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RADIOCARBON DATES FOR HUMAN AND ANIMAL BONES FROM MENDIP CAVES

by

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ABSTRACT

The radiocarbon dates that have been obtained over the last fifteen years or so for material from archaeological sites belonging to the late Pleistocene and (mainly the earlier part of) the Holocene in the neighbourhood of Cheddar, are reviewed and some of their implications assessed. Several of these sites would provide, from among human and faunal remains in extant collections, further highly suitable material for dating, especially by the new and virtually non-destructive small-sample techniques, and in particular by the accelerator (AMS) method.

INTRODUCTION

Cave sites in the Mendips have attracted the attention of modern humans since at least the end of the eighteenth century (human burials now known to be of early Holocene age were discovered in Aveline's Hole, Burrington Combe in 1797, for example), although systematic investigation of these sites and the deposits they contained was not carried out until the earlier part of the present century. Study of the faunal remains, artifacts and sedimentary materials from the various excavations and in particular those made in the period from the early 1900s up to about 1940 still continues, as evidenced by numerous articles in this journal, with considerable profit to modern archaeology.

Material from these excavations, now in museum collections at Cheddar, Wells and elsewhere, has provided the basis for several radiocarbon investigations over the last fifteen years or so, mainly for the sites in the neighbourhood of Cheddar (see TABLE I), the results of which are summarized here. The material dated ranges from animal bone of late

TABLE I – *Mendip Sites with Radiocarbon Dates*

Site	*Location* (NGR)	*Number of dates*
Aveline's Hole	ST 4761/5867	3
Badger Hole	ST 5324/4795	3
Charterhouse Warren Farm Swallet	ST 4936/5458	1
Chelm's Combe Shelter	ST 4634/5447	2
Gough's Cave	ST 4670/5391	23
Gough's Old Cave	ST 4668/5388	1
Picken's Hole	ST 3969/5500	5
Sandford Hill	ST 423 /590	1
Soldier's Hole	ST 4687/5400	5
Sun Hole	ST 4673/5408	5

Grid references taken from Barrington & Stanton, 1977

Upper Palaeolithic age bearing cut-marks of human origin, and human skeletal remains, to material (e.g. reindeer and aurochs) forming part of a programme to determine the latest times of survival of the mammalian species that became extinct in Britain during the Holocene, and these dates are presented here as a regional group irrespective of the topics to which they relate. The dates have been obtained over a period as already stated, by different laboratories using different methods of measurement (gas and liquid scintillation counting and more recently accelerator mass spectrometry) and possible differences between the results obtained, in particular by the so-called conventional techniques of radiocarbon measurement and the newer accelerator (or AMS) method, are considered briefly in the Discussion that follows the list of dates. Most of the dates obtained are beyond the range of ^{14}C calibration (i.e. earlier than about 7000 bp) and are thus presented in TABLE II in radiocarbon years based on the 5570 year half-life, with no allowance for natural ^{14}C variations. The dates are necessarily given in abbreviated form and in particular the association of the material dated is only briefly indicated (although where necessary it is considered in more detail in the Discussion). The list is believed to include all published and unpublished dates for material from underground sites in the area under consideration, up to 31 March 1986.

TABLE II – *Radiocarbon Dates for Mendip Sites*
(the lower case letters bp and bc (or ad) are used to denote uncalibrated dates in radiocarbon years before AD1950, based on the 5570 year half-life of ^{14}C, as distinct from the BP/BC, AD convention frequently used to denote calendar, i.e. calibrated, dates)

Material and association	*Radiocarbon date* (5570 yr half-life)		*Lab. No.*	*Ref.*
AVELINE'S HOLE				
human femora (collagen)	9114 ± 110 bp	(7164 bc)	BM-471	1, 2
stalagmite from within human skull (Aveline's Hole 1)	8100 ± 50 bp	(6150 bc)	GrN-5393	1, 2, 3
fragmentary post-cranial human bone (collagen)	9090 ± 110 bp	(7140 bc)	Q-1458	4
BADGER HOLE				
unidentified mammalian bone fragments (collagen) possibly associated with unifacial leaf-point and human skull fragments	> 18,000 bp		BM-497	5, 6
human mandible, 'Badger Hole 1' (amino acids)	9060 ± 130 bp	(7110 bc)	OxA-679	6, 7
human cranial fragment, 'Badger Hole 3' (amino acids)	1380 ± 70 bp	(570 ad)	OxA-680	6, 7

CHARTERHOUSE WARREN FARM SWALLET radius of *Bos primigenius* (collagen)	3245 ± 37 bp	(1295 bc)	BM-731	8, 9
CHELM'S CCOMBE SHELTER metapodial of *Rangifer tarandus* (collagen) from Area A, Spit 7	10,190 ± 130 bp	(8240 bc)	BM-2318	
tibia of *Rangifer tarandus* (collagen) from Area A, Spit 7	10,220 ± 130 bp	(8270 bc)	BM-2431	
GOUGH'S CAVE human tibia (collagen), 'Cheddar Man' (Gough's Cave 1)	9080 ± 150 bp	(7130 bc)	BM-525	10, 11
human talus (amino acids), 'Cheddar Man' (Gough's Cave 1)	9100 ± 100 bp	(7150 bc)	OxA-814	
antler fragment of *Rangifer tarandus* (collagen) from Spit 8	9920 ± 130 bp	(7970 bc)	Q-1581	12
atlas vertebra of *Equus ferus* (collagen) from Spit 10, with cut-marks	12,120 ± 120 bp	(10,170 bc)	BM-2183	13, 14
calcaneum of *Equus ferus* (collagen) from Spit 12	12,020 ± 120 bp	(10,070 bc)	BM-2184	13, 14
metapodial of *Equus ferus* (collagen) from Spit 13	11,970 ± 230 bp	(10,020 bc)	BM-2185	13, 14
metapodial of *Equus ferus* (collagen) from Spit 14	12,240 ± 220 bp	(10,290 bc)	BM-2186	13, 14
metapodial of *Equus ferus* (collagen) from Spit 16	12,070 ± 170 bp	(10,120 bc)	BM-2187	13, 14
metapodial of *Equus ferus* (collagen) from Spit 18	12,160 ± 210 bp	(10,210 bc)	BM-2188	13, 14
metacarpal of *Equus ferus* (amino acids) from Spit 18, with cut-marks	12,470 ± 160 bp	(10,520 bc)	OxA-464	15
phalanx of *Equus ferus* (amino acids) from Spit 14, with cut-marks	12,360 ± 170 bp	(10,410 bc)	OxA-465	15
metatarsal of *Cervus elaphus* (amino acids) from Spit 13, with cut-marks	12,800 ± 170 bp	(10,850 bc)	OxA-466	15
phalanx of bovid (amino acids) from Spit 11, with cut-marks	± bp	(bc)	OxA-	

calcaneum of *Saiga tatarica* (amino acids) from Spit 14	12,380 ± 160 bp	(10,430 bc)	OxA-463	15
phalanx of bovid (amino acids) from Spit 15	12,030 ± 150 bp	(10,080 bc)	OxA-588	16
astragalus of *Bos primigenius* (amino acids) from Spit 11	11,900 ± 140 bp	(9950 bc)	OxA-813	
maxilla of *Rangifer tarandus* (amino acids) from Spit 13	± bp	(bc)	OxA-	
maxilla of *Sus scrofa* (amino acids) from Spit 12	1740 ± 60 bp	(210 ad)	OxA-815	
mandible of *Alopex lagopus* (amino acids) from Spit 11	± bp	(bc)	OxA-	
Gough's Old Cave				
phalanx of *Equus ferus* (amino acids) with cut-marks	12,530 ± 150 bp	(10,580 bc)	OxA-587	16
Picken's Hole				
unidentified mammalian bone fragments (collagen) from Layer 3, layer containing human teeth	34,265 + 2600 bp − 1950	(32,315 bc)	BM-654	17
unidentified mammalian bone fragments (collagen) from Layer 5	26,650 + 1700 bp − 1400	(24,700 bc)	BM-655A	17
unidentified mammalian bone fragments (collagen) from Layer 5	27000 + 1850 bp − 1500	(25,050 bc)	BM-655B	17
limb bone of large mammal (collagen) from Layer 3	27,540 ± 2440 bp	(25,590 bc)	BM-2117	18
metacarpal of *Rangifer tarandus* (collagen) from Layer 5	12,400 ± 1500 bp	(10,450 bc)	BM-2118	18
Sandford Hill				
skull of *Crocuta crocuta spelaea* (collagen) from cave-earth deposit	36,000 ± 1900 bp	(34,050 bc)	BM-1526	19
Soldier's Hole				
metapodial of *Rangifer tarandus* (collagen) from Unit 3, Spit 8	9930 ± 210 bp	(7980 bc)	BM-2249	20
calcaneum of *Rangifer tarandus* (amino acids) from Unit 4, Spit 12	> 34,500 bp		OxA-691	7, 21

phalanx of *Rangifer tarandus* (amino acids) from Unit 4, Spit 13	29,300 ± 1100 bp	(27,350 bc)	OxA-692	7, 21
astragalus of *Rangifer tarandus* (amino acids) from Unit 4, Spit 14	> 35,000 bp		OxA-693	7, 21
tibia of bovid (amino acids) from Unit 4, Spit 16	19,300 ± 400 bp	(17,350 bc)	OxA-694	7, 21
SUN HOLE				
fragmentary bones of *Rangifer tarandus* (collagen) from 3rd ft of Pleistocene deposits	10,110 ± 160 bp	(8160 bc)	Birm-819	22
partial tibia, partial femur and calcaneum of *Rangifer tarandus*, and possibly fragmentary bones of *Equus ferus* (collagen) from 5th ft of Pleistocene deposits	10,280 ± 200 bp	(8330 bc)	Birm-820	22
distal humerus, distal tibia (and possibly upper molar) of *Equus ferus* (collagen) from 6th or 7th ft of Pleistocene deposits	10,470 ± 190 bp	(8520 bc)	Birm-821	22
human ulna (amino acids) from 5th ft of Pleistocene deposits	12,210 ± 160 bp	(10,260 bc)	OxA-535	16, 23
humerus of *Ursus arctos*	12,378 ± 150 bp	(10,428 bc)	BM-524	5, 23

Key to References

1. Barker, Burleigh & Meeks (1971), 179-180.
2. Oakley, Campbell & Molleson (1971), 17-19.
3. Vogel & Waterbolk (1972), 57-58.
4. Tratman (1977).
5. Barker, Burleigh & Meeks (1971), 168.
6. Oakley, Campbell & Molleson (1971), 19-20.
7. Gowlett (1986).
8. Burleigh & Clutton-Brock (1977).
9. Burleigh & Matthews (1982), 151.
10. Barker, Burleigh & Meeks (1971), 180.
11. Oakley, Campbell & Molleson (1971), 22-25.
12. Clutton-Brock & Burleigh (1983).
13. Burleigh, Jacobi & Jacobi (1985).
14. Ambers, Matthews & Burleigh (1985), 512.
15. Gillespie *et al.* (1985), 238.
16. Gowlett *et al.* (1986), 118.
17. Burleigh & Hewson (1979), 340.
18. Burleigh, Ambers & Matthews (1984), 65.
19. Burleigh, Matthews & Ambers (1982), 237.
20. Ambers, Matthews & Burleigh (1985), 517.
21. Parry (1931), 49-53.
22. Collcutt, Currant & Hawkes (1981).
23. Oakley, Campbell & Molleson (1971), 39-40.

The two British Museum and three Oxford dates listed without references in the table were kindly made available by these two laboratories prior to publication and will appear in forthcoming issues of *Radiocarbon* and *Archaeometry*, respectively. Three Oxford dates for samples from Gough's Cave which it was hoped to include in this paper at proof stage were unfortunately not available in time.

DISCUSSION

TABLE II comprises essentially a catalogue *raisonné*, and some additional commentary on certain of the dates listed is necessary.

The Groningen date for stalagmite from within the skull from Aveline's Hole should be considered as a *minimum* age and is thus not strictly discordant with the British Museum and Cambridge dates from the same site. There is uncertainty as to exactly which human bones the Cambridge date is based on as these were fragmentary, and their stratigraphic position is also uncertain due to loss of the excavation records. Accelerator dates are being sought for human bone of better known provenance from Aveline's Hole and in due course it will be interesting to see how these new dates compare.

The associations of the earlier material dated from Badger Hole (BM-471) are also uncertain. There may have been a direct association of the bones with a 'proto-Solutrean' point (unifacial leaf-point), but as this is a minimum date anyway it is of little value. The agreement of the accelerator date for the human mandible from Badger Hole (OxA-679) with the conventional dates for the human remains from Aveline's Hole (BM-471, and particularly Q-1458), and with the dates for 'Cheddar Man' from Gough's Cave (BM-525 and OxA-814), is, however, especially noteworthy.

The date for the remains of *Bos primigenius* from Charterhouse Warren Farm provides one of the latest dates obtained for the survival of the aurochs into the earlier part of the Bronze Age in Britain, after which it appears to have become extinct, though surviving on the mainland of Europe until historic times.

Similarly, the dates for reindeer from Chelm's Combe Shelter, Gough's Cave and Soldier's Hole add very usefully to the pattern of dates around 10,000 bp or a little later, that is beginning to emerge for the latest survival of this species in Britain.

The British Museum date for Sun Hole has no direct archaeological association and the relationship of the Birmingham dates to the chipped flints from the site is also uncertain. The human ulna from Sun Hole dated by accelerator was formerly misidentified as a radius (Sun Hole 2; Oakley, Campbell & Molleson, 1971, p. 39), but was recently recognized as an ulna when re-examined by Dr C. B. Stringer, Department of Palaeontology, British Museum (Natural History).

By far the most interesting dates, however, are the series from Gough's Cave upon which most dating work has recently been concentrated. These dates provide a chronological basis both for faunal remains from the site and for the presence of human occupants during the warm phase towards the end of the last glacial maximum as some of the bones dated bore cut-marks of human origin, as well as allowing direct comparisons to be made between conventional and accelerator techniques of radiocarbon measurement. Thus, the first six BM dates listed for bones of wild horse, *Equus ferus*, from Gough's Cave (BM-2183-2188) form a tightly clustered group with a weighted mean date of 12,100 bp, while the four accelerator dates listed for other bones from the same deposit (OxA-463-466) also form a closely-knit group the weighted mean date of which, 12,500 b.p., is significantly older statistically. This difference could perhaps reflect the spread of age of material within the deposit, but further measurements have indicated that the difference between the two sets of dates is real as accelerator measurements of the collagen used for BM-2183 and BM-2187 and amino acids separated from these two samples are also significantly older (OxA-589-592: 12,340 ± 150, 12,260 ± 160 for collagen BM-2183 and 2187, respectively, and 12,370 ± 150 and 12,500 ± 160, for the corresponding amino acids; Gowlett *et al.*, 1986, and Currant, this volume p. 297). Which of these different sets of measurements is the most accurate is not easy to say and it is not appropriate to discuss in detail here the acknowledged fact that there are offsets between different laboratories, but it may be that the more detailed chemical preparation to which it is possible to subject the much smaller samples (milligrams rather than gram amounts of carbon) needed for accelerator measurements might be expected to lead to more accurate results.

Small sample methods offer great potential for the accurate dating of material or specimens that it is not desirable and may not be permissible to destroy in part or in total. One of the strengths of the accelerator technique is that it is already well adapted to this purpose and when the chemistry of sample preparation is fully developed it should be possible to extend its use in the same way to much older samples. Material excavated from sites in and around Cheddar may have an important part to play in such investigations to the likely benefit of radiocarbon methodology as well as archaeology.

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