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CANID CAVES: THE FAUNA OF FISHMONGER'S SWALLET

by

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ABSTRACT

The animals of Fishmonger's Swallet are here recontextualised by integrating existing and new zooarchaeological analysis, as well as new radiocarbon dating of three dogs. This paper highlights this unusual assemblage, which consists mostly of canid (namely dog) remains which have been deposited with human remains and other animal species. The radiocarbon dating dates the dog remains, as well as a single bovine bone, to the late Iron Age. The main domesticate assemblage is a small waste deposit, with cattle, horse, sheep, and pig present.

The dog assemblage has a minimum nine individuals which is uncommon within a prehistoric context, particularly in this environment and with the association of human remains. The remains recovered were disarticulated, and there is little evidence of butchery or trauma on the bones. The dogs recovered from the site are a range of sizes and shapes, from small and gracile to large and robust. This variation indicates that the dogs had various functions that may have included pest control, hunting, herding and guarding. Their deposition within the swallet is possibly ritual in nature and could be representative of an association of dogs with death and healing, social roles, or of the strong bond between people and dogs. However, without further analysis that will be conducted after the publication of this paper as part of an ongoing project, this remains one theory of many.

INTRODUCTION

In this paper, we examine and interpret the faunal deposit – the majority of which is made up of dog remains – and the possible association with modified human remains found within the same chamber (see Cox and Loe, 2022; Bricking, *et al*, 2022, both this volume). The project aims are to understand the faunal deposit recovered from the swallet, integrating both past and newly excavated material. Through this, we hope to understand the assemblage, particularly the dogs, within the wider Late Iron Age context. The unusual dog assemblage gives us valuable new information to further our knowledge of human-dog relationships in the Iron Age, understand how dogs were viewed or utilised, and to assess the range of dogs present in late Iron Age Gloucestershire. To do this, zooarchaeological and archaeological scientific techniques are used, such as metrical analysis and radiocarbon dating, to understand the deposit. Our work adds to the growing body of knowledge that dogs of the Iron Age were varied and possibly modified or selectively bred and moves beyond outdated ideas of limited dog variation prior to the Roman Conquest in 43 AD (e.g. Harcourt, 1974). Fishmonger's Swallet is a unique and significant insight into the human-dog relationships of the Iron Age and further adds to the hypothesis that smaller dogs were present in Britain in the Iron Age. It is worth noting that the depositional environment makes the swallet difficult to excavate and date, due to the lack of clear chronological stratigraphy. Therefore, it is highly likely this is only a small part of a wider faunal assemblage still present within the chambers, and that only the radiocarbon dated remains can be confidently assigned as contemporary to one another. As such, for the purposes of this report the animal remains will be considered as one assemblage, but it should be remembered that this may be the result of many different depositional events.

MATERIALS AND METHODS

Zooarchaeological Recording and Quantification

Identifiable specimens were recorded following the Cardiff University Bioarchaeology (CUBA) laboratory zooarchaeological guidelines. All fragments over 1 cm were analysed to gain the greatest information on this small and highly fragmented assemblage. All material, apart from vertebrae and pig/dog metapodials, were recorded using zones (adapted from Serjeantson, 1996).

Taxon, element, side, sex, and fusion were recorded. Material that could be identified by element but not by taxa was assigned either an informed estimate (e.g., Canidae *cf. Canis familiaris*) or categorised by mammal size. These categories were Large Mammal (LM: e.g., horse, cattle), Medium Mammal (MM: sheep, pig, large to medium sized dogs), Small Mammal (SM: small dogs, fox), and Very Small Mammal (VSM: vole, mouse). These categorised remains were fully recorded but excluded from the species-specific results and discussions. The inclusion of this broad data could affect the interpretations of the site, without the accuracy of a species-specific interpretation. Where identification to element or size group was not possible, due to the fragment size or condition, the fragment was recorded and catalogued as 'unidentified'. Within the identified remains, size groups were also used for the dogs to impart further information. The dogs are grouped into three general size categories based on element size and/or calculated wither height (large e.g., hound or Labrador-size, medium e.g., terrier or Corgi size, small e.g., lapdog or Cairn Terrier size).

The Number of Identified Specimens (NISP) in this report is a count of all identifiable fragments, both those catalogued by species (e.g., *Bos taurus*) or useful taxonomic grouping (e.g., Bird *cf.* duck) and by informative size category (e.g., LM - Large Mammal). The Minimum Number of Elements (MNE) was calculated for the main domesticated species using the zones, and for these calculations, symmetry was considered. The Minimum Number of Individuals (MNI) was calculated for the main domestic species, using the highest MNE results per taxa. The MNE and MNI were not calculated for the LM, MM, SM or VSM recorded elements. Finally, the preservation scores of the dog remains were determined by the number of identifiable element landmarks that were still present and identifiable (1 being poorly preserved and 5 being best preserved). The percentage survival of each element was also calculated following Brain (1981), where the maximum number of each element present is expressed as a percentage of the most frequently occurring left or right element (i.e., the number expected if all the skeleton was present).

Taphonomy and Pathology

Taphonomic evidence was recorded on all identified material, with butchery, gnawing and surface condition/staining recorded following CUBA guidelines. Burning was absent from the assemblage, as were some other taphonomic processes such as root etching. Any usual pathological features (i.e., osteophytes) were recorded. Unusual dental wear was categorised as excessive (dentine exposure) and/or unusually angled and/or on unusual surfaces of the tooth.

Taphonomy	1	2	3	4	5	6
Butchery	Chopped	Cut	Chopped and cut	Sawn	Worked	Intentional Fracture
Gnawing	Gnawed (canid)	Surface Gnawed (canid)	Heavy Gnawed (canid)	Digested (canid)	Rodent Gnawed	
Surface Condition/Staining	Blackened	Iron Staining	Waxy	Calculus		

Ageing and Sexing

Tooth eruption was recorded, where possible, for the mandibles of the cattle, sheep, pigs (Grant, 1982; Greenfield and Arnold, 2008; Halstead, 1985; Silver, 1969) and dogs (Gipson, *et al* 2000; Shope, *et al* 2019). Both loose and in-situ teeth were aged to maximise information recovery. Horse teeth, however, were not aged due to the inaccuracy of horse tooth ageing (Richardson and Waldron, 1994). Unusual dental wear was recorded as above. Fusion data was recorded, and Silver (1969) consulted primarily for cattle, horse, pig and sheep. For the interpretation of the dog fusion, Summer-Smith (1966) was consulted. Sexing of the dog material was attempted using humeri morphology following Ruscillo's (2002) 'table-top' methodology. For the other domesticated fauna, no sexing was recorded as there were no sexable elements present or complete enough for accurate evaluation.

Metrical Analysis

Measurements

Von den Driesch (1976) was consulted for all post cranial and mandibular measurements of the main domesticates and dogs. Small sample sizes preclude detailed metrical analysis for species other than dogs. For dog cranial measurements, Harcourt (1974) and Lüps (1974) were used.

Dog Withers Height Calculations

Withers height calculations were made using the greatest length (GL) measurements of complete elements. Two humeri, three radii and five metatarsals provided withers heights. For the long bone calculations Harcourt (1974, 154) is used and for metatarsal calculations Clark (1995, 22) is used.

Radiocarbon dating

Three right mandibles of dogs of different sizes were selected for dating. The sizes were estimated based on the mandibular M1 root width measurements (measurement number 14 in Von den Driesh [1976]) and ordered from largest to smallest. The samples were 1cm^2 in size and taken from the inferior-lingual portion. Results are presented in Bricking *et al*, 2022b, this volume. There are also two previous faunal radiocarbon dates – one canid and one bovine – which were dated to the late Iron Age - 35 cal BC (WK - 8223) and 40 cal BC (WK - 8224). However, no exact information is recorded about the elements used for these previous radiocarbon dates and they were destroyed for the analysis.

RESULTS

Assemblage Summary

The assemblage consisted of 1037 bone fragments, of which 563 were unidentifiable. 381 fragments were identifiable to species or informative taxonomic grouping. A further 93 specimens were assigned to a useful size grouping (e.g., LM) (see Figure 1 and Table 1).

The most abundant identified species was dog with 178 fragments, making up 38% of the NISP. There were an additional 14 fragments (3%) assigned to *cf.* dog, meaning this figure is likely to be higher. Horse, pig, sheep, and cattle collectively account for 31% of the NISP. Horse is the next most abundant individual species at 12% of the NISP (55 fragments), sheep 9% (44 fragments), cattle 8% (39 fragments) and pig 2% (9 fragments) (see fig. 1). More specimens from these species are also likely represented in the size categories, particularly ribs, vertebrae and cranial fragments. The results of the individual species will be discussed in detail in this section. Dogs are discussed in more detail separately due to their prominence in the assemblage (see Figure 1 and below).

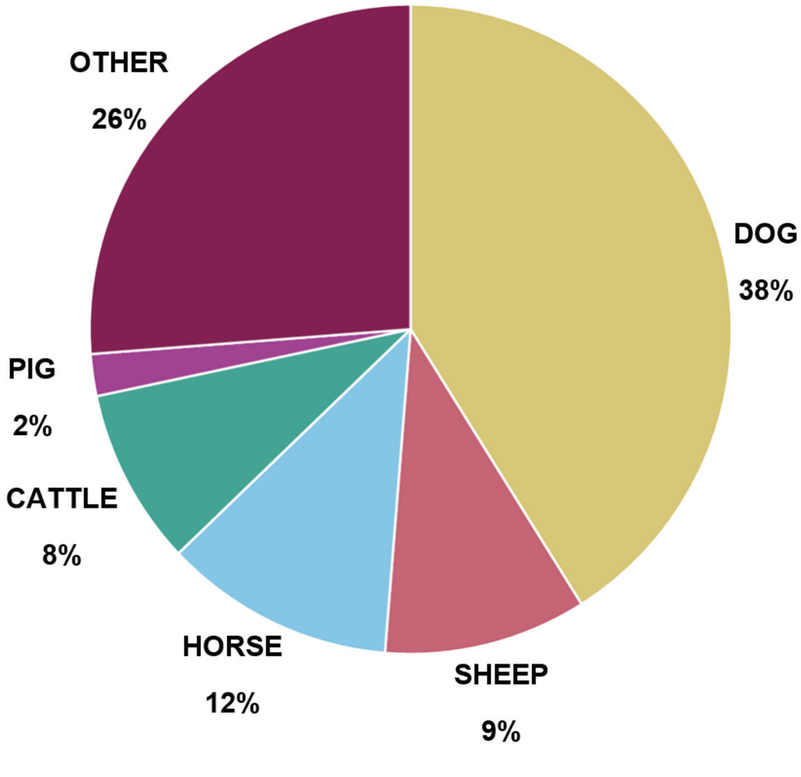

Figure 1. *Graph showing percentage NISP for main species (Other: size categories, minor species, and groupings such as* cf. *dog).*

FAMILY	SPECIES	COMMON NAME	NISP	%NISP
Canidae	*Canis familiaris*	Dog	178	37.6
Canidae	*cf. Canis familiaris*	*cf.* Dog	14	3.0
Equidae	*Equus ferus*	Horse	55	11.6
Equidae	*cf. Equus ferus*	*cf.* Horse	1	0.2
Bovidae	*Ovis aries*	Sheep	44	9.3
Bovidae	*cf. Ovis aries*	*cf.* Sheep	2	0.4
Bovidae	*Bos taurus*	Cattle	39	8.2
Bovidae	*cf. Bos taurus*	*cf.* Cattle	9	1.9
Suidae	*Sus scrofa*	Pig	9	1.9
Leporidae	-	Rabbit/Hare	5	1.1
Leporidae	-	*cf.* Rabbit/Hare	2	0.4
Canidae	*Vulpes vulpes*	Fox	2	0.4
Cricetidae	-	Vole	2	0.4
Erinaceidae	-	*cf.* Hedgehog	1	0.2
Aves	-	Bird	7	1.5
Galliformes	-	*cf.* Pheasant	2	0.4
Galliformes	-	-	2	0.4
Passeriformes	-	Blackbird sized	1	0.2
Anatidae	-	*cf.* Duck	1	0.2
Aves	-	*cf.* Bird	5	1.1
‘Large Mammal’			51	10.8
‘Medium Mammal’			15	3.2
‘Small Mammal’			26	5.5
‘Very Small Mammal’			1	0.2
TOTAL NISP			474	100

Table 1. *Table showing NISP and %NISP for assemblage.*

Species abundance and Size Categories (LM, MM, SM, VSM)

Fragments in these categories made up 20% (93 fragments) of the NISP, with LM (cattle or horse remains) the most abundant (see table 1). In these categories, 51 were identifiable to elements in LM, 15 in MM, 26 in SM and only 1 in VSM.

Main Domesticates (Horse, Sheep, Cattle and Pig)

Quantification and Element Abundance

The abundance of elements for horse, cattle, sheep, and pig is shown in Table 2. Mandible fragments were numerous. Horse is the most abundant by NISP and has MNI of three based on the distal right radius. Sheep have a slightly higher representation by MNI than by NISP, with at least 4 individuals calculated from the left mandible. The cattle MNI is two, calculated from left mandible fragments and astragali. Pigs have an MNI of two, calculated from left mandible fragments.

	ELEMENT	**FRAGMENT NO.**												**TOTAL FRAGMENTS**
		Horse			Cattle			Sheep			Pig			
		L	R	N	L	R	N	L	R	N	L	R	N	
AXIAL	Cranium			2			4							4
	Mandible		1		3			4	1		2	1		12
	Maxilla	2	2		2	4		1						10
	Scapula	1	2		1	1								4
	Ribs			2			3	2		1			2	3
	Pelvis		2			1		1				1		4
APPENDICULAR	Humerus										1	1		2
	Radius	2	3											9
	Ulna	1												1
	Phalanx	1		1			2			3			1	1
	Femur		1	1	1									1
	Tibia	1						1						2
	Patella	1												1
	Astragalus	1				2								3
	Calcaneus							1	1					2
	Metapodials	1	1	1	1					1				3

Table 2. *Total numbers of fragments for the main domesticate assemblage, recovered from Fishmonger's Swallet.*

Tooth Wear and Epiphyseal Fusion Ageing

Sexing was not possible within the main domesticate assemblage due to a lack of applicable elements found. Ageing data was also limited; however, some information was obtained from tooth wear and epiphyseal fusion.

The fusion and dental data for cattle places the individuals between neonate to 2½ years at age of death - with proximally and distally unfused neonate femur, unfused pelvis, unfused vertebral plate, porous astragalus and a mandible aged to 17-30 months (see Table 3; Silver, 1969: 253). The fusion and dental data indicate that most of the sheep (75%) died before the age of three years, with at least two animals of 3-4 years (37-40 months) represented by both fusion and dental data (see Table 3; Popkin *et al* 2012: 1783-1784). The horse remains are largely fused, with a single distal femoral epiphysis recovered, making this individual <3-3½ years old at death (Silver 1969, 253). Finally, for the pig remains, two distal humeri epiphysis were unfused, indicating animals of <1 year old, which correlated with the dental data that indicates the pigs died before 12 months. Mandibular eruption and wear-based age estimates for cattle, pig and sheep mandibular teeth are shown in Table 3.

TAXON	AGE	STAGE	REFERENCE
Ovis	4-6 months	Juvenile	Payne 1973
Ovis	17-30 months	Subadult	Payne 1973
Ovis	at least 17 months	Adult	Payne 1973
Ovis	at least 17 months	Adult	Payne 1973
Ovis	37-40 months	Adult	Payne 1973
Ovis	37-40 months	Adult	Payne 1973
Sus	2-8 months	Juvenile	Grant 1982
Sus	2-8 months	Juvenile	Grant 1982
Sus	2-8 months	Juvenile	Grant 1982
Bos	17-30 months	Subadult	Silver 1963, Halstead 1985

Table 3. *Age at death estimations for the main domesticates based on tooth wear analysis*.

Taphonomy and Pathology

Butchery and canid gnawing was recorded on cattle, horse, and sheep elements (see Table 4). Two cattle mandibles and a pelvis had fine cut marks, the latter was also canid gnawed. A horse ulna featured cut marks, a horse metapodial and femur had possible helical fractures, as well as canid gnawing on both elements. This helical fracture estimate is based on analysis of the fracture type outlined by Karr and Outram (2015: 207). A sheep metatarsal featured cut marks, and a pelvis had been sawn. The butchery may represent food preparation, storage, or other processing, but the small assemblage size limits interpretation. The horse and cattle elements with butchery marks also feature canid gnawing. Pigs had evidence of gnawing on a mandible and humerus, but no signs of butchery, possibly due to the small number of fragments in the assemblage.

TAXON	BUTCHERED (%)	GNAWED (%)
Horse	6	4
Cattle	8	5
Sheep	5	2
Pigs	0	22

Table 4. *The taphonomy observed on the main domesticate assemblage.*

Blackened cave staining, associated with waterlogged environments, as well as 'waxy' surfaces, iron-stained surfaces were noted on elements of the main domesticates, as well as stalactites on a cattle cranium. Two horse elements were pathological, with osteophytes on a phalanx and a rib.

Wild Mammals

Wild mammals make up 2.6% of the NISP, represented by rabbit (1.5%), fox (0.4%), vole (0.4%) and hedgehog (0.2%) (see table 1). It is not possible to say if this is a mixed period site without radiocarbon dating, though the only non-native species (rabbit) has recently been dated to as early as the 1st century AD at Fishbourne Roman Palace (part of an ongoing project – The Easter E.g.,). There is no taphonomic evidence of butchery or gnawing found on the remains and so the wild mammals are likely a non-anthropogenic inclusion and will not be discussed further.

Birds

Bird makes up 3.2% of the NISP, with the large proportion (2.4%) of the material fragmentary. Galliformes and Anatidae remains were identified (see Table 1). As for the wild mammals, it can be postulated these are a non-anthropogenic inclusion in the overall assemblage, as all could occur in the area. It should be noted that the Galliformes *cf.* Pheasant are likely a later intrusion.

Dog Assemblage

Quantification

Dogs are the most abundant species at 38% of the NISP, with cranial and post-cranial elements represented. There are a range of sizes and shapes represented. Mandibles are the most abundant element and provide an MNI of 9. Survival rates are calculated as the percentage of elements present compared to that expected from the MNI. Figure 2 provides an estimate of the proportion of the dog skeletons present through the survival rates of the remains. There are at least two of a small/medium, robust type dog present; these are represented by two fragmentary craniums and an associated bone group (ABG) forelimb, which represent a minimum of two terrier-like animals. In height, the forelimb appears small and will therefore be discussed as such, however, the robustness of the morphology places it into probable association with the crania, which could be classified as medium. The notable morphology of these crania and forelimb are discussed further in the results and discussion sections.

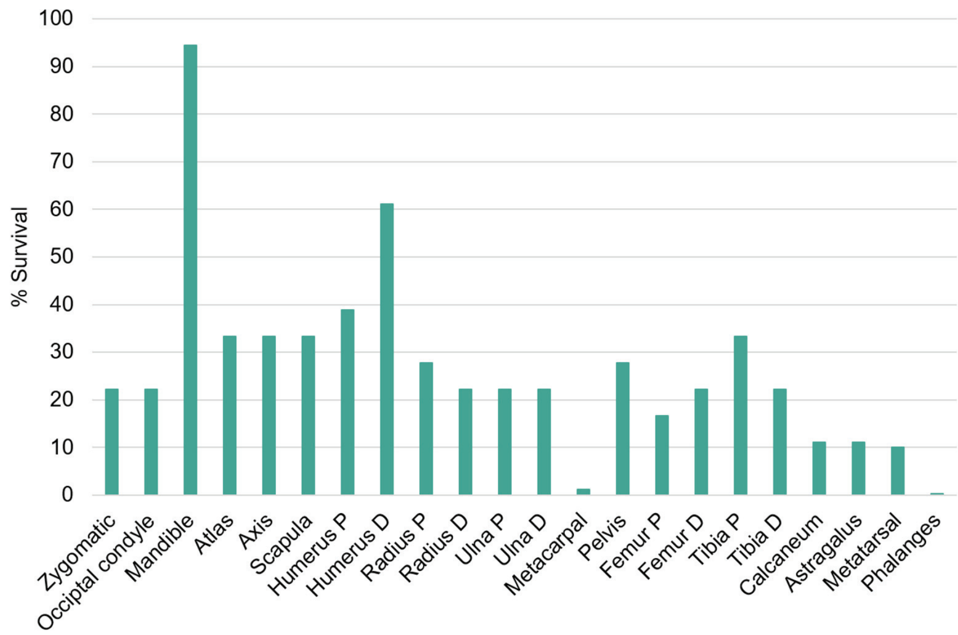

Figure 2. *The survival rate (%) of dog elements recovered.*

Metric Analysis - Withers heights

Metrical analysis of the dog remains was limited due to the high fragmentation. Withers height estimates were calculated from the greatest length (GL) measurements of two complete humeri and three radii after Harcourt (1974) and five metapodia using Clark (1995). The withers heights represent at least 3 individuals, based on the number of right 5th metatarsals. The range from 29.3 cm to 60.8 cm, indicates a high degree of size variability within the dog assemblage.

Metric Analysis – Cranial Morphology and Metrics

The only two dog crania are morphologically similar and may derive from dogs with similar physical characteristics. Cranial measurements were taken to compare with a similar Iron Age dog crania from Trumpington, Cambridge (Baxter and Nussbaumer, 2009) which is comparable in morphology and period. The measurements from both sites are very similar (Baxter and Nussbaumer, 2009: 71-72) (see Figure 3 and Table 6) with differences ranging from 0.2 mm to 5.3 mm.

ELEMENT	SIDE	WITHERS HEIGHT (CM)	MODERN BREED COMPARATIVE
Radius*	R	29.6	Jack Russell Terrier X
Humerus*	R	36.6	Jack Russel Terrier X
Mt 5	R	39.0	Jack Russel terrier X
Mt 5	R	47.1	Spaniel X
Mt 5	R	49.0	Spaniel X
Radius	L	49.3	Labrador X
Mt 2	R	50.1	Labrador X
Mt 3	R	50.3	Labrador X
Radius	L	56.2	Alsatian
Humerus	L	60.8	Boxer

Table 5. *Wither heights calculated Harcourt (1974) and Clark (1995). Modern breed comparisons are taken from Table 3 from Clark (1995: 25). The asterisk (*) indicates ABG forelimb.*

HARCOURT CODE	FISHMONGER'S SWALLET (MM)	TRUMPINGTON (MM)	DIFFERENCE (MM)
I	167	161.7	5.3
II	92.3	89.9	2.4
III	83.7	77.3	1
IV	-	95.9	-
IX	-	81.9	-
X	61.5	62.3	0.8
XI	62.2	60.2	2
XII	36.6	36.8	0.2
LÜPS CODE	**FISHMONGER'S SWALLET (MM)**	**TRUMPINGTON (MM)**	**DIFFERENCE (MM)**
B	-	148.1	-
C	-	94.8	-
D	-	51.3	-
E1	17.2	18	0.8
F	36.6	36.8	0.2
G	-	95.9	-
H	47.7	53	5.3

Table 6. *Measurements of dog crania from Fishmonger's Swallet and comparative site Trumpington, using codes from Harcourt (1974) and Lüps (1974), Trumpington measurements taken from Baxter and Nussbaumer (2009).*

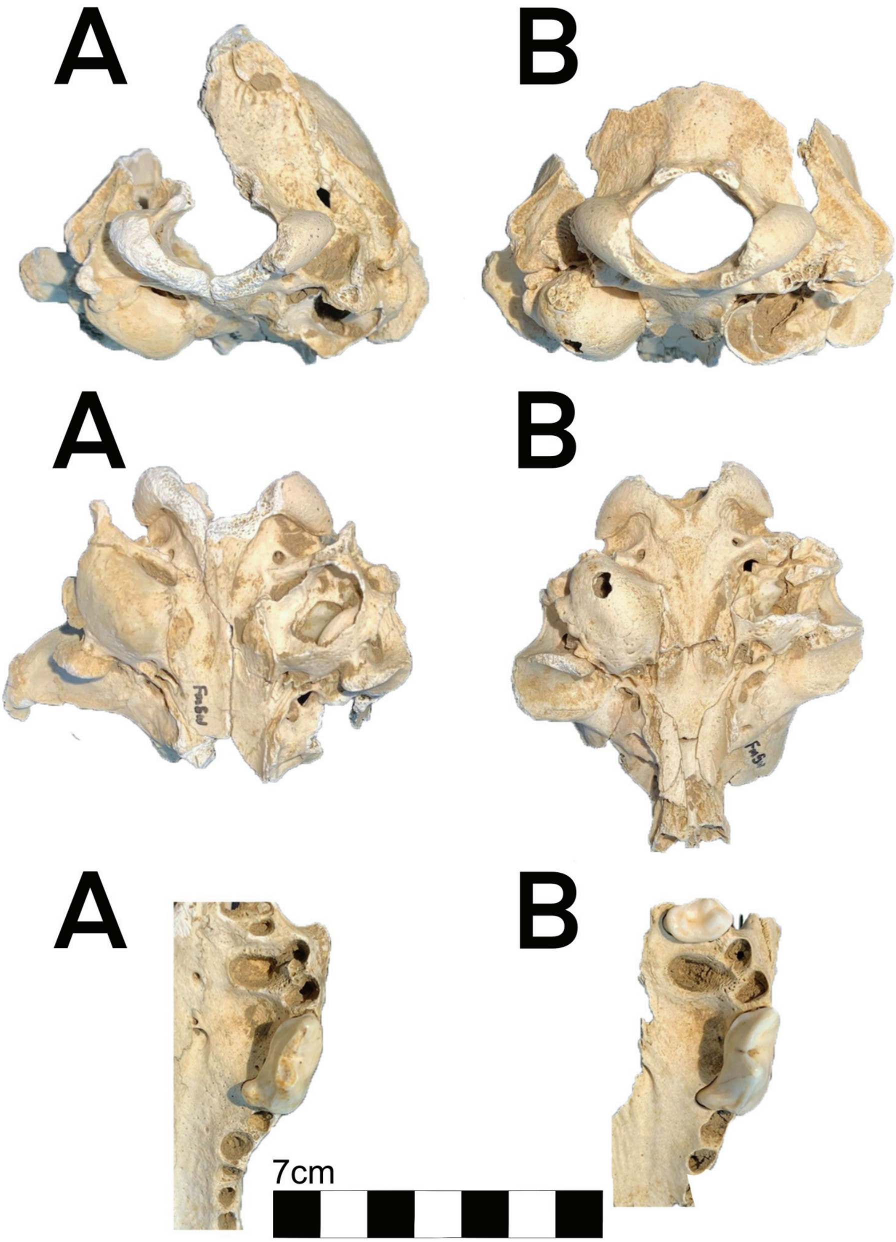

Figure 3. *A comparison of the (A) and (B) crania. They appear morphologically similar and could be from the same dog type. (Top Row) The foramen magnum differs slightly, with the (B) foramen rounder, and the posterior generally flatter and wider. (Middle Row) The foramen appears wider on (A) and tympanic bulla large. (Bottom Row) The maxilla and P4 teeth are nearly identical in size and shape.*

Photo © Jessica Peto

Metric Analysis – Mandibles

The mandibles varied in completeness, with the M1 and surrounding area the most commonly intact portion allowing measurements to be taken (see Table 7). There is a wide variation in size and shape. The smallest adult mandible (Dog 202) is 19.3 mm across the M1 root and the largest adult mandible 25.8 mm (difference = 6.5 mm). The small size of Dog 202 is significant for its size and will be highlighted in the discussion.

M1 Width (mm)	-	*21.5*	*21.5*	22.9	*23*	*23.4*	23.5	23.9	24.6	*25.6*	*25.6*	**26.1**	**26.1**
M1 Root Width (mm)	19.3	*20.9*	*21*	22.9	*22.2*	*23.4*	22.2	22.2	22.7	*24.1*	*25*	**24.6**	**25.8**

Table 7. *Measurements of mandibles followed Von den Driesch (13 and 14) (1976). Numbers in bold indicate known associated mandibles, numbers in italics indicate possibly associated mandibles.*

Taphonomy and Pathology

A small portion (less than 1%) of the dog elements feature black and/or orange staining from the cave's waterlogged environment. Cut marks were recorded on a single right mandible. Three elements feature possible canid gnawing: a humerus, a tibia, and a radius. The gnawed radius also has a modern hole, likely damaged in the swallet after deposition or during excavation. The preservation condition of the dogs is 4/5. A single element (a right 5th metatarsal) is the only element to exhibit osteophytes.

The ABG forelimb associated with crania (A) or (B) based on size and zooarchaeological inference in the lab during analysis, has a distinct morphology with a short, robust, curved appearance like that seen in Pembrokeshire Corgi held in the CUBA reference collection (see Figure 4). This morphology is common in dogs with dwarfism, such as modern Corgis and Dachshunds and is scientifically referred to as achondroplasia (Parker, *et al* 2009: 996). In dogs this condition stems from genetics, specifically the retrogene fgf4 that affects certain breeds of domestic dog (Parker, *et al* 2009: 996). Although not found articulated, the specimens articulate precisely in the lab.

Notable Mandible Wear

Many carnassial (mandibular M1 and maxillary P4) teeth are heavily worn – some wore at an angle and to the point of dentine exposure (Clarke, 2014; see Figure 5). A loose right and an in-situ left canine both exhibit unusual wear patterns on the medial and lateral sides. Heavy wear can be associated with age, damaging substrates (i.e., coarse food), behaviour, or tooth crowding in the case of the small mandible. It may have impeded the dogs' ability to process their food, capture prey and could affect ageing estimates, as ageing is based on the visual assessment of the carnassial teeth (Gipson, *et al*, 2000). In canines the heavy wear is suggestive of prolonged contact wear (see Figure 5); that is an extended period in which teeth are rubbed against a respective canine, an object or both to the point of damage. Antemortem tooth loss of a P2 is present on one right mandible.

Figure 4. *A comparison of the ABG right forelimb. Left: The Fishmonger's forelimb. Right: The CUBA reference collection Corgi forelimb.*

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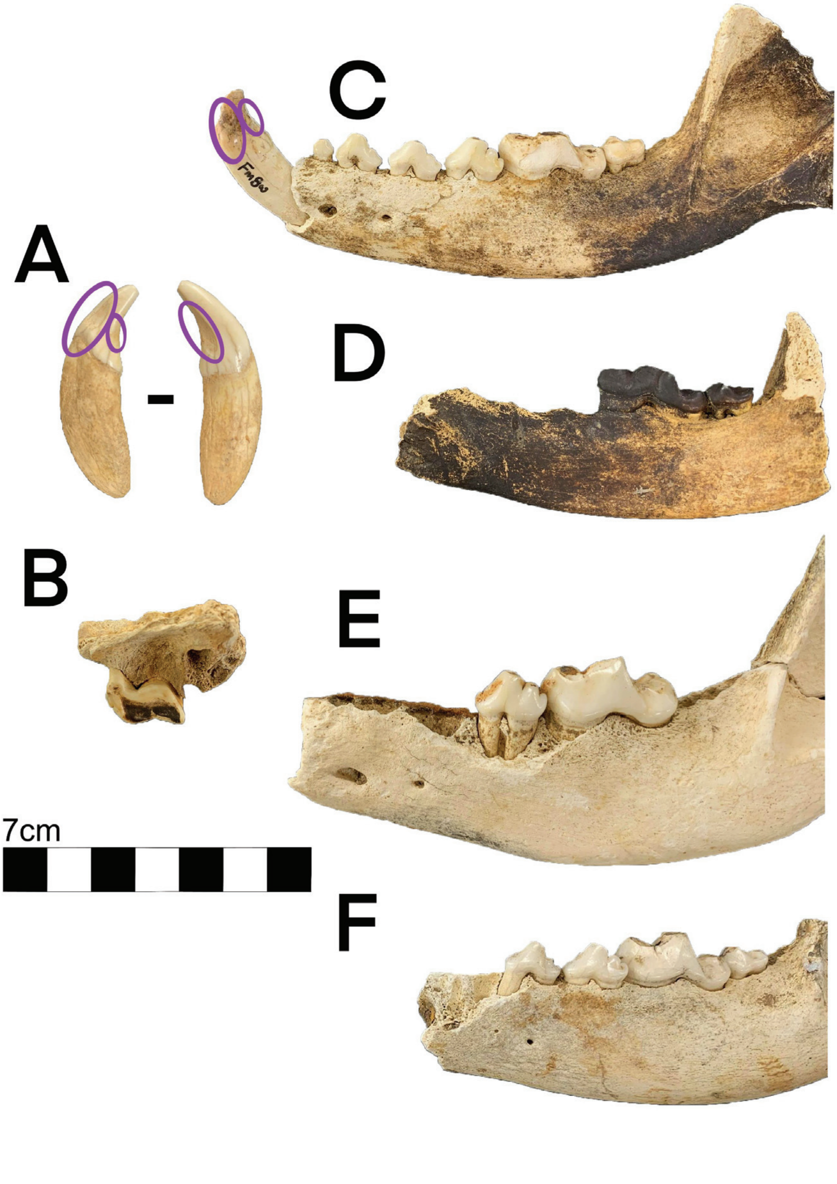

Figure 5. The unusual and excessive dental wear found on two dog canines and five M1s. Locations of the unusual wear is highlighted by purple ovals. A: Loose canine both lateral and medial sides. B: Unusual canine and excessive M1 wear. C: Excessive, usual P4 wear – exposure of dentine. D, E, F: Possibly excessive M1 wear.

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Ageing and Sexing

Ageing and sexing data is limited due to preservation. Carnassial tooth wear and eruption provide an age range of between 4 months and 12 years of age, with 6-8 years the most represented range with a minimum of two individuals based on siding (Gipson, *et al* 2000, Shope, *et al* 2019). Most elements were fully fused (97%) and indicated the presence of animals over 40 weeks of age. Five elements (three vertebral plates, one proximal femur and one innominate) were unfused. The unfused femur indicates an individual younger than 24 weeks (Riser 1975; Summer-Smith 1966) (see Table 7).

ELEMENT	AGE	REFERENCE
L. Maxilla	>4 months	Shope et al 2019
L? M1	>5 months	Shope et al 2019
R. Mandible (Dp4, M1)	>5 months	Shope et al 2019; Gipson et al 2000
L. Mandible (P2, P4-M2)	>5 months	Shope et al 2019; Gipson et al 2000
R. Maxilla	>5 months	Shope et al 2019
R. Mandible (P3, P4)	4-6 months	Shope et al 2019
R. M1	>6 years	Gipson et al 2000
L. Mandible (P3-M2)	6-8 years	Gipson et al 2000
R. Mandible (M1, M2)	6-8 years	Gipson et al 2000
R. Mandible (P3-M1)	6-8 years	Gipson et al 2000
R. Maxilla	6-8 years	Gipson et al 2000
L. Maxilla	6-8 years	Gipson et al 2000
R. Mandible (M1)	About 8 years	Gipson et al 2000
L. Mandible (P4, M1)	8-10 years	Gipson et al 2000
R. Mandible (M1, M2)	About 10 years	Gipson et al 2000
L. Mandible (P4-M2)	About 10 years	Gipson et al 2000
L. Mandible (P2-M2)	10-12 years	Gipson et al 2000
FUSION AGEING		
Pelvis	>12 weeks	Riser 1975
Femur	<24 weeks	Summer-Smith 1960

Table 7. *The ageing data available from both dental eruption and wear, and fusion examination of the dog assemblage. Eruption minimum ages are shown using Shope*, et al *2019.*

Sexing information was limited, as no baculum was recovered and complete humeri used for the Ruscillo (2014) table-top method were rare. This method did indicate that there were at least two females, from a left and right humerus. One is from the ABG, robust forelimb. It is possible the morphology of the bone may have affected the test accuracy, as this has not been factored into the method.

DISCUSSION

Accumulation

Faunal material is thought to have accumulated in the bone chamber via water flow through the swallet or cave system and this matches accumulations in the Mendip swallets and Read's Cavern, Somerset (Marcucci and Kerns, 2011: 179). This is reflected in the disarticulated nature and taphonomic characteristics of the domestic assemblage. The presence of associated material (the ABG) in the canid assemblage suggests that at least some of the dog assemblage was deposited whole. If the remains had travelled through the cave system, it is unlikely that association would be preserved. This suggests that the dogs' depositional processes are different to the other fauna.

The Dog Assemblage

The canid assemblage provides an opportunity to further understand dogs and human-dog relationships in prehistoric Gloucestershire. This section will address the possible source of these animals and use the morphological and metrical results to compare the dogs to other Iron Age assemblages and iconography.

The proposed fluvial transport of the assemblage makes it difficult to assess the source of the canid material. Previous stable isotope (Sr84/Sr86) analysis suggests the animals are locally raised (Horton, 2022, this volume). In terms of chronology, four individual dogs - one small, one medium/robust, one large and one of unknown size - have all been dated to the late Iron Age (Bricking, *et al*, 2022a, this volume). This could indicate that the remainder of the dog assemblage is contemporaneous, but this cannot be confirmed until further dating occurs.

The material represents dogs of large, medium, and small size. This range is unusual within the morphologically homogeneous 'standards' of the Iron Age, defined by earlier works such as Harcourt 1974. This suggests that selective breeding has taken place resulting in a greater diversification of sizes and shapes (Hoard-Herbin 2014, 25-27; Clark 1995). Within this report, the word 'type' is used to describe canid characteristics - as opposed to breed - follows the example of Clutton Brock (1987) and Cram (2000, 171). This avoids direct comparison with modern breeds, as this would be a misrepresentation (Clutton Brock 1987; Cram 200, 171). Modern breeds are used as comparisons for archaeological dogs to explain what a 'type' or size and shape of a dog looks like but only to help with visualisation.

Dog Type and Deposition

Small Dog Type Representation

One of the most interesting specimens is a very small dog right mandible – Dog 202 (see fig. 6), though missing the M1-3, P1 and canine. The M1 root width is 1.6 mm smaller (at 19.3 mm) than the next smallest mandible (20.9 mm). The mandible is notably gracile, and may be representative of a miniature dog, as opposed to a dwarf, but more elements are needed to explore this. The positioning of the mental foramen shows variation in comparison to the other dogs. The animal can be aged by tooth development, the permanent first molar (M1) has erupted giving this animal an age of at least 5-7 months, this is determined by the lack of M1 within the crypt. Whilst smaller breeds often reach full size by 6 months, for medium and large breeds, growth can continue until 12 months. Without additional information, e.g., tooth wear, it is not possible to confidently say if the individual is fully grown. This directly dated (126 cal BC) mandible represents one of the earliest small dogs in the British archaeological record. There are two other fragmentary Iron Age mandible specimens of a similar small size, root widths 20.9 mm and 21 mm, and gracile shape in the Iron Age. Other comparably small but more fragmentary mandibles were recovered, with root widths of 20.9 mm and 21 mm, and gracile shape in the assemblage. It is possible these two fragments represent one individual - dog G10.21.71 (now Dog 71).

Figure 6. *The complete but fragmentary remains of the smallest mandible in the dog assemblage (G10.21.202 aka Dog 202). This has been identified as a dog of at least age 5-7 months but likely older due to no M1 found in crypt. (Peto, 2021; Shope,* et al *2019).*
Photo © Jessica Peto

Other comparably sized mandibles have been found in Iron Age southern Britain. At Edix Hill, Barrington, Cambridgeshire, a small and gracile dog mandible is dated to 150 BC – 50 AD (Davis 1995: 1-3). This had the M1 present in-situ and could be aged to over 5-7 months and in size it is smaller than a modern Jack Russell (Davis 1995, 3: appendix). Another two smaller dog mandibles were recovered from Coombe Down South on Salisbury Plain. One was recovered from a Middle Iron Age context (A51) and another from a Late Iron Age/Romano-British context (A64) (Powell, *et al* 2006: 186-8, 197). The former (A51) is a slightly larger and older individual (see Table 8; Powell *et al* 2006: 179) and is comparable in size to the undated mandible (dog 71) at Fishmonger's. The A64 mandible is described as like a modern Cairn Terrier and is compatible in size to Dog 202 (see table 8; Powell, *et al* 2006: 179, 186). Dog 202 may also be of this type.

	FISHMONGER'S SWALLET		COOMBE DOWN SOUTH	
	DOG 202	DOG 71	A64	A51
4	98	-	-	106.2
5	92.4	-	-	99.8
6	94.5	-	-	-
7	65.8	73.4	-	70.9
8	62.8	69.9	60.8	66.2
9	50.3	65.9	-	61.2
10	31.4	34.4	32.1	33.3
11	33.1	35.3	30.5	35.5
12	29.9	31.4	-	30.4
13	-	21.5	-	-
14	19.3	21	19.4	20.1
15	-	-	9.3	9.3
16	-	-	4.2	5
17	-	-	10.2	10.3
18	31.7	-	44.4	48.7
19	-	21	19.8	21.3
20	-	18.8	16.7	16.7

Table 8. *Comparative mandible measurements of Dog 202 and Dog 71 from Fishmonger's Swallet and the mandibles from Coombe Down South, Salisbury Plain. The Coombe Down South metrics are taken from Powell,* et al, *2006: 179.*

The withers height calculation for the robust ABG forelimb indicates an animal of 29.6 - 36.6 cm. Another estimate from a metatarsal indicates a similar withers height of 39 cm. This could represent the same individual or a similar type, though it is not possible to see if they articulate. Specimens of a similar height include a gracile dog at Silchester, dated to 110 cal BC – 60 cal AD, with a withers height of 24 cm (Clark, 2018: 274) and other gracile dogs at Skeleton Green, dated to between 15 – 40 AD, were of a similar height (27.5-30.8 cm) (Ashdown and Evans, 1981: 213-214; Harcourt, 1974). The robust nature of the small dog with the ABG forelimb appears to be more unusual within the comparative Iron Age record. There are however similar stature animals found in small numbers, at the Iron Age sites of Owslebury and Danebury, in Hampshire (Grant, 1984: 524; Maltby, 1987). Therefore, there are at least two types of small dog type represented at Fishmongers swallet, both gracile and robust, and these provide further evidence of a range of dogs being present in southern Britain at this time. Small dogs, with withers heights at or less than 30 cm, may have been more frequent in and around Gloucestershire earlier than previously thought. Prior to the identification of the Silchester 'toy poodle' (Bennett and Timm, 2018: 61), the breeding of smaller dogs was believed to have begun in the late Iron Age, from c.80 BC. The lower ranges of the dating of the smaller animals from Fishmonger's Swallet and Silchester provide tentative evidence of this process occurring earlier.

The exact functions of these gracile and robust small dogs remain unclear. There is compelling evidence that smaller, gracile dogs – 'lap-dogs' – were regarded as luxurious or status symbols in the Roman Empire and Romano-British period (e.g., Harcourt 1974). The burial of the individual at Silchester, placed - carefully positioned, under the foundations of the house – reflect this status (Clark 2018, 274). The animal deposits at Fishmonger's are less structured and more like the disarticulated and deposited small dogs found with other fauna and human remains at Edix Hill (Davis 1995).

Figure 7. *A figurine of a terrier-like hunting dog excavated in the Roman fort site of Carrawburgh, Northumberland, a representative of a type of dog present in the Fishmonger's Swallet assemblage. (Toynbee, 1973: 104, 118).*

Rather than lapdogs the smaller, gracile animals at Fishmongers may have been working dogs, used for ratting (Bennett and Timm, 2018: 78). The more robust small dog represented by the ABG forelimb, was more suited to hunting and a terrier type. Such terrier type hunting dogs are represented in iconography and historic accounts from the late Iron Age and Romano British period. For example, a figurine of a similar dog was recovered from the Roman fort site of Carrawburgh, Northumberland (Toynbee, 1973: 104, 118) (see Figure 7). This figurine is thought to depict a type of hunting dog, bred in Britain prior to the conquest, and imported to Rome post-conquest (Akhand 2020, 12; Toynbee 1973, 104). Working dogs are likely to have held an important role in Iron Age society, as although not status symbols like the lap-dogs, they would have helped with day-to-day lives.

Figure 8. *Comparison of a modern Corgi skull (left) and cranium 34/35 from Fishmonger's Swallet.*
Photo © Jessica Peto

Medium Dog Type Representation

Two fragmentary crania recovered from Fishmonger's Swallet are medium sized; cranium 34/35 has a small sagittal crest and both have mesocephalic snouts. Metrical analysis demonstrated that cranium 34/35 is morphometrically like those recovered from Trumpington, Cambridgeshire (Baxter and Nussbaumer, 2009: see Table 7). Cranium 34/35 is lacking the zygoma, and so the cranial index cannot be calculated, and direct comparison to Harcourt Iron Age and Roman period dogs is not possible (Harcourt, 1974). This would have been a useful comparative as this cranium is not currently directly dated, however, a mandible that articulates with the cranium is dated to the late Iron Age. Like the group 3 forelimb, cranium 34/35 is comparable in size to a modern Corgi but different in shape (see Figure 8). As the high frontal portion and flat muzzle appear to streamline into one another and create the appearance of a flattened 'face' this individual is therefore more terrier-like in shape, as discussed, a type associated with hunting dogs.

Large Dog Type Representation

Large dogs in the assemblage are represented by both mandibles and by estimated withers heights of up to 60.8 cm. This is not as large as others found in Europe, which have reached up to 65 cm but it still sits outside the expected range laid out by Harcourt (1974: 151; Horard-Herbin, 2014: 26). There have been more recent records of large prehistoric dogs in Britain, such as those at the Late Bronze Age to Early Iron Age site of Cladh Hallan and Dun Vulan in Scotland (Horard-Herbin, 2014: 26; Mulville and Peto, 2021: 291).

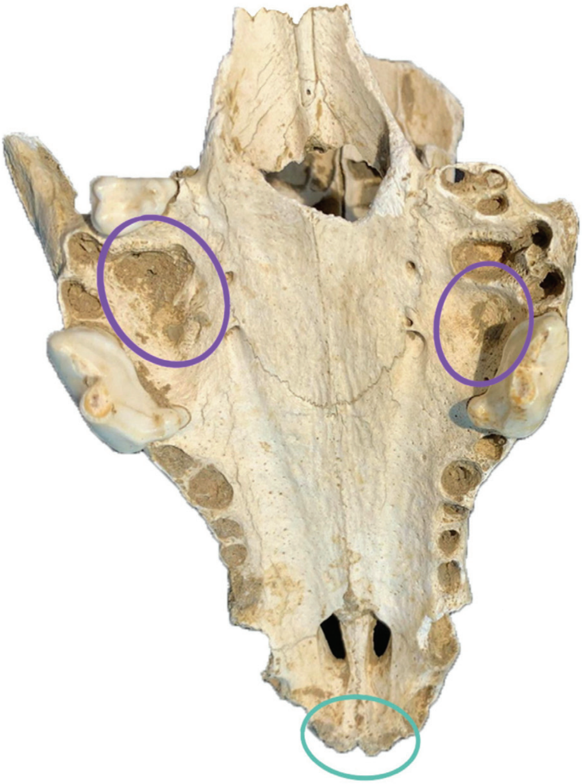

Figure 9. *The inferior view of the anterior cranium (G10.21.35). The antemortem tooth loss (green) and alveolar bone cysts (purple) are marked.*
Photo © Jessica Peto

Dental Pathology and Wear

The dental pathology present in the dogs suggests minor oral health issues within the dog population. Cranium 34/35 has significant incisor antemortem tooth loss and alveolar bone cysts (see Figure 9). The pathology can be caused by ill health or linked to the small size of the dogs and be a side effect of selective breeding. This can be particularly prevalent in terriers, and the cysts represent a progressed case of periodontal disease (Gorrel, 2013; Niemiec, 2008; Wallis and Holcombe, 2020: 530, 532). As noted above, some of the large dogs exhibit tooth wear, which would be attributed to everyday life and ageing, much like in humans, however this excessive wear is likely to be the result of repetitive activities, such as bone gnawing, which could correspond to the canid gnawing present on the other remains (Schubert, *et al*, 2010). However, the wear pattern does not follow what would be expected for excessive bone gnawing - it is heavy lingual surface wear, not buccal. The wear of the carnassial teeth instead indicates that the dog(s) may have been using the 'slicing' action of their teeth regularly, or perhaps eating coarse human diet scraps (Nowakowski and Burke, 2016). Further, excessive contact of the canines can be seen in dogs with an overbite and is seen in some modern larger breeds, such as Irish Wolfhounds (Clarke, 1972). Similar wear has not been widely reported in prehistoric dogs, and only other reported example is from the burial of dog 3380 at Cladh Hallan, Scotland, which is of a similar size to the dogs with unusual canine wear at Fishmonger's (see Figure 10).

Figure 10. *A right maxillary canine of dog 3380 from the Bronze Age/Early Iron Age site of Cladh Hallan, South Uist. The canine exhibits a similar wear pattern to the canines from Fishmonger's Swallet.*

Photo © Jessica Peto

Ageing and Sexing

The only elements that could be sexed (two humeri) demonstrated the presence of females. This information, combined with evidence for juvenile dogs, suggest a breeding population contributed to the assemblage. The source material comprises a diverse mix of dog-types, and a wide range of ages, implying a varied population being used for work, as pets and as breeding dogs.

Protectors? Midden Fodder? Why are the dogs here?

Dogs are significant in the Iron Age, both ritually and in everyday life. This can be clearly seen by the depositions of dogs beneath houses, such as at Cladh Hallan and Silchester, symbolising the dog protecting the threshold (Smith, 2005: 38-39; Wheeler, 1943: 115). With their strong association with guarding and protection, dogs are also often found with human remains in Iron Age contexts (e.g., pit burials from Andover, Hampshire) (Smith, 2005: 30-31). Therefore, in one respect, this deposition may be symbolic, possibly referencing the guarding or protection of the humans. It may be the case that this only applies to some of the dogs, perhaps the larger and more guard type dogs. It is possible that this deposition represents a sacrifice to a hunting God, such as the god Nodens, who is strongly associated with the area and later nearby temples such as Lydney Temple. Lydney Temple is later, between 305-367 AD, with the exact date debated (Casey and Hoffman, 1999: 81-115; Shotter, 1973: 206-209; Smith, 1994; Smith, 2005: 199-201; Wheeler and Wheeler, 1932: 102-104). However, figurines and mosaics from Lydney Temple have a strong correlation to the dogs recovered from Fishmonger's (see Figure 11). It may be possible that the swallet represents an earlier form of this worship practice. Nonetheless, the dogs are not obviously sacrificed as no trauma is observed on the remains, therefore if they were sacrificed, it was likely via drowning or another 'invisible' death. Dogs are rarely found in cave contexts in the archaeological record, particularly in the Iron Age. However, they are found in other periods, such as the late Medieval in a cave at Overton, Wales (Cooper and Hughes, 2021). Therefore, the context here is unusual and likely indicates that something more is happening here, perhaps something specific to the local area.

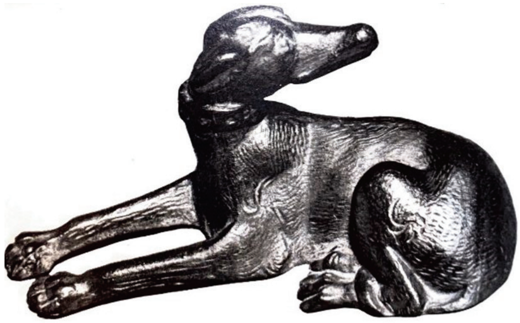

Figure 11. *Left: A figurine of a large hunting dog found at the Roman site of Lydney Temple, Gloucestershire. Physically like dog type present at Fishmonger's Swallet based on size. (Image after Toynbee, 1973: 118). Right: The 'licking dog' statue recovered from close to Lydney Temple, Gloucestershire. The bronze statue is dated to AD 318-450. PAS ID: GLO-BE1187 (image after Andreski 2017.*

However, the simplest explanation and one that must not be overlooked, is that the whole faunal deposit represents a culled and/or waste assemblage. This due to the disarticulation of the dogs, and this is something also observed at Owslebury (Maltby, 1987). Further, some of the taphonomy present, such as the dog bite marks observed on faunal elements, suggests that the remains were likely exposed prior to deposition. It is likely that they were accessible to dogs after death and therefore likely spent time elsewhere. Alternatively, the assemblage may be mixed with some disarticulated, and other more structured depositions (as is hinted at by the ABG).

Main Domesticates (Horse, Sheep, Cattle and Pig)

The main domesticates represented at Fishmonger's Swallet remain, unlike the dogs, undated, apart from a single bovine bone. This bone, WK-8223, was dated previously to the late Iron Age. This would make it contemporary with the youngest dog date from WK-8224 (Bricking, *et al* 2022b this volume). However, without further dating, it cannot be certain that all the faunae are contemporary. Therefore, the interpretation of the main domesticates remains more to period interpretation. Overall, the assemblage indicates a waste deposit, possibly built up through several separate depositions, or accumulated in the chamber after travelling through the cave system. The taxa and elements are typical and some butchery methods, such as the sawn sheep pelvis, could be indicative of a later depositional date for this element based on butchery practices. The elements that feature cut marks are indicative of skinning or meat processing, for example, the cut marks on the mandibles and the pelvis (Foster, 2016: 29). The cattle and sheep were likely used for meat, as opposed to traction, milk and/or wool. The gnawing evidence on many of the domesticate bones indicates that they were accessible to dogs for a period after death, either outside of the cave or inside. However, this further adds to speculation that this is a waste deposit, used to feed both humans and dogs.

In one hundred and fifty prehistoric (middle Bronze Age to Late Iron Age) sites reviewed by Hambleton (2008), cattle were found to be the second most abundant species on site in 59% of the assemblages. Therefore, cattle only being 8% of the NISP here would make it an atypical prehistoric British site (Hambleton, 2008: 58). In the same review, assemblages, horse was found to be the fourth most abundant species at 61% of sites, and therefore it appears at Fishmonger's Swallet there is a reverse trend (Hambleton 2008, 71). This indicates this is the accumulation of several waste deposits across periods, not just the Iron Age. The higher percentage of sheep is more typical of a late Iron Age assemblage (Hambleton 2008, 58). Small percentages of pigs are typical for both Iron Age and Roman rural settings. However, they are evidenced as being most represented at military sites, major settlements, and villas - as pigs are thought to be associated with specific dietary preference and status (Hambleton 2008, 66; Maltby 2014, 8). Therefore, this could function as evidence that this assemblage is not the waste of a military camp or major settlement. With the lack of radiocarbon dating, it is difficult to say if this assemblage is contemporary to the human and dog deposits. However, with the presence of the gnawing, there is certainly access to the remains by dogs at some point before or after deposition. There are no obvious signs of sacrifice on the fauna.

CONCLUSIONS

In conclusion, the main domestic faunal assemblage is a multi-period waste deposit which animals were utilised around the swallet; however, the dog assemblage provides a valuable insight into size and shape diversity in the late Iron Age in Gloucestershire. This can tell us about how specific dog types may have been used and treated. The burial context, with likely whole dogs deposited with contemporary human remains, raising questions about ritual and symbolism. It is difficult to draw conclusions about the purpose of the deposition, due to the lack of taphonomic evidence on the dog remains that would be able to tell us about how they died. A suitable conclusion that can be drawn from this is that the dogs either died or were killed in a way that is invisible to the naked eye, and more light could be shed on their death through further scientific analysis. The purpose of the inclusion of the dogs with the humans in this burial could be a sign of early dog-based healing or death cult practices, which are later seen more overtly in Romano-British temples, such as Lydney Temple. The discovery of similar dog types in the form of figurines, recovered in and around Lydney Temple, close to Fishmonger's Swallet but much later, can be used as evidence to substantiate this theory. However, this is something that can be explored further as the project progresses, more excavations take place, and the results of the scientific analysis are compiled.

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