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BLACKFRIARS, NEWCASTLE

A report on selected groups of 16-18th century bone and shell from excavations at Blackfriars, Newcastle.
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Introduction

The sample comes from four areas of the post-dissolution deposits at Blackfriars. The collection has been analysed within period groups and these four areas. The four areas distinguished are the Cordwainers, Chapter House, South room of the west range and the Southyard.

The archaeological analysis has shown that the material broadly falls into two groups. The earlier (Group 1) including deposits dating from the mid-16th to the mid-17th century includes stratified levels with very little residual material. The second group (Group 2) are layers deposited in the first quarter of the 18th century but including circa 25% residual mediaeval, 16th and early 17th century pottery (see above). This latter group incorporates layers dumped to raise the floor levels, the infill deriving from rubbish deposits outside the buildings.

In the discussion of the material from each area the sample is divided into these two groups.

Southyard

The sample from this area is composed of 1053 bones and fragments and fifteen shells. The material comes from ten contexts spanning a period from the mid-16th to the early 18th century, 1737 - the date of the latest clay pipe (see above). These deposits have been interpreted as midden produced by the cordwainers and contain little residual pottery except for one layer which is assigned to group 2. The joins between pottery from this area with some from the Cordwainers suggests that the filling of the latter may have been obtained from the Southyard. The material is initially treated in groups of layers dating respectively to the 16th and 17th centuries and the early 18th century.

South room of west range

The sample from this area comprises 585 bones and fragments and nine shells from twelve contexts probably of the late 17th and early 18th centuries. Only one layer (BK) is assigned to group 1, the remaining contexts being deposited in the early 18th century and falling within group 2.

Chapter House

This is a very small group of 19 bones and four shells from a single layer of the late 17th-early 18th centuries, and includes a single human rib bone. This collection is not included in the tables.

Cordwainers

The collection from this area is composed of 1071 bones and fragments from 53 contexts, the majority of which fall within the first half of the 18th century. Ten contexts produced a collection of 126 bones from the second half of the 16th century, and a further twelve from the 17th century, but the majority of the material derives from group 2 deposits of the early 18th century.

Most small groups, those of 19th century and more recent date, and those with a higher proportion of residual material than group 2 have not been included in the analysis or catalogued.

The collection is small but nevertheless does yield information of interest in terms of activities on or near the site and aspects of the diet and variation in post-Mediaeval Newcastle.

<u>The major domestic species</u>

The domestic animals include the five common species exploited as food, cattle, sheep, pig, fowl and goose and also horse, cat and dog for which there is no evidence of consumption. These latter species are almost certainly domestic pets and functional or working animals. One bone of goat, a metatarsus, was recognised in the 18th century levels in the South room. Despite the nature of the Cordwainers guild all the other bones of ovicaprid that were catalogued from the site even though classed as sheep or goat displayed characters of sheep and no doubt many could have been specifically identified as such if more time had been spent on them.

The proportions of the three major domestic species is assessed using three methods, fragment percentages, relative frequency and a relative abundance method (Rackham, 1983). The traditional method of minimum numbers of individuals (MNI-Chaplin, 1972) is applied to sheep in order to illustrate the influence of bias and the reason for not applying this method at this site. Utilising the two most common bones of sheep in the sample, the metacarpus and metatarsus, these yield respectively 65 and 67 individuals based upon the proximal end of the left bone (Table 5). These figures are in fact considerably in excess of the frequency of occurrence of all fragments of most of the other bones (Table 2) let alone repeatable fragments. Since the next most numerous bones (Table 2) give minimum numbers of considerably less it is safe to assume that some activity selective for the metapodials of sheep has been operating on the site. Since active selection of a bone type can be demonstrated it would be a misjudgement to use this element as a basis for determining the general proportions of the species. It is in fact reasonable to suppose that the most numerous element has some selective advantage and is therefore the least suitable for a general comparison of species proportions. For this reason minimum numbers is dispelled as an inadequate method for this site.

The number of fragments of each species in each period are given in Table 1 and the percentages of these fragments for the major species listed in Table 3. Taking into account the sample size variations there is no evidence to suggest that the proportions differ between the areas sampled or between groups 1 and 2. The pig and horse bones show fluctuations of the greatest proportional magnitude, but this can be attributed to low frequency in the deposits rather than real variation. However in respect of the horse bones in the 18th century deposits in the Cordwainers a number of bones quite clearly derive from the same individuals.

The second method used for assessing species proportions can only be applied to the sheep and cattle samples at this site since the pigs occur in insufficient numbers for the technique to be used. The technique compares the number of fragments of each bone type for each species the resulting distribution (Fig. 1) indicating the proportion most commonly represented in the material. This is then taken as representative of the proportions in which the species arrived or were utilised (ie. eaten, skinned, etc) on the site. The correct way of using this technique is to count like fragments of each species, ie distal tibiae of sheep and distal tibiae of cattle (Rackham, in prep.). If this is not done then differential fragmentation may over or under-represent the true proportions. The deposits were first compared by area for each period but the samples were too small for interpretation. The 16/17th century material was then compared with the 18th century sample to check for differences in the porportions of sheep and cattle. The resulting distributions (Fig. 1) are skewed. This is most obviously caused by two factors. Low percentages of sheep occassioned by a greater number of cattle fragments are related to size, ie. phalanges, carpals and loose teeth, and also in the 18th century material, vertebral fragments. The highest figures are associated with the disproportionate abundance of metapodials and 1st phalanges. It is these latter bones that are responsible for the discrepancy between the RF figures with and without foot bones and the 18th century fragment percentages with and without foot bones. Although the tail on the left of the figure caused by foot elements may reflect a different treatment of the feet between cattle and sheep it may also reflect recovery efficiency, these elements of sheep being generally less than 2 cms long. The presence of large numbers of sheep metapodials and 1st phalanges responsible for some of the above mean frequencies, either points to the point at which the rest of the carcass was removed from the hooves or the size of element at which recovery is almost guaranteed when excavating by hand. With reference to the latter point, given the number of distal metapodials of sheep present, at least 178, if whole feet were disposed on site these would account for at least 356 1st, 2nd and 3rd phalanges of which only 83 1st phalanges, 5 2nd and 4 3rd phalanges were found. It is unlikely that such a low occurrence can be attributed to recovery efficiency and the data almost certainly reflects alternative disposal of the lower digits, a point discussed in more detail later.

Given these plausible explanations for the lack of uniformity in the distributions in Fig. 1 it can be seen that the majority of elements fall in the 70-90% range in the 17th century and in the 60-80% range in the 18th century. The figures include the mean of each distribution, a mean with the metapodials and phalanges removed from the data, the median and the relative frequency of the fragments of cattle expressed as a percentage of the sum of the relative frequency (RF, Gilbert, Singer and Perkins, 1983) of cattle and sheep. This RF value is calculated by dividing the total number of fragments of each species by the number of different skeletal elements represented in the sample of each species. A second RF value is calculated with the metapodials and phalanges excluded.

All the figures except RF on the whole sample indicate a slight increase in the proportion of cattle to sheep between the 17th and 18th century. The magnitude of this difference is between 0.7 and 11% and could reflect variability in the sample. The RF value does not exhibit this largely due to the superabundance of sheep metapodials in the 18th century which biases the figure. The consistency of the different methods therefore suggests that the trend is real, the scale of difference in each case being significantly increased when calculated without the metapodials and phalanges. The ratio of the two species in the sample approximates from 1 ox: 1.6 sheep to 1:2.7, ox to sheep. This is less than the 1:3.0 and 1:3.1 figures produced using fragment counts (from Table 3) and very considerably less than the figures if MNI had been calculated. The former figures represented the approximate proportions in terms of food and are largely independent of the sheep material that is arriving on the site as a result of commercial activities. The pig must have contributed little to the diet, occurring with approximately one fifth to one sixth of the frequency of cattle (see Table 3) although boned meats such as bacon are not represented in bone collections. The fragment percentages failed to register, except after removal of the foot bones, the slight change in utilisation of cattle and sheep between the early and later period.

The RF figures for Blackfriars (based on identified bones only) can be compared with contemporary material from the 17th century deposits at Black Gate (Rackham, 1983). The sample from phases 2 and 3 give a ratio of cattle to sheep of 1:2.25 a slightly greater frequency of sheep than both periods represented at Blackfriars (if the metapodials are not included - 1:2.1 17th and 1:1.8 18th century groups). This variation is however still acceptable as sample variability and cannot be shown to be a real difference between the sites and as we have seen the variation between methods at Blackfriars is greater than that between the sites. Pigs were equally infrequent at Black Gate and it would appear that the major species were being slaughtered in order to supply both sites at this period in the approximate proportions 1 pig: 5 cattle: 10 sheep, the cattle however by virtue of their size contributing the most meat to the diet.

Skeletal representation

Recovery efficiency has been alluded to above as a possible factor in the frequency of some skeletal elements, but the evidence does not suggest that this was serious and other factors appear to be more important. The preservation of the sample is good, with little evidence of erosion or scavenging.

Cattle

The collection of cattle bones from each area and period is small and therefore has limited potential for analysis. The fragments have been considered in terms of the proportion of different units of the body and are tabulated as a percentage in Table 4 with the information from the 17th century Black Gate site (Rackham, 1983).

Table 4. Percentage of the fragments of cattle and large ungulate in particular carcass units from Blackfriars and 17th century Black Gate (phases 2 & 3).

	Blackfriars	Black Gate
Head, jaws, teeth and hyoid	28.3%	13.53%
Vertebrae & ribs	38.0%	45.5 %
Shoulder, rump & limbs	10.46%	21.6 %
Ankles & feet	23.3%	20.0 %
N =	516	532

The comparison of the frequency of fragments from different parts of the carcass permits a crude assessment of the parts of the animal being exploited on the site and the economic level of this. A better procedure where sample size is sufficient is to count the frequency of joints or identifiably different limb and skull fragments rather than individual fragments since differential fragmentation of different parts of the skeleton can bias the conclusions. The figures in Table 4 illustrate a difference in carcass distribution between Blackfriars and Black Gate. Low meat value parts, head and feet constitute over 50% of the fragments at Blackfriars and the good joints of shoulder, rump and loin etc are represented by only 10% of the fragments. In contrast at 17th century Blackgate the poor parts of the carcass make up only 33% of the fragments and the better meat parts such as the neck, ribs, sirloin, limbs etc constitute over 65% of the fragments. It would appear from this evidence that the occupants whose dietary rubbish is incorporated in the deposits at Blackfriars used a higher proportion of the poorer parts of the beef carcass than those at Black Gate.

Sheep

It has already been noted above that the skeletal elements of sheep are not uniformly represented. There is variation both between periods and areas. A number of bones occur much more frequently than the other elements of the skeleton and this is readily seen in Tables 2 and 5. In Table 2 the metapodials, phalanges and mandibles yield a much higher number of fragments than the other bones. The earliest layers in the South Yard while containing a number of these elements (28.9% of sheep and small ungulate bones), do not show as pronounced a concentration as the 18th century deposits in the South Room and Cordwainers (48.5% of sheep and small ungulate fragments). The discussions above have suggested that all the phalanges, particularly the 2nd and 3rd are extremely under-represented by comparison with the metapodials, to a degree that cannot be attributed to recovery efficiency. Furthermore an anlysis of the incidence of the whole, proximal and distal metapodial fragments shows that the distal ends of the bones are less frequent than the proximal ends particularly in the 18th century deposits (Table 5). The similar abundance of the left and right units is suggestive of an association (Table 5) that might indicate that many individuals are represented by both left and right bones in the samples and fore and hind feet. O'Connor (1984) reports a collection of 18th century sheep bones from Walmgate, York which he interprets as the waste from skin processing, commenting that 'skins arrived on site with the phalanges still attached, but only a minority bore both phalanges and metapodials'. The foot bones from Blackfriars are rather suggestive of the converse and reflect rather the pattern of the foot bones absent from Walmgate, ie. a majority of metapodials as compared to phalanges, and a majority of proximal as opposed to distal metapodials (see O'Connor, 1984, Fig 7. and Table 5 below).

Table 5: Number of proximal and distal parts of the metapodials of sheep (the counts include many bones that are complete)

	South Yard Group 1	South Room Group 2	Cordwainers Group 2	Total
Prox. metacarpus L.	17	17	31	65
Prox. metacarpus R.	20	18	27	65
Dist. Metacarpus L.	11	9	16	36
Dist. metacarpus R.	19	13	12	44
Prox. metatarsus L.	14	21	32	67
Prox. metatarsus R.	12	20	34	66
Dist. metatarsus L.	14	10	13	37
Dist. metatarsus R.	11	6	29	46

The interpretation of these particular skeletal elements is problematic. The absence of toe bones suggests that they were removed from site or never arrived. Two possible explanations being that the skins with the feet were removed (or never arrived) or else this part of the carcass was cut off and discarded (from the site or prior to the arrival of the rest of the carcass). The next cut on the carcass occurred at the ankle above the cannon bones since few carpals or tarsals were recovered and a few specimens had visible knife cuts on the proximal end of the metapodials. This position for the dismemberment of the carcass is understandable as butchery associated with the removal of waste, the cannon bones having no meat value, but whether it occurred on the site and before or after the removal of the feet and "skin" is impossible to determine. Certainly the documentary evidence indicates that the individuals of the guilds on the site were not permitted to carry on their commercial activities there but only the business of the guild itself. This debris is however obviously of a commercial nature and indicates either the butchery and disposal of at least 67 sheep carcasses and skins or else some activity involving a like number of sheep skins coming onto the site and later being disposed of with the hooves. Both these possibilities could result in the leaving of a collection of metapodials and some phalanges. The evidence from Walmgate cited above suggests that these remains represent an intermediary stage between skinning and primary butchery, this material being waste to both exercises. The 65 or so sheep mandibles in the collection may derive from these same carcasses and activity and would suggest that it was butchery that was carried out on or near the site, but they could equally derive from a different activity. It is possible that the layers containing this material were redeposited as leveling or infilling from a source outside the site. This is more acceptable in the contexts of the historical use of these buildings (see above) and it is probable that the activities discussed above were carried out nearby and the debris exploited for leveling. There was no evidence for bone-working on the site, a possible alternative explanation for large numbers of metapodials.

The majority of the remainder of the sheep bones appear to be food debris and are probably unassociated with the elements discussed above although a small proportion of the latter may also be food debris. A comparison of the sheep material with that from Black Gate (phases 2 and 3) where the most frequently occurring parts of the skeleton were scapulae, humeri, radii, innominates, femora and tibiae (although metapodials were nearly as abundant) (Rackham, 1983) illustrates the contrast and reinforces the domestic (food debris) interpretation of the latter and the commercial origin of a proportion of the material at Blackfriars.

The remaining species occurred with such low frequency that little can be said on those parts of the skeleton represented. However certainly in the 18th century deposits in the Cordwainers numbers of the horse bones came from the same individuals, at least two possibly three animals are indicated.

<u>Age structure of the cattle and sheep sample</u>

The analysis of the age structure of the two most common species is based upon the state of epiphyseal fusion of the post-cranial skeleton and the eruption and wear on the mandibular and maxillary teeth. The tooth wear has been recorded in the detail advocated by Grant (1982) only for sheep, cattle have been recorded merely under general categories, ie no wear, slight, medium and extremely or very worn.

Cattle. Only 140 fragments carried a fused or unfused epiphysis and this is too small a sample for a reliable estimate of the age at slaughter of the cattle sample population. However the number of early, middle and late fusing epiphyses can be assessed in a manner that assists in estimating the ages at which animals were killed (Table 6).

Table 6. Proportions of fused and unfused epiphyses of cattle at Blackfriars and Black Gate (phases 2 & 3)

Age#	Blackfriars			Black Gate		
	U:F	%unf.	%killed	U:F	%unf.	%kill
Early fus. 0-2 yrs	4:55	6.8	6.8	2:51	3.8	3.8

Middle fus.	2-2.5	6:24	20	13.33	1:18	5.3	1.6
Later fus.	3-4.5	5:6	45.5	25.45	11:18	37.9	32.7
Vertebrae	7-9	24:17	58.5	13.1	31:21	59.6	21.7
After	7-9 yrs			41.4			40.38

Approximate age in modern animals (Silver, 1969)

At Blackfriars a small percentage of animals appear to have been slaughtered in their first two years of life. A number of further animals must have been slaughtered in their third year with a more substantial increase in the next two years. Between 5 and 7-9 years the epiphyses suggest another 13% but many (perhaps 41%) were killed in full skeletal maturity at seven years or older. Although the maturation rate of cattle is thought to have changed it is unlikely that this will be greatly different at this period from the figures derived from modern animals given in Table 6 (from Silver, 1969).

The teeth and jaws constitute an even smaller sample and they have been analysed in terms of the proportions of each tooth type that is erupted or unerupted (Table 7). Loose teeth are counted in the analysis but teeth lost from jaws are not. This ensures no duplication of the same tooth. Jaws with only deciduous teeth are counted individually for each unerupted tooth, ie M1, M2 and M3. The figures are given in Table 7.

Table 7. Number and percentage of erupted and unerupted teeth of cattle at Blackfriars, in approximate order of eruption.

	M1	M2	P3	P2	M3	P4	
Unerupted	3	3	3	2	3	8	
Just in wear		1	1		2	1	
Worn	16	13	8	4	7	10	
%unerupted	18.75	17.6	33.3	25	25	42.1	
%killed before eruption	18.75	0	8.33	8.33	0	8.9	56
Approx. age	6mths	1.25	2	2.25	2.25	2.75	>2.75 yrs

In a small proportion of jaws the M1 was unerupted, by about 2.25-2.5 years a further 17% had been slaughtered, all of these probably in their second year. A further 9% were slaughtered before 3 years but the majority, some 56%, survived beyond this. This would appear to be a slightly higher proportion of juveniles than is indicated by the post-cranial bones (Table 6) but it would be unreasonable to attempt to attach significance to these variations on such a small sample size.

The epiphyseal data suggests a slightly different slaughter pattern to that at BlackGate (Table 6) with fewer juveniles being slaughtered and a higher proportion of beasts in the age classes over 2 years but less than 7 years at BlackGate.

Sheep. The epiphysial fusion data for sheep is presented in Fig.2a-c where the bones are arranged in their approximate order of fusion. The comparison of the 17th and 18th century data is given (Fig. 2a & b) but although there is some suggestion of an increase in the proportion of younger animals being slaughtered in the 18th century the sample sizes are small and discussion is based on both groups together (Fig. 2c). It is possible from the pattern of these bar diagrams to interpret the age structure of the animals that generated the bone samples (Rackham in prep.) and compare it directly with the data from Black Gate which is also presented on the figure (Fig. 2d). This is a more reliable method than that used for cattle above but is dependent upon a sufficient sample size. In principle if all animals slaughtered to produce the sample are represented randomly with regard to skeletal element the line of the figure should consistently drop to the right. It can be seen that this is not the case although the proximal tibia and proximal humerus (Fig. 2c) should perhaps be ignored on the basis of small sample size. A marked increase in the proportions of fused epiphyses to the right would indicate a non-random representation of the original slaughtered sample. The figure may also be biassed by the large number of metapodials and phalanges which may well have had a different age structure to the animals whose meat was eaten on site. This is not discernible from the figure although there may be a slightly higher proportion of juveniles than the remainder of the diagram to the right (ie later fusing epiphyses) would lead us to expect. Given these possible anomalies in the diagram the data (Fig. 2c) suggests approximately 13% of the animals were slaughtered before one year of age and the presence of just fused bones suggests that some of these animals were killed at ages from 3 months upwards. A further 16% were slaughtered between one and two years, a large proportion of which were killed before the distal tibia fused, which on modern figures is about 16 months. The remaining animals represented in the collection had all their appendicular elements fused, corresponding to an age in excess of 3.5 years in modern sheep. 43% of the sample population were killed between this age and the time the epiphyses of the vertebrae fuse, between 4 and 5 years old, and the remaining 27% had reached complete skeletal maturity and were probably slaughtered when in excess of 5 years old.

Without detailing the slaughter pattern from Black Gate (phases 2 and 3) it is nevertheless apparent from the figure

(Fig. 2c & d) that a much higher proportion of younger animals occur in the sample from this site. Many of the later fusing epiphyses have over 50% unfused in contrast to the collection from Blackfriars although the number of animals at skeletal maturity is similar if not a little more common at Black Gate. Overall however it is likely that poorer quality meat (by modern standards) was eaten at Blackfriars, Black Gate being supplied with a higher proportion of lamb and prime mutton.

An analysis of the teeth from the site supports the data from epiphysial fusion. Figure 3 shows the percentage of each tooth erupted for Blackfriars and Blackgate (phases 2 & 3). The data are arranged in order of eruption and should diminish to the right. The apparent high proportion of juvenile P2's and P3's can be explained as a result of recovery. The adult premolars are readily lost from the jaw whereas the jaws with deciduous teeth tend to remain intact, therefore over-representing juveniles for these teeth. If these two teeth are excluded from the figure then the pattern can be seen to fall and shows approximately 76.5% of the sample from Blackfriars possessed an adult dentition in wear. This corresponds very closely with the 74% with the distal tibia and most later fusing epiphyses fused, indicating that adult dentition is normally present in these sheep by the time the distal tibia fuses. This is comparable with the figures for modern animals but may indicate a slightly later relative age at which the distal tibia fuses than the 1.5 - 2 years of age suggested by Silver (1969), it being generally considered that tooth eruption is likely to be more consistent with modern data than epiphyseal fusion. The BlackGate data again shows a higher proportion of juveniles, but only slightly and this perhaps suggests that the major part of the difference in slaughter observed from the epiphyses occurs after the fusion of the distal tibia and eruption of the P4 but before skeletal maturity. This is therefore not revealed in Figure 3 and can only be assessed by consideration of tooth wear on the adult mandibular dentition. This has been recorded for the Blackfriars jaws (Fig. 4 Rackham & Alvey, in prep.) but is not available for the groups from BlackGate. This figure shows a small proportion (17%) of lambs with the M1 erupted and the M2 unerupted (with dp4 at wear stage e,f or g), perhaps 6-15 months old (see Silver, 1969) and three individuals with heavy wear on all teeth indicating aged adults probably over 6 years old. The majority fall in between in a pattern suggesting slaughter at all ages between 30 months and six years, although some of the variability in tooth wear may be due to animals grazing on different pastures. This group includes two peaks in the older part of the range, 28.3% of the sample suggesting animals killed at 4-6 years and a further 30.2% at about 3-4 years. This data compares well with that from the epiphyses. The older peak and aged animals being 34% of the jaw sample corresponding with the approximately 30% of the sample with fused vertebral epiphyses (Fig. 2c), ie older than about five years. The 30-35% with the distal metapodials unfused would correspond with those animals represented by jaws up until wear stage 12 of M1+M3 on Fig. 4, (ie Grant (1982) stages c & d on the M3) indicating an age of perhaps 2 years. The remaining appendicular epiphyses fusing during the period the M3 undergoes further wear up until stage f/g (see Grant, 1982).

Other species. Few of the pig remains are from adult animals, and among the juveniles one or two specimens indicate very young animals, one bone from the Cordwainers was so small and undeveloped as to suggest a prenatal specimen. The horse bones in contrast are all, barring one, from adult animals and all vertebral epiphyses had fused suggesting ages in excess of 5 years. One bone only, an ulna with the proximal epiphysis unfused, suggested an animal younger than this, although a maxilla had very large teeth with very little wear.

Measurements

Although measurements were taken on the bones of cattle, sheep, pig, horse, dog and fowl only sheep bones occurred with sufficient frequency for metrical analysis. The metapodials of sheep were the most abundant remains and these have been analysed in an attempt to determine the sex structure of the animals represented by the measured sample. The illustrations (Figures 5 and 6) show a small group of large individuals that may be interpreted as tupps. The remaining part of the sample is more diffuse although a large middle group can be recognised with a number of smaller cases. Although some of these differences could be associated with different populations or stock types it seems plausible to interpret the middle group as wethers and the diffuse smaller group as ewes. Specimens that were known to be from juveniles were also plotted on Fig. 6 and one may possibly be a juvenile ram but the remaining juveniles would appear to be both wethers and ewes although the size range is likely to extend lower for the juveniles of both groups. If these interpretations are correct then the sample of metapodials derives from a sample in which adult wethers predominate with some ewes and a small number of tupps. As such they probably represent the cull from populations kept principally for wool production. Since this group or at least a large proportion of it is interpreted as being commercial in origin rather than domestic the sex structure may vary from the remainder of the sheep sample. Unfortunately the other skeletal elements do not occur with sufficient frequency for analysis.

Pathology

Pathological conditions are most abundant on the bones of sheep. These are restricted to the horn cores, jaws and feet. Six horn cores posses a 'thumb print' on the medial proximal side, a common feature of archaeological material and variously interpreted including its attribution to castration and malnutrition. Five jaws show pathological features; two have lost the M2 antemortem with subsequent closure of the alveoli; in one the alveoli of the PM2 lies at right angles to the axis of the jaw and indicates malalignment of this tooth; a single jaw carries a swelling below the M2 and M3 associated with an inflammation during life and the last specimen (Plate 1) carries a large pathological foramen on the buccal side of the diastema with associated porosity and destruction of the surrounding bone tissue. A number of metapodials carry another common feature - a swelling on the anterior proximal part of the shaft of the medial metacarpus or metatarsus of the metapodials. This is often associated with porosity and may result from extensive bruising and inflammation of the periosteum. This condition was found among the 18th century material from Walmgate, York (O'Connor, 1984) and is illustrated in that work. Two bones have what may be arthritic conditions , the anterior articulation of a metatarsus shows some lipping in association with the condition just described and the distal articulation of a 1st phalanx carries slight exostoses around the facet.

In the other species, two cattle bones, a tibia and metatarsus have a swelling with porous bone tissue on the diaphysis and three vertebrae of horse have extensive exostosis and lipping around the cranial and caudal epiphyses of the centrum which has progressed so far in two specimens that the vertebrae are fusing together. This latter condition was common at Black Gate (Rackham, 1981; 1983) and appears to be due to advanced age and also possibly due to stresses incurred by work.

Other species

The other species in Table 1 occur in insufficient numbers for detailed discussion but are nevertheless of interest. The goat is identified from only one bone, a metatarsus, which may derive from an unprocessed skin or from food debris. Domestic dog and cat were identified from ten and four bones repectively. These included a number of bones from one dog, a bone from a small terrier sized dog, a kitten and a jaw from a very old almost toothless cat. The remaining species probably represent the debris from occasional meals of species other than the common domesticates. One or two bones of rabbit, hare and roe deer were recovered and a single tibia of a rat. Chicken and goose bones are present in small numbers with single finds of grouse, woodcock and swan. The more commonly eaten fish, cod, ling, haddock and whiting also occur, with one individual of cod being represented by a number of vertebrae in one layer. The greatest variety of fish and bird occurred in the 18th century layers of the Cordwainers with a few in the 17th century deposits in the South room. Recovery may have affected the frequency of these remains but it appears characteristic of the post-mediaeval deposits in Newcastle (Rackham, 1981;1983) that large fish are infrequent and must either have been purchased filleted, the bone debris being restricted to the fish market, or little eaten. Given the situation of Newcastle one is inclined to think fish was being bought already filleted at this time and is not leaving any remains on the site.

Other dietary refuse included the shells of a number of shellfish. Oyster were the most abundant (47 upper and 47 lower valves), with cockles (15 valves), periwinkles (6 shells), a mussel and a limpet also present.

Soil samples

Three samples were collected and processed. Two 2.5 kg. samples from 18th century deposits in the Cordwainers (DO and DP) and one 2.2 kg sample from layer IL. The samples were washed and sieved and all material caught in an 850um sieve was dried and sorted for bones and shells etc.. The samples from DO and DP both contain a suite of terrestrial snails characteristic of gardens and damp calcareous places which included Discus rotundatus, Cecilioides acicula, Carychium tridentatum, Vallonia sp., Vitrea crystallina, Oxychilussp. and Cochlicopa lubrica/lubricella. A number of fragments of shell and bone were found including cockle, a rodent tibia and a few small fish bones. The sample from IL contained a number of small fish bones and included herring, cod and eel , and samples DO and DP produced Haddock and herring. It is probable that many small fish species that are purchased whole have not been recovered and this part of the local populations diet must be considerably under-represented in this collection. The fish from the excavation are the larger specimens and one measurement from a cod bone in layer IR indicates a fish of over 1 metre in length, approximately 9-10 kg. live weight.

Conclusion

The sample from this site despite its fairly limited size has proved of some interest. In respect of activities being carried out on the site, as well as dietary waste, there is a collection of sheep material indicative of commercial butchery or skin processing, in fact perhaps both. There is a possibility that the 17th and 18th century deposits have been derived from elsewhere for leveling and make-up (see archaeological report above) and the bone material may therefore reflect activities off the site rather than on it.

A comparison with the material from Black Gate suggests a similar proportion of domesticates being slaughtered although differences in the skeletal representation and age structure of the samples perhaps suggests social differences between the originators of the rubbish at each site.

A brief consideration can be given to the farming economy producing these collections by a consideration of the age structure discussed above. Much of the cattle farming must have been orientated towards supplying prime beef. Over 40% (Table 6) of the sample population were slaughtered between 2 and 4.5 years of age. Trow-Smith (1957, p.239) records steers not fattening until they were 4 or 5 in the early 18th century although heifers were ready at three. However a further 40% of the collections from both sites survived to 7 years and beyond. We have no data on the sex of these older animals but 17th century milch cows were kept up to about 12 years and occasionally beyond (Trow-Smith, 1957, p.238). Some of these animals may have been retired plough oxen but it would appear that both beef and dairy were important local farming economies.

The data from the sheep bones would suggest a similar pattern, with both lamb and mutton production being important as well as wool. Using the mandibles the lamb and 'old' lamb accounts for some 36% of the sample from Blackfriars, and a large proportion, 40%, were killed for mutton but only after two or three seasons of wool crop. A further 24.6% of the sample were probably animals over 4 or 5 years and are probably predominantly wethers kept on for two or three more wool clips. The measurements in Fig. 6 suggest that many of these mature animals and a high proportion of the 'old' lambs are wethers with a few adult ewes at the end of their usefulness being supplied to the Newcastle market. Contemporary treatises (Trow-Smith, 1957) suggest that ewes were not generally kept after 6 years and wethers were not slaughtered for the butcher until 4 years old. This is consistent with the data from Blackfriars and Black Gate.

The contemporary treatises assign little importance to the pig and its relative scarcity in the post-Mediaeval deposits in Newcastle presumably reflect the fact that the intensive husbandry of the present day did not really start developing until the 18th century.

Although numerically the sheep are the most important animal, in terms of meat contribution beef is obviously the major source. Other items such as rabbit, game and fish make some contribution but are of little significance.

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TABLE 1
BLACKFRIARS, NEWCASTLE

Table of the species and bone numbers found in each period of the three areas.

Species	South Yard		South Room		Cordwainers			Totals	
	16–17th	18th	17th	18th	17tha	17thb	18th	16/17th	18th
Horse	4	4		10			34	4	48
Cattle	107	32		83	2	10	109	119	224
Sheep	18	1		19			6	18	26
Sheep or goat	311	72	3	221	9	23	357	346	650
Goat				1					1
Pig	15	3		25	2	1	15	18	43
Dog	1	1		1		1	8	2	10
Cat	4						4	4	4
Rat	1							1	
Rabbit	2						1	2	1
Hare	1			1				1	1
Roe deer		1							1
Human							1		1
Chicken	17	1	1	6	22	6	12	46	19
Goose	8			2	2	4	3	14	5
Grouse							1		1
Woodcock							1		1
Swan, sp indet.							1		1
Bird, indet.		1		2	1			1	3
Haddock	1						3	1	3
Cod	1			19	2		1	3	20
Ling				1					1
Whiting				2			1		3
Gadidae, indet.			1				2	1	2
Fish, indet.	7	1		33	6		7	13	41
Large animal	69	12		33	4	9	44	82	89
Large ungulate	57	13		29	9	24	53	90	95
Small ungulate	133	21	3	53	62	26	93	224	167
Indet. mammal	94	39		36	5	8	76	107	151
TOTALS	851	202	8	577	126	112	833	1097	1612

Grand Total 2709

TABLE 2
BLACKFRIARS, NEWCASTLE

Table of the fragment numbers of particular bones of sheep/goat, and small ungulate for each period and area.

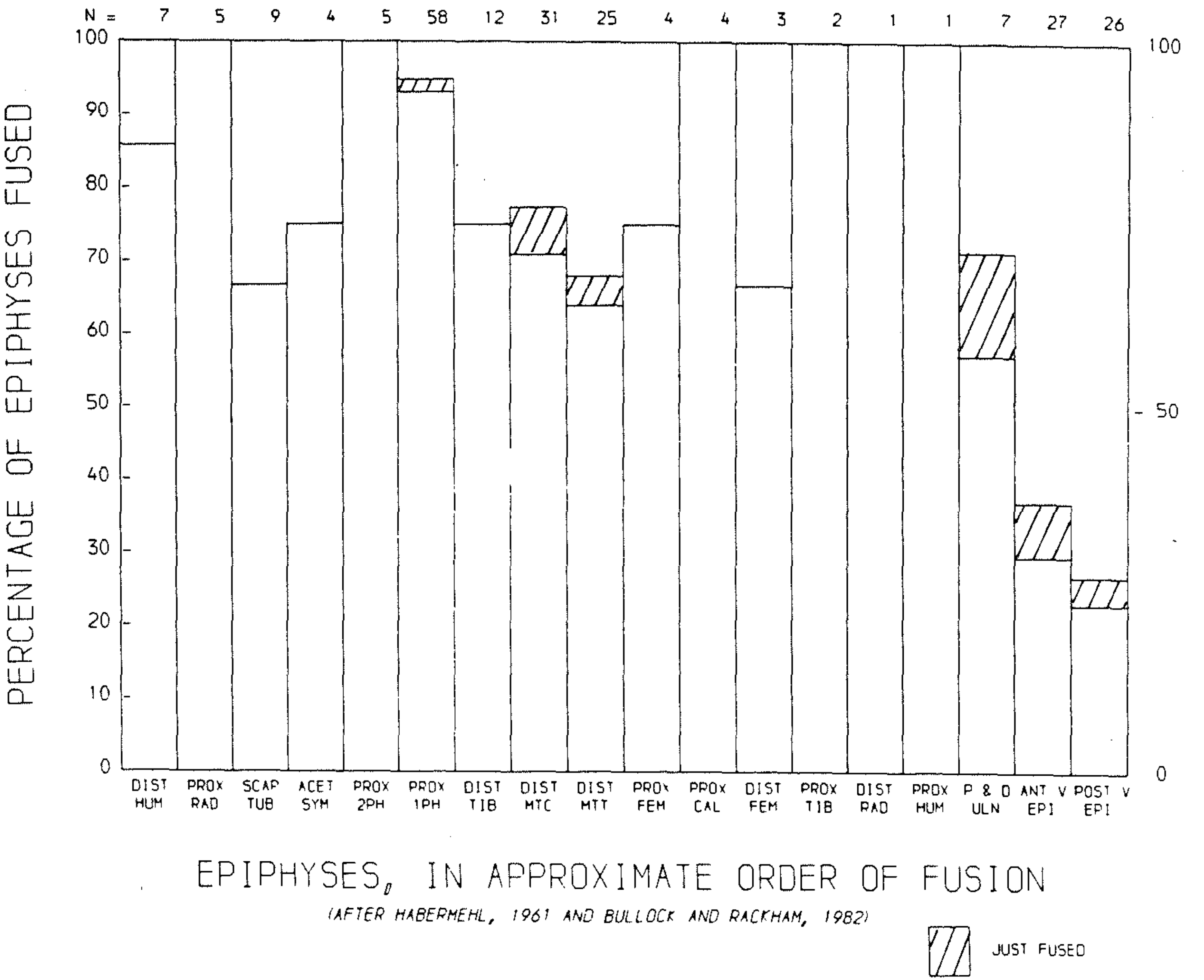
	South Yard		South Room		Cordwainers		TOTALS	
	16/17th	18th	17th	18th	16/17th	18th	Group 1	Group 2
Horn core	13			6		2	13	8
Skull fragments	35	2		25		9	35	36
Maxilla	5			5		2	5	7
Mandible	30	5		28	1	30	31	63
Upper teeth	12	1		5		10	12	16
Lower teeth	4	3		10		6	4	19
Hyoid	3			1		2	3	3
Atlas	1		1		1	3	3	3
Axis	2	2		2		4	2	8
Cervical vert.	9	1		1	4	4	13	6
Thoracic vert.	10	2		2	3	2	13	6
Lumbar vert.	13	3		10		4	13	17
Sacrum					1	1	1	1
Caudal vert.	2						2	
Rib fragments	91	11	2	34	77	75	170	130
Scapula	27	2		18	5	9	32	29
Humerus	8	1		4	3	13	11	18
Radius	6	5		6	1	15	7	26
Ulna	7			2		7	7	9
Carpals								
Metacarpus	38	18		52	5	77	42	147
Phalanx 1	55	10		12	3	25	58	47
Phalanx 2	8	1				2	8	3
Phalanx 3	1			1		2	1	3
Innominate	7	4		6	2	13	9	23
Femur	9	3		4	1	11	10	18
Patella								
Tibia	16	7		2	2	14	18	23
Astragalus	4			1		4	4	5
Calcaneum	5					6	5	6
Tarsals	2				1	1	3	1
Metatarsus	29	11	2	47	7	96	38	154
Metapodials	7	1		7	1	2	8	10
Sternal frags.	1			2	1		2	2
Costal cartilage					1	1	1	1
TOTALS	460	93	5	294	120	452	584	848

TABLE 3
BLACKFRIARS, NEWCASTLE

Table of the fragments of horse, cattle, sheep and pig as a percentage of the total number of bones identified to these species.

	South Yard 16/17th	South Yard 18th	South Room 18th	Cordwainers 16/17th	Cordwainers 18th	TOTALS Group 1	TOTALS Group 2
Horse	0.9%	3.6%	2.8%		6.5%	0.8%	4.8%
Cattle	23.5	28.6	23.2	25.5	20.9	23.6	22.6
Sheep	4.0	0.1	5.3		1.1	3.6	2.6
Sheep/goat	68.3	64.3	61.7	68.1	68.5	68.5	65.6
Pig	3.3	2.7	7.0	6.4	2.9	3.6	4.3
N =	455	112	358	47	521	505	991

FIG. 2A BLACKFRIARS, NEWCASTLE 17TH CENT. SHEEP



EPIPHYSES, IN APPROXIMATE ORDER OF FUSION

(AFTER HABERMEHL, 1961 AND BULLOCK AND RACKHAM, 1982)

JUST FUSED

FIG. 2B BLACKFRIARS, NEWCASTLE 18TH CENT. SHEEP

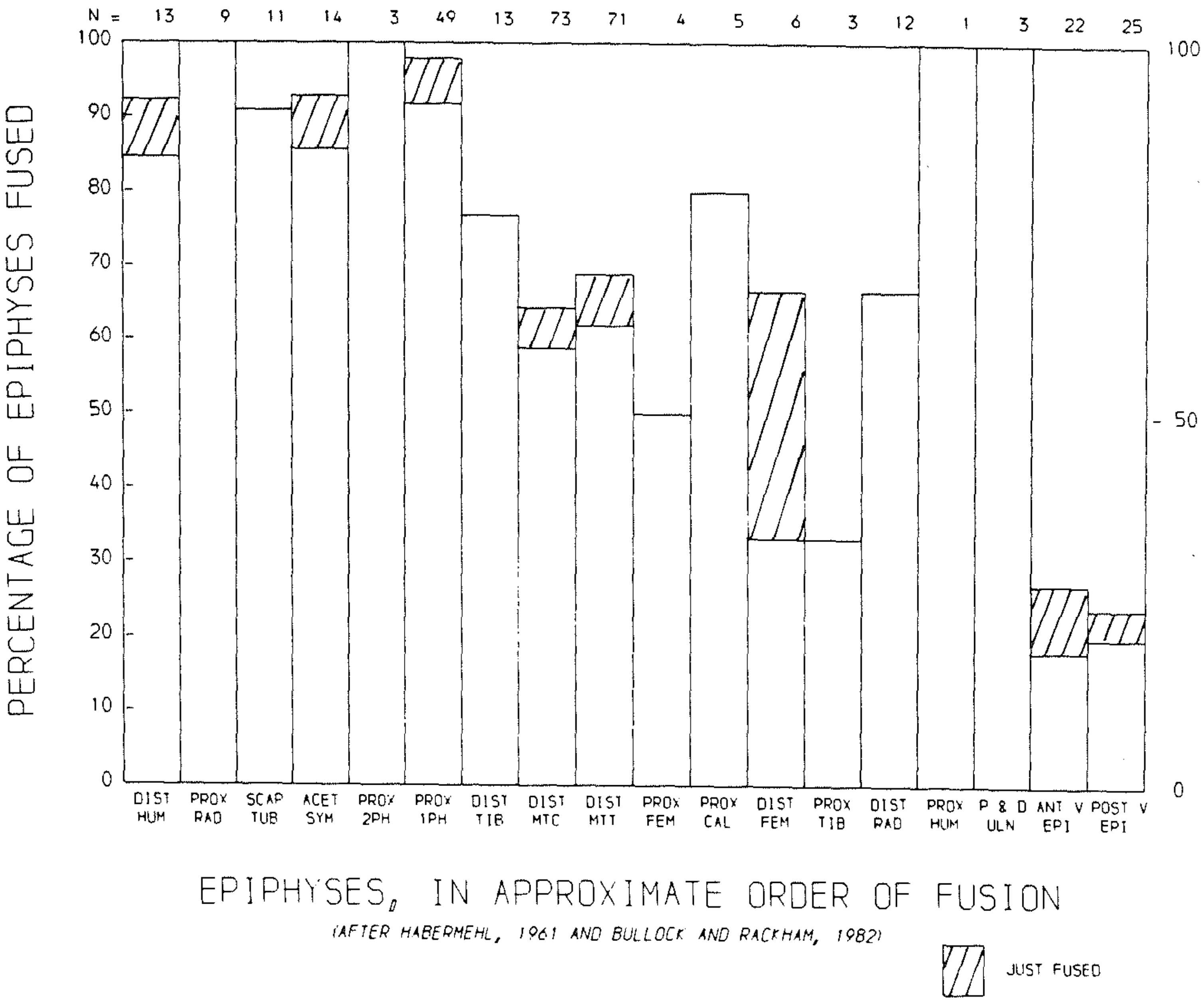
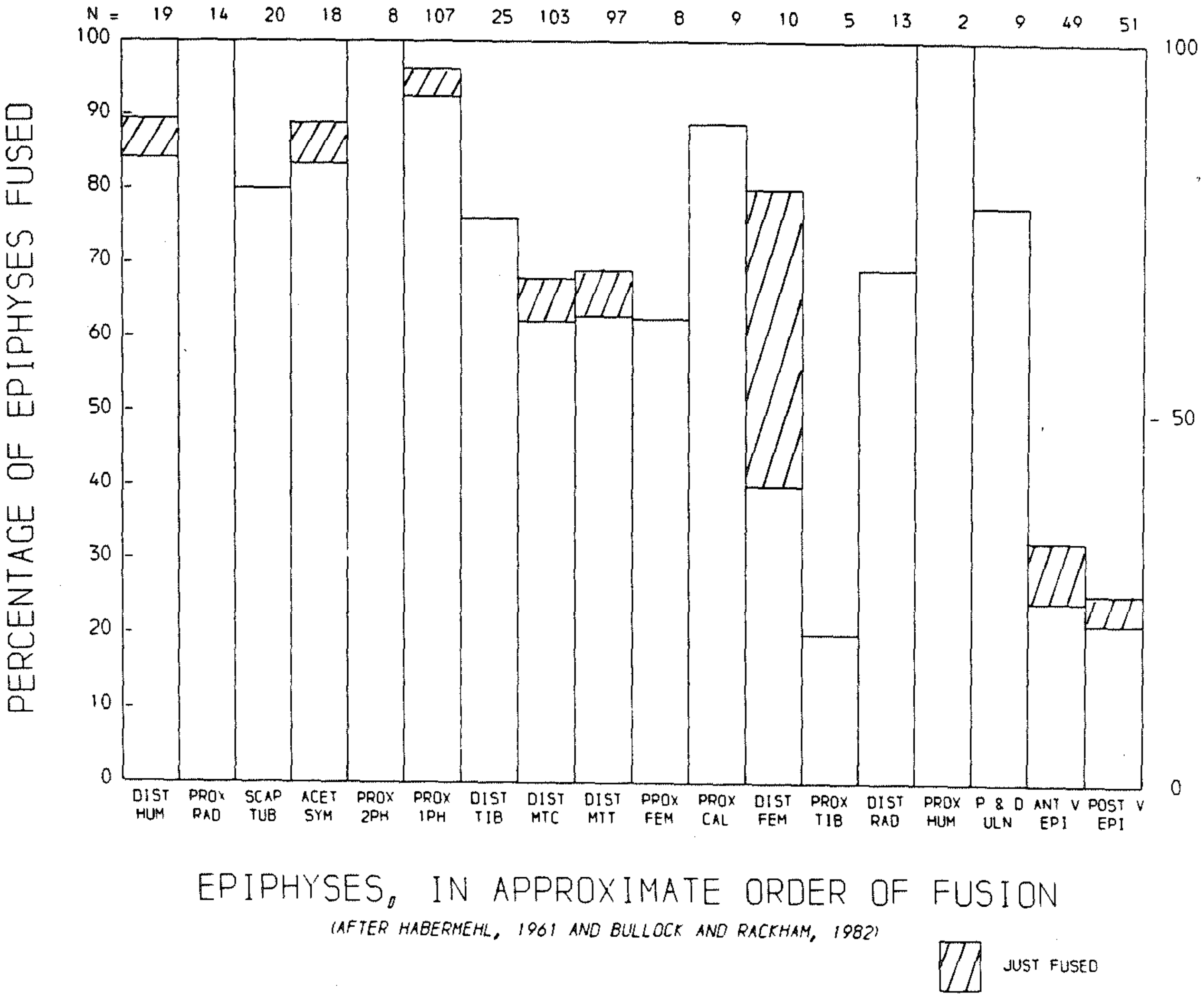


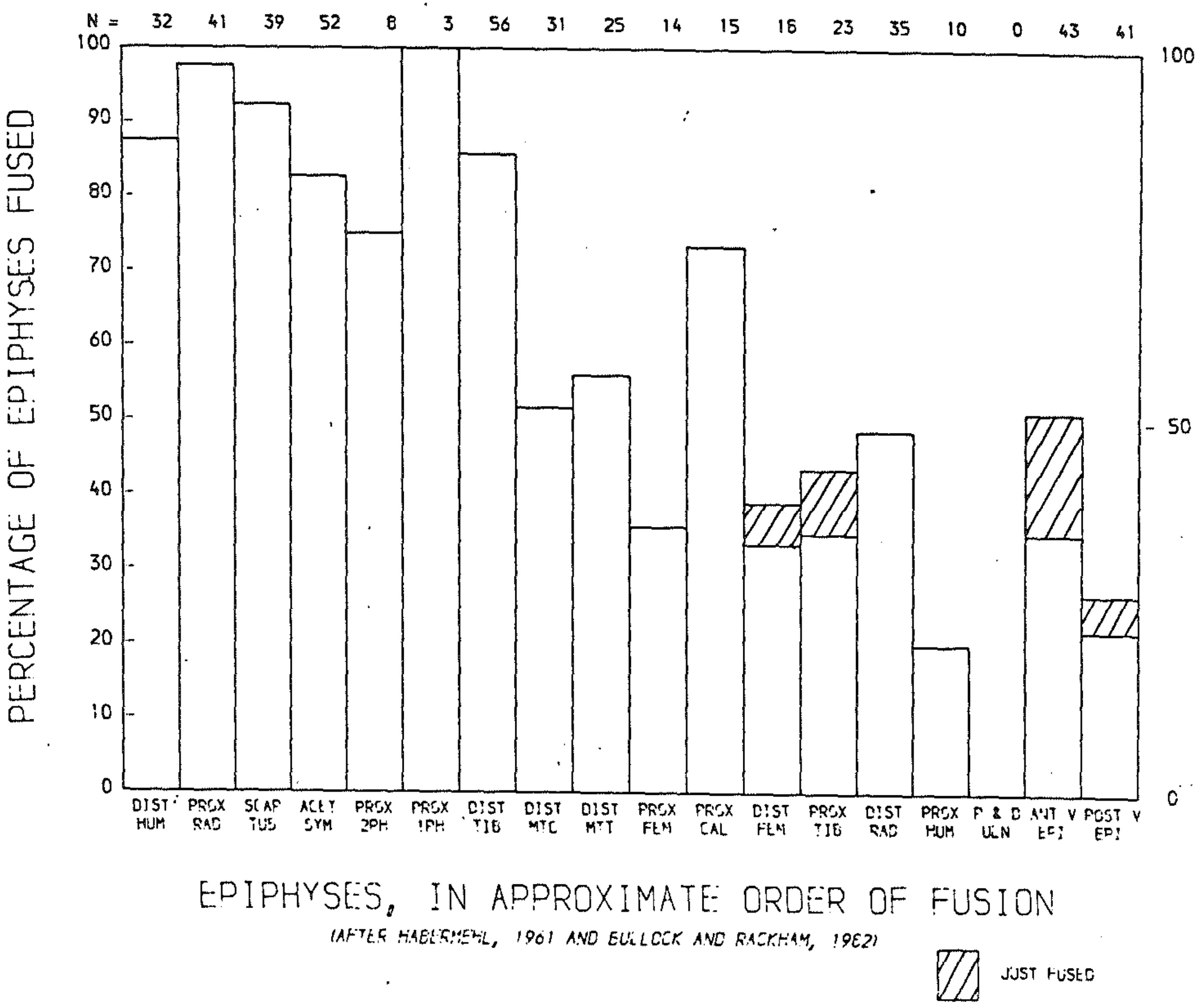
FIG. 2C BLACKFRIARS, NEWCASTLE-SHEEP EPIPHYSES



EPIPHYSES, IN APPROXIMATE ORDER OF FUSION

(AFTER HABERMEHL, 1961 AND BULLOCK AND RACKHAM, 1982)

FIG. 2D BLACKGATE, NEWCASTLE SHEEP/GOAT



EPIPHYSES, IN APPROXIMATE ORDER OF FUSION

(AFTER HABERMEHL, 1961 AND BULLOCK AND RACKHAM, 1962)

FIG. 3 BLACKFRIARS AND BLACKGATE SHEEP TEETH

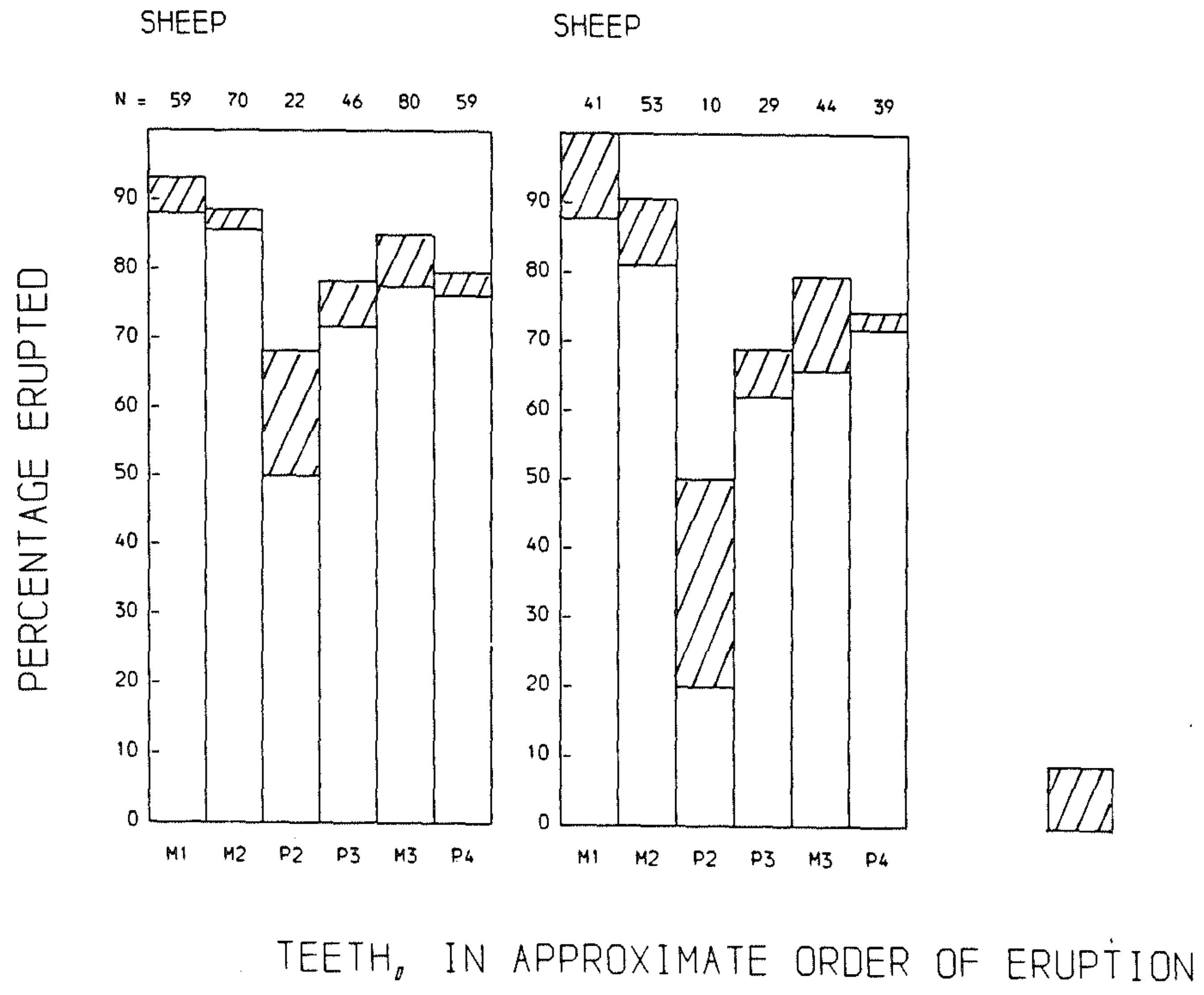


Fig. 4. Two dimensional bar diagram of the frequency of wear patterns of the M2 and M1+3 on sheep mandibles from Blackfriars Newcastle (wear after Grant, 1982 unerupted = 1, a = 2 etc)

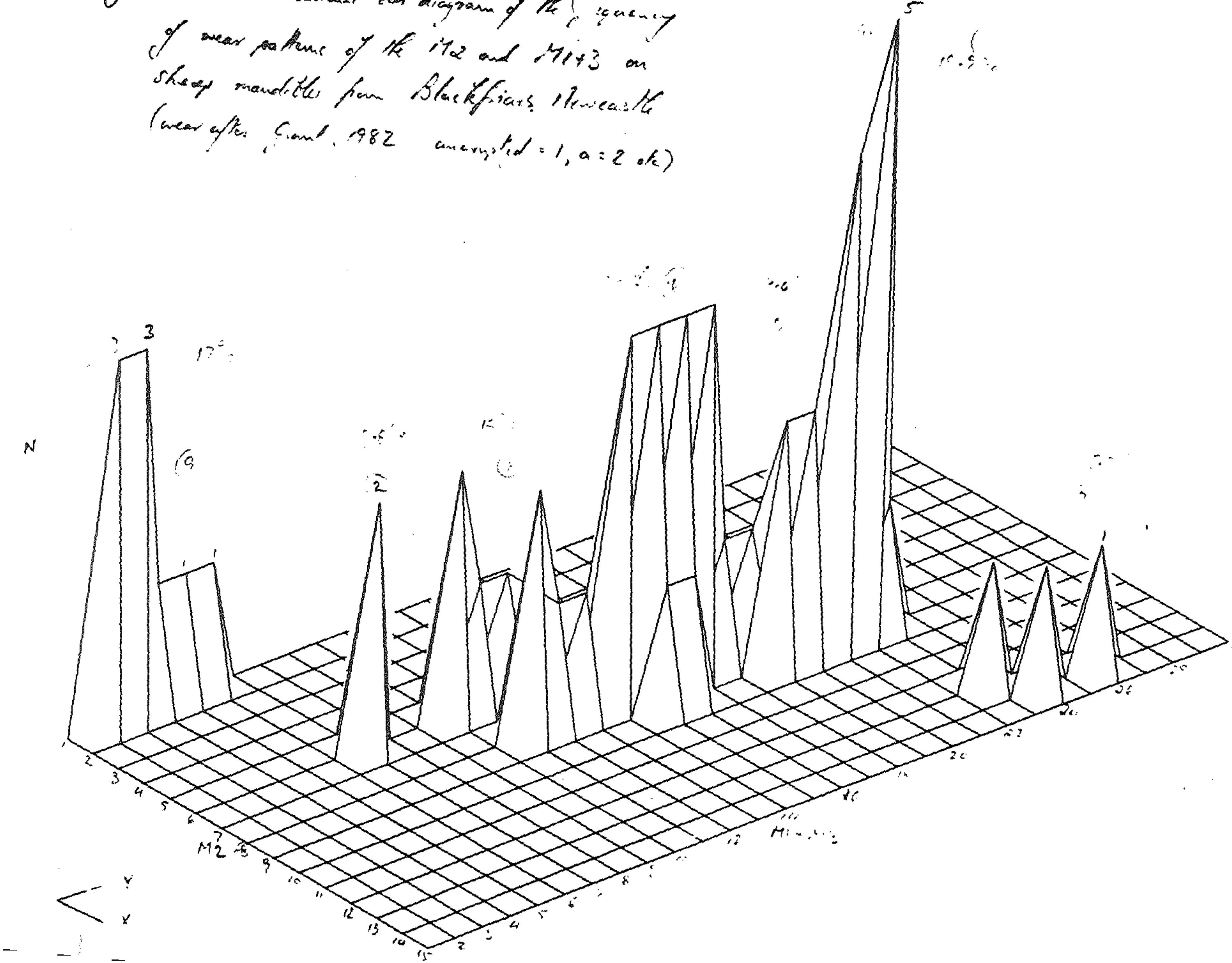
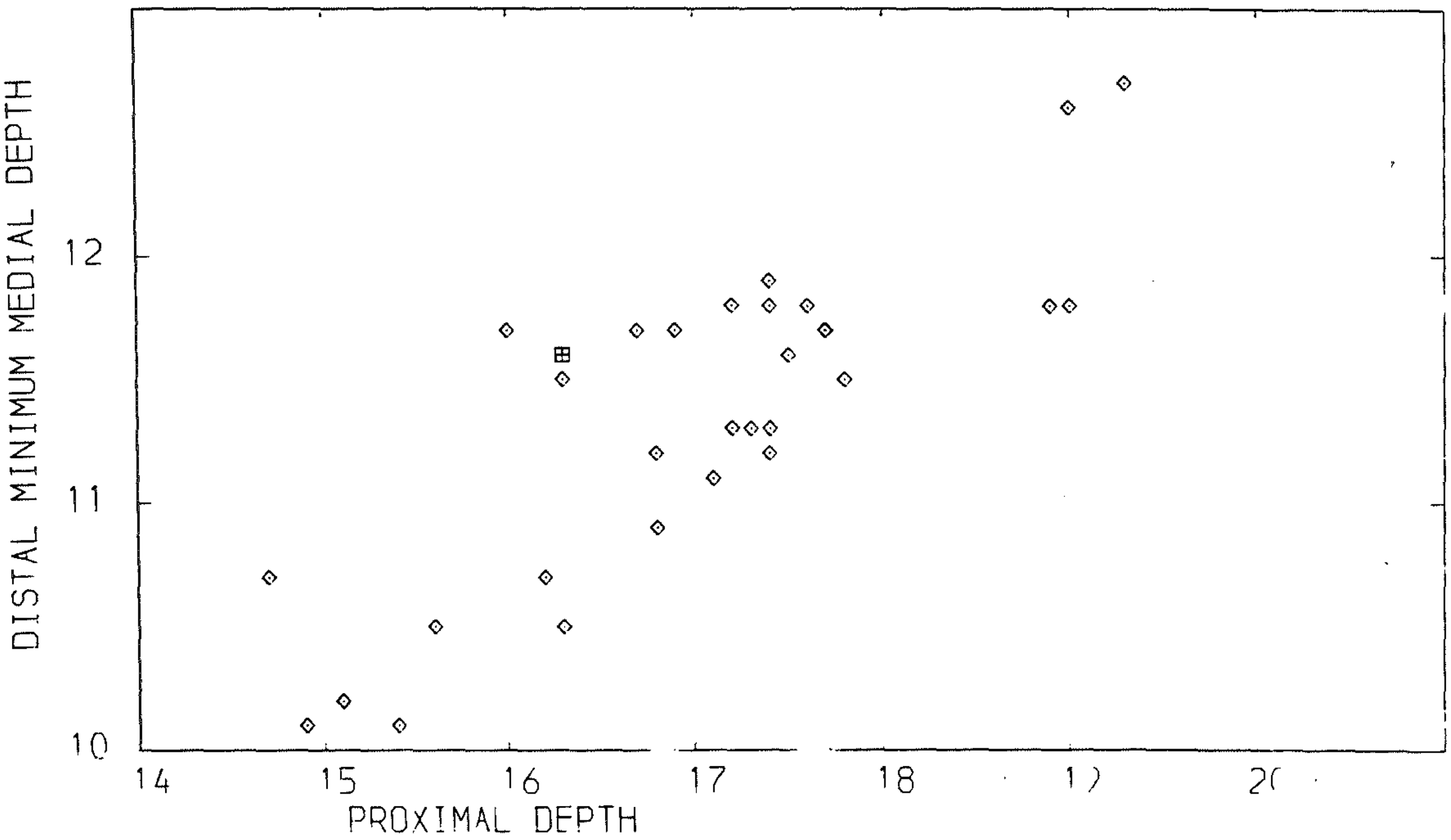
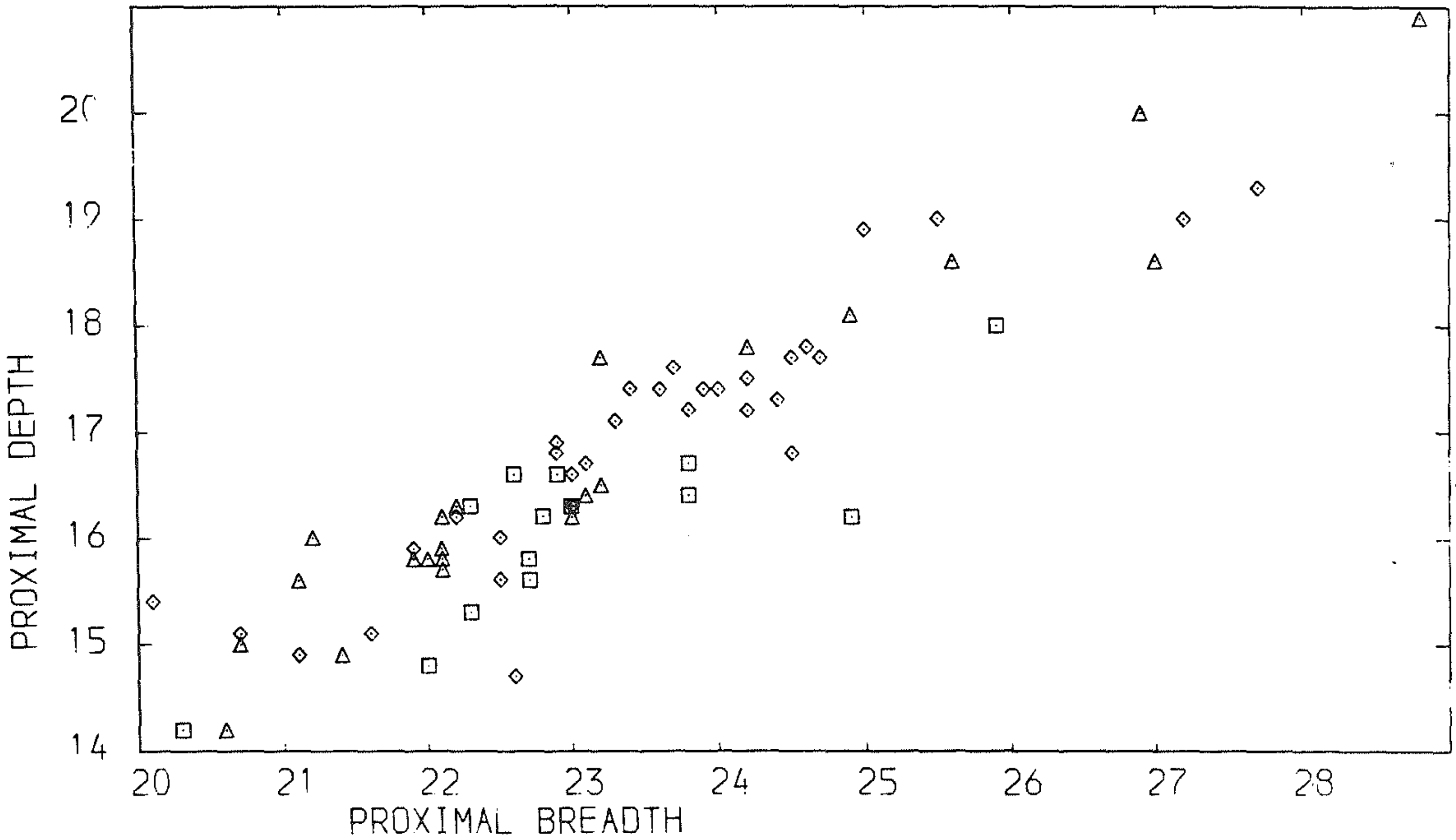


FIG. 5 BLACKFRIARS, NEWCASTLE

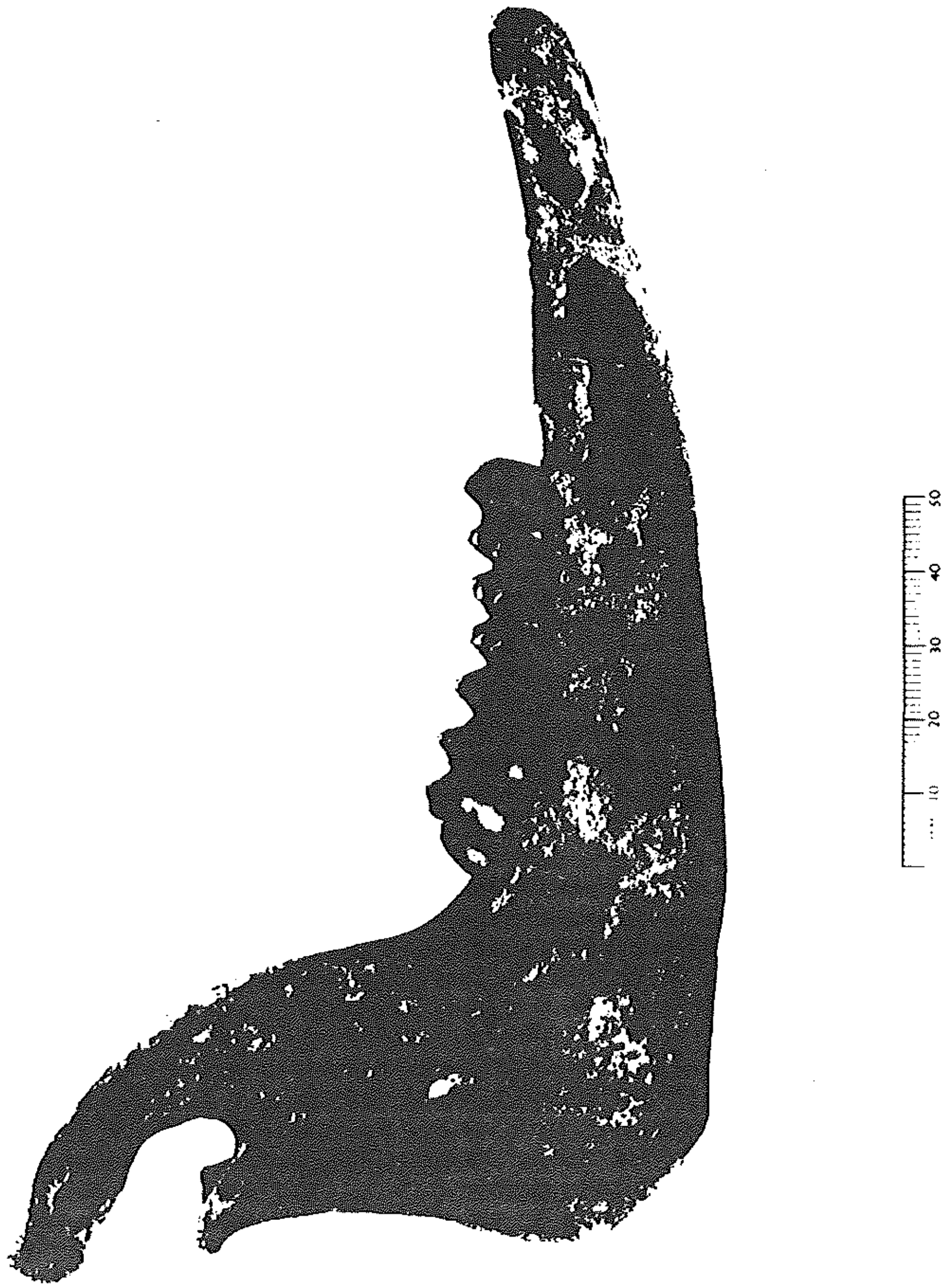


scattergram of the distal minimum medial condylar depth against the proximal depth of sheep metacarpals

FIG. 6 BLACKFRIARS, NEWCASTLE



scattergram of proximal depth against proximal breadth of sheep metacarpals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