GLASTONBURY ABBEY ARCHIVE PROJECT: ANIMAL BONE

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Introduction

The assemblage comprises 981 fragments of hand-recovered animal bone; the majority of this material is from excavations undertaken by Radford between 1954-1964, the rest was recovered from the 1979 excavations undertaken by Wedlake or is of uncertain provenance (i.e. no context or excavation date).

The assemblage is quantified in Table 1 by excavation area. The largest sample is from Radford's excavations within the cloister (*c.*94% of the total), in particular from mid-12th century contexts beneath the floor level (71%); a further small amount of bone was recovered from within and underneath three Late Saxon glass furnaces. Very little material was recovered/retained from the other areas of the site. Given the unequal distribution and the generally small size of the assemblage, it is considered as in the following sections of the report.

Methods

All anatomical elements were identified to species where possible, with the exception of ribs and vertebrae, which were assigned to general size categories. Where appropriate the following information was recorded for each fragment; element, anatomical zone, anatomical position, fusion data, tooth ageing data, butchery marks, metrical data, gnawing, burning, surface condition, pathology and non-metric traits. This information was directly recorded into a spreadsheet and cross-referenced with relevant contextual information. A detailed methods statement is provided in the site archive.

Quantification methods applied to the assemblage include the number of identified species present (or NISP) and were appropriate the minimum number of individuals (or MNI). The calculation of MNI is based on the most numerous zone of a single element taking into account anatomical position (i.e. side).

Results

Recovery, preservation condition and taphonomy
Hand-recovered assemblages of animal bone are generally biased in favour of large bone fragments and therefore the bones of larger species, in particular mammals (Payne 1992). This is to some extent true of the Glastonbury Abbey assemblage, however in this instance the large fragments are mostly bird bones. This result is unsurprising given the dietary restrictions imposed on monastic communities according to the Rule of religious observance as set out by St Benedict, which stipulated that fish and the meat of birds were allowed but the meat of quadrupeds was forbidden. The sample of hand-recovered bones is therefore broadly representative of the dietary range of the Glastonbury monks, while the lack of sieving accounts for the near absence of fish bones.

The condition of bone fragments is consistent between contexts and is generally good to fair. There is little or no sign of weathering and fine surface details such as cut marks are clear and easily observed when present. This suggests that bones were deposited and buried

fairly rapidly, rather than being allowed to accumulate on the ground surface where they would have been exposed to physical weathering such as changes in moisture and temperature, and the affects of rolling and trampling. This theory is supported by the low incidence of gnawed bones (<1% of the total).

Species represented and their relative importance
Approximately 49% of bone fragments are identifiable to species and element (Table 2). Bird bones dominate the assemblage (61% NISP; Figure 1) and at least thirteen separate species have been identified. The small mammal bone assemblage is mostly made-up of the bones from livestock species.

Avian species
Chicken is the dominant species in the assemblage (*c.*32% NISP) and at least 22 individuals are represented. A small number of bones belong either to chicken or pheasant; these two species of related galliformes are difficult distinguish (see MacDonald 1992) but given the rarity of pheasant bones from contemporary sites (Serjeantson 2006, 138; Sykes 2007, 156-7) and the abundance of chicken bones in the Glastonbury Abbey assemblage, the four indeterminate bones are here considered as belonging to chicken.

The major meat bearing parts of the carcass, as represented by the humerus and femur are more numerous than other parts of the wing and leg. No skulls are present and only a small number of phalanges were recovered, this evidence suggests that the chicken bone assemblage is almost entirely composed of dressed carcasses (i.e. table waste). No butchery marks were evident on any of the bones, however the carcasses of birds can easily be subdivided without leaving marks.

The sex ratio of chickens could not be established due to the complete absence of tarsometatari, although medullary bone, which is deposited inside the long bones of hens in lay, was noted for a small number of broken shaft fragments. This evidence coupled with the dominance of adult chicken bones (*c.*59%) suggests that egg production was important. Under this regime the immature bird bones could potential be male capons that were fattened for eating. The proportion of immature birds is relatively high in comparison to broadly contemporary lower status secular sites. For example, the chicken bone assemblage recovered from the poorer suburbs of Winchester (Serjeantson and Rees 2009) is almost entirely (90%) adult birds. This demonstrates that wealthier establishments could afford to eat younger more palatable chickens (Serjeantson 2006, 137).

Unfortunately the quantity of biometric data collected from the sample of chicken bones is insufficient for detailed analysis. However it is clear from a visual assessment of the bones that both small bantam-sized and larger breeds of chicken are represented.

Bones from domestic geese and ducks are also relatively common (*c.*11% and *c.*9% NISP respectively) and both species are represented by a minimum of nine individuals. The skeletal element representation for both species is similar to that for chicken, indicating that most of the domestic bird bone assemblage is table waste. All of the duck bones and all but one of the goose bones are from adult birds. Adult geese are known as 'stubble geese' and were generally eaten in October and November, whilst juvenile or 'green geese' were eaten in May and June (Serjeantson 2002, 42; Stone 2006, 152). The fact that most geese were fully mature when eaten suggests that they were valued for their feathers, which can be plucked from live birds, as well as their meat (Serjeantson 2006, 141).

The only other possible domestic bird species is the pigeon or dove (*c.*2% NISP). These birds are difficult to distinguish from wild birds, however all of the specimens are rather small and this coupled with the presence of immature birds (or squabs) suggests that they were from a managed (i.e. domestic) population. Squads are a seasonal resource and are principally available during the summer, and around Easter and Michaelmas (Stone 2006, 151; Dyer 2006, 206).

The rest of the bird bone assemblage includes a range of wetland and some woodland species, of these teal/garganey and woodcock are relatively common (*c.*3% NISP each), while plover, grey heron, mute swan and snipe are rare. All of these birds could have been obtained directly from professional wildfowlers (Sykes 2007, 61-2) operating in the Somerset Levels or from local markets. And although they do not represent a significant food resource it is clear from historical sources that these particular species were amongst the most highly prized birds served at elite and monastic sites (Cosman 1976, 40-1; Harvey 1993, 52; Albarella and Thomas 2002).

A single bone from an indeterminate species of the thrush/blackbird family (*Turdus* sp.) was also recovered. It is uncertain whether or not this specimen is just part of the general environmental background to the site or if the bone is in fact food waste, although the latter seems likely given that they were amongst the most commonly consumed wild birds during the period under consideration (Albarella and Thomas 2002, 32).

Mammalian species
Pig is the most common mammalian species (21% NISP) and the second most abundant species after chicken. In terms of MNI, post-cranial bones indicate that there are five immature individuals, while canine teeth suggest that there are at least 14 adults. The body part data contrasts with that for domestic poultry and suggest that the pig bone assemblage is mostly waste from primary butchery (i.e. heads and feet). Despite the under-representation of some skeletal elements, the body part data also suggests that whole carcasses are represented and it is highly likely that live pigs were brought to the Abbey precinct from its estate (see for example Biddick 1984) to be slaughter and butchered.

Age information based on epiphyseal fusion of the post-cranial skeleton indicates that most pigs were slaughtered early in their first year of life. Only one mandible was recovered and this is from a piglet aged between birth and two months old (mandibular wear stage A after Hambleton 1999, 63-4). This data indicates a preference for the tender meat from suckling pigs, however it is clear from a number of loose canine teeth that adults are also represented in the assemblage.

The pig canines are grouped together in the site archive (GLSGA: 1988/1356), it is unclear therefore whether or not they are all from a single context or have been separated and amalgamated from several contexts during post-excavation, although the latter seems more plausible. Regardless of their provenance, pig canines are sexually dimorphic therefore the sex ratio of the adult pig population can be estimated. In total there are 25 canines, 11 from the left side of the mandible and 14 from the right side. Only two of the left canines and one of the right canines are from sows, this gives a ration of almost seven boars to each sow.

Butchery marks were noted on five pig bones, three vertebrae, a pelvis and a tibia. The vertebrae had all been chopped in half down the mid-line (i.e. dorso-ventrally). This evidence indicates that pork carcasses were divided into sides, a common technique for the

period but one which only came into practice with the advent of professional butchers (Sykes 2007, 45).

Sheep bones are also fairly common in the assemblage (11% NISP) and at least four individuals are represented. All of the major meat bearing bones are present and bones from the forequarters are particularly numerous, which suggests a preference for shoulder joints. No foot bones and only a few cranial fragments were recovered, indicating that dressed joints rather than whole carcasses were purchased. The general size and epiphyseal fusion state of sheep post-cranial bones indicates that most are from lambs just a few months old. However, tooth eruption and attrition analysis indicates the presence of two older sheep aged between 1-2 years and 2-3 years (mandibular wear stages D and E after Payne 1973).

Only ten cattle bones were recovered, these include a small number of loose teeth, a horncore from a juvenile animal, a scapula, humerus, metatarsal and two first phalanges. Horse is represented by just one loose upper molar, while dog is represented by several articulating elements from the foundation trench of the Abbott's Hall. These elements include a skull with terrier type morphology (i.e. pronounced sagittal crest) and three cervical vertebrae. A radius from this context might also belong to this individual.

A large fragment of red deer antler was recovered from a Late Saxon context. Saw marks are clearly visible where the tines had been removed from the beam, indicating that this particular antler had been reduced into small sections for object manufacture. Two smaller off-cuts of antler were also recovered from Late Saxon contexts. Several fallow deer teeth and a metatarsal were also identified but are unpovenanced, however since the Normans are generally attributed with introducing this species to Britain (Sykes 2007, 76-80; Sykes 2010, 51-8), it can be assumed that these remains are from a medieval context.

A small number of hare, rabbit, mole and rat bones were also identified from the assemblage. The hare bones are all from a single articulating foreleg, while the single rabbit scapula is from an unprovenced context, most probably post-12th century (see Sykes 2007, 80-4; Sykes and Curl 2010), if not intrusive. The mole and rat bones are non-anthropogenic in origin and are also likely to be intrusive given their burrowing habit.

Discussion

The basic pattern of relative importance outlined above, that is an abundance of birds but few mammals, is characteristic of monastic diets and linked to the Rule of religious observance as defined by St Benedict of Nursia (*c.*480-*c.*550). Following this Rule, fish and the meat of birds was permitted but the meat of quadrupeds, commonly referred to as 'flesh meat', was forbidden to all except the sick (Ervynck 1997, 71-3; Galik and Kunst 2004, 229-30; Harvey 1997, 620-1; Serjeantson 2006, 131). Individual monastic Orders interpreted this rule in different ways and it was not uncommon for fish-substitutes to be consumed during the fast seasons without causing serious repercussions. These substitutes included animals that were considered to have a similar anatomical, physiological or ecological (i.e. aquatic habit) resemblance to fish (Galik and Kunst 2004, 225; Noddle and Stallibrass 2007, 566).

These dietary restrictions were only relaxed within the Benedictine Order in 1336 by Pope Benedict XII, to allow the consumption of flesh meat on four days in the week outside the fast seasons, but only in an appointed room other than the refectory (Harvey 2006, 220-1;

Woolgar 2006, 194). Since most of the animal bone from Glastonbury Abbey predates this amendment we can assume that the bones of livestock species represent the remains of meals that were fed to sick monks or lay servants and guests, all of whom were exempt from dietary restrictions (Barber and Thomas 2002, 61). The alternative is that the Abbey monks were not strictly observant to the Rule of complete abstinence from the consumption of flesh meat and might even have broken this during the fast seasons by consuming fish-substitutes in the form of wildfowl (i.e. water birds). It is also likely that newborn pigs and lambs were also incorporated into the fast-day menu since these animals could be considered to have come from a watery environment (i.e. the uterus) and therefore reclassified as fish.

Conclusions

Excavations at monastic sites such as Glastonbury Abbey generally yield little in the way of animal bone (see O'Connor 1993), this makes comparisons between sites extremely difficult particularly given that fish, one of the main sources of animal based protein permitted under the Rule of St Benedict, is generally under-represented or entirely absent due to a lack of on-site sieving. Hand-recovered assemblages from monastic sites do however seem to be broadly representative of the monastic diet since they are usually dominated by bird bones. However, most monastic assemblages also include a significant proportion of bones from young, generally newborn, pigs and sheep (see for example Noddle and Stallibrass 2007, 550-52, 554). The presence of these prohibited items indicates that the dietary rule of abstinence from flesh meat was usually manipulated to allow meat to be eaten during periods of fast. In general there is little to distinguish the diet of monastic communities from secular high status society (Sykes 2007, 91).

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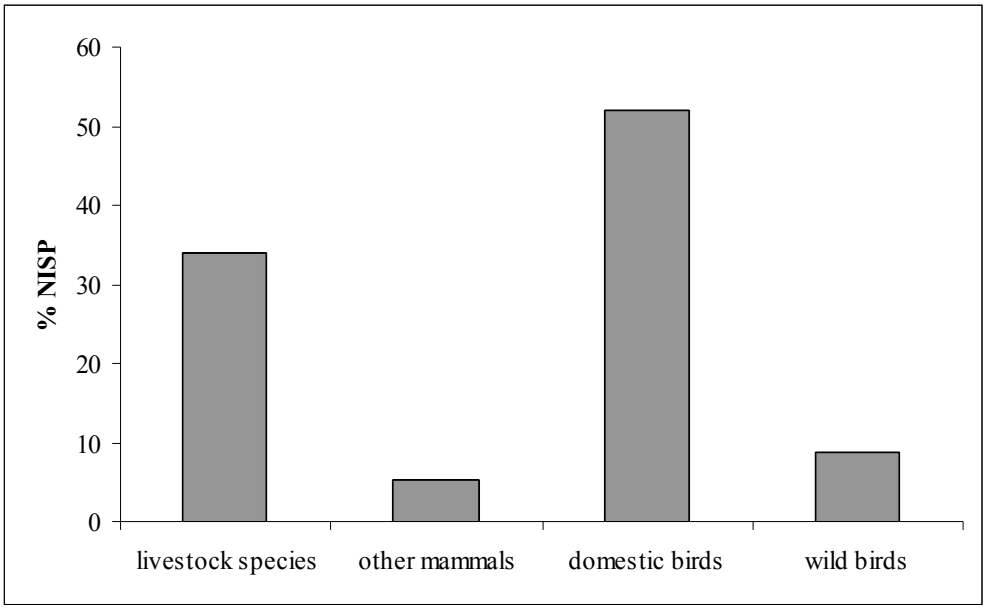
Table 1. Quantity and percentage of animal bone by site area.

Location	**Frag. count**	**%**
Abbot's Hall	10	1
Dormitory	2	0.2
Lady Chapel	1	0.1
Edgar Chapel	1	0.1
nave south aisle	7	0.7
cloister	917	93.5
unassigned	42	4.2
Total	**980**	**100**

Table 2. Number and percentage of identified specimens present (or NISP).

Species		**Late Saxon**	**%**	**Medieval**	**%**
Bos f. domestic	cattle	1	1.2	9	2.2
Ovicaprid	sheep/goat	4	4.8	48	12.1
Sus f. domestic	pig	6	7.2	94	23.8
Equus f. domestic	horse			1	0.2
Canis f. domestic	dog			6	1.5
Cervus elaphus	red deer	1	1.2		
Dama dama	fallow deer			6	1.5
Cervid	deer	4	4.8	1	0.2
Lepus sp.	hare			3	0.7
Oryctolagus cuniculus	rabbit			1	0.2
Talpa europaea	mole			1	0.2
Rattus sp.	rat			2	0.5
Gallus f. domestic	chicken	19	22.9	128	33.3
Anser sp.	goose	39	47	12	3
Anas cf. *platyrhynchos*	?mallard	2	2.4	38	9.6
Columbidae	pigeon/dove			10	2.5
Gallus f. domestic/Phasianus colchicus	chicken/pheasant	4	4.8		
A. crecca/A. querquedula	teal/garganey	1	1.2	15	3.8
Pluvialis sp.	?plover			1	0.2
Ardea cinerea	grey heron			1	0.2
Cygnus olor	mute swan	1	1.2		
cf. Gallinago gallinago	?snipe			1	0.2
Scolopax rusticola	woodcock	1	1.2	11	2.8
small wader sp.	wader			4	1
Turdidae sp.	?thrush/blackbird			1	0.2
Total identified		**83**		**394**	
% identified		*71*		*46*	
large mammal		5		13	
medium mammal		1		300	
small mammal				1	
mammal		3		65	
bird		25		90	
fish				1	
Total unidentified		**34**		**470**	
% unidentifiable		*29*		*54*	
Overall Total		**117**		**864**	

Figure 1. Relative frequency of different categories of animals.



GLASTONBURY ABBEY ARCHIVE PROJECT: ANIMAL BONE DETAILED METHODS STATEMENT FOR SITE ARCHIVE

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All anatomical elements were identified to species where possible, with the exception of ribs and vertebrae, which were assigned to general size categories. Mandibles and limb bones were recorded using the zonal method developed by Serjeantson (1996, 195-200) for mammals and Cohen and Serjeantson (1996, 110-12) for birds. The latter were only recorded if they retained one complete articular surface.

Quantification methods applied to the assemblage include the number of identified species present (or NISP) and where appropriate the minimum number of individuals (or MNI). The calculation of MNI is based on the most numerous zone of a single element taking into account anatomical position (i.e. side).

In addition to the above, all undiagnostic fragments over 1cm were assigned to general size categories and smaller splinters to an unidentifiable category. This information was gathered in order to provide an overall fragment count for the entire assemblage. The nature of most archaeological mammal bone assemblages suggests that the majority of fragments categorised as large mammal are likely to belong to cattle or horse, and those in the medium mammal category to sheep/goat or pig.

Species identifications were made with the aid of modern reference collections held by the author and Wessex Archaeology. Caprines (sheep and goat) were differentiated based on the morphological criteria of Boessneck (1969), Payne (1985) and Halstead *et al* (2002). The Gallus/Numida/Phasianus group of closely related galliformes are also difficult to distinguish (see MacDonald 1992), no guinea fowl bones were positively identified, but a small number of possible pheasant bones are present.

Tooth eruption and attrition was recorded following Grant (1982) for cattle and pig, and Payne (1973) for sheep/goat. Mandibular age stages were attributed according to Halstead (1985) for cattle, Payne (1973 and 1987) for sheep/goat and Hambleton (1999) for pig. Epiphyseal fusion categories for the post-cranial bones of the three main livestock species follow O'Connor (1989). Epiphyses are recorded as 'fused' when the epiphyseal plate joining epiphysis to metaphysis is closed; 'fusing' once spicules of bone have formed across the epiphyseal plate and 'unfused' if none of these changes had taken place. Bird bones with 'spongy' ends were recorded as 'juvenile'. Pig canines were sexed following Schmidt (1972).

In general, measurements follow the conventions of von den Driesch (1976), with addition measurements following Davis (1992), Payne and Bull (1982) and Cohen and Serjeantson (1996).

The presence of butchery marks on mammal bones were recorded following the coded system devised by Lauwerier (1988) with later additions by Sykes (2007) and further additions by the present author. Pathology was recorded following the standardised system proposed by Vann and Thomas (2006). Gnaw marks and evidence for burning was also recorded where present, as was the general preservation condition of bone fragments.

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