BARBARA NODDLE

Animal Bone from Droitwich Bay Meadow

The animal bone from Droitwich was very well preserved, but extremely fragmentary. Consequently only 70% of the material (by weight) could be identified: this was estimated on about half of the total. This is rather less than the ideal of over 80%.

The bone fragments were initially identified according to species, and the bird bones were presented to Mr. Bramwell, whose report follows this; they are not considered further in the mammalian statistics. Besides makinggan identified fragment count, the minimum number of iddividuals was estimated. This is achieved by adding to the maximum number from the most numerous anatomical part (e.g. left mandible plus unpaired right mandible) those individuals not presented by this part but clearly distinct on grounds of age or size. These individuals were then aged according to the following scale.

Newborn. All bones small and of neonatal character. Temporary dentition only, though the first molar may be partially erupted. No fused epiphyses. None of these individuals will have been weaned.

Juvenile. Bones less than full sized, or with only the earliest epiphyses fused (scapula - coracoid, proximal radius, distal humerus, second phalanx). 3rd molar not present, permanent premolars not present.

Immature. Bone full size, but latest epiphyses (vertebrae, proximal humerus, ulna and tibia, both ends of femur) not fused. Permanent premolars may be present but scarcely worn. 3rd molar not fully in wear.

Mature. All epiphyses fused, all teeth in wear.

These stages of maturity are employed because the chronological sequence of events has been worked out on modern stock, which certainly does not apply at this date. However, for modern stock the ages would be :- Newborn under 3 months, juvenile 12-18 months depending on species, immature up to 4 years and mature older than this.

It was assumed that all archeological layers contain the bones of separate individuals.

Where possible complete bones and the ends of mature bones were measured. With the exception of the distal metapodials, for which the epiphyseal line was the measured point, all measurements were taken according to the recommendations of Von den Driesch (1976).

<u>Results</u>. A total of 6752 fragments was identified.

The distribution of species is set out in Table 1 according to fragment count. When a layer was asigned to the junction between 2 periods, it was counted with the lower one, Owing to the small number of bones in period 2, the results from this have less significance than the others, as they might well be due to chance. The group of undated layers is placed after period 4 because most of the bone came from the surface layers which are probably later than the dated layers, but are unlikely to be Roman as the site was not reoccupied. Table 1 shows a stable situation, with very little chanve during the period covered by the excavation. Cattle bone makes up some 60% of the fragments, sheep about 20%, pig about 12% and the rest is made up of deer, horse, dog and a few others. These others include two or three bones from each period deriving from cat, fox, hare, small rodent or goat. Rabbit bones have not been included, as the burrowing habits of this animal mean that its bones may not be contemporary with the rest. The deer were mainly red deer, but there were a few fragments of roe deer in all periods other than the undated. The bones of both roe deer and goat were probably underestimated because of the fragmentation of the material; the less distinct bones of both these species may well have been assessed as sheep, but it is not thought likely that individuals were overlooked. The complete stag skeleton found in the period 3 well was not included as it would have distorted the figures. Nevertheless there was a higher proportion of deer bones on this site than has previously n encountered by the writer inaa Roman context. Also in period 3 were 20 bones deriving from 3 cats, 25% which were in the same layer.

Table 2 presents the species distribution according to minimum numbers of individuals. Here again the situation is constant throughout the period, but it differs from the fragment count, sheep and pig being increased at the expense of cattle. Unless dressed carcasses or part carcasses have been imported to the site, it is likely that the individual count gives a truer picture of the facts than a fragment count with its overemphasis on the larger cattle bones. This is borne out by the anatomical analysis of the major species presented in table 3. The analysis has been done according to groups of bones with different economic significance rather than individual bones. Mandibles, metapodials and phalanges represent wast parts from the point of view of meat content. Vertebrea, upper fore and hind limbs carry the good meat of the carcass, but vertebrea are made up largely of spongy bone and are perishable. Tarsals and carpals are recorded separately, because the tarsal bones are often used to suspend the carcass in process of butchering and the small carpal bones in particular those of sheep tend to be lost in clearance of the material from the consumption site to mudden. Loose teeth, particularly those of the upper jaw (which the majority of these were) are the result of destruction of the jaw bones either before or more likely after final deposition of the material.

Table 3 shows consistant results for all periods, apart from a rise in loose teeth for the undated period, as might be expected from their disturbance by Medieval agriculture. The reason for the discrapancy between fragment counts and minimum individual counts for cattle and sheep is at once apparent. Fragile vertebrae and small carpal bones and phalanges are reduced in the sheep and pig. The reduction in metapodials and phalanges of the pig is particularly marked because this animal has twice as many digits as the others. Ribs have been accounted unidentifiable throughout this report.

However, whatever method of estimation is employed, there is no doubt that the principle source of meat eaten was cattle. This is borne out by a weight analysis of the material, 74% cattle, 9% sheep, 8% pig and 8% horse, and

.eer together for all periods. Bone weight is directly proportional to meat weight (Kubasiewixz 195.). This high proportion of beef bone is typical of military and urban Roman sites, as opposed to Roman British rural sites where the proportion of sheep is higher (Hodgson 1963 and Noddle unpublished data).

Besides the proportions of the different species, the age range of the individuals concerned is of economic and agricultural interest. The system of ageing has already been explained in the introduction, and the results are set out in Table 4. Though themain source of meat in modern animals is the juvenile animal specially reared for the purpose, this is an uneconomic situation only possible in an affluent society using rapidly maturing and very well fed modern stock. Besides contributing its meat and hide, an older animal will have contributed offspring, labour, and perhaps meat according to species. Only the older pig has nothing extra to contribute except its offspring, and the prolificacy of this species means that fewer breeding stock are required. Juvenile animals may well not have been killed for choice, but may be actual or anticipated casualties as in time of winter dearth. The choicest meat would have come from animals at the upper end of the immature stage, and these would have required the most maintainance for the least return. This is to be expected and is found in this case for the pig, but is also found in the sheep, indicating either that the flocks were not being maintained for wool production or more likely that the consumers were sufficiently affluent to be choosy. Immature and mature cattle are in about an equal proportion with a possible rise in mature animals with time as there is with sheep. Juvenile deaths are at all times fairly low, bearing in mind the horrific casualty rates that are recorded for the Medieval monastic flocks (Lloyd 1978). However, newborn animals are probably under-represented.

Besides the proportions of species, the size and type of the animal is of interest. Size is of course deduced from bone measurements. Type can be deduced from the nature of the horn cores in those animals which have them and from the proportions of some of the bones. As might be expected from this site most of the information pertains to cattle. A list of measurements of complete bones is set out in Table 5. The more frequent measurements of bone ends are set out in histogram form in Figure 1. Both give indication of the period from which the bones come. Figure 1 also includes an estimation of the live weight, based on the measurements of the astragalis (Noddle 1973). The cattle from Droitwich are large, considerably larger than Medieval animals other than exceptionally large animals from Saxon North Elmham (Noddle and Bramwell 1975). Bones such as the lower 3rd molar seem to show a reduction in size with the passage of time but this is not confirmed for all bones, the period 2 bones showing a greater range of size than the others. The animals are rather larger than those of another villa site in Gloucestershire studied by the author. There are three reasons for size variation within a species, genetic, composition, nutrition and sex. The former has probably been over rated and nutrition underated. There is a greater size discrepancy between the sexes of primitive breeds than modern (Walker 1954). However, the type of animal present, as indicated by the horn core is mainly Roman, having short round curved horns as opposed to the oval horn cores of the iron age celtic ox (Armitage and 1977). However, the horn core of one of these was found in a surface context, and this was the only bull horn core found. The few Roman specimens that were found intact were probably female and mostly young; other specimens might have been removed for bone working. The best specimen is illustrated in Plate 1.

There was one common abnormality in evidence among these animals, but very little pathology. This is the absence of the posterior pillar of the lower 3rd molar, sometimes accompanied by the total absence of the 2nd premolar. This latter condition has been discussed by Andrews and Noddle 1975, and is probably congenital. The details of the missing 5th pillar are as follows :-

Period 2, 4 out of 15 abnormal (27%); Period 3, 3 out of 13 abnormal (23%);

Period 4, 4 out of 37 abnormal (11%) and undated 5 out of 33 abnormal (15%). The modern occurence of this condition is probably about 10%. It is very tentatively suggested that this higher incidence might be due to inbreeding.

As previously stated, pathology was rare, but there was one pelvic acetabulum from Period showing damage followed by abnormal wear, perhaps due to an obstetric injury.

The dimensions of the sheep bones, both whole and ends, are listed in Table 6. This table also includes two calculations from bone shape, the neck of the scapula and the proximal metacarpal. These last, derived from a) Noddle (in press) and b) O'Connor (unpublished) should give some estimate of the degree of primitiveness of the animals. The other dimensions indicate an animal fairly large for the period, and there were some bones from even larger immature animals from which measurements could not be obtained.

The shape of the neck of the scapula and the proximal metacarpal suggest a fairly primitive animal but not so primitive as the Soay type which has been demonstrated for the iron age and Romano British period for the West of England (Pitt-Rivers91979). Neither did the horn core resemble this type, but were so varied that no definite statement can be made about them, other than that they were mainly circular in cross section. There was also one specimen of a polled sheep frontal. A singel pathological specimen came from the sheep; this was a metatarsal with a discrete absess cavity, perhaps the result of a penetrating injury.

The pig bones were also on the large size, comperable with N. Elmham but lagger than Medieval animals and larger than those of the Gloucestesshire villa. A number of them, showing up clearly by their discontinuity on a histogram, were large enough to come from wild animals. These are underlined in Table 7, where all the measurements are set out. Despite their large size, the bones were still slender in form, suggesting the animals were maintained extensively rather than kept in sties (Hammond et al. 1971). The dimensions are set out in Table 7. Two cases of periodontal disease were found noted from periods (Plate 2). This condition if much more common thesheep. There was also

an animal with dentition worn down to the jaw bone from period
Several pathologcial bones from an arthritic hip and hock joints came from period

Little can be said about the horses. There were few complete bones, other than the first phalanx. Those measurements which were obtained are set out in Table 8. The dimensions, though variable, suggest nothing larger than a stocky pont. The measurements are set out in Table 8.

The deer bones are of considerable interest, in particular the stag skeleton found down the Period 3 well. As previously stated, there is a larger quantity of red deer bone on this site than found by this author on other Roman sites. The present dayddeer of the Scottish highlands is a miniature of the earlier form, though present day deer farming seems to be raising the size of the domesticates by giving them more favourable conditions. The contrast in size is illustrated by Ritchie (1920). These Roman specimens are of full Pliestocene size, and compare with the Mesolithic dimensions from StarrCarr (Fraser and King 1954). The dimensions of all the bones are set out in Table 9.

Measurable dog bones were very few, though there was one more or less intact skull from a sharp mosed slight animal, probably about the size of a fox terrier.

The carnassial measured 17 mm in length. This animal came from Period 3. The fragmentary bones were therefore judged subjectively to be large, medium andsmall (in modern terms Alsation size, collie size and fox terrier size or less). From Period 2 dogs were assessed small, medium and 2 large. From Period 3 there was one small and one large animal. From Period 4 there were 2 large animals, one medium and four small, of which 2 were bor legged after the manner of the present day dachshund. Undated were 6 animals, 2 large and 4 small pet dogs, particularly in the later period. Eith the deposits had been much distributed, or these dogs had not been burried, as most of the bones occurred singly.

(The only measurable dog bones were 2 metacarpals, one of 59 mm from Period 4 and one of 44 mm undated).

The few cat bones were also found singly, with the exception of 3 animals, all of lwhich come from period 3, two from the same layer. One animal had the following bone lengths :- humerus 103, radius 98, femur 115, metacarpals 32, 48, 48, 52 mm. The other had femora of 82 mm, and tibiae of 89 mm. The third cat was immature. The size discrapancy might be accounted for by sexual differences, but the larger cat might bema wild animal.

Table 1.

DROITWICH BAY MEADOW

Distribution of Species. Numbers of Identified Fragments.

Period	Total	Cattle	Sheep	Pig	Horse	Deer	Dog	Other
2	[illegible]31	389 62%	105 17%	48 8%	35 6%	35 [illegible]%	12 2%	4 < 1%
3	1506	815 54%	372 25%	21[illegible] 14%	39 3%	24* 2%	10 1%	2 2%
4	2660	1594 60%	393 15%	435 1[illegible]%	57 2%	141 5%	20 1%	20 1%
No Date	1772	1141 64%	306 17%	219 12%	43 2%	40 2%	21 1%	2 < 1%

* Excluding 85 bones from the Well Skeleton.

Average number of fragments per minimum individual = 5.

Table 2.

DROITWICH BAY MEADOW

Distribution of Species. Minimum Number Individuals

Period	Total	Cattle	Sheep	Pig	Horse	Deer	Dog	Other
2	189	79 42%	49 26%	21 11%	15 8%	9 5%	11 6%	5 3%
3	412	171 42%	116 28%	79 19%	18 4%	10 2%	8 2%	10 2%
4	485	173 36%	105 22%	102 21%	29 6%	44 9%	17 4%	15 3%
No Date	263	107 41%	53 20%	57 22%	16 6%	14 5%	14 5%	2 1%

Table 3.

Anatomical Analysis (Maximum Species Only) Expressed as %.

	Period	Mandible	Vertebrae	Proximal [illegible] Limb	Proximal Hind Limb	Carpals & Tarsals	Metapodials	Phalanges	Loose Teeth
Cattle	2	11	14	12	16	6	8	11	14
	3	5	18	13	13	8	7	11	15
	4	5	11	16	15	9	8	11	20
	No Date	4	10	13	10	8	9	11	31
Sheep	2	9	4	20	20	0	21	3	22
	3	11	8	19	20	2	11	3	19
	4	7	7	22	19	4	10	3	25
	No Date	9	4	16	17	3	9	1	40
Pig	2	8	8	10	6	4	8	4	31
	3	12	7	18	12	6	13	3	11
	4	11	7	18	10	5	14	4	28
	No Date	11	8	13	13	6	11	6	26

Table 4.

DROITWICH BAY MEADOW

Age Range of Individuals % Principle Species Only.

Period	Cattle				Sheep				Pig			
	N	J	I	M	N	J	I	M	N	J	I	M
2	8	8	43	42	8	21	50	21	10	10	45	35
3	14	3	40	43	15	7	51	28	11	14	55	20
4	5	4	46	45	17	17	35	31	9	6	49	34
No Date	7	8	32	53	6	13	45	42	4	11	54	30

Table 5.

Dimensions of Complete Cattle Bones

Period	Bone	Length	Proximal Width	Distal Width	Midshaft
3	Radius	265	-	-	-
4	"	270	75	66	37
2	Metacarpal	180	60	55	35
3	"	173	515	48	27
"	"	180	52	51	29
"	"	180	55	50	30
"	"	180	53	[illegible]	28
4	"	190	54	58	35
No Date	"	176	56	-	32.5
		168	54	50	29
		176	59	57	38
		180	45	45	36
		200	60	59	34
4	Femur	3466	-	96	
4	Tibia	350	-	59	
2	Metatarsal	196	-	43	23
	"	207	46	-	26
	"	222	50	56	30
	"	232	51	57	32
3		210	45	47.5	24
4		197	42	49	26
		205	47	50	26
		200	38	42	23
		206	43	47	25
4	Metatarsal	212	44	47	26
		213	49	56	32
No Date		188	55	50.5	31
		200	41	42	22

Table 9. **Dimensions of Red Deer Bones**

*Well Skeleton

Period	Bone	Length	Proximal Width	Distal Width	Midshaft Width
2	Humerus	270	-	-	-
3	"	290	83	58	40 *
2	Radius			48	
3	"	255	68	-	-
		305	60	55	37 *
		300	61	55	37 *
2	Metacarpal	313	405	44	25
2			35		
3		2[illegible]7	43	42	26 *
4		270	43	42.5	- *
			40		
No Date			44		
			44		
			50		
3	Femur	350	95	77	*
3		340	94	75	
3	Tibia	390	79	52	*
		388	79	50	*
4				48	
4				51	
No Date	Tibia			45	
				57	
3	Calcaneum	125			
4		95			
		113			
		130			
No Datee		120			
		125			
4	Ashapalus	52			
		53			
2	Metatarsal	40			
3	Metatarsal	305	39	42	25 *
4		325	39	4[illegible]	28
		-	39		
				47	
2	1st Phalanx	59			

Table 9 - Continued.

Period	Bone	Length	Proximal Width	Distal Width	Midshaft Width
		59			
		60			
		61			
		61			
3		625 *			
		61 *			
		61 *			
4		61			
		62			
No Date		59			
		61			

Droitwich

Captions for Plates.

Plate 1. Bovine horn core (left). This is from a young animal and is slightly damaged. However the dimensions and shape are typical of all horn cores, except one. It is thought to have come from a female.

Plate 2. Pig, left mandible from a mature animal. There is an erosion of the alveolar bone between the 1st and 2nd molars, possibly due to infection following a food trap. The break in the 2nd molar is post mortem

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Table [illegible].

Sheep Bone Measurements, MM.

Lower 3rd Molar Length

Period	2	20
	3	22 22 22 22 23 24 25
	4	20 22 23 24
No Date		20 20 21 21 21 21 22

Humerus Distal Width

Period	2	28
	3	2[illegible] 28 29
	4	25 2[illegible] 27 27 27 28
No Date		27

Radius Proximal Width

(Whole bone; No date, length 158, distal width 28, midshaft width 17).

Period	2	28 28
	3	27 28
	4	28 29
No Date		29

Distal Width

Period	2	20
	3	2[illegible]
	4	2[illegible] 28

Metacarpal

Whole bone Period 4. Length 130, Prox. Width 22, Dist. Width 26, MSW 14.5.

Proximal Width

Period	2	20.5 21
	3	20 20 22 23 *
	4	20.5 22 23
No Date		20 21 21

1st Phalanx Length

Period	2	35 3[illegible]
	3	31 33 35 3[illegible] 37 38
	4	32 35 3[illegible]
No Date		33

<u>Table 6 - Contd.</u>

<u>Tibia</u> Distal Width

Period 3	23 24 25 25 26 27
4	22 24 26 26 26 26
No Date	23 23 23 24 25 25 25 26

<u>Ashapalus</u> Maximum Length

Period 3	31	
4	24 27 27	*
No Date	2[illegible] 27	

<u>Metatarsal</u> Whole bone.

Period 3	Length	Proximal Width	Dist. Width	Midshaft Width
(immature)	125 +	22	-	12
	119	18	20	12

Proximal Width

Period 3	17 18 19 20 21 21 22	
4	19 19 19 21 21 21	*
No Date	17 21	

<u>Scapula</u> Proportions of Neck. $\frac{\text{Glenoid to spine base}}{\text{Least width}}$ Ratio

Period 3	1.09
4	0.94 0.97 1.06 1.09 1.11 1.11 1.13
No Date	1.00 1.13

<u>Horn Core</u> base.

	Least Measurement	Greatest Measurement
Period 3	14	19
4	8	8

* May derive from immature bone.

Table 7.

Pig Bone Measurements

Lower 3rd Molar Length

Period	2	33 3[illegible]
	3	34 3[illegible] 37
	4	29 30 32 33 33 35 35 37 <u>40</u> <u>42</u>
No Date		30 30 33

Scapula Least width neck.

Period	2	23 *
	3	22 23 24
	4	18 22 23 2[illegible] 27 27 <u>30</u> <u>31</u> <u>32</u>

Humerus Distal Width

Period	3	33 33
	4	2[illegible] 35 <u>42</u>

Radius Proximal Width

Period	3	34 *
	4	28 29 33 35 37

Metacarpal Maximum Length

Period	3	73 73 7[illegible]
	4	<u>93</u> <u>94</u> <u>94</u>
No Date		[illegible]8

1st Phalanx Maximum Length

Period	2	32
	3	40 42
	4	38 39 40 <u>48</u>
No Date		34 38 39 39 42

Tibia Distal Width

Period	3	29
	4	2[illegible] 2[illegible] 32 <u>35</u>
No Date		30 30

Ashapalus Maximum Length

Period	3	42 42 45
	4	45 45 4[illegible] <u>49</u> <u>49</u>
No Date		37 38 40 44 4[illegible]

The underlined measusements may derive from wild boar bones.

The measurements marked * may be from immature bones.