

APPENDIX B

ARCHAEOLOGICAL MATERIALS

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I Faunal material

Following Montgomery (2002: 121, Table 5.2), only teeth that showed a level preservation scored as 'good' or 'excellent' were subject to analysis:

- **Preservation excellent**

"Crown dentine is hard on grinding, uncracked and translucent near the EDJ. EDJ is strong and intact. Root dentine may be discoloured on the surface but with no obvious discoloration/de-mineralisation internally. Roots are intact with no post-mortem damage." (Montgomery 2002: 121, Table 5.2)

- **Preservation good**

"Crown dentine is still hard on grinding and uncracked but may be opaque. Translucent zone near the EDJ is still apparent and EDJ is strong and intact. Post-mortem discoloration/de-mineralisation radiating from pulp cavity does not extend into crown dentine. Roots may display some minor surface changes such as plant root/stone abrasion." (Montgomery 2002: 121, Table 5.2)

I.i Details of archaeological sites

Table B 01: List of archaeological sites investigated.

Site	OS grid reference	Type	Period	Key reference	Location of finds archive	Accessions number
Ivinghoe Beacon	496040, 216850	Hillfort	LBA/EIA	Cotton and Frere (1968)	Buckinghamshire County Museum	—
Ward's Coombe	497050, 215760	Pennanular enclosure	EIA–RB	Dunnet (1872)	Buckinghamshire County Museum	—
Bierton Vicarage Garden	483650, 215230	Enclosed settlement	LIA	Allen (1988)	Buckinghamshire County Museum	BCM 606.1979
Bicester Fields Farm	459200, 222200	Enclosed settlement	MIA–LIA	Cromarty <i>et al.</i> (1999)	Oxfordshire Museum Service	OXCMS 1998.94

Simplified chronological scheme for lowland Britain follows Cunliffe (2005:32, Figure 2.2): LBA = Late Bronze Age; EIA = Early Iron Age; MIA = Middle Iron Age; LIA = Late Iron Age; RB = Romano-British.

Table B 02: Site code used to identify archaeological sites and samples.

Site	Site Code	Number of cattle analysed		Number of sheep/goats analysed	
		Individuals (n)	Teeth (n)	Individuals (n)	Teeth (n)
Ivinghoe Beacon	IB	1	2	1	2
Ward's Coombe	WC	1	1	1	2
Bierton Vicarage Garden	BIE	2	2	2	2
Bicester Fields Farm	BIFF	2	2	2	2

I.ii Sample records

The metric characteristics of the selected cattle and sheep/goat mandibles are recorded in Tables B 03 and B 04, following von den Driesch (1976). As the mandibles were fragmentary and incomplete only a limited number of measurements were possible. Mandibular tooth-wear was scored following Grant (1982) (Table B 05). Hambleton (1999) indicates a range of MWS values that can be used to estimate age-at-death (Table B 06). The metric characteristics of the individually sampled teeth are recorded in Tables B 07 and Table B 08. Enamel and dentine samples were obtained only from the distal buccal lobe of the second lower molar (M₂) and mesial lobe of the lower third molar (M₃). The position of the top and the bottom of each serial sample on each tooth crown is recorded as 'Position' (Tables B 07 & B 08); these measurements were made with respect to the cervical margin of each crown, parallel to the growth axis of each tooth. Bulk enamel samples, representing the majority of the height of each crown were prepared from the teeth of one cattle mandible (BIFF_01) and one sheep/goat mandible (BIFF_02) (Table B 09). Duplicate serial enamel samples were prepared from one cattle second molar (BIFF_04 M₂) (Table B 10).

Table B 03: Record of standard measurements for selected cattle mandibles following von den Driesch (1976).

Site	Context	Mandible	Side	Measurement ID following von den Driesch (1976)						
				3	7	8	9	15a	15b	15c
IB	A VII 11	IB_01	R	97.4	—	—	—	65.0	—	—
WC	VI Primary silt	WC_01	R	—	—	—	56.4	—	45.2	30.8
BIE	(859)	BIE_01	L	111.6	—	84.7	—	64.2	—	—
	(838)	BIE_02	L	—	127.4	82.6	43.4	—	—	—
BIFF	(5253)	BIFF_01	R	—	—	—	—	63.8	—	—
	(5191)	BIFF_04*	L	—	—	—	—	—	—	—

*Mandible too fragmented to record accurately.

Table B 04: Record of standard measurements for selected sheep/goat mandibles following von den Driesch (1976).

Site	Context	Mandible	Side	Measurements ID following von den Driesch (1976)						
				7	8	9	11	5a	15b	15c
IB	A VII 11	IB_02	Right	72.0	50.8	22.8	36.6	30.5	—	—
WC	VI Primary silt	WC_02*	Left	—	—	—	—	—	—	—
BIE	(842)	BIE_06	Left	60.7	42.4	18.7	30.1	31.7	19.0	15.9
	(819)	BIE_08	Left	—	—	—	—	30.1	—	—
BIFF	(5060)	BIFF_02	Right	66.6	44.9	21.8	—	29.2	17.5	14.6
	(5437)	BIFF_05	Left	64.7	43.5	21.6	32.9	33.2	20.0	17.3

*Mandible too fragmented to record accurately.

Table B 05: Cattle and sheep/goat teeth from mandibles obtained from selected sites (cf. Table 2) with mandible wear score (MWS) allocated following Grant (1982), and age stage of each individual estimated following the recommendations of Hambleton (1999).

	Mandible	Tooth-wear score					MWS	Age stage [‡]
		dm ₃	PM ₄	M ₁	M ₂	M ₃		
Cattle	IB_01	–	–	X (15)	j (14)	g (12)	41*	G
	WC_01	#	c	k (15)	g (12)	X (11)	38*	F
	BIE_01	#	f	l (16)	k (15)	k (15)	46	I
	BIE_02	#	f	k (15)	j (14)	g (12)	41	G
	BIFF_01	–	–	X (15)	j (14)	g (12)	41*	G
	BIFF_04	–	–	j (14)	g (12)	b (7)	33	E
Sheep/goat	IB_02	#	X	X (12)	g (12)	g (12)	36*	F
	WC_02	–	h	g (12)	g (12)	e (10)	34	F
	BIE_06	#	j	l (16)	h (13)	g (12)	41	G
	BIE_08	–	–	X (12)	g (12)	e (10)	34*	F
	BIFF_02	#	h	h (13)	g (12)	g (12)	37	F
	BIFF_05	#	X	l (16)	h (13)	g (12)	41	G

IB = Ivinghoe Beacon; WC = Ward's Coombe; BIE = Bierton Vicarage Garden; BIFF = Bicester Fields Farm
= exfoliated; – = jaw and teeth not present; X = post-mortem loss

[‡]Halstead/Payne age stage (cf. Table B 06) estimated using mandible wear score (MWS) following the recommendations of Hambleton (1999).

* Where one molar is absent from the tooth row (X) the minimum mandible wear score (MWS) has been estimated by comparison to tables of tooth wear combinations provided by Grant (1982); MWS may be up to 1 point higher than stated. Note that, following Hambleton (1999) the likely error makes no difference to the age stage estimated for each individual.

Table B 06: Age stages commonly used for the evaluation of age at death in cattle and sheep/goat based on the assessment of tooth wear, defined by Halstead (1985) following Payne (1973).

	Cattle age at death	Sheep/goat age at death	
Age stage	A	0–1 months	0–2 months
	B	1–8 months	2–6 months
	C	8–18 months	6–12 months
	D	18–30 months	1–2 years
	E	30–36 months	2–3 years
	F	Young adult*	3–4 years
	G	Adult	4–6 years
	H	Old adult	6–8 years
	I	Senile	8–10 years

*Grigson (1982) suggests that in cattle, slight wear is usually visible on the M₃ after at least 3 years of age and that the distal third cusp (or post) of the crown comes into wear at around 5 years; this suggests a level of M₃ wear equivalent to Grant's stage 'e' and greater conferring, on the basis of the patterns observed by Grant (1982), a MWS ≥ 37 and membership of the 'young adult' age stage 'F'.

Table B 07: List of enamel samples obtained from selected cattle teeth.

Mandible	Tooth	*Crown metrics (mm)			Sample details		
		L	B	H	location	Position (mm)	Sample ID [‡]
IB_01	M ₂	25.4	15.7	31.6	Cusp	25.3–22.5	IB_01_M2_A
					Cervix	3.1–0.6	IB_01_M2_B
	M ₃	34.8	15.8	37.5	Cusp	30.6–28.2	IB_01_M3_A
					Cervix	4.9–2.6	IB_01_M3_B
WC_01	M ₂	26.0	15.2	42.6	Cusp	37.3–34.8	WC_01_M2_A
					Mid-lobe	21.5–19.0	WC_01_M2_B
					Cervix	6.2–3.3	WC_01_M2_C
BIE_01	M ₂	22.9	16.6	14.5	Cusp	12.3–9.7	BIE_01_M2_A
					Cervix	3.6–1.8	BIE_01_M2_B
	M ₃	37.6	17.2	20.0	Cusp	12.0–9.9	BIE_01_M3_A
					Cervix	4.4–2.3	BIE_01_M3_B
BIE_02	M ₂	24.2	15.8	25.9	Cusp	23.6–21.5	BIE_02_M2_A
					Cervix	3.2–1.1	BIE_02_M2_B
	M ₃	36.4	15.2	32.9	Cusp	30.3–28.2	BIE_02_M3_A
					Cervix	3.8–1.7	BIE_02_M3_B
BIFF_01	M ₂	26.8	16.7	38.2	Cusp	35.4–33.2	BIFF_01_M2_A
					Mid-lobe	20.2–17.4	BIFF_01_M2_B
					Cervix	4.3–2.2	BIFF_01_M2_C
	M ₃	38.8	16.2	44.5	Cusp	40.1–38.1	BIFF_01_M3_A
					Mid-lobe	23.4–21.4	BIFF_01_M3_B
					Cervix	7.0–4.7	BIFF_01_M3_C
BIFF_04	M ₂	27.9	13.5	42.1	Cusp	40.2–38.0	BIFF_04_M2_A
					Mid-lobe	21.8–19.5	BIFF_04_M2_B
					Cervix	3.2–1.0	BIFF_04_M2_C
	M ₃	32.7	14.6	48.0	Cusp	46.6–44.4	BIFF_04_M3_A
					Mid-lobe	25.3–22.9	BIFF_04_M3_B
					Cervix	3.6–1.6	BIFF_04_M3_C

*L = length of occlusal surface; B = breadth of occlusal surface; H = crown height.

[‡]All samples are of enamel.

Table B 08: List of serial enamel samples obtained from selected sheep/goat teeth.

Mandible	Tooth	*Crown metrics (mm)			Sample details		
		L	B	H	location	Position (mm)	Sample ID [‡]
IB_02	M ₂	13.6	8.3	19.4	Cusp	14.2–12.0	IB_02_M2_A
					Cervix	2.7–0.7	IB_02_M2_B
							IB_02_M2_Dentine
	M ₃	22.2	9.2	25.8	Cusp	24.1–22.1	IB_02_M3_A
					Mid-lobe	13.8–11.8	IB_02_M3_B
					Cervix	3.5–1.5	IB_02_M3_C
WC_02	M ₂	13.9	8.0	25.1	Cusp	23.7–22.0	WC_02_M2_A
					Mid-lobe	13.5–11.3	WC_02_M2_B
					Cervix	3.3–1.1	WC_02_M2_C
	WC_02_M2_Dentine						
	M ₃	21.0	8.1	30.2	Cusp	28.7–26.8	WC_02_M3_A
					Mid-lobe	16.4–14.5	WC_02_M3_B
Cervix					4.0–2.1	WC_02_M3_C	
BIE_06	M ₂	11.5	7.4	16.2	Cusp	14.8–12.8	BIE_06_M2_A
					Cervix	3.0–1.0	BIE_06_M2_B
	M ₃	20.2	8.0	21.9	Cusp	20.3–18.8	BIE_06_M3_A
					Mid-lobe	12.2–10.3	BIE_06_M3_B
Cervix	4.3–2.3	BIE_06_M3_C					
BIE_08	M ₂	14.2	6.9	24.5	Cusp	23.2–21.1	BIE_08_M2_A
					Mid-lobe	12.9–11.5	BIE_08_M2_B
					Cervix	3.3–1.2	BIE_08_M2_C
	M ₃	19.6	7.3	28.3	Cusp	27.3–25.3	BIE_08_M3_A
					Mid-lobe	15.5–13.5	BIE_08_M3_B
					Cervix	3.4–1.7	BIE_08_M3_C
BIE_08_M3_Dentine							
BIFF_02	M ₂	14.2	7.9	21.0	Cusp	19.9–17.7	BIFF_02_M2_A
					Mid-lobe	11.9–9.8	BIFF_02_M2_B
					Cervix	4.5–1.8	BIFF_02_M2_C
	BIFF_02_M2_Dentine						
	M ₃	20.4	8.2	27.1	Cusp	22.4–20.3	BIFF_02_M3_A
					Mid-lobe	12.9–10.9	BIFF_02_M3_B
Cervix					3.5–1.4	BIFF_02_M3_C	
BIFF_05	M ₂	12.4	7.7	14.0	Cusp	13.1–11.1	BIFF_05_M2_A
					Cervix	2.3–0.5	BIFF_05_M2_B
	M ₃	21.4	8.1	18.4	Cusp	18.3–16.3	BIFF_05_M3_A
					Mid-lobe	10.8–8.9	BIFF_05_M3_B
Cervix	3.2–1.4	BIFF_05_M3_C					

*L = length of occlusal surface; B = breadth of occlusal surface; H = crown height.

[‡]Samples of dentine are identified by the 'Dentine' suffix of the Sample ID, all other samples area of enamel.

Table B 09: Details of bulk enamel samples.

	Mandible ID	Tooth	location	Position (mm)	Sample ID
Cattle	BIFF_01	M ₂	Bulk	35.4–2.2	BIFF_01_M2_Bulk
		M ₃	Bulk	40.1–4.7	BIFF_01_M3_Bulk
Sheep/goat	BIFF_02	M ₂	Bulk	19.9–1.8	BIFF_02_M2_Bulk
		M ₃	Bulk	22.4–1.4	BIFF_02_M3_Bulk

Table B 10: Details of parallel duplicate serial samples of cattle enamel.

Mandible	Tooth	location	Principal series (cf. Table B.09)	Duplicate series	
				Position (mm)	Sample ID
BIFF_04	M ₂	Cusp	BIFF_04_M2_A	39.8–37.8	BIFF_04_M2_A2
		Cervix	BIFF_04_M2_C	2.8–1.0	BIFF_04_M2_C2

1.iii Un-worn crown heights

In this current study, a limited number of loose, fully mineralised lower molars were identified, which showed little or no wear (Tables B 11 and B 12). These were used to estimate the initial crown heights for sheep/goat and cattle teeth (Chapter 3: Section 3.3.1). As the available data suggest that second and third molar crown heights may be very similar, the unworn crown heights were combined to calculate a mean value for each taxon.

Table B 11: Crown heights of sheep/goat lower molars from Bierton Vicarage Garden (BIE) and Bicester Fields Farm (BIFF) that showed little or no wear.

Site	Context	Side	Tooth	Wear	Crown height (mm)
BIFF	(5163)	Right	M ₂	a	33.8
BIE	(1556)	Left	M ₃	a	35.4
BIFF	(510)	Left	M ₃	a	35.5
BIE	(1525)	Right	M ₂	a	35.6
BIFF	(5164)	Right	M ₃	b	35.8
BIE	(0431)	Left	M ₃	a	36.0
BIE	(0608)	Left	M ₃	a	36.5
BIFF	(5320)	Left	M ₂	a	36.7
BIE	(0468)	Right	M ₂	a	37.3
BIFF	(5235)	Left	M ₂	a	37.6
BIFF	(5394)	Left	M ₃	a	38.2
BIFF	(5060)	Right	M ₃	a	38.7

Table B 12: Crown heights of cattle lower molars from Bicester Fields Farm (BIFF) that show little or no wear.

Site	Context	Side	Tooth	Wear	Crown height (mm)
BIFF	(5238)	Right	M ₃	a	47.9
BIFF	(5191)	Left	M ₃ *	b	48.0
BIFF	(5134)	Left	M ₂	a	50.8

*Third molar from mandible identified as 'BIFF_04' (cf. Table B 07).

II Human material

Following Montgomery (2002: 121, Table 5.2), only teeth that showed a level preservation scored as 'good' or 'excellent' were subject to analysis:

- **Preservation excellent**

“Crown dentine is hard on grinding, uncracked and translucent near the EDJ. EDJ is strong and intact. Root dentine may be discoloured on the surface but with no obvious discoloration/de-mineralisation internally. Roots are intact with no post-mortem damage.” (Montgomery 2002: 121, Table 5.2)

- **Preservation good**

“Crown dentine is still hard on grinding and uncracked but may be opaque. Translucent zone near the EDJ is still apparent and EDJ is strong and intact. Post-mortem discoloration/de-mineralisation radiating from pulp cavity does not extend into crown dentine. Roots may display some minor surface changes such as plant root/stone abrasion.” (Montgomery 2002: 121, Table 5.2)

I.i Details of archaeological site

Samples were taken from selected human teeth that were recovered from the late Saxon site of Old Dairy Cottage, which is thought to represent an execution cemetery. The site is located on the northern outskirts of modern Winchester (NGR 447260, 131410), and was excavated as part of a series of works undertaken by the Archaeology Section of Winchester Museums from 1989–1994. Following a post-excavation assessment exercise (Powell 2007) the human bone assemblage has been subject to a full osteological analysis (Cherryson and Buckberry in preparation). The finds archive is curated by Winchester Museums Service, and identified by site-code ODC89.

II.ii Sample records

Teeth were obtained from graves, which each contained the articulated remains of one individual and included the remains of a skull. In addition, an upper right second molar (M²) was extracted from a maxillary bone fragment contained by grave number 128, identified as skeleton number 574 (Table B 13). Although the majority of the teeth had been lost post-mortem, this individual provided evidence for the eruption of the third molars and sufficient teeth were present to suggest that the remains were those of a young adult (Cherryson and Buckberry in preparation).

Table B 13: Details of teeth selected from ODC989 for ⁸⁷Sr/⁸⁶Sr analysis.

Grave	Skeleton	Tooth	Root score	Attrition score	Sampled cusp	Sample ID*
111	525	Lower left M ₂	5	4	Distolingual	ODC_Sk525_E
113	531	Upper right P ¹	5	4	Buccal	ODC_Sk531_E
123	560	Upper left P ¹	5	3	Buccal	ODC_Sk560_E
124	562	Lower left P ₂	5	4	Buccal	ODC_Sk562_E
125b	565	Upper left M ²	5	4	Mesiobuccal	ODC_Sk565_E
128	574	Upper right M ²	5	3	Mesiobuccal	ODC_Sk574_E
128	575/578	Upper left P ¹	5	5	Buccal	ODC_Sk578_E ODC_Sk578_D
129	576	Lower left M ₂	4	2	Distolingual	ODC_Sk576_E

* 'E' suffix in Sample ID denotes an enamel sample 'D' indicates a sample of dentine.

Table B 14: Classification of dental attrition after Montgomery (2002: 122, Table 5.3), adapted from Buikstra and Ubelaker (1994: 50).

Score	Stage	Description
0	Unerupted	Unerupted tooth with no attrition
1	Negligible	Cusp tips intact, Polishing on small facets may be present.
2	Slight	Blunting of cusps, but no dentine visible.
3	Slight-moderate	Cusp tips removed. Pinpricks or thin lines of dentine visible on cusps.
4	Moderate	Discrete areas of dentine visible on individual cusps.
5	Moderate-severe	Exposed areas of dentine on cusps have coalesced.
6	Severe	All occlusal enamel has been worn away.
7	Very severe	Only cervical enamel remains.
8	Complete	Complete loss of crown with no enamel.

Table B 15: Classification of root formation and resorption of permanent teeth after Montgomery (2002: 122, Table 5.4), adapted from Buikstra and Ubelaker (1994: 52).

Score	Root status
0	Crown dentine not completely formed.
1	Crown dentine complete but no root formation.
2	Roots $\frac{1}{4}$ formed
3	Roots $\frac{1}{2}$ formed.
4	Roots $\frac{3}{4}$ formed.
5	Roots complete, apices closed or closing.
10	Unable to score due to post-mortem damage