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CLADDEDIGAETHAU MEWN OGOFÂU: PREHISTORIC HUMAN REMAINS (MAINLY) FROM THE CAVES OF WALES

by

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ABSTRACT

This paper presents 28 AMS ^{14}C determinations and associated stable carbon and nitrogen isotope measurements on human bone primarily from cave contexts in Wales, with a small number of additional cave and non-cave contexts in southwest England. While some of these dates have been previously published, the entire series was originally affected by a problem with the ultrafilters in use at the Oxford radiocarbon dating laboratory where they were analysed. The original dates were consequently all withdrawn in 2007, and for most new measurements have been made. The project was originally focussed on identifying Mesolithic and Neolithic human remains from Welsh caves in order to provide a chronological framework for an isotopic investigation of diet, and for the temporality of the use of caves for burial. Thus, the majority of the results reported here date to the Mesolithic and Neolithic, though human remains are also identified from the Bronze Age, Iron Age, and Romano-British periods. The results confirm the previously observed sharp shift towards the dominance of terrestrial foods in coastal locations at the start of the Neolithic, as well as supporting the use of caves for the deposition of human remains in the earlier Mesolithic and in the Neolithic, separated by an intervening gap of nearly two millennia suggesting no meaningful continuity in the practice.

INTRODUCTION

Caves in Wales are well known as burial places, ranging from the Palaeolithic to Romano-British times and beyond. This paper presents the results of a programme of radiocarbon dating on human remains from Welsh caves carried out some years ago, of which only some results have seen publication. The aims of the project were to identify Mesolithic and Neolithic human remains to provide a chronological framework for an isotopic study of palaeodiet, and for the use of caves for burial. As many of the caves in Wales are found along the south and north coasts, stable carbon and nitrogen isotope values obtained on the same collagen used for dating can provide information on the use, or non-use, of marine resources (cf. Schulting and Richards, 2002; Schulting *et al*., 2013). The project's second aim was to contribute to our understanding of the extent of the funerary use of caves in all periods, but particularly in the Neolithic as an alternative to the mortuary monuments – long barrows and chambered tombs – that often dominate discussions (Chamberlain, 1996; 1997; 2012; Peterson 2019; Schulting, 2007; 2016).

Initially, a total of 33 human bone samples was taken from 23 sites across Wales and southwest England. The great majority of sites, however, were from Welsh caves, comprising Cat Hole Cave, Eel Point, Gop Cave, Ifton Quarry, Mewslade Bay, North Face Cave (Ogof Rhiwledyn), Ogof Brân Goesgoch, Ogof Colomendy, Ogof Garreg Hir, Ogof-yr-Ychen, Pant-y-Wennol, Pitton Cliff Cave, Priory Farm Cave, Red Fescue Hole and Worm's Head Cave (Figure 1). A small number of samples was also taken from cave sites in southwest England, from Banwell Cave, Somerset (though see below), and Kent's Cavern, Happaway Cave and Neale's Cave, Devon. In addition to human remains from caves, the opportunity was taken to sample human remains of potentially earlier prehistoric date from Borth/Ynyslas, Prestatyn and Ty Gwyn Road in Wales, and from Constantine Bay in Cornwall. Dates were previously

Figure 1. *Map of Wales and SW England showing sites included in the project or mentioned in the text (basemap drawn by Libby Mulqueeny).*

available for human remains from Ogof-yr-Ychen and Worm's Head cave, in both cases yielding Mesolithic results (Schulting and Richards 2002; Schulting 2009). While a number of results have already been published elsewhere (Worm's Head Cave and Mewslade: Meiklejohn *et al*., 2011; Schulting, 2009; Eel Point: Schulting *et al*., 2005; Prestatyn: Schulting and Gonzalez, 2008), others have not and are presented here for the first time. Furthermore, as discussed below, some of the previously published dates have been re-measured due to a technical issue in the Oxford radiocarbon dating laboratory.

RADIOCARBON DATING AND THE ULTRAFILTRATION (UF) PROBLEM

A series of 33 ^{14}C determinations originally obtained by the project was withdrawn when a problem was recognised with the ultrafilters then newly introduced at the Oxford Radiocarbon Laboratory (Bronk Ramsey *et al*., 2000; 2004; Higham *et al*., 2006). Essentially the filters introduced small amounts of exogenous carbon into the samples, resulting in dates that were either too recent, or too old by up to some centuries. The fact that the effects were unpredictable meant that the full extent of the problem was not realised for some time (Bayliss *et al*., 2007; Brock *et al*., 2007; 2013). The issue affected dates in the ranges OxA-9361 to OxA-11851 and OxA-12214 to OxA-12236 (Bayliss *et al*., 2007, p. 21), all of which have been withdrawn (Higham *et al*., 2007) (Table 1). Many dates were affected alongside those in the project reported here. Some, but not all, have been re-analysed and the corrected date published.

In terms of this project, there are a small number of specimens for which insufficient sample remained for re-dating, and which, for various reasons, it was either not possible to re-sample, or it was decided to focus on alternative material. The entire process took some years to complete, as it was then without funding and the author had other commitments. While the original dates have been retracted, their broad period assignation is likely to be correct, since Holocene dates affected by the UF problem tend to be older by no more than a few centuries, but may also show no difference, or indeed be younger (Bayliss *et al*., 2007). The assignment of any that fall near a transitional period, of course, must be view with extreme caution – this was a problem affecting the interpretation of Fox Hole Cave, Derbyshire, for example, which was presented by Hellewell and Milner (2011) as rare evidence for the continuity in the use of caves for burial between the Late Mesolithic and Early Neolithic, but is almost certainly affected by the UF problem (Schulting *et al*., 2013). Withdrawn OxA- numbers are presented in Table 1 and discussed in the paper purely for comparison to the new dates (since a number have made their way into the literature), but are not calibrated.

This paper presents measurements made on 28 individuals (Table 2; with the addition of determinations from Worm's Head, Ifton Quarry, Ogof Colomendy and North Face Cave [Rhiwledyn] that were not part of the project, but have been included for completeness). An additional four samples, from Kent's Cavern (ulna, KC5), Worm's Head (scapula, NMC 2001.4H/36), Paviland (metatarsal, NHM EM.602) and Ogof Ffynnon Ddu (fibula, NMC 89.26H), failed to provide sufficient collagen for dating. It should be noted that the Middle Upper Palaeolithic humerus attributed – albeit cautiously (see Jacobi and Higham, 2011) – to Eel Point, Caldey Island, had already been re-dated (OxA-14164: 24,470 ± 110 BP) before the full extent of the ultrafilter contamination issue became recognised, simply because of the importance of the specimen and the possibility of a conservative being applied to the outside of the bone. This has been published previously (Schulting *et al*., 2005) and so is not further

discussed here. More detailed inventories of the human remains from most of the sites discussed here are on file with the author.

Table 1. *Retracted radiocarbon dates affected by contamination from the ultrafilters used in the dating process (see Brock* et al.*, 2007).*

Site	*Sample id.*	*Element*	*Age*	*Lab no.*	*^{14}C BP*	±	*$\delta^{13}C$*	*$\delta^{15}N$*
'Banwell Cave' *	NHM 44705	clavicle	adult	OxA-11020	427	29	-18.8	11.1
Borth/Ynyslas *	Aber. 2545	mandible	adult	OxA-10972	1176	35	-19.8	8.9
Eel Point, Caldey Island	SM 1840.2.1	humerus	adult	OxA-11015	24000	140	-19.1	10.3
Eel Point, Caldey Island	SM 1840.2.1	humerus	adult	OxA-11543	23370	110	-18.8	11.0
Cathole Cave	NHM M.114	cranium	adult	OxA-11023	4645	40	-20.3	9.2
Constantine Bay *	NHM 1958.17.6.1	cranium	adult	OxA-11019	2363	35	-20.0	9.2
Eel Point, Caldey Island	TM 1988.30.1	ulna	adult	OxA-10968	1771	34	-19.5	9.9
Gop Cave	47.97/96	mandible	adult	OxA-10645	4840	40	-20.3	9.2
Gop Cave	47.97/103	mandible	adult	OxA-10646	4570	45	-20.5	10.1
Gop Cave	19.259	cranium	adult	OxA-10644	4350	40	-19.6	11.0
Happaway Cave *	NHM 273.1	humerus	adult	OxA-11021	4891	36	-20.4	8.4
Ifton Quarry	NM 88.116.11M	femur	adult	OxA-X-101 8-32	4110	50	-20.5	7.9
Kent's Cavern	KC6	mandible	adult	OxA-11783	570	24	-17.7	
Mewslade Bay Cave	SM 1919.41.11	mandible	adult	OxA-11017	9385	45	-19.0	9.1
Mewslade Bay Cave	SM 1919.41.12	mandible	adult	OxA-11018	9235	50	-19.0	9.0
Mewslade Bay Cave	SM 1919.41.10	mandible	adult	OxA-11016	3153	36	-20.8	9.5
Neale's Cave	NHM EM.425	cranium	adult	OxA-11022	3466	33	-20.8	8.7
North Face Cave (Rhiwledyn)	NMGW Rhiw1	mandible	adult	OxA-10969	2878	37	-20.5	11.2
Ogof Brâ Goesgoch	2002.35H/1	1st metatarsal	adult	OxA-11779	3680	29	-20.3	
Ogof Colomendy	2001.H3	humerus	adult	OxA-11354	3475	37	-20.6	8.9
Ogof Garreg Hir	2002.34H/2	ulna shaft	adult?	OxA-11780	5085	30	-20.7	
Ogof-yr-Ychen	98.2H/1	tibia	adult	OxA-10616	8760	55	-14.6	15.1
Pant y Wennol	LLDMG 1990/5	cranium	adult	OxA-10971	4977	39	-20.2	9.7
Pitton Cliff Cave	2002.36H/1	calcaneous	adult	OxA-11781	4882	30	-20.2	
Prestatyn	4.903 RCS	R femur	adult	OxA-11125	5090	45	-19.2	9.9
Priory Farm Cave	09.18/101.4	mandible	adult	OxA-10647	4950	45	-20.6	9.2
Priory Farm Cave	09.18/101.5	mandible	adult	OxA-10648	2300	35	-19.9	9.2
Red Fescue Hole	2001.5H/4	fibula	adult	OxA-10649	4880	40	-19.9	10.1
Ty Gwyn Rd.	LLDMG 1997/216	cranium	adult	OxA-10970	1778	36	-20.3	12.3

Site	*Sample id.*	*Element*	*Age*	*Lab no.*	*^{14}C BP*	±	*$\delta^{13}C$*	*$\delta^{15}N$*
Worm's Head Cave	2001.4H/4	L scapula	adult	OxA-11171	10035	65	-18.9	12.0
Worm's Head Cave	WH 2	cranium	child	OxA-11129	9360	50	-18.6	11.4
Worm's Head Cave	WH 1	ulna	adult	OxA-11128	9450	50	-18.3	10.2
Worm's Head Cave	1924.6.35	femur	adult	OxA-11083	9420	55	-18.8	7.2

RESULTS

The AMS radiocarbon dating results are presented in this section, along with a brief summary of the sites separated regionally. All dates are calibrated in OxCal using the IntCal13 curve and presented at 95.4% confidence.

North Wales

North Face Cave (SH 8135 8269)

North Face Cave, also known as Ogof Rhiwledyn, is one of two small caves on the Little Orme near Llandudno, the other being Letterbox Cave (Dibble, 1997). J.D. Blore carried out the first known excavations of the cave in 1962–1976 (Blore, 2012; Davies, 1989a). There were few finds, and excavations stopped upon reaching a stalagmite floor up to 1 m thick in places. Among the finds was an amber bead (Davies, 1989a, fig. 8.4g), possibly attributable to the Bronze Age. Remains of ox, sheep and pig and roe deer were recovered, together with those of small carnivores and rodents; some of the fauna may be intrusive from recent times.

The excavations yielded the scattered and fragmentary cranial and postcranial remains from a minimum of four individuals, comprising an adult and three children, aged 4, 8-9, and 10-12 years. The adult mandible (provisionally labeled at the time of sampling as Rhiw1) originally gave a Late Bronze Age date of 2878 ± 37 BP (OxA-10616). When re-analysed the specimen returned a broadly comparable though slightly older date of 2979 ± 35 BP (OxA-16568: 1374–1057 cal BC), placing it in the late Middle Bronze Age. More recently, the right maxilla fragment of a child aged 10-12 was found in 2015, and a tooth from it radiocarbon dated to 1415–1228 cal BC (SUERC-62072: 3065 ± 36 BP) as part of a large ancient DNA project (Blore, 2017; Olalde *et al*., 2018). This may belong to the same individual represented by the mandible fragment of a child of similar age. The $\delta^{13}C$ and $\delta^{15}N$ values for the child are -20.9‰ and 10.8‰, respectively (Blore, 2017), comparable to those of -20.4‰ and 11.9‰ for the adult mandible. North Face Cave is located ca. 5 km east of the Great Orme copper mine, the main period of use of which has been placed at 1500–1300 cal BC (Timberlake and Marshall, 2013, p. 84), thus at least partly overlapping with the human dates.

Ogof Pant-y-Wennol (SH 8082 8161)

Compared to many of the others considered here, Ogof Pant-y-Wennol is a relatively large cave near the coast in North Wales, measuring 5.2 m wide by 8.6 m long with a present height of some 3 m at the entrance. It was first excavated by K. Mason and M. Davies in 1974-77, at which time a considerable quantity of human and animal bones were found in disturbed cave earth at the entrance; an MNI of six was estimated, including the remains of four adults

Site	*Sample id.*	*Element*	*Age/Sex*	*Lab no.*	*^{14}C BP*	±	*calibrated*		*$\delta^{13}C$*	*$\delta^{15}N$*	*C:N*	*Period*
Cathole Cave	NHM M.114	cranium	adult	OxA-16605	4675	39	3627	3365	-20.4	10.0	3.2	Middle Neolithic
Gop Cave	47.97/96	mandible	adult	OxA-22991	4414	30	3312	2918	-20.8	8.8	3.2	Middle/Late Neolithic
Gop Cave	47.9/103	mandible	adult	OxA-22992	4381	29	3090	2914	-21.4	9.9	3.3	Middle/Late Neolithic
Gop Cave	19.259	cranium	adult	OxA-22990	4357	30	3084	2903	-20.2	10.9	3.2	Middle/Late Neolithic
Ifton Quarry	NM 88.116.1M	femur	adult, M?	OxA-22995	4640	29	3516	3358	-20.7	8.2	3.3	Middle Neolithic
Ifton Quarry	NM 88.116.6	cranium	child	OxA-22994	4624	29	3511	3350	-21.2	9.7	3.3	Middle Neolithic
Ifton Quarry	NM 88.116.11F	femur	adult, F?	OxA-X-1018-31	4350	90	3345	2709	-20.4	10.7		Middle/Late Neolithic
Ifton Quarry	NM 88.116.2	cranium	adult, M?	OxA-23139	4178	28	2885	2666	-20.6	10.0	3.2	Late Neolithic
Kent's Cavern	KC5	ulna	adult	OxA-13132	1520	90	AD 440	640	-19.6	8.7	3.2	early Anglo-Saxon
Mewslade Bay Cave	SM 1919.41.12	mandible	adult, M?	OxA-19845	9235	40	8565	8311	-19.0	9.8	3.2	Early Mesolithic
Mewslade Bay Cave	SM 1919.41.11	mandible	adult	OxA-16604	9077	49	8420	8015	-19.0	9.1	3.1	Early Mesolithic
Neale's Cave	NHM EM.425	cranium	adult	OxA-12679	3512	37	1938	1744	-20.4	9.4	3.4	Early Bronze Age
North Face Cave	NMGW Rhiw1	mandible	adult	OxA-16568	2979	35	1374	1057	-20.4	11.9	3.3	Middle Bronze Age
North Face Cave	'NFC07151'	max tooth	child	SUERC-62072	3065	36	1415	1228	-20.9	10.8	3.3	Middle Bronze Age
Ogof Brân Goesgoch	2002.35H/1	1st metatarsal	adult	OxA-16532	3939	37	2566	2300	-20.2	10.9	3.3	Late Neolithic/Beaker
Ogof Colomendy	2001.H3	humerus	adult	OxA-16523	3518	35	1939	1747	-20.4	10.2	3.4	Early Bronze Age

Ogof Colomendy	no number		adult/adol	SUERC-66486	4408	33	3321	2915	-21.7	8.6	3.3	Middle Neolithic
Ogof Garreg Hir	2002.34H/2	ulna shaft	adult?	OxA-16612	5056	39	3961	3718	-20.9	9.5	3.2	Early Neolithic
Ogof-yr-Ychen	98.2H/1	tibia	adult	OxA-22987	8465	38	7421	7128	-14.5	15.2	3.2	Early Mesolithic
Pant y Wennol	2000.49H.233	cranium	adult	OxA-12810	4982	36	3933	3661	-20.3	7.8	3.2	Early Neolithic
Pant y Wennol	2000.49H.234	cranium	adult	OxA-12744	4962	32	3889	3656	-20.0	9.9	3.2	Early Neolithic
Pant y Wennol	2000.49H.235	cranium	adult	OxA-12745	4657	32	3520	3363	-20.5	8.7	3.2	Middle Neolithic
Pitton Cliff Cave	2002.36H/1	calcaneus	adult	OxA-16570	4837	38	3701	3526	-20.3	10.4	3.2	Early Neolithic
Priory Farm Cave	09.18/101.4	mandible	adult	OxA-22988	4631	31	3516	3352	-20.9	9.3	3.2	Middle Neolithic
Priory Farm Cave	PFC 99	mand. canine	adult	OxA-12746	2814	29	1050	860	-20.3	9.9	3.2	Late Bronze Age
Priory Farm Cave	09.18/101.5	mandible	adult	OxA-22989	2133	26	350	55	-20.5	9.1	3.2	Mid-Late Iron Age
Red Fescue Hole	2001.5H/4	fibula	adult	OxA-22993	4634	29	3515	3355	-20.5	9.9	3.3	Middle Neolithic
Ty Gwyn Rd.	LLDMG 1997/216	cranium	adult	OxA-16521	1901	34	AD 27	215	-19.8	12.1	3.4	Romano-British
Worm's Head Cave	2001.4H/4	L scapula	adult	OxA-13131	9920	160	10100	8860	-19.3	10.2	3.1	Early Mesolithic
Worm's Head Cave	WH 2	cranium	child	OxA-16607	9294	49	8615	8330	-19.0	10.8	3.3	Early Mesolithic
Worm's Head Cave	SM 1924.6.35	femur	adult, M?	OxA-19844	9255	45	8611	8328	-18.8	8.0	3.2	Early Mesolithic
Worm's Head Cave	WH04-70	tibia	adult	UB-6817	9030	45	8310	8000	-20.0	8.8	3.4	Early Mesolithic

Table 2. *Re-measured and new radiocarbon dates and stable isotope results, supplemented with additional dates on humans from the same sites (North Face Cave: Blore, 2017; Ogof Colomendy: Hankinson, 2016). Calibrated in OxCal 4.3 using IntCal13 and MARINE13 (Bronk Ramsey, 2019; Reimer* et al.*, 2013)*

and two infants (Davies, 1977a; 1989a; Dibble, 1993). Davies (1989a) provides additional detail, indicating that the human remains were found in two areas; both consisting of fissures between large slabs that may represent a primary burial site. Further work was undertaken by Tom Stone between 1979 and 1981, who excavated to a depth of over 2.5 m without hitting bedrock. While Davies (1989a) reported that a considerable amount of undisturbed deposits remain both in the cave and on the entrance platform, it is uncertain what remains today.

Figure 2. *Pant-y-Wennol adult cranium. (Llandudno Museum.)*
Photo: R.J. Schulting

Pleistocene faunal remains were recovered from the lower levels during the 1974-77 excavations, within a sticky red clay mixed with a loose, stony, yellowish-brown clay. The deposits seemed sterile below this layer. Above this 'Devensian' layer was a deposit of silty red clay containing sub-angular stones. Thin charcoal lenses and microlithic implements in this layer assign it to the Mesolithic. Lithic raw materials reportedly included both flint and black chert (Davies, 1989a, fig. 8.4a-d). Overlying the red silty clay was a stalagmite floor, covered in turn by a brownish cave earth showing disturbance by water, and containing abundant material of predominantly Neolithic age in terms of diagnostic finds (a leaf-shaped arrowhead, convex scraper, Ebbsfleet ware). This layer also contained scattered animal and human bones as well as flint debitage. Outside the main trench were two areas containing more structured deposits of human bone:

> Both were fissures or spaces between large slabs and were probably originally burial sites. The more complete one had evidence that the burial cavity had been filled with rubble, which included thin sheets of broken stalagmite, and covered with a slab of rock. In the other the bones had decomposed in air spaces or become cemented in stalagmite. (Davies, 1989a, p. 97)

Charcoal and microliths were encountered in the entrance of the cave and outside under an overhang, apparently sealed under a layer of stalagmite. Human remains together with finds from later periods were made in the disturbed 'cave earth' above this, some of which may have washed into the cave (Davies, 1989a). A leaf-shaped arrowhead and Neolithic Peterborough/Ebbsfleet pottery were also found. All finds were recorded and catalogued, with some on display at the Great Orme Copper Mines exhibit (or at least they were the last time the

author visited). Not specified as to layer (but possibly from 'Neolithic and later' levels) are four notched stone 'net sinkers' and an unspecified number of stone 'choppers' (Davies, 1977a).

Faunal remains recovered from the excavations include reindeer, woolly rhinoceros, deer, wild pig, ox, goat, sheep, fox/dog, and bird (noted as being possibly domestic fowl, in which case it would date to the Iron Age or later) (Davies, 1977a, 1989a; Dibble, 1993). Considerable quantities of marine shells were found in the site's upper levels, becoming less frequent with depth, possible reflecting the site's increasing distance from sea further back in time. Some unidentified fish remains are also mentioned.

The majority of the human remains have entered, via M. Davies, the collections of the National Museum Wales, but the Llandudno Museum retains a partial adult cranium (LLDMG 1990.5). The specimen includes the orbits, the frontal, and most of the parietals, but no occipital or temporals (Figure 2). Breccia is still adhering to the nasal passages and part of the inner vault. The limited degree of suture closure suggests that this is an older adolescent or young adult, probably female based on the absence of pronounced brow ridges, sharp orbits, and the gracile, rounded forehead. This cranium was originally dated to the Early Neolithic, 4977 ± 39 (OxA-10971). Unfortunately insufficient sample remained to re-analyse this specimen, the date for which has been withdrawn, but given its relevance to the project, three dates on crania held in Cardiff were substituted. These confirm burial activity in the Early (OxA-12810: 4982 ± 36 BP and OxA-12744: 4962 ± 32 BP) and Middle Neolithic (OxA-12745: 4657 ± 32 BP), with respective calibrated date ranges of 3933–3661, 3889–3635 and 3520–3362 cal BC. The $\delta^{13}C$ and $\delta^{15}N$ results for the three individuals average -20.3 ± 0.3‰ and 8.8 ± 1.1‰, respectively (Table 2), consistent with an entirely terrestrial diet.

Figure 3. *Ty Gwyn Road cranium, right lateral view. (Llandudno Museum).*
Photo: R.J. Schulting

Ty Gwyn Rd., Llandudno (SH 76 84)

A second specimen sampled at the Llandudno Museum (LLDMG 1997.216) was found in a garden along Ty Gwyn Road on the Great Orme. The sampled element consists of a partial calotte, with most of the frontal bone, about half of the parietals, and half the occipital bone (Figure 3). The occipital suture is still visible, but the others are largely obliterated, suggesting that this individual was of a fairly advanced age (40-50 years?). Sex is difficult to judge because of the specimen's incomplete state, but it may be male on the basis of the

moderate brow ridges and well-developed nuchal region. The bone noticeably more weathered than the Pant-y-Wennol remains, in keeping with its more exposed location in an open-air site on the Great Orme.

The cranium originally yielded a date of 1778 ± 36 (OxA-10970), suggesting a Romano-British attribution. Re-analysis provided an older result of 1901 ± 34 BP (OxA-16521: AD 27–215), placing it at the very end of the Iron Age or in the early Romano-British period. The $\delta^{13}C$ and $\delta^{15}N$ results of -19.8‰ and 12.1‰ suggest the possibility of some minor contribution of marine resources, which could introduce a small marine reservoir effect, perhaps making a very late Iron Age attribution more probable. Confirmation of this would need further analysis.

Ty Gwyn Road runs below the Iron Age hillfort of Pen-y-Dinas, which saw antiquarian investigation as well as an unpublished excavation by P. Sirrett in 1960 (Smith, 2011). Animal bone from the hillfort provided a date of 320–210 cal BC (Smith, 2011), pre-dating the human cranium presented here by some centuries, even given a small marine reservoir offset for the latter (which would be on no more than the order of a few decades based on the stable isotope values). But excavations at the hillfort also recovered Samian ware, and so it is entirely possible that the individual falls within the early Romano-British period.

Gop Cave SJ 0863 8008)

Gop Cave is found at an elevation of some 250 m at the end of a line of hills forming the east boundary of the Vale of Clwyd, near Prestatyn. The site complex actually consists of a large south-facing rockshelter, with a platform in front and a cave system behind. Some 30 m away is the large, enigmatic Gop Cairn, the center of which was investigated in 1886-87 by Boyd Dawkins but found to contain little (Boyd Dawkins, 1901; 1912). The rockshelter itself was excavated in its entirety by Boyd Dawkins in 1886 (Boyd Dawkins, 1901). As is typical for such sites in Wales, the deposits were found to be multi-period, with two lower layers containing abundant Pleistocene fauna, while the two uppermost layers contained wild and domestic fauna together with abundant charcoal and some coarse pottery. There is clearly the potential for mixing at sites such as this, and indeed the intrusion of Pleistocene fauna into later layers was noted in Boyd Dawkins' excavations.

Against the rear wall of the rockshelter Boyd Dawkins found a great quantity of jumbled human remains, largely held within a rectangular chamber constructed of limestone blocks, enclosing a space measuring some 4'6" by 5'4" (1.37 x 1.63 m). The mixed remains of a minimum of 14 individuals were reportedly found, many preserving a degree of articulation suggesting deposition as fleshed bodies, at least some of which were originally in a flexed position. The degree of disturbance may be explained by the addition of later interments, reminiscent of practices associated with earlier Neolithic chambered tombs. Associated with the burial chamber were fragments of pottery bearing herringbone designs characteristic of the Late Neolithic/Bronze Age, together with two jet sliders and a ground flint knife (Boyd Dawkins, 1901, p. 330-331). A number of leaf-shaped arrowheads found in the area over a period of years led to its being designated 'Hill of the Arrows' (E. Davies, 1949), and provide evidence of earlier Neolithic activity in the immediate vicinity of the rockshelter and cave.

Unfortunately, much of the material from Dawkins' excavations was dumped down a disused mine shaft in 1913 by the tenant farmer at Gop Farm, where the finds were being kept. Some material, however, escaped this fate, as a 1937 letter from the keeper of the Manchester Museum refers to the presence in their collections of human and faunal remains, as well as 'Neolithic B' pottery, from 'the cave' (E. Davies, 1949, p. 280). The human remains currently held in the Museum include four complete or nearly complete adult crania, as well as a child's

mandible and some adult postcranial remains, including a number of well-matched right and left long bones likely from the same individuals.

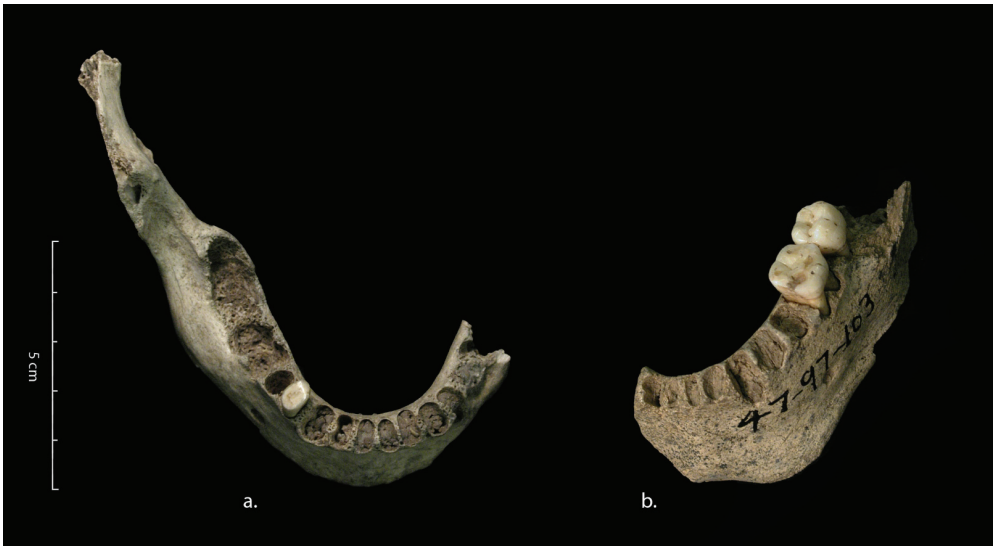

Figure 4. *Gop Cave mandibles (a: 47.97/96; b: 47.9/103) (National Museum Cardiff.)*
Photo: R.J. Schulting

The years 1908-14 saw the excavation of what became known as the North-West Cave, accessed by a passage at the back of the rockshelter that had been missed by Dawkins due to its being blocked by clay and stalagmite. The material from these excavations, carried out by Mr. J.H. Morris with the assistance of Mr. T.A. Glenn, is currently housed in the National Museum Wales, Cardiff. While excavating in the northwest cave and its two associated passages, Morris found the scattered and partial remains of at least six individuals, including two children. Although the floor of the cave was much disturbed by roof-fall, there was some indication that limestone slabs has been used to build low walls around some of the skeletons (E. Davies, 1949, p. 280-281). One of the passages led to a second, previously unknown entrance to the cave in the same cliff face as the rockshelter; it had been blocked up right to the roof with limestone slabs at some point in the past. This yielded a collection of wild and domestic fauna, an axe from the Graig Lwyd source (Group VII), and various worked flints. Mussel shells were also recovered – the modern coast is ca. 4 km distant. In contrast to the rockshelter, no pottery was found in the excavations of the cave and its passages. Encouraged and financially supported by the National Museum of Wales, Glenn in 1920-21 excavated part of the platform, left largely intact by Dawkins, in front of the rockshelter. He reported finding scattered human and animal remains, as well as a significant assemblage of microlithic tools in flint and chert, the latter leading Grimes (1951) to call Gop Cave one of the most important Creswellian sites in Wales. As supported by the dating programme (see below), the human remains were seen as intrusive into the level with the microliths.

Three individuals from Gop Cave held in Cardiff were originally sampled, with dates spanning the Early (NMC 47.97/96, OxA-10645: 4840 ± 40 BP) to Middle/Late Neolithic

(47.9/103, OxA-10646: 4570 ± 45 BP and 10.259, OxA-10644: 4350 40 BP). These have been withdrawn, with the new results falling much more consistently in the Middle Neolithic of the late 4th millennium BC (47.97/96, OxA-22991: 4414 ± 30 BP; 47.9/103, OxA-22992: 4381 ± 29 BP; and 10.259, OxA-22990: 4357 ± 30 BP) (Figure 4). In fact, and in contrast to the centuries of burial suggesting by the original determinations, the three new dates can be successfully combined to 3086–2919 cal BC (χ^2, df=2, T=1.8(5% 6.0)) using OxCal's R_Combine function. This is not to say that the burials represent a single event, and further dates on additional individuals would be necessary before a Bayesian model would be worthwhile. The $\delta^{13}C$ and $\delta^{15}N$ results for the three individuals average -20.8 ± 0.6‰ and 9.9 ± 1.1‰, respectively, and so are consistent with a largely or entirely terrestrial diet.

Ogof Colomendy (SJ 2020 6277)

Ogof Colomendy is one of a group of four caves in an inland location, some 5 km west of Mold in northeast Wales (the others being Orchid Cave, Lynx Cave and Maeshafn Cave). It was the subject of a brief excavation in 1976-77, and even the limited area opened yielded a large number of finds. The matrix, described as a loose brown cave earth containing sub-angular limestone fragments and archaeological material, was reportedly thoroughly disturbed by tree roots (Davies, 1977b; 1989a). The potentially rich platform has been left sealed under collapsed blocks. The only diagnostic find was that of a patinated, broken leaf-shaped point, that led to the supposition that the human remains might date to the Neolithic (cf. Davies, 1975, cited in Dinnis and Ebbs, 2013).

Davies (1989a, p. 99) reported the remains of an estimated minimum of three human individuals, together with the typical suite of domestic fauna: ox, sheep/goat, and pig. The remains of two dogs and a single red deer bone were also found. In an earlier report, Davies (1977b) noted some unusual features on the human remains: one mandible was said to have had two of its molars fractured in life, and the long bones all appeared as if they had been intentionally broken. He interpreted this as a mortuary practice involving ritual fracturing prior to interment. However, a reexamination by the present author indicates that all breaks are likely to have been made postmortem on dry bone.

An adult humerus (NMC 2001.H3) originally yielded a date of 3475 ± 37 BP (OxA-11354), suggesting an Early Bronze Age attribution. Re-analysis of the same specimen confirmed this, with a result of 3518 ± 35 BP (OxA-16523: 1939–1747 cal BC). While the $\delta^{13}C$ values are closely comparable (-20.4‰ vs. the original -20.6‰), the re-measured $\delta^{15}N$ value of 10.2‰ is somewhat higher than that of 8.9‰ in the original analysis. A recent evaluation of the site recovered fragmentary cranial and postcranial remains from a disturbed context, possibly relating to earlier excavations (Hankinson, 2016). A radicarbon date obtained on one of the human bones – possibly all from a single late adolescent or young adult – yielded a much earlier date of 4408 ± 33 BP (SUERC-66486: 3312–2915) indicating use of the cave for the deposition of human remains in the late Middle Neolithic (Hankinson, 2016).

West Wales

Ynyslas/Borth (SN 605 915)

A human mandible was found by groundskeeper Chris Grain washed up on the course of the Borth and Ynyslas Golf Club, just northwest of Aberystwyth, after a storm in early January of 1999. The golf course lies directly behind a part of the beach at Ynyslas that has remnant shelves of peat and the remains of a drowned forest visible at low tide. The same

stretch of beach has yielded red deer antlers and aurochs remains: in 1968 the nearly complete (except for the cranium) skeleton of an exceptionally large adult male *Bos primigenius* was found on Borth beach opposite the Grand Hotel (Taylor, 1984). The forest of the lower Dyfi estuary is thought to have become inundated by around 6700 cal BP. However, a red deer antler found on the beach at Borth yielded a much later date of 3890 ± 100 BP (OxA-3816) (Hedges *et al*., 1996).

Figure 5. *Mandible from Borth. (Ceredigion Museum).* **Photo: R.J. Schulting**

The mandible's ascending rami have been broken off; the tooth row is intact although all but three teeth have been lost post-mortem (Figure 5). The three right molars present are quite small: M1 is worn down to secondary dentine, with no enamel remaining; M2 is worn to an enamel ring; and M3 retains roughly 3/4 of its enamel. The surfaces of the teeth are eroded post-mortem. A possible abscess is present bucally at LM1, although erosion here makes it difficult to be certain. The mandible is relatively gracile, and so may be female.

The Borth mandible originally returned a date of 1176 ± 35 BP (OxA-10972), placing it within the medieval period of the late 1st millennium. This OxA number falls within the series of retracted dates, and was not resampled as it clearly lay outside the study's main period of interest. The date should be treated as broadly indicative only. As they appear to be less affected, the $\delta^{13}C$ and $\delta^{15}N$ results of -19.8‰ and 8.9‰, respectively, are probably acceptable, and indicate a largely or entirely terrestrial diet.

South Wales: Pembokeshire

Priory Farm Cave (SM 9789 0184)

Priory Farm Cave is located some 300 m west of Pembroke Castle on an arm of Milford Haven on the south side of the river. At some 9 km from the coast, the site is one of the few 'inland' locations in south Wales that has yielded prehistoric human bone (although the present tidal limit of the Western Cleddau reaches within several hundred metres of the cave). The cave entrance is c. 6 m wide and 2.5 m high, with a narrow winding passage extending some 30 m. There is a broad entrance platform of about 6m wide before a sharp drop to the tidal flats below.

Early excavations at the site are poorly documented, with no direct records available for the first known work carried out in 1906-07 by Style and Dixon, with the finds briefly summarised by Laws (1908). A later series of excavations reported by Grimes (1933) is largely based on secondhand accounts (Barton and Price, 1999). Near the entrance to an inner cave was found an adult female's skull and a child's (age ca. 7) maxilla; at the same level but at some horizontal distance from these remains was a small Middle or Late Bronze Age hoard

consisting of a saw with hoop, a chisel and a palstave, which were initially assumed to date the human bones (Grimes 1933). However, the same layer within the cave yielded a large amount of glacial and post-glacial fauna (cattle, horse, reindeer) as well as fragmentary human remains representing at least three individuals. Deeper laminated clays contained Pleistocene fauna, from which those in the higher Layer 2 likely derived (Grimes, 1933). Gravettian points and two Late Mesolithic microliths were also recovered (David, 2007). More recent excavations in 1999 at the entrance to Priory Farm Cave revealed a small shell midden ca. 10 cm thick, predominantly comprised of oysters and cockles with some limpets and scallops, and including some Bronze Age sherds. Four eroded human teeth in anatomical position, the surrounding bone having eroded away, were found at bottom of this midden (Barton and Price, 1999).

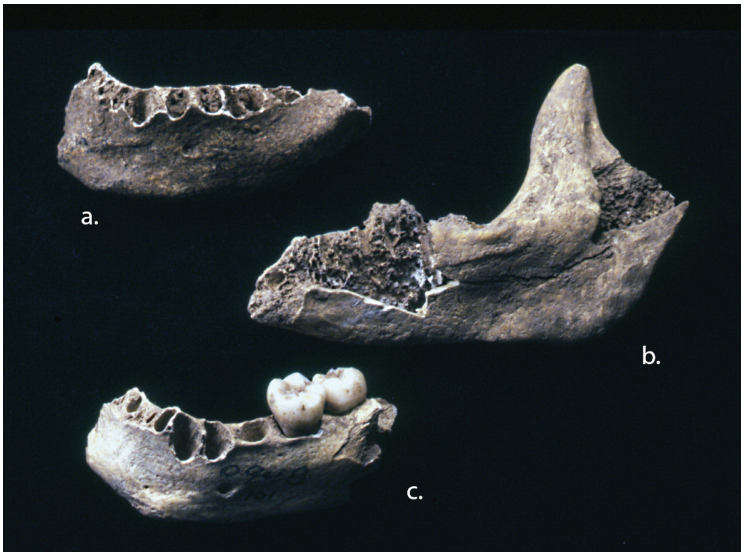

Figure 6. *Priory Farm Cave mandibles: a) 09.18/101.4; b) 09.18101.3 (not dated); c) 09.18/101.5. (National Museum of Wales)*
Photo: R.J. Schulting

Human remains curated at the National Museum Wales, Cardiff, present a minimum number of five individuals (four adults and one child) represented within the cave. Whether the teeth found in the midden outside the cave relate to any of these or to another individual is unknown.

Two adult mandibles from within the cave were initially chosen for AMS dating. One of these, a partial adult left mandible with teeth missing post-mortem (09.18/101.4), has been previously published as dating to the Early Neolithic, ca. 3910–3650 cal BC (OxA-10647: 4950 ± 45 BP) (Schulting and Richards, 2002, tab. 3) (Figure 6). The second mandible, that of a child aged ca. 12 years (09.18/101.5), returned an unpublished of date, 2300 ± 35 BP (OxA-10648), suggesting its attribution to the Iron Age. Both results have since been retracted, and are here replaced in turn by OxA-22988 (3516–3352 cal BC, 4631 ± 31 BP) and OxA-22989 (350–55 cal BC, 2133 ± 26 BP). In both cases the new results are significantly later than the original dates, though the discrepancy is larger for the Neolithic individual. The stable isotope results, in contrast, show only minor differences (see Tables 1 and 2), and indicate at most minimal use of aquatic resources despite the site's estuarine location. A new radiocarbon determination was obtained on a permanent mandibular canine (identified as 'PFC 99' only for the purposes of the table), one of the four teeth found at the bottom of the midden outside the cave (Barton and Price, 1999). This returned a Late Bronze Age date of 1050–860 cal BC (OxA-12746: 2814 ± 29 BP) that could be coeval with the bronze finds inside the cave. The $\delta^{13}C$ and $\delta^{15}N$ values of -20.3‰ and 9.9‰ are again consistent with an entirely terrestrial

diet, despite the site's location and presence of the shell midden; hence, whatever marine or estuarine foods were consumed must have formed only a minor part of the diet.

Ogof Garreg Hir (SR 9428 9387)

Ogof Garreg Hir is one of a group of cave sites along the Castlemartin Cliffs of South Pembrokeshire. Today, access is via a rope descent to a small entrance (1.2 m high by 0.5 m wide) 21 m down a sheer cliff 46 m high. The cave is some 4.5 m deep, of which the first 2.5 m were excavated by Davies in 1972, 1974 and 1977 (Davies, 1973; 1978; 1989b). The matrix is described as a moist reddish-brown cave earth with sub-angular stones. Any stratification has been destroyed by storm-wave action; a layer of stalagmite inferred from remnants against the east wall has otherwise completely eroded away. A worked bone point (an awl?) and a patinated flint blade 8.7 cm long were found (Davies, 1989b, fig. 7.2), as well as a backed bladelet. Jacobi (1980) attributes the flint tools to the later Mesolithic (post-8500 BP). Associated skeletal remains consisted of two human bones and faunal remains representing red deer, roe deer, wolf, pig, hare, fox and bird. The great variety of faunal remains from such a small cave led Davies (1989b, p. 81) to suggest that a much larger complex once existed seawards of the surviving cave.

The two human elements attributed to Ogof Garreg Hir in the National Museum Wales, Cardiff, are an immature left calcaneus and the shaft fragment of a left ulna of a probable adult. The left ulna (2002.34H/2) originally yielded an Early Neolithic date of 5085 ± 30 BP; in this case, this date has been confirmed by the re-analysis, giving a result of 3961–3718 cal BC (OxA-16612: 5056 ± 39 BP). The stable isotope results are also closely comparable. As is demonstrably the case for a number of Welsh cave sites, there appears to be no association between the material culture and the human remains.

Ogof Brân Goesgoch (SR 9432 9386)

This is the second of a group of inaccessible cave sites on the Castlemartin Cliffs, not far from Ogof Garreg Hir. Three human extremity bones were noted in 1977 after rabbit burrowing activities (Davies, 1989b). These sites are on the Ministry of Defence range, and the cliffs provide important bird-nesting locations and so are difficult to access.

The presence of three human metapodials in the National Museum Wales, Cardiff, was confirmed by the author; four elements labeled as 'sheep/goat' are also attributed to the site. A human first metatarsal (2002.35H/1) originally provided an Early Bronze Age date of 3680 ± 29 BP (OxA-11779). In this case re-analysis of the same specimen yielded a significantly older date of 3939 ± 37 BP (OxA-16532: 2566–2300 cal BC), placing this individual in the Chalcolithic. Again, the two sets of stable isotope results are similar.

A microlith and additional human and faunal remains were apparently found subsequently, but the current whereabouts of this material is unknown.

Ogof-yr-Ychen (SS 1464 9691)

Ogof-yr-Ychen is one of a series of caves and rockshelters on Caldey Island yielding Mesolithic, Neolithic and later human remains. Excavations by Brother van Nedervelde and Melvyn Davies recovered Pleistocene fauna remains, as well as later material (van Nedervelde and Davies, 1982; 1986). A previous dating programme suggested that the relatively large assemblage of human remains from the site might date entirely to the Mesolithic (Schulting and Richards, 2002).

As part of an ancient DNA study, two petrous bones were radiocarbon dated, since this element has been shown to have a greater likelihood of having higher yields of endogenous

Sample id	*Element*	*Age*	*Lab code*	*14C yr*	±	$\delta^{13}C$	$\delta^{15}N$	*C:N*	*Source*
98.2H/1	tibia	adult	*OxA-10616*	*8,760*	55	-14.9	14.2	3.3	Schulting & Richards 2002
98.2H/1	tibia	adult	OxA-22987	8,465	38	-14.5	15.2	3.2	this paper
98.2H/55	petrous	adult	UBA-32282	8,597	54	-15.2	15.5	3.2	Brace *et al*. 2019
98.2H/179	mandible	adult, M?	OxA-7741	8,415	65	-16.9	12.9	3.2	Schulting & Richards 2002
98.2H/142	os coxa	adult, M	OxA-7690	8,280	55	-15.2	15.6	3.2	Schulting & Richards 2002
98.2H/145	os coxa	adult, F	OxA-7691	8,210	55	-14.4	15.0	3.0	Schulting & Richards 2002
98.2H/54	cranium	adult, M	OxA-7742	7,880	55	-15.7	15.6	3.8	Schulting & Richards 2002
98.2H/14	mandible	adult	OxA-2574	7,020	100	-14.9	15.4	3.1	David 2007; Schulting & Richards 2002
98.2H/276	petrous	adult	UBA-32283	4,819	42	-19.5	10.1	3.3	Brace *et al.* 2019

Table 3. *AMS ^{14}C determinations from Ogof-yr-Ychen, Caldey Island. Withdrawn date is in italics.*

DNA. While one sample (NMC 98.2H/55) returned the expected Early Mesolithic result (UBA-32282: 8597 ± 54 BP, 7735–7541 cal BC), in keeping with other human dates from the site (Table 3), the second (98.2H/276) was dated to the Early Neolithic (UBA-32283: 4819 ± 42 BP, 3695–3520 cal BC) (Brace *et al*., 2019, suppl. info.). This is less surprising than the unexpected presence of human cranial remains at the otherwise Early Mesolithic cemetery of Aveline's Hole (Schulting *et al*., 2019), since it has long been suggested (David, 2007 [1990]) that Ogof-yr-Ychen may once have been connected to Ogof-yr-Benlog, which has provided an earlier Neolithic date (OxA-7743: 4660 ± 45 BP) on a human vertebra (Schulting and Richards, 2002, tab. 1).

The $\delta^{13}C$ and $\delta^{15}N$ results strongly support the previously observed pattern of a marked contribution from marine resources in Mesolithic diets on Caldey Island (Schulting and Richards, 2002), with averages of -15.3 ± 0.9‰ and 15.0 ± 1.0‰ for seven measurements (though note that there may be some duplication of individuals represented), in contrast to a largely terrestrial diet in the earlier Neolithic individual at the site (-19.5‰, 10.1‰). There is, however, the possiblity of a small contribution of marine foods in the diet of this individual.

South Wales: Gower Peninsula

Worm's Head Cave (SS 3836 8769)

Worm's Head Cave is sited in what is today a very dramatic setting on the southern extremity of the Gower peninsula. The first known excavations were by E.C. Cunnington in the early 1910s, followed by excavations by Riches and Northwood in the 1920s (Riches 1923-24). Finds included human remains as well as bear, wolf, fox, cat, reindeer and bird, and possibly domestic dog (David, 2007; Davies, 1989b; Schulting 2005a). Some of the fauna, together with a rhyolite blade found in a more recent examination of the spoil, suggests use of the cave in the Upper Palaeolithic (Davies, 1989b). Significantly, the layer with the human remains is noted as being clearly separated from the Pleistocene bone layer, which overlay the bedrock.

A radiocarbon date of 8800 ± 80 BP (OxA-4024) obtained on an adult human right ulna (Hedges *et al*., 1996) indicated the presence of Mesolithic human remains, making it the focus of a project culminating in small-scale test excavations at the site in 2004 (Schulting, 2005a; 2008; 2009). The ulna is part of a collection of fragmentary human bones and mammalian fauna, much of it cemented in breccia, collected in 1967 by G. Cooper from the cave floor and from fallen blocks of matrix. In addition to re-sampling the ulna for palaeodietary analysis, a child's fragmentary cranium in the NHM was sampled. The presence of a second individual is also indicated by two scapulae of considerably different size (the smaller of the two possibly belonging with the child's cranium). The single human element presently in the Swansea Museum consists of the mid-shaft section of an adult left femur (1924.6.35). The linea aspera is pronounced, and the element in general exhibits a considerable degree of robusticity, and is likely to be that of a male. Some poorly preserved human remains and flintwork of a Mesolithic character attributed to Worm's Head are also present in Oxford's University Museum. Work on this collection is ongoing.

Despite the UF issues, it is clear that all the dated humans from Worm's Head Cave consistently fall within the Early Mesolithic (Tables 1-3). The three re-measured determinations are all later by between ca. 70 and 165 ^{14}C years than those affected by the UF problem (Table 4). The most notable discrepancy however, is between the previously published result for WH1 (OxA-4024: 8800 ± 80 BP) and the withdrawn date on the same specimen affected by the UF problem (OxA-11128: 9450 ± 50 BP). Unfortunately insufficient sample remained for WH1 to permit its re-analysis: it may be suggested that the specimen's true date probably lies between

the two estimates. The large error term of ±160 years on the re-measurement of an adult scapula (2001.4H/4) is due to the small sample size, and hence increased uncertainty. Nevertheless, it is clear that the individual represented by this specimen can be placed at the very beginning of the Holocene, in the period 10100–8860 cal BC (OxA-13131: 9920 ± 160 BP). An additional determination of 8310–8000 cal BC (UB-6817, 9030 ± 45) was obtained on an adult tibia recovered during the most recent investigations at Worm's Head in 2004 (Schulting, 2005a).

Taking into account the presence of at least one child, and the differences in the dates obtained, at least four individuals – three adults and one child – must be represented in the sampled remains from Worm's Head.

Mewslade Quarry Fissures (SS 42442 87526)

Mewslade, just south of Rhossili, hosts a series of small caves and a larger cave system. The latter is entered through Mewslade Quarry Fissures, located at the upper end of the slade (a local term for a dry valley) leading down to Mewslade Bay. Early investigations by Lieutenant-Colonel E.R. Wood, an active antiquarian on Gower, yielded the remains of six or seven individuals from a narrow fissure, reportedly aged 'from 60 or 70 down to 3 or 4 years' (Busk 1861, p. 174; cf. Falconer, 1868, p. 594), including a nearly complete cranium (Figure 7). The 'ossiferous fissure' has been equated with the Mewslade Quarry Fissures by Allen and Rutter:

> In the middle of the last century, Colonel Wood found a cranium and bones of six or seven individuals in an "ossiferous fissure" in a limestone quarry at Mewslade. Unfortunately little is known of this discovery and we have been unable to ascertain the present whereabouts of these remains. The probable site of this "fissure" is in the small disused quarry alongside the path leading down to the bay, on the western side of Mewslade... (Allen and Rutter, 1984, p. 35).

While the inner portions of the cave system still survive, and are used by recreational cavers, the original entrance/s, along with any archaeology, were destroyed by quarrying in the nineteenth century (Figure 8). Small-scale test excavations led by the author in 2004 did not identify evidence for any remaining archaeological deposits, though investigation was hindered by the historic use of the main surviving chamber for the disposal of rubbish (Schulting, 2005a).

There are a number of other small caves further along the same slade, the most important of which is known as Mewslade Cave (SS 42234 87316), located three-quarters of the way down the slade, on its eastern side. Finds attributed to antiquarian excavations in this cave include unspecified Holocene fauna, a backed flint microlith and flint debitage, a possible worked bone object, and 'iron scoriae' (Rutter, 1948, p. 33). Among a small number of finds presented to Swansea Museum by Mr. E.C. Cunnington in 1914 (with further material arriving in 1919 from Cunnington's father following his son's death in the Great War; Cunnington, 1919-20) is a backed flint microlith (SM 1919.41.1) that may be that mentioned as coming from the cave, with 'E. Cunnington' written in pencil on one side and 'midden' on the other side. There is also what appears to be a Mesolithic flint pick (ca. 13 cm long). Representing later periods are a coarse rimsherd and iron slag. The Swansea Museum documentation accompanying the material from the site suggests that the very partial remains of three human skeletons held in their collections were found in this cave, but the source of this information is not

clear. Cunnington's excavations in Mewslade long postdate the original discovery of human remains in the Quarry Fissure.

The human remains attributed to Mewslade were first examined by the author at the Swansea Museum in July 1999. These include three incomplete adult mandibles (Figure 9). The first specimen (SM 1919.41.10) consists of the left half of a mandible, with the canine, premolars and first two molars in place. The molars in particular are quite small, and the mandible could belong to a female. M1 is worn to an enamel ring, and the cusps of M2 are worn flat but with only small spots of dentine exposed. M3 had probably erupted, but there is some damage to the tooth row distally. The appearance of this specimen differs substantially from the other two mandibles, having a darker patina. No teeth are present on the second mandible (SM 1919.41.11); the element is somewhat eroded, but was certainly largely if not entirely edentulous at the time of death (and therefore an older adult), although possibly some anterior teeth remained. There is some 'cave earth' still adhering to the specimen. The third mandible (SM 1919.41.12) is quite large and robust, and could belong to a male. The left ramus is absent. While most of the tooth row is intact, although in places eroded, the only teeth still present are the two fourth premolars (the others lost pre-mortem). The element likely belongs to an older individual (>40?), as both premolars are worn down to dentine only.

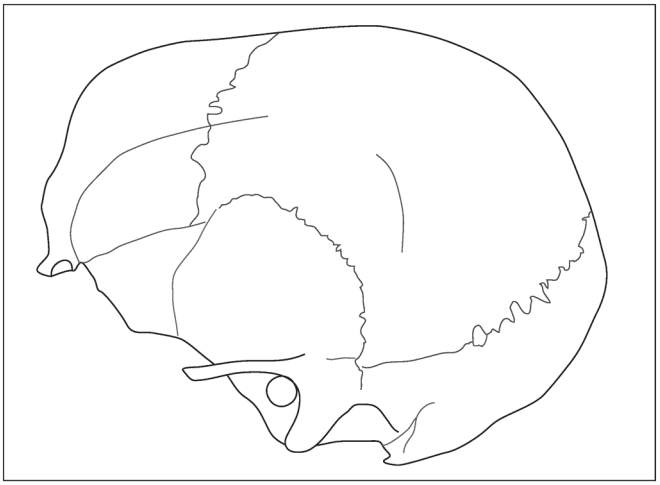

Figure 7. *Left lateral view of adult probable female cranium from Mewslade Quarry Fissures, recovered by Col. Wood before 1861.*
After Busk, 1861, Plate V, fig. 5.

A portion of a right maxilla may belong to the same individual as represented by SM 1919.41.12, but it may also represent a forth individual. The element was not sampled as it is quite fragile and the potential for damage seemed too great. The limited postcranial remains include two adult left ulnae, a thoracic vertebra, the distal third of a radius, and a fragment of the petrous portion of the temporal bone.

Two of the three mandibles (SM 1919.41.11 and SM 1919.41.12) initially yielded Early Mesolithic dates that were confirmed when re-analysed. While the new date for SM 1919.41.11 was more recent by ca. 300 ^{14}C years, an identical result was obtained for SM 1919.41.12 (see Table 4). Finally, the left mandible fragment (SM 1919.41.10) provided a previously unpublished date suggesting an attribution to the Middle Bronze Age (OxA-11016: 3153 ± 36 BP). This result has been withdrawn and, as it lay outside the project's main period of interest, the specimen has not been re-dated.

Some doubt has previously been expressed regarding the attribution of this collection of human remains to Mewslade, with the alternative possibility of Worm's Head being proposed (Schulting, 2009). This was in part because of Riches' (1923-24) account of recovering human remains there, said to have been gifted to the precursor of the Swansea Museum, the

Royal Institution of South Wales (RISW), but not identified in their collections, nor indeed in the Worm's Head collections held in other museums. As noted above, the remains are linked in Swansea Museum's records with E.C. Cunnington's excavation at Mewslade Bay Cave, but no mention of human remains is found in his own accounts, including that in the annual report for 1919-20 to the RISW, listing the finds that had been presented to the Museum (Cunnington 1919-20, p. 14). It is very unlikely that highly recognisable human mandibles would not have been remarked upon had they been recovered. Thus, Mewslade Bay Cave can probably be ruled out. An attribution to Mewslade Quarry Fissures is plausible, given that human remains were by all accounts recovered there in the mid-nineteenth century, but there is no clear trail leading to the RISW that would secure such a provenance. Moreover, in the section quoted above, Allen and Rutter (1948) specifically state that the whereabouts of the human remains from that site were unknown, despite efforts made to locate them.

Figure 8. *Mewslade Quarry. The two surviving entrances into the cave system can be seen on the right side of the image Figure 8. Mewslade Quarry. The two surviving entrances into the cave system can be seen on the right side of the image*.

Photo: R.J. Schulting

The case for Worm's Head is that the material recovered in Riches excavations included human remains, possibly including a mandible, that were reportedly deposited in the RISW (Riches 1923-24). Yet, at present there is only a single adult femur (1924.6.35) attributed to the site, yielding a similar radiocarbon date to those obtained on two of the Mewslade mandibles (Table 4). That being said, if the mandibles and other human remains were from

Riches' excavations at Worm's Head, why do they not share the same accession? To complicate matters further, Cunnington also excavated on Worm's Head prior to 1917, though no mention is made of human remains being recovered. As matters stand, the attribution of the human remains in the Swansea Museum is unlikely to be definitively resolved unless further documentation comes to light. It is likely, however, that the material does derive from either Mewslade Quarry Fissure or Worm's Head.

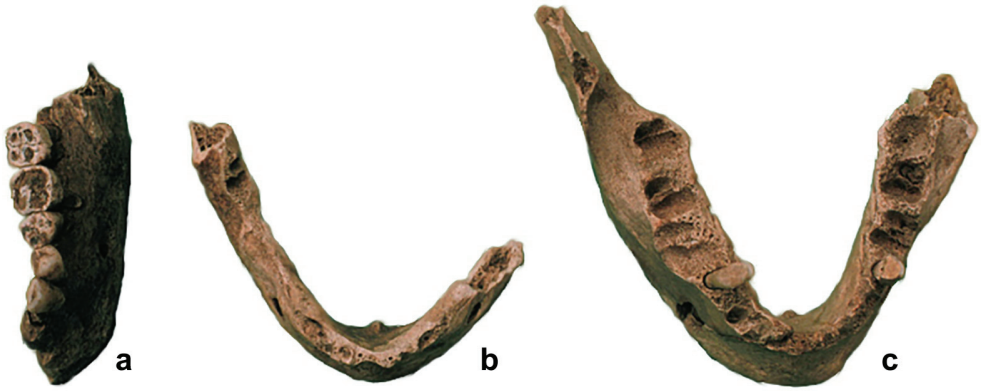

Figure 9. *Mandibles from Mewslade Quarry Fissure or Worm's Head held in the Swansea Museum (a: 1919.41.10; b: 1919.41.11; c: 1919.41.12).*

Photo: R.J. Schulting

Five dates from Worm's Head and Mewslade published in Schulting (2009) have now been withdrawn (OxA-11017, 11018, 11083, 11128 and 11129). Both the withdrawn and most of the newer dates also appear in Meiklejohn *et al*. (2011). The calibrated dates presented in Table 2 do not include any marine reservoir correction for Worm's Head/Mewslade. The slight elevation in $\delta^{13}C$ values here (-19.2 ± 0.4‰, n = 6) compared to later Holocene humans is consistent with other Early Holocene human and terrestrial faunal values; indeed, similar $\delta^{13}C$ values were obtained at the inland Early Mesolithic cemetery of Aveline's Hole, Somerset (-19.6 ± 0.5‰, n = 14; Schulting *et al*., 2019). This is interpreted as the result of environmental factors rather than any detectable contribution of marine foods. The relatively low $\delta^{15}N$ values (9.4 ± 1.0‰, n = 6) support the lack of any significant consumption of fish or seal mammals in the diet. While Worm's Head Cave is today located directly on the coast, and Mewslade Quarry is within 500 m, in the 8th millennium BC, the sea would have been some 30 m lower, placing the both sites 20 km or more away from the contemporary shoreline (Heyworth and Kidson, 1982; Schulting, 2009).

Pitton Cliff Caves (SS 4251 8754)

Pitton Cliff Caves lie in a small sycamore wood on private property, along the path leading down to Mewslade. The main entrance is a rockshelter facing slightly southwest (Davies, 1989b; 1989c). An apparent passage at the back of the shelter had been blocked, perhaps recently against foxes. Upon removal of the blocking, archaeological deposits were encountered at 20 cm depth. A limited investigation by Davies revealed mussel shell filled with clay and traces of stalagmite, a hacked bone fragment (small ox-size) and a human left

Sample id	*Element*	*Age*	*Lab code*	*^{14}C yr*	±	*$\delta^{13}C$*	*$\delta^{15}N$*	*Lab code*	*^{14}Cyr*	±	*$\delta^{13}C$*	*$\delta^{15}N$*
Worm's Head												
2001.4H/4	scapula	adult	OxA-13131	9,920	160	-19.3	10.2	*OxA-11171*	*10,035*	*65*	-18.9	12
WH1	ulna	adult	OxA-4024	8,800	80	-18.8	-	*OxA-11128*	*9,450*	*50*	-18.3	10.2
WH2	cranium	child	OxA-16607	9,294	49	-19	10.8	*OxA-11129*	*9,360*	*50*	-18.6	11.4
1924.6.35	femur	adult	OxA-19844	9,255	45	-18.8	8.0	*OxA-11083*	*9,420*	*55*	-18.8	7.2
WH04-70	tibia	adult	UB-6817	9,030	45	-20	8.8					
'Mewslade'												
1919.41.11	mandible	adult	OxA-16604	9,077	49	-19	9.1	*OxA-11017*	9,385	45	-19	9.1
1919.41.12	mandible	adult	OxA-19845	9,235	40	-19	9.8	*OxA-11018*	*9,235*	*50*	-19.0	9.0

Table 4. *Early Mesolithic AMS ^{14}C determinations from Worm's Head and 'Mewslade' (note that there is uncertainty as to the provenance of the Mewslade remains, which may derive from Worm's Head Cave). Withdrawn dates are in italics.*

calcaneus 79 mm long with patches of stalagmite. There are other small caves in same c. 10 m high cliff face. Mewslade Valley spring is only 500 m away (other fresh water is scarce on Gower as it sinks underground). Attempts by the author to investigate what looks like a promising site in 2012 met with refusal of access by the landowner.

The human calcaneus (2002.36H/1) collected by Davies originally returned a result of 4882 ± 30 BP (OxA-11781) indicating an Early Neolithic attribution. This was confirmed by its re-measurement, yielding a very similar date of 4837 ± 38 BP (xA-16570: 3701–3526 cal BC). The $\delta^{13}C$ and $\delta^{15}N$ values of -20.2‰ and 9.5‰, respectively, provide no evidence for any detectable consumption of marine resources, despite the site's location within a few hundred metres of the coast at Mewslade Bay.

Red Fescue Hole (SS 4266 8678)

Red Fescue Hole is one of a series of largely unexplored cave sites remaining on Gower (Davies, 1986a; 1986b; 1989b). It is accessed through a small archway, 2 m wide by 1 m high. Two human bones, an adult fibula diaphysis and a left scapula, were found during clearance of rubbish at the entrance, together with a flint implement. The passage reportedly continues for at least 2 m before the deposits meet the roof, and the cave was considered by Davies (1989b: 87) to hold great archaeological potential.

The fibula (2001.5H/4) was initially dated to ca. 3760–3540 cal BC (OxA-10649: 4880 ± 40 BP) and previously published in Schulting and Richards (2002, table 3). This OxA-number falls within the series affected by the ultrafiltration problem, and so has been withdrawn. The new result on the same specimen falls some centuries later in the Middle Neolithic, 3515–3355 cal BC (OxA-22993: 4634 ± 29 BP). The re-measured $\delta^{13}C$ value of -20.5‰ suggests even less use of terrestrial resources than the originally reported value of -19.9‰. The two sets of $\delta^{15}N$ values are closely comparable (9.9‰ vs. 10.1‰ in the original).

Cathole Cave (SS 5376 9001)

Cathole Cave is of great interest since it is one of the few 'inland' sites in the study area that has yielded human remains of potentially Mesolithic age. No record exists of the stratigraphy within the cave. Early excavations in the nineteenth century recovered what have been tentatively identified as three fragmentary Upper Palaeolithic 'Font Roberts' points, as well as Mesolithic and later material (Jacobi, 1980; Walker *et al*., 2014). Similarly, both Pleistocene and Holocene fauna are well represented. Human remains found in the nineteenth century excavations by Col. E.R. Wood include two human skulls (crania and mandibles) and some postcranial

Figure 10. *Adult cranium (M.114) from Cathole Cave, left lateral view (National History Museum, London).*
Photo: R.J. Schulting

elements from near the surface inside the cave; the location of the two skulls within the cave were marked on a sketch plan by Vivian (1887, reproduced in Nash and Beardsley, 2013, fig. 6). Once thought to be of Bronze Age date (McBurney, 1959), at least one individual has been dated to the earlier Neolithic.

Human remains from the site are to found both in the National Museum Wales, Cardiff, and in the Natural History Museum, London. The majority of the material is in the NHM, where substantial portions of two skulls are found, at least one of which clearly belongs to a younger adult male (aging by the mandibular and maxillary dentition) (Figure 10). The second skull is from a substantially older individual based on the degree of dental attrition seen on the mandible (no maxilla survives) (assuming the partial mandible does match the partial cranium, which is less certain in this case, in contrast with the young adult male). This clearly matches the description from McBurney's excavations. Less certain is the provenance of the single element, a femoral head, currently in National Museum Wales, Cardiff.

One of the adult crania was sampled (NMH M.114). In this case, the new determination of 4675 ± 39 BP (OxA-16605: 3627–3365 cal BC) is statistically indistinguishable from the withdrawn result of 4645 ± 40 BP (OxA-11023), highlighting the unpredictability of the offset introduced by the contaminated ultrafilters (Brock *et al*., 2013). Similarly, the new $\delta^{13}C$ and $\delta^{15}N$ values of -20.4‰ and 10.0‰, respectively, are broadly comparable to those of -20.3‰ and 9.2‰ originally obtained. The result is a particular interest in terms of its overlap with the series of radiocarbon dates from the classic Cotswold-Severn tomb of Parc le Breos Cwm (Whittle and Wysocki, 1998), located only a few hundred meters from, and within site of, Cathole cave (see Schulting, 2007, fig. 6). The new, correct date appears in a recent discussion of the site by Walker *et al*. (2014, p. 162).

South-east Wales

Ifton Quarry (ST 464 884)

Human remains were recovered from a ledge during limestone extraction at the Ifton Quarry near Newport in 1908 (Anwyl, 1909; Knowles, 1911). The highly fragmentary material consists of crania and postcrania, the latter including small elements such as phalanges and ribs, although these are poorly represented relative to the crania and larger postcranial elements. This is most likely a result of how the material was collected, and, on the basis of the presence of the smaller elements, it seems probable that at least some complete bodies were originally present. Little detailed information is available on the

Figure 11. *Posterior view of Ifton cranium (88.116.2) showing a small healed depressed fracture (Newport Museum and Art Gallery).*

Photo: R.J. Schulting

disposition of the remains when they were found, other than that '[t]he skulls were well hidden behind and the bones were all laid out in front' (Knowles 1911, p. 9).

Based on the extant crania, six individuals are represented, including four adults (two probable males and two probable females) and two older children or young adolescents. None of the postcrania equal this MNI. There are four humeri, and a number of femur fragments; both of these elements support the presence of both males and females.

While only a single individual was originally sampled and dated (Table 1), the re-analysis involved three samples, yielding two Middle Neolithic dates in the second half of the 4th millennium BC, and another spanning the late 4th to early 3rd millennia. This specimen had a low collagen yield of less than 1%, resulting in a larger error term than usual (± 90 years) and hence the use of a laboratory code beginning 'OxA-X' to recognise the lower confidence in this result. Note that in this case the estimate for the re-dated individual (NMAG 88.116.1M) is ca. 500 years older than that originally obtained. A fourth date was subsequently obtained, as part of a separate project on Neolithic violence, on the cranium of an adult probable male (NMAG 88.116.2), exhibiting a probable small healed depressed fracture on the rear right parietal (Figure 11). This returned a Late Neolithic date of 2885–2666 cal BC (OxA-23139: 4178 ± 28 BP).

South-west England

Happaway Cave, Torquay, Devon (SX 921 641)

Happaway Cave lies in the southwest slope of a Devonian limestone hill bounding the main street of Victorian Torquay, some 61 m above modern sea level (just NW of Kent's Cavern). Discovered by quarrymen in 1862, it was 'completely' excavated over the next few years by William Pengelly (1885), at which point its dimensions were recorded as 46 ft long, by 10-15 ft wide and some 10 ft high (14 x 3.05/4.57 x 3.05 m). Three layers were observed:

> Layer 1: surface to 6" - fine, friable earth, light brown, dry, with bones and charcoal.
> Layer 2: 6-24" - moist, tenacious earth, dark, some rounded but mainly angular stones, with bones and charcoal.
> Layer 3: below 24" - coarse reddish, sandy earth; more numerous stones with occasional limestone blocks and pieces of stalagmite (which do not appear to have comprised part of a complete floor layer); bones and charcoal occur but are less common.

Faunal remains noted include some marine shells, a single fish vertebra and a small number of bird bones, but are otherwise dominated by terrestrial species, including numerous badger bones, and those of deer, fox, pig, sheep, hare, rabbit, and various small rodents. The presence of a small number of teeth of bear, rhinoceros and hyæna indicates a Pleistocene component, but most of the fauna clearly fits within the Holocene. Evidence of modern rodent nesting was also found.

Cultural material included relatively abundant charcoal, as well as some 50 rather nondescript flint flakes. Human remains are reported as including the greater part of an adult cranium, a mandible, and some fragments of a child's cranium (Garson, 1885). These were not thought to show any great antiquity. The adult cranial fragments were found at a depth of 0.76 to 0.91 m at the cave's entrance, while removing debris to fit a doorway intended to prevent any rifling of the cave's contents. The adult mandible, together with some other unspecified elements, was found at a depth of 0.9 m, about 1.5 m from the east wall of the cavern. The

fragments of a child's parietal were found adjacent to the west wall of the cavern at a depth of between 0.31 m and 0.61 m (Pengelly, 1886, p. 166-167).

The material examined in the NHM, although attributed to Pengelly's excavations at Happaway Cave, does not correspond to the elements noted above. There are no cranial remains whatsoever in the surviving collection; however, the postcranial material does include the partial remains of an adult and a subadult. The cranial material must have been lost at some point, or was never given to the NHM.

An adult humerus (NHM 273.1) originally provided a date of 4891 ± 36 BP (OxA-11021), suggesting an Early Neolithic attribution and published only as 'ca. 3600 BC' in Sheridan *et al*. (2008), as by this point the UF problem had been recognised, but then – inadvertently – with its full details in Schulting (2013). Unfortunately, the specimen has not been reanalysed. Thus, while its attribution to the Early/Middle Neolithic is likely to be correct, its placement within the 4th millennium is uncertain. The stable carbon and nitrogen isotope results of -20.4‰ and 8.4‰ can be taken as more reliable, and indicate a largely or entirely terrestrial diet.

Neale's Cave, Paignton, Devon (SX 877 595)

Neale's Cave is a small cave near the coast at Paignton, Devon (it is also known as Paignton Zoo Cave). It was excavated by its finder, Mr L. Neale, and A.J. Sutcliffe of the Natural History Museum (London) in 1958-9, yielding an abundant Late Glacial/Early Holocene mammalian fauna assemblage lacking domesticated fauna, and so was thought to date to the Final Palaeolithic and Mesolithic (Jackson, 1962; Sutcliffe, 1974). Horse remains yielded a radiocarbon date of 10,420 ± 75 BP (OxA-6670) (Kaagan, 2000).

A box of human remains in the NHM from this site includes many specimens are labeled as to area and layer, but no accompanying documentation has yet been located. Finds include various adult cranial fragments, a left mandibular condyle, and a partial left maxilla (with tooth row and teeth from C to M2 present; M1 is worn to less than half its enamel; M2 retains approximately half its enamel and a large distal interproximal caries with a root abscess; two loose mandibular molars worn to half their enamel also exhibit large interproximal caries, although their association with the maxilla is uncertain). Various postcranial elements are also present, including bones of the extremities, the distal portion of a tibia, the proximal half of a tibia, a fibula fragment, and a proximal femur. The only complete element is a right humerus with well-developed muscle attachment sites, although the element is not large overall. This humerus, together with the proximal half of a radius, exhibits a slight discolouration that may represent light charring. The remains seem to be consistent with the presence of one young/middle-age adult. In addition, the presence of at least one juvenile is indicated by an immature petrous portion and two molar crowns (the latter from Area V, Layer 1a).

The adult partial cranium (NHM EM.425) from Neale's Cave originally yielded an Early Bronze Age date of 3466 ± 33 BP (OxA-11022). In this case, a comparable result of 3512 ± 37 BP (OxA-16522: 1938–1744 cal BC) was obtained when the specimen was reanalysed. This result has appeared in the supplementary table for an ancient DNA paper by Olalde *et al*. (2018), where it is mistakenly attributed to that project. The $\delta^{13}C$ and $\delta^{15}N$ values of -20.4‰ and 9.4‰, respectively, are consistent with a largely or entirely terrestrial diet.

Banwell Bone Cave, Somerset (ST 3822 5881)

Banwell Cave was first discovered in 1824, and dug by William Beard. Large quantities of bones were found in a large chamber (approx. 9 by 9 m [Drew, 1975]), reportedly mainly of '*Bos*' (probably mainly bison), and also including a typical complement of

Pleistocene fauna (Tratman, 1975). A date of 40,500 ± 1600 BP (OxA-4581) has been obtained on a bison tooth (Hedges *et al*., 1996). The assemblage was thought to be a largely natural accumulation through an opening in the roof of the chamber, but a series of flint implements of Late Upper Palaeolithic character in the Weston-super-Mare Museum are labelled as deriving from Banwell Cave (J. Davies, 1926)—an attribution that Tratman (1975:358) and others (Roger Jacobi, pers. comm.) treat with much skepticism. As Tratman notes, this implies the past existence of another undiscovered entrance to the cave, since upon its forced entry in the 19th century the only opening was that in the high roof of the chamber.

No mention of the presence of human bone was made in Tratman's (1975) brief summary of the site. However, a single adult clavicle in the NHM is attributed to the site, having been donated by a Mr B. Bright in 1873. This refers to Benjamin Bright of Bristol, son of noted antiquarian Benjamin Heywood Bright (1787–1843). The son donated a collection of mainly geological specimens to what was then called the British Museum (Natural History) in the 1870s (Fletcher, 1904). Incidentally, a small collection of human remains from Aveline's Hole was also donated to the museum by 'Benj. Bright, Esquire' in 1873, although it was likely obtained by his grandfather, Richard Bright (1745-1840), prior to 1840 (Schulting, 2005b; Schulting *et al.*, 2019). To return to the matter at hand, the attribution to Banwell Cave may be problematic, and it is conceivable that the element derives from another cave (Andrew Currant *pers. comm*.; Roger Jacobi *pers. comm*.). That it does derive from a cave deposit is strongly suggested by traces of adhering 'red cave earth' very typical of such deposits, and that it is likely from Somerset is suggested by Mr Bright's residence in Bristol.

The clavicle (NMH 4 4705) originally returned a date of 427 ± 29 BP (OxA-11020), suggesting an attribution to the late medieval period. This OxA number falls in the retracted series, but it is clear that, whatever its provenance, the specimen is recent and not contemporary with the Banwell Cave's Pleistocene fauna. The $\delta^{13}C$ value of -18.8‰ is the highest obtained for post-Mesolithic individuals in this project, and could reflect greater consumption of marine foods for this individual, though still forming a minor component of the diet overall. The comparatively high $\delta^{15}N$ value of 11.1‰ is not inconsistent with this interpretation.

Constantine Bay, Cornwall

The Cornish coast, including the area around Trevose Head, is known for a dense concentration of lithic scatters belonging to the Mesolithic (Smith, 1987), as well as for Neolithic flintwork and Bronze Age barrows (Bullen, 1930). No human remains, however, are known from the county for this period; nor, indeed, have any unburnt Neolithic human remains been found, mainly due to the predominance of highly acidic soils. However, the shelly sands along the coast act to buffer soil acidity, permitting the survival of osseous material. The partial skeleton of an adult reportedly from Constantine Bay (possibly Constantine Island) held in the Natural History Museum, London, presents such an example, with the potential to fill this gap. The extant remains consist of cranial fragments, a partial right ulna and femur, part of a right mandible and a maxilla fragment; all could be from a single adult, probably male.

In the event, the cranium (NHM 1958.17.61) originally returned an Early–Middle Iron Age date (OxA-11019: 2363 ± 35 BP). As this lay outside the study's period of interest, the sample was not re-measured. Nevertheless, an attribution to the Iron Age seems likely. It is possible that the skeleton derives from the well-known Iron Age cemetery at Harlyn Bay, located just to the north of Constantine Bay, separated by Trevose Head, which, incidentally, is the site of an Iron Age promontory fort. Prehistoric finds are known from both bays, including two well-known Early Bronze Age gold lunulae (Taylor 1980). The Harlyn Bay site has been known since at least 1866, and approximately 100 graves were excavated in 1900, attributed

broadly to the Iron Age. The excavations were never fully published, and only brief accounts appear, of which the most comprehensive reports not only on the finds and human remains from Harlyn Bay, but also on human remains recovered from a midden at Constantine Bay (Bullen, 1930).

DISCUSSION

Not surprisingly given the genesis of the project, the results presented here are dominated by the Mesolithic and Neolithic periods. In some cases the human remains were already known or suspected to date to these periods, but in others there were no such indications. In terms of the aims of the project set out at the beginning of this paper, the Mesolithic and Neolithic results further confirm two trends already noted for south-west Britain. The first is that coastal Mesolithic humans (excluding those that were not near the coast at the time) are clearly distinguished from all subsequent periods in having a strong contribution from marine

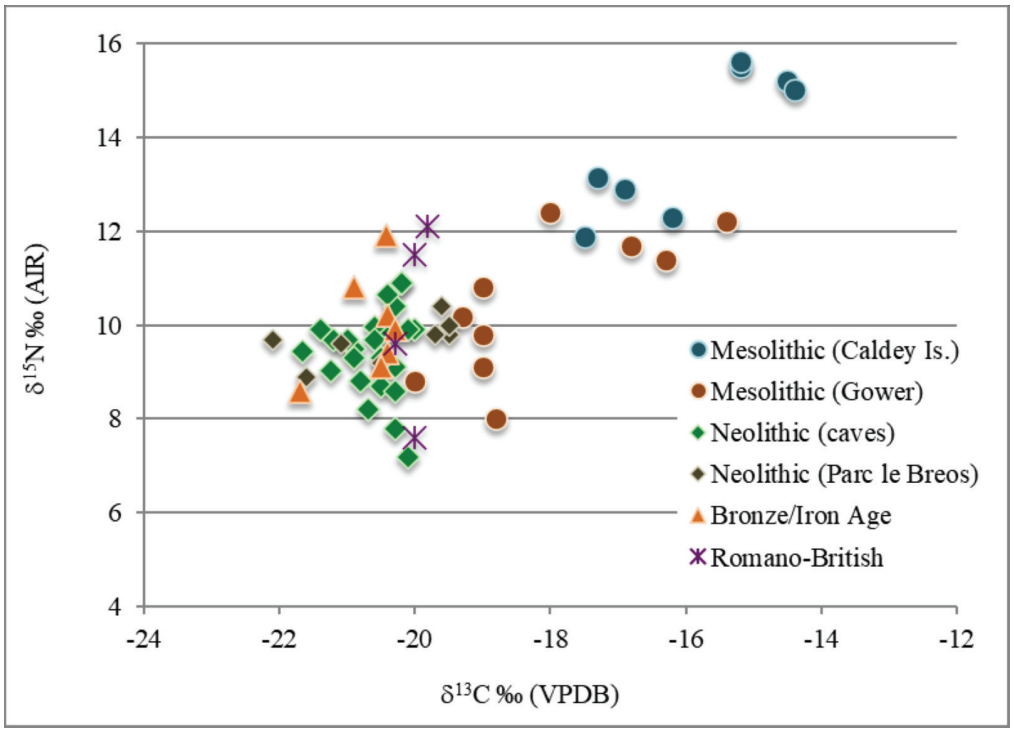

Figure 12. *$\delta^{13}C$ and $\delta^{15}N$ results on directed dated human bone collagen from Welsh caves included in the study. Additional data from Parc le Breos Cwm (Whittle and Wysocki, 1998), Caldey Island (Schulting and Richards, 2002) and Gower (Schulting* et al.*, 2013) are included for comparison. The separation of the Mesolithic Gower individuals into two groups follows their dating to the Early Mesolithic (Worm's Head and Mewslade: predominantly/entirely terrestrial) and the Late Mesolithic (Foxhole and Paviland: mixed terrestrial and marine). For some sites it is possible that multiple samples were taken from the same individuals.*

resources (Richards *et al*., 2003; Schulting and Richards, 2002; Schulting and Borić, 2017; Schulting *et al*., 2013) (Figure 12). A newer finding is that, at least for the Early Mesolithic away from the coast, $\delta^{13}C$ values are also slightly higher than seen in the earlier Neolithic (and presumably also the Late Mesolithic, but very few human remains are known from this period, with even fewer from inland locations). This is interpreted as related to the different isotope ecology of the Early Holocene (cf. Stevens *et al*., 2004), rather than to the consumption of small amounts of marine foods (Schulting *et al*., 2019).

The second trend receiving additional support from the results presented here relates to the use of caves for burial in the Early Mesolithic and again from the start of the Neolithic, with a very notable gap of some millennia for the Late Mesolithic (Chamberlain, 1996; 1997; 2012; Schulting, 2007; 2016). Thus, there is essentially no evidence of continuity in this practice, a view that can be seen in the context of the increasing evidence for a strong element of population replacement from the beginning of the Neolithic, not only in Britain but across most of Europe (Brace *et al*., 2019; Olalde *et al*., 2018). It is also apparent that caves continued to see use for burial into the Middle and Late Neolithic, at a time when mortuary monuments had largely gone out of use (Bayliss and Whittle, 2007). That being said, the Late Neolithic (ca. 3000–2500 BC) remains poorly represented in caves as well (cf. Peterson, 2019) – Gop Cave and Ifton Quarry appear to bridge the Middle and Late Neolithic, and both sites have additional undated individuals that would be worth further dating. The Late Neolithic seems to see a shift to cremation (Willis *et al*., 2016), which is infrequently represented in caves, though this needs to be seen in light of the early date and nature of many cave investigations – cremated remains from Kilgreany Cave, Co. Waterford, Ireland, have been directly dated to the Middle Bronze Age (Dowd, 2015, tab. 6.1), and a few as yet undated examples are known in Britain (e.g., Goldsland, Vale of Glamorgan; Peterson, 2019). A small number of human remains in the study were found to date to the Early, Middle and Late Bronze Age, with even fewer to later periods (Tables 1 and 2). This is in part a result of the lower research emphasis on these periods in the present study, such that a small number of samples originally yielding post-Neolithic dates were not re-measured. In the previously published literature, for example, there are additional remains human that have yielded Romano-British dates from Foxhole Cave and from sites on Caldey Island (Schulting and Richards, 2002; Schulting *et al*., 2013). Nevertheless, the pattern of use mainly in the earlier Mesolithic and earlier Neolithic is probably broadly correct.

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This paper is dedicated to the late Mr. Melvyn Davies of Swansea, whose enthusiasm for the cave archaeology of Wales is apparent from his many publications bridging the caving and archaeological communities. These together with his collections were the genesis for the present study.

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