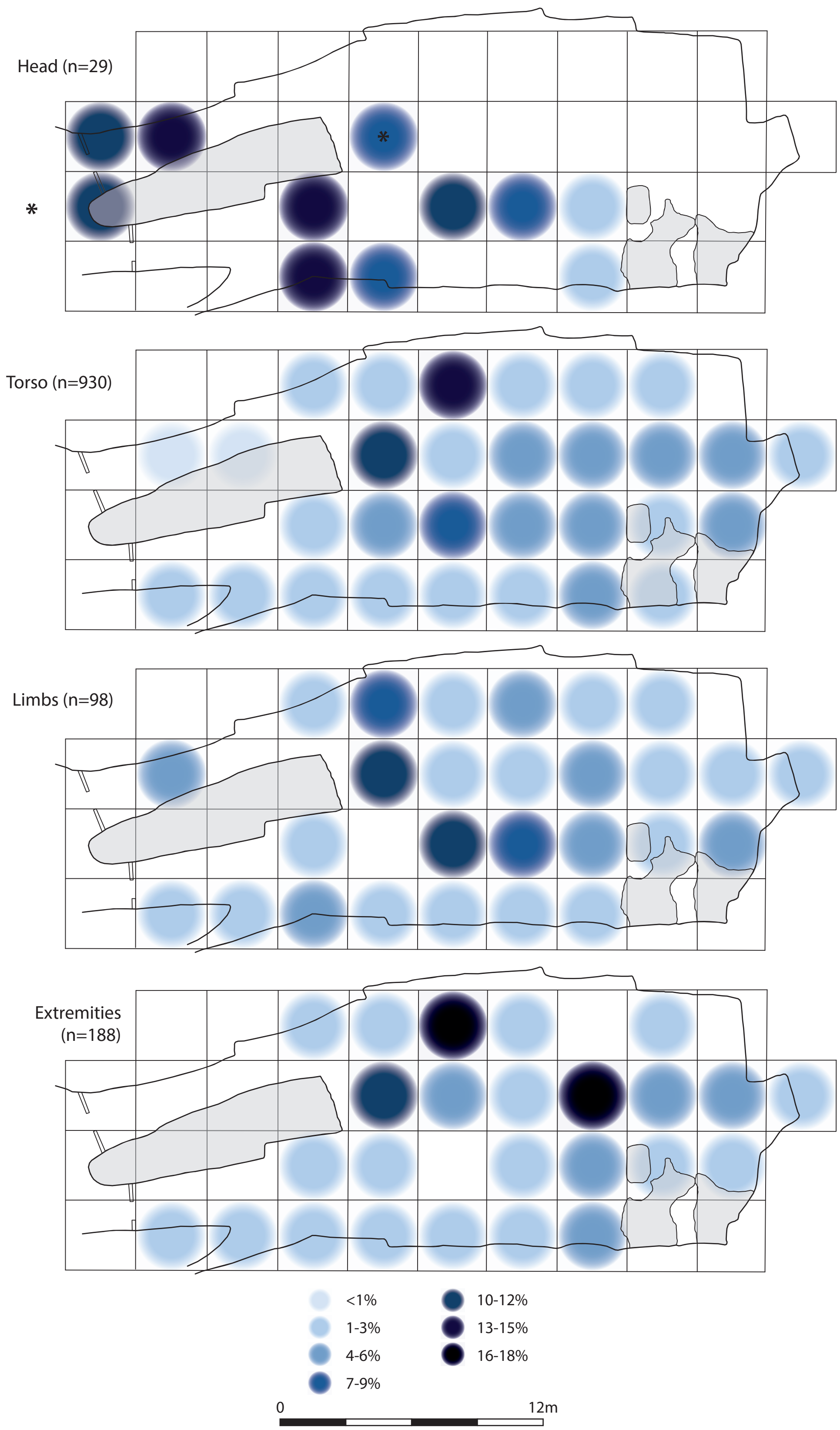

Illustration 6.12
Spatial distribution of Benton's 1929 and Shepherd 1979 human bone assemblages broken down by body region (see table 6.5); values are quoted as percentages of each body region represented. Asterisks indicate the location of additional 'crushed skulls' cited in Benton's report (1931: 181, 190)

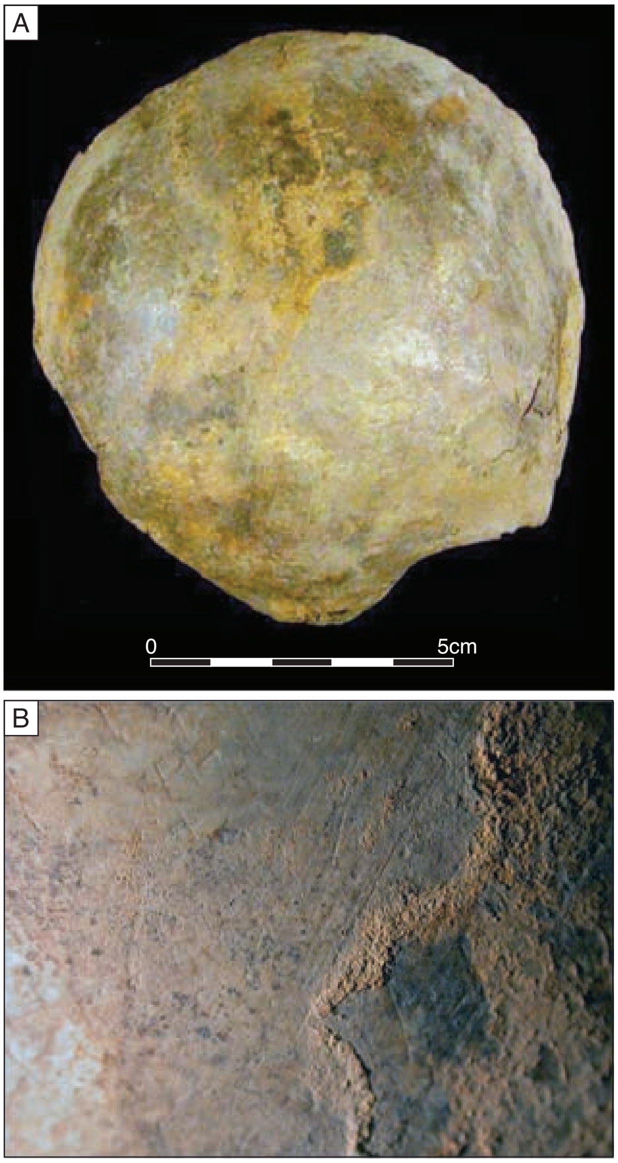

Illustration 6.13
(A) Child's frontal bone (SF231) with (B) detail showing striations; note continuation under adhering sediment (photographs: Rick Schulting)

bias (section 2.3.4). While cranial and mandible fragments are common, 57% of the bones are post-cranial. Sex cannot be determined for any of the individuals represented.

Sub-adult cranial fragments

The Late Bronze deposits yielded eight sub-adult cranial fragments; SF232 and SF234 were found in pieces but are probably from single bones and have been recorded as individual fragments. Three of the fragments (SF243–5), which were found close together by the west wall of the East Passage, near to the entrance (section 2.3.2; illus 2.13), probably come from the same individual; a child of less than 5–6 years old. At least three other children appear to be represented by cranial fragments, ranging from 2–12 years in age (table 6.5).

The most notable element from this group is a sub-adult frontal belonging to an individual aged around 2 years at death (SF231; Phase 1; Block 2.2; Context IIb18; illus 6.13A; table 6.5), with a frontal chord length of 92mm. The surface of this element is covered with groups of fine, parallel striations in multiple directions that can be seen to continue beneath sediment deposits that adhere to the vault (illus 6.13B). Taken individually, some of these could be seen as the result of taphonomic processes, such as the movement of the bone against stony ground (cf Andrews and Cook 1985). However, three factors argue against such an interpretation: first, no other cranial elements show comparable striations; second, they are too numerous, covering much of the surface of the bone; and third, the striations occur only on the outer surface of the bone, but might be expected to be equally distributed across all surfaces if resulting from post-depositional processes. It is unclear what implement was used to produce the striations, but they appear to be anthropogenic and ancient. The most probable explanation is that they relate to the removal of adhering soft tissues from the cranial vault by scraping or scouring: they are not cut marks that would indicate avulsion or reflection of the scalp, as one might find in scalping or cranial surgery.

A break to the mid-lateral right frontal displays some of the characteristics of peri-mortem fracture, with a well-defined, patinated internal bevel. The fracture edges themselves, however, were damaged post-mortem, making assessment difficult and leaving the question of peri-mortem injury or post-mortem damage open.

The rich brown colouration, seen particularly on the internal surface, is typical of bone that has been immersed in water or peat, though it has also been noted on human bone from chambered tombs in Orkney (Rick Schulting pers obs), where damp conditions can presumably produce a similar effect. A sample unfortunately failed to yield sufficient collagen for dating.

Sub-adult mandibles

Four sub-adult mandibles represent children ranging from 2–4 and 14–16 years of age (table 6.5). Three (SF225, SF227, SF235) were found in close association with cranial fragments in a relatively confined area of the East Passage (section 2.3.2; illus 2.13).

The stratigraphically earliest example is a sub-adult mandible (SF225; Phase 1; Block 2.2; Context IIb17) belonging to a child aged 4–6 years at death. It produced an AMS date of 1120–910 cal BC (SUERC-16623). In the block immediately overlying this, was another mandible, belonging to a child aged 2–4 years at death (SF235; Phase 1; Block 2.3; Context IIb16/17; illus 6.14A), with the permanent molar crypts just beginning to open (based on Ubelaker's (1978) standard dental development chart). The gonial region shows bilateral damage (illus 6.14B). This is the area that would be affected by decapitation blows, which typically travel completely through the neck and hit the posterior of the mandible. In this case, however, the splintered morphology of the damage and a lack of patination both indicate recent damage. It produced an AMS date of 1120–910 cal BC

Illustrations 6.14
(A) Child's mandible (SF235) with (B) details of recent damage to gonial region (photographs: Rick Schulting)

(SUERC-16622). A second sub-adult mandible fragment from the same context (SF227; Phase 1; Block 2.3; Context IIb16) belongs to a child aged *c* 7 years at death (age determination based on a radiograph that does not appear to survive in the site archive; Bruce 1981).

The fourth sub-adult mandible (SF312; Phase 1; Block 1.2; Context Ia22) represents an older individual than the others; an adolescent aged 14–16 years at death. It shows no signs of pathology or trauma and was found in association with the stake-built structures in the West Passage (section 2.3.4; illus 2.21). Its context would place it slightly later than the others, though still within the Late Bronze Age.

Post-cranial elements

The Shepherds also recovered 16 stratified post-cranial bones, again mainly composed of sub-adults. All but one bone derived from Block 2.3 in the East Passage (table 6.5).

Of two humeri, one is adolescent or adult size but lacks its epiphyses (SF1117) and the second belongs to a child aged 6–7 years at death (SF1103). A complete left radius (SF1118) belongs to a child aged 4–5 years at death (it is unstratified and thus not shown in table 6.5), while another fragmentary radius (SF1106) also belongs to a sub-adult of approximately the same age. The youngest individual, approximately 1 year old at death, is represented by an ulna (SF1104).

The sole adult bone known to date from the Late Bronze Age is a left second metatarsal from Block 1.2 (SF1120), one of only three human bones from the West Passage.

Summary

The human remains of known Late Bronze Age date comprise at least five children ranging from 1 to *c* 16 years of age at death (based on the four children's mandibles and the infant represented by an ulna), an adolescent and an adult (table 6.5).

During the Shepherds' excavation, only the sub-adult mandibles and cranial fragments were identified as human (which is why only these elements are plotted on plans of the entrance passages; illus 2.13, 2.21). This led to the suggestion that the entrance area of the cave was given over to the display of fleshed children's heads (Shepherd 2007: 199), perhaps wearing the hair rings that were also found in the Late Bronze Age deposits (illus 2.21). In this interpretation, the mandibles and hair rings were believed to have fallen from the heads as they decayed, becoming incorporated into the accumulating entrance deposits. When the faunal bone was analysed following the completion of the excavations, however, it became evident that numerous post-cranial human bones had also been recovered from the same contexts but had simply not been identified as human at the time. While the overwhelming preponderance of children's bones remains striking, the presence of these post-cranial elements suggests that Late Bronze Age rites practiced in the cave did not focus solely on the head, and casts doubt on some of the initial interpretations.

Although the idea of a display of fleshed heads may be less compelling than it seemed initially, the multiple striations on the sub-adult frontal (SF231) suggests that there was at least some element of manipulation and curation of human remains within the cave at this time.

6.8.3 Roman Iron Age

Only one human bone (a sub-adult maxilla fragment; SF1121) of likely Roman Iron Age date was recovered from stratified contexts during the Shepherds' excavation. This came from Block 2.7 in the East Passage, a complex set of deposits that formed over several centuries (section 2.4.2; table 6.6). The remainder of the human remains known to date from this period have been identified only where directly AMS dated. The majority of these comprise a series of cut-marked cervical vertebrae from Sylvia Benton's excavations: where the locations are recorded, these were found in the interior of the cave (one each in grid squares B4, C4, D4, C7 and D7; Benton 1931: 207; illus 6.15); it is not possible to attribute all vertebrae to a specific grid square (see below). Benton's original report (1931: 207) mentions nine cut-marked cervical vertebrae: six (four axis vertebrae and two atlas vertebrae) identified by Low and three (unspecified) by a certain Dr Dodgson (this is the only mention of this individual in the site archive, and it is unclear what happened to these bones). Of the seven vertebrae which survive

Illustration 6.15
Spatial distribution of cut-marked vertebrae (after Benton 1931: 207)

(six axis vertebrae and one atlas vertebra), six exhibit definite lesions with morphological features characteristic of peri-mortem sharp force injury (Sauer 1998; Novak 2000; Symes et al 2002; Knüsel 2005); the remaining axis vertebra (CV7; which did not appear in Low's original list) shows breakage that appears to be peri-mortem and related to decapitation (table 6.6). Five of these vertebrae derive from adults, with degenerative changes of one element (CV4) consistent with an older age at death. The remaining two vertebrae (CV3 and CV6) belong to sub-adults of less than 16–17 years of age, as seen in their unfused ephiphyseal rings. None of the surviving vertebrae can be matched to the same individual. Thus, we are dealing with the killing of at least six people; four adults and two children or young adolescents. Assuming that the elements identified by Dodgson belonged to separate individuals, the total would rise to nine. These vertebrae are highly unusual and describing them individually allows us to elucidate further details on the nature of this violent event.

Illustration 6.16
CV1: Inferior view showing sharp force trauma predominantly to left inferior articular surface (photograph: Rick Schulting)

Cut-marked vertebrae

CV1: Atlas vertebra, adult (grid square C7; illus 6.16)
This specimen is the only atlas among the surviving vertebrae, though Low (nd) notes the presence of two in his report. Although unstratified and not directly dated, the bone is assigned to the Roman Iron Age by association with the directly dated cut-marked vertebrae (table 4.1).

An oblique cut in the transverse plane directed from the posterior left side has completely removed the left inferior articular facet (through its process), the inferior margin of the left portion of the anterior arch and a piece of bone from the mid-line, from the inferior portion of the articular surface for the dens of the axis, as well as two small chips of bone from the right inferior articular facet, one (larger) from the medial margin and a smaller one from the lateral margin.

The injury appears to have resulted from a single blow to the posterior of the neck. As the cut is to the inferior surface, this vertebra would have remained attached to the head, assuming decapitation was completed by cutting through any remaining soft tissues.

CV2: Axis vertebra, adult (illus 6.17A)
A cut directed from the posterior right side has removed both inferior articular facets and the inferior portion of the spinous process and body, bisecting the vertebra obliquely in the transverse plane antero-posteriorly (illus 6.17B). The bone returned an AMS date of cal AD 120–340 (SUERC-16617).

The injury appears to have resulted from a single blow that may have clipped the left inferior articular facet of the atlas. Assuming that decapitation was completed by cutting through any soft tissues, the portion of the axis represented here, together with an undamaged atlas vertebra, would have remained with the head.

CV3: Axis vertebra, sub-adult (illus 6.18A)
The vertebra belongs to a child or adolescent aged less than 16–17 years at death (based on the unfused vertebral plate epiphysis of the body). The element is relatively small and thus is probably that

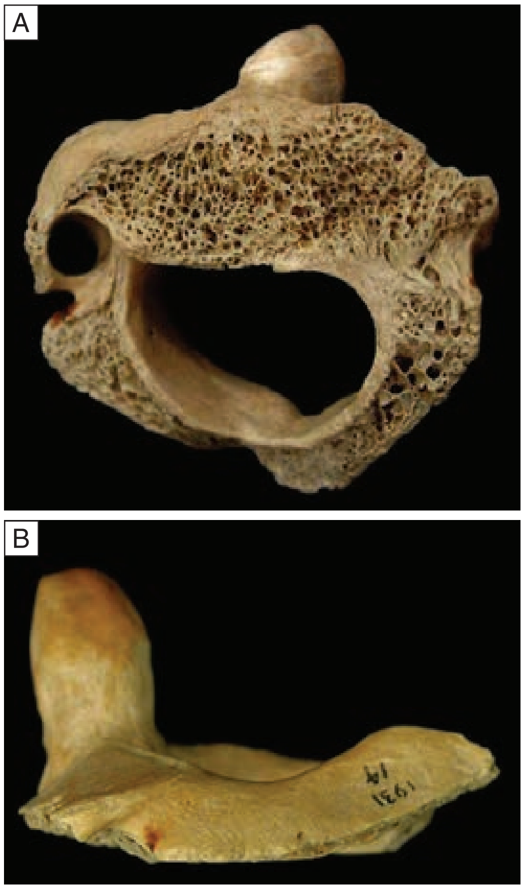

Illustration 6.17
CV2: (A) Inferior view of axis bisected by heavy blow with a sharp-edged implement and (B) left lateral view (photographs: Rick Schulting)

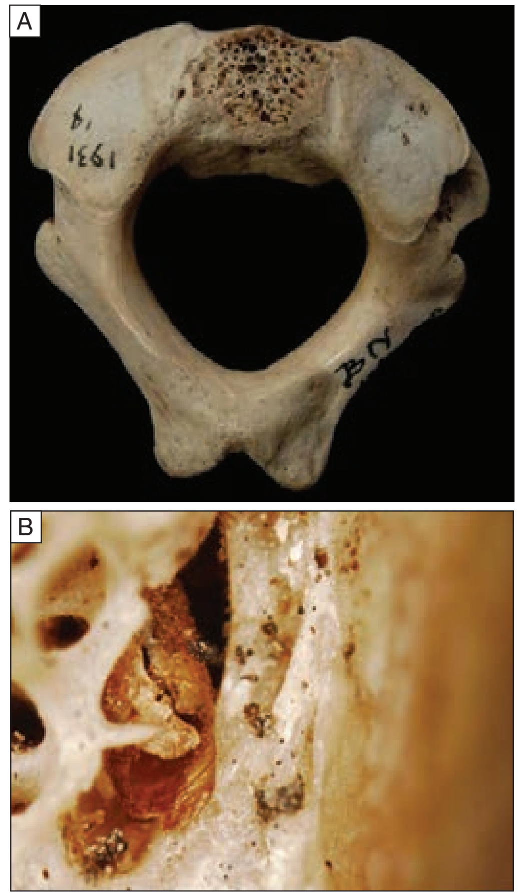

Illustration 6.18
CV3: (A) Superior view, showing heavy blow through the dens with (B) detail of fly pupa casing in the exposed cancellous bone of the dens (photographs: Rick Schulting)

of a child rather than an adolescent. The bone has been dated to cal AD 220–400 (SUERC-16618).

A cut directed from the posterior has detached the dens and its process from the body of the vertebra (ie through the intervertebral space between C1 and C2). The process of the dens seems to have snapped off with the weight of the head (as with CV7).

The injury appears to have resulted from a single blow to the posterior of the neck. This element would have remained with the torso, with the dens and the atlas being removed with the head.

A number of pupa casings are present in the cancellous bone exposed by the removal of the dens (illus 6.18B). Precise identification to species is made difficult by their incomplete and fragile state; nevertheless, their size, morphology (as far as can be made out) and context suggest that they are almost certainly pupae of the *Phoridae* family (Paul Moore pers comm). Phorid flies are attracted to decaying organic matter, including corpses, as the common name of 'coffin fly' for one species suggests (Benecke 2008). A single female will lay hundreds of eggs which hatch within a day or two. Larvae then feed for eight to sixteen days before moving to a drier spot to pupate (Disney 1994). Most species within the family are not immediately attracted to fresh corpses, and this, together with the presence of a fly pupa within the vertebra, suggests that this cycle of flies at least was feeding from well-decayed corpses in the cave, to the extent that the vertebra was already becoming dry. As the flies can burrow or follow small cracks in the soil to depths as great as 2m, this does not necessarily imply that the remains were exposed on the cave floor, though of course this is implied by Benton's discovery of bones lying on the surface when she visited the site.

CV4: Axis vertebra, adult (grid square D4; illus 6.19A)

This axis vertebra has osteophytes on the superior aspect of the articular surface of the dens and slight joint surface contour change of all four articular facets. There is also a syndesmophytic growth deriving from ossification of the anterior longitudinal ligament. There is a small area of eburnation anteriorly on the left inferior articular facet, indicating the erosion of the intervertebral disc, leading to bone-on-bone contact with the vertebra immediately below. A syndesmophyte would also suggest the possibility of spondyloarthropathy, diffuse idiopathic skeletal hyperostosis (DISH) or possibly trauma. These degenerative changes are consistent with an older individual. Due to its incompleteness, measurements to aid in sex determination, following Westcott (2000), could not be undertaken; nevertheless, the specimen's relatively large size suggests that the individual was likely male. The bone returned an AMS date of cal AD 230–400 (UB-6930).

A mid-line cut directed from the left posterior direction terminated in the left lateral mass inferior to the left superior articular facet in the posterior arch of the vertebra, removing a spall of bone from the left side posterior vertebral arch. The fineness of the blade producing this injury is particularly evident in the termination of the blow in the left lateral mass (illus 6.19B).

The injury appears to have resulted from a single blow to the posterior of the neck. However, the stroke in itself did not result in decapitation. Nor is there any indication of additional blows or secondary cuts that would be necessary to completely remove the head from the body. While it is conceivable that the required cuts could be made without leaving traces on the surrounding bone, this seems unlikely. It must be assumed, in the absence of the other vertebrae above and below the axis, that no such cuts were present on these elements and this is why they were not retained.

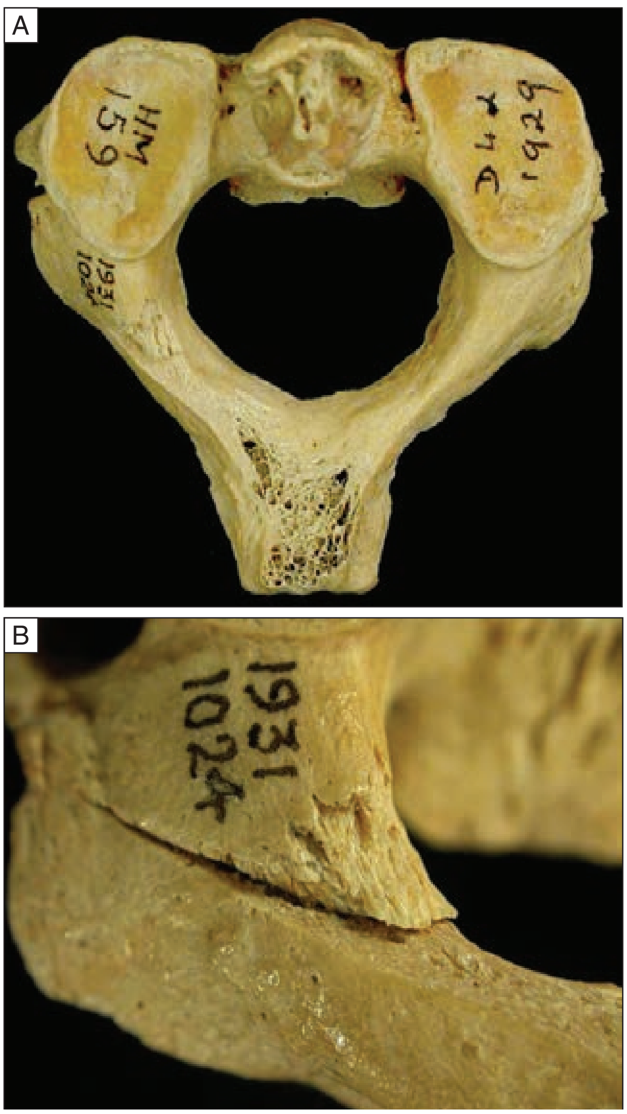

Illustration 6.19
CV4: (A) Superior view showing sharp force trauma to the left vertebral arch with (B) detail of sharp force trauma. The thinness of the weapon's edge is particularly evident here, and indicates a sword rather than, for example, an axe (photographs: Rick Schulting)

Regardless, as with many of the other injuries seen at the site, the injury to CV4 must represent a powerful blow from a sharp and relatively heavy implement.

CV5: Axis vertebra, adult (grid square D7; illus 6.20)
The bone returned an AMS date of cal AD 80–320 (SUERC-16619).

Eleven separate oblique cuts run from the right posterior in an antero-posterior direction in the transverse plan, one to the tip of the spinous process (perhaps associated with cut 4, see below). Three oblique cuts (1–3) can be observed to the right side of the neural arch at the base of the odontoid process of the dens (essentially, these are chop marks), where they terminate. Cut 4 terminates at the base of the odontoid process and removed a spall of bone from the superior aspect of the right lamina, the majority of the right superior articular facet and a small spall from the left superior articular facet; cut 4 may also have removed the superior tip of the spinous process and may demonstrate that the blade deformed as it passed through the tissue and bone. Another two short cuts (7, 8) have been made to the lateral aspect of the right lamina of the neural arch between cuts 6 and 9, while three more oblique linear cuts (6, 9, 10) appear on the posterior right lamina of the neural arch. A final cut (11) is present on the inferior spinous process.

This specimen appears to have been subjected to as many as 11 separate blows. The blow (cut 4) to the spinous process likely would have detached the right inferior articular facet and the inferior portion of the body of the overlying atlas. The sequence of these cuts may be the smaller ones first, then those on the posterior right lamina and then cut 4 and the superior three linear chops (cuts 1–3). As with CV4 (illus 6.19), the fineness of the blade is evident.

Despite the number of blows, the dens remained attached to the body of the vertebra and so, as with CV4, it cannot be said from the surviving evidence that this is a true decapitation. The cuts into the dens do indicate that the spinal cord was completely severed. All of the injuries are the result of forceful blows with a relatively heavy implement and not from, for example, a knife used to cut at the soft tissues surrounding the bone.

This is probably the vertebra that was subject to inconclusive SEM analysis (Wakely and Bruce 1989; Wakely 1993).

CV6: Axis vertebra, sub-adult (grid square B4; illus 6.21)
This axis vertebra is from a child or adolescent, aged less than 16–17 years at death (based on the unfused vertebral plate epiphysis of the body and apophyses), and dates to cal AD 220–400 (SUERC-16620).

A single cut to the mid-line from the posterior direction, nearly perfectly in the transverse plane, has sheared off the superior portion of the spinous process, the entire dens and its process and the medial portions of the superior articular facets bilaterally.

This injury appears to have resulted from a single blow to the posterior of the neck. The blow to the spinous process would have detached the right inferior articular facet and the inferior portion of the body of the atlas. This blow appears to have been delivered from directly behind the victim with the weapon held horizontally.

This specimen may represent a complete decapitation, though of course soft tissue could still have held the head onto the body,

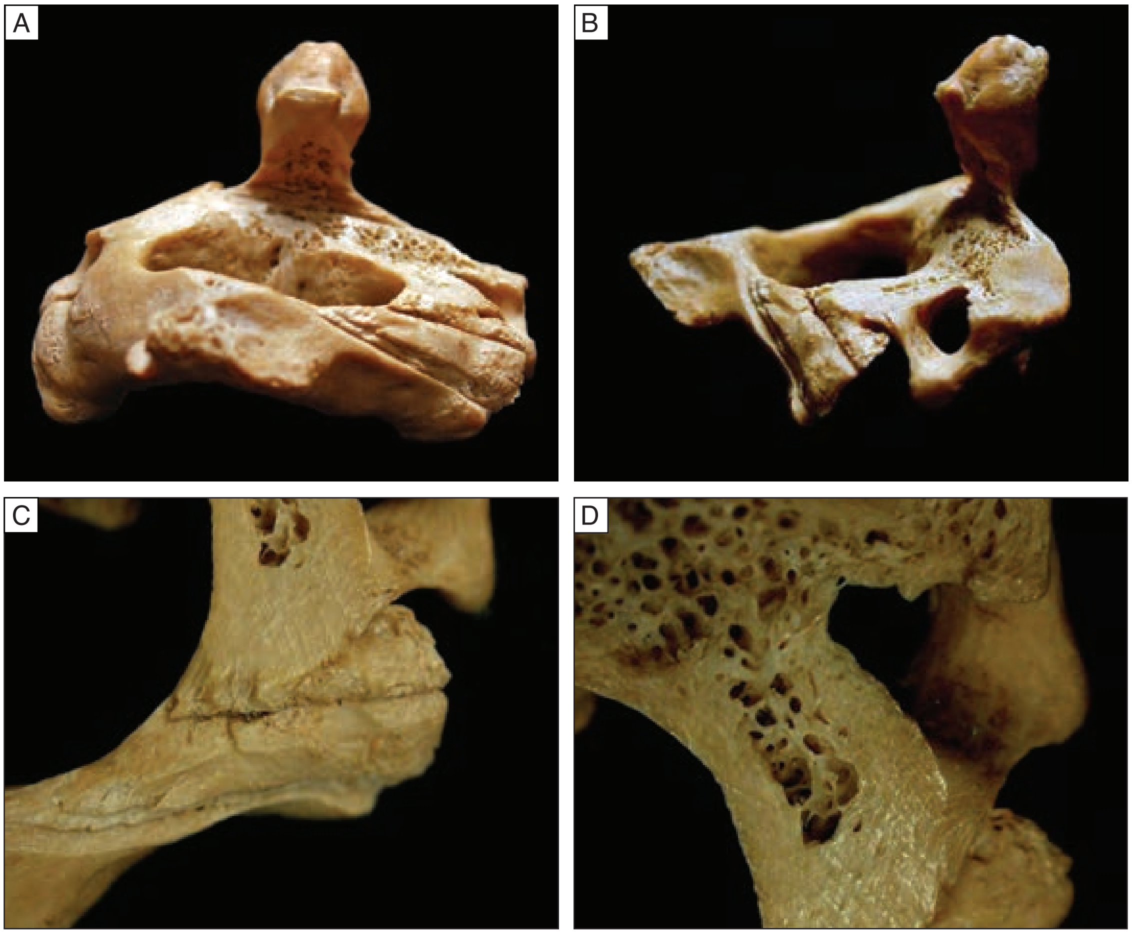

Illustration 6.20
CV5: (A) Superior view: multiple blows terminating in the right lateral mass and the dens are evident, (B) right lateral view showing multiple blows terminating in the right vertebral arch and the odontoid process, (C) detail showing series of blows into the right vertebral arch and superior right lateral mass, (D) detail showing cut across the right lateral mass, removing part of the superior articular surface; multiple striations from the weapon's edge are evident (photographs: Rick Schulting)

even once the axis was bisected. However, cutting through the remaining vessels and muscles would have been easily achieved and would have been unlikely to leave any marks on the vertebra. If the head had been completely removed, it would still retain the missing uppermost portions of the axis vertebra (held in place by alar ligaments and the apical ligament of the dens) together with the atlas. The extant element (CV6) would thus have remained attached to the torso.

CV7: Axis vertebra, adult (illus 6.22)
This axis vertebra comes from an adult. It displays a joint surface contour change of the body inferiorly, with marginal osteophytic growths on the right side and eburnation superiorly on the dens. Although not directly dated, the bone is assigned to the Roman Iron Age by association with the directly dated cut-marked vertebrae (table 4.1).

No cut marks are present on this specimen, but there is a dry/peri-mortem break of the laminae of the neural arch, posterior to the superior articular facets and through the right inferior articular facet. This may be a fracture caused by the weight of a largely detached head. Without clearer evidence, the status of this specimen remains uncertain, though in the context of the other vertebrae, the break might be considered suggestive of a peri-mortem injury associated with trauma to the neck resulting from decapitation.

Other bones
Aside from the cut-marked vertebrae, there are a few other surviving bones that can be placed confidently within the Roman Iron Age. Perhaps the most significant is a human right tibia shaft fragment (SF1100; illus 6.23A), *c* 13cm in length, found eroding out of what is now known to have been Benton's spoil heap outside the cave in 2006. The element is reasonably robust and could belong to a male (though this is tentative given its incompleteness). It has been AMS dated to cal AD 130–350 (SUERC-16621), and is of particular interest because it demonstrates a classic peri-mortem spiral fracture pattern running lengthways along the shaft (illus 6.23B). The fracture margins are sharp and the fracture surface is smooth and presents an undulating profile (cf Outram 2002; Knüsel 2005).

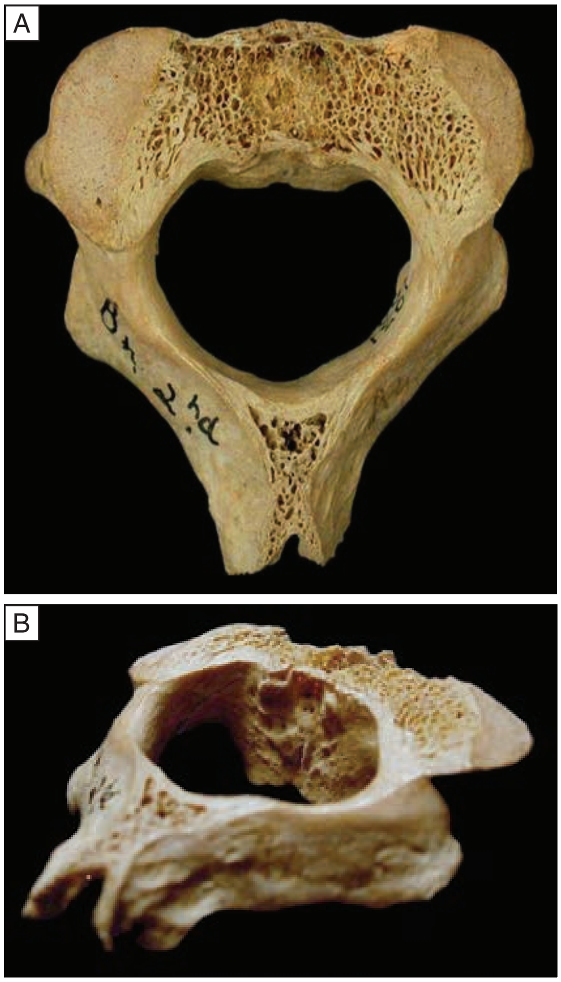

Illustration 6.21
CV6: (A) Superior view and (B) right oblique view showing the upper surface, including the odontoid process and the dens, removed by a single blow (photographs: Rick Schulting)

Illustration 6.22
CV7: Superior view showing missing vertebral arch, possibly as a result of traumatic fracture (photograph: Rick Schulting). There are no cuts visible on this specimen

From the Shepherds' excavations, an unstratified sub-adult thoracic vertebra (SF1101) from Area III produced a Roman Iron Age date of cal AD 130–380 (SUERC-16627). The unfused state of the epiphyseal rings indicates an age of less than 15–16 years at death. Furthermore, a sub-adult maxilla fragment (SF1121) can be attributed to the Roman Iron Age due to its stratigraphic position within Block 2.7 in the East Passage (section 2.4.2).

Finally, a fragment of a left temporal bone (SF1130), shown to be male through ancient DNA analysis (David Reich pers comm), was recovered from excavations of Benton's spoil heap in 2014 (box section 2). It produced an AMS determination of cal AD 250–420 (SUERC-68717).

Summary

The Roman Iron Age material, limited as it is, has a markedly different character to that of the Late Bronze Age. The scale and consistency of peri-mortem trauma shows that many of these individuals (perhaps at least nine) were deliberately decapitated. The majority of individuals were adult, with no young children represented; again, in marked contrast to the earlier assemblage.

Assuming that the small surviving collection of Roman Iron Age cut-marked vertebrae is representative, there is a certain degree of consistency to the injuries. The cut marks in all cases relate to a heavy, sharp-edged weapon, struck with varying but generally considerable force. This can be seen particularly in axis CV6 (illus 6.21), cleanly sliced through with a single stroke, which certainly suggests a sword or an axe. At the opposite extreme, axis CV5 (illus 6.20) displays as many as 11 cuts, still leaving the dens attached. While many of these are short, chopping blows, there is no indication of the associated crushing that might be expected with an axe. The thinness of the weapon's edge is also clear from a number of the cuts on CV5 (illus 6.20B), and on CV4 (illus 6.19B). Thus, it is probable that a sword is the implement responsible for all observed vertebral trauma.

The placement, and in some cases the number and close proximity, of the injuries suggests a ritualised aspect to what was clearly a violent event, at least with regard to patterning in the way in which the blows were struck. Each blow seems to have been delivered from behind in all cases and, in most but not all, to the left-hand side of the individual. This might suggest that the assailant stood to the right side of a kneeling victim. The multiple blows of CV5 which impacted the right side of the element, the opposite to the majority of others, suggest that the assailant may have stood to the left side of the victim while targeting the same area of the neck, but was apparently less proficient in the task of decapitation. This may suggest at least two assailants were involved. The fact that this sample of vertebrae derive from the most superior elements of the vertebral column, the repeated and close proximity of the cut and chop marks, and their having been delivered from behind, all suggest that the posture of the victim was controlled. Because of the absence of the corresponding mandibles and posterior cranial vault elements (occipital and parietals) of these individuals, it is difficult to determine the posture of the neck (see, for example, Boylston et al 2000; Pitts et al 2002; Buckberry 2008). However, given the apparent accuracy of the blows and the repeated left-side patterning and position of the cuts, it would seem most likely that the head of the victim was held in flexion (ie with the chin oriented toward the chest). A

Illustration 6.23
(A) Human tibial shaft fragment (SF1100) found on path outside the Sculptor's Cave entrance in 2006, (B) detail showing smoothly undulating fracture edges (photographs: Rick Schulting)

flexed head would stretch the *ligamentum nuchae*, making it taut, and expose the uppermost vertebrae to blows delivered from behind. By contrast, if the head were held in extension (ie with the neck extended, forming a more acute angle with the back), the occipital would obscure these vertebrae and would have received the blows instead. In the case of those vertebrae displaying multiple cut marks, the victim must have been held in place while multiple blows were delivered.

The upper two cervical vertebrae present a relatively small target for a blade swung with force, implying a considerable level of skill by the weapon's wielder. This applies even to the multiple blows – best described as hacking – seen in CV5, since they fall so closely together. While this is in the absence of the other vertebrae, we can assume, given that these examples were recognised, that any similar damage present on other cervical vertebrae would have been noted and commented upon. The dating evidence, as discussed above, is consistent with the cut vertebrae belonging to a single event, though it could alternatively represent a series of similar events made over a longer period. In either case, the injuries appear to be the result of execution-style killings rather than combat injuries or homicidal assaults.

The adult tibia shaft fragment, featuring classic peri-mortem spiral or helical fracturing, adds quite another dimension to the Roman Iron Age human bone assemblage from the Sculptor's Cave. Within the limits of radiocarbon dating, it falls within the same period as the decapitations. While the breakage pattern might suggest butchery for marrow extraction, the absence of a percussion scar would seem to exclude the possibility of marrow removal associated with anthropophagy (see Knüsel and Outram 2006: 256–7, figs 17.2, 17.4), although such indicators might not always be visible. The breaking of limbs might be undertaken in a context of torture or may represent a peri-mortem injury resulting from a fall or from interpersonal violence. As another possibility, the bodies of the executed may have been subjected to post-mortem violence or, less likely, to accidental damage by a rockfall (though this would have had to occur while the bone was still in a very fresh state). Further interpretation relies on the identification of patterning in the treatment of the entire skeleton, which is not possible from examination of a single element.

6.8.4 Unstratified/undated

Among the unstratified human remains from the Shepherds' excavations, one element merits individual attention. This is an adult frontal fragment (SF1128; illus 6.24A) missing much of the right side above the orbit. A linear fracture extends from the middle of the left orbit diagonally towards the mid-line. The fracture edge is oblique, suggesting that this may be a peri-mortem fracture, though this is uncertain, largely due to the incompleteness of this area of the bone. There is also a fracture to the upper-middle left frontal, exhibiting a semi-circular fracture margin, with a patinated internal bevel (illus 6.24B). These features could suggest a peri-mortem injury. As with the Late Bronze Age sub-adult frontal (SF231; illus 6.13), the colouration seen particularly on the internal surface suggests deposition in water or peat or exposure to damp. This specimen remains undated.

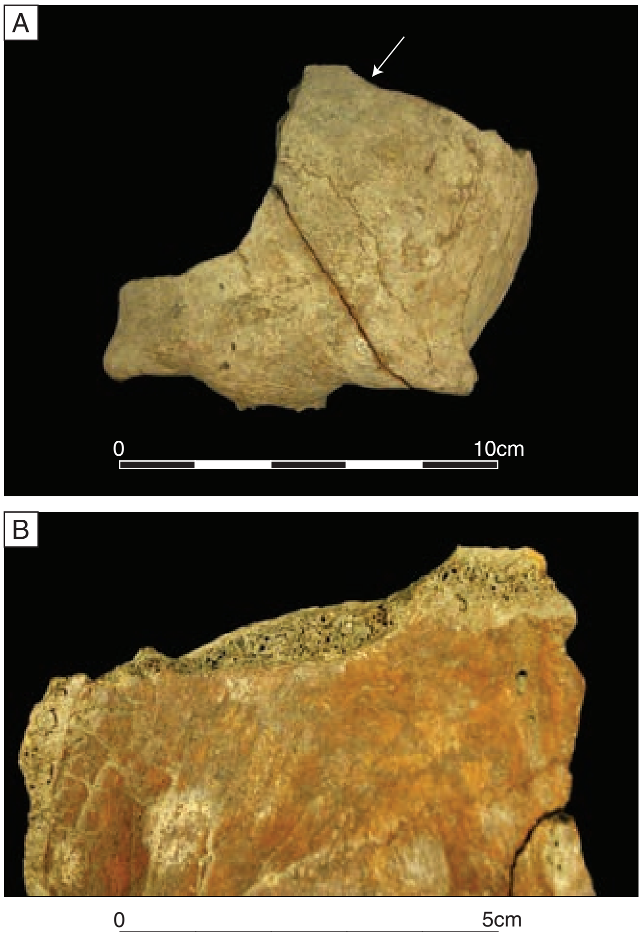

Illustration 6.24
(A) Adult frontal (SF1128) with arrow pointing to fracture, (B) detail showing endocranial (internal) surface of the left frontal fracture; note the patinated bevel (photographs: Rick Schulting)

Of the 104 human bones recovered from Benton's spoil heap in 2014, only three showed possible signs of trauma. The clearest example was the fifth left metatarsal of an individual aged less than 16–18 years at death (SF1131), which showed signs of sharp-force trauma (illus 6.25).

6.9 Stable isotope analysis

Rick Schulting and Ian Armit

Sampling of the human and faunal remains from the Sculptor's Cave for AMS radiocarbon dating at the Scottish Universities Environmental Research Centre (SUERC) provided the additional opportunity to undertake stable carbon (δ^{13}C) and nitrogen (δ^{15}N) isotope analysis. These two isotopes provide information on aspects of the long-term diets of the individuals in question, over approximately the last decade of life in the case of adults (Ambrose and Krigbaum 2003). Measurements on bone collagen (as opposed to bioapatite, the mineral component of bone) are biased towards dietary protein at the expense of lipids and carbohydrates (Ambrose and Norr 1993). In the absence of

Illustration 6.25
The fifth left metatarsal of an individual aged less than 16–18 years (SF1131), which shows signs of sharp-force trauma (photograph: Ian R Cartwright, School of Archaeology, University of Oxford)

C4 plants such as millet, δ^{13}C indicates the contribution of protein derived from marine sources (Chisholm et al 1982) while δ^{15}N reflects primarily a trophic level effect, ie the place of an animal in the food chain as a herbivore, omnivore or carnivore (Schoeninger et al 1983; Hedges and Reynard 2007). Stable carbon isotope values on bone collagen for human consumers in north-west Europe range from about -21‰ for a purely terrestrial diet to about -12‰ for a purely marine diet. Stable nitrogen isotope values for terrestrial herbivores in north-west Europe can vary quite widely, but in general fall between about 4‰ and 7‰. Human consumers without a significant marine component in their diets usually have values of about 8–10‰, though they may be slightly higher if the animals they consume fall in the upper part of their range. Values can be substantially higher (*c* 14–16‰) if marine or aquatic foods (eg fish, birds, marine mammals) make a significant dietary contribution, since food chains in both cases can be much longer and thus the cumulative effect greater.

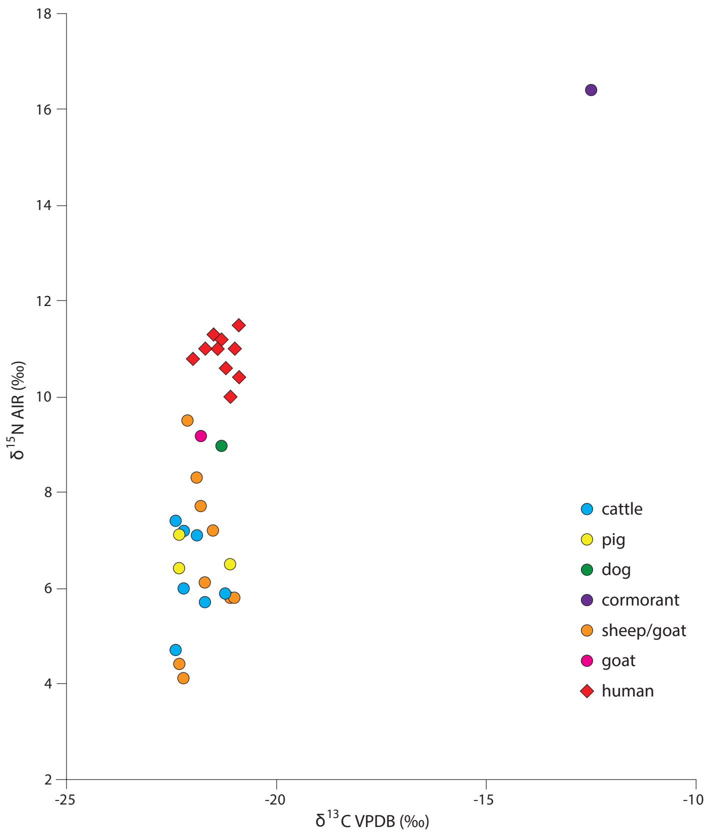

Illustration 6.26
Bivariate plot of δ^{13}C and δ^{15}N results on directly dated humans and animals from the Sculptor's Cave

Given the coastal location of the Sculptor's Cave and the recovery of marine fish bones (section 7.4.3), the significant use of marine resources certainly seems possible. However, a summary of δ^{13}C data associated with radiocarbon dating of human bone from around Scotland from between the Mesolithic and medieval periods suggests that the substantial use of marine foods was very much restricted to the Mesolithic and Viking periods (the evidence for the latter thus far being restricted to Orkney, though this may be a result of sampling bias) (Barrett et al 2001; Schulting and Richards 2002; Richards et al 2006). This is not to say that marine foods were never used in the intervening periods – there is clear zooarchaeological evidence that they were – but rather that this took the form of low-level (perhaps intermittent) use which was of little relative importance in the overall diet.

The isotopic results from the Sculptor's Cave are in keeping with this general pattern. Neither the results from the Late Bronze Age nor from the Roman Iron Age show evidence for any significant use of marine foods (table 4.1; illus 6.26). While fish bones are present at the Sculptor's Cave, the amount of protein and calories provided by them would have been overshadowed by those of domestic species (see section 7.4.3) and, in any case, it is entirely possible that food consumed by those individuals found within the cave was not typical of the everyday diet. The slight elevation in δ^{13}C in the average human value compared to that of the faunal remains is as expected, given the small trophic level shift in carbon (Bocherens and Drucker 2003). Trophic level shifts are much more pronounced in δ^{15}N and the human elevation above the faunal average suggests diets more than adequate in animal protein, though there are other considerations to be taken into account, such as the manuring of crops, which has been shown to raise δ^{15}N values in cereals (Bogaard et al 2007). It can also be noted that some of the sheep/goat δ^{15}N values are unusually high. At least one of these animals is immature and may still be showing a nursing effect, essentially raising their values by a trophic level over that of their mother (Schurr 1998).

Interestingly, the humans from the Sculptor's Cave (both Late Bronze Age and Roman Iron Age) form a relatively tight cluster that is distinct, for example, from the equally tight cluster of the Middle Iron Age cemetery population at Broxmouth hillfort, East Lothian (Armit and McKenzie 2013; illus 6.27); it is even more distinct from the strongly marine-influenced diets of some Viking and medieval individuals from Newark Bay, Orkney (Richards et al 2006). Low-level consumption of marine foods (less than 5–10% of the protein intake) by the Sculptor's Cave population is still possible; comparative samples from contemporary inland populations would be needed to assess this further.

The lack of evidence for substantial marine or freshwater aquatic resource use is a common feature throughout Iron Age Britain (Jay and Richards 2006; 2007). At the Glastonbury Lake Village in Somerset, stable isotope data on humans show negligible dietary use (Jay 2008) despite expectations based on the location of the settlement and the presence of fish and waterbirds. Even in the far north, data from the Pictish period in Orkney show strongly terrestrial isotope signatures. Only in the Viking Age do isotopic values become significantly elevated, indicating an increasing use of marine foods (illus 6.27) (Barrett et al 2001; Richards et al 2006). It is perhaps particularly interesting in the context of the local environment that the individuals deposited at the Sculptor's Cave do not seem to have relied upon either the coastal resources of the Moray Firth or the estuarine environs of Loch Spynie. Indeed, they seem to have even less of a marine component in their diet than the Middle Iron Age population at Broxmouth hillfort (illus 6.27). This might suggest that either the Sculptor's Cave individuals did not inhabit the immediate locality of the cave or that they failed to exploit the coastal resources and estuarine wetlands on any significant scale.

6.10 Reconstructing mortuary practices

Lindsey Büster and Ian Armit

6.10.1 The core assemblage: element index

In discussing the composition of the human bone assemblage, it is useful to look at element representation in order to assess differences in patterns between, for example, different age groups (section 6.6). Such analyses are always crude, given that certain elements, such as vertebrae and ribs, are more numerous in the human skeleton than, for example, mandibles, crania and long bones. In order to understand more clearly what element and body part representation might actually mean in terms of the mortuary treatments practised in the cave, it is necessary to establish a more formal index of elements.

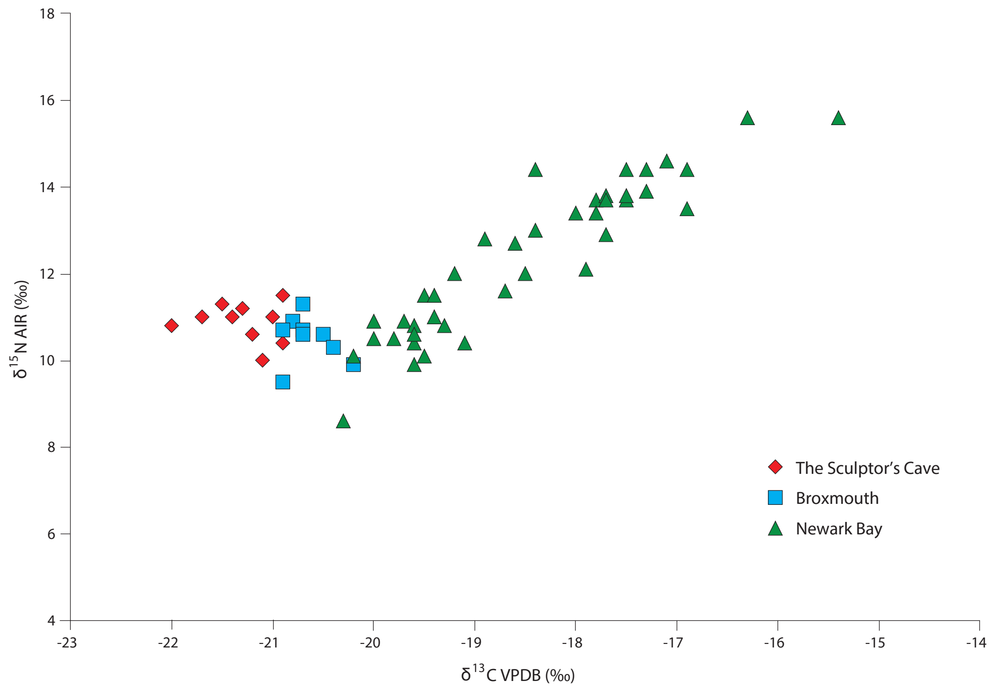

Illustration 6.27

Bivariate plot of $\delta^{13}C$ and $\delta^{15}N$ results obtained from analyses of human remains from the Sculptor's Cave, Broxmouth hillfort cemetery and Newark Bay (Broxmouth data from Armit and McKenzie 2013; Newark Bay data from Richards et al 2006, taking marine reservoir effect into account). The Newark Bay data range in date from the Viking to Medieval periods

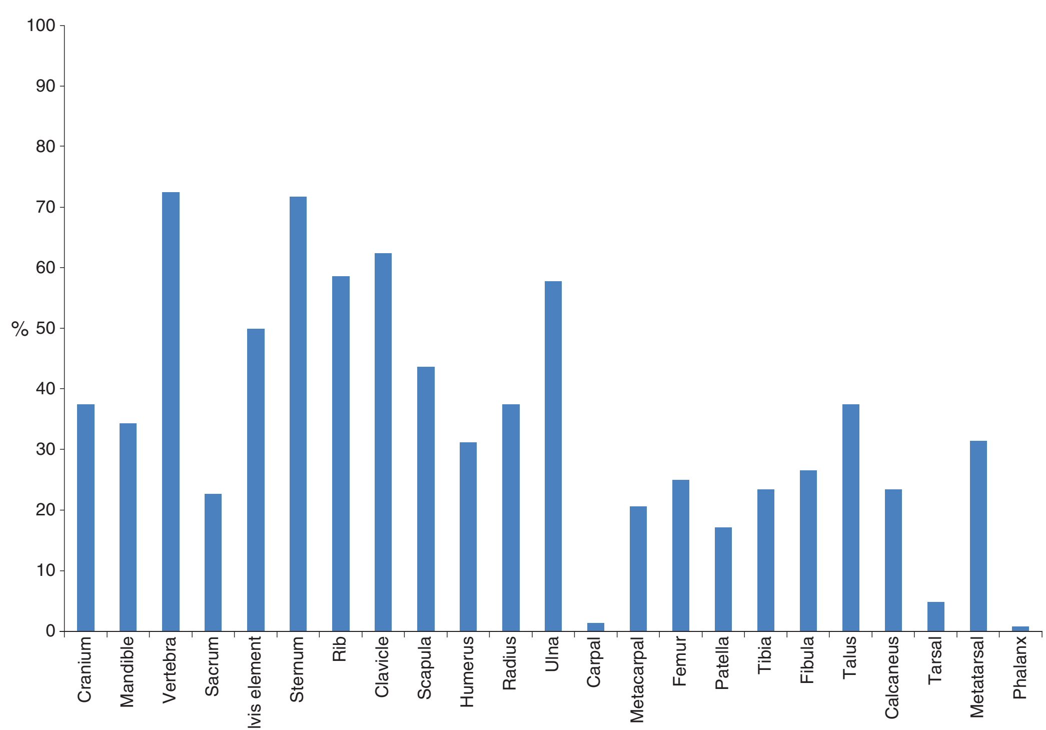

Illustration 6.28

Element index for the Sculptor's Cave human remains: core assemblage

Table 6.9

Element index for the Sculptor's Cave. Individual cranial and pelvis elements have been grouped to establish MNI for 'adult' (22) and 'juvenile' (10) age categories respectively. Pelvis elements include the ilium and ischium, together with elements described as 'pelvis' and 'hip bone'. Each pelvis comprises two ossa coxae (left and right), hence an 'element per capita' of two (after Knüsel et al 2016: 157, table 4.4.3). Carpals include scaphoid; talus includes astragalus; calcaneus includes os calcis; tarsals include cuboid and intermediate cuneiform. Undifferentiated sub-adults have been omitted. MNI for juveniles differs from that in table 6.4 due to the aggregation of child and infant age categories. Two bones identified as 'young' sacra have been included in the 'adult' age category, though (as noted in relation to table 6.2), it is possible that they represent unfused sacral vertebrae

Element	MNE							MNI		Elements per capita	Total elements expected	% representation
	Adult left	Adult right	Adult	Juvenile left	Juvenile right	Juvenile	Total MNE	Adult	Juvenile			
Cranium	0	0	6	0	0	6	12	6	6	1	32	37.50
Mandible	0	3	1	0	1	6	11	4	7	1	32	34.38
Vertebra	0	0	511	0	0	64	575	22	2	24/33	528/330	96.78/19.39 weighted av. 72.60
Sacrum	0	0	5	n/a	n/a	n/a	5	5	0	1	22	22.73
Pelvis element	2	1	1	9	9	1	23	2	10	2	64	35.94
Sternum	0	0	14	0	0	9	23	14	9	1	32	71.88
Rib	0	0	379	0	0	72	451	16	3	24	768	58.72
Clavicle	5	15	11	4	4	2	41	16	5	2	64	62.50
Scapula	3	3	5	6	5	6	28	6	9	2	64	43.75
Humerus	2	4	8	2	2	2	20	7	3	2	64	31.25
Radius	2	9	9	2	0	2	24	10	3	2	64	37.50
Ulna	6	9	12	3	5	2	37	13	5	2	64	57.81
Carpal	0	0	7	0	0	0	7	1	0	16	512	1.37
Metacarpal	0	0	58	0	1	9	68	6	1	10	330	20.61
Femur	4	2	6	1	3	0	16	6	3	2	64	25.00
Patella	0	0	5	0	0	6	11	3	3	2	64	17.19
Tibia	3	2	6	1	1	2	15	6	1	2	64	23.44
Fibula	0	1	16	0	0	0	17	9	0	2	64	26.56
Talus	7	2	14	1	0	0	24	12	1	2	64	37.50
Calcaneus	0	0	14	0	0	1	15	7	1	2	64	23.44
Tarsal	0	0	15	0	0	1	16	2	1	10	330	4.85
Metatarsal	1	0	102	0	0	1	104	11	1	10	330	31.52
Phalanx	0	0	5	0	0	2	7	1	1	28	896	0.78

Table 6.10
The nature of mortuary activity at a range of comparative sites (information from Knüsel et al 2016)

Site name	Location	Type of site	Date	Type of mortuary activity represented	Reference
Scaloria Cave	Puglia, Italy	Cave	Neolithic	Commingled deposit comprising predominantly disarticulated elements. Other rites represented include individual articulated burials	Knüsel et al 2016
Kunji Cave	Luristan, Iran	Cave	Bronze Age	Collective burial and secondary deposition	Emberling et al 2002
West Tenter Street	London, UK	Cemetery	Roman	Cemetery of single primary inhumations	Waldron 1987
Nanjemoy Creek	Maryland, USA	Ossuary	Late prehistoric	Secondary deposition	Ubelaker 1974

Table 6.11
Element index for the Sculptor's Cave, compared to those for Scaloria Cave, Kunji Cave, Nanjemoy Creek and West Tenter Street (after Knüsel et al 2016: 159, table 4.4.5, fig 4.4.9). Scaloria Cave element index based on the Ubelaker and Buikstra (1994) method of calculating MNI (Knüsel et al 2016: 156). Element index not available for ribs for Kunji Cave, Nanjemoy Creek or West Tenter Street

Element	The Sculptor's Cave	Scaloria Cave (B+U method)	Kunji Cave	Nanjemoy Creek	West Tenter Street
Cranium	37.50	59.09	97.00	92.17	80.50
Mandible	34.38	54.55	73.00	82.13	65.00
Vertebra	72.60	17.25	22.90	14.05	56.00
Sacrum	22.73	4.55	30.00	47.02	59.00
Pelvis element	35.94	34.09	30.00	81.03	66.50
Sternum	71.88	9.09	12.00	32.60	24.00
Rib	58.72	10.61	–	–	–
Clavicle	62.50	54.55	24.00	65.20	45.50
Scapula	43.75	36.36	67.00	74.45	53.00
Humerus	31.25	52.27	38.50	86.52	57.00
Radius	37.50	45.45	37.50	69.91	54.50
Ulna	57.81	40.91	37.50	79.47	61.50
Carpal	1.37	1.14	4.50	21.69	17.00
Metacarpal	20.61	11.36	19.50	35.96	50.00
Femur	25.00	79.55	53.00	91.07	59.00
Patella	17.19	22.73	21.00	41.07	26.50
Tibia	23.44	40.91	31.50	84.64	48.50
Fibula	26.56	20.45	39.00	54.70	32.50
Talus	37.50	36.36	30.00	51.72	47.50
Calcaneus	23.44	27.27	21.00	57.68	47.00
Tarsal	4.85	8.18	12.50	38.84	30.00
Metatarsal	31.52	18.64	20.50	40.75	41.50
Phalanx	0.78	3.57	7.57	6.73	13.71

An element index essentially calibrates the numbers of each element present in an assemblage in relation to how many such elements might be expected if all of the bones from complete bodies (based on the MNI) were present. To give a hypothetical example, if a given assemblage had an MNI of 50, we might expect to find 100 femora; if we found only 20 femora, we would have an element index for femora of 20%.

The element index (or 'bone representation index'; cf Knüsel et al 2016: 156) can be expressed as follows:

$$\frac{\text{number of elements present} \times 100}{\text{number of elements present if each skeleton were complete}}$$

The element index for the Sculptor's Cave is represented in table 6.9 and illus 6.28 (for the purposes of comparison with other sites, which employed different methods for element identification, certain of the categories in table 6.2 have been amalgamated). In line with the earlier analyses based solely on element as a percentage of the core assemblage (section 6.6), vertebrae remain the best represented element, at 73%, closely followed by sterna (72%). The next most numerous elements also represent parts of the upper body, with clavicles at 63% and ribs at 59%. In contrast, carpals, tarsals and phalanges are the least represented element, the latter with an index of only 0.78%. Crania and mandibles have similar representation at 38% and 34% respectively. Long bones of the lower limb also have very similar indices (femur 25%; tibia 38%; fibula 27%) suggesting similar representation of these elements; the somewhat lesser representation of the patella (17%) is indicative of the generally more common absence of this element. It should be remembered that these figures are calculated against an MNI; they are therefore useful as a relative indication of element representation but should not be regarded as absolute figures (since the actual number of individuals represented in the cave is likely to be higher than the MNI).

6.10.2 A comparative perspective

Calculation of the element index permits comparison of the Sculptor's Cave assemblage with other mortuary sites. In their analysis of various treatments of the dead represented at the Neolithic site of Scaloria Cave in south-east Italy, for example, Knüsel et al (2016: 159, table 4.45) compare their element index with that of a number of other sites in order to consider the kinds of mortuary contexts represented by these assemblages (table 6.10), including primary inhumation, collective burial and secondary deposition. This comparative approach is useful in helping tease out the potential funerary practices underlying the

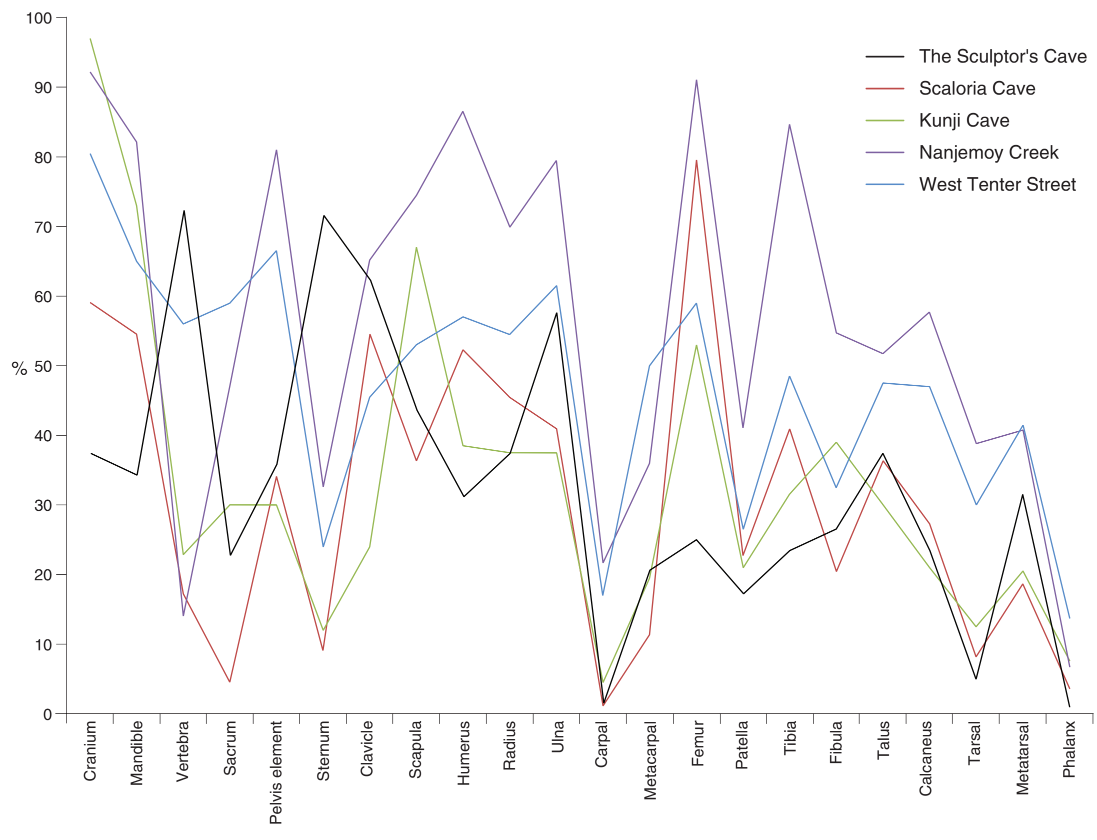

Illustration 6.29
Comparison of element indices for the Sculptor's Cave, Scaloria Cave, Kunji Cave, Nanjemoy Creek and West Tenter Street (after Knüsel et al 2016: 159, table 4.4.5, fig 4.4.9). Scaloria Cave element index based on the Buikstra and Ubelaker (1994) method of calculating MNI (Knüsel et al 2016: 156)

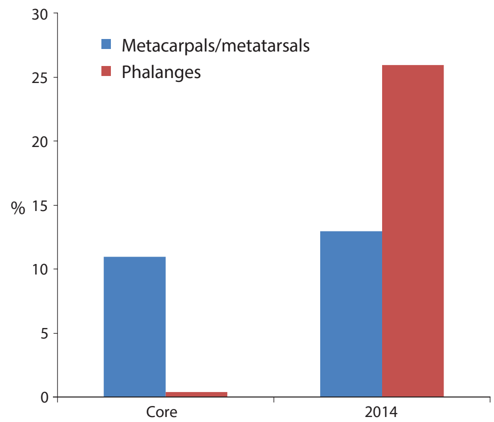

Illustration 6.30
Comparison of percentages of metatarsals and phalanges in the core bone assemblage versus that excavated from Benton's spoil heap in 2014

element index in each case, and thus forms a useful basis for the comparative discussion of the Sculptor's Cave core assemblage.

Comparison of these sites (and Scaloria Cave itself) with the element index for the Sculptor's Cave assemblage (table 6.11) shows considerable variation in patterning (illus 6.29). This must, to some extent, reflect the different mortuary processes at each of the sites, although we also need to bear in mind taphonomic differences relating to the various preservational environments. Collection strategies are also potentially an issue. It is clear, for example, that the representation of phalanges in the Sculptor's Cave core assemblage is lower than any of the comparative assemblages (table 6.11). Yet, comparing the percentages of phalanges represented in the core assemblage with that obtained in 2014 from Benton's spoil heap (box section 2; illus 6.30) demonstrates that phalanges were indeed present in considerable numbers at the Sculptor's Cave, but were apparently not collected or were discarded; by contrast, metacarpals and metatarsals were apparently collected almost as effectively as other bones.

The comparative representations of element index shown in illus 6.31 are intended to highlight two things: the graphs on the left visually display the differences in the patterning of element representation between the Sculptor's Cave and each comparative assemblage, while those on the right plot the divergence of the Sculptor's Cave assemblage against the element index of each comparative site (represented by a horizontal line at 0).

Comparison with West Tenter Street inhumation cemetery

The West Tenter Street assemblage derives from what is believed to be a large, but fairly typical, urban inhumation cemetery in Roman London (Waldron 1987). Comparing the West Tenter Street element index with that of the Sculptor's Cave highlights marked differences. The patterning of lower limb bones and extremities (hand and foot bones) is fairly similar between the two assemblages (illus 6.31A), although West Tenter Street has a larger overall representation of these elements. The pectoral girdle, the humerus and radius of the upper limb and torso elements (vertebrae), however, display more marked differences. Crania, mandibles, pelvis elements (excluding the sacrum), sacra and femora in particular appear to be much less well represented at the Sculptor's Cave. These are larger recognisable bones which are unlikely to have been missed during excavation and could suggest some selective removal of skeletal elements. Certainly, long bone and cranial fragments are the most frequently encountered human bones on later prehistoric settlement sites in Britain (Brück 1995; Armit and Ginn 2007). These differences suggest, unsurprisingly, that the Sculptor's Cave population does not represent the residue of a simple inhumation cemetery.

There are other significant differences in the element indices between these two sites. Most important, perhaps, is the over-representation of vertebrae, clavicles and sterna in the Sculptor's Cave assemblage relative to that from West Tenter Street (illus 6.31A). It is unfortunate that comparative figures are unavailable for rib representation, but we should note that the element index for ribs at the Sculptor's Cave is also very high.

Since the West Tenter Street assemblage represents the remains of complete articulated bodies, an over-representation of vertebrae, clavicles and sterna at the Sculptor's Cave could suggest one of three possibilities. First, additional upper limb and torso elements may have been selectively deposited in the cave. Second, some complete bodies within the cave may have had all but these elements removed. The third and most parsimonious explanation, however, would be that the torsos of individuals in the Sculptor's Cave were significantly better preserved than would be expected in an inhumation cemetery.

Under normal conditions of primary inhumation, those parts of the skeleton surrounded by large amounts of soft tissue and internal organs, perhaps closer to the gut, are likely to be more susceptible to destruction through microbial activity than other parts of the body (eg Booth 2016). The preferential survival of vertebrae, sterna, clavicles and (probably) ribs at the Sculptor's Cave thus raises the intriguing possibility that this bacterial activity had been arrested in some way. It has been noted during excavation at other caves along the Moray coast that these sites display exceptional conditions for the preservation of human bone and other organic materials, which extends to the preservation of ligaments on Late Bronze Age human remains at Covesea Cave 2 (Büster and Armit 2016). This is most likely due to a combination of fairly constant temperatures and humidity together with the sandy nature of the soil matrix and the salty atmosphere created by sea spray (as with historically documented seventeenth-century 'mummies' from Stroma; Lowe 1774: 16–17; Anon 1786: 346). The preservation of bodies could potentially also be enhanced by more active mortuary practices such as drying or smoking and/or the removal of organs. The survival of these torso elements also reinforces the impression from the disarticulated nature of the remains that bodies were not buried in the Sculptor's Cave, as was the case for the West Tenter Street inhumations, but left exposed on the surface.

There is a further taphonomic point to be made about the high representation of vertebrae and sterna particularly. Knüsel et al (2016: 157) note, in relation to the Scaloria Cave assemblage, that the *under*-representation of vertebrae, sacra and sterna is most likely due to the fact that these fragile bones are most likely to be fragmented and destroyed 'through mechanical breakage when they are moved, kicked, trampled, or re-deposited'. Thus, the over-representation of these elements in the Sculptor's Cave assemblage suggests that bodies were not subject to extensive disturbance, despite their disarticulated state upon excavation.

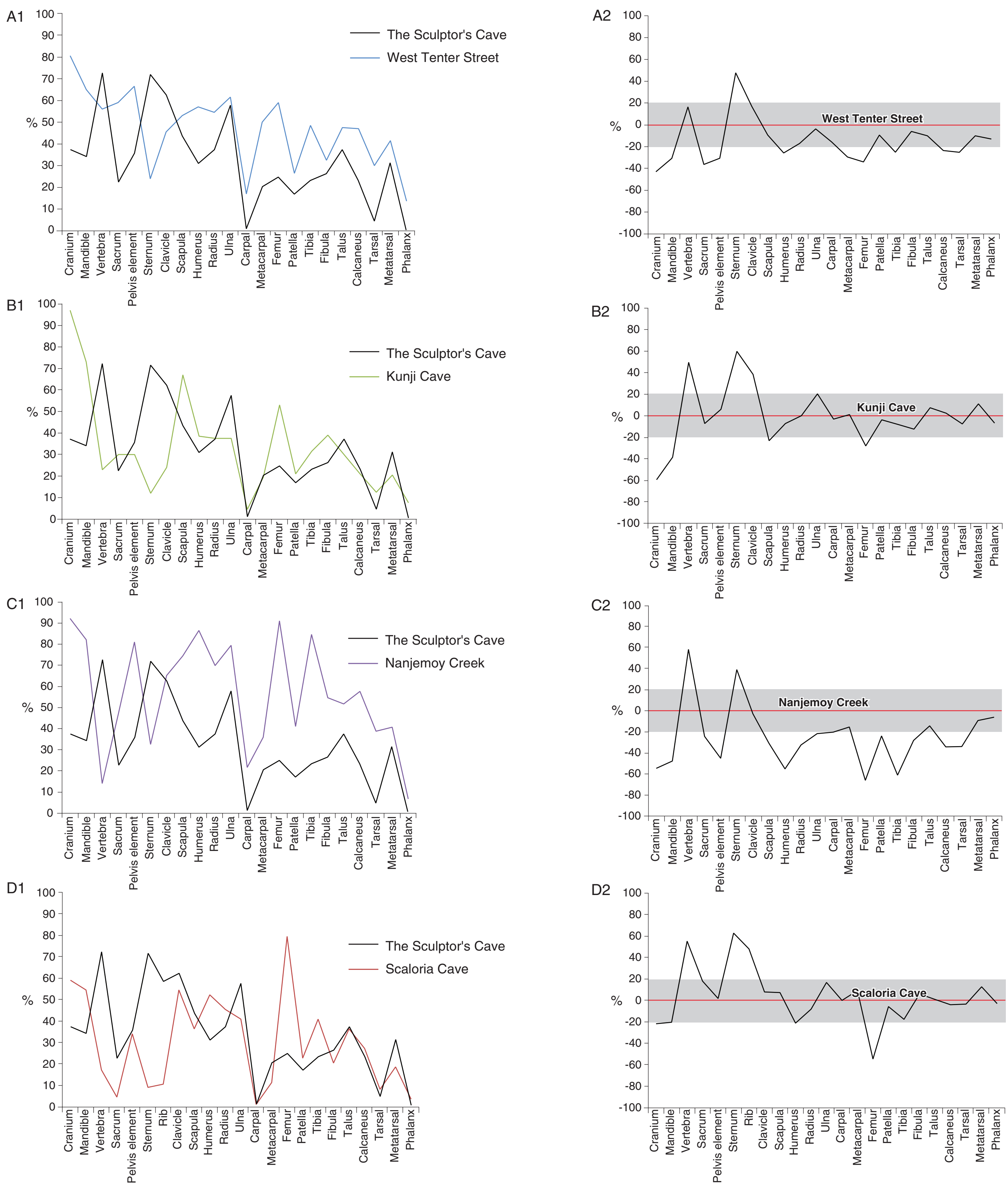

Illustration 6.31
Element index for the Sculptor’s Cave compared with: (A1) West Tenter Street, and (A2) with West Tenter Street signature normalised to 0, (B1) Kunji Cave and (B2) with Kunji Cave normalised to 0, (C1) Nanjemoy Creek and (C2) with Nanjemoy Creek normalised to 0, (D1) Scaloria Cave and (D2) with Scaloria Cave normalised to 0. Element indices for ribs were not available for West Tenter Street, Kunji Cave or Nanjemoy Creek. Shaded areas are provided to aid visual comparison only, and do not represent statistical significance

Comparison with Kunji Cave: a collective tomb

Further insights can be gained by comparing the Sculptor's Cave with sites used for more complex forms of funerary deposition. Kunji Cave, in Luristan (table 6.10), is a Bronze Age collective burial site; once disarticulated, parts of the bodies were removed, though crania and mandibles seem to have been preferentially retained inside the cave (Emberling et al 2002). Comparison with the Sculptor's Cave again indicates a complex pattern of similarities and differences (illus 6.31B). In general, as with West Tenter Street, the representation of lower limb elements and extremities is similar between the two sites. Carpals, for example, are equally poorly represented at both. The preferential retention of crania and mandibles within Kunji Cave is very evident in the high absolute value of the element index for these bones (illus 6.31B1), in contrast to their relative paucity at the Sculptor's Cave. Meanwhile, the relative under-representation of fragile elements such as vertebrae, sacra and sterna at Kunji Cave is likely the product, as Knüsel et al (2016: 157) suggest, of fragmentation and destruction during the periodic reworking and redeposition of the assemblage, and again highlights the relatively minimal disturbance of the remains within the Sculptor's Cave.

Comparison with Nanjemoy Creek: ossuary

Nanjemoy Creek is a late prehistoric site in Maryland, USA, where bones of the dead were brought to be reburied after primary exposure elsewhere (Ubelaker 1974). Although these are secondary deposits, care appears to have been taken 'to gather small bones such as hand and foot bones' (Knüsel et al 2016: 156). This is reflected in a relatively high element index for these bones, although it is noteworthy that phalanges are as under-represented here as they are at the Sculptor's Cave, especially when the additional phalanges recovered from Benton's spoil heap are taken into account (illus 6.30; these were not included in the element index analysis). Long bones and crania are extremely well represented at Nanjemoy Creek, with indices above 90% for crania and femora (illus 6.31C; table 6.11). Although the element indices for lower limb elements and extremities are consistently lower at the Sculptor's Cave, the actual patterning is not greatly different, suggesting that the differences may be taphonomic. Very clear differences are apparent, however, in relation to elements of the head and upper body. Crania and mandibles especially are, for example, more poorly represented at the Sculptor's Cave, while (as with the other comparative sites) representation of the elements of the torso (vertebrae and sterna) is much higher, suggesting that these elements survived much better at the Sculptor's Cave than they did elsewhere.

Comparison with Scaloria Cave: a commingled mixed funerary deposit

The Scaloria Cave assemblage incorporates several different mortuary practices, including primary inhumation, secondary deposition of skeletonised elements from excarnated individuals and the secondary deposition of skeletal elements brought from elsewhere (Knüsel et al 2016; table 6.10). Once again, the representation of lower limb elements and extremities between the two sites follows a similar pattern, although there is a marked under-representation of femora at the Sculptor's Cave (illus 6.31D). Crania and mandibles are also better represented at Scaloria Cave. What is most striking in the comparison between these two sites, however, is the much higher representation of torso elements (vertebrae, ribs and sterna) at the Sculptor's Cave. The paucity of these elements at Scaloria Cave has been interpreted as a product of periodic reworking and secondary deposition of the bone deposits at this site (ibid: 157). It might also suggest, however, that the salty coastal atmosphere at the Sculptor's Cave was a major factor in creating the exceptional preservational conditions observed.

Table 6.12
Element index for adults (including 'young') and juveniles (comprising 'child' and 'infant' categories) in the Sculptor's Cave core assemblage. Undifferentiated sub-adults not included. Individual cranial and pelvis elements have been grouped to establish MNI for each age category. MNI for juveniles differs from that in table 6.4 due to the aggregation of child and infant age categories

Element	Adult	Juvenile
Cranium	27.27	60.00
Mandible	18.18	70.00
Vertebra	96.78	19.39
Sacrum	22.73	n/a
Pelvis element	9.09	95.00
Sternum	63.64	90.00
Rib	71.78	30.00
Clavicle	70.45	45.00
Scapula	25.00	85.00
Humerus	31.82	30.00
Radius	45.45	20.00
Ulna	61.36	50.00
Carpal	1.99	0.00
Metacarpal	26.36	10.00
Femur	27.27	20.00
Patella	11.36	30.00
Tibia	25.00	20.00
Fibula	38.64	0.00
Talus	52.27	5.00
Calcaneus	31.82	5.00
Tarsal	6.82	1.00
Metatarsal	46.82	1.00
Phalanx	0.81	0.71

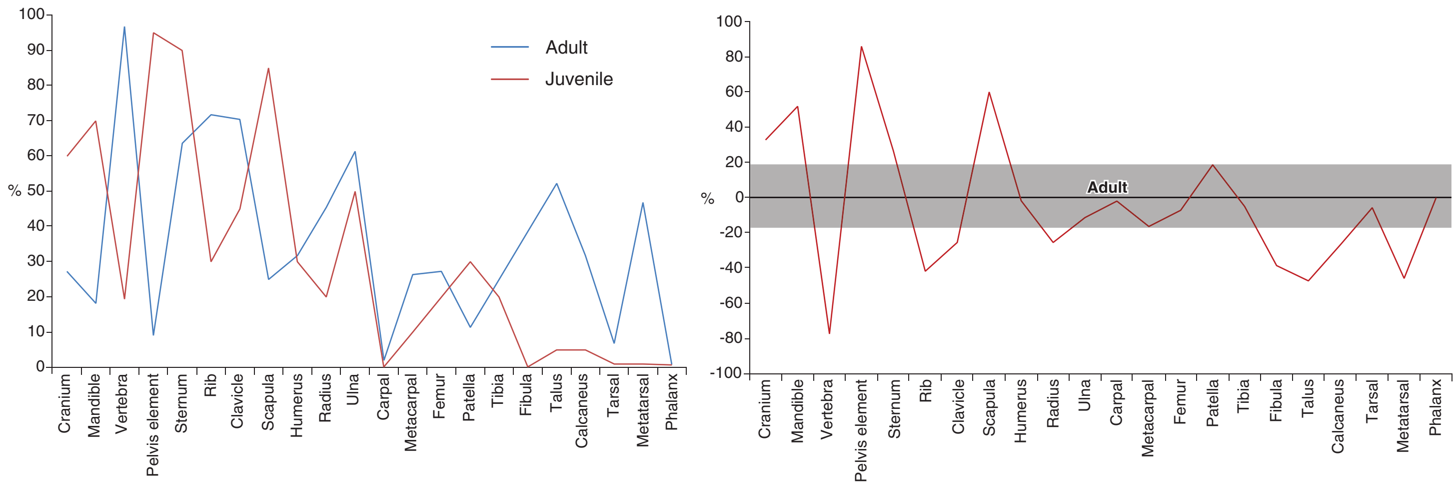

Illustration 6.32
Comparison of element indices for adults (including 'young) and juveniles (comprising 'child' and 'infant') from the Sculptor's Cave assemblage (left) and with adults normalised to 0 (right)

6.10.3 Element index by age

These comparisons show that there is no easy template from which to interpret the Sculptor's Cave human remains. Nonetheless, comparison with other funerary sites does bring some aspects of the assemblage into sharper focus; notably, the very high representation at the Sculptor's Cave of the torso (suggesting that post-mortem bacterial activity was suppressed by some natural and/or anthropogenic mechanism in these individuals) and the paucity of crania, mandibles and major long bones.

To interrogate these data in more depth, however, it is useful to break down the Sculptor's Cave assemblage further. We have already noted the markedly different demographic profile between those individuals known to date to the Late Bronze Age and those known to date to the Roman Iron Age (section 6.5; illus 6.3), and have used this as a basis to argue that the Sculptor's Cave human bone assemblage likely comprises two mortuary populations with different age-at-death characteristics: a Late Bronze Age population dominated by juveniles and a Roman Iron Age population dominated by adults. With this in mind, the element index for the Sculptor's Cave bone assemblage can be divided according to age at death (table 6.12; illus 6.32) in order to examine whether different funerary treatments were applied to the different age groups: this might reflect, albeit in a slightly blurred way, a chronological division between Late Bronze Age and Roman Iron Age mortuary practices.

Illus 6.32 demonstrates that the element indices for the adult (MNI: 22) and juvenile (MNI: 10) bone assemblages display very different patterning; in fact, they are arguably more different from each other than the Sculptor's Cave core assemblage is from any of the comparator sites considered above. This suggests strongly that the age-based division, crude as it is, may indeed reflect a chronological division between Late Bronze Age and Roman Iron Age populations. In particular, juvenile crania, mandibles, pelvis elements and scapulae are far better represented than the equivalent adult elements, while adult vertebrae, ribs and clavicles are far better represented than the equivalent juvenile elements, as are the small bones of the hands and feet (illus 6.32). This last observation suggests perhaps the presence of complete adult bodies in the cave but more selective deposition of individual juvenile bones. There is, of course, the caveat that small juvenile bones may have survived less well or may have been missed during excavation; although this may well be part of the explanation for the variations in the element index, it would not account for the over-representation of certain bones in the juvenile group (eg sterna and scapulae), which is much more suggestive of some deliberate selection strategy. Indeed, this initial comparison suggests that we may be looking at a change in role for the Sculptor's Cave from an ossuary for the secondary deposition of predominantly juvenile bones in the Late Bronze Age to a place where complete bodies were left exposed in the Roman Iron Age (perhaps for the purpose of excarnation, or for their natural or artificial preservation as mummies). To explore this further it is useful to return to our inter-site comparisons, this time splitting the Sculptor's Cave assemblage into these two age-based groups.

The Sculptor's Cave adults (adults and 'young')

As with the element index for the combined Sculptor's Cave core assemblage, the adult signature closely resembles that of the West Tenter Street inhumation cemetery in the frequencies for lower limb and extremity elements, but displays significantly different patterning for elements from the upper limbs and torso (illus 6.33A). The numbers and patterning of the extremities in particular provides a strong indication that this part of the Sculptor's Cave assemblage, like that of West Tenter Street, derives from the former presence of complete fleshed bodies. The significant over-representation of vertebrae, sterna and clavicles in the Sculptor's Cave adults relative to West Tenter Street supports the interpretation, discussed above, that the bodies were not buried in the cave but were exposed on the surface, leading to desiccation and inhibited decay of the bones of the torso. It may also, however, reflect human intervention in the form of specific mortuary treatments such as smoking, drying or organ removal to arrest bacterial activity; unfortunately, in the absence of the

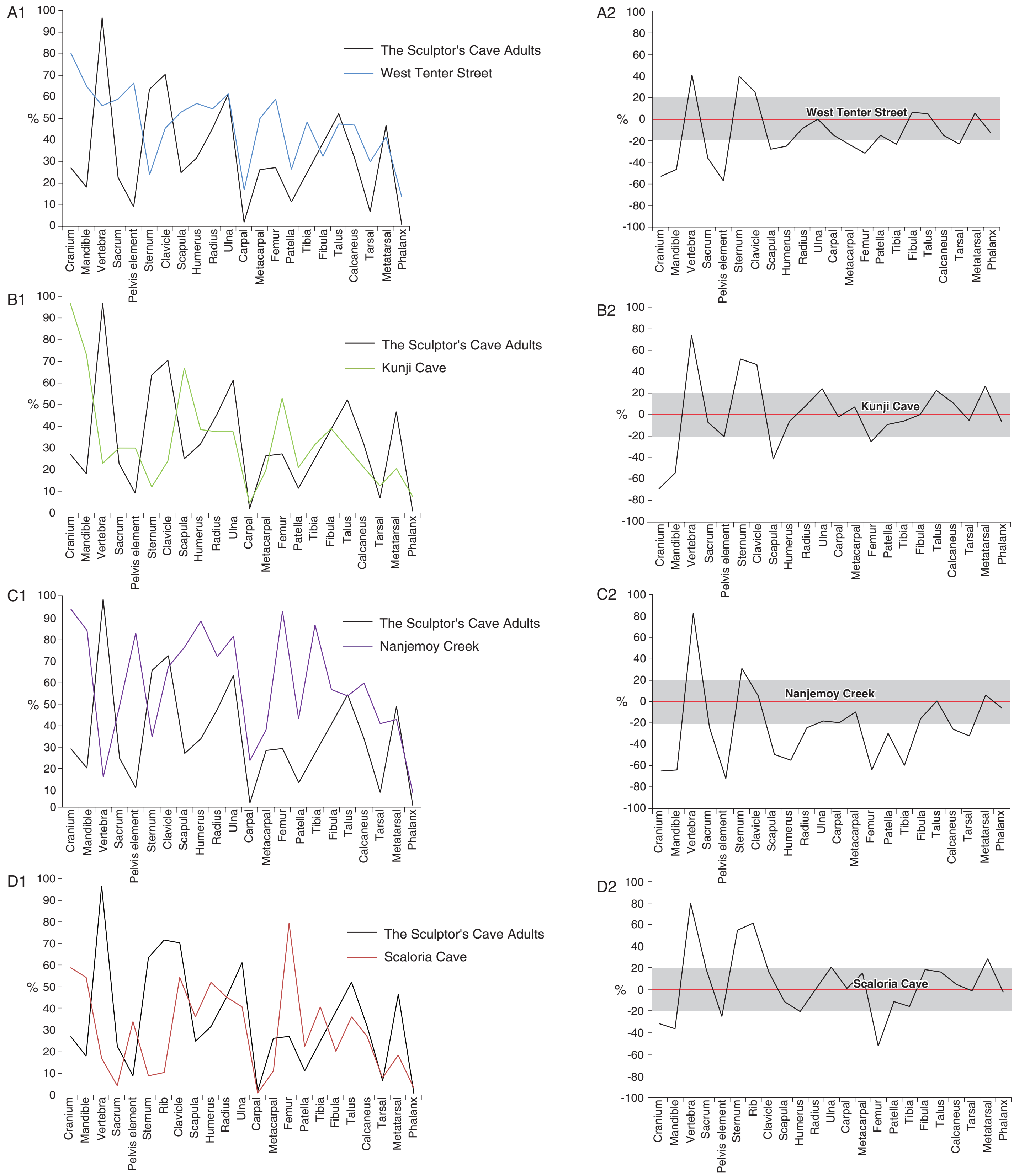

Illustration 6.33

Element index for adults (including 'young') from the Sculptor's Cave and comparative sites. Shaded areas are provided to aid visual comparison only, and do not represent statistical significance

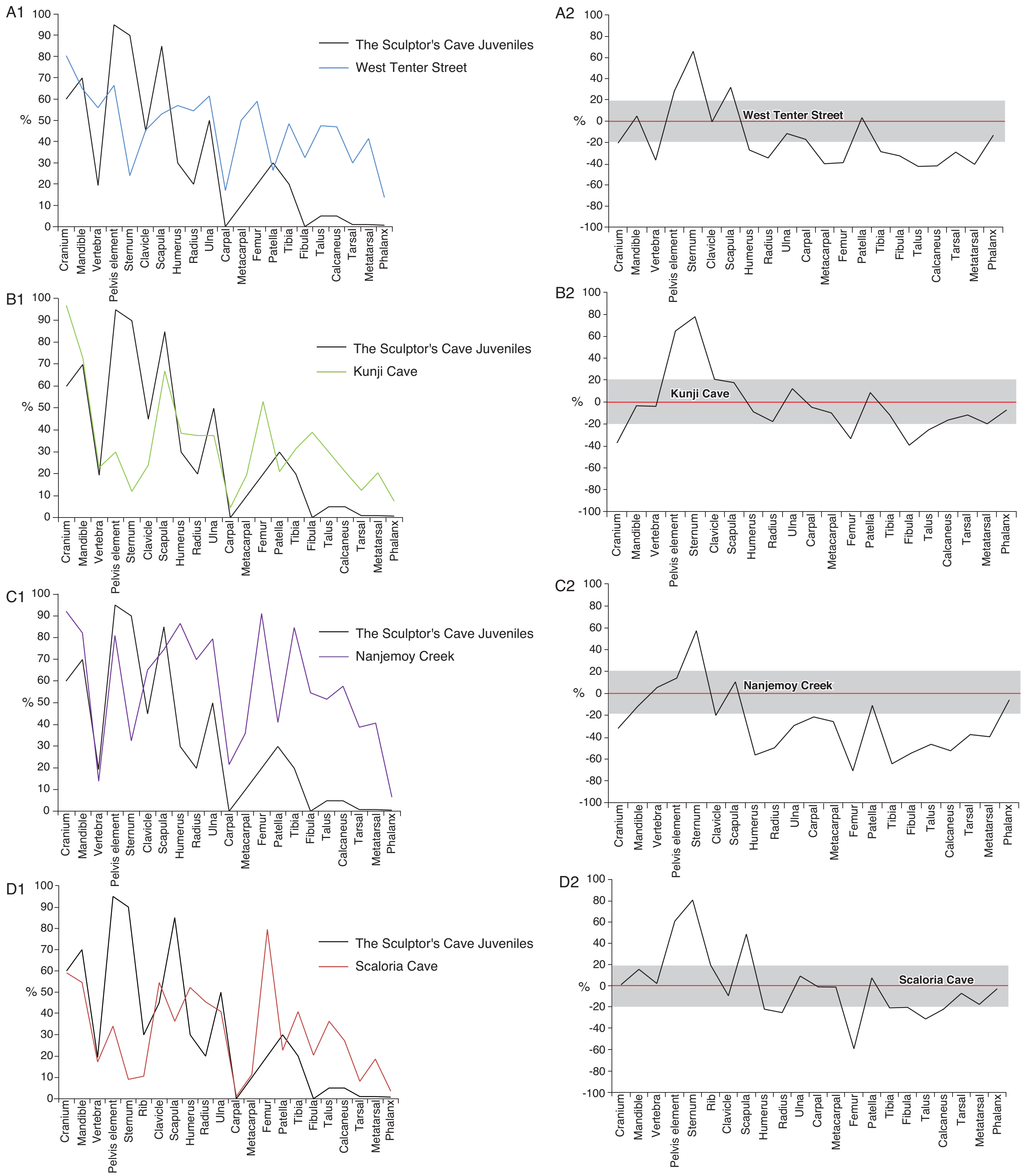

Illustration 6.34

Element index for juveniles (comprising 'child' and 'infant') from the Sculptor's Cave and comparative sites. Shaded areas are provided to aid visual comparison only, and do not represent statistical significance original bone assemblage, these hypotheses cannot be more fully explored through, for example, the identification of potential cut marks, which are unlikely to have been noted during their initial examination.

Interestingly, given the decapitations which are known to have taken place around the third century AD, the relative under-representation of crania and mandibles in the adult Sculptor's Cave population suggests the deliberate removal of at least some of these heads. Since some of the cut-marked vertebrae would have stayed with the fleshed head after decapitation, it may be the case that the heads were removed from the cave only after a period of disarticulation (sufficient to leave behind these particular elements). The under-representation of femora, sacra, scapulae, humeri and especially pelvis elements in comparison to West Tenter Street may also reflect the selective removal of specific bones.

Comparisons with Kunji Cave add little to the picture, merely reinforcing the relative over-representation of the elements of the torso and under-representation of crania and mandibles among the Sculptor's Cave adults (illus 6.33B). Comparison with the ossuary at Nanjemoy Creek produces similar results (illus 6.33C); in particular, however, the large difference between the element indices of crania and mandibles at the Sculptor's Cave and Nanjemoy Creek suggests that adult heads are indeed significantly under-represented at the Sculptor's Cave and that divergence from the Kunji Cave assemblage is not merely the product of selective retention of crania at the latter site.

Though far from identical, the element indices at Scaloria Cave are perhaps the most similar to those of the Sculptor's Cave adults (illus 6.33D). Scaloria Cave represents a complex set of funerary practices, including movement and secondary deposition of disarticulated elements from complete bodies that were apparently excarnated inside the cave or elsewhere before being deposited (table 6.10). Higher numbers of vertebrae and small bones of the hands and feet suggest that the adult bodies at the Sculptor's Cave may have been subject to less post-depositional reworking and secondary deposition than those at Scaloria Cave and further attest to the unusual preservational environment at the Sculptor's Cave. Meanwhile, the under-representation of crania, pelvis elements, scapulae and long bones such as femora and tibiae at the Sculptor's Cave provides further evidence that these large, easily recognisable elements may have been retrieved from the disarticulated adult bodies for secondary deposition elsewhere.

The Sculptor's Cave juveniles

Comparison of the juvenile bones from the Sculptor's Cave with the various comparative sites is difficult, since these latter sites are dominated by adult remains that are generally more robust and (taphonomic considerations aside) more likely to survive and be retrieved. There are indications, however, that the juvenile bones at the Sculptor's Cave are, in fact, rather well preserved. The most striking example of this is the element index for sterna. At 90%, this is substantially greater than the equivalent index for the adult bones (64%), despite the sternum being one of the more fragile bones of the body and one of the least likely to survive in a disturbed environment (Knüsel et al 2016: 157).

When compared with West Tenter Street inhumation cemetery (illus 6.34A), the Sculptor's Cave juvenile assemblage displays very different patterning. Although survival and collection bias for small juvenile bones must be borne in mind, as must the demographic profile of the West Tenter Street cemetery population (with a substantial proportion of adults), there is a clear under-representation of juvenile hand and foot bones at the Sculptor's Cave, suggesting perhaps that complete juvenile bodies were not present in the cave. This hypothesis is supported by the under-representation of vertebrae, given how well they are represented among the adult population (illus 6.32, 6.33). Given that West Tenter Street represents complete inhumed bodies, the high element indices of scapulae, sterna and pelvis elements among the juvenile Sculptor's Cave population (at 85%, 90% and 95% respectively) is striking. Similarly, though juvenile crania at the Sculptor's Cave are less well represented than those at West Tenter Street, the difference is smaller than with those of the adult population, suggesting that crania may also have been selected for secondary deposition at the site or, at the very least, not removed (as has been argued for the adults; see above).

Comparison with Kunji Cave reveals some interesting results (illus 6.34B). The assemblage at Kunji Cave reflects the selective removal of bones from complete disarticulated bodies, resulting in the destruction of small, fragile elements and the over-representation of certain others such as crania, which were selectively retained within the cave (table 6.10). Since Kunji Cave is thought to represent such a destructive environment for small skeletal elements, it is significant that the juvenile population at the Sculptor's Cave has even lower representation of the bones of the hands and feet, suggesting that very few of these elements entered the cave at all. The same could be argued for humeri and radii, since they are also under-represented in relation to Kunji Cave and are sufficiently robust that they are unlikely to have been destroyed by reworking inside the cave. Since it seems that crania were selectively retained at Kunji Cave, it is hard to assess the significance of the difference between the two sites in terms of this skeletal element. The fact that the indices for pelvis elements and scapulae are so much higher for the juvenile Sculptor's Cave population than at Kunji Cave suggests, however, that either we have a situation such as that presented by crania at Kunji Cave, whereby all juvenile bones other than these select skeletal elements were cleared out of the Sculptor's Cave, or that we are looking at selective secondary deposition within the cave of these elements from bodies which had become disarticulated elsewhere.

Nanjemoy Creek represents exactly this; the secondary deposition of bones from bodies which had been buried or exposed at another location. The pattern between the two assemblages is, however, still markedly different (illus 6.34C). At Nanjemoy Creek, every effort was apparently made to collect as many of the bones as possible, including small hand and foot bones, which would account for the vastly inflated element indices for these elements in comparison with the Sculptor's Cave assemblage. It does suggest, however, that if the juvenile remains from the Sculptor's Cave do represent the secondary deposition of disarticulated remains, then it was only certain bones that were selected. This is perhaps reinforced by the substantial under-representation of limb bones among the juvenile Sculptor's Cave assemblage; these are robust bones unlikely to have become fragmented and destroyed within the cave itself, suggesting either that they were selectively retrieved from the site or that they were never present to begin with. Pelvis elements on the other hand are well represented at both sites; these are larger recognisable bones which are frequently recovered from secondary contexts, such as those deposited in disused grain pits at the Iron Age hillfort of Danebury in Hampshire (Craig et al 2005: table 1), lending some weight to the possibility that the juvenile (and likely Late Bronze Age) bones at the Sculptor's Cave are a result of secondary deposition. In this context, and given early interpretations of the site as dominated in the Late Bronze Age by the display of fleshed juvenile heads (Shepherd 2007: 199), it is noteworthy that crania and mandibles are far less well represented at the Sculptor's Cave than at Nanjemoy Creek; certainly there appears to have been no additional selection of these elements over others for deposition at the Sculptor's Cave.

The representation of juvenile crania and mandibles at the Sculptor's Cave is, however, very similar to that at Scaloria Cave (illus 6.34D), suggesting either selective retrieval of these elements or, perhaps more likely, the destruction of these fragile bones during successive reworkings of the deposits. We have demonstrated that, at least in relation to the stratified Shepherd assemblage, many of the juvenile bones are likely to be Late Bronze Age in date (illus 6.3); as such, and concentrated as they were in the entrance passages, these may have been subject to more intensive and periodic post-depositional processes than the Roman Iron Age bones, which represent some of the last deposits to enter the cave. Despite the frequent reworking of deposits at Scaloria Cave, the element indices for small fragile bones of the hands and feet are far higher than at the Sculptor's Cave, lending additional weight to the hypothesis that many of these bones may not have originally been present within the cave. This is also true for long bones, which are less well represented among juveniles at the Sculptor's Cave than at Scaloria Cave and which are likely to have been sufficiently robust to have survived within the cave if they were originally present and not selectively removed. The same over-representation of scapulae, sterna and pelvis elements in the juvenile Sculptor's Cave population is however a feature of the Nanjemoy Creek assemblage, suggesting the selective secondary deposition of these larger recognisable elements.

Summary

The weight of evidence from these comparative assessments suggests that whole adult bodies were brought into the Sculptor's Cave during the Roman Iron Age; at least six of these individuals (represented by the cut-marked vertebrae) entered the cave alive and were killed there, but it is unlikely that this decapitation event accounts for all of the human remains. The preservational environment (perhaps aided by human intervention in the form of smoking, drying etc) ensured excellent survival of 'fleshy' parts of the body (particularly the torso) that would otherwise disarticulate in a more conventional burial environment. Subsequently, when bodies had become substantially disarticulated, certain elements – notably heads (crania and mandibles), femora and pelvis elements – appear to have been selectively removed from the cave.

By contrast, comparative assessment of the juvenile assemblage suggests that whole bodies were not brought into the Sculptor's Cave during the Late Bronze Age. Instead, the cave appears to have been used for the secondary deposition of bodies and/or body parts that had been subject to primary funerary treatment elsewhere. There are no certain peri-mortem injuries on the surviving Late Bronze Age human remains, although the frontal bones of a sub-adult (SF231) and an adult (SF1128) exhibit some characteristics of peri-mortem fracture. Post-mortem modification in the form of multiple striations are unambiguously present on the sub-adult frontal (SF231) and could be seen as consistent with the curation and display of juvenile heads at the cave entrance.