

LITTLE HOYLE CAVE, TENBY, PEMBROKESHIRE: STEPHEN ALDHOUSE-GREEN'S EXCAVATIONS 1984–1990

by

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ABSTRACT

Work took place at Little Hoyle in 1984, 1986 and 1990. Excavation took place in the west facing entrances to the cave and on the platform outside these entrances. There was also excavation around the south entrance, and in the cave interior. The surviving deposits at Little Hoyle span at least 128,000 years. Basal clay deposits accumulated under cold conditions in the Early and Middle Devensian. There is then evidence for a period of interstadial conditions between 50,000 and 40,000 BP. The succeeding deposits are a series of stony clays and matrix supported breccias which formed slowly under cold conditions after this date and down to at least 14,500 BP. These were in turn succeeded by Holocene sediments which have largely been disturbed by previous excavations.

Lithic artefacts included part of an Upper Palaeolithic convex-backed point, an Early Mesolithic blade core, and a small Neolithic assemblage. There is a single bone needle from the 19th century excavations at the site. Early Neolithic pottery was recovered from above the cave. Faunal remains include evidence for denning by brown bears in the cave interior, alongside evidence for hyaena, wolf, fox, woolly rhinoceros, horse and reindeer in the wider environment. An assemblage of human remains from earlier excavations within the cave were re-assessed as part of the current project. The minimum number of individuals in the assemblage is 11 and radiocarbon dates on five of these have provided earlier Neolithic results.

INTRODUCTION

Project background and research aims

Excavations at Little Hoyle Cave (SS 1117 9997) (Figure 1) were carried out by the National Museum of Wales (now Amgueddfa Cymru - Museum Wales) between 1984 and 1990 as part of the wider *Palaeolithic Settlement of Wales Research Project*. The Palaeolithic Settlement of Wales research programme was initiated by the late Professor Stephen Aldhouse-Green in 1978 (Green, 1986a). Excavation at Pontnewydd Cave and the Elwy Valley caves of North Wales formed an initial focus for that research (Aldhouse-Green, *et al.* 2012). A further component of the programme was the definitive publication of excavations by the late Professor Charles McBurney at Coygan, Carmarthenshire (Aldhouse-Green, *et al.* 1995); and Little Hoyle Cave, Pembrokeshire (McBurney, 1959). In addition to the above, work took place at Paviland Cave in 1997 and led to a definitive publication and new assessment of that site (Aldhouse-Green, 2000). The research aims of the excavations at Little Hoyle were to understand the Pleistocene sequence at the cave and to contextualise the earlier discoveries.

The Setting, Geology and Geomorphology of the Site

Little Hoyle Cave is cut at around 20 m O.D. into a ridge defined by two valleys draining off the northern slopes of the Ridgeway into the Ritec Valley 2 km west of Tenby. The cave is 400 m due south of the Upper Palaeolithic site of Hoyle's Mouth (SN 1119 0032). The overall regional geology is of Variscan aligned folds, locally complicated by faulting, bringing

to crop out the Ridgeway Conglomerate Formation (Devonian sandstones and conglomerates) forming The Ridgeway, the southern interfluvium of the Ritec valley (at around 90 to 100 m O.D.); the Carboniferous limestones (Pembroke and Avon Groups) within which the cave and the valley floor are contained; and the Bishopston Mudstone Formation (Carboniferous mudstones, siltstones and sandstone) forming the northern Ritec valley interfluvium (at around 80 to 100 m O.D.). The parent rock of Little Hoyle Cave is tentatively assigned to the Gully Oolite Formation {Pembroke Limestone Group; Chadian age: c.345 Ma (Waters and Davies, 2006)}.



Figure 1. Location and environs of Little Hoyle and Hoyle's Mouth caves, showing Longbury Bank, Ritec valley and floodplain along with the Ridgeway.

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The Ritec valley is cut into the lower Coastal Plateaux of Brown (1960), more specifically the 45 m to 100 m denudation surface of Rowberry (2012). Denuded or exhumed during the Palaeogene, Neogene (Pliocene) or early Pleistocene (Crowther, 1989; Owen, 2015), the Coastal Plateaux provided the regional geological and topographic foundation to erosion and deposition during the Quaternary. Within this context however the age of the valley is indeterminate and is probably the product of multiple episodes of sub-glacial and interglacial channel flow. Little Hoyle Cave itself would predate the cutting of the Ritec valley.

The evidence for glaciation of the Little Hoyle area is in the form of relict glacial sediment outcrops on local interfluvies from ice sheets overrunning the region. The earliest glaciation recorded in the area deposited gravels with local clasts and erratics from north Pembrokeshire (Penfro Till Formation). Relict outcrops of till/diamicton are mapped within the Ritec valley to the south and west of St Florence {British Geological Survey, 1977 (Boulder Clay on earlier map editions)}. The deposits are possibly as old as 620 ka BP (MIS 16+) (Bowen, 1999), though there is some uncertainty attached to this. The 'Paviland Moraine', West Gower, comprised of sediments deposited by Welsh Ice from the north (Llanddewi

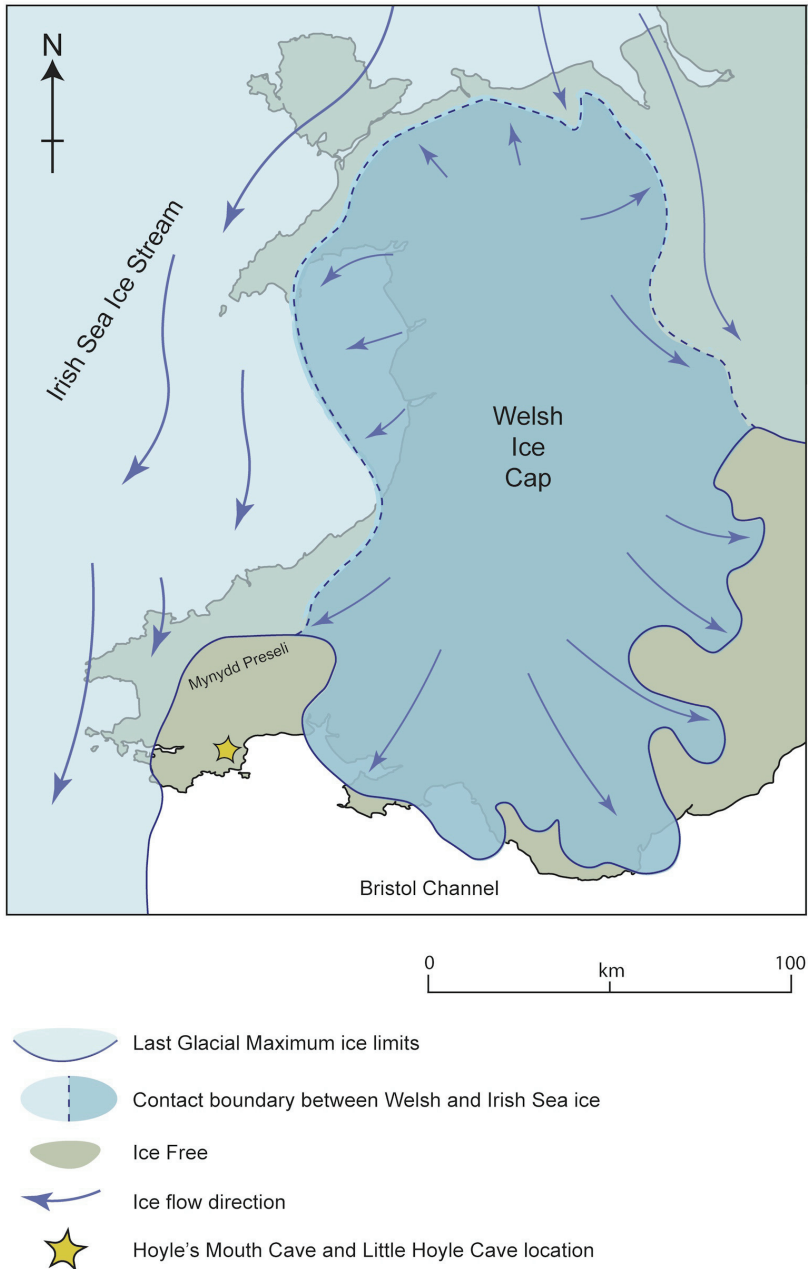


Figure 2. The location of Hoyle's Mouth and Little Hoyle caves relative to the Last Glacial Maximum ice limit in Wales (based on Bowen, 1984, 5; Glasser, et al. 2018, 805; Jenkins, et al. 2018, 264). Mynydd Preseli proved a barrier to the full advance of the Welsh ice. The 'Bristol Channel' would have been an open flat terrestrial landscape due to low sea level.

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Formation) is, with acknowledged uncertainty, considered by Bowen (1999) to be the product of an MIS 12 (at around 470ka to 420ka BP) ice advance across the region. Shakesby *et al.* (2018) consider the moraine to be Devensian (MIS 2, Last Glacial Maximum).

Devensian ice (MIS 2) did not overrun the Little Hoyle Cave location. Mynydd Preseli provided sufficient barrier to deflect the coalesced Irish Sea and Welsh ice sheets to the west and east respectively, the Welsh Ice ultimately advancing to within 16 km of the Ritec valley (Figure 2). The Devensian ice reached its maximum extent between 26,000 BP and 21,000 BP, a ^{36}Cl age from the giant erratic boulder of Arthur's Stone dates the Late Glacial Maximum on Gower at 23,272 BP (Bowen, *et al.* 2002), after which evidence suggests a rapid deglaciation with much of the Cambrian Mountains ice free by about 15,000 BP (Glasser, *et al.* 2018). Although not glaciated at this time the Ritec valley and the slopes of the Ridgeway would have been subject to a periglacial environment with freeze thaw, fluvial, hillslope and aeolian processes activating and depositing breccia, alluvium, colluvium, coversand and loess (Case, 1983). Field survey, excavation and augering has shown that the valley floors lie at only 13 m O.D. with a sedimentary fill of at least 2 m of colluvium overlaying fluvial deposits.

Warm interglacial and Post-glacial (Holocene) environments would have enabled water percolation and speleothem deposition within the cave, the cementing of cave sediments, water flow which would erode cave sediments, and water ponding which would facilitate the deposition of fine sediments.

Cave Morphology

Little Hoyle is situated just below the crest of the limestone ridge. The cave floor itself lies at 19.5 m O.D. and the crest of the ridge at 26 m O.D. Three cave-entrances (Figure 3) open from the north side of the ridge (the North Platform) and one from the south. Entrance 1 is the easternmost of the three northern entrances (see Figure 6). The entrance chamber tapers up to a point about 4 m above the floor. The upper part of the wall here is half covered with a fibrous calcite speleothem, up to a few centimetres thick. A narrow entrance on the east side of the main chamber shows some bedding surfaces in the limestone and leads into a small side chamber. At the inner end of the main chamber a relict patch of breccia cemented by speleothem is attached to the eastern wall about 1.5 m above the floor (Figure 4) indicating cave fill to at least this level at some time in the past.

Beyond the first chamber a chimney 2 m in diameter, which would have originated as a sinkhole, rises 3 m through the roof of the cave to the surface. Corrosion of the south wall of the Chimney has etched the limestone so that grains up to a few millimetres across stand out visibly. A narrow gap at floor level in the east side of the chimney leads through to the South Entrance.

Entrance 2, the central northern entrance, tapers to closure within 4 m. Entrance 3, also known as the West Entrance, narrows from about 1.5 m high and 0.8 m wide at the entrance along an east-southeast passage before widening into a small chamber 2 m high. The roof is about 40% bare smooth limestone and 60% bulbous flowstone, the latter showing signs of corrosion. At the foot of the wall on the south side there is a gap of up to 0.3 m high between the limestone and the floor deposit, suggesting a continuation of the passage.



Figure 3. *View of the cave entrances from the west showing the position of North Cave Entrance 1,2 and 3.*

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The History of Excavations at the Site

The cave, variously known as Little Hoyle or Longbury Bank Cave, has been known since at least 1866, when it was explored by the Rev. H. H. Winwood. Winwood's discoveries comprised bones of *Bos*, goat, badger and shells of oyster, limpet and mussel which are likely to derive from post-Pleistocene contexts. Many of the bones were burnt, a condition noted among the recent fauna recovered during the excavations reported on here. In addition, Winwood found a few human bones, two flint flakes and some fine “red-grained” pottery which Professor Boyd Dawkins considered to be of Roman age (Dawkins, 1874, 133).

The cave was next examined, around 1870, by the Rev. G. N. Smith but no record of his discoveries survives (Laws, 1885, 6). In the mid 1870s, the cave was excavated by Wilmot Power and Edward Laws (Laws, 1878). They recorded the existence of relic breccia deposits cemented to the cave walls. Power and Laws excavated the younger deposits which had accumulated both below the level of these ‘shelves’ of breccia and within the central Chimney. Most of the remains found were of Roman or later age although a speckled green rhyolite scraper, certainly, and a perforated bone bodkin, probably, were prehistoric. The historic finds came from two ‘heaps of black vegetable mould, mixed in with broken shells, bones, and angular fragments of limestone’. The bodkin and scraper came from the surface of a probable Pleistocene deposit underlying one of these heaps. No certain Pleistocene fauna was discovered at this time.



Figure 4. *Speleothem and cemented breccia attached to the eastern wall of the main cave.*
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In 1878, the cave was examined by a committee composed of Professor Rolleston, Major-General Lane Fox, Professors Busk and Dawkins, Dr John Evans and Mr F. G. Hilton-Price. The committee published an account of its findings (Rolleston, *et al.* 1878), but much more valuable is a large watercolour section-drawing preserved in the Tenby Museum (Figure 5). Between 1875 and 1878 the emptying of the central Chimney seems to have been completed and finds from there include the human remains of at least 11 people, five of which are now radiocarbon dated to the earlier Neolithic. ‘Roman’ and later finds (including iron slag) and the bones of probably domestic animals (horse and cattle) occurred only in the upper deposits of the Chimney. The Rolleston account and section both describe and portray the scraper and bodkin as having been found ‘in the red cave earth, just inside the north cave and beneath the black mould’, but Laws had made it clear that these finds actually came from the surface of that deposit (Laws, 1878, 86; Rolleston, *et al.* 1878, 214). Also recorded from the North Cave are 160 or so fragments of bones or teeth of rhinoceros or elephant and the bones of bear, roe deer, eagle and black grouse. The watercolour section drawing specifically names mammoth and rhinoceros in the cave earth outside the North Entrance, and bear and human in the equivalent deposit outside the South Entrance.

Three seasons of work by Professor Charles McBurney in 1958-1959 and 1963 (see Figure 6), of which only the first season is reported (McBurney, 1959), demonstrated that substantial deposits remained at the cave. Outside North Cave Entrance 1 and 2, McBurney discovered an upper and, apparently, a lower thermoclastic scree, separated by a ‘finer grained deposit varying from silt to clay grade with a well marked reddish zone and another blackish in hue’. From the Upper Scree at a depth of ‘some 18 inches to 2 feet’ (0.45 – 0.60 m) was a thin scatter of bones and rare lumps of charcoal, and a single very typical large Creswellian type

pen-knife blade'. Fauna recovered by McBurney from the Upper Scree included reindeer, bear and fox (*Rangifer tarandus*, *Ursus* sp., and *Vulpes* sp). A radius of *Lepus* sp., possibly of *Lepus timidus* (arctic hare), was the only identifiable bone from the Lower Scree.

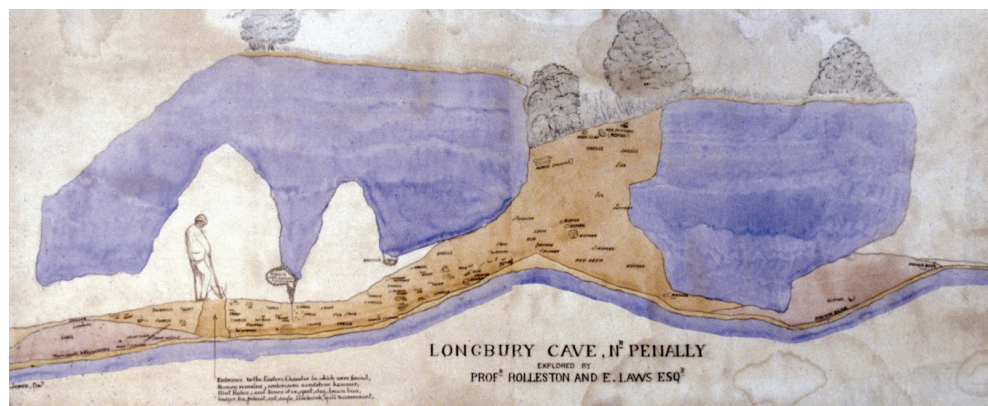


Figure 5. A copy of the 1878 watercolour section preserved at Tenby Museum showing explorations by Rolleston and Laws.

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The site is important not only for its prehistoric finds but also for a scatter of finds of early medieval date, associated with the known high status settlement of Longbury Bank above the cave. Accordingly, part of the original research design was to gauge the importance of this phase of the site's history. Early medieval finds, including pottery, metalwork and imported glass, come only from the upper chimney fill and from the platform outside the cave. There is no evidence of an early medieval use of the cave itself. A full examination of the Longbury Bank settlement was later conducted by Cardiff University, and is now published (Campbell and Lane, 1993).

RESULTS OF THE ALDHOUSE-GREEN EXCAVATIONS

Location of the Excavations (Figure 6)

A two week exploratory season took place at Easter 1984 (Green, 1986b) and the following work was undertaken. McBurney's deep sounding of 1958 was reopened (trench NP2, plus extension NP3), a trial trench (NP1) was opened outside the previously untouched West Cave, a test pit (NC1) was opened inside the North Cave, a trench (T7) was opened on the ridge above the cave to look for possible open air settlement, and a test pit (SV1) was dug in the South Valley to examine the depth and nature of the stratigraphy there and to look for possible open air settlement-debris. A transect of auger holes in the North Valley by the late Professor John G. Evans demonstrated a depth of at least several metres of colluvium. SV1 demonstrated much the same picture but with alluvial layers of sand and gravel near the base of the section.

The 1986 Little Hoyle excavations took place in three areas: T4, a 6 x 5.5 m area on the platform outside the North Cave (incorporating the former trenches NP2 and NP3); T5, a 1.4 x 2.5 m area within the North Cave (incorporating the former trench NC1); and T6, a 4 x 2 m area outside the South Cave (Figure 6). Excavations in 1990 took place in T1, a 6.5 x 12 m area outside the West Cave incorporating the former trench NP1 (Figure 6).

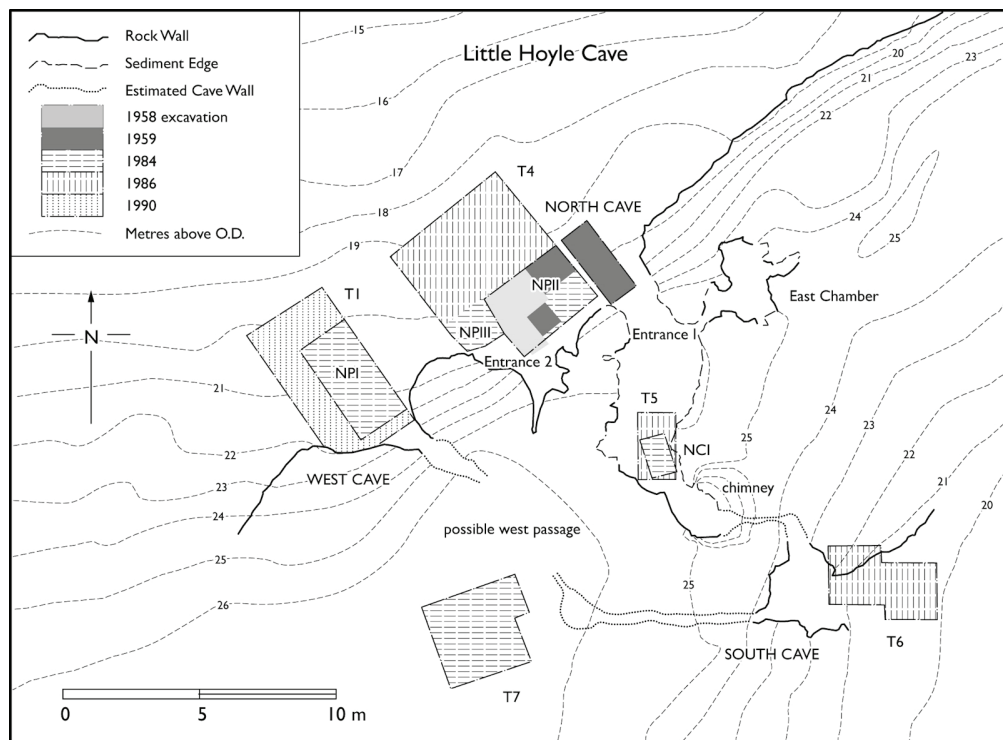


Figure 6. Location of the excavated areas at Little Hoyle.

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Stratigraphy, Sedimentology and Chronology of the Cave Fill Deposits (Tables 1 and 2)

The Aldhouse-Green excavations enabled field stratigraphic recording and sampling of sediments for description and characterisation. Selected contexts were sampled and physical properties of clast lithology, particle size, Powers Roundness (Powers, 1953), shape, and fines/matrix particle size were measured (calliper, sieve and sedimentation/Accusizer [2003]) and descriptive statistics determined through processing measurements through GRADISTAT and Tri-plot software (Graham and Midgley, 2000). Where multiple samples were examined from one context the results are presented below as a range. Where possible the data has been interpreted to elucidate provenance and sedimentary environment. Layer numbers were applied on excavation with a separate sequence for each excavated area. Table 1 provides an overview of the major sedimentological units and chronology and a correlation of the layers.

Table 1. Little Hoyle Cave sedimentology, stratigraphy and chronology. Dating (^{14}C , TL and U-series) has enabled correlation between trenches, and with NGRIP, GRIP, and GISP2 timescales and INTIMATE event stratigraphy from Rasmussen, et al. 2014. Notes: a) water erosion of channel in earlier channel fill; b) water erosion of channel in limestone breccias; c) eroded top to layer 4; d) stalagmite on breccia cemented to cave wall.

North Platform - entrance to North Cave		North Cave Interior	South Cave	Formal Stage/ Age	Dating (BP)
T1: W. Cave Entrance	T4: N. Cave Entrance	T5: N. Cave Internal	T6: S. Cave Entrance		
L1, L2 & L7	L2, L13, L10, L14 & L1	L1	L1, L2, L3, L4, L5, L7, L8 L9, L10, L12, L17 & L18		
L3, L4, L9	L3a			Holocene	
a) L14				Younger Dryas	11,703
b) L5 & L12					GS-1 12,896
L6 L13		L2		Allerød	GI-1a 13,099 GI-1b 13,311
					GI-1c 13,954
			L6	Older Dryas	GI-1d 14,075
	L3 (L11 & L12)			Meiendorf/ Bølling- Oscillation	GI-1e 14,692
L10			L13	Oldest Dryas	GS-2.1a 17,480
				Late LGM	GS 2.1b-c 22,900
	c) L4	L3 & L4		Early LGM	GS 4 to GS-2.1c 28,600
	L20 & L21	L5	L11a L16 L11b		
	L5 & L6		L12 & L14	Middle Devensian	c. GI-17 to GS-4
		d)			
		L6, & L7	L15, L19, L21 & L22	Early Devensian	59,440 c. GI-25 to GI-17
	L7				115,370
	L8			Last Inter-glacial	
L11	L9	L9	L23		128,000

The cave can be subdivided on the basis of sediment fill characteristics into two facies:

1. Cave Entrance Platforms represented by:
 - West Cave Entrance - North Platform Entrance 3 - T1
 - North Cave Entrance - North Platform Entrances 1 and 2 – T4
 - South Cave Entrance - South Platform – T6

The cave entrance sequence can be summarised as basal orange/red clay sitting on shattered Carboniferous limestone bedrock overlain by limestone breccia with a silty clay matrix.

2. Cave Interior represented by:

- North Cave Interior - T5

The cave interior sequence can be summarised as basal orange/brown silty clay sitting on coherent Carboniferous limestone overlain by a sequence of red and brown silts and clays, coarsening upwards with increasing limestone clasts content, becoming a matrix supported limestone breccia at the top of the sequence.

Chronology and stratigraphic control is partially afforded by dated stalagmite for the Early to Middle Devensian and ^{14}C plus one TL date linking the Middle Devensian through the Last Glacial Maximum to the Holocene (Table 2).

Table 2: Radiometric dates from the deposits discussed below

U-series dates:

<i>Find number</i>	<i>Description</i>	<i>Context</i>		<i>Determination BP</i>	
NC212	Cemented breccia	T5		47,500 +9500/-8500	47,500
NC276	Derived stal	T5	L2	42,000 ± 7000	42,000
NC941	Derived stal	T4	L3	69,000 +7700/-7100	69,000

TL dates

<i>Find number</i>	<i>Lab. Reference</i>	<i>Context</i>		<i>Determination ^{14}C BP</i>	<i>OxCal Calibration IntCal 20 (95.4% range cal BP)</i>
NP1049	OxTL-273	T1	L14	9980 ± 800	
		T1	L14	TL equivalent to ^{14}C age of c 8,800 BP	12,428-8343

¹⁴C dates:

<i>Find number</i>	<i>Lab. Reference</i>	<i>Species</i>	<i>Description</i>	<i>Context</i>		<i>$\delta^{13}C$ value (where available)</i>	<i>Determination ¹⁴C BP</i>	<i>OxCal Calibration IntCal 20 (95.4% range cal BP)</i>
NC238	ANU-4349	<i>Rangifer tarandus</i>	Metatarsal	T5	L3		17,050 ± 1,010	23,668 - 18,355
NC214	ANU-4348	<i>Ursus arctos</i>	Proximal ulna	T5	L3		18,240 ± 1260	25,634 - 19,456
NC95	OxA-33902	<i>Branta leucopsis</i>	Left ulna	T1	L2	-21.0	19,320 ± 120	23,741 - 22,986
NC201	ANU-4347	<i>Ursus arctos</i>	Proximal tibia	T5	L3		20,080 ± 1,120	27,117 - 22,071
NC239	ANU-4350	<i>Ursus arctos</i>	Distal humerus	T5	L3		20,800 ± 910	27,128 - 23,125
NC214	OxA-32246	<i>Ursus arctos</i>	Proximal ulna	T5	L3	-17.7	23,010 ± 180	27,709 - 27,040
NC214	OxA-2508	<i>Ursus arctos</i>	Proximal ulna	T5	L3	-18.3	23,550 ± 290	28,445 - 27,261
NC214	OxA-X-228 8-32	<i>Ursus arctos</i>	Proximal ulna	T5	L3		25,860 ± 350	30,895 - 29,299
NP385	OxA-33903	<i>Rangifer tarandus</i>	Molar	T2	L4	-17.7	20,880 ± 140	25,636 - 24,794
NP385	OxA-1490	<i>Rangifer tarandus</i>	Left upper molar	T2	L4	-21.0	23,340 ± 350	28,438 - 27,007
NP426	OxA-33788	Undetermined	Bone fragment	T4	L13	-22.5	1450 ± 34	1384 - 1297
NP899	OxA-33789	Bos/Bison	Radius	T4	L11	-20.4	12,390 ± 70	14,913 - 14,161
NP950	OxA-1492	<i>Rangifer tarandus</i>	Upper third molar	T4	L21	-21.0	28,930 ± 800	35,070 - 31,498

NP399	OxA-1028	<i>Rangifer tarandus</i>	Phalange	T4	L5		29,200 ± 700	35,113 - 31,850
NC142	OxA-1027	<i>Branta leucopsis</i>	Undetermined bone	T5	L2		22,800 ± 300	27,662 - 26,425
SC175	OxA-1026	Ungulate (horse or bison)	Humerus shaft	T6	L6		17,600 ± 200	21,962 - 20,830
SC160	OxA-X-269 7-15	<i>Rangifer tarandus</i>	Calcaneum	T6	L6		26,870 ± 240	31,385 - 30,419
SC174	OxA-1491	<i>Crocota crocuta</i>	Left upper canine	T6	L11	-21.0	34,590 ± 1500 BP	42,239 - 36,496
1983.237 5/5	OxA-3303	Human mandible	17+ years			-19.4	4660 ± 80	5587 - 5055
1983.237 6/11	OxA-3305	Human mandible	> 42 years			-19.9	4750 ± 75	5594 - 5320
1983.243 5/9	OxA-3306	Human mandible	Juvenile			-20.4	4880 ± 90	5894 - 5329
1983.237 6/2	OxA-3304	Human mandible	> 50 years			-21.2	4930 ± 80	5898 - 5482
1983.243 5/5	OxA-41033	Human l. humerus	Adult			-20.0	4893 ± 22	5660 - 5585
NC201	ANU-4347	<i>Ursus arctos</i>	Proximal tibia	T5	L3		20,050 ± 900	26,346 - 22,373
NC214	ANU-4348	<i>Ursus arctos</i>	Proximal ulna	T5	L3		17,800 ± 950	24,046 - 19,425
NC238	ANU-4349	<i>Rangifer tarandus</i>	Metatarsal	T5	L3		17,350 ± 850	23,131 - 19060
NC239	ANU-4350	<i>Ursus arctos</i>	Distal humerus	T5	L3		19,950 ± 650	25,707 - 22,729

Trench 1: West Cave Entrance deposits (Table 1, Figures 7 and 8)

The sequence of deposits in T1 is as follows:

The top layers 1, 2, 3, 4, 7 and 9 comprise 0.5 m of trampled and disturbed soil and sediment.

Layer 14: Clast supported breccia, 0.4 to 0.5 m thick, with moderately sorted angular (mean roundness 0.25) coarse gravel clasts (mean 27.8 mm). An even distribution of bladed and platy shapes. 100% limestone. The buff matrix is predominantly silty. The upper boundary is clear with a channel shaped cut infilled with disturbed sediment of Layers 3/4/9. The basal boundary is clear with a channel form cutting into Layer 5/12 infilled with Layer 14.

Layer 5/12 (Layers combined): Clast supported breccia, 0.2 to 0.3 m thick, with clasts up to 400 mm length. The matrix is predominantly grey brown silt grading locally into a red brown clay. Clear upper (see Layer 14) and lower boundaries.



Figure 7. *T1 from the north-east in 1990 during excavation.*

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Layer 6: Clast supported breccia, 0.35 m thick, with moderate to well sorted angular and sub-rounded (mean roundness 0.21 to 0.4) coarse gravel clasts (mean 20.6 to 28 mm). Predominantly bladed. 100% limestone. The buff/yellow matrix is variable; in places it is dominated by coarse and very coarse sand (60-70%), and in places it is very silty (50%+ of fines) with locally a slight peak in the coarse silt (32%+ of fines). Statistically all matrix samples were poorly sorted suggesting a colluvial/slopewash deposit with the possibility of upslope loess contributing to the coarse silt fraction.

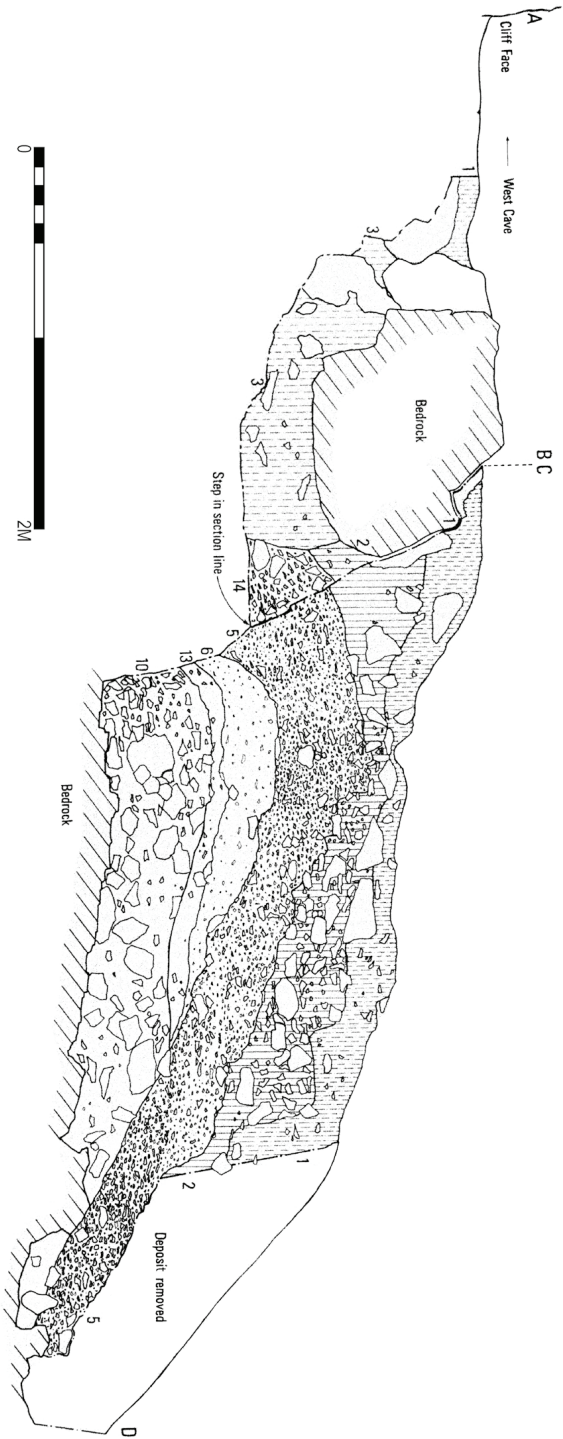


Figure 8. *Section along the east facing section of T1 at the end of excavation in 1990.*
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Layer 13: Matrix supported breccia, 0.1 to 0.15 m thick, with moderate to very well sorted sub-angular (mean roundness 0.21 to 0.28) coarse gravel (mean 22.3 to 22.4 mm). Predominantly elongate and bladed shapes. 100% limestone. Buff poorly sorted sand matrix. Clear upper and basal boundaries.

Layer 10: Buff clay silt, 0.4 m thick resting on and filling fractures in the top of the Carboniferous limestone (L11), coarsening upwards into a clast supported breccia. Clear upper boundary.

Trench 4: North Cave Entrance deposits (Figure 9)

Sediment samples for palynological analysis were taken from the east facing section of T4 in April 1984. The sediment samples were treated using the improved palynological preparation techniques outlined by Hunt (1985) and the results of this analysis have been incorporated into the discussion of the T4 sediments with a more detailed report as Appendix 1:

The sequence of deposits in T4 is as follows.

Layers 1, 2, 10, 13 and 14 form a complex sequence of disturbed sediment which together represents the backfill of McBurney's excavation in this area. Layer 1 is a pedogenic humic horizon developed in the top of the layers.

Layer 3 including Layers 3a, 11 and 12: Clast supported breccia, 0.3 m thick, with a silty matrix. Clear basal boundary with Layer 4. Layers 11 and 12, within the Layer 3 breccia are red/orange/brown silty clay lenses, with small limestone clasts. The top of Layer 3 fines upwards becoming more matrix rich and darker in colour. Labelled 3a this is interpreted as a pedogenic humic horizon developed in the top of the Layer 3.

Layer 4: Buff very fine sand (mean 0.1 mm) with 64% very fine and fine sand, with no visible laminations. Contains very few sub-angular clasts up to 150 mm which can only have been introduced into a fine sediment through roof/rock face fall. The geometry of the layer shows it banked southwards towards the cave entrance (Figure 9 upper section) and suggests an aeolian deposit, possibly a coversand. Clear top boundary with Layer 3 and bottom boundary with Layer 5. The pollen assemblages from this layer suggest a possible slight amelioration at this time. However, conditions generally appear to have remained relatively cold and wet and it is possible to envisage a form of scrub or park tundra with large open expanses of grassland with a varied herb flora, punctuated by thins of pine, birch and juniper.

Layer 19: Matrix supported limestone breccia, 0.35 m thick, with mostly sub-angular limestone clasts (5 to 100 mm) set in a brown grey silty clay matrix. Varying clear and diffuse top boundary with Layer 3, and diffuse bottom boundary with Layers 20 and 21.

Layer 20: Matrix supported limestone breccia with a red brown silty clay matrix. Diffuse top boundary with Layer 19 and bottom boundary with Layer 9.

Layer 21: Orange brown to red brown clay. Contains a few limestone clasts with corroded surface. Diffuse top boundary with Layer 19 and bottom boundary with Layer 9.

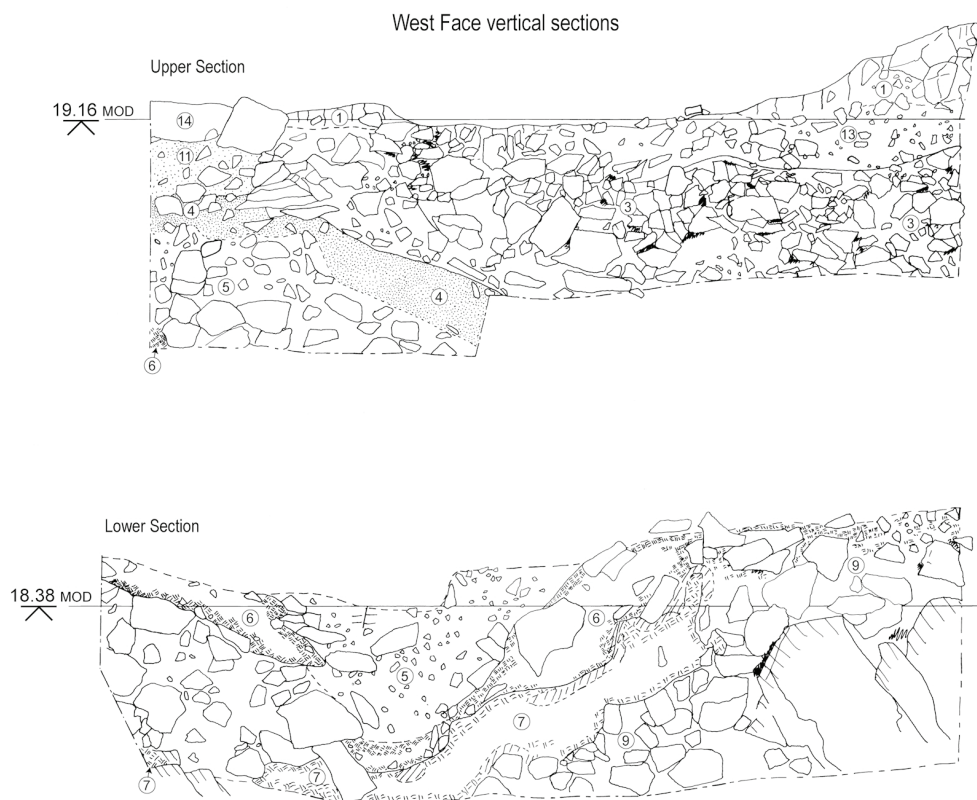


Figure 9. Section through the deposits in T4 at the end of the 1986 excavations.
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Layers 19, 20, 21: Field review identified strong similarities between these layers and Layer 7 with an interpretation of them being a continuation of Layer 7 or slightly reworked Layer 7.

Layer 5: Buff grey stony silt. Sub-angular and occasional sub-rounded limestone clasts up to 200 mm, but mostly around 50 mm long axis. Could be classed as a matrix supported breccia but is very matrix dominated. Clear top boundary with Layer 4 and bottom boundary with Layer 6. The pollen assemblages from Layer 5 suggest the presence of an open grassland environment under very cold, wet, conditions (possibly resembling arctic tundra). The low incidence of *Pinus* (Pine) recorded during this period may reflect long distance transport or very limited local growth.

Layer 6: Breccia exhibiting both matrix supported and clast supported characteristics. The clast fraction is a sub-rounded (mean roundness 0.33) coarse gravel (mean 22.5 mm). The matrix is pink-brown poorly sorted fine sand (mean 0.17 mm) dominated by the fine sand and very fine sand fractions (54%), suggesting a possible windblown, coversand, inclusion. Clear top boundary with Layer 5 and bottom boundary with Layer 7. The pollen spectrum from Layer 6 is dominated by *Pinus* (pine), with limited occurrences of *Betula* (birch) and *Juniperus* (juniper).

The assemblages from Layer 6 would suggest the presence of closed pine woodland. However low incidences of limited numbers of open ground herbs would indicate that local areas of open ground existed, possibly in the immediate area of the cave entrance.

Layer 7: Orange clay with occasional sub-angular limestone clasts (50 to 150 mm). The clast surfaces are corroded indicating *in situ* weathering or minimal transport. The clay contains lenses of sand dominated by very fine and fine sand (68.5%). Clear top boundary with Layer 6 and diffuse with Layer 8. The pollen samples from Layer 7 show an increase in the number and frequency of tree taxa. *Pinus* is still the dominant arboreal species, followed by substantially increased incidences of *Betula* and *Juniperus*. The assemblages from Layer 7 suggest climatic amelioration, with warm dry conditions prevailing. The landscape was probably still largely open grassland, with considerable tracts of Pine-Birch-Aspen 'park woodland'.

Layer 8: Black clay 0.1 m thick, only crops out between Layer 7 and the limestone. The colouration is interpreted as manganese staining of Layer 7 orange clay and as such is a post depositional alteration and formed after the deposition of Layer 7. The basal boundary is sharp onto a smooth Carboniferous limestone surface.

Layer 9: Surface of Carboniferous limestone bedrock. The surface is variable between smooth and coherent limestone, generally below Layer 7/8, and shattered limestone with red brown silty clay filling the cracks. Analysis of pollen from sediments amongst the bedrock in Layer 9 shows high incidences of *Pinus* and *Ericales* (heather and heaths) with scattered occurrences of *Betula* and *Juniperus*. The landscape was probably open, possibly resembling present day arctic pine-ericaceous heathlands.

Trench 6: South Cave entrance deposits (Figures 10 and 11)

The sequence of deposits in T6 is as follows:

Layers 1, 2, 3, 4, 5, 7, 8, 9, 10 and 12: A complex of reworked and disturbed deposits constituting up to 1 m of sediment at the top of the sequence.

Layers 17 and 18: Infilled trenches or burrows extending down into the *in situ* sediments from the overlying disturbance layer.

Layer 6: Matrix supported breccia 0.3 m thick. Medium to coarse limestone gravel, (20 to 50 mm), the clasts are sub-rounded. The matrix is a pale yellow to brown sandy silt. Diffuse lower boundary with Layer 13.

Layer 13: Matrix supported limestone breccia 0.05 to 0.1 m thick. Clasts are sub-angular, medium to fine gravel size, matrix is buff brown silt clay. Diffuse upper boundary with Layer 6, clear basal boundary with Layer 11a.

Layer 11(including Layer 20) and Layer 16: Layer 11 is sub-divided into a clast supported breccia with a greyish silt matrix, Layer 11a; and a matrix supported breccia with a greyish silt matrix, Layer 11b. Sitting between Layers 11a and 11b, clearly distinguished by clear top and basal boundaries is 0.2 m of clast supported breccia comprising fine gravel size sub-angular clasts with very little matrix, labelled Layer 16. Diffuse top boundary with Layer 13 and

variable clear and diffuse basal boundary with Layers 14 and 21. Layer 20 is regarded as a matrix poor variation of Layer 11.

Layer 14: Clast supported limestone breccia close to cave entrance bedrock wall, becoming matrix supported with distance from cave wall. The sub-angular clasts coarsen from fine to medium gravel, to medium to coarse gravel with distance from the cave wall. Matrix is a grey buff silt. Diffuse top boundary with Layer 11b and diffuse basal boundary with Layer 15.

Layer 15: Stoney red clay with small to medium gravel size sub-angular limestone clasts. Spatially localised - interpreted as a local roof collapse. Diffuse top boundary with Layer 14 and diffuse basal boundary with Layer 19.

Layer 19: Mustard yellow clay. Very sharp, possibly erosional, top boundary with Layer 15, clear top boundary with 21, and clear basal boundary with Layer 22.



Figure 10. *Trench 6 South Cave 1986 vertical view.*
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Layer 21: Red Clay

Layer 22: Red clay intercalated with shattered limestone bedrock surface.

Layer 23: Carboniferous limestone.

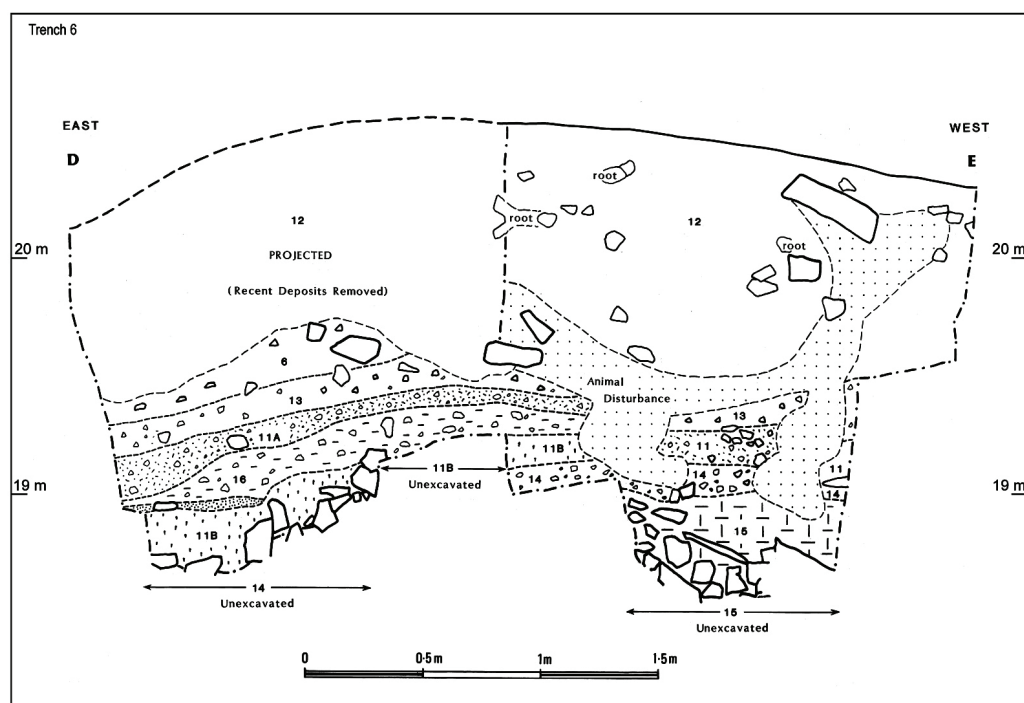


Figure 11. Section through the deposits in Trench 6 at the end of the 1986 excavations.

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Trench 5: North Cave interior deposits (Figure 12)

The sequence of deposits in T5 is as follows:

Layer 1: Disturbed and trampled deposit <0.1 m thick.

Layer 2: Varying clast and matrix supported limestone breccia 0.3 m thick, with sub-angular clasts of fine gravel (20 to 30 mm), but also some large limestone blocks. The matrix is grey-green silt which locally occurs as a discrete lens of silt <0.1 m thick, with no clasts (sub-layer 2b), the matrix locally exhibits horizontal laminations. There is also a lens <50 mm thick of reddish brown grit (sub-layer 2c) with a very clear boundary with the containing Layer 2. Layer 2 has a clear basal boundary with Layer 3.

Layers 3: Red sandy silt with sub-angular limestone clasts, 0.9 to 1.1 m thick. Clear top boundary with Layer 3 and clear bottom boundary with Layer 5. This layer has a locally cemented variant labelled Layer 4.

Layer 5: Brown silty clay <0.2 m thick, with few sub-angular clasts. Diffuse top boundary with Layer 3, lower boundary on limestone bedrock.

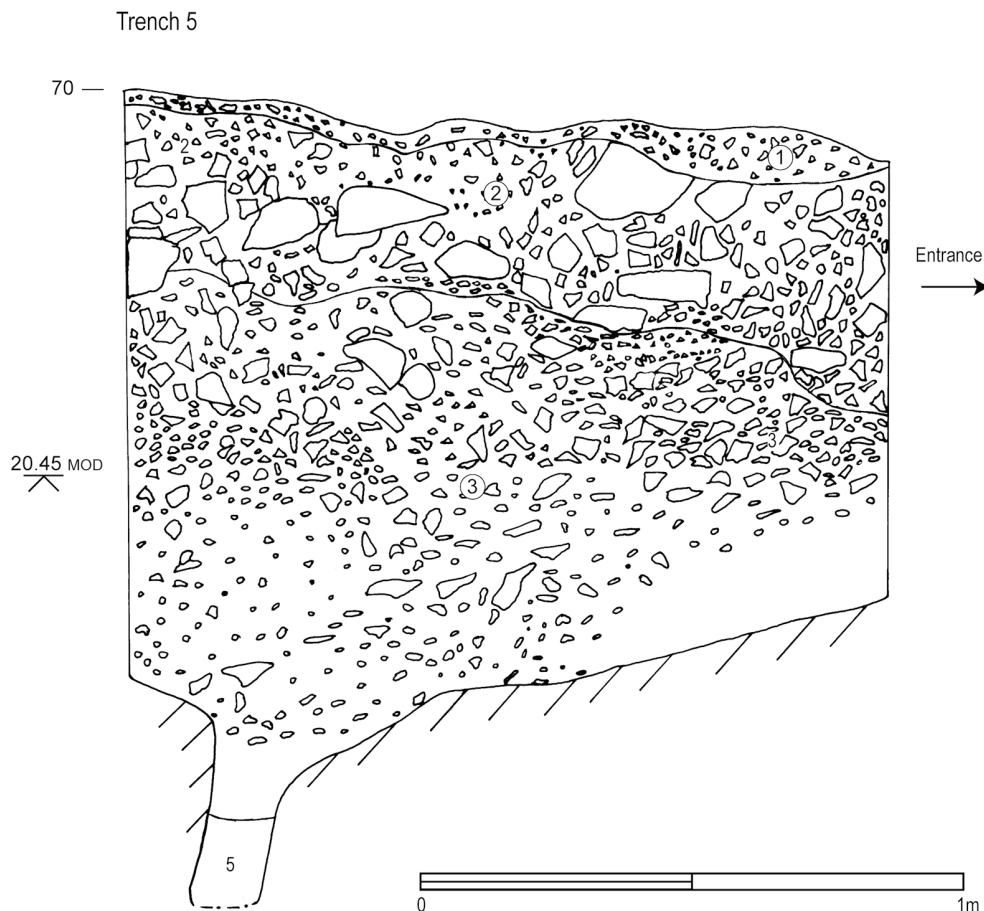


Figure 12. Section through the deposits in Trench 5 at the end of the 1986 excavations.
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Layer 6: Orange clay 0.05 to 0.1 m thick. This occurs in patches or lenses. Clear top boundary with Layer 5 and clear basal boundary with Layer 7.

Layer 7: Black clay 0.1 m thick, only crops out between Layer 6 and the limestone. The colouration is interpreted as manganese staining of Layer 6 orange clay and as such is a post depositional alteration.

Layer 9: Carboniferous limestone surface, which is smooth.

INTERPRETATION

Stratigraphically the oldest deposits exposed are basal orange - red clays with lenses of fine sand and rare weathered limestone clasts. These crop out at the North and South Entrances and within the North Cave. The clays sit directly on the Carboniferous limestone bedrock cave floor, which is smooth within the cave but fractured at the two entrances, the clays filling the fractures. At the point of clay - limestone contact there is locally a thin horizon of black staining. Orange - red clays of this nature have been described on the Carboniferous limestone of the Gower Peninsula. They are interpreted as relict terra rossa or terra fusca soils derived from the weathering of Triassic rocks under an interglacial environment, locally reworked by colluvial action downslope and along joints in the limestone. (Ball, 1960; Bowen and Henry, 1984, 51-4). Their occurrence on Gower between Last Interglacial fossil beach and Last Glacial Maximum deposits dates colluviation as Early to Middle Devensian (Case, 1993). Currently Triassic rocks crop out on the Pembroke Group limestone to the south of Tenby and it is reasonable to assume they were formerly more widespread and small outcrops may still exist in the vicinity of the cave.

The fracturing of the North and South Entrance bedrock limestone is ascribed to frost action prior to the Last Interglacial, although endokarstic processes (Gutiérrez and Cooper, 2013) could also have contributed to the fracturing. The freshness of the limestone bedrock under the orange - red clays within and without the cave indicates that these clays have not developed through *in situ* weathering, they are derived from outside the cave by downslope colluviation and translocation through joints. The corroded limestone clasts contained in the North Entrance clays could not have been transported with the clays and must have been relict on the cave floor at the time of clay accumulation. The fine sand in the North Entrance clays may indicate sporadic short episodes of water flow. Given the similarity of the sediments and their habit to those of Gower it is reasonable to assume that the colluviation and translocation of the Little Hoyle clays also occurred during the Early and Middle Devensian. The lack of any fresh limestone clasts intercalated with the clays and the absence of any faunal finds raises the possibility of the cave entrances being in a more extensive position and/or being blocked at this time. The black colouration at or close to the limestone bedrock contact is manganiferous staining, the product of post depositional weathering alteration as described by, for example, Clayden (1977) and Findlay (1965) in the basal horizon of soils on the Carboniferous limestone of Gower and Mendip respectively.

The derived and cave wall speleothem in the North Cave Interior enables the identification of interstadial conditions between approximately 50,000 and 40,000 BP. Subsequently the cave environment cooled considerably, evidenced by a series of ^{14}C dates obtained from faunal remains incorporated within a sequence of essentially matrix and clast supported breccias from 42,239 – 36,496 cal BP (OxA-1491, table 2 above, *Hyaena* (*Crocota crocuta*) left upper canine) through to 14,913 – 14,161 cal BP (OxA-33789, table 2 above, *Bos*/Bison radius). Within the North Cave and the North Cave Entrance this episode is initially characterised by a reworking of the red clay with the introduction of angular limestone clasts forming stony clays and matrix supported breccias. At the South and West Cave Entrances breccia formation commenced with no evidence of any reworking of older deposits. All of the breccias have a local clast lithology indicating an autochthonous origin. The North Cave Interior breccias most likely formed through endokarstic processes as described by Gutiérrez and Cooper (2013), angular clasts being released from the cave roof and walls through interstratal dissolution enabling gravity brecciation. However, the cave roof is within 6 m of the ground surface and so it is also possible that some internal cave breccia could have been released

through frost penetration during the Last Glacial Maximum period. At the three cave entrances it is most probable that frost action was the dominant process in the release of clast around the entrance walls as well as from exposed limestone upslope. The breccia matrix is variable ranging from coarse and very coarse sand (60-70% of total fines) to very silty (50%+ of total fines) with a slight peak in the coarse silt (32%+ of total fines). Statistically all matrix samples are poorly sorted suggesting a colluvial/slopewash deposit, most probably washed in through the cave entrances and/or through the limestone joints of the cave roof, these fines also contributing to local lenses of red-brown silt and clay near the top of the West and North Cave Entrance sequences. The breccias, deposited over at least 25,000 years, do not exceed 1 m in thickness suggesting that clast release and accumulation was slow. This coupled with the lack of evidence for any speleothem accumulation after about 40,000 BP, or any significant cementation of the breccias indicates an essentially dry cave. The deposition of coversand at the North Entrance also suggests dry episodes.

Holocene sediments are mainly disturbed by previous excavation. An intact sequence in the West Entrance (T1) records the cutting of a channel in the top of the Devensian breccias by running water and its subsequent infill with limestone gravel, almost certainly derived from the breccia. A thermoluminescence date on a burnt blade core (NP1049) dates the infill to 9980 BP, in the early Holocene. A further channel was then cut into the infill and the top of the Devensian breccia, this channel infilling with a pink silty clay suggesting ponding within the channel (undated).

THE LITHIC ARTEFACTS

A total of 33 lithic artefacts have been recovered from Little Hoyle Cave and are preserved in museum collections (see Appendix 2). One scraper and three pieces of debitage in Tenby Museum originated from Power and Laws' excavations; a further seven pieces of debitage are of historic origin, but which of the excavations they came from is currently uncertain. In Amgueddfa Cymru – Museum Wales, one convex-backed blade and three pieces of debitage come from McBurney's excavations of 1959 and five tools and 13 pieces of debitage from the Aldhouse-Green excavations. The assemblage comprises pieces representative of a range of prehistoric dates. Of the pieces from the recent excavations, one tool and twelve pieces of debitage have findspots recorded from test-pits on the ridge above the cave, on Longbury Bank itself and a further two tools and one piece of debitage were recovered from a test pit placed in the valley bottom immediately in front of the cave. The following raw materials are represented in the Little Hoyle Cave assemblage: 28 pieces are flint; 3 sandstone, 1 chert and 1 is a speckled rhyolite.

Methodology

All the worked stone underwent macroscopic analysis in the relevant holding museum where a series of key characteristics were recorded and detailed descriptions undertaken of each individual piece. Characteristics recorded included a typological attribution and detail of surface characteristics; including whether or not any pieces are broken, burnt or patinated. The colour of the artefact was recorded, as was the amount of cortex covering the dorsal surface. Debitage was divided into categories and also recorded by size. The basic principles adopted are those recommended by Andrefsky (2005) for recording lithic assemblages. Additional

details, such as the location and extent of retouch on tools were captured, when appropriate, and informs the analysis presented below.

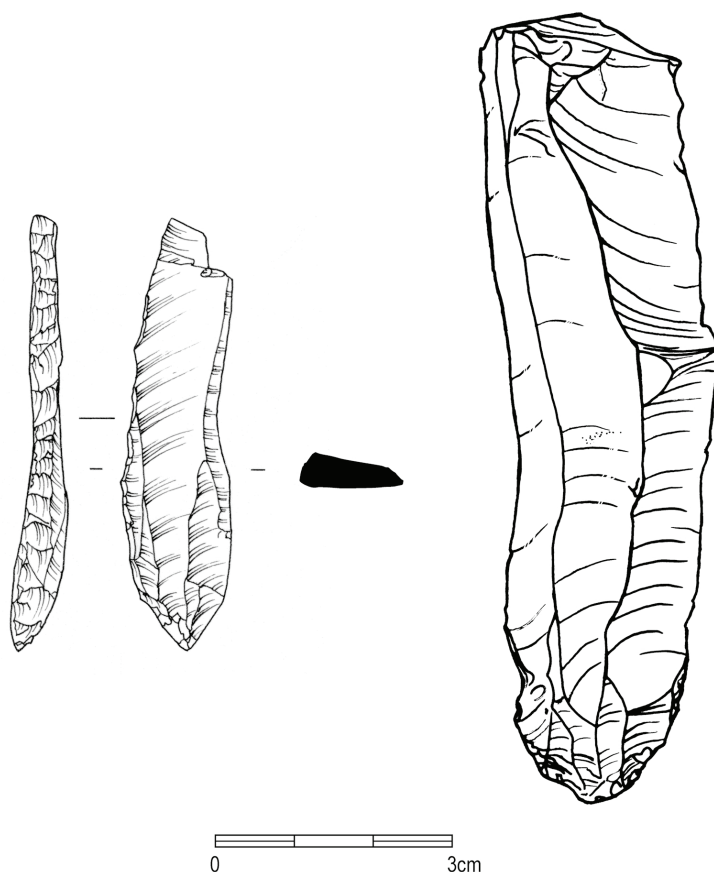


Figure 13. *Convex-backed point (81.85H) drawn by Jackie Chadwick and blade (81.85H) drawn by Jessie James.*
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Finished Tools - Late Glacial

One convex-backed point was recovered from the cave during excavations undertaken by Charles McBurney in 1959 (Figure 13). This tool was recovered from a depth of between 0.45 and 0.60 m in a thermoclastic scree (Upper Screens: equivalent to T4 Layer 3 above) he considered undisturbed which also contained a thin scatter of bones and charcoal fragments (McBurney, 1959, 269). David (2007, 44) suggests that, as the subsequent excavations have not recovered further diagnostic artefacts or dating that would confirm the age of this deposit, that it is hard to make a case for Upper Palaeolithic occupation of the cave based on this one tool. Jacobi describes it as remarkably similar in form to convex-backed pieces found at Gough's Cave, Cheddar, Somerset (Wessex Archaeology and Jacobi, 2014). This tool is the proximal

fragment of a convex-backed point with steep retouch running along one length. The other length is completely unmodified and the distal termination displays an ancient impact fracture. The bulb of percussion is present and the piece is sharp and has a white patination.

One burnt bladelet core (NP1049) from T1 Layer 14 is a prismatic blade core made of flint struck from a flat platform. This was dated by thermoluminescence generating an early Mesolithic age of 9430 ± 800 BP (OxTL-273). This core would most likely be of early Mesolithic age and helps with the dating of the upper contexts on the North Platform.

Finished Tools - Neolithic

Several tools in the assemblage can be attributed to the Neolithic. One of these, in the Tenby Museum collection (1983:2399), was found by Power and Laws on the surface of a probable Pleistocene deposit underlying a heap of deposits that had accumulated below shelves of older breccia and also within the central chimney (Laws, 1878, 85, Green and Walker, 1991, 61–62). This is made of speckled green rhyolite, it is a large convex scraper with a plain butt. The scraping edge runs around the one side and the other is straight with a serrated edge. The tool is very thin. Garrod (1926, 75) suggests that the flake itself may be Palaeolithic in age but reworked in the Neolithic into the scraper. Certainly, this speckled rhyolite rarely appears to be used as a raw material at any time other than during the Palaeolithic (Bevins, *et al.* 2025).

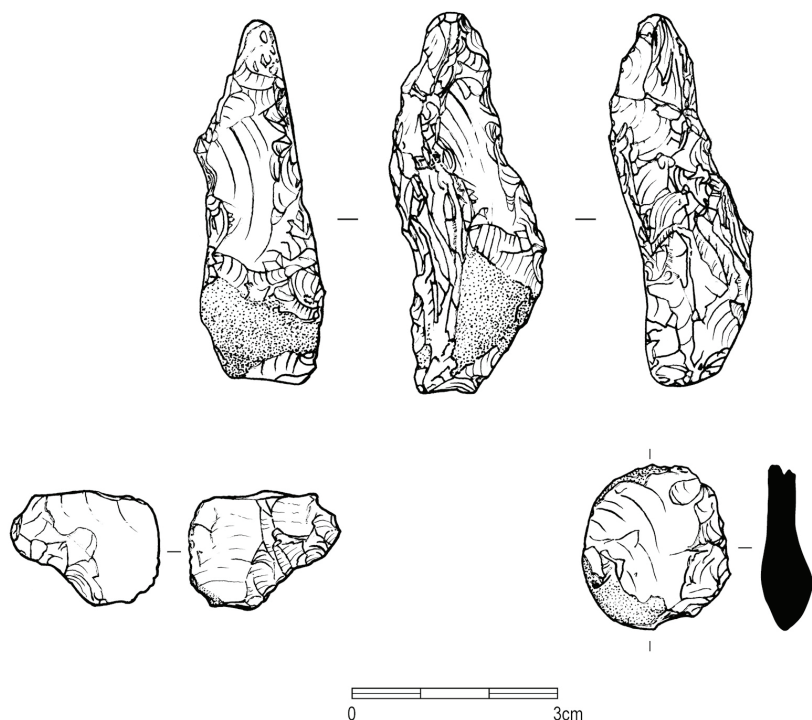


Figure 14. Oblique arrowhead fragment (NP1415) and scraper (NP722).

Drawn by Jessie James.

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One further scraper is recorded from the cave (NP722), found in T4 Layer 3A. It has all the appearance of a Neolithic scraper, and is convex, with some cortex on the dorsal surface (Figure 14). Two further tools, a fabricator (NP500) and a fragment of an oblique arrowhead (NP1415), would also indicate a Neolithic presence (Figure 14). Both were found in T4; the arrowhead from Layer 2 and the fabricator from Layer 3 or 13. The fabricator has a heavily worked tip. It is made of black unpatinated flint and is very weathered and rolled. The arrowhead by contrast is white, possibly due to burning, and is a basal fragment of an oblique arrowhead. The barb is present although the tip is absent. The piece has broken mid-way across its length, probably due to a thermal fracture.

The assemblage contains four bipolar cores made using the anvil and hammer technique. Two are from T4; one from Layer 1 and the second from Layer 13 or 3; whilst two originate from historic excavations and are unstratified. David (2018) suggests that such pieces may be dated to a period from between the later Mesolithic, Neolithic or early Bronze Age. Other debitage in the assemblage includes three single-platform blade cores: NP1456 from T4 Layer 2; NP7 from T4 Layer 1 (both Figure 15); and one from the historic excavations (1983:2433). On the evidence of the scrapers, arrowhead and fabricator it is likely that the majority of this small assemblage is of Neolithic age. One plunging blade (NP319), from the rejuvenation of a blade core, comes from T4, Layer 3.

There are two very long flint blades amongst the assemblage the exact dating of which remains ambiguous. One originates from the McBurney excavations of 1959 (81.85H/1.4, Figure 13) and a second from the 1877 excavations by Power and Law, in the collections of Tenby Museum (1983:2399). The former blade is 99.3 mm in length and is struck from a core with two opposed platforms. The distal end has a snap fracture. The proximal end has a plain butt and heavy evidence for core preparation. The second blade is 105.4 mm in length and has a plain butt. The blade has a pronounced bulb of percussion indicative of having been struck using a hard hammer. It has some minor chips which are ancient along both the lengths. The distal termination is thick displaying evidence of the prismatic core from which the blade was originally struck. The blade is made on grey flint which has a heavy white patination. The dating of both these blades is open to debate. Neither would look out of place amongst the Kent's Cavern, Devon, or Gough's Cave, Cheddar, Somerset assemblages, however, both are far longer than any other such pieces found in Welsh caves, except the Later Neolithic hoard of blades and scrapers found at Penmachno (Burrow, 2003, 139). The two blades could equally date to an Upper Palaeolithic age as to a Neolithic date and the patination of the pieces provides no real clue, given that several of the Neolithic pieces recovered from the cave are similarly patinated.

Flakes and debitage

One retouched flake, a utilised flake and general knapping debitage have also been recovered from the excavations. The utilised flake (NP1328) has a natural cortex backing to it. The used edge has a series of small chips detached along its length. It was recovered from T4 Layer 1 so is unstratified. The retouched distal blade fragment (SC229) has an area of concave retouch towards the distal termination. The proximal end has been broken horizontally across the piece and there is damage at this end close to the retouch which makes it impossible to determine the form of the original tool from which this came. This tool was found in T6, Layer 13.

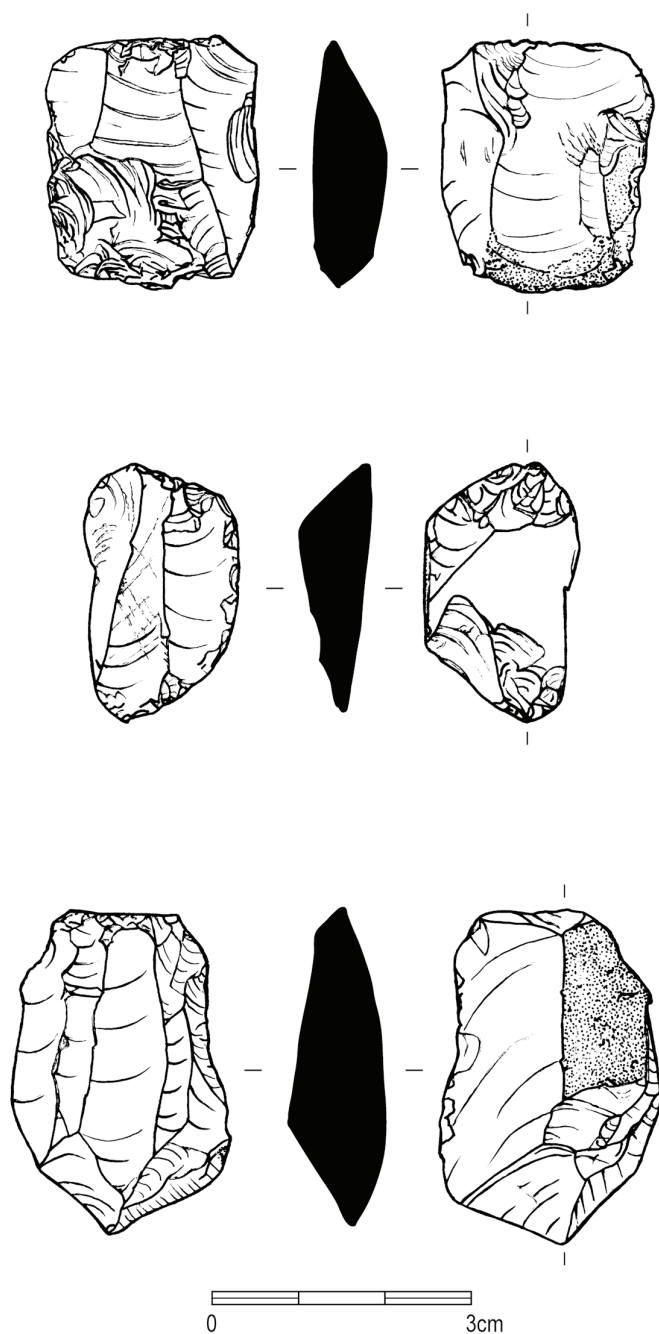


Figure 15. Core (NP7), écaillé core (NP1052), core (NP1456), core (NP474).
 Drawn by Jessie James.

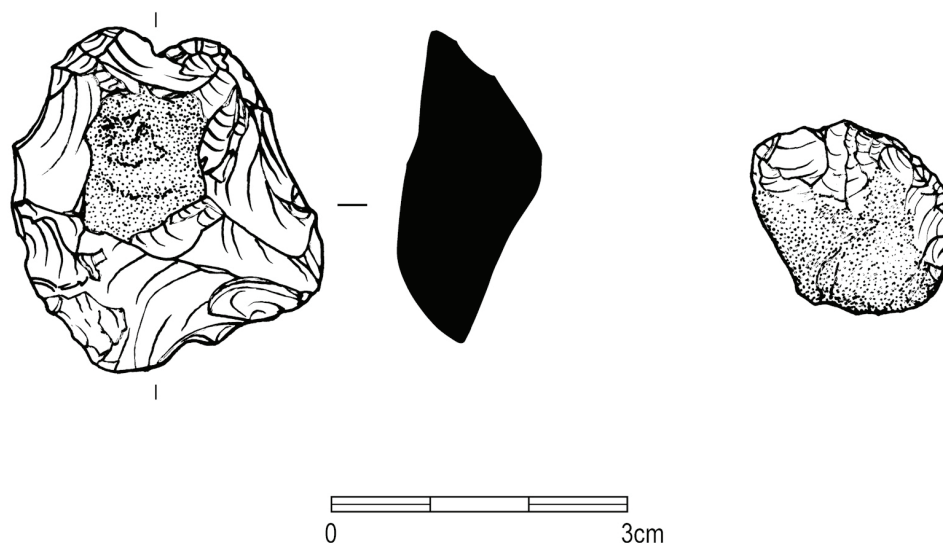


Figure 16. *Scraper (SV8) and scraper (R10). Drawn by Jessie James.*

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There are blades, flakes and general pieces of knapping debitage amongst the assemblage. Three sandstone pebble tools are present in the Tenby Museum collection. All display evidence for use as hammerstones suggesting local knapping activity.

Two Neolithic scrapers were recovered from test pits, one from the South Valley and one from the ridge above the cave (Longbury Bank) (Figure 16). The South Valley test pit also generated two pieces of undiagnostic general knapping debitage, whilst a further 12 pieces of debitage, including blades and flakes were recovered from the test pit above the cave.

OTHER PREHISTORIC ARTEFACTS

The Bone Needle

A bone needle (Figure 17) was discovered by Powers and Law in 1877. This worked bone tool is made on a creamy-white, flat piece of bone with some cancellous tissue towards the eye on the ventral surface. The piece tapers to a distinct point which has been shaped and worked. There are many tool marks towards the point. The sides are rounded and at the eye the bone has been shaped in a spiral as it has been thinned to make the bone easier to perforate. The needle is 87.7 mm in length and is in the Tenby Museum Collection (1983:2389). It was reportedly found on the surface of a probable Pleistocene deposit underlying a heap of deposits that had accumulated below shelves of older breccia and also within the central chimney (Laws, 1878, 85; Green and Walker, 1991, 61–62). The needle is likely to be prehistoric (Green and Walker, *ibid*).

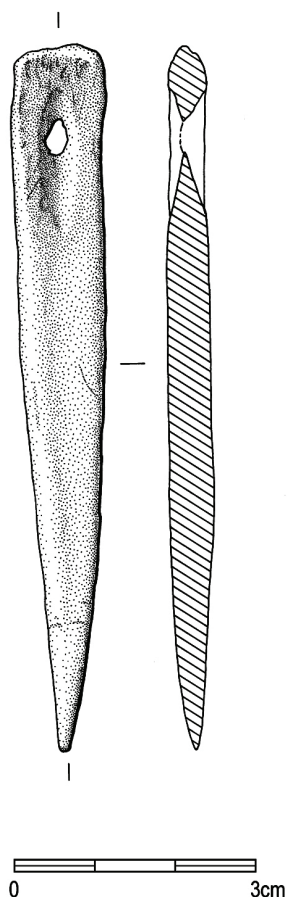


Figure 17 (left). *The bone needle in the Tenby Museum collections.*
Drawn by Jackie Chadwick.
 © Amgueddfa Cymru – Museum Wales.

Early Neolithic finds from Longbury Bank

Excavations by Campbell and Lane (1993, 54 and see Figure 18) on the early medieval site of Longbury Bank, directly above the cave, have identified a Neolithic phase represented by two postholes H (36) and E (4), both of which had been packed with broken pottery, flints and stone implements (Figure 18). There was also a scatter of flints across all the excavated areas, particularly trench H, including scrapers, blades, an arrowhead, cores and waste flakes. Distribution and typology showed that almost none of this material was likely to be of early medieval date.

The prehistoric pottery can largely be attributed to the Early Neolithic, with a smaller Early Bronze Age component. In total there were 43 sherds and fragments from the Longbury Bank excavations. In addition, seven sherds of Neolithic pottery were identified from the 1984 excavations, one in T1, Layer 2 and the remaining six in Layers 1 and 2 in T7. Details of the prehistoric pottery from both excavations are recorded in Appendix 3. The sherds are likely to represent the remains of seven different vessels.



Figure 18. *Density of Neolithic activity on Longbury Bank (after Campbell and Lane 1993).*

Thirty seven sherds and fragments survive from Vessel 1, including three rim sherds (Figure 19). The fabric is soft, grey and vesicular. There are abundant angular cavities formed by weathered-out calcite crystals which would have been up to 5 mm long. Occasional sherds have the calcite preserved, showing that they were originally rhomboidal cleavage fragments of vein calcite. There is also a scatter of tiny quartz inclusions. The surviving rim sherds show that the vessel had a diameter of around 260 mm. It had an out-turned rim on what was most probably a simple hemispherical bowl form. One sherd (1287 from context H37) is decorated on the top of the rim with closely-spaced incised lines. These lines do not survive on the other rim sherds but this is probably a result of the relatively abraded nature of all the sherds. Vessel 1 is an Early Neolithic bowl in the Hembury style, sherds from this vessel come from contexts E23 and E37 in trench E, and context H37 in Trench H. There is also a single sherd from T7 Layer 2.

Four body sherds survive from vessel 4. The fabric is medium-hard and light brown/black in colour. The sherds are tempered with large inclusions (up to 7 mm), of sub-angular mixed minerals including feldspar, quartz, limestone and possible igneous rock fragments. Vessel 4 is probably another Early Neolithic bowl in the Hembury style, sherds from

this vessel come from T7 Layer 1 and from context C21 in trench C and context E71 in trench E.

There are five quartz-tempered body sherds from vessels 2 and 3. The fabric is medium-hard and dark brown in colour with some lighter surfaces. The inclusions are poorly sorted, sub-angular quartz and limestone fragments up to 2 mm long. These sherds are likely to be Early Bronze Age in date and they were discovered in topsoil contexts in T7 and trench A, in context A16 in trench A, in context C40 in trench C, and in context E41 in trench E. Two upright rim sherds from vessel 5 are also likely to be Early Bronze Age in date. The fabric of these is medium-hard and black in colour. The sherds are tempered with large sub-angular, poorly sorted inclusions (up to 5 mm in length) which are mainly of weathered doleritic rock, with occasional large sub-rounded quartz or smaller rounded quartz. These sherds were discovered in context E71 in trench E and context H37 in trench H. There are two sherds in different quartz-tempered fabrics which have been ascribed to vessel 6 (from context C74 in trench C) and vessel 7 (from context A15 in trench A). In both cases these sherds are too small and abraded to ascribe them more precisely than as probably prehistoric.

The vast majority of the Neolithic pottery from the surface of Longbury Bank seems to be sherds of vessel 1, which was deposited after breakage in the fill of two postholes E4 and H36. The vesicular fabric of vessel 1 is widespread amongst Early Neolithic pottery in Wales with the common use of calcite, calcined shell and other soluble materials as inclusions from the earliest Neolithic onwards. This fabric is one of the distinguishing characteristics of the carinated bowl tradition in Wales, the Dyffryn-Llandegai series of Irish Sea Ware (Lynch, 1976, 63-4) but it is also found on a wider range of more closed forms with more complex rims, as is the case at Longbury Bank. The large assemblage of Neolithic pottery from excavations at the hilltop site at Clegyr Boia, Pembrokeshire (Williams, 1953; Peterson, 2003, 124-8) is dominated by carinated bowl Irish Sea Ware but has a significant number of Hembury style vessels. The general form and out-turned rim of Longbury Bank vessel 1 is paralleled in vessels from Clegyr Boia, particularly vessels 17, 26, 28 and 31, although some of these have a more open profile than is suggested for the Longbury Bank example. Clegyr Boia vessel 31 is a particularly good parallel, also having the upper rim decoration. Vessel 5 from Garn Turne dolmen (Peterson in Cummings and Richards, 2021, 268) has a similar fabric and decoration on the rim. There are also similar vessels from Carreg Coetan Arthur, listed as sherd group 8, (Gibson in Rees, 2012, 115-116). The overall form and rim decoration is also present on vessel 56 from Stackpole Warren, Pembrokeshire (Benson, *et al.* 1990, 209-11). Slightly further afield, there are three very similar examples, vessels 1, 2 and 4, from the Neolithic structure at Mount Pleasant, Newton Nottage, Glamorgan (Savory, 1955; Peterson, 2007, 132) and from the ditches of the causewayed enclosure at Caerau, near Cardiff (Deacon in Davies and Sharples, 2017, 10-11). Radiocarbon dating for the deposits at Garn Turne (Cummings and Richards, 2021, 207) and Caerau (Davies and Sharples, 2017, 12-13) reinforces the suggestion that the Longbury Bank pottery belongs to a more developed phase of the Early Neolithic, probably between the 37th and 35th centuries BC and is therefore contemporary with the burial activity in the cave described below.

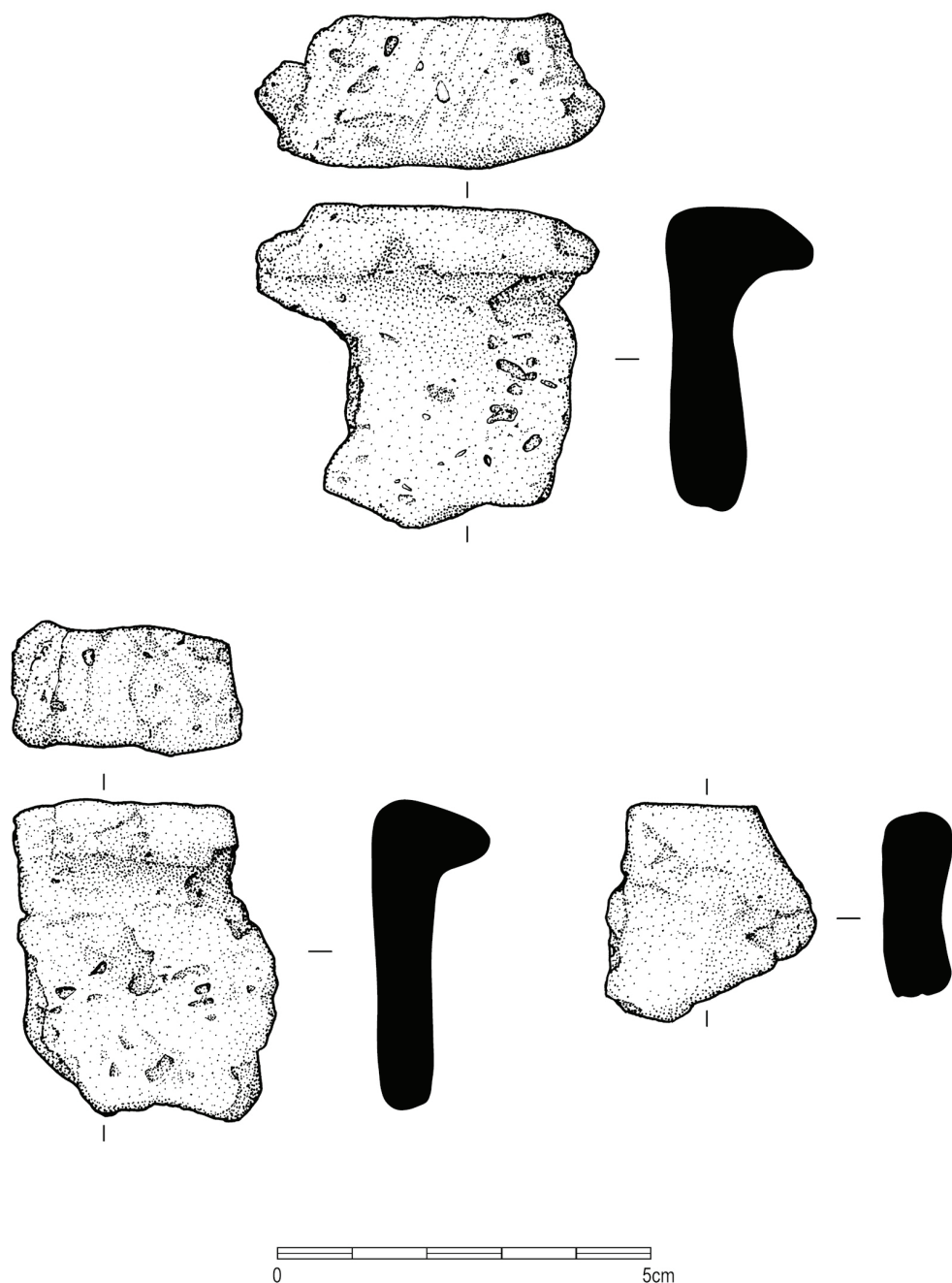


Figure 19. *Early Neolithic pottery sherds from Longbury Bank. Drawn by Jessie James.*
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LARGE ANIMAL REMAINS

Introduction

The large animal remains recovered from the cave in 1984, 1986 and 1990 are considered alongside the material recovered by Charles McBurney during 1958, 1959 and 1963. McBurney's work produced a thin scatter of bones from what he described as the upper scree. Unfortunately, the stratigraphy is unclear, and it has proved impossible to relate these deposits to those excavated more recently (see below).

Methodology

Anatomical elements were identified to species or family level where possible using the author's (CI) personal reference collection, comparative material in the collections at the University of Southampton, the Museum of Somerset and various identification atlases (Lavocat, 1966; Pales and Lambert, 1971; Schmid, 1972). Unidentifiable specimens were assigned to animal size categories where possible. Mandibles and limb bones were recorded using the zonal method developed by Ingrem (2009) to allow the calculation of the minimum number of elements (MNE) and individuals (MNI). In addition, all bone fragments over 10 mm in the hand recorded material and over 2 mm in the sieved samples were recorded to species or size category to produce a basic fragment count of the Number of Identified Specimens (NISIP).

Evidence of gnawing and butchery were recorded along with the agents considered responsible. Evidence for burning and root damage was noted although this proved problematic as similar modifications and discolouration can result from chemical process such as mineralisation. The colour of the bone and the degree of weathering was recorded. In respect of limb bones, the proportion of the circumference and length of the bone present was noted as well as the characteristics necessary to allow the calculation of the fracture freshness index devised by Outram (2001).

Measurements were taken according to the conventions of von den Driesch (1976) for mammals and are listed in Appendix 4.12. The wear stages of the lower cheek teeth of cattle, sheep and pig were recorded using the method proposed by Grant (1982) and age attributed according to the method devised by Legge (1982), Payne (1973) and O'Connor (1988). The fusion stage of post-cranial bones was recorded and age ranges estimated according to Getty (1975) for domestic animals. The wear on teeth belonging to fox, brown bear (*Ursus arctos*) and spotted hyaena (*Crocuta crocuta*) was recorded and age estimated following the criteria of Stiner (1994).

A selected suite of elements was used to differentiate between sheep and goat (Boessneck, 1969; Payne, 1985): the distal humerus, proximal radius, distal metapodials, astragalus, calcaneus and deciduous fourth premolar. No elements were positively identified to goat so for the purposes of this report the caprine remains are generally referred to as sheep. Lagomorphs were assigned to taxa/species following the criteria of Callou (1997) and Lavocat (1966) and as brown hare (*Lepus europaeus*) is not thought to have been introduced into Britain until the Flandrian (Mayhew, 1975) the hare bones from stratigraphically intact Late Glacial deposits are assumed to belong to arctic hare (*Lepus timidus*). Cat and fox remains were assigned to species according to size and by comparison with modern reference specimens. In respect of fox, measurements taken on teeth were also compared with those published for arctic fox (*Alopex lagopus*) and red fox (*Vulpes vulpes*) by Compagnoni *et al.* (1997).

There is no reliable method that allows the teeth of reindeer (*Rangifer tarandus*), red deer (*Cervus elaphus*) and giant deer (*Megaloceros giganteus*) to be differentiated according to morphology; however, it was possible to tentatively assign some specimens to reindeer based on overall size and buccolingual width (Hillson, 1986). Where this was not possible, deer remains are categorised simple as Cervidae spp.

Table 3. Broad stratigraphic units used in the reporting and discussion of the faunal remains and the equivalent Layer numbers.

Trench	T1	T4	T5	T6
Unit I Holocene Deposits	1	1	1	1
	2	2		2
	3	10		3
	4	13		4
	7	14		5
	9	16		7
		3a		9
				12
Unit II Screes	5	3		6
	6	11		13
	10	12		
	13			
	14			
Unit III Silts		4	2	11a
		5		11b
				16
Unit IV Stony Clays		6	3	14
		15	5	15
Unit V Basal Clays		7	6	19
		19		21
		20		
		21		
Unit VI Bedrock	11	9		

Data

A total of 2,615 pieces of animal bone were examined of which 1,096 (42%) are identifiable (Appendix 4). Animal bones were ascribed to broader stratigraphic units as outlined in Table 3 above, which are less fine-grained than the layer descriptions given in the earlier part of the report. More than half of the identifiable specimens (n=690) were recovered during the recent excavations by Aldhouse-Green and the majority of these came from Unit I (Holocene Deposits) although Units II (Screes), III (Silts) and particularly IV (Stony Clays) produced a

good number of specimens. The material recovered by McBurney includes 406 identifiable specimens even though a relatively low proportion (23%) of the assemblage is identifiable.

Overall, a wide range of species were recovered with lagomorphs (*Lepus* spp./*Oryctolagus cuniculus*) the most numerous taxon, followed by: caprines (sheep/goat); fox (*Vulpes vulpes*/*Alopex lagopus*); and bovid (*Bos*/*Bison* spp.). Bear (*Ursus arctos*) and badger (*Meles meles*) are also relatively numerous.

Table 4 includes 27 specimens recovered from the sieved samples. This assemblage is too small to warrant separate analysis but for the sake of clarity taxa representation within the sieved material is given in Appendix 4.1.

Large mammal remains by unit and layer number

Unit IV (Stony clays)

A total of 118 identifiable specimens came from the stony clays (Unit IV) and almost half belong to brown bear (*Ursus arctos*) (Appendix 4). In addition, wolf (*Canis lupus*), fox (*Vulpes*/*Alopex* spp), spotted hyaena (*Crocuta crocuta*), woolly rhinoceros (*Coelodonta antiquitatis*), horse (cf. *Equus ferus*), reindeer (*Rangifer tarandus*), red/giant deer (*Cervus elaphus*/*Megaloceros giganteus* spp.) and hare (cf. *Lepus timidus*) are all represented by a few specimens (Appendix 4).

Anatomical representation for the major taxa is shown in Appendix 4.2 and this indicates that the assemblage is dominated by cranial and podial bones although fox, bear and hare are represented by elements from most parts of the body – head, major limbs and feet. A few major limb bones belonging to other taxa are also present and these include a wolf scapula and a humerus and radius belonging to reindeer.

Most of the remains were recovered from Layer 3 in T5 (appendices 4.3 and 4.4). The minimum number of individuals represented has been calculated for this deposit and indicates that at least five bears and two hares are represented; other taxa are represented by at least one individual. Six specimens came from Layer 6 in T1 including a thoracic vertebra belonging to bear, a deciduous lower premolar belonging to fox, an upper molar belonging to red/giant deer and a hare femur. Layers 14 and 15 in T6 produced seven pieces including a bear ulna, an incisor and 1st phalanx belonging to spotted hyaena, an arctic fox radius and two conjoining pieces of antler.

Two maxillary second molars belonging to bear provide ageing data: one is at stage III and the other between stages III/IV and attest to the presence of juvenile animals (Appendix 4.5). The recovery of a deciduous fox premolar provides evidence for the presence of juvenile foxes. In addition to the dental data, five specimens have unfused epiphyses and so provide additional evidence for juvenile and sub-adult animals; these are a thoracic vertebra belonging to brown bear, a 1st phalanx belonging to hyaena, a woolly rhinoceros metapodial, and hare proximal radius and proximal femur (Appendix 4.13).

Two specimens display evidence for canid gnawing - a probable bear metapodial with pits and furrows on both ends and a piece of probable reindeer humerus that has gouge marks on its distal end (Appendix 4.6).

According to the fracture analysis, few limb bones appear to have been broken whilst fresh with the majority displaying characteristics associated with the breakage of dry bone (Appendix 4.7). Only one bone, a reindeer radius, displays the characteristics associated with the deliberate breakage of fresh bone with less than 10% of its fracture surface being perpendicular to the cortical surface and having a smooth helical outline in places. The shaft circumference of the majority of limb bones is intact but in respect of length most are less than three

quarters complete (Appendix 4.8). A piece of deer antler has suffered severe weathering and is falling apart but the rest of the assemblage is either in the early stages of weathering or shows no signs of having been affected (Appendix 4.9). A significant proportion of the material displays patterning caused either by light root damage or mineralisation (Appendix 4.10). Most of the specimens are yellow/grey or black although a variety of colours was recorded (Appendix 4.11).

Unit III/IV

Two specimens came from the boundary of Units III and IV – an atlas belonging to brown bear came from the junction between Layers 2 and 3 in T5 and a reindeer 2nd phalanx came from the junction between Layers 5 and 6 in T4.

Unit III (Silts)

Forty-four identifiable specimens came from Unit III (Silts). Samples for individual taxa are too small to withstand detailed analysis, but it is noteworthy that once again, bear appears to be the most numerous taxon (Appendix 4). A wide range of other taxa are present although most are represented by only a few specimens; they include fox, spotted hyaena, badger (*Meles meles*), horse, bovid, sheep/goat, pig and rabbit (*Oryctolagus cuniculus*).

Anatomical representation of the major taxa is given in Appendix 4.2. Most specimens are from the extremities (head and feet) although odd limb bones belonging to fox, brown bear, cat (*Felis* spp.), badger, sheep/goat, hare and rabbit are also present.

The majority of the remains came from T1 and T4 (Appendix 4.3) where the co-existence of wild species such as spotted hyaena and reindeer that were present in Britain during the Pleistocene period along with modern domestic animals (cattle, sheep/goat, pig) indicates that mixing has taken place. Only the deposits from T5 and T6 appear to be intact and the samples from these areas are small so may not be truly representative of the animal remains originally present. Despite this, it does appear that brown bear is again the most numerous taxa (Figure 20). T1 and T4 produced specimens belonging to arctic fox, brown bear, reindeer and hare although only brown bear and hare are represented by limb bones. The sample from T6 includes two bear metacarpals, a hyaena tooth (destroyed during radiocarbon dating) and a reindeer premolar (Appendix 4.4).

Two lower molars provide ageing information, both are at wear stage III and indicate the presence of at least one juvenile fox and bear (Appendix 4.5). The presence of juvenile animals is also attested by a few bones that have unfused epiphyses (Appendix 4.13); all came from T1 and T4 and include an unfused proximal bear tibia, an unfused bovid calcaneus and an unfused probable reindeer 1st phalanx. The remaining specimens are of Holocene origin and comprise an unfused sheep/goat scapula and metacarpal, a cat distal ulna and a rabbit distal femur in the process of fusing.

Four specimens display evidence for gnawing: a large bovid calcaneus has gouge marks, a hare radius has been punctured and furrowed probably by a fox and two fragments belonging to large mammal have also been gnawed (Appendix 4.6). One specimen is calcined. Fracture analysis indicates that very few bones display helical fractures indicative of the breakage of fresh bone (Appendix 4.7, iii). In fact, only three specimens, an ulna belonging to a hare recovered from T5, an arctic fox radius and a medium mammal limb bone fragment from T4 possess all three fracture characteristics suggestive of breakage whilst fresh. Most limb bones retain intact shaft circumferences but only one is complete in terms of shaft length (Appendix 4.8, ii). Almost all the remains are either unaffected by weathering or in the early stages (Appendix 4.9). Light root damage/mineralisation is present on a few specimens, but the

majority are unaffected (Appendix 4.10). The remains display a variety of colours, but a significant proportion are yellow/grey (Appendix 4.11).

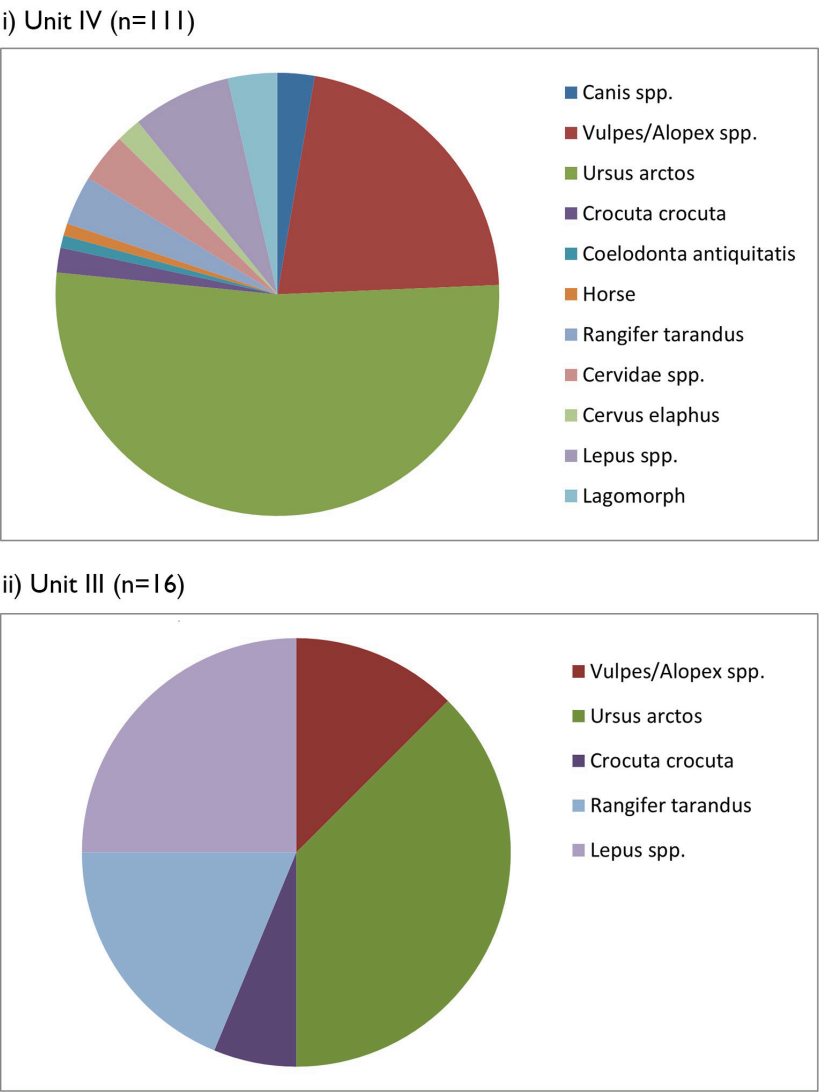


Figure 20. *Taxa representation in uncontaminated deposits (NISP).*

Units II/III

Three specimens were recovered from the boundary of Units II and III. A carpal bone (pisiform) belonging to brown bear came from Layer 3, 4 or 5 in T4 and a brown bear incisor and deer tooth are from the junction between Layers 11 and 13 in T6.

Unit II (Screes)

Fifty identifiable specimens came from the screes (Unit II). Caprines and rabbit are the most numerous taxa although wolf, fox (red and arctic), bear, badger, reindeer and large bovid are all represented (Appendix 4). Anatomical representation indicates that badger, sheep/goat and rabbit are the only taxa represented by elements from the head, major limbs and feet (Appendix 4.2). Wolf and bear are represented solely by loose teeth whilst only foot bones belonging to reindeer and hare were recovered. Most of the remains are from T1 and T4 where the presence of sheep/goat and rabbit (Appendix 4.3) reflects the fact that some of the layers within the screes formed during the Holocene (see table 1 above) and indicates that mixing has occurred with later Holocene deposits. T6 produced a wolf premolar, a deciduous canine, incisor and upper molar all belonging to bear as well as a reindeer calcaneus and 1st phalanx.

The deciduous canine tooth from T6 provides evidence for young bears whilst the upper molar is at wear stage V so belonged to a prime adult bear (Appendix 4.5). A few bones recovered from T1 and T4 have unfused epiphyses so provide evidence for juvenile animals; these include an arctic fox metatarsal, a badger 1st phalanx, a large bovid proximal tibia and a sheep/goat proximal tibia (Appendix 4.13).

Gnaw marks are visible on one specimen – a reindeer 1st phalanx (Appendix 4.6). A few limb bones display fracture characteristics associated with the breakage of fresh bone including a large bovid radius and tibia, and a rabbit humerus and tibia. However, most specimens have characteristics associated with the breakage of dry bone (Appendix 4.7). Most limb bones have intact shaft circumferences, but few have intact shaft lengths (Appendix 4.8). Most specimens are unaffected by weathering although a significant proportion are in the early stages and one bone has angular cracks and is flaking (Stage 2) (Appendix 4.9). A few bones display patterning caused by root damage/mineralisation, but the majority are unaffected (Appendix 4.10). The sample displays a variety of colour although many are either natural or at least partly yellow (Appendix 4.11).

Unit I/II

Four specimens came from the junction between Layers 2 and 3 in T4: a dog 1st phalanx, a rabbit metapodial, a hare/rabbit femur and a limb bone fragment belonging to a medium mammal.

Unit 1 (Holocene Deposits)

The largest sample, consisting of 430 identifiable specimens, came from recent layers (Appendix 4). Large bovid (most of which appear to be domestic cattle, *Bos taurus*), sheep/goat and rabbit dominate the assemblage although fox is also quite common and a wide range of other species including dog, badger, polecat (*Mustela putorius*), horse, reindeer, roe deer (*Capreolus capreolus*), pig, hare and hedgehog (*Erinaceus europaeus*) are present. Fish are represented by a dentary belonging to sea bass (*Dicentrarchus labrax*).

Dog, fox, badger, large bovid, sheep/goat, pig, hare and rabbit are all represented by elements from most parts of the body (head, major limbs and feet). In addition, a humerus and femur belonging to polecat, a reindeer femur, a roe deer lower premolar deer and a hedgehog tibia were recovered. Mandibles and radii are the most frequent large bovid bones whilst for sheep/goat the radius and tibia are the most numerous (Appendix 4.2).

Four-fifths of the assemblage came from T1 and T4 and this material is dominated by the remains of domestic animals (Appendix 4.3) although fox (red and arctic), badger, polecat, roe deer, hare and rabbit are all present. T6 also produced a significant sample, and this is dominated by badger, rabbit and hare remains although dog, arctic fox, reindeer, large bovid

and sheep/goat are all represented. The presence of arctic hare and reindeer indicates that some of the material is derived from earlier deposits. The small sample ($n=4$) recovered from T5 includes specimens belonging solely to sheep/goat, bovid/cervid and lagomorph.



Figure 21. *Cut marks visible on large mammal limb bone.*

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Several teeth provide tooth eruption and wear data (Appendix 4.5) and these attest to the presence of both juvenile and adult cattle and sheep/goat, and an old fox. In addition, a few bones belonging to cattle and caprines and wild animals including fox, badger, hare and rabbit have unfused epiphyses which provides evidence for young animals (Appendix 4.13). Mortality profiles have not been constructed as they would have little value given the mixed nature of the deposits and their broad chronological range.

An ulna that probably belongs to modern cattle has a transverse cut mark on the trochlear notch and a large mammal limb bone fragment which appears to have a Pleistocene origin (Figure 21) has also been cut.

Eight specimens display evidence for gnawing by canids and evidence for burning was noted on a few fragments (Appendix 4.6). Once again, few bones have characteristics suggestive of breakage whilst fresh (Appendix 4.7). A total of 22 specimens show characteristics associated with the breakage of fresh bone or a mixture of fresh and dry characteristics; these include a humerus and two radii belonging to cattle and a radius, humerus, tibia and metapodial belonging to sheep/goat. The remaining specimens belong to foxes, lagomorphs and polecat. As with the other units, the shaft circumferences of most limb bones remain intact whilst only a relatively small number are complete in terms of shaft length (Appendix 4.8).

Approximately a fifth of the material shows signs of weathering and most of this is in the early stages although a few specimens display more advanced signs with one specimen

having a fibrous texture (Appendix 4.9). A few bones display root damage, but the majority are unaffected (Appendix 4.10). Around 50% of the assemblage appears natural in colour and most of the remainder are at least partly yellow or brown in colour (Appendix 4.11).

The assemblage recovered by McBurney

A total of 406 identifiable specimens were recovered by McBurney (Appendix 4) but unfortunately the stratigraphy associated with these deposits is unclear and it has proved impossible to relate it to the stratigraphic units used in this report.

Taxa representation is shown in Appendix 4, and this indicates that rabbit is the most frequent species with sheep/goat and fox also numerous. A few specimens belong to arctic hare, brown bear and reindeer but apart from a reindeer astragalus, all are from deposits containing modern domestic animals so must have suffered mixing. The provenance of the reindeer astragalus is also unknown as the only information given on the label is LH58/3 indicating only that it was recovered in Trench 3 during the 1958 season of work. Almost all the burnt remains came from these deposits, but most are unidentifiable (Appendix 4.6).

Evidence for the interaction of humans with the Holocene material is provided by a sheep/goat radius that has been chopped obliquely through the middle of the diaphysis. However, in the absence of securely dated deposits and/or stratigraphic integrity this material cannot provide reliable information concerning past environments and/or human practices and so, for the purposes of this report, it is not considered further.

Discussion and interpretation - Pleistocene deposits

The silts and underlying deposits (Units III – V) fall within the range c. 30–22 ka (see table 1 above) and therefore span the early cold phase (Davies and Gollop, 2003, 135) at the end of Marine Isotope Stage (MIS) 3 and the early part of MIS 2 prior to the Last Glacial Maximum. The taxa represented in the lowest layers (Units V–VI) have all been recorded at contemporary sites of MIS 3 date (Currant and Jacobi, 2001) and so there is no reason to think that they have suffered disturbance or mixing.

The predominance of brown bear in the Unit IV material, particularly the sample recovered from T5, suggests the cave functioned primarily as a bear den during this period. Radiocarbon dates obtained on animal bones recovered from the overlying silts (Unit III) in this area returned dates of 27,662–26,425 cal BP (OxA-1027) and 28,445–27,261 cal BP (OxA-2508) (see table 2 above) with the presence of bear, fox, reindeer and hare suggesting that the deposit is stratigraphically intact and that the cave continued to be used by denning bears and occasionally by arctic fox. Material recovered from the silts (Unit III) in T6 produced a date of 42,239–36,496 cal BP (OxA-1491) and again, judging from the species represented - brown bear, spotted hyaena and reindeer, appears to be intact.

Denning brown bears spend a considerable amount of time sleeping. Both adults and cubs are particularly vulnerable at this time and may die of starvation if they have not accumulated sufficient fat reserves (Stiner, 1994, 80). Consequently, some of the remains could be natural casualties. The co-presence of wolf and fox in T5 and spotted hyaena and fox in T6 indicates intermittent use by other carnivores and it is possible that denning bears made for easy prey.

The presence of large herbivore remains such as those belonging to horse and reindeer is most probably due to the wolf and/or hyaena activity and it is likely that limb bones, particularly those belonging to juveniles have been preferentially destroyed (Sutcliffe, 1970; Marean

and Kim, 1998, 89). Being relatively small, foxes generally target small mammals and birds (MacDonald and Barrett, 1993) so are most likely to have brought the hare, other small mammals and birds into the cave.

A reindeer specimen from the basal clays (Unit V, T4, Layer 21) outside the North Cave entrance produced a radiocarbon date of 35,070-31,498 cal BP (OxA-1492 table 2) thereby providing a maximum age for the material recovered from this area. Judging from the presence of fox, bear, deer and hare amongst the material from Unit IV some animal parts were also consumed outside the cave. The majority of the Unit III assemblage came from T1 and T4. Two reindeer bones returned dates (see table 2) of 28,438-27,007 cal BP (OxA-1490, T2, Layer 4) and 35,113-31,850 cal BP (OxA-1028, T4, Layer 5). However, the co-presence of modern domestic taxa with extinct animals such as arctic fox and reindeer indicates that mixing has occurred.

The range of herbivorous taxa present in the locality included rhinoceros, horse and reindeer. The fact that present day horses and reindeer are known to live in herds suggests that the vegetation in this part of Britain during the late glacial period was still capable of supporting herds of large herbivores. At this time the climate was becoming increasingly cold and it has been suggested that during the 'cold events' of MIS 3, carnivore ranges and population sizes were reduced in response to the lower productivity offered by the predominance of herbaceous vegetation dominated by steppic taxa, probably in response to the decrease in moisture availability (Huntley and Allen, 2003, 99).

The presence of breeding populations of herbivores and carnivores is evidenced by the survival of a few bones and teeth belonging to juvenile hyaena, fox, bear, woolly rhinoceros and hare. The presence of young bears and foxes probably relates to the use of the cave for denning whilst young herbivores would have been particularly vulnerable to predation. Some of the remains may represent scavenging from animals previously brought down by other predators, rather than hunting success.

Other than the cut marks preserved on an undated large mammal limb bone fragment, evidence for human interaction with the bones is absent. Previous work on MIS 3 assemblages indicates that the general scarcity of cut marked bones at contemporary British sites is a reflection of the low density and sporadic nature of humans in Britain during this period, rather than simply due to subsequent carnivore activity (Ingrem, 2009). At Little Hoyle, the absence of direct evidence (cut marks) for human interaction with the bones, the predominance of loose teeth and podial bones, and the scarcity of fractures associated with the breakage of fresh bone suggests that non-human carnivores were primarily responsible for accumulating and modifying the animal remains.

A radiocarbon date of 21,962-20,830 cal BP (OxA-1026, table 2) was obtained from Unit II deposits (T6, Layer 6) in the South Cave and suggests the material was accumulated toward the end of the Last Glacial Maximum (LGM). The range of animals represented in this area suggests that the deposits are intact with a few specimens belonging to wolf and bear indicating that carnivores continued to use this area for denning, especially as there is evidence for juvenile bears and gnaw marks are preserved on a reindeer 1st phalanx.

Once again, the largest sample of animal remains came from T1 and T4 but the co-presence of Holocene animals such as sheep/goat and rabbit along with arctic fox and reindeer indicates that the deposit has suffered mixing.

Discussion and interpretation – Holocene deposits

The recent layers (Unit I) and the material recovered by McBurney during the 1950s produced a considerable number of specimens belonging to modern domestic animals, particularly caprines but with cattle and pig fairly numerous and dog also present. The presence of these relatively modern taxa is primarily the result of animal husbandry practices that took place in the locality in more recent years. This is not surprising as evidence for Neolithic and early medieval activity has already been noted at Little Hoyle. However, in the absence of securely dated deposits, the assemblage is unable to provide information concerning the economic and cultural practices that took place at any specific period.

Most of the animal bone came from T1 and T4 where the presence of small fox bones, which are thought to belong to arctic fox, and the probable Pleistocene cut marked large mammal limb bone suggest that it is not only the older deposits in this area that have been subjected to mixing. Rabbit remains are quite numerous as are other burrowing animals such as badgers and this might at least partly explain the mixing that has taken place. The presence of another burrowing animal, the polecat is not surprising as it is found in Wales in the present day (MacDonald and Barrett, 1993, 117) and is known to prey on rabbits. The single fish bone that belongs to sea bass was probably caught on the coast nearby and transported to the site, perhaps by a bird.

The majority of bones from T6 belong to badgers and rabbits so clearly this area continued to be used as a den. A single bone belonging to reindeer was amongst the herbivore remains and is almost certainly derived from earlier deposits. Carnivore remains were absent from the small sample recovered from T5, but carnivores were probably responsible for accumulating the few bones belonging to herbivores.

BIRD REMAINS

Description

Bird bone has been noted and recovered from every phase of excavation at Little Hoyle, including the material in Tenby Museum from the nineteenth century excavations. McBurney in 1958 and 1959 found a considerable quantity of avian material representing a diversity of species. The excavations of 1984, 1986 and 1990 not only retrieved further bird remains but also clarified the differences between the avifauna of the cave interior and that from the exterior. The separate nature of these assemblages is evident in the lists of species. Most of the bone is in good condition though the specimens from T5 tend to be more fragmentary than those recovered from T1 and T4. The species range from T1 and T4 is similar and consistent. For the full analysis see Appendix 5. Table 4 shows the combined lists for T1 and T4. By contrast, the stratigraphic sequence in T5 contained a markedly different avifauna (Table 5). Apart from the geese, only wood pigeon, *Columba palumbus*, and starling, *Sturnus vulgaris*, were represented.

Table 4. Bird bones from the excavations in T1 and T4 (NISP).

Stratigraphic Units Species	II/III	III	III/IV	IV	V	VI	Unstr.	Total
cf. <i>Branta leucopsis</i> Barnacle goose						1		1
<i>Anas</i> cf. <i>penelope</i> Widgeon		1	1					2
<i>Anas platyrhynchos</i> Mallard		1	2					3
cf. <i>Haliaeetus albicilla</i> White tailed eagle	1							1
<i>Accipiter nisus</i> Sparrowhawk		1						1
<i>Falco tinnunculus</i> Kestrel		1						1
<i>Lagopus lagopus</i> Willow grouse			4					4
<i>Lagopus mutus</i> Ptarmigan		1					1	2
<i>Tetrao tetrix</i> Black grouse	4							4
<i>Perdix perdix</i> Partridge		2	1			1		4
cf. <i>Calidris alpina</i> Dunlin	2							2
<i>Scolopax rusticola</i> Woodcock			1					1
<i>Alca torda</i> Razorbill		1						1
<i>Columba palumbus</i> Woodpigeon			1			1		2
<i>Columba livia</i> Rock dove			1					1
<i>Alauda arvensis</i> Skylark		2	8				2	12
cf. <i>Lullula arborea</i> Woodlark			2					2
<i>Anthus spinoletta</i> Water pipit			1					1
<i>Turdus merula/torquatus</i> Blackbird/ringouzel			1				1	2
<i>Turdus iliacus</i> Redwing			1			1	1	3
<i>Sturnus vulgaris</i> Starling		4						4
<i>Corvus corone</i> Carrion crow		1	4				1	6
<i>Corvus monedula</i> Jackdaw		1	1					2
<i>Phylloscopus</i> sp. Willow warbler/Chiffchaff			1					1
<i>Fringilla coelebs</i> Chaffinch			1					1
<i>Coccothraustes coccothraustes</i> Hawfinch			1					1
<i>Carduelis</i> cf. <i>carduelis</i> Goldfinch			1					1
<i>Emberiza citronella</i> Yellowhammer			4					4
Totals	7	16	37	0	0	4	6	70

T6 contained very few small animal bones. The only bird specimens from the Pleistocene deposits were two humeri of black grouse, *Tetrao tetrix*. These are consistent with avian material from T4. The Holocene remains included partridge, *Perdix perdix*.

Bird bones from the collection held in Tenby Museum come from what can probably be considered as part of the Pleistocene assemblage on the evidence of the watercolour section (Figure 5). A note on the watercolour drawing indicates that avian bones were recovered from the infill of the entrance to the eastern chamber. The sample includes remains of: *Phalacrocorax aristotelis* (shag); *Branta leucopsis* (barnacle goose); *Melanitta nigra* (common scoter); *Falco tinnunculus* (kestrel); *Larus argentatus* (herring gull); *Larus marinus* (greater black-backed gull) and *Turdus philomelos* (song thrush). There is also a coracoid, which was ascribed by Rolleston and Laws to 'eagle', but its patination does not fully match the avian remains from

the Tenby sites and in fact is the left coracoid from a crane, *Grus grus*, and is of some significance for the interpretation of the environment of the site. Finds of cranes are infrequent in the Pleistocene record of Western Europe. They appear sporadically on sites from Israel to Ireland. In Britain bones of the common crane were recovered late Pleistocene/early Holocene deposits at Thatcham, Berkshire dated between $10,365 \pm 170$ BP and 9480 ± 160 BP (Stuart, 1982) and at Star Carr, North Yorkshire (Schulting and Richards, 2002, 329). At Pin Hole Cave, Derbyshire, Bramwell (1960) identified *Anthropoides virgo*, the demoiselle crane, in the context of a Mousterian occupation layer. At the present day a reduced breeding distribution of the common crane is continental, restricted to north-eastern Europe, with major wintering areas in southern Spain, North Africa, Turkey and the Tigris and Euphrates catchments (Cramp and Perrins, 1994).

Table 5. Bird bones from excavations in T5 (NISP).

Stratigraphic Units Species	I/II	II	IIb	II/III & III	Total
<i>Anser brachyrhynchos</i> Pink footed goose		5	2	1	8
<i>Anser albifrons</i> White fronted goose				1	1
<i>Anser erythropus</i> Lesser white front goose		10		1	11
<i>Branta leucopsis</i> Barnacle goose	6	74	4	2	86
<i>Anser/Branta</i> not determined	1	18	1		20
<i>Columba palumbus</i> Woodpigeon		2			2
<i>Sturnus vulgaris</i> Starling		1			1
Totals	7	110	7	5	129

Interpretation

The pattern of bird fauna makes it possible to identify three distinct but overlapping zones of avian habitat within range of the site. The exposed heights and slopes were favoured by grouse in descending order of preferred habitat and with them were the larks. The valley bottom, with its swamps, open water, reedbeds and meadow extending out from the present shoreline was the haunt of geese, ducks and wading birds and the slopes, crags and steep wooded sides of the valley between was the domain of raptors, columbids, corvids and small passerines.

Seasonal indicators are predominantly towards autumn, winter and early spring. The evidence of a mixed population of geese, the possible wigeon, *Anas Penelope*, the crane, *Grus grus*, dunlin, *Calidris alpina*, redwing, *Turdus iliacus*, and even increased numbers of starling, *Sturnus vulgaris*, suggest that these may have been winter visitors to the locality. Less certain is the warbler, although chiffchaff, *Phylloscopus collybita*, is resident over part of its range at the present day and the possible woodlark, *Lullula arborea*, that in a winter context seems doubtful.

The majority of the bird remains appear to come from deposits which are likely to post-date the Last Glacial Maximum (see Table 2 above). In particular, the material from inside the cave in T5 is likely to be contemporary with the later part of the bear denning activity identified above. Some of the more diverse avifaunal remains from T1 and T4 may have been deposited through a variety of factors. The rock dove, *Columba livia*, resident in the rocks and fissures around the cave and carrion eaters, like the corvids, that were profiting from carcasses

brought to the cave were less likely to have themselves fallen as prey. Other species may have been natural or accidental deaths or attacked while feeding on carrion. The bear denning acted as a starting point but their activities brought and attracted other elements on to the site with the diversity of avifauna as part of the consequence.

THE MICROFAUNAL REMAINS

Introduction

The remains were collected from T1, T4, T5 and T6. A sub-sample of microfaunal remains from the Charles McBurney excavations undertaken during 1958 and 1959 excavations were analysed in addition to the Aldhouse-Green material. The relationship of the McBurney layers with the layers identified during the more recent excavations are little understood, and consequently material from the two deposits are discussed separately.

Micromammals occupy very distinctive habitat niches and are much more sensitive to localised environmental conditions than macromammals. The aims of the analysis were to identify which species were present within the assemblage to determine what the environment surrounding the cave was like during the time that the remains were deposited, and where possible to provide an indication of the relative dates of the deposits.

Methodology

Recording of the microfaunal remains was undertaken following the small mammal and herpetofauna recording protocol and standards outlined by English Heritage (Baker and Worley, 2014). Where possible cranial elements of small mammal taxa were analysed to species layer following diagnostic features of dentition as outlined by Hillson (2005), Yalden and Morris (1990), Yalden (2010) and by visual comparison to reference specimens. The identification of herpetofauna was undertaken following Böhme (1977), Gleed-Owen (1998), and Holman (1998) with the aid of comparative reference specimens.

Long bones of microfauna are generally less diagnostic, and therefore identification was restricted to genus or family layer with the aid of reference specimens. The exception to this being *Arvicola terrestris*, *Lemmus lemmus*, and *Dicrostonyx torquatus*, for which certain post cranial bones could be positively identified to species using reference specimens. Any unidentifiable specimens were separated into species class (e.g. amphibian, micromammal) and counted to provide an indication of taphonomic processes influencing the assemblage.

Results of the microfaunal analysis

Aldhouse-Green excavations

As shown in Table 6 the most fruitful layer was T4, Layer 3, with 224 specimens identifiable either to species or to genus layer. T5, Layer 2 was the next densest layer, with 167 fragments of identifiable bone present, closely followed by T5, Layer 3, with 145 identifiable fragments present. All other layers from all trenches had NISP counts of less than 100.

Table 6. NISP and fragment counts in each trench by layer. Layers are grouped in stratigraphic order (see table 1 above) with Holocene layers highlighted in green.

	Totals	<i>Tupa europae</i>	<i>Sorex araneus</i>	<i>Rana temporaria</i>	<i>Rana</i> Sp.	<i>Myodes glareolus</i>	<i>Microtus oeconomus</i>	<i>Microtus gregalis</i>	<i>Microtus agrestis</i>	<i>Lemmus lemmus</i>	<i>Lacerta</i> sp.	<i>Erinaceus europaeus</i>	<i>Dicorytonyx torquatus</i>	<i>Bufo</i> Sp.	<i>Bufo calamita</i>	<i>Bufo bufo</i>	<i>Avicola terrestris</i>	Layer	
T1				1													1	1	2
				28				1	1		3				1	31		2	65
																	1	3	1
															1		1	5	2
								1								2		6	3
	Total	0	0	29	0	0	0	2	1	0	3	0	0	0	2	31	5		73
T4																	1	1	1
								1								2	4	10	7
				1														16	1
				14					1							44	13	3a	72
		2	1	20	2	1	16	11	76		1	1	22			30	41	3	224
				9			1	1	8						5		23	11	47
																1		12	1
				1					1							2		4	4
						1	1		3									21	6
								1										5	1
				1			1		9									6	11
	Total	2	1	46	2	2	19	15	98	0	1	1	22	0	0	81	85		375
T5				10													23	1	33
				14	4	4	9	1	47	4			45			26	13	2	167
													1					2c	1
				8	4	5	6	1	63	6			24			7	21	3	145
								1										5	1
	Total	0	0	32	8	9	15	2	111	10	0	0	70	0	0	56	34		347
T6				2														3	2
				5												19		4	24
				5										1		21	1	5	28
				10	4				16				3			12	5	6	50
																1		13	1
																1		16	1
				2			1		8							1		11	12
									3				1					L13 L20	4
									1							1		15	2
	Total	0	0	24	4	0	1	0	28	0	0	0	4	1	0	54	8		124

The largest numbers of fragments came from T5 (46% of total NISP) and T4 (38% of total NISP), which accounted for the bulk of the microfaunal assemblage (Table 6). T4 was the largest trench, and therefore may have a higher NISP count for this reason. T5 is one of the

smallest trenches, and is located centrally within the cave system. The large NISP indicates that there was a higher density of microfaunal remains in this location. The next highest NISP count was observed within T6 (8% of total NISP), with all other trenches containing less than 5% of the identifiable NISP.

Table 7. *NISP and fragment counts in each trench.*

Trench	NISP	% total NISP	Unidentifiable fragments
T1	103	4.5	126
T4 (inc. 2 and 3)	953	41.5	762
T5	1048	45.6	942
T6	182	7.9	200
None	13	0.6	11
Totals	2299	100	2041

The NISP counts for the species identified within each layer are shown in Table 8. The largest assemblage of microfaunal remains were present within T4, Layers 3a, 3 and 11 and T5, Layers 3 and 2. Very few remains were identified within the other layers, and consequently may not be representative of past environments, preventing a detailed understanding of ecological changes through time. The presence and absence of certain species within the more fruitful layers can be useful for enabling environmental reconstruction at this time, and the potential date frame for these deposits.

Three layers have exclusively Holocene species present (Figure 22): T1, Layer 2, T4, Layer 3a and T5, Layer 1. These layers have assemblages which are dominated by amphibians, with *Bufo bufo* being the most common and *Rana temporaria* also present in substantial numbers. T1, Layer 2 also has a small number of other microfauna species present: *Microtus agrestis*; *Microtus gregalis* and *Lacerta* sp. The stratigraphic analysis (see table 1) shows that these three layers are Holocene in date.

The remaining layers, from T4, T5 and T6, have been placed in the overall sequence as belonging between the end of the Last Glacial Maximum and the end of the Younger Dryas (see Table 1). In all cases the microfauna in these layers continued to be dominated by species which are still extant today. Although amphibian species were still present, they generally made up a much smaller proportion of the overall numbers. T4, Layer 11 was dominated by vole species, predominantly *Arvicola terrestris*, *Microtus agrestis* and *Microtus gregalis* although there was a single specimen of the tundra vole, *Microtus oeconomus*. T4, Layer 3 had a similarly large amount of vole species, in this case also including *Myodes glareolus*. However, this layer also had a significant number of specimens of the diagnostically Pleistocene species *Dicrostonyx torquatus* and *Lemmus lemmus*.

T5, Layers 2 and 3 had the highest proportion of Pleistocene species. In both cases there were similar proportions of amphibian and vole species as were present in the T4 layers but approximately 30% of the specimens from T5, Layer 2 were *Dicrostonyx torquatus*,

Lemmus lemmus or *Microtus oeconomus*. T5, Layer 3 presents a similar picture, with only a slightly smaller proportion of Pleistocene specimens present.

Table 8. *Identifiable Species NISPs by Phase (NISP>30 in layer).*

Trench	T1	T4			T5			T6	Totals
Layer	2	3a	3	11	1	2	3	6	
<i>Arvicola terrestris</i> (Water vole)		13	41	23		13	21	5	116
<i>Bufo bufo</i> (Common toad)	31	44	30	5	23	26	7	12	178
<i>Bufo calamita</i> (Natterjack toad)	1								1
<i>Dicrostonyx torquatus</i> (Arctic or collared lemming)			22			45	24	3	94
<i>Erinaceus europaeus</i> (European hedgehog)			1						1
<i>Lacerta</i> sp. (Lizard)	3		1						4
<i>Lemmus lemmus</i> (Norway lemming)						4	6		10
<i>Microtus agrestis</i> (Field vole)	1	1	76	8		47	63	16	212
<i>Microtus gregalis</i> (Narrow headed vole)	1		11	1		1	1		15
<i>Microtus oeconomus</i> (Tundra vole)			16	1		9	6		32
<i>Myodes glareolus</i> (Bank vole)			1			4	5		10
<i>Rana</i> sp. (Frog)			2			4	4	4	14
<i>Rana temporaria</i> (Common frog)	28	14	20	9	10	14	8	10	113
<i>Sorex araneus</i> (Common shrew)			1						1
<i>Talpa europa</i> (European mole)			2						2
NISP/Layer Totals	65	72	224	47	33	167	145	5	

T6 Layer 6 is slightly different, in that it has a much higher proportion of amphibians present than the other Pleistocene layers. The only diagnostically Pleistocene fauna from this layer are three specimens of *Dicrostonyx torquatus*.

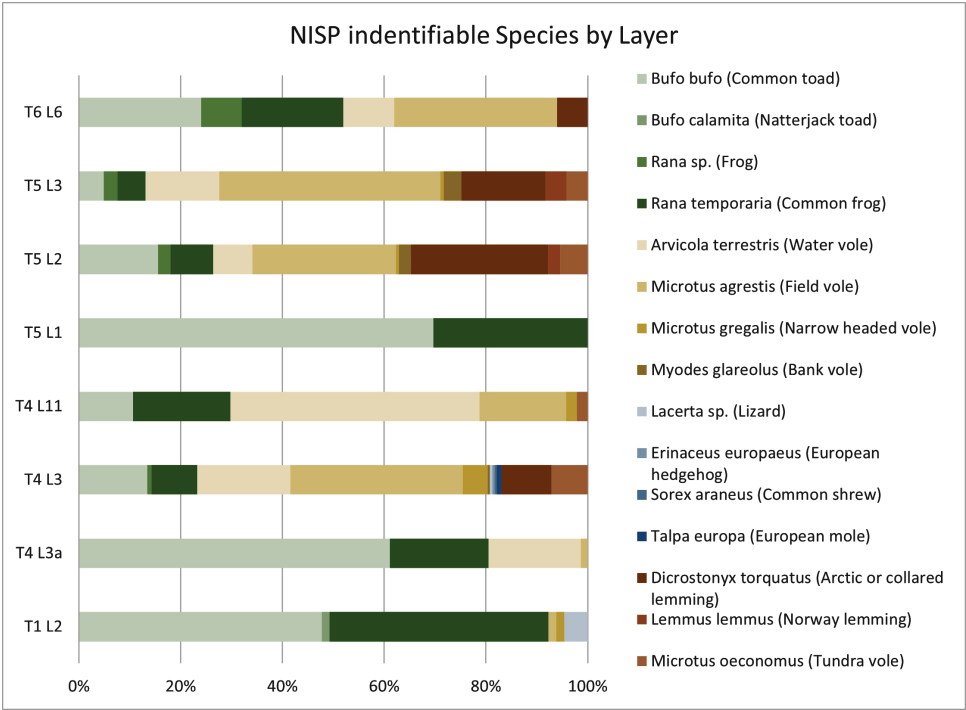


Figure 22. NISP of identifiable species by layer (NISP>30).

Minimum number of individuals

The microfaunal remains within Little Hoyle comprised of a minimum of 105 *Bufo bufo* specimens, 58 *Microtus agrestis*, and 57 *Rana temporaria* individuals (Table 9). This mirrors the NISP count, where these species were the most commonly identified. The minimum number of *D. torquatus*, and *Microtus oeconomus* was 26 and 24 respectively. The minimum numbers of these individuals demonstrate that these remains were not a product of occasional individuals sheltering in the cave, the consistently repeating anatomical elements producing these MNI values indicates that the microfaunal assemblage originated from a large number of animals.

Table 9. Minimum numbers of individuals at Little Hoyle.

<i>Species</i>	<i>MNI</i>
<i>Bufo bufo</i>	105
<i>Microtus agrestis</i>	58
<i>Rana temporaria</i>	57
<i>Dicrostonyx torquatus</i>	26
<i>Microtus oeconomus</i>	24
<i>Microtus gregalis</i>	12
<i>Myodes glareolus</i>	2
<i>Lemmus lemmus</i>	2

The McBurney material

A sub-sample of 662 specimens from the 1958 and 1959 seasons of excavation were analysed (Table 10). The majority of these came from Horizons D (123 NISP), and E 6 (150 NISP), and E (NISP 88). The McBurney sample was composed predominantly of larger amphibian long bones, and micromammal long bones, with occasional larger mandible fragments. Specimens identifiable to species were extremely limited, with only one loose molar, 6 mandible fragments, and 3 maxillary fragments.

Table 10. *NISP counts in the McBurney material by layer.*

	<i>NISP</i>	<i>unidentifiable specimens</i>
<i>B1</i>	38	12
<i>D</i>	123	70
<i>D ('E')</i>	6	12
<i>D/E</i>	3	4
<i>D10</i>	5	0
<i>D11</i>	2	0
<i>D12</i>	1	0
<i>D5</i>	2	1
<i>D7</i>	22	27
<i>D8</i>	1	0
<i>D9</i>	6	0
<i>E</i>	88	28
<i>E 6</i>	150	54
<i>E/F</i>	7	0
<i>Total</i>	454	208

Rana temporaria and *Bufo bufo* were the most identified species within the assemblage (Table 11). This is likely a product of the lack of cranial fragments, leaving behind the identifiable post-cranial amphibian bones, which explains the high NISP values of these species. Similarly, an analytical bias is observed by the representation of *A. terrestris* specimens which can also be identified using post cranial remains.

The lack of identifiable tooth fragments is interesting, it is possible that they were simply not in the sub-sample analysed, however this is unlikely, since no further sorting was evident within the assemblage. It is possible that sieving processes were too coarse to retrieve the small, identifiable micromamal teeth. However given that a suite of microfaunal specimens have previously been identified at the site using teeth (Currant, 1984). It is highly likely that

any micromammal teeth retained are being held separately from the main collection, making them unavailable for analysis at this time.

	B1	D	D (E')	D/E	D10	D11	D12	D5	D7	D8	D9	E	E 6	E/F	Total
<i>Rana temporaria</i>	1	64	0	0	0	0	1	0	1	0	0	4	1	0	72
<i>Bufo bufo</i>	1	55	0	0	0	0	0	0	1	0	0	3	3	1	64
<i>Arvicola terrestris</i>	6	0	0	0	0	0	0	1	2	0	0	21	2	0	32
<i>Microtus agrestis</i>	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5
<i>Bufo calamita</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Dicrostonyx torquatus</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Sorex araneus</i>	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>Arvicoline/Muridae</i>	29	1	6	1	5	2	0	0	18	1	6	40	143	3	255
<i>Arvicoline</i>	0	1	0	2	0	0	0	1	0	0	0	15	1	3	23
Grand Total	38	123	6	3	5	2	1	2	22	1	6	88	150	7	454

Table 11. Identifiable specimens within the McBurney material studied.

Discussion

Unlike macrofaunal remains, microfaunal remains are typically not a product of human influenced accumulation. Some micromammal species can be attracted to cave environments in the search of food and shelter (Andrews, 1990; Price, 2003). However, the quantity of microfaunal individuals involved, and the suite of microfauna with vastly different habitat requirements present at the site (such as *A. terrestris*, *L. lemmus* and *B. bufo*) indicates that an alternative agent must be responsible.

The most plausible explanation for the formation of the deposit is that these are the remains of ancient owl pellets deposited in the cave. Owls consume their prey whole, later regurgitating the indigestible remains including bones and feathers when roosting. The presence of cranial and post-cranial remains within the deposit in combination with the diverse mix of species indicates that the assemblage is a product of owl pellet regurgitation. This is a common phenomenon in Palaeolithic cave assemblages in Britain (Andrews, 1990), and owls were responsible for the accumulation of microfaunal remains in South Wales (Price, 2003; Walker, *et al.* 2014).

The presence of large number of specimens within T4 and T5 indicates that these areas of the cave may have been favoured roosting places of owls.

Relative Dating of the deposits

The microfaunal evidence from Little Hoyle can provide some indication of the dating of the material within these deposits. The presence of *Dicrostonyx torquatus* and *Lemmus lemmus* within T5, Layers 2 and 3 indicates that these predate the onset of the warming event associated with the start of the Holocene (c. 11,700 BP), when both of these species are thought to have disappeared (Stuart, 1995; Coard and Chamberlain, 1999). Collared lemming was found in Younger Dryas sediments at Foxhole Cave, Gower and was directly dated to $13,810 \pm 75$ BP (OxA-20980) (Schulting, *et al.* 2013, 10). The latest *Dicrostonyx torquatus* specimens persisted in Southern Ireland until c. 10,000 ^{14}C yrs BP (Coard and Chamberlain, 1999), indicating that the Little Hoyle deposits are likely to predate this point. *M. oeconomus*, and *M. gregalis* are also typical of the Late Devensian and are believed to have become extinct prior to 9000 BP (Coard and Chamberlain, 1999); therefore, these deposits must predate this event.

Erinaceus europaeus, found within T4 Layer 3 is thought to have arrived in Britain during the environmental changes associated with the climatic warming prior to the Holocene (Stuart, 1995). Palaeoenvironmental evidence from South Wales suggests the Lateglacial warming may have started before 14,500, possibly up to 15,000 cal BP (Walker, *et al.* 2003, 511). The continued presence of the lemming species, in combination with low frequencies of species associated with slightly warmer temperatures (e.g. *E. europaeus*, *B. calamita*) indicates that this layer dates to around the time of the Lateglacial interstadial.

Environmental reconstruction and temporal trends

The low NISP counts within certain layers makes detailed comparisons challenging. However, it is possible to get an understanding of the environments within the locale of the cave, especially within the larger samples. The most common species within all deposits is *Microtus agrestis*, which preferentially reside in rough grassland, although are able to inhabit more marginal habitats such as bogs, woodland and moorland (Harris and Yalden, 2008),

consequently their presence within an assemblage does provide a broad indication of local environments, but is not as distinctive an environmental indicator as some of the other species.

To sustain the population of *Bufo bufo*, there must have been large permanent bodies of water in the vicinity of the cave to enable spawning. As this species is present within all layers, it suggests that this was a near permanent body of water (Beebee and Griffiths, 2000, 102). This is supported by the high representation of *A. terrestris*. This species is commonly found within approximately 2 m of bodies of water, including riverbanks, streams and marshes, in regions where water is reliably present throughout the year (Harris and Yalden, 2008). Whilst *R. temporaria* is less specific than *Bufo bufo* in terms of the environmental niche it requires, the representation of this species within all the deposits indicates again a moist environment within which to breed. The species can spawn in environments ranging from upland bogs to lowland rivers and streams, in addition to occupying terrestrial habitats including wooded areas, hedgerow, pastures and grasslands (Beebee and Griffiths, 2000, 83-84). *R. temporaria* are thought to be characteristic of an outgoing warm stage and the beginning of a cooler stage (Holman, 1998, 204). This is consistent with the findings from nearby Hoyle's Mouth Cave, where both amphibian species, and *A. terrestris* were well represented throughout the sequence. (Walker, *et al.* 2026, see this volume).

Bufo calamita (natterjack toad) was represented by a single specimen within T1, Layer 2. This species is typically a pioneer species and is one of the first invaders associated with the latter part of a warm stage (Holman, 1998, 204). The presence of this species indicates that some of the environment must have been saline with dune, heath or salt marshes available for this species to pioneer and survive. (Boomsma and Arntzen, 1985). *B. calamita* can breed in very shallow pools or water and can tolerate brackish environments (Beebee, 1985). The species is thought to have colonised the UK during the first stages of climatic amelioration in the Lateglacial Interstadial (Gleed-Owen, 1998). The proximity of the site to the coast would have provided the ideal environment for this species to dwell in the vicinity of Little Hoyle. This species was not common, indicating a relatively small local population.

The fauna in the Pleistocene layers suggests that there must have been a relative cool tundra environment within the catchment range of the site rich in the willow/sedge plants preferentially eaten by both lemming species. The high numbers of *D. torquatus*, which generally dwell in cool environments and are typical of the suite of archaeological fauna dating to the last glacial period (Stuart, 1995; Coard and Chamberlain, 1999), indicates that this region must have been an ideal tundra environment to sustain relatively large populations of this species. A cool tundra environment is also suggested by the presence of *M. gregalis*, which typically inhabit these environments.

Microtus oeconomus by contrast preferentially inhabit wetter, more marshy humid grasslands, but are known to survive in drier fields, hedgerows and dune systems when they are not directly competing with *M. arvalis* (Ligtvoet and van Wijngaarden, 1994). No *M. arvalis* specimens were recorded at Little Hoyle, and it suggests that *Microtus oeconomus* species was able to thrive in these drier tundra environments available at the time. This is supported by the presence of *M. glareolus* (bank vole) which also inhabits drier areas or land. The presence of *M. agrestis* throughout the sequence is also indicative of areas of drier scrub land that enabled this species to thrive. Similarly, *L. lemmus* prefer more moist environments (Yalden, 2010), and their presence in these layers indicates that the nearby environments contained relatively moist tundra. Of the species identified less frequently, *M. glareolus* prefers drier areas or land. It typically resides in areas of mature deciduous forest but can extend into grasslands hedgerows and coniferous forests (Harris and Yalden, 2008). *Microtus gregalis* occupies tundra and forest steppe environments: it can be indicative of cooler environmental conditions. *S. araneus* is

most common in bushy scrub, deciduous woodland and hedgerows, but can also inhabit grasslands (Harris and Yalden, 2008).

Within the McBurney material, the presence of *M. agrestis*, *D. torquatus* and *B. calamita* is consistent with the findings from the analysis of the material from the more recent excavations at the site, indicative of tundra environments. The large number of amphibian remains are also consistent with the findings within the main assemblage, again supporting the idea that there was a pool of water surrounding the site, essential for these species to survive.

Comparisons to other Upper Palaeolithic Microfaunal assemblages

The remains from two other Upper Palaeolithic South Wales cave sites were available from comparison: Hoyle's Mouth (Walker, *et al.* 2026, see this volume), and Cathole Cave (Walker, *et al.* 2014).

Cathole Cave, Gower similarly dates to the late Upper Palaeolithic, and contained a large microfaunal assemblage (Walker, *et al.* 2014). The proportions of species identifiable to species at each of these sites is shown in Figure 23.

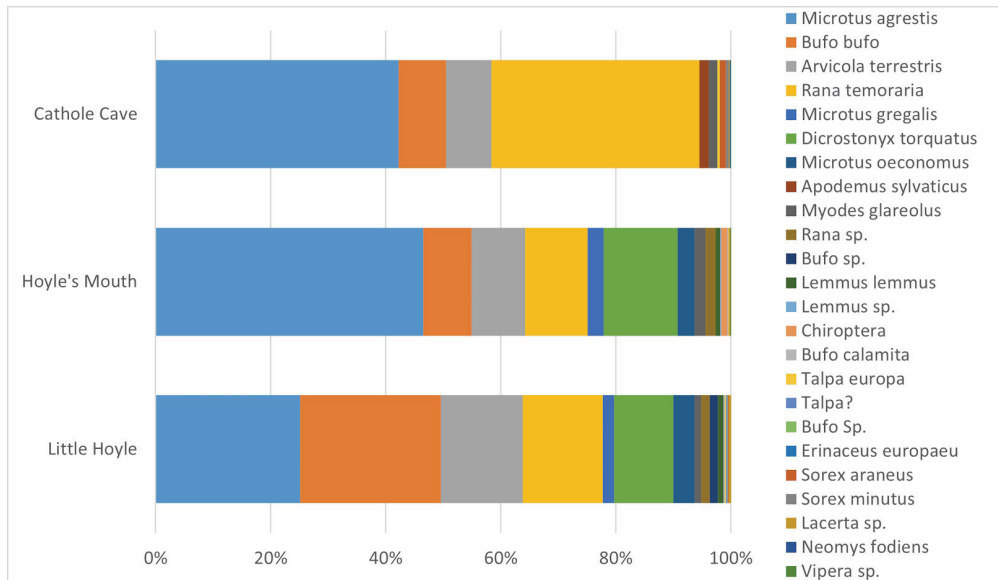


Figure 23. NISP comparisons between South Wales Upper Palaeolithic cave sites.

The suite of faunal specimens identified at Little Hoyle and Hoyle's Mouth is consistent. Both sites contained large quantities of *Microtus agrestis*, *Bufo bufo*, *Arvicola terrestris*, *Rana temporaria* and *Dicrostonyx torquatus* which combine to account for 90% of the total assemblage (Figure 23). Other key species represented at both sites included *L. lemmus*, *M. gregalis* and *M. oeconomus*. This suite of species is typical of British Lateglacial microfauna (Yalden, 2010). Similarly, limited examples of *B. calamita* and *E. europaeus* were both identified, which are typically associated with climatic warming during the end of the Lateglacial period. The only minor difference between these two sites is that no shrews were identified at Hoyle's Mouth, and two *S. araneus* specimens were identified within the Little Hoyle

assemblage. Given the proximity of these sites to each other, the similarity within the microfungal deposits is expected, and both sites indicate a relatively cool tundra environment, with bodies of water nearby to support large populations of *B. bufo*, *A. terrestris* and *R. temporaria*.

In contrast, Cathole Cave on Gower exhibited a different suite of fauna, with neither lemming species or *M. gregalis*, or *M. oeconomus* identified at the site. Similarly, a greater variety of shrew specimens were identified at Cathole Cave including *S. minutus* (pygmy shrew) and *N. fodiens*, as well as *A. sylvaticus* (wood mouse). This indicates that there were localised environmental differences between these two regions during the late Upper Palaeolithic in South Wales. The suite of fauna represented at Cathole Cave is more indicative of grassland environments, and shrub-based environments (Walker, *et al.* 2014), whereas Little Hoyle and Hoyle's Mouth have species indicative of cooler tundra environments.

The biggest similarity between these sites is the dominance of *M. agrestis*, which are less specialised in the environmental conditions that they inhabit: spanning grassland, shrubland, hedgerows and meadows (Harris and Yalden, 2008). The large representation of *R. temporaria*, *B. bufo* and *A. terrestris* also indicates that there were at least semi-permanent water sources in the vicinity of all the sites.

Conclusions

The suite of faunal remains within the Pleistocene deposits at Little Hoyle is characteristic of the Lateglacial period, with *D. torquatus*, *L. lemmus*, *M. gregalis*, and *M. oeconomus*, all of which became extinct in Britain prior to around 10,000 BP, demonstrating that these deposits predate this point. *B. calamita* and *E. europaeus* emerged during warming associated with the conclusion of the Lateglacial period. A body of water must have been present within the vicinity of the site that was capable of sustaining large populations of *A. terrestris*, *B. bufo* and *R. temporaria*. The small sample size throughout the sequence prevented temporal changes in environment from being identified. The predominant environment in the vicinity of the site was likely a relatively moist tundra to support the *D. torquatus*, *L. lemmus*, *M. gregalis*, and *M. oeconomus* species all identified.

HUMAN REMAINS

Introduction and Methodology

The human remains from Little Hoyle were recovered during the excavations in the chimney connecting the North Cave to the surface between 1877 and 1878 (see Figure 5 above). As part of the current project a reassessment of the whole collection was carried out to modern standards. An initial assessment of the remains was conducted to verify taxon and skeletal element. Taphonomic analysis was conducted, and each element scored on general preservation, mineral staining and deposits, fracture patterns, surface effects, cortical removal, destruction, fluvial markers, processing modifications, carnivore modifications, rodent activity, burning, and root embedding/etching. The remains have limited stratigraphic information and are therefore treated as an homogenous assemblage. All the remains were recovered from areas within the daylight zone of the cave, either beneath the chimney or in the cave mouth (Davies, 1989, 83). The assemblage has also been studied as part of a recent PhD project (Konstantinidi, 2023) which examined the taphonomic evidence for burial practice using both microscopic and macroscopic methods.

Where possible, age estimations for juveniles were made based on fusion times and dentition using Scheuer, *et al.* (2008). Further age assessments were made using dental attrition of molars (Miles, 1962; Scott, 1979). Sex estimations were made on adult mandibles where markers were present (Buikstra and Ubelaker, 1994). Sex estimations using metrics on postcranial elements were not possible due to their fragmented nature, similarly stature estimations were not possible.

Results

The human assemblage comprised of 91 fragments, three elements previously identified as human were unidentified mammalian, seven were unidentified fragments, leaving a number of identified specimens (NISP) of 81. Teeth within sockets were not included in the NISP count but loose teeth were.

Minimum number of individuals (MNI) was assessed based on repetition of skeletal elements and age markers. Taphonomy was not considered in the MNI estimation due to the possibility of differential diagenesis. Most of the fragments were mandibular, with some cranial fragments. There were 18 post cranial fragments (Figure 24).

All the post cranial elements were assessed as older than 12 years due to fusion times. Robusticity and size indicate they are all adult. There was no repetition of elements giving an MNI estimation of one. However, given the number of mandibles present, it is possible that the post cranial elements have originated from more than one individual.

There were 21 cranial fragments. It was not possible to refit all the fragments of cranium, none of the fragments appeared to be juvenile and did not exceed the size of single cranium. Differences in thickness between several of the fragments, however, suggested that they originated from different cranial vaults.

In addition to loose fragments there was a partially reconstructed cranium. There was overlap between the frontal and left parietal fragments with the reconstructed cranium. This

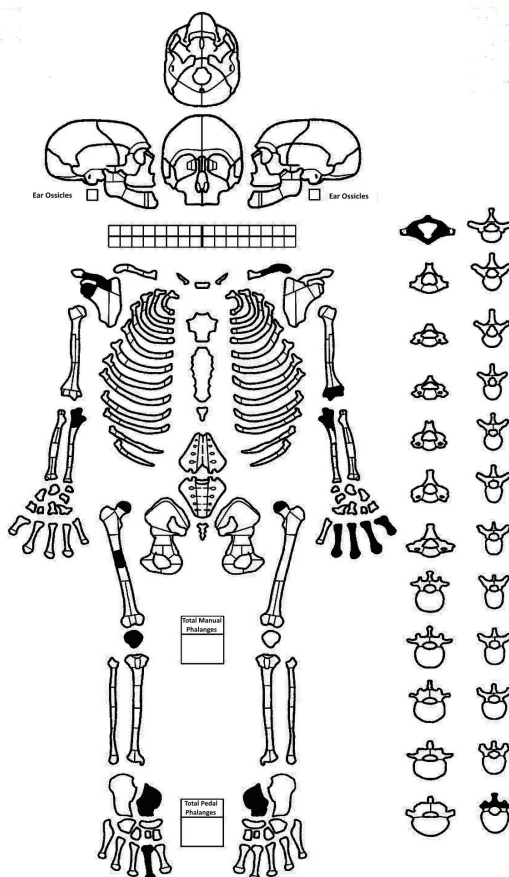


Figure 24. Diagram of human post-cranial elements present.

gave an MNI estimation of two for the crania. The partially constructed cranium was estimated to be probably female based on a score of three for the glabella.

There were 16 mandibular fragments, three of these were juvenile and the remaining were adult. Due to the impact on the final MNI and age estimations these fragments are discussed in detail in Appendix 6. A summary of age and sex estimations and possible associations is provided below (Table 12).

Table 12. *Summary of mandibular fragments and osteological assessments.*

Specimen N ^o	Age	Sex	Possible Refits	
1983:2376/7	7 yrs $\pm$ 24 m	Undetermined	1983:2435/9	A
1983:2435/9	Juvenile	Undetermined	1983:2376/7	A
1983:2435/11	Juvenile	Undetermined		B
1983:2376/6	>48 years	Undetermined	1983:2376/12 1983:2435/4	C
1983:2435/4	Undetermined	Undetermined	1983:2376/12 1983:2376/6	C
1983:2376/12	Undetermined	Undetermined	1983:2376/6 1983:2435/4	C
1983:2376/1	>24 years	(?) Female		D
1983:2376/2	>50 years	(?) Male	1983:2345/40	E
1983:2345/40	Undetermined	Undetermined	1983:2376/2	E
1983:2376/8	>18 years	(?) Female		F
1983:2376/11	>42 years	Male		G
1983:2435/10	Undetermined	Male	1983:2435/13	H
1983:2435/13	Undetermined	Undetermined	1983:2435/10	H
1983:2380/1	>42 years	Male		I
1983:2375/10	>48 years	(?) Female		J
1983:2375/5	>17 years	Undetermined		K

The total MNI for the assemblage is 11. This is based on repetition of mandibular fragments. This is a minimum estimation, and it is possible that the actual number of individuals is higher than this. None of the possible refits were direct associations but the absence of overlap and similar morphology means that they cannot be ruled out as belonging to the same individual.

Taphonomy

The general preservation of the remains was graded between good and fair. Most of the fragments had some level of soil staining, ranging from patchy to heavy, with some

showing calcite or soil adhesions. Similarly, there was evidence of grey and black staining consistent with manganese staining. One metatarsal (1983:2435/4) had evidence of rodent gnawing and cortical removal (Figure 25). There is staining over this suggesting it occurred earlier in deposition. It is the only specimen within the Little Hoyle assemblage that showed evidence of animal activity.



Figure 25. *Rodent gnawing on 1983:2435/4.*

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42% of the bones had evidence of cracking, either longitudinal or along the bone grain consistent with deposition in a cave environment. There was little to no evidence of fluvial action, suggesting that the bones were not deposited in an area of intensive hydrological action. All fractures were dry with 82% of specimens showing signs of recent fracture or edge wear. This is possibly the result of more recent disturbance. There were no fresh fractures evident.

Only one specimen, 1983:2375/5 (Figure 26), showed a weathering score of one (Behrensmeyer 1978). Weathering does occur in caves, at a slower rate, but it may be that at some point this specimen was sub-aerially exposed. The absence of severe weathering and minimal animal activity across most of the assemblage suggests that it is unlikely the bones were sub-aerially exposed for any length of time.

Skeletal Part Representation

There is a heavy bias towards mandibular fragments. The recovery of individual teeth and smaller elements is good, therefore bias in recovery is unlikely. It is possible that the post cranial elements were due to one body being deposited whole, particularly as extremities are represented. However, the limited number of elements, coupled with the number of mandibles present, suggests that a more complex burial practice was taking place in most cases.

The number of cranial fragments (MNI =2) does not correlate with the MNI of 11 derived from the mandibles. This is a point of interest as most literature and research discusses preferential selection and circulation of bones and curation of crania (Smith and Brickley, 2009; Cummings, 2017; Peterson, 2019) but not separate curation of mandibles. The temporomandibular joint (TMJ) is a persistent articulation so if there was collection of crania the separation of the mandibles would have had to occur at an advanced stage of decomposition or involve deliberate disarticulation. Two fragments were condylar processes but showed no evidence of processing.



Figure 26. *Cracking on 1983:2375/5 (portion of mandible).*

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Summary

This commingled assemblage consists of a minimum of nine adults and a minimum of two juveniles. There does not appear to be a bias towards a biological sex with three probable females, three males and one probable male. Most of the remains are older adults and those adults with estimations of younger ages are due to limited age markers available and should be considered a minimum age.

Skeletal part representation is heavily weighted towards mandibular fragments and the post cranial elements only represent a minimum of one individual. This indicates preferential

retrieval and/or deposition of certain elements. While taphonomic evidence of sub-aerial exposure is limited it cannot be ruled out that the remains were previously buried elsewhere and then moved to the current location. The presence of limited post cranial elements and crania in relation to mandibles is interesting and would be considered unusual for a Neolithic cave burial. Taphonomic analysis is consistent with burial within a cave environment, including post depositional disturbance and damage. Histological analysis by Konstantinidi (2023, 327-31) on sixteen samples from the cave shows a variation in taphonomic signatures. This suggests that a number of different funerary processes were taking place at the site, including burial, exhumation and the selection of body parts after skeletonisation (Konstantinidi, 2023, 332).

The deposition of human remains in caves forms a significant part of funerary practice in the earlier 4th millennium BC in Britain and more widely in north-west Europe (Peterson, 2019; Warburton, *et al.* 2025). Funerary practices in caves at this date include single burial, the successive inhumation of multiple bodies, secondary burials and a specific secondary burial rite focussed on the curation of crania (Peterson, 2019, 125-50). Generally, the most common of these rites, as is the case in chambered tombs of the same date, is successive inhumation. The taphonomy and element representation from Little Hoyle would suggest that this cave was used for part of the cranial secondary burial rite. The most likely explanation for the varied evidence presented above is that the cave or its environs was being used for the first, burial, stage of the rite. The crania and their associated mandibles were then being exhumed and collected in the cave, before the final stage of the rite saw most of the crania removed for a final deposition at some as yet unidentified site.

The Little Hoyle individuals can be compared to other Early Neolithic comingled deposits from sites in South Wales. The evidence for funerary practice at these sites is varied. It includes examples such as George Rock Shelter, Goldsland Wood (Konstantinidi, 2023, 226) where analysis suggests that, following deposition in the shelter, remains were being moved to another location for final secondary burial. At Priory Farm Cave (Schulting, 2020, 14-5) skeletal assemblages are also dominated by cranial, and especially mandibular elements. However, it must be noted that at Priory Farm Cave there are also later Bronze Age and Iron Age dates on some of the human remains. At Cathole Cave, Schulting (2020, 25) noted the presence of both cranial and post cranial elements from multiple individuals dating to the Early Neolithic and it is likely that this is another site where multi-stage burial was taking place. In summary, the caves of South Wales, including Little Hoyle, show a more varied range of burial practice in the Early Neolithic than is usual in other regions at this date. Rather than been dominated by evidence for successive inhumation, most of the evidence points to different kinds of secondary burial practice having taken place.

DISCUSSION

Introduction

The archaeological and environmental evidence from Little Hoyle Cave is highly significant. The cave provides a detailed environmental record with multiple lines of evidence which spans at least the last 128,000 years. The evidence for Pleistocene human activity at the cave is limited. The small number of lithic pieces of this date are likely to relate to the much larger assemblage at nearby Hoyle's Mouth Cave. The Holocene evidence of human activity is, however, extremely significant. The cave provides detailed evidence for a specific funerary

practice in the earlier Neolithic and potentially contemporaneous occupation on the surface above the cave.

The Pleistocene Evidence

The environmental and chronometric evidence demonstrate that the surviving cave-deposits at Little Hoyle span some 128,000 years at least. The basal clay deposits formed under cold conditions in the Early and Middle Devensian. This was followed by a period of interstadial conditions between 50,000 and 40,000 BP. The bulk of the faunal evidence comes from the series of stony clays and matrix supported breccias which formed slowly under cold conditions after this date and down to at least 14,500 BP.

The absolute dates obtained indicate that faunal remains were accumulated during the end of MIS 3 and the early part of MIS 2. Taxa and anatomical representation suggest the cave was used primarily as a den by brown bears with intermittent use by other carnivores including wolves, hyaena and foxes. The recovery of a large mammal bone fragment with cut marks suggests that humans also used the cave at some point during its history. However, the assemblage has few of the characteristics generally associated with human exploitation.

Several cave sites in the coastal area of South Wales have produced assemblages of Late Glacial animal remains. Seventeen miles to the east, MIS 3 deposits at Coygan Cave, Laugharne produced Neanderthal artefacts and an animal bone assemblage characteristic of later Quaternary assemblages in Europe and northern central Asia (Currant and Jacobi, 1997, 3). Coygan Cave suggests a very late Neanderthal presence (c. 60,000 – 44,000 cal BP) based on their dating (Aldhouse-Green, *et al.* 1995; Walker, 2016, 5–6). No faunal or human remains were recovered during the Little Hoyle excavations that date to this time. Analysis of the fauna from Hoyle's Mouth, 350m to the north of Little Hoyle, (Walker, *et al.* 2026 and see this volume) indicates a smaller MIS 3 faunal assemblage than might otherwise have been expected from such a cave and the presence of a handful of specimens recovered from the North Platform and the South Cave at Little Hoyle of reindeer and hyaena also support the notion that these caves were most likely used as carnivore dens at various times. The one *burin busquée* recovered from Hoyle's Mouth is indicative of an Aurignacian presence, also found at Paviland Cave, and Long Hole, Gower (Dinnis, 2015, 68; Dinnis, *et al.* 2019).

What is possibly more unusual is the dating of several specimens to the early part of the Late Glacial Maximum from Little Hoyle. These provide glimpses into what the local environment may have been like in the vicinity of this cave during parts of this period. Redating and genetic studies of some of the brown bear bones from Little Hoyle by Erik Ersmark *et al.* (2019) demonstrated that the bears survived in very cold conditions due to a range of factors including climate and interspecies competition. Another Late Glacial site located a few kilometres to the south-east is Ogof-yr-Ychen, Caldey Island where a date of $22,350 \pm 620$ BP was obtained from a woolly rhinoceros specimen (Bateman, 1973; van Nèdervelde, *et al.* 1973).

Other than the dated specimens and a few derived specimens belonging to woolly rhinoceros and spotted hyaena, the majority of the Pleistocene faunal remains from Hoyle's Mouth have a Late Glacial origin. At Hoyle's Mouth, faunal taxa and body part representation similarly indicate the cave was used intermittently after the Last Glacial Maximum by a variety of carnivores, particularly foxes and, whilst there is clear evidence for a human presence including the recovery of some 300 artefacts, cut marks were recorded on only one dated brown bear phalanx (HM1751; OxA-33908; 13,934 cal BP). At Little Hoyle a pattern of dated individual specimens from the late Glacial period is also recorded but their numbers are far fewer than in Hoyle's Mouth. Other local caves in the vicinity have produced Late Upper Palaeolithic

artefacts and late Glacial animal bone assemblages including Paviland Cave, Swansea (Swainston 2000, 108–109) and Nanna’s Cave, Caldey Island (Walker, 2016, 13–14).

Other than the undated cut-marked bone from the North Platform of Little Hoyle noted above, the only other certain evidence for Pleistocene human activity is the presence of the one convex-backed point from the McBurney excavations. This tool is likely to be a casual loss associated with the temporary use of the platform outside the cave and to be contemporary with the much more extensive Late Glacial occupation at Hoyle’s Mouth Cave (Walker, *et al.* 2026, and see this volume).

Neolithic Occupation and Funerary Practice

The five radiocarbon dates for Neolithic human remains from the cave have been modelled on the assumption that burial was a single phase of activity (Table 13). In this case the burial activity can be shown to have lasted between 0 and 645 years at 95.4% probability. However, this extended span is probably a result of the large standard deviations associated with the earlier dates (OxA-3304 to OxA-3306, see Figure 27) The results will not statistically combine to date a single event, so there was clearly some duration to the burial practice. It is likely that the burials belong to a shorter time period around the dates represented by the most recent result (OxA-41033), that is to say sometime in the late 37th or 36th centuries cal BC. This would potentially be contemporary with the occupation of the Longbury Bank site above the cave.

Table 13. *Calibrated and modelled date ranges for the five radiocarbon results from Neolithic human remains from the cave. Dates calibrated at 95.4% probability and modelled on the assumption that the burials represent a single phase of activity using OxCal 4.4.4 (Bronk Ramsey, 2021: Reimer, et al. 2020).*

Name	Unmodelled (calBC)		Modelled (calBC)	
Boundary Start			3950	3635
OxA-3304	3950	3530	3785	3530
OxA-3306	3945	3380	3775	3520
OxA-3305	3645	3370	3700	3390
OxA-3303	3640	3105	3655	3405
OxA-41033	3710	3635	3710	3635
First burial			3790	3635
Last burial			3650	3390
Boundary End			3650	3255

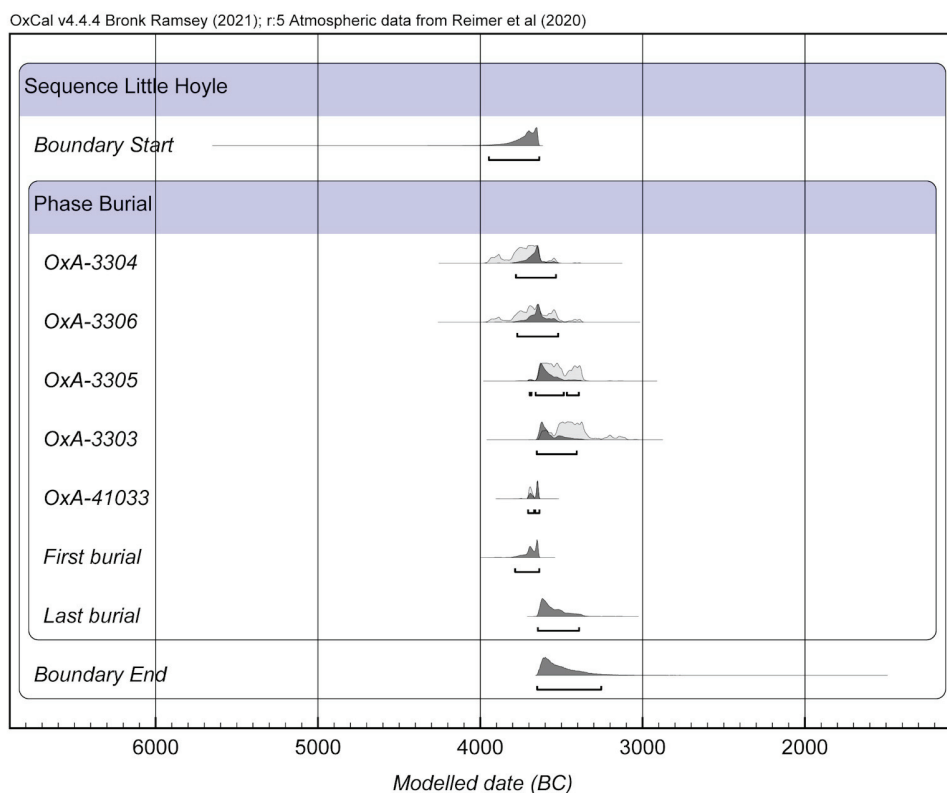


Figure 27. Calibrated and modelled date ranges for the five radiocarbon results from Neolithic human remains from the cave. Dates calibrated at 95.4% probability and modelled on the assumption that the burials represent a single phase of activity using OxCal 4.4.4.

The Neolithic material from Little Hoyle and Longbury Bank provides one of the most complete pictures of Early Neolithic funerary activity in a cave for British sites. The site provides a rare opportunity to discuss cave funerary practice in direct association with contemporary occupation. The evidence from the Longbury Bank excavations suggests that this was a hilltop occupation site, probably similar to the pre-enclosure phases at Clegyr Boia (Williams, 1953) and occupied at some point between the 37th and 35th centuries BC. Despite the lack of distinguishable house plans, the surviving postholes indicate that the site was likely to have been used as a settlement. The formal deposition of large numbers of pottery sherds and lithics in two of these postholes suggests a concern with regeneration and fertility (see Bruck, 2007, 79-80 for similar examples in a Bronze Age context) at the point at which the associated structures went out of use.

The human remains show that the burial rite itself was a protracted multi-stage process. To date, the best examples of occupation evidence associated with cave burial come from sites such as Broken Cavern, Devon (Berridge in Roberts, 1996, 203) or Chelm's Combe, Somerset (Peterson, 2019, 135-8) where midden material from settlements appears to have been deposited with the human remains. However, at Little Hoyle there is scant evidence of

Neolithic occupation debris in the cave. None of the pottery was discovered within the cave and there is little evidence of Neolithic domestic activity in the Holocene faunal assemblage. There appears to have been a clear separation between the world of the living above and the funerary rite in the cave. There was a primary phase to this rite over an extended period which removed the post-cranial remains, this stage may have taken place outside of the cave, at some location which has not been identified. This was followed by secondary burial of the articulated crania and mandibles in the main chamber of the cave. Following another period of time, sufficient to allow the mandibles to completely disarticulate, the crania alone were usually removed to a final place of burial. This detailed sequence allows us to understand the cranial burial rite which has been identified in British Neolithic caves (Peterson, 2019, 125-32) in more detail. Over multiple intermediary periods the body was becoming distilled to a single essential item, the crania. Reilly (2003, 140-3), has analysed a similar process of distillation for human remains from Early Neolithic chambered tombs on Orkney. This would allow the crania, in their final resting place, to represent the deceased individual as having completed a journey from the world of the living to their absorption into the world of the dead.

The early medieval period at Little Hoyle

The excavations at Little Hoyle generated a number of finds of early medieval date. These include pottery and glass and an exceptional Type 'G' penannular brooch, of 6th–7th century AD date that has become known as the Longbury Bank brooch, recovered from the excavation of the North Platform (Redknap, 1991, 32). All the finds from this work have been published in the wider context of separate work undertaken on Longbury Bank (Campbell and Lane, 1993).

Also within the chimney area of the cave is an enigmatic carving of a cross into the wall of the cave. This remains undated, and is interpreted by Campbell and Lane as most likely to have been incised in more modern times, possibly carved into the cave wall by Rolleston's team as a mark of respect after they had excavated the Neolithic human remains from below (Campbell and Lane, 1993, 65).

ACKNOWLEDGEMENTS

This is the final element of Stephen Aldhouse-Green's Palaeolithic Settlement of Wales Research Project to be brought to publication. This research successfully enhanced the awareness, understanding and archaeological datasets available for the Palaeolithic of Welsh caves. Stephen's research also touched on so much more than just the archaeology, forging new careers in many of the personnel involved with the project, created new teams, developed and supported the development of new techniques, new thinking and original research. There are so many who have contributed to this and to earlier papers, who have lived the Welsh Palaeolithic and learnt so much whilst sharing some fascinating days engaged with Stephen in caves over so many years.

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APPENDICIES

Appendices 1-6 are available online from the following URLs:

Appendix 1: Palynology of Trench 4 sediments.

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_1.pdf

Appendix 2: Location of flaked stone artefact finds.

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_2.pdf

Appendix 3: Prehistoric Pottery from Little Hoyle.

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_3.xlsx

Appendix 4: Faunal details from Little Hoyle

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_4.xlsx

Appendix 5: The Bird Remains, Little Hoyle

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_5.pdf

Appendix 6: Human mandibular fragments, Little Hoyle

https://ubss.org.uk/resources/procsupplement/30_2_133-204_appendix_6.pdf

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