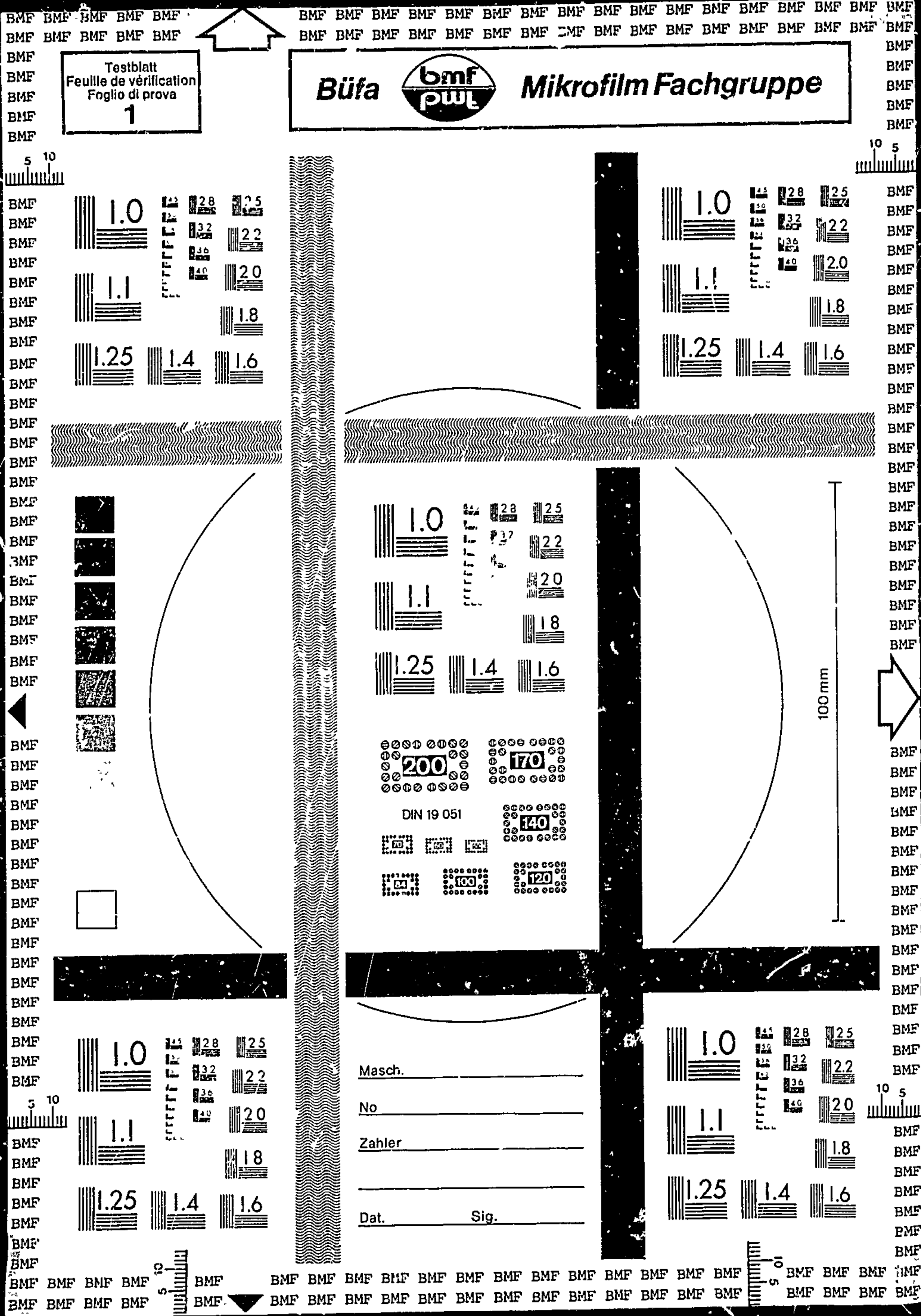

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Photocopies of the microfiche can be obtained from the Oxford Archaeological Unit, 46 Hythe Bridge Street, Oxford, OX1 2EP.

# LEVEL III REPORT ON THE MEDIEVAL ANIMAL BONES AND MARINE SHELLS FROM CHURCH STREET (SITE A) by BOB WILSON WITH ALISON LOCKER

Section Headings of Fiche V (con.)



Continued on Fiche VI

## List Tables for the Church Street report



Continued on Fiche VI

List of Figures for the Church Street report



Continued on Fiche VI M V A6

Table 18 Summary of Individual Burials, Including the Numbers of Carious Teeth, Abscesses and Teeth Lost Ante Mortem in the Number of Teeth and Tooth Sockets Seen.

Note: Condition: P = Poor, F = Fair, G = Good
Sex: M = Male, F = Female

Burials in the Nave and Aisle

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench IV | F11 | F | M | 45+ | c.5'11" 1.80 m. | 06/22 | 06/23 | 07/30 | Osteophytes on vertebrae. Cervical vertebrae 1 and 2 fused. |
| " | F16 | F | M | 40-50 | | 00/06 | 00/08 | 00/08 | |
| " | F35 | P | M | 30-35 | 5'8" 1.73 m. | 00/03 | | 01/08 | Osteo-arthritis on cervical vertebrae. |
| " | F36 | F | M | 19-20 | 5'7½" 1.71 m. | Yes | 00/28 | 00/28 | Metopic |
| " | F63 | F | M | Adult | 5'9" 1.75 m. | | | | |
| " | F67 | P | F? | 23+ | 5'7" 1.70 m. | | | | |
| " | F69 | F | M | 25-35 | 5'9" 1.75 m. | 00/21 | 00/30 | 00/30 | |

Table 18(con.)
Burials in the Nave and Aisle

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench IV (con.) | F81 | F | M | c.20 | 5'8" 1.73 m. | | | | |
| " | F84 | G | M | 23-25 | | 00/32 | 00/32 | 00/32 | |
| " | F77 | F | M | Adult | | 01/01 | | | |
| " | F77 | F | M | 35+ | | 00/13 | 00/32 | 00/32 | |
| Trench X | F30 | P | M | 45+ | 5'10" 1.78 m. | 03/25 | 00/31 | 01/32 | Severe osteophytes on many vertebrae, also in hip joint. |
| " | F31 | P | M | c.16 | | 03/28 | | 00/28 | |
| " | F33 | P | M | 17-25 | 5'9" 1.75 m. | 00/25 | 00/32 | 00/32 | |
| " | F40 | P | M | 45+ | | 04/24 | 00/28 | 02/30 | Upper right canine malerupted. |
| " | F44 | P | M | 17-25 | | 01/08 | 00/08 | 00/08 | |
| " | F53 | P | M | 45+ | 5'8" 1.73 m. | 02/11 | 00/16 | 00/16 | Slight osteophytes on thoracic and lumbar vertebrae. |
| " | F55 | P | M | 25-30 | | 00/11 | 00/15 | 01/16 | Orbital osteoporosis. |

Table 18 (con.)

Burials in the Nave and Aisle

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench X (con.) | F56 | | M? | 13-19 | | | | | |
| " | F57 | | M | late 20's + | | | | | |

Burial in the Choir

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Trench I | F28 | P | M | 40's | c.5'7" 1.70 m. | | 00/18 | 06/22 | Osteophytes on thoracic vertebrae. |

Burials Outside the Church, North of the Nave

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Trench IV | F41 | | M | Adult | 5'6" 1.68 m. | | | | |
| " | F51 | F | M | 25-35 | 5'2½" 1.59 m. | 02/27 | 01/28 | | Slight osteophytes on thoracic and lumbar vertebrae. |
| " | F52 | P | M | 30's | 5'5½" 1.66 m. | 03/22 | 01/29 | | Metopic. Small odontome in right mandible. |

Table 18 (con.)

Burials Outside the Church, North of the Nave

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench IV (con.) | F53 | F | M | c.35 | 5'3½" 1.74 m. | 01/28 | 00/28 | 01/32 | Wormian bones. Osteophytes on thoracic and lumbar vertebrae. |
| " | F54 | P | M | early 20's | | 00/32 | | 00/32 | Cervical vertebrae 5 and 6 joined. |
| " | F55 | P | M | 20-25 | | 01/28 | Yes | | Five thoracic vertebrae have right lateral bias. Supernumerary tooth - upper left 9. |
| " | F56 | P | M | 17-19 | 5'9" 1.75 m. | 00/27 | 00/27 | 00/30 | Metopic. |
| " | F57 | P | M | 35-45 | | 00/19 | 00/22 | 09/32 | |
| " | F58 | F | M | c.45? | 5'6" 1.67 m. | 04/17 | Yes | 03/20 | Osteophytes on most vertebrae. |
| " | F73 | F | M | 35-40 | | Yes | 03/27 | 01/28 | Osteophytes on thoracic and lumbar vertebrae. |
| " | F91 | P | M | 21-25 | | 01/03 | 02/05 | Yes | |
| " | F92 | F | M | 30-35 | | 00/31 | 00/32 | 00/32 | Wormian bones. |
| " | F95 | F | M | 30+ | | 00/16 | | 00/16 | |

Table 18 (con.)

Burials Outside the Church, North of the Choir and Walking Place

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench I | F25 | P | M? | 20-30 | | | | | |
| Trench II | F3 | F | M | c.35 | 5'6½" 1.69 m. | Yes | 00/32 | 00/32 | Wormian bones. Osteophytes on lumbar vertebrae. |
| " | F4 | F | M | 40+ | 5'10" 1.78 m. | 07/16 | 02/27 | 05/32 | Osteophytes in vertebrae and hip. |
| " | F5 | F | M | 25++ | 5'8" 1.73 m. | 05/28 | 02/30 | 01/31 | Osteophytes on vertebrae. |
| " | F8 | F | M? | c.15 | | 00/07 | 00/14 | 00/14 | Wormian bones. |
| " | F9 | F | M | 17-18 | 5'3" 1.60 m. | 03/32 | 00/32 | 00/32 | Shovel-shaped incisors. ?Fistula in right mastoid. |
| " | F10 | G | M | 17-25 | 5'8½" 1.74 m. | 00/27 | 00/32 | 00/32 | |
| " | F11 | G | M | 17-25 | 5'8½" 1.74 m. | 00/30 | 00/30 | 00/30 | |
| " | F12 | F | M | 17-18 | 5'8" 1.73 m. | 00/30 | 00/32 | 00/32 | Upper left second incisor is microdont. |
| " | F13 | P | M | 23-30 | 5'9" 1.75 m. | | | | |

Table 18 (con.)

Burials Outside the Church, North of the Choir and Walking Place

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench II (con.) | | | | | | | | | |
| " | F14 | F | M | 17-20 | 5'5"<br>1.65 m. | 01/26 | 00/30 | 00/30 | |
| " | F15 | P | M | 12-15 | | 00/28 | 00/28 | 00/28 | |
| " | F16 | P | M? | Adult | 5'3"<br>1.60 m. | | | | |
| " | F21 | G | M | 30-35 | 5'9½ "<br>1.77 m. | 01/24 | 00/29 | 03/32 | Shovel-shaped incisors. Osteophytes on vertebrae. |
| " | F22 | G | M? | 14-15 | | 00/21 | 00/28 | 00/28 | Wormian bones. Shovel-shaped incisors. Extra cusps on first molars. |
| " | F24 | P | M | 40+ | | | | All Molars | Osteophytes on cervical vertebrae and femoral heads. Wormian bones. |
| " | F25 | P | M? | 13-15 | | | | | |
| " | F26 | G | M | 20-30 | 5'8½ "<br>1.74 m. | 00/18 | | Some | |
| " | F27 | F | ? | 18-20 | | | | | |
| " | F31A | G | M | 20's | | 02/11 | 00/14 | 00/14 | |

Table 18 (con.)

Burials Outside the Church, North of the Choir and Walking Place

| Feature Number | | Condition | Sex | Age | Height | Caries | Abscess | Ante Mortem Loss | Other Comments |
|---|---|---|---|---|---|---|---|---|---|
| Trench II (con.) | | | | | | | | | |
| " | F31B | | M | 30-45 | | 00/26 | 01/27 | Some | Slight osteophytes on thoracic vertebrae. Unequal tooth wear. |
| Unlocated Burials | | | | | | | | | |
| " | F20 | P | M | 20's | | 00/06 | | | |
| " | F5A | F | M | Adult? | | | | | Wormian bones. Metopic. Hydrocephalic? Achondroplastic? |
| " | F5B | F | M | 35+ | | 01/24 | 02/27 | 02/28 | |

AND OTHER SITES IN ST. EBBE'S

# LEVEL III REPORT ON THE MEDIEVAL BONES AND SHELLS FROM CHURCH STREET, OXFORD

by Bob Wilson and Alison Locker[1]

Aims of the Report These were:-

1. To determine the nature of the bone deposits, especially the origins of the bones as household or industrial waste.
2. To indicate the site environment.
3. To determine the urban and rural economic contexts of the site bones.
4. To indicate any specialised trades or evidence of status.
5. To show continuity or change of occupation.

Usefulness of the bones The importance of the collection is:-

1. With the post-medieval deposits, it represents the second longest excavated sequence of urban occupation in Oxfordshire. This extends from before the 10th- century to the 19th-century A.D. and is only exceeded at St. Aldates, Oxford. [2]
2. It is over twice as large as any group of bones yet excavated in Oxford and large scale excavations are most unlikely in the future.
3. It yields useful general data for comparison with evidence from other small urban excavations in Oxford and rural excavations within the county.

Retrieval of the bones and shells Most of the bones and marine shells had been recovered from pits by normal excavation. A small amount of soil was sieved at a later date but the results are of little further consequence.

Footnotes

1. A. Locker kindly provided the fiche reports on the bird and fish bones. All the bonework was funded by the Ancient Monuments Laboratory, Fortress House,London.

2. R. Wilson, Post-medieval report in T.G. Hassall, C.E. Halpin & M. Mellor, 'Excavs in St. Ebbe's, Oxford, 1967-1976, Part II', Oxoniensia xlix (1984); & B.J. Marples. in B. Durham, 'Archaeological investigations in St. Aldates,Oxford', Oxoniensia, xlii (1977), 166-69.

Archaeological difficulties and approaches to analysis The problems of reporting the bones include:-

a) some difficulties with the stratigraphic record.

b) both intrusive and residual material is present in many groups of bones. These problems became more apparent as work on the pottery and bones continued.

The problems of dating deposits gave uncertainty about which bone groups should be recorded and written up. Finally, with the exception of small groups of bones of doubtful context, it was decided to record all the bones. Subsequent redating of some deposits and other evidence indicated that a few of the minor unexamined deposits ought to have been recorded. Some large groups should have only been recorded briefly, not fully.

The majority of bones and shells were recorded as in my previous reports.[1] More than 28,000 mammal bones and 1,200 oyster shells were examined. Alison Locker dealt with some 1,800 bones of bird and fish (M VI C5-13). Over ten years ago Professor B.J. Marples examined bones from several features and his report on those from A F84 was found to be very useful and is appended at the end of the main reports (M VI B14-C4). In addition a further report by Alison Locker on 206 fish bones from the Hamel, Oxford and not reported previously, has been archived in the fiche here to allow convenient comparison with the Church Street fish remains (M VI C14-D2).

Following the three months which were spent recording the mammal bones and sorting out other material, it appeared worthwhile to present as much as possible of the bone information in summary tabulations and cope with the problems of interpretation as they occurred, and as the potential of the information was revealed.

Contaminated deposits Nearly all of the bone data from the features were separated into two groups for each chronological period and according to whether the associated pottery of a feature consisted of less than 10% or more than 10% of residual or intrusive sherds. The method suggests that on average the most reliable groups of bones would contain about 5% of extraneous debris but a lower percentage was indicated by an inspection of the pottery data. Of this relatively reliable debris, the 10th- 11th- and 13th-century groups are the least contaminated.

Contamination of some 12th-century and most of the 14th- and 15th-century deposits is largely restricted to the entry and mixing of other

1. For example, R. Wilson, in M. Parrington, Excavs. at the Ashville Trading Estate, Abingdon, Oxon, 1974-76 (C.B.A. Res. Report 28, 1978), 110-126.

medieval debris due to medieval site activity or problems of excavation. Mixing of post-medieval bones is unlikely to be of any consequence since the bones of the later period were often recognisable by their light colour against the majority of brown stained medieval bones. On these occasions this indication was confirmed by the presence of other morphological criteria for example, polled sheep crania and rabbit bones which are more abundant in post-medieval deposits. Such material was largely absent from the features assigned to the medieval period.

In the text and tables a plus sign is used to denote groups of bones or single items from the severely contaminated deposits, either more contaminated (+) or most contaminated (++, eg. see Table 19).

Interpretation of less well dated data The problem of contaminated deposits most concerns the extent to which information from 14th- to 15th-century features should be interpretated. The main incentive to include such data is that Oxford deposits of this period appear to be less common and have been less widely reported than those of early medieval period.

Although particular items from contaminated groups cannot be dated with any surety, the grouped data will be largely representative of the century period assigned to it. In addition since the majority of data are clearly of the medieval period, evidence of change, but less of the extent of change, can be reasonably accepted.

General Composition of the Bone and Shell Debris Table 19 shows the results for general classes of evidence. Data is presented with allowance for the degree of extraneous material in deposits of each period. In addition, Pit A F84 is separated from other 11th-century deposits since nearly all of the unidentifiable bones, all of the fish and bird and many other species bones appear lost following their examination by another specialist. This is unfortunate since the group comprised the largest Saxon deposit and one associated with continental pottery. Some data, however, survive from the previous work (M VI B14-C2).

Percentages of identified bones in the phase groups range from 37% to 53%. Percentages of burnt bones are small. An exception is a 13th-century pit, A F145, where burnt fragments, especially from L309, exceed 10% of the feature total.

From this stage in this part of the report the focus is mainly on mammal bones but some general information on other dietary debris is included to be

Table 19 Fragment frequency of general classes of bones and shells in the late Saxon and medieval feature groups at Church Street, Oxford

| Century group | 10th | 11th | 11th | 11th | 12th | 12th | 12th | 13th | 13th | 14th | 14th | 15th | 15th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | F84 | | | F1028 | | | | | | |
| High (+) and very high contamination (++) | | | + | | | + | ++ | | + | | + | | + |
| Identified mammal | 106 | 156 | 112 | 456[b] | 2945[b] | 1018 | 130 | 4464[b] | 400 | 165 | 886[b] | 98 | 996 |
| Unidentified mammal | 184 | 1597 | 90 | lost[c] | 3229 | 909 | 117 | 4568 | 392 | 213 | 1014 | 103 | 1517 |
| Total | 290 | 3158 | 202 | 456 | 6174 | 1927 | 247 | 9032 | 792 | 378 | 1900 | 201 | 2513 |
| % identified | 37 | 49 | 55 | + | 48 | 53 | 53 | 49 | 51 | 44 | 47 | 49 | 40 |
| Burnt bones | 1 | 20 | - | - | 70 | 23 | 3 | 183 | 12 | 7 | 40 | 2 | 6 |
| % burnt | 0.3 | 0.6 | - | - | 1.1 | 1.2 | 1.2 | 2.0 | 1.5 | 1.9 | 2.1 | 1.0 | 0.2 |
| All bird | 5 | 262 | 11 | ? lost[c] | 271 | 61 | 38 | 502 | 6 | 15 | 150 | 3 | 277 |
| Fish | - | 1 | - | ? lost | 10 | 12 | - | 68 | 2 | 6 | 17 | 1 | 36 |
| Frog | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| Oyster shells | 4 | 233 | 39 | 372 | 148 | 71 | - | 122 | 21 | 3 | 104 | 11 | 129 |
| Mussel[d] | - | - | - | - | - | - | - | - | - | - | - | - | 1 |

a Low contamination between 0% to 5%; high (+) 10% to 30%; and very high (++) 52%.

b Excludes a count from skeletons

c See appendix 1, (M VI B14-C2)

d *Mytilus edulis*

consistent with previous local reports in order to develop some wider themes of interpretation.

Species Records Minor problems of identification centered on the identification of goat (M V D10) and on possible confusion of the bones of the smallest red deer with those of fallow.

There were no surprises among the species recorded, although two badger bones are unusual (13th-century A F1051 L1259 and in 15th-century A F1006+) as are bones of hedgehog (14th-century A F1535+).

An antler base of fallow deer, possibly red deer (M VI B14-C2) was found in pre-conquest 11th-century A F84. Rabbit and black rat bones were not recorded for 10th-and 11th-century deposits and four of rabbit among the 12th century groups were from less reliable deposits (A F1526+, A F1537+ and A F2517+). Black rat first occurred in 12th-century A F2503. A probable house mouse bone was noted also (12th-century A F2515). Sieving would have increased the record of the small species.

Fragment frequencies and percentages of species Table 20 shows the frequencies of mammalian bones and some groups of bird bones.

Table 21 shows the percentage representation of mammal species, the most common birds (see also Table 38) and of oyster. Representation of species is generally comparable to that of most urban sites elsewhere, especially at the Hamel, Oxford[1] although bird bones appear less abundant at Church Street possibly due to differences in the recovery of bones. Bones of red and roe deer and hare appear more common in early deposits; rabbit and possibly fallow, bird and fish, are more common in later deposits.

Slighter differences do occur among the common domestic species. Sheep, and possibly domestic pigeon, are represented better among the 11th- to 13th-century groups. Cattle, pig, fowl, goose and duck are slightly more abundant in the 14th- and 15th-century and post-medieval groups and pig is better represented in the 10th-century group.

11th-century and post-medieval deposits contained a relative abundance of oyster shells.

1. R. Wilson, in N. Palmer, 'A Beaker burial and Medieval tenements in The Hamel, Oxford', Oxoniensia, xlv (1980), Table 0, Fiche F08.

Table20 Fragment frequency of mammal and bird species

| Century group | 10th | 11th | 11th | 11th (F84) | 12th | 12th | 12th (F1028) | 13th | 13th | 14th | 14th | 15th | 15th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contamination (+) | | | + | | | + | ++ | | + | | + | | + |
| Cattle | 30 | 410 | 36 | 68 | 608 | 248 | 44 | 1203 | 74 | 72 | 319 | 31 | 321 |
| Sheep/goat | 49 | 844 | 61 | 294 | 1673 | 596 | 31 | 2510 | 238 | 50 | 431 | 40 | 434 |
| Goat | - | - | - | - | - | 2 | - | 2 | - | - | - | - | - |
| Pig | 25 | 249 | 15 | 84 | 589 | 157[a] | 45 | 595 | 85 | 42 | 126 | 24 | 218 |
| Horse | 1 | 30 | - | - | 16 | 5 | 1 | 70 | 2 | 1 | 3 | 1 | 2 |
| Dog | 1 | 3 | - | - | 8 | 1 | 1 | 6[a] | 1 | - | - | - | 2 |
| Cat | - | 17 | - | -[a] | 32 | 5 | 7[a] | 55[a] | - | - | 3[a] | - | 6 |
| Red deer | - | - | - | - | 2 | - | 1 | 6 | - | - | A | - | - |
| Fallow | - | - | - | 1 | - | - | - | 2+A | - | - | - | - | 4 |
| Roe | - | 3 | - | 7 | 5 | - | - | 6 | - | - | - | - | - |
| Hare | - | 2 | - | 2 | 8 | - | - | 5 | - | - | - | 1 | - |
| Rabbit | - | - | - | - | - | 4 | - | 1 | - | - | 1 | 1 | 6 |
| Fox | - | 3? | - | - | 2 | - | - | 1[a] | - | - | 2 | - | - |
| Badger | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 |
| Black rat | - | - | - | - | 1 | - | - | - | - | - | - | - | 2 |
| House mouse | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| Total | 106 | 1561 | 112 | 456 | 2945 | 1018 | 130 | 4464 | 400 | 165 | 886 | 98 | 996 |
| | | | | | | | | | | | | | |
| Domestic fowl | 3 | 152 | 6 | ?lost | 168 | 44 | 29 | 247 | 4 | 4 | 60 | 1 | 145 |
| Domestic goose | 1 | 22 | 2 | " | 40 | 6 | - | 113 | 2 | 5 | 38 | 1 | 43 |
| Domestic duck/mallard | - | 12 | - | " | 10 | 2 | - | 15 | - | - | 6 | - | 7 |
| Pigeon | - | 23 | - | " | 4 | - | 1 | 1 | - | - | 1 | - | - |
| Wild Birds | - | 10 | - | " | 4 | 1 | - | 13 | - | - | 10 | - | 1 |

a Excludes bones from whole and most part skeletons: 4 13th-century foxes (140 bones); 5 cats, viz 11th-century (14), 12th-century (124), 2 13th-century cats (34), and 14th-century (12); a 13th-century puppy (53); a 12th-century piglet (55) and a 14th-century hedgehog (57) - see text on articulated bones.

Table 21 Percentage representation of bones and shells

| Century group | 10th | 11th | 11th | 11th (F84) | 12th | 12th | 13th | 13th | 14th | 14th | 15th | 15th | 16th to 19th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contamination (+) | | | + | | | + | | + | | + | | + | |
| No of bones (n)[a] | 106 | 1561 | 112 | 456 | 2945 | 1018 | 4463 | 400 | 163 | 885 | 98 | 996 | 1645 |
| Cattle | 28 | 26 | 32 | 15 | 21 | 24 | 27 | 19 | 44 | 36 | 32 | 32 | 32 |
| Sheep/goat | 46 | 54 | 55 | 64 | 57 | 59 | 56 | 60 | 30 | 49 | 41 | 44 | 52 |
| Pig | 24 | 16 | 13 | 18 | 20[a] | 15 | 13 | 21 | 25 | 14 | 24 | 22 | 12 |
| Horse | 0.9 | .9 | - | - | 0.5 | 0.5 | 1.6 | 0.5 | 0.6 | 0.3 | 1.0 | 0.2 | 0.2 |
| Dog | 0.9 | .2 | - | - | 0.3 | 0.1 | 0.1[a] | 0.3 | - | - | - | 0.2 | 0.5 |
| Cat | - | 1.1 | - | -[a] | 1.1 | 0.5 | 1.2[a] | - | - | 0.3[a] | - | 0.6 | 0.3[a] |
| Red deer | - | - | - | - | 0.1 | - | 0.1 | - | - | +[b] | - | - | - |
| Fallow | - | - | - | 0.2 | - | - | 0.1 | - | - | - | - | 0.4 | 0.3 |
| Roe | - | 0.2 | - | 1.5 | 0.2 | - | 0.1 | - | - | - | - | - | - |
| Hare | - | 0.2 | - | 0.4 | 0.3 | - | 0.1 | - | - | - | 1.0 | - | 0.4 |
| Rabbit | - | - | - | - | - | 0.4 | + | - | - | 0.1 | 1.0 | 0.6 | 2.4 |
| Fox | - | ?0.2 | - | - | 0.1 | - | +[a] | - | - | 0.2 | - | - | - |
| Badger | - | - | - | - | - | - | + | - | - | - | - | 0.1 | - |
| Black rat | - | - | - | - | - | - | + | - | - | - | - | 0.2 | 0.4 |
| Hedgehog | - | - | - | - | - | - | - | - | - | -[a] | - | - | -[a] |
| % indices of n | | | | | | | | | | | | | |
| Domestic fowl | 2.8 | 9.7 | 5.4 | lost | 5.7 | 4.3 | 5.5 | 1.0 | 2.4 | 5.8 | 1.0 | 14.6 | 28.1 |
| Domestic goose | 0.9 | 1.4 | 1.8 | " | 1.[illegible] | 0.6 | 2.5 | 0.5 | 3.0 | 4.3 | 1.0 | 4.3 | 6.0 |
| Domestic duck | - | 0.8 | - | " | 0.3 | 0.2 | 0.3 | - | - | 0.7 | - | 0.7 | 2.1 |
| Pigeon | - | 1.5 | - | " | 0.1 | - | + | - | - | 0.1 | - | - | 0.1 |
| Wild bird | - | 0.6 | - | " | [illegible] | 0.1 | 0.3 | - | - | 1.1 | - | 0.1 | 3.6 |
| Fish | - | 0.9 | - | " | 0.[illegible] | 1.2 | 1.5 | 0.5 | 3.6 | 1.9 | 1.0 | 3.6 | 4.6 |
| Oyster | 3.8 | 14.9 | 34.8 | 70.6 | 5.[illegible] | 7.0 | 2.7 | 5.3 | 1.8 | 11.8 | 11.2 | 13.0 | 35.6 |

a Excluding skeletons (Table 20, n is the total of mammal bones.

b Presence of antler only or presence of species bones amounting to less than 0.05% of n.

c From post-medieval report

Species percentages and site activity: Table 22 focuses on the percentages of the four main species in each period group. In Fig. 204 the combined percentages of sheep and pig in feature groups are compared to those from contexts internal to buildings and contexts external to them at other Oxford town sites and those at Harding's Field moated manor, Chalgrove.[1]

In general the internal contexts have a greater percentage of pig and sheep than the external contexts. This phenomenon is related to the size of species bones and fragments in these contexts. Thus, especially at Harding's Field, coarse debris is found outside buildings and (less densely) in buildings away from the domestic rooms which comprised the kitchen and other service rooms. A similar pattern of finer debris in association with Iron Age houses and hearths, and coarse debris with peripheral areas of occupation, was found at Mingie's Ditch, Hardwick with Yelford and also recurred at the Romano-British site of Barton Court Farm, Abingdon. At other Iron Age sites the finer debris is usually most evident in pit deposits and less in ditches. Differences between levelling dumps and pit refuse have been noted in Lincoln.[2]

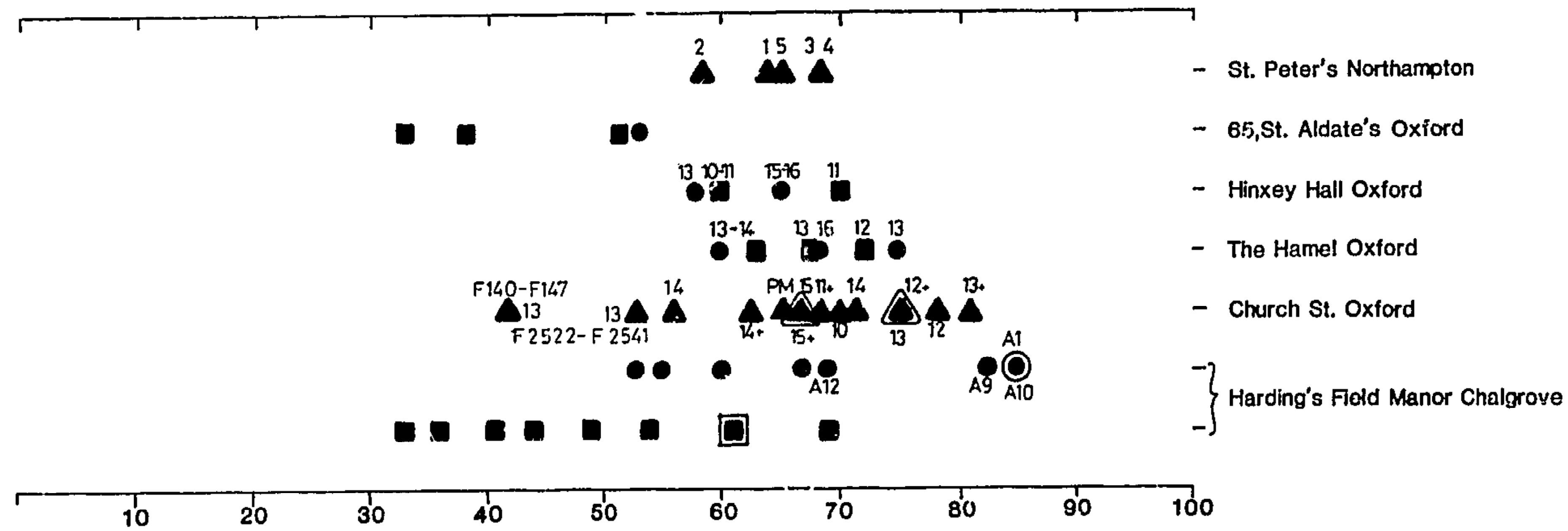
Evidence from other Oxford sites tends to support the internal-external contrast of bone debris though not always consistently at first appearance as shown in Fig. 204 However the predominantly external contexts at Church Street and various groups from the Hamel and New Inn Court tend to fall between the extremes of coarse and fine debris found at Harding's Field. Bones from external dumping levels and river silts at early medieval 65 St. Aldates consisted of relatively coarse debris.[3]

1. R. Wilson, unpublished report for P. Page, 'Excavs. at Harding's Field, Chalgrove, Oxon, held by Oxford Archaeological Unit, 46 Hythe Bridge Street, Oxford.

2. R. Wilson, in T. Allen, 'Excavs at Mingie's Ditch, Hardwick with Yelford' in prep, in D. Miles, Archaeology at Barton Court Farm, Abingdon, Oxon. (CBA Res. Report), in press; in Ashville, Abingdon (CBA Res. report 28, 1978), 111-12; & 'Degraded bones, feature type and spatial patterning on an Iron Age site in Oxfordshire, England' in Paleobiological investigations, ed. N.R.J. Fieller, D.D. Gilbertson, & N.G.A. Ralph (BAR, Intern. Ser. 266, 1985) 81-93 & T. O'Connor, Animal bones from Flaxengate, Lincoln (Archaeology of Lincoln, xviii, 1982).

3. R. Wilson, in The Hamel, Oxford, Oxoniensia, xlv (1980), Table G, Fiche E08; in C. Halpin, 'Late Saxon evidence and excavation of Hinxey Hall (New Inn Court)', Oxoniensia, xlviii (1983), 68-69; in B. Durham, 'Thames River crossings (65 St Aldates) Oxoniensia, xlix (1984), 77.

Fig.204 A comparison of coarse and fine bone debris from internal and external contexts at medieval Oxford sites and Harding's Field manor, Chalgrove.




Scale of coarse to fine bone debris

Percentages of sheep and pig among the bones of the four common domestic mammals

● Deposits from inside buildings

■ Deposits outside buildings

▲ Period groups at Church St.Oxford & St. Peter's Northampton

Table 22 Percentage of the four main species of mammal

| Century group | 10th | 11th | 11th + | 12th | 12th + | 13th | 13th[a] | 13th[b] | 13th | 14th | 14th + | 15th | 15th + | 16th to 19th |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| n | 105 | 1532 | 112 | 2886 | 1006 | 3722 | 282 | 374 | 399 | 165 | 880 | 196 | 975 | 1575 |
| | % | % | % | % | % | % | % | % | % | % | % | % | % | % |
| Cattle | 29 | 27 | 32 | 21 | 25 | 25 | 42 | 44 | 19 | 44 | 36 | 32 | 33 | c.33 |
| Sheep | 47 | 55 | 55 | 58 | 59 | 61 | 31 | 43 | 60 | 30 | 49 | 42 | 45 | 54 |
| Pig | 24 | 16 | 13 | 20 | 16 | 14 | 10 | 10 | 21 | 25 | 14 | 25 | 22 | 12 |
| Horse | 1 | 2 | - | 1 | + | + | 16 | 3 | 1 | 1 | + | 1 | + | + |
| Sheep & pig | 70 | 71 | 68 | 78 | 75 | 75 | 42 | 53 | 81 | 56 | 63 | 67 | 67 | 66 |

a & b Subgroups of main 13th-century deposit

a A F140, F141, F142, F145 & F147

b A F2522, F2532, F2535 & F2541

Problems of differential recovery of bones are not thought to be a major cause of such distributions (M V C7 ).

Scavenging, rubbish clearance, place and type of butchery particularly of large animals variously contribute to such varied deposition.[1] Here factors of butchery are unlikely to have played a part since the skeletal elements (M V C7 ) of most urban contexts indicate that the bones are derived from household sources and only indirectly from butchers. Since most of the features of Church Street were pits, the bones are well preserved (M V C9 ), and pits tend to protect bones from degradation (M V C9 ), effects of scavenging probably are less important factors in the explanation of this town site debris.

The evidence implies that rubbish clearance and dumping contributed most to the accumulation of pit deposits and indicates the removal of mediumly coarse bones from meal tables and kitchens. Where bones were not dumped into pits scavenging was liable to have selected and scattered the large bones further. Where houses lay near slaughterhouses or on the periphery of the town the percentage representation of large bones should be greater, as indicated at 65 St. Aldates.

If pits were repositories for rubbish dumped from houses then the rubbish in these features should resemble domestic room debris most of all external features. This is confirmed by the Church Street evidence as well as the previously anomalous (Fig. 204 ) 11th-century group from New Inn Court which consisted primarily of bones from a large pit F29. Admittedly too, bones from the Hamel were not often associated with pits but were mainly excavated close to houses. Similar material and results were obtained at St. Peters, Northampton.[2] Noticeably pits were virtually absent from the excavated area at Harding's Field and there the external deposit which was most similar to the internal deposits was found to occupy the courtyard close to the kitchen and buttery.

1. R. Wilson, in Mingies Ditch, Oxon, in prep; in Palaeobiological investigations, ed. Fieller et al (BAR Intern. Ser. 266, 1985) 81-93 & in Harding's Field, Chalgrove, unpublished, held by CAU, 46 Hythe Bridge Street, Oxford.

2. M. Harman, in J.H. Williams, St Peters Street, Northampton, Excavs. 1973-76 (1979), 328-32.

This general logic implies that debris in most of the 11th-to 13th-century groups was more closely connected with purely domestic activity than were later groups and two sub groups of 13th-century features A F140-147 and A F2522-2541 (Table22). Thus the late medieval groups could indicate events such as decreased local domestic activity, less direct rubbish dumping, greater scavenging, and possibly the butchering of some animals nearby or a change of diet.

It is worth noting the percentage of horse in the two 13th-century sub groups is high but in one group is boosted by the presence of articulated vertebrae and other bones in F145 (M V C14 ).

Species percentages and chronological trends Interpretation of species percentages as evidence of butchery, rubbish disposal or scavenging, raises the question of whether it is possible to determine chronological change from such results. Table23 represents data in more general and simplified form. All of the 10th-and 11th-century data including that from A F84 were added together to increase sample size; so were the 14th- and 15th-century data. This information is therefore subject to the minor anomalies of contamination as described previously. Additional post-medieval data from the Greyfriars site is included for comparison.[1]

Percentages of identified bones are given as a further indication of the relative coarseness of bone debris. A lower percentage of identification of the 14th-and 15th-century and post-medieval groups suggests that recovery of unidentifiable, possibly smaller, fragments was not worse than in the other groups and confirms that the species percentages of these groups are moderately reliable. Post-medieval data from the Greyfriars site is more variable and limited recovery of the bones of small species is probable.

While the relative abundance of the bones of the commonest mammals may lead to questionable interpretation, it is suspected that at least the percentage presence of individual less common species tends to be buffered against the mass of bones of the other species and probably yields reasonable indications of change. Overall it is suggested that, cattle, rabbit, fallow, goose, fish and possibly dog, black rat and hedgehog increase in abundance while horse, red deer, roe, perhaps pig, pigeon and doubtfully cat, decrease

1. R. Wilson, in post-medieval Greyfriars, St Ebbe's, Oxoniensia, xlix (1984), Fiche M VI A11-13.

Table 23 Percentage representation of mammals, birds, fish and oysters in the overall period groups (regrouped to increase sample size) at Church Street and post-medieval Greyfriars

| | | | | | | Greyfriars |
|---|---|---|---|---|---|---|
| Century | 10th & 11th | 12th | 13th | 14th & 15th | 16th to 19th | 16th to 19th |
| Contamination | + | | | + | + | |
| n | 2235 | 2945 | 4463 | 2144 | 1645 | 1271 |
| Cattle | 24 | 21 | 27 | 35 | 32 | 30 |
| Sheep/goat | 56 | 57 | 56 | 46 | 52 | 54 |
| Pig | 17 | 20[a] | 13 | 19 | 12 | 13 |
| Horse | 1.4 | 0.5 | 1.6 | 0.3 | 0.2 | 0.3 |
| Dog | 0.2 | 0.3 | 0.1[a] | 0.1 | 0.5 | 0.6 |
| Cat | 0.8[a] | 1.1 | 1.2[a] | 0.4[a] | 0.3[a] | 2.2 |
| Red deer | - | 0.1 | 0.1 | + | - | - |
| Fallow | + | - | 0.1 | 0.2 | 0.3 | 0.1 |
| Roe | 0.4 | 0.2 | 0.1 | - | - | 0.1 |
| Hare | 0.2 | 0.3 | 0.1 | + | 0.4 | 0.2 |
| Rabbit | - | - | + | 0.4 | 2.4 | 0.3 |
| Fox | 0.1 | 0.1 | +[a] | 0.1 | - | - |
| Badger | - | - | + | + | - | - |
| Black rat | - | - | + | 0.1 | 0.4 | - |
| Hedgehog | - | - | - | -[a] | -[a] | - |
| | | | | | | |
| % identified mammal bones | 49 | 48 | 49 | 43 | 38 | 52 |
| % indices of n | | | | | | |
| Domestic fowl | 17.0[b] | 5.7 | 5.5 | 9.8 | 28.1 | 4.2 |
| Domestic goose | 1.7[b] | 1.4 | 2.5 | 4.1 | 6.0 | 1.3 |
| Duck | 1.1[b] | 0.3 | 0.3 | 0.6 | 2.1 | 2.2 |
| Oyster | 27[b] | 5 | 3 | 12 | 36 | 4 |
| Fish | 0.9[b] | 0.3 | 1.5 | 2.8 | 4.6 | 0.1 |

a Excluding skeletons

b Indicies may be up to a third smaller than given (M V C5).

in abundance. Evidence from the Hamel confirms the trends for the three deer species, rabbit and fish. Percentages of sheep appear to fluctuate as does pig and oyster. Higher percentages of pig occur in the 12th-and 14th-to 15th-century groups while oyster shell is more abundant in the 10th-to 11th-century and the post-medieval groups.

Skeletal element representation This has been studied in an attenuated but substantial form by adding up results from features where more than 50 bones of a species were recovered. Exceptions are the 10th-and 11th-century features where smaller groups of bones were considered. General results were expressed as percentages and are given in Table 24.

The clearest pattern is shown by sheep bones. There is an abundance of elements from the main meat carcass and this tends to increase over time with a corresponding drop in elements from the head and feet (metapodia).[1] Grouped elements of cattle and pig show no obvious trends. The upper limb bones of hare and rabbit outnumber cranial and metapodial elements by 18 to 3, but recovery of small elements of this species appears to be a problem.

Recovery of small elements of sheep Table 24 also shows the percentages of teeth and the smaller bones of the hooves and hock and carpal joints in the total of sheep bones. These percentages are similar to those at the Hamel, Oxford,[2] they fluctuate rather than showing any trend, and suggest that differential recovery of smaller bones is not a major factor in the general trend of sheep bones.

Bone Degradation and elements of sheep In Table 24 a percentage index which crudely assesses the degree of leaching, fragmentation and general degradation of bones is found to give low values for 11th-to 15th-century groups (26%-29%) and a higher but not large value for the 10th-century bones. It is doubtful that poor preservation influenced the trends shown among the skeletal elements of sheep.

1. R. Wilson, in Ashville, Abingdon, (CBA Res. Report 28, 1978) Table XII, 112.

2. R. Wilson, in The Hamel, Oxford, Oxoniensia, xlv (1980), Table F, Fiche E07.

Table 24 Percentages of grouped skeletal elements of sheep, cattle, and pig

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sheep** | | | | | | | | | |
| Century group | 10th | 11th | 12th | 12th | 13th | 13th | 14th | 14th | 15th |
| Contamination | | | | + | | + | | + | + |
| No of features | 4 | 8 | 8 | 4 | 16 | 2 | 1 | 3 | 3 |
| No of bones n | 49 | 206 | 1565 | 48 | 2210 | 190 | nc | 310 | 293 |
| | % | % | % | % | % | % | % | % | % |
| Head | 35 | 27 | 27 | 23 | 28 | 26 | - | 22 | 18 |
| Feet | 16 | 16 | 19 | 21 | 20 | 13 | | 16 | 14 |
| Body | 49 | 58 | 54 | 57 | 53 | 61 | | 62 | 68 |
| Degradation index %[a] | 43 | 29 | 26 | 28 | 29 | 28 | | 26 | 26 |
| % loose teeth | 6 | 4 | 6 | 4 | * | 12 | | 1 | 4 |
| % small bones[b] | 2 | 3 | 8 | 6 | 5 | 7 | | 5 | 5 |
| **Cattle** | | | | | | | | | |
| n | 27 | 344 | 463 | 152 | 864 | | 56 | 174 | 242 |
| Head | 11 | 14 | 19 | 17 | 18 | | 11 | 29 | 14 |
| Feet | 30 | 27 | 30 | 38 | 31 | | 36 | 32 | 36 |
| Body | 59 | 60 | 51 | 45 | 51 | | 53 | 38 | 51 |
| **Pig** | | | | | | | | | |
| n | 25 | | 519 | | 254 | | | 174 | 45 |
| Head | 44 | | 28 | | 36 | | | 26 | 29 |
| Feet | 12 | | 17 | | 14 | | | 27 | 27 |
| Body | 44 | | 55 | | 57 | | | 47 | 44 |

a % of loose teeth and fragments of mandible, tibia and radius of sheep in bone group

b Phalanges and bones of hock and carpal joints

Deposition of degraded bones At the manor of Harding's Field, Chalgrove, in external contexts such as farmyard or destruction deposits, bone degradation appears greater (42%-63%) than for deposits inside buildings (20%-50%).[1] The lesser degradation of bones in external contexts at Church Street is due to the majority of them being buried in deep pits with only brief exposure of bones to degradation before burial.

These considerations suggest that many bones at Church Street were buried quite quickly either by being dumped directly into pits or because superficial deposits accumulated fairly rapidly. Soil alkalinity would also contribute to bone preservation.

Butchery of carcasses and element representation The increasing percentages of elements from the main meat carcass of sheep reflect increasingly specialised and localised butchery of sheep carcasses. The bones of the head and feet tend to accumulate in deposits which are associated with butchers, slaughterhouses, or industrial processing of carcass by-products, although this association is most pronounced for the post-medieval period.[2]

At Church Street therefore the general evidence from sheep bones is indicative of domestic rather than specialised trade activities. Feature deposits which are possible exceptions include those from 11th-century A F1519, A F1556, 12th-century A F1515, A F1538, and 13th-century A F2518, but their percentages of head and foot bones are not exceptional compared with some post-medieval deposits and even with 16th-century A F1529, where 53% of head debris predominates.[3]

A higher percentage of bones from the feet of cattle (43%) is evident for A F2518, but again other element and species data from the feature is not indicative of any exceptionally different activity. Conversely, even where species representation or presence of skeletons in individual features (eg. A F145 and A F1540) indicates differences in depositional patterns the elemental composition of species bones appear ordinary.

1. R. Wilson, Harding's Field, Report held by O.A.U., Table 16.

2. R. Wilson, 'The animal bones from the Broad Street and Old Gaol sites, Abingdon', Oxoniensia, xl (1975), 119-20; in M. Parrington, 'Excavs. at Stert Street, Abingdon, Oxon', Oxoniensia, xliv (1979), 19-20; in The Hamel, Oxford, Oxoniensia, xlv (1980), Fiche E09-E11, & unpublished report for C. Chambers on The Causeway, Bicester, Oxon, held by O.A.U., 46 Hythe Bridge Street, Oxford.

3. R. Wilson, in post-medieval fiche on Church Street, St Ebbe's, Oxoniensia, xlix (1984).

From the age evidence of the mandibles of cattle (M V D4 ) it is evident that during the 14th to 16th centuries many crania or at least the mandibles of older cattle were disposed of elsewhere, too (The trend is not detectable in the percentages of grouped skeletal elements; being partly obscured by the presence of calf skull debris). Presumably disposal of much head debris was adjacent to butchers' stalls, slaughterhouses, or places of related trades, or in socially prescribed locations.

Documentary evidence helps to explain and confirms the dating of the change deduced from the cattle head debris.

'After complaints' (about the nuisance of slaughtering in the vicinity of the High Street Oxford), 'from the early 14th century onwards much of the slaughtering of beasts was apparently done outside the town wall in Brewer Street, called Slaying Lane by the late 15th century.'[1]

The probable establishment of slaughterhouses in this area thus appears closely related to the absence of many cattle heads for sale at butchers stalls as items likely to have contributed to household rubbish.

Although cheekmeats and tongues may still have been cut off and sold, most butchery of the whole heads appears likely to have occurred at or in the vicinity of slaughterhouses. Undoubtedly parts of the cranium, particularly the horn cores, were removed with the skin at the slaughterhouse. The heads or remaining bone waste may have been retained because this material was useful and could be processed further, for example for fat and glue.

Butchery of the head at the slaughterhouse would avoid the unnecessary transport of cranial waste some distance to butchers' stalls in the town centre from which it would have to be disposed of over a greater distance. The periphery of the town was the best location for rubbish dumping and noisome processing of carcass wastes.

Notes on articulated skeletons: Foxes The most interesting skeletons found were 98 bones and 42 rib fragments from four foxes buried in 13th-century A F1540. Many of the vertebrae, small bones and some of the larger elements are missing presumably for some reason of excavation. It is difficult to sort out the bones from individual skeletons.

1. Victoria County History of Oxfordshire, IV, 27.

All the epiphyses present are fused. All teeth in the eight mandibles were erupted but not noticeably worn. The foxes therefore were skeletally mature but not necessarily old. Signs of pathology are restricted to the loss of M3 and P4 from one mandible and M3 from another - the alveoli were healed over.

Two larger and two smaller individuals are present, possibly representing the sexes. Saxon foxes from Wally Corner, Berinsfield in part showed a similar range and separation of size.[1]

The cranial debris showed skinning cuts around the snout; across or in front of the orbits and under the anterior and mid mandibles (Fig.205 ). No cut marks show on the other bones. The dumping of these carcasses in A F1540 indicates that the foxes were trapped not very far away, presumably at the same time and possibly from one or several fox earths.

Cat A F84 Fourteen 11th-century bones with 10 fused epiphyses and one (prox. hu) unfused.

Cats A F133 L281 Sixteen 11th-century bones indicating a complete skeleton of at least one individual which itself appears to be half grown. A transverse cutmark occurs on a distal radius.

Cat A F1028 L1155+ Ninety-six 12th-century bones and 28 ribs. All epiphyses fused. A fully grown individual.

Cat A F1003 Fourteen 13th-century bones including fused elements of acetabulum and unfused shafts of femur and tibia.

Cat A F1515 A 13th-century cranium is associated with an atlas and axis.

Cat A F1540 Twenty 13th-century bones with 8 fused and 8 unfused epiphyses and all teeth erupted in the mandibles. A half grown individual which was associated with the skinned foxes yet shows no sign of butchery.

Cat A F59 L101+ Twelve 14th-century limb bones of cat skeleton lacking cranium with all epiphyses fused except one (prox. hu). Right femur with cut posterior proximal area below articulation. Left femur with probable knife cut on anterior proximal area below head. These are not skinning marks and must indicate disjointing of the limb from the pelvis or, more probably, the removal of meat from the bones.

Kitten hind limbs A F2502+ Two 14th-century femuri and 2 tibiae with unfused epiphyses.

1. R. Wilson, for D. Miles, Excavs. at Wally Corner, Berinsfield in prep, held by O.A.U.

Fig.205 Cut marks from skinning on 13th-century fox skulls from A F1540.

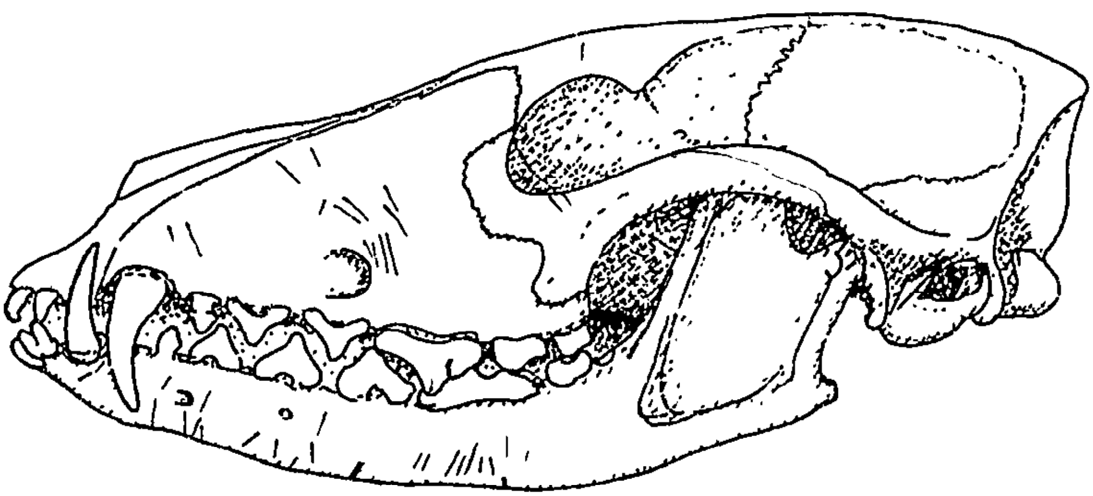


Table 25 Measurements of bones from fox skeletons (mm)

| $M_1$ (ma) length | n | r | $\bar{x}$ |
|---|---|---|---|
| OXA F1540 | 8 | 14.3-16.1 | 15.2 |
| BER WC[a] | 6 | 14.0-15.0 | 14.7 |
| Fe(GL) | | | |
| OXA F1540 | 7 | 120-133 | 126.7 |
| BER WC | 4 | 122-133 | 29.0 |
| Ti(GL) | | | |
| OXA F1540 | 7 | 131-147 | 138.0 |
| BER WC | 2 | 136-138 | 137.0 |

Cranial measurements[b] from Church Street: Interorbital width (33) 26.1; post interorbital (31) 21.5; (7) 65; and (30) 76.

a From Wally Corner, Berinsfield, Oxon.

b A von den Driesch, A guide to the measurement of animal bones from archaeological sites (1976).

Puppy A F1531: Thirty-four 13th-century bones and 15 ribs. Eleven epiphyses unfused. In mandible p2 - p4 are present and M1 appears to have been at a pre-eruption stage. Probably one to five months of age.

Hedgehog A F1535+ Thirty-one 14th-century bones and 26 ribs. Epiphyses of pelvis, humeri (prox. just fused), femuri, proximal radius, and distal tibia are fused while those of the proximal tibia and distal radius are unfused. The sequence of epiphysial fusion appears to be different to that in other mammals.

Piglet A F2520/1 Thirty-seven 12th-century bones and 18 ribs. All epiphyses unfused including the bodies and arches of vertebrae. In the mandibles p3 and p4 are just in wear (T.W.S. c) and M1 is not erupted (V).[1] Less than six months of age and probably much younger. Marks occur on one humerus but do not appear to be from butchery.

Notes on less articulated bones: Horse At least 4 13th-century cervical and 6 thoracic vertebrae of a length of backbone from A F145 and at least 2 limb bones from L 142 appear associated with 5 other limb bones with unfused epiphyses and possibly with vertebrae from L 309 and L 315. The epiphyses of the elbow indicate a horse dying at less than 15 to 18 months of age.

Cranial debris of another immature horse in A F147, L 321 is perhaps of an older individual. Both P4 and M3 had not erupted and M2 is slightly worn and indicates an age of 24 to 30 months.

The immaturity of these horse bones is unusual ( M V D7 ) though at least one other bone in those features is from a mature or old horse. The degree of articulation and the immaturity of the bones could suggest the burial of horses which lived and died nearby. The incompleteness of the youngest skeleton is no worse than that of several of the fox skeletons in A F1540 and could be explained by a variety of excavation factors or disturbance after burial.

These horses could have been butchered although certain evidence of this is lacking. Anyway it is improbable that the immature individuals would have been slaughtered unless lame or diseased. Since they could otherwise have died from disease some pathological element appears inferrable from their early deaths.

1. A. Grant, The use of tooth wear as a guide to the age of domestic ungulates', in Ageing and sexing of animal bones from archaeological sites, ed. R. Wilson, C. Grigson and S. Payne (BAR British Ser. 109, 1982), 91-108.

Sheep A F133 All the seven cervical vertebrae are present in an 11th-century segment of backbone which was severed by chopping through part of the 7th cervical from the ventral side.

Bones of the hoof, trotters etc. Articulated bones of cattle were noted from 12th-century A F1503 (2) and A F1537 (2), 14th-century A F2502+, 15th-century A F1006+, and calf hind feet in 15th-century A F53. Articulated bones of pig were also found in A F1006+, and three of fallow deer in 15th-century A F1030+. Articulated bones of the hock joint also occurred eg. cattle, A F1019 and sheep, A F1527. Almost certainly there were other connected bones particularly of sheep and pig which were not recognised.

Age data from mandibles and relevant epiphysial fusion Tooth data was recorded and Mandible Wear Stages were calculated following the method of Grant[1] but making no age stage estimates for mandibles where more than one molar was missing.

Sheep The frequencies of Mandible Wear Stages are given with some data from other nearby sites in Fig.206 . Although Pit A F84 contributes 75% of the mandibles in the 11th-century group at Church Street, the abundance of mandibles from younger sheep is found also in other features at the same period as well as in the 12th-and 13th-century groups. There is a general decline in the representation of immature mandibles in the kill off patterns over the medieval and the post-medieval periods. Possibly most change occurred during the 14th to 15th centuries, but the 16th-century group indicates either that these small samples cannot be relied on or that the general trend observed is also a fluctuating one.

The statistical significance of the results is indicated by the comparison of the 11th-to 19th-century period and other site groups given in Table 26. This confirms the general trend observed above and at the Hamel of the greater slaughtering of older sheep during the later historic periods but it is also noticeable that younger sheep are better represented at Church Street than at the Hamel. Inspection of the limited data from Harding's Field, Chalgrove, and Middleton Stoney[2] indicates that mandibles of younger

1. A Grant, in Ageing and sexing of animal bones from archaeological sites; (BAR British ser. 109, 1982), 91-108.

2. R. Wilson, in The Hamel, Oxford, Oxoniensia, xlv (1980), Fiche E12-13; Harding's Field, Chalgrove, held by O.A.U; & B. Levitan, in S. Rahtz & T. Rowley, Middleton Stoney 1970-72 (1984), 108-24.

Fig.206 Mandible Wear Stages of sheep for period groups at Church Street and other sites in Oxford.

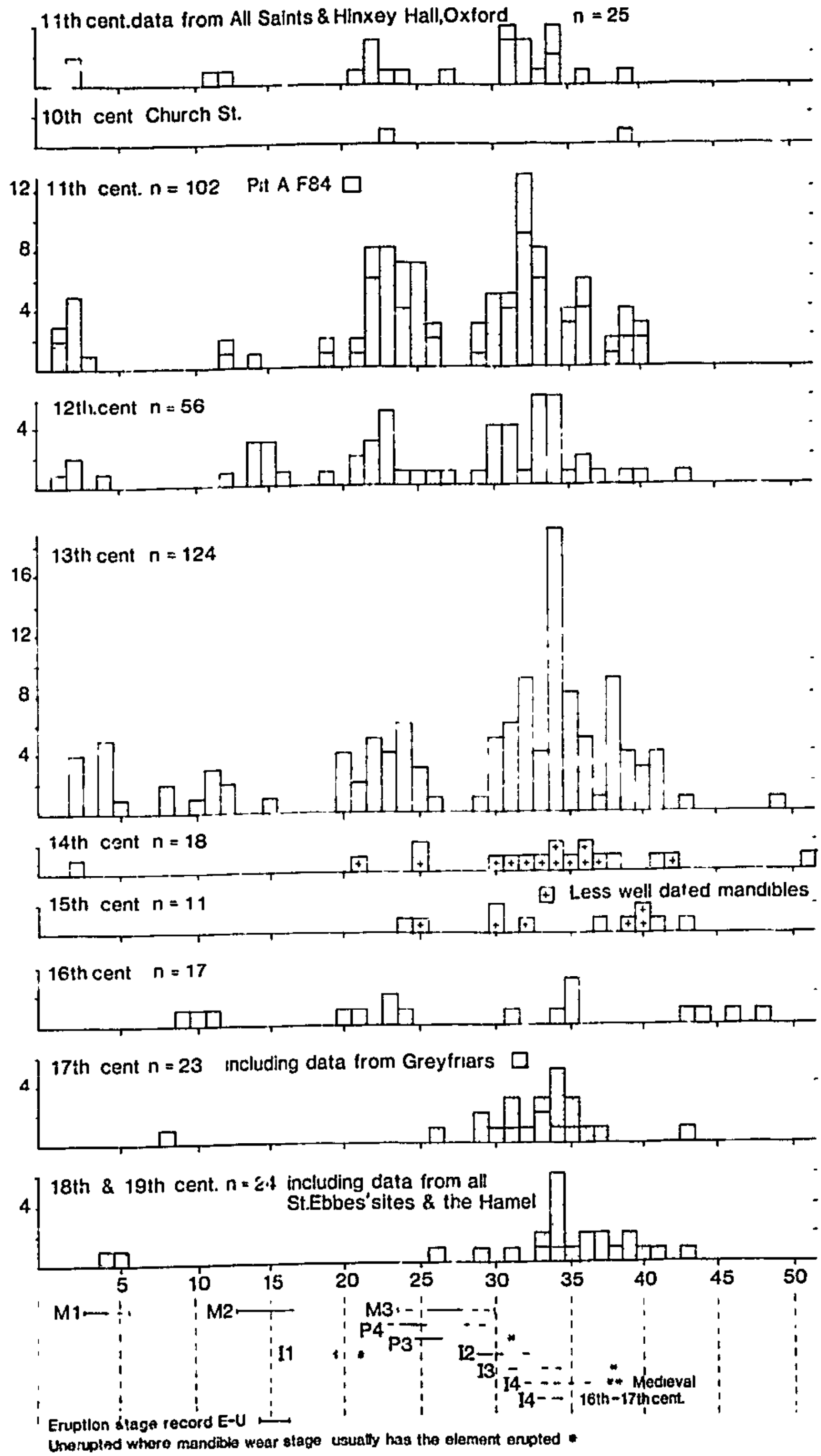


Table 26 Assessment of significant differences between period and site groups of Mandible Wear Stages of sheep by the use of the Kolmogorov-Smirnov test (Ho, p greater than 0.05).[ab]

| Period groups from Church Street, Oxford | | | | | AS & NIC[c] | Groups from the Hamel | | | HF, Chalgrove[c] |
|---|---|---|---|---|---|---|---|---|---|
| Century group | | 11th | 12th | 13th | 11th | 12th | 13-15th | 14-16th | 14-15th |
| | n1/n2 | (102) | (56) | (124) | (25) | (37) | (26) | (56) | (15) |
| 11th | (102) | - | - | - | NS? | S | S? | S | S? |
| 12th | (56) | NS | - | - | NS? | NS | S? | S | S? |
| 13th | (124) | S | NS | - | NS? | nc | nc | S | nc |
| 14&15th | (29) | S? | NS? | NS? | nc | nc | nc | S? | nc |
| 16th | (17) | NS? | NS? | NS? | nc | nc | nc | S? | nc |
| 17th | (23) | S? | S? | S? | nc | nc | nc | S? | nc |
| 16&19th | (64) | S | S | NS | S? | NS | S? | S | S? |

a Statistical test undertaken where $n_1$ and $n_2$ both exceed 40 (except Hamel 12th century)

S = significant result NS = not significant

Where either $n_1$ or $n_2$ does not exceed 40 the cumulative percentage difference between groups is estimated by inspection (not tested) to be either S? or NS?

Where both $n_1$ and $n_2$ do not exceed 40 no estimate is made (nc).

One tailed tests of data yielding significant results (S) show generally that earlier period groups contain a higher proportion of mandibles from young sheep. The reverse occurs between the 14th to 16th-century group from the Hamel and the 16th to 19th-century group from Church Street (and elsewhere. Other minor anomalies are indicated by results in Fig. 206).

b S. Siegel, Non-parametric statistics for the behavioural sciences (International Students edition, 1956), 109-10.

c Site information includes that from All Saints (AS), New Inn Court (NIC) and The Hamel, Oxford, and from Hardings' Field, Chalgrove (HF).

sheep are more common on the urban sites. In fact, results from the Hamel fall between those of Church Street and the rural sites, the 14th-to 16th-century group from the Hamel being nearly identical in distribution to that at Chalgrove.

Comparison with results so far from sites of Iron Age to early Saxon period shows that these usually have a greater proportion of mandibles of younger sheep than in the 11th-to 19th-century groups. An exceptional distribution, possibly typical of villa sites, is the 3rd-to 5th-century A.D. group from Barton Court Farm which tends to fall between the 11th- and 13th-century groups[1].

These broad scale differences form the basis for the interpretation of the medieval animal economy and husbandry (M VI A13–B13)

Cattle Fig. 207 shows the frequencies of Mandible Wear Stages of cattle and includes data from other nearby sites. The 11th-to 13th-century groups contain sufficient mandibles to suggest that the cattle of intermediate age stages are represented most, followed by those of mature or old cattle. In the 15th-to 19th- century groups, and possibly the 14th-century, there is a predominance of mandibles from calves. This last important difference is supported by 11th-to 13th-century data from the Hamel, All Saints and 65 St. Aldates, Oxford, and similar evidence of change of 13th-to 15th-century Hardings Field and at the 16th-century Hamel.[2] Large sample comparisons of these trends would show significant differences between these early and late period groups. Less distinct differences would contrast the medieval distributions of the Hamel and Chalgrove with that at Church Street where more mandibles of intermediate age cattle are present in the 11th- to 13th-century group.

Comparison of the post-medieval mandible distribution and epiphysial fusion data has already shown that a high proportion of the meat eaten was from older cattle.[3]

1. J. Hamilton in M. Parrington, Ashville, Abingdon (CBA Res. Report 28, 1978) 126-33; R. Wilson, in G. Lambrick and M. Robinson, Iron Age and riverside settlements at Farmoor, Oxon, (CBA Res. Report 32, 1979), 128-33; & in D. Miles, Archaeology at Barton Court Farm, Abingdon (C.B.A. Res. Report) 77.

2. R. Wilson, unpublished data on The Hamel; for B. Durham, All Saints Church, Oxford, in prep;in B. Durham, 'Thames riverside crossings' (St Aldates), Oxoniensia, xlix (1984) in press; in Harding's Field, Chalgrove, held by O.A.U.

3. R. Wilson, in post-medieval Church Street, Oxoniensia, xlix (1984), Fiche M VI A4.

Fig.207 Mandible Wear Stages of cattle

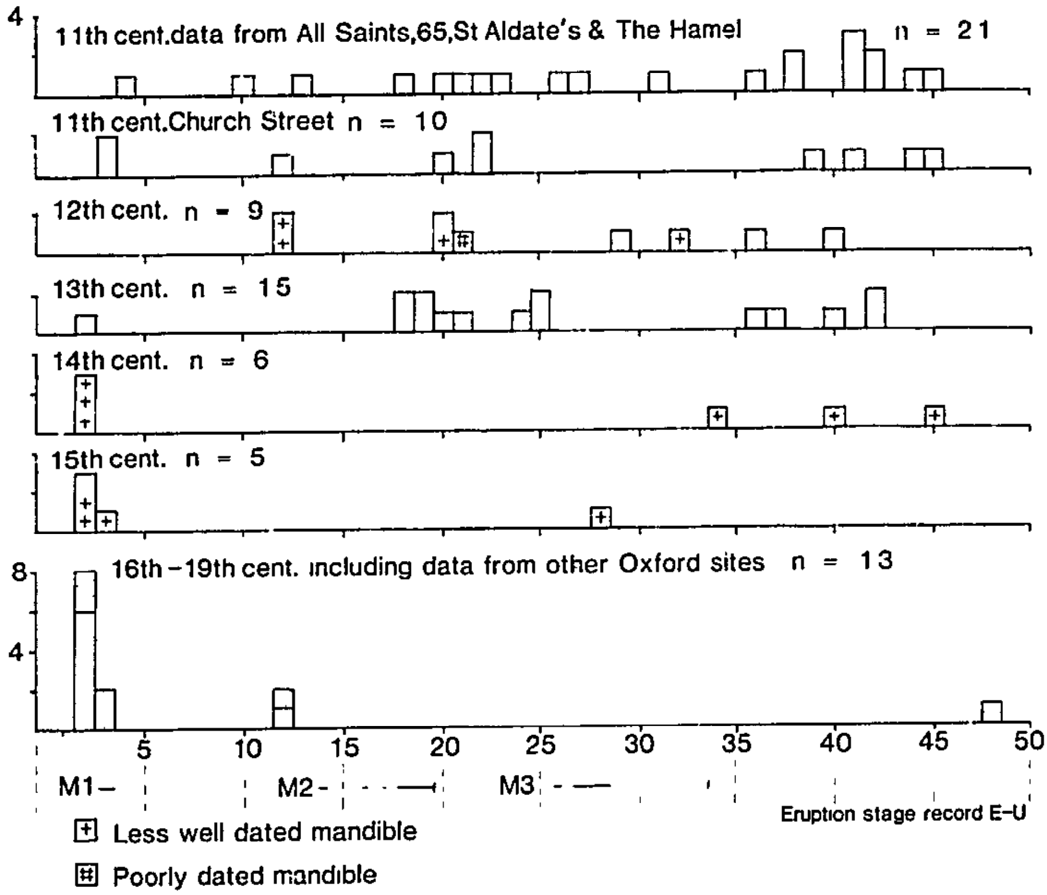


Table 27 Percentages of fused epiphyses of cattle in the 13th to 19th century groups

| Century | 13th | 14th | 15th | 16th[a] | 17th[a] | 18&19th[a] |
|---|---|---|---|---|---|---|
| n | 364 | 124 | 108 | 49 | 70 | 39 |
| % of all epiphyses | 79 | 82 | 63 | 73 | 71 | 79 |
| % of early fusing epiphyses (7-18 months)[b] | 94 | 92 | 94 | nc[c] | nc | nc |
| % of intermediate fusing epiphyses (18-36 months) | 82 | 88 | 58 | nc | nc | nc |
| % of late fusing epiphyses (36-48 months) | 50 | 50 | 63 | nc | nc | nc |

a From Table 21, Post-medieval report

b Groupings of epiphyses after I.A. Silver, "The ageing of domestic animals', in *Science in Archaeology*, ed. D. Brothwell and E. Higgs (1969), Table A, 285-86.

c Not calculated

Table 27 demonstrates that the percentage of fused epiphyses of cattle ranges between 63% and 82% of the 13th-to 19th-century groups of bones. It indicates that a high proportion of cattle were killed when relatively mature. The most extreme group is for the 15th century where epiphysial data from calf feet in A F53 distorts the consistency of the overall results.

Although some destruction of unfused epiphyses from calves would be expected during the normal course of bone deposition, there is little evidence from Table 24 to suggest that degradation of bones severely biased the recognition of calf limb bones. Conversely, the relative absence of cattle mandibles resistant to degradation and the presence of more vulnerable calf mandibles shows conclusively that head debris of older cattle must have been deposited somewhere else and especially near slaughterhouses, tanneries or hornworking establishments.[1] This differentiation of butchery activity began or intensified during the 14th or 15th centuries (see also M VI B7).

Pig The frequencies of Mandible Wear Stages of pig are shown in Fig. 208. These results are little different to those obtained at urban sites, such as the Hamel, and the rural pattern at Harding's Field is also similar except for a relative absence of pigs killed at MWS 8-17. The small samples from the 15th to 19th centuries indicate a trend of greater proportions of piglets and young pigs being eaten (M VI B13).

Horse: The majority of 11th-to 15th-century bones show the deaths of horses during maturity or old age: Thirty-six epiphyses were fused and only one metapodial epiphysis was unfused; 5 mandibles or maxillae indicated ages older than four years. The exceptions are the 13th-century bones from A F145, which include 9 unfused and 4 fused epiphyses, and cranial debris from F147 which indicates an individual around 24 to 30 months but probably not the same individual that the other epiphyses came from (M V C14).

Cat In six or nine mandibles the first molar has erupted. In two mandibles the tooth is erupting and indicates that death occurred around six months of age,[2] and in one mandible M1 had not erupted and indicates a kitten. This information contrasts with epiphysial and tooth data in Table 28 which indicates that 60% of the cats died at ages older than six months but that only 40% reached skeletal maturity.

1. P. Armitage, Cattle horn cores from Greyfriars, Oxoniensia, xlix (1984), Fiche M VI B2.
2. I.A. Silver, 'Ageing of domestic animals', in Science in archaeology, ed. D. Brothwell & E. Higgs (2nd edn, 1969), Table I.

Fig.208 Mandible Wear Stages of pig.

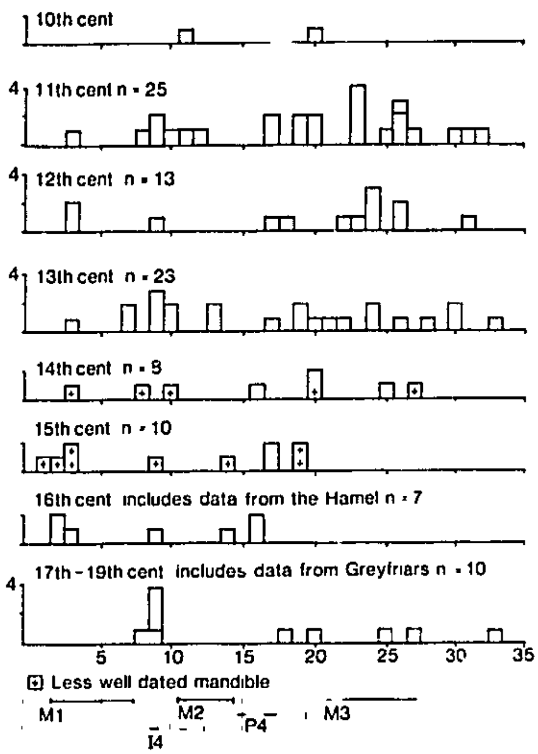


Table 28 Epiphysial fusion of medieval cat bones[a]

| | n | % fused |
|---|---|---|
| Pelvis acetabuluum | 6 | 100 |
| Distal humerus | 20 | 95 |
| Proximal radius | 8 | 88 |
| Distal radius | 8 | 63 |
| Distal tibia | 14 | 64 |
| Proximal femur[b] | 11 | 55 |
| Distal femur[b] | 16 | 44 |
| Proximal tibia | 16 | 38 |
| Proximal humerus | 14 | 43 |
| Total | 113 | 64% |

a Epiphyses listed in approximate order of epiphysial fusion as indicated by percentage of fused epiphyses or data from cat skeletons.

b In the cat skeleton from A F1540 (M V C11, M1 of mandible erupted (5½-6½ months of age) before the fusion of the epiphyses of the femur, the proximal tibia and proximal humerus. Thus from the evidence here, it appears that around 60% of the cats died at ages older than 6 months and about 40% reached skeletal maturity.

Thus perhaps half of the cats born met a premature death. This is confirmed by post-medieval data ( / & Table22) and evidence of butchery (M V C11).



Bone measurements Measurements were taken as for previous reports mainly on an osteometric board and to the nearest millimetre. Sometimes, usually with the smallest species (eg. cat, rabbit and rat), sliding calipers were used to measure to 0.1 millimetre.

Tables 29, 33, 35 and 36 summarise the results for selected bone measurements. The data presented includes evidence from post-medieval Church Street and Greyfriars and from the 11th-century sites of All Saints and New Inn Court, Oxford. In the tables the bone groups from Church Street alone are prefixed OXA and the number following is the century date of the material, eg. OXA 17. General site groups from Oxford are indicated by the prefix OX.

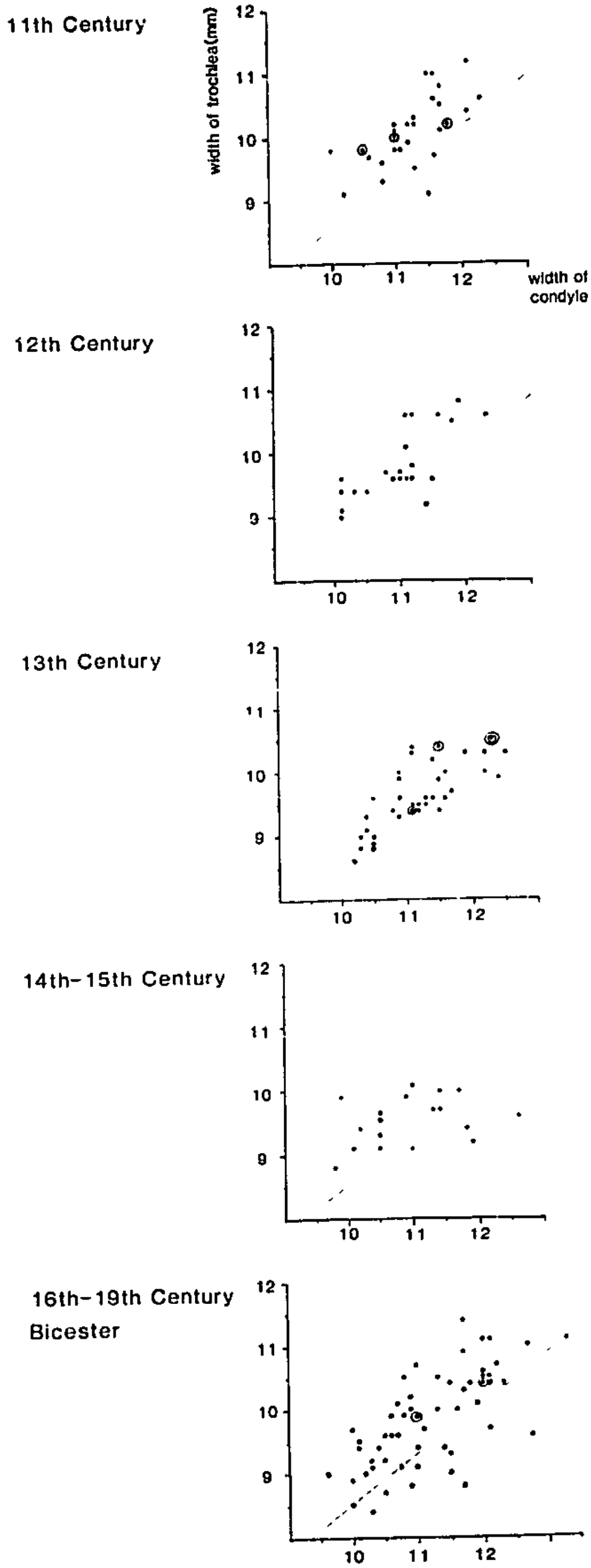
The use of this data presents difficulties. Bone data are grouped according to periods of one century and therefore some contributing features with overlapping dates will enlarge the date range of the data. In addition all medieval groups are contaminated by bones of other medieval date: normally 0-1 in 10 but about 1 in 5 for the 14th- and 15th-century groups. Some medieval material may bias the post-medieval results but the reverse does not appear to be a problem (see introduction, M V B8 ).

The main purpose of the bone measurements was to indicate any general trends among chronological groups. There is also sufficient medieval data to discuss some other problems of the bone evidence. Indeed, comparisons of the undigested statistics in the result tables are prone to misinterpretation without some examination of data for evidence of age, sex, husbandry, marketing patterns or other factors which are liable to influence the overall results. The relevant evidence is best discussed for individual species beginning with sheep and goats.

Presence of goat among the sheep bones Fig.209 shows scattergrams of measurements from the lateral condyle of the metacarpal which Payne[1] suggested to separate between goat and sheep. A few measurements, especially in the 14th-and 15th-century group occur to the right of the suggested diagonal line of demarcation and indicate the presence of goat.

1. S. Payne, 'A metrical distinction between sheep and goat metacarpals', in Domestication of animals and plants', ed. P.J. Ucko & G. Dimbleby (1969), 293-305.

Fig.209 Lateral condyle measurements of 11th- to 15th-century sheep/goat metacarpals from Church Street and 16th- to 19th-century Bicester, Oxon.



Notice how there appears to be a shrinkage in the size of the metacarpal condyle from the 11th to the 14th-and 15th-century groups. For further comparison, a large group of post-medieval measurements from the Causeway, Bicester[1] indicates a subsequent size increase and also indicates goat metacarpals although no goat horn cores or other evidence of goat was noted.

A plot of the length and distal width measurements of the metacarpals was made (not illustrated) but the scattergram was of one and not two separate clusters of data as, for example, was obtained with Saxon data from Melbourne Street, Southampton.[2] However, goats with small metacarpals could still be represented since two of the 14th-and 15th-century metacarpals, indicated by the method of Payne to be goat, do overlap somewhat anomalously with one or two others into the expected location of goat metacarpals.

A similar result (not illustrated) was found with a plot of scapula measurements[3] although measurements of immature sheep scapulae may create interpretative difficulties here. No minor morphological variations were convincingly of goat. Nevertheless the percentage presence of five such characters are summarised in Table 31. Though defects in the reliability of these criteria could be suggested, it could be concluded that around 95% or more of the sheep/goat bones are of sheep. Possibly the small representation of goat is greater among the 14th-and 15th-century group.

These results suggest that unless any goat bones differ greatly in size from those of sheep, the overall statistics of the size of sheep would not be affected unduly by the presence of goat. The few measurements of possible goat humeri (posterior foramen present) are scarcely different from those of sheep in Table 29. Consequently the sheep/goat data can be generally referred to as of sheep.

1. R. Wilson, in The Causeway, Bicester, held by O.A.U.

2. J. Bourdillon & J. Coy, in P. Holdsworth, Excavs. at Melbourne Street, Southampton 1971-76 (CBA Res. Report 33, 1980) Fig 17. 18.

3. J.A. Boessneck, H.H. Muller & M. Teichert, 'Osteologische unterscheidungsmerkmale zwischen scharf und zeige', Kuhn-Archiv., cxxviii (1-2, 1964), 1-129.

Table 29 Selected measurements of sheep/goat bones (mm)

length of humerus GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA17 | 2 | 122-152 | 137.0 | |

width of distal humerus

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 31 | 27-33 | 30.19 | 1.45 |
| OXA12 | 24 | 26-33 | 29.58 | 1.79 |
| OXA13 | 48 | 27-32 | 29.67 | 1.31 |
| OXA14 | 15 | 27-32 | 29.93 | 1.98 |
| OXA15 | 15 | 27-32 | 29.47 | 1.55 |
| OXA16 | 11 | 28-33 | 30.82 | 1.33 |
| OXA17[a] | 14 | 26-36 | 30.43 | 2.79 |
| OXA18[a] | 8 | 32-39 | 34.50 | (2.45) |
| OXA18&19[a] | 9 | 28-39 | 34.78 | (3.90) |
| Goat? (post.foramen) | | | | |
| OXA13 to 16 | 6 | 28-32 | 30.17 | (1.47) |

length of tibia GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 1 | | 185.0 | |
| OXA12 | 1 | | 187.0 | |
| OXA14 | 1 | | 190.0 | |
| OXA11 to 14 | 3 | 185-190 | 187.33 | |

width of distal tibia

| | n | r | x | s |
|---|---|---|---|---|
| OXA10 | 2 | 27 | 27.0 | |
| OXA11 | 38 | 23-28 | 25.29 | 1.18 |
| OXA12 | 40 | 22-27 | 24.85 | 1.35 |
| OXA13 | 57 | 22-27 | 24.63 | 1.23 |
| OXA14 | 21 | 22-27 | 24.43 | 1.21 |
| OXA15 | 7 | 23-29 | 25.29 | (1.98) |
| OXA16 | 11 | 23-27 | 25.45 | 1.13 |
| OXA17[a] | 9 | 23-30 | 26.11 | (2.67) |
| OXA18[a] | 7 | 25-30 | 28.29 | (2.06) |
| OXA18&19 | 2 | 26-35 | 30.5 | |

width of distal metacarpal Bd

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 30 | 21-26 | 25.07 | 1.34 |
| OXA12 | 23 | 23-28 | 25.09 | 1.38 |
| OXA13 | 39 | 23-28 | 25.41 | 1.29 |
| OXA14 | 8 | 23-26 | 24.38 | (1.19) |
| OXA15 | 7 | 22-25 | 23.86 | (1.21) |
| OXA16 | 2 | 24-25 | 24.5 | |
| OXA17 | 1 | | 28.0 | |
| OXA18[a] | 5 | 26-29 | 27.20 | (1.30) |
| OXA18&19[a] | 3 | 25-28 | 26.67 | |

length of radius GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 8 | 130-152 | 142.88 | (6.73) |
| OXA12 | 4 | 134-164 | 149.0 | |
| OXA11&12 | 12 | 130-164 | 144.92 | 10.25 |
| OXA13 | 5 | 138-153 | 143.80 | (7.16) |
| OXA14 | 1 | | 134.0 | |
| OXA15 | 5 | 135-163 | 147.80 | (10.89) |
| OXA13 to 15 | 11 | 134-163 | 144.91 | 9.33 |
| OXA16 | 2 | 157 | 157.0 | |
| OXA18[a] | 2 | 136-147 | 141.5 | |

length of metacarpal GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 22 | 112-132 | 123.27 | 5.21 |
| OXA12 | 13 | 110-130 | 121.46 | 5.56 |
| OXA13 | 18 | 104-131 | 118.89 | 7.63 |
| OXA14 | 1 | | 122.0 | |
| OXA15 | 6 | 99-119 | 112.0 | (7.37) |
| OXA18[a] | 2 | 127-138 | 132.5 | |
| OXA18&19[a] | 1 | | 130.0 | |

length of metatarsal GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 20 | 127-144 | 132.20 | 5.20 |
| OXA12 | 11 | 121-147 | 132.27 | 7.51 |
| OXA13 | 23 | 117-143 | 129.48 | 8.27 |
| OXA14 | 4 | 119-144 | 128.25 | |
| OXA15 | 3 | 105-135 | 115.33 | |
| OXA17 | 1 | | 144.0 | |
| OXA18 | 1 | | 144.0 | |
| OXA18-19 | 1 | | 117.0 | |

width of distal metatarsal Bd

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 26 | 21-25 | 23.46 | 1.24 |
| OXA12 | 28 | 22-25 | 23.89 | 0.88 |
| OXA13 | 53 | 21-26 | 23.74 | 1.89 |
| OXA14 | 8 | 21-26 | 23.00 | (1.41) |
| OXA15 | 13 | 22-24 | 23.38 | (0.77) |
| OXA16 | 1 | | 24.0 | |
| OXA17 | 1 | | 23.0 | |
| OXA18 | 1 | | 25.0 | |
| OXA18&19 | 3 | 24-28 | 25.56 | |

a Includes additional measurements from Greyfriars, St Ebbes.

Table 30 Estimates of the species representation of sheep and goat, and of the representation of horned and polled sheep, as determined from the fronto-parietal region of the skull[a]

| Century | 10&11th | 12th | 13th | 14th | 15&16th | 17th[b] | 18&19th[b] | Med. 10 to 15th | Post-med. 16 to 19th |
|---|---|---|---|---|---|---|---|---|---|
| n | 45 | 25-35 | 22 | 11-18 | 4 | 18 | 19 | 123 | 37 |
| % goat | - | 6-8[c] | 4 | 6-9 | - | - | - | 4.1 | - |
| % sheep | 100 | 92-94 | 96 | 91-94 | 100 | 100 | 100 | 95.9 | 100 |
| | | | | | | | | | |
| n | 45 | 23-33 | 21 | 8-15 | 3 | 18 | 18 | 118 | 37 |
| % polled sheep | 4 | 4-6 | 14 | 13-25 | 75 | 61 | 89 | 9.3 | 75.7 |
| % two-horned | 87 | 91 | 86 | 75-87 | 25 | 39 | 11 | 86.4 | 24.3 |
| % four-horned | 9 | 3-4 | - | - | - | - | - | 4.2 | - |

a Based on J. Boessneck, 'Osteological differences between sheep and goats', in Science in Archaeology, ed. E. Higgs and D. Brothwell (2nd edition, 1969), fig 45. There is still some uncertainty about these identifications.

b Includes post-medieval data from Greyfriars and Westgate

c Broken horn cores of goat present also.

Table 31 percentage presence of goat among the sheep/goat bones

| | Medieval | Post medieval |
|---|---|---|
| Fronto-parietal suture[a] | 4.1% (12th to 14th century) | 0.0% |
| Scapula ASG/KHS[b] / ASG | 2-4% (10th to 12th century) | -[d] |
| Posterior foramina[a] on humerus shaft | not less than 3.9% (13th to 15th century) | 2.4% (16th century) |
| Lateral condyle[c] of metacarpal | 5-10% (11th to 15th century) | -[d] |
| dw (Bd) metacarpal[b] / length metacarpal | 4-6% (13th & 15th century) | -[d] |

a See Table 30

b Boesneck, Muller and Teichert (1964). See text.

c Payne (1969). See text.

d Small samples only

Size of sheep bones Table 29 shows few definite changes in the length of sheep bones over time although the metapodials appear to decrease in length during the medieval period. Measurements of the distal width of the selected bones (and of the metacarpal condyle) confirm a size decrease. A much greater change, and greatest perhaps for the 18th-century groups, occurs with the increased distal width or general robustness of post-medieval bones.

Similar changes were observed for the 11th-to 16th-century groups from the Hamel, Oxford. Additionally it was concluded that there has been an overall increase of bone robustness from the Iron Age onward and this appeared greatest for the Roman and Saxon sheep.[1] A more accurate conclusion is that the average size of individual sheep at slaughtering time corresponds to this pattern and decreases slightly over the medieval period. This is not the same as showing a size change of the species as a whole and could result from other causes.

Changes of sheep breeds One explanation of the change in the size of sheep bones is that it was due to changes in the breed of sheep kept, for example, smaller, better proportioned sheep may have been preferred during the medieval period.[2] Strictly however, the bone measurements do not demonstrate a change of breed although there is other evidence of breeding changes.

Table 30 shows that polled individuals predominate in the post-medieval group (76%) compared to the opposite predominance of two-horned sheep (86% and 14% polled) in the medieval group. The period of greatest change in this cranial morphology appears to be during the 15th and 16th centuries.

Four-horned crania occurred also among the 10th-to 12th-century groups but accounted to only 4% of the medieval debris and none among the post-medieval although possibly one is present,[3] ie. possibly 2-3% of the later group. This character may have been culled out, but also appears genetically suppressed. An incipient posterior horn core failed to develop in one 13th-century cranium (A F2521).

1. R. Wilson, in The Hamel, Oxoniensia, xlv (1980), Fiche E14-F03.

2. Ibid. Fiche F03.

3. B.J. Marples, in post-medieval Greyfriars, St Ebbes, Oxoniensia, xlix (1984), Fiche M VI A11.

Morphological variability of the scapula is shown by the index values plotted in Fig. 210. Change toward a smaller scapula index ratio[1] is indicated from the 12th-to the 18th- or 19th-century groups but the distribution of the index for the 10th-to 11th-century group raises doubts about the extent and nature of such change. This trend may indicate an increasing predominance of longtailed sheep among the later period groups.[2]

This morphological variability of breeds over time cannot yet be equated with an altered representation of distinct and different sized breeds. In any case selection for breeding or other purposes might have favoured larger sheep where possible and this is evident among the post-medieval groups but not among the medieval.

Bone size and the sexes of sheep A second explanation of the size changes in sheep bones is that the proportion of the different sized sexes which contributed to the bone groups may have altered with changes of animal husbandry. For example, the small size of Iron Age sheep may be partly due to the predominance of females among the mature individuals as indicated by the pelves.[3] Whereas at the Hamel a small number of medieval pelves indicated a greater predominance of intact or castrated males[4] and this trend is confirmed by the scattergram of pelvic measurements for Church Street (Fig. 211 ).

The sex of relatively complete pelves was however determined substantially by non metric and subjective criteria.[5] Nevertheless there appears to be only a limited overlap of measurements of more and less robust pelves which probably are from 'males' and females respectively. The interpretation is further confirmed by the presence of unfused or immature pelves among those indicated to be of males since they tend to be slaughtered earlier than the females because they are less essential to regeneration of the population.

1. J.A. Boesneck et al, Kuhn-Archiv., cxxviii (1-2, 1964), 1-129; & B. Noddle, 'Some minor skeletal differences in sheep', in Research problems in zoo archaeology, ed. D.R. Brothwell, K.D. Thomas, & J. Clutton-Brock, (London Inst. Archaeol. Occ. Publ. iii, 1978), 133-34.
2. B. Noddle, ibid, 133-139.
3. R. Wilson, Ashville, Abingdon (CBA Res. Report 28, 1978), 115; & Barton Court Farm, Abingdon (CBA Res. Report), in press.
4. R. Wilson, in The Hamel, Oxford, Oxoniensia, xlv (1980), Fiche F03.
5. R. Wilson, in Ashville, Abingdon & Barton Court Farm, Abingdon.

Fig.210 Scapula measurement indices of sheep.

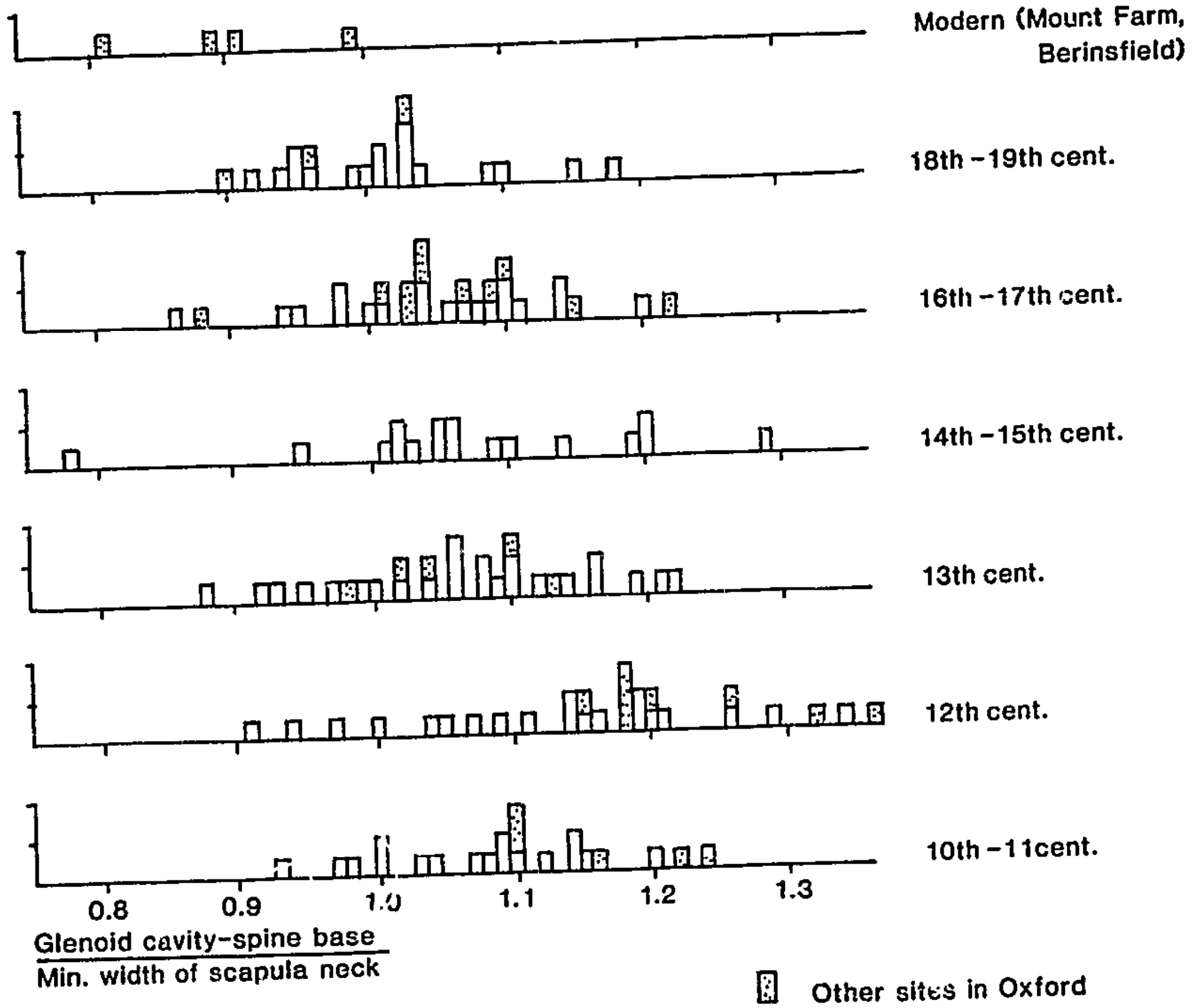
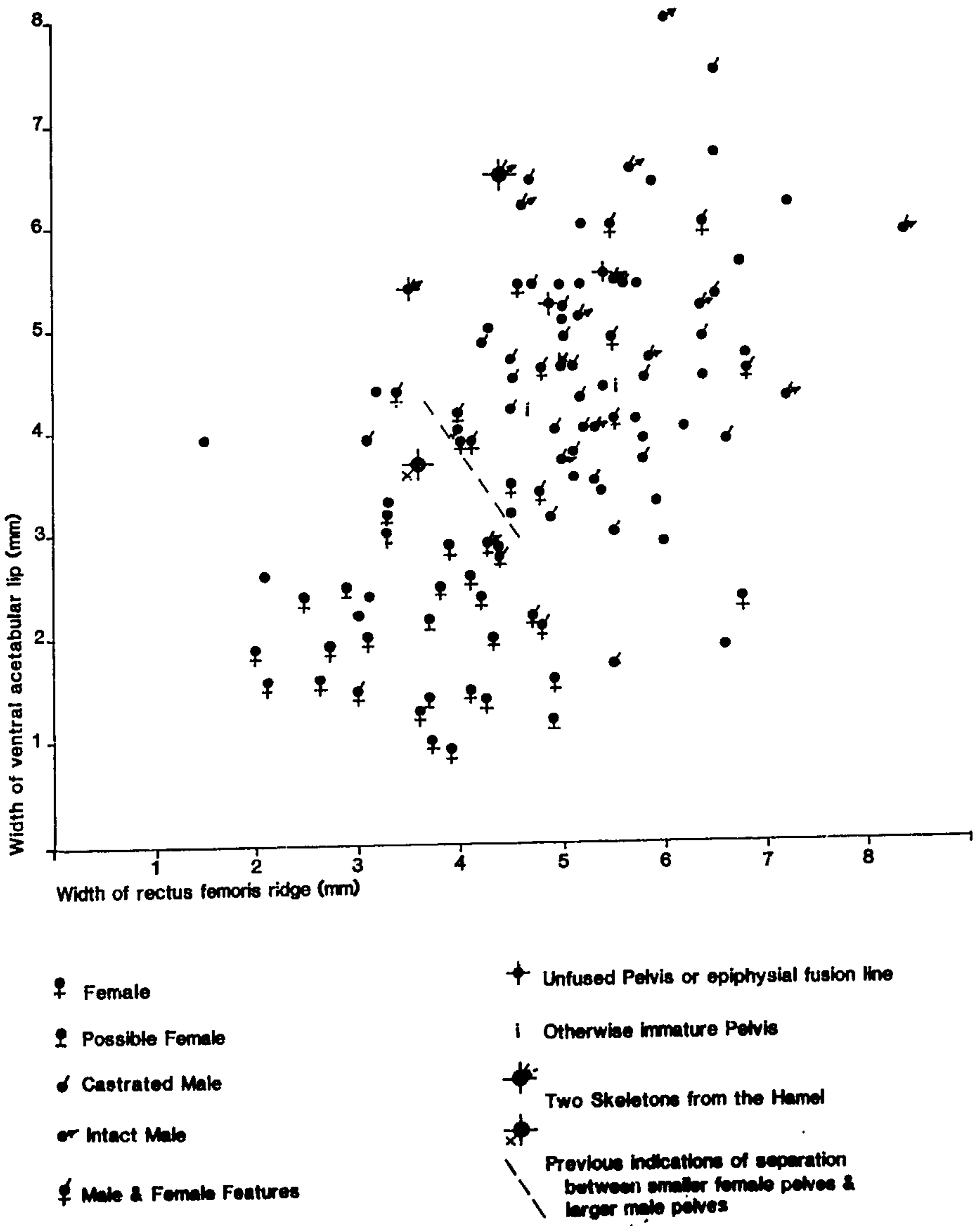


Fig.211   Scattergram of measurements of sheep pelves (11th- to 16th-century).



This slaughtering trend suggests that bones of intact or castrated male sheep should be better represented among the early fusing epiphyses than the late. Thus, if also males were consistently larger than females, there should be greater proportions of large bones represented among the measurements of early maturing bones than among the measurements of late fusing bones.

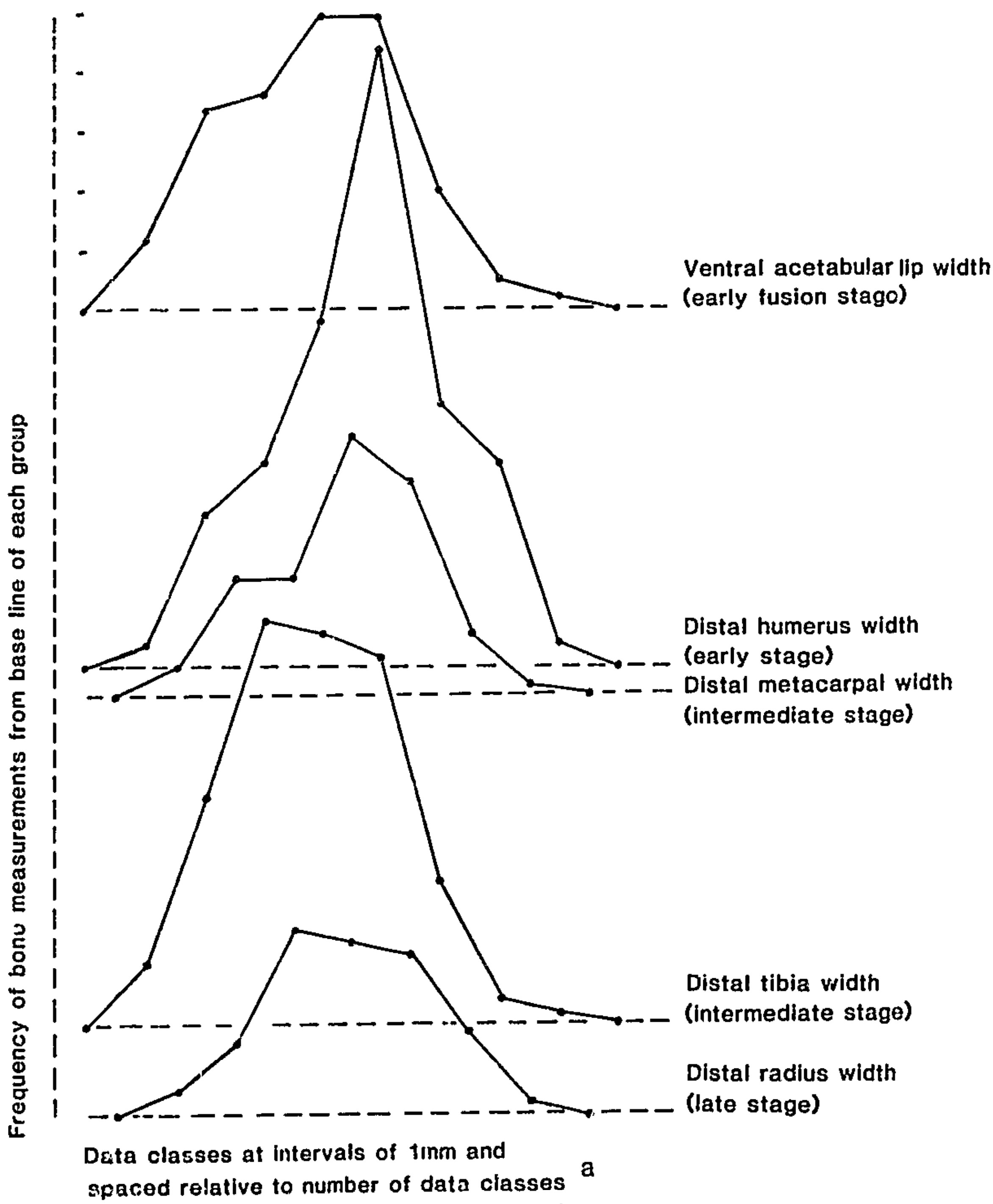
Fig.212 compares the frequency distributions of measurements of five elements which fuse at various stages in the skeletal development of sheep. The distributions of the two early fusing elements indicate little or right sided skewing while those of the three intermediate or late fusing elements indicate either little or left-sided skewing. The frequencies of measurements are however, irregular, and adequate comparisons are difficult to make, because each skeletal element compared has a different size range and comparisons of results are made on a relative scale based largely on the number of classes into which the data fall.

Nevertheless the compared distributions indicate that the median of each varies by one or two classes of one millimetre according to whether typical early or late fusing elements are measured. This finding and similar evidence from cattle bones (M V E11) show that the means of different bone measurements are affected by skewing and that both of these parameters result from the proportion of the sexes represented. Otherwise it would not make economic or breeding sense to kill the larger sheep instead of smaller ones at early stages of development as is indicated superficially by the change from right to left side skewing. It is more sensible, however, to conclude that the least useful, albeit larger, sex tended to be slaughtered before the other.

Besides confirming the general assumptions made about the slaughtering of the sheep sexes, the results suggest that the predominance of the sexes among medieval sheep bones altered from male to female about the time of epiphysial fusion at the intermediate stage of skeletal development (perhaps c.18 to 24 months). Inspection of the results indicates however that intact or castrated males remained a substantial proportion of the sheep slaughtered at even later stages of epiphysial fusion - at least compared to the slaughtering of Iron Age sheep.

Size and sex of sheep and their slaughtering ages A related area of explanation involves the mandible age evidence which indicates that

Fig.212 A compariso of right and left skewed distributions of measurements of five skeletal elements of sheep which mature at different ages of epiphysial fusion.




a The number of data classes (7 or 8) determines the comparative relationship of graphs to each other.

increasing numbers of sheep were kept to later ages of slaughtering ( M V D1). If, as to be concluded, an increased production of wool was the aim of late medieval husbandry and regeneration of flocks was less important, then the age evidence also implies that castrates were kept to older ages and for optimal yields of wool. Unfortunately the chronological subgroups of bone measurements are too variable in class frequency and sample size to detect any such changes in the proportions of the sexes over the medieval and post-medieval periods; although unpublished data from 17th-and 18th-century metapodials from The Causeway, Bicester suggest an increased representation of castrates over the medieval Church Street samples of measurements from elements of intermediate stages of epiphysial fusion.

It could be argued from the lack of definite evidence above that, if the sex ratio had stayed the same, or if the larger castrates were better represented than females at the later medieval period, then the evidence of decreased size of bones could be accepted as evidence of an overall size decrease of sheep.

In turn this conclusion might be rejected if the proportion of females among the slaughtered sheep had increased. This cannot, however, be supported metrically. Further, it would imply that the females were slaughtered at increasingly older ages but this does not make much sense even in terms of wool production. Since ewe sheep were probably already well represented in terms of flock maintenance, their keeping to greater ages would be less advantageous than retaining wethers solely for wool (and later meat).

In general the suggestion of increased numbers of females among the slaughtered sheep appears unsound unless the kill-off pattern represents a very local constriction of sheep husbandry. Both possibilities appear doubtful, since the late medieval husbandry of sheep might generally be expected to have been less rather than more constricted than during the early medieval period. Consequently, the evidence at present suggests it may be reasonable to accept that the overall size of local sheep decreased during the medieval period.

Height estimates of sheep These are given in Table 32. Mean estimates from the metapodials appear 2-6 centimetres greater than estimates from the bones of the upper limbs and indicate that:-

a) methods of estimation are not quite accurate;

Table 32 Shoulder height estimates of sheep[a] from Oxford (cm)

| from humerus | n | r | x |
|---|---|---|---|
| OXA17 | 2 | 52-65 | 58.6 |

| from radius | n | r | x |
|---|---|---|---|
| OXA11&12 | 12 | 52-66 | 58.2 |
| OXA13 to 15 | 11 | 52-66 | 58.3 |
| OXA16 to 18 | 3 | 55-63 | 59.0 |
| OXH16[b] | 12 | 53-62 | c58 |

| from metacarpal | n | r | x |
|---|---|---|---|
| OXA11 | 22 | 55-65 | 60.3 |
| OXA12 | 13 | 54-64 | 59.4 |
| OXA13 | 18 | 51-64 | 58.1 |
| OXA14&15 | 7 | 48-60 | 55.5 |
| OXA18&19 | 3 | 62-67 | 64.4 |

| from tibia | n | r | x |
|---|---|---|---|
| OXA11 to 14 | 3 | 56-57 | 56.4 |

| from metatarsal | n | r | x |
|---|---|---|---|
| OXA11 | 20 | 58-65 | 60.0 |
| OXA12 | 11 | 55-67 | 60.1 |
| OXA13 | 23 | 53-65 | 58.8 |
| OXA14 to 15 | 7 | 48-65 | 55.7 |
| OXA17 to 19 | 3 | 53-65 | 61.3 |

a M. Teichert, 'Osteometrische Untersuchungen zur Berechnung der Widderisthohe bei Schafen', in Archaeozoological Studies, ed A.T. Clason (1975), 51-69.

b From the Hamel, Oxford.

b) estimates from the upper limb bones may be more reliable because they represent two thirds of the major bones of the limbs; or,

c) medieval sheep were differently proportioned to the sheep used to calculate multiplication factors for height estimates.[1]

Size of cattle bones Table 33 gives the overall statistics for the commonest elements. There is some but not consistent evidence for a slight decrease in the lengths of bones during the medieval period. There is contrary evidence for this from the distal widths of the metapodials. A post-medieval increase of size appears acceptable particularly from the relatively abundant distal metapodials although such broad interpretations require careful qualification.

Fig. 213 presents frequency distributions of measurements of cattle in a similar way to those given for sheep in Fig. 212. Here, however, a comparable general interpretation of the frequency distributions can be tested further by other methods of sexing bones and this should give greater confidence to accepting the general rationale about the proportions of the sexes, represented among the sheep bones at the site.

Fig. 213 shows frequency distributions which are predominantly skewed left. These and even the exceptional distribution of the distal tibia measurements are interpreted as showing the predominance of bones from females. There is a tendency for smaller frequency peaks to form on the right side, and these indicate the presence rather than great abundance of males. In total these peaks or modes indicate the presence of three separate groups of measurements which require explanation.

The first overall conclusion from a comparison of the trends of measurement frequency distributions of cattle and sheep in Figs. 212 and 213 is that the husbandry or economy of these species is somewhat different. Males appear better represented among sheep bones than among cattle and especially for elements which mature early during skeletal development. This conclusion will be discussed later.

Pelvic bones and the sexes of cattle A scattergram of pelvic measurements (cf sheep Fig 211 ) is given by Fig. 214 . The sex of some of the more complete or distinctive pelves is also given as a result of applying still subjective morphological criteria for sexing bones,[2] though these are

1. M. Teichert, 'Osteometrische untersuchungen zur berechnung der widderisthohe bei schafen', Archaeozoological Studies, ed. A. Clason, 51-69.
2. R. Wilson, in Barton Court Farm, Abingdon (CBA Res. Report 50, 1986).

Table 33 Selected measurements of cattle bones (mm)

length of metacarpal GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 7 | 167-208 | 180.86 | (12.93) |
| OXA12 | 1 | | 186.0 | |
| OXA13 | 4 | 161-187 | 175.0 | |
| OXA11 to 13 | 12 | 161-208 | 179.33 | 11.61 |
| OXA17 | 1 | | 188.0 | |

length of metatarsal GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA10 | 1 | | 215.0e | |
| OXA11 | 8 | 181-212 | 203.25 | (10.86) |
| OXA12 | 4 | 193-206 | 199.25 | |
| OXA13 | 4 | 199-217 | 205.0 | |
| OXA14 | 1 | | 204 | |
| OXA11 to 14 | 18 | 181-217 | 203.44 | 8.93 |
| OXA18 | 2 | 190 | 190 | |

Sexed metapodials from sites in Oxford

Cows

| | n | r | x | s |
|---|---|---|---|---|
| OX11 | 8 | 167-190 | 176.75 | (7.21) |
| OX13 | 3 | 166-177 | 171.0 | |
| OX11 to 13 | 11 | 161-190 | 175.18 | 7.67 |
| OX17 | 1 | | 188.0 | |

| | n | r | x | s |
|---|---|---|---|---|
| OX11 | 9 | 181-212 | 202.44 | (10.44) |
| OX12 | 4 | 193-209 | 202.75 | |
| OX13 | 4 | 199-204 | 201.75 | |
| OX14 | 1 | | 204.0 | |
| OX11 to 14 | 18 | 181-212 | 202.44 | 7.81 |
| OX18 | 2 | 190 | 190.0 | |

Bulls or steers

| | n | r | x | s |
|---|---|---|---|---|
| OX11 | 2 | 181-208 | 194.5 | |
| OX12 | 1 | | 186.0 | |
| OX13 | 1 | | 187.0 | |
| OX16 | 1 | | 205.0 | |

| | n | r | x | s |
|---|---|---|---|---|
| OX12 | 1 | | 195.0 | |

width of distal metacarpal Bd

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 7 | 48-65 | 53.0 | (6.31) |
| OXA12 | 1 | | 64.4 | |
| OXA13 | 12 | 47-68 | 53.34 | (6.74) |
| OXA14[b] | 5 | 50-69 | 57.50 | (7.92) |
| OXA15[b] | 1 | | 52.0 | |
| OXA16 | 3 | 53-57 | 55.33 | |
| OXA17 | 3 | 52-56 | 54.67 | |
| OXA18[a] | 13 | 56-66 | 60.86 | 3.03 |
| OXA18&19[a] | 4 | 58-69 | 63.35 | |

width of distal metatarsal Bd

| | n | r | x | s |
|---|---|---|---|---|
| OXA10 | 23 | | 55.0 | |
| OXA11 | 4 | 44-50 | 46.86 | (1.51) |
| OXA12[b] | 3 | 44-62 | 49.10 | 5.71 |
| OXA13[b] | 1 | 43-56 | 49.41 | 4.21 |
| OXA14[b] | 1 | 46-63 | 53.29 | 6.08 |
| OXA15[b] | 1 | 45-56 | 50.75 | |
| OXA16 | | | 53.8 | |
| OXA18[a] | | 46-57 | 54.06 | 3.70 |
| OXA18&19[a] | | 54-59 | 55.70 | 2.27 |

distal widths of metapodials probably from cows

| | n | r | x | s |
|---|---|---|---|---|
| OX11 to 13 | 11 | 46-52 | 49.96 | 2.31 |
| OXA17 | 1 | | 56.1 | |

| | n | r | x | s |
|---|---|---|---|---|
| OXA10 to 14 | 15 | 43-49 | 46.60 | 2.04 |
| OXA18[a] | 2 | 54-55 | 54.5 | |

a Includes additional measurements from Greyfriars, St Ebbes.

b Includes measurements of less certain date (+)

Table 33 Selected measurements of cattle bones (mm) (continued)

| | n | r | x | s |
|---|---|---|---|---|
| | length of astragalus GL | | | |
| OXNIC & AS11[c] | 9 | 55-64 | 60.67 | (2.83) |
| OX11 | 29 | 54-64 | 59.31 | 3.11 |
| OXA11 | 20 | 54-64 | 58.70 | 3.60 |
| OXA12 | 9 | 52-59 | 56.67 | (2.06) |
| OXA13 | 15 | 54-64 | 57.47 | 2.72 |
| OXA14[b] | 9 | 55-68 | 59.11 | (4.28) |
| OXA15[b] | 4 | 55-64 | 60.0 | |
| OXA16 | 1 | | 59.0 | |
| OXA17 | 1 | | 64.0 | |
| OXA18 & 19[a] | 1 | | 57.0 | |
| | width of distal tibia | | | |
| OX11 | 17 | 50-63 | 55.00 | 4.11 |
| OXA11 | 12 | 51-63 | 51.08 | 3 63 |
| OXA12 | 9 | 50-62 | 56.00 | (3.71) |
| OXA13 | 12 | 49-62 | 55.25 | 3.67 |
| OXA14 | 3 | 51-61 | 55.33 | |
| OXA15 | 4 | 51-63 | 55.50 | |
| OXA16 | 2 | 46-55 | 50.5 | |
| OXA & H16 | 9 | 46-66 | 58.44 | (6.31) |
| OXA18-19[a] | 2 | 50-63 | 56.6 | |
| | length of radius GL | | | |
| OXA11 | 2 | 248-265e | 256.5 | |
| OXA12 | 1 | | 256 | |
| OXA13 | 1 | | 248 | |

a Includes additional measurements from Greyfriars, St Ebbes.

b Includes measurements of less certain date (+)

c Additional measurements included from All Saints Oxford (AS)
The Hamel (H)
New Inn Court (NIC)

confirmed generally by previous and independent work elsewhere. As for the sheep measurements in Fig. 211, note should be taken of unfused or partly fused epiphyses which are most probably derived from immature bulls or steers rather than from cows. The smallest measurements are of pelves which usually show female characteristics; the larger pelves tend to show male characteristics. About equal numbers of males and females appear represented.

Metapodial size and the sexes of medieval cattle Interesting groupings of measurements of the distal metapodials emerge in Figs. 215 and 216. The size difference between medieval and post-medieval bones is clearly shown. The medieval metatarsals separate into three distinct clusters while the pattern of the metacarpals appears similar but is not as distinct.

The extent of the medieval separations suggests that breeds of different size are unlikely to be represented by the different groups because,

a) this would contradict other quite reasonable evidence of sexual di-or trimorphism of cattle, and,

b) size variability due to both sex and breed would produce diffuse rather than distinct groupings.

c) conversely, if this factor of different sized breeds did affect other measurement distributions slightly then the minimal influence of it among the metatarsals suggests that their distributions should be interpreted more confidently in terms of sexuality.

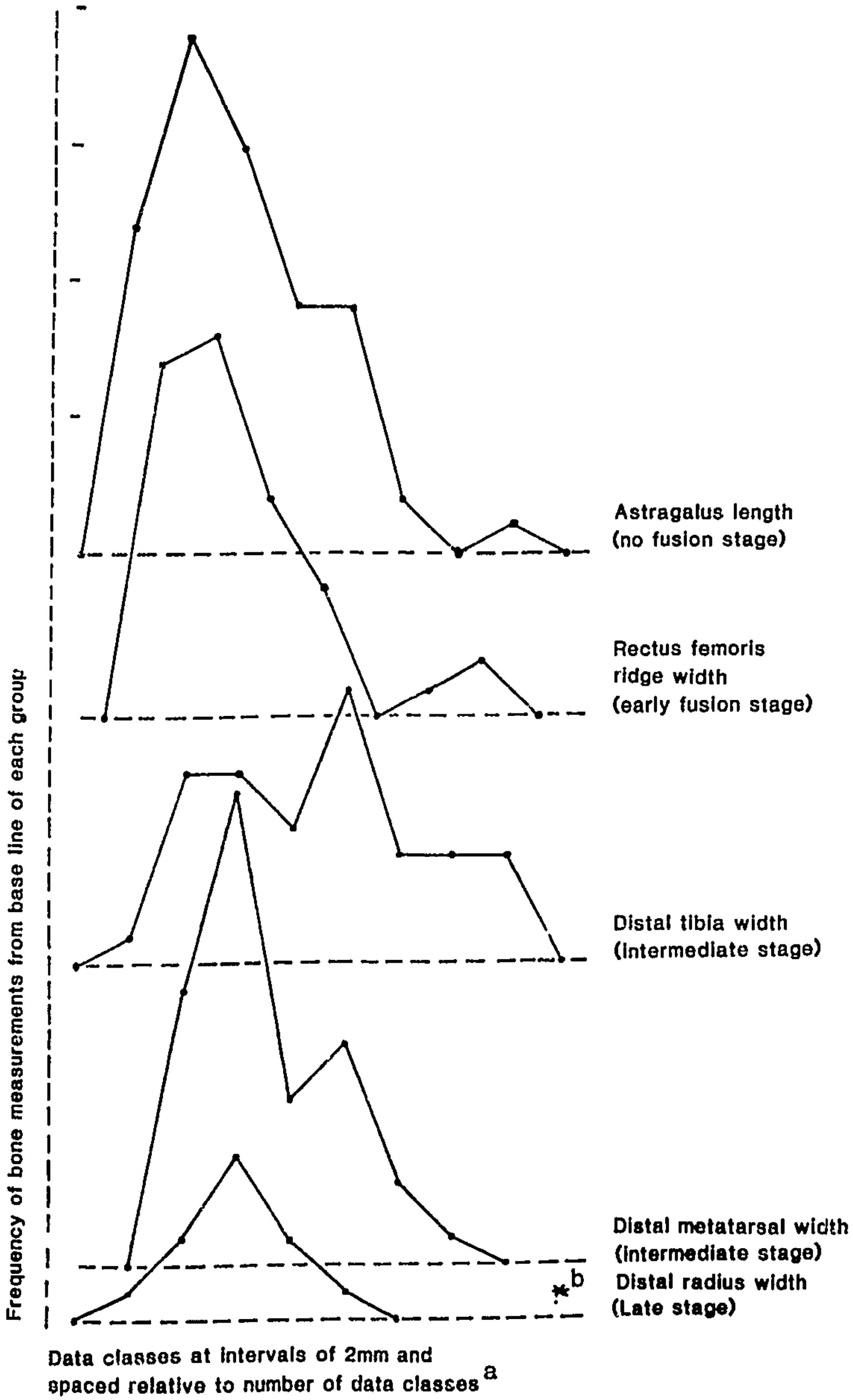
d) it is improbable that any separation between different sized breeds could have been maintained for the whole of the medieval period to yield the results obtained.

In comparison with the improbable effects of the presence of different breeds, the arguments for size differences due to sex are superior. The independent method of Howard, the comparable work of Higham and Message, and the present evidence from the pelves in Fig.214, all indicate that most of each large cluster of the small metacarpals and metatarsals from Oxford - in Figs. 215 and 216- are from females.

1. C. Grigson, 'Sex and age determination of some bones and teeth of domestic cattle', in Ageing and sexing animal bones from archaeological sites, (BAR British Ser. 109, 1982), 7-19.

2. M. Howard, 'Metrical determination of the metapodials and skulls of cattle', Royal Anthrop. Inst. Occ. Paper viii (1963) 91; C. Higham & M. Message, 'An assessment of prehistoric techniques of bovine husbandry', in Science and archaeology, ed. D. Brothwell & E. Higgs (2nd edn, 1969), 315-30.

Fig.213 A comparison of predominantly left skewed distributions of measurements of five skeletal elements of cattle which mature at different ages of epiphysial fusion.




a The number of data classes (6-8) determines the comparative relationship of graphs to each other.

b With the exception of the distal tibia where one large measurement from the Hamel, Oxford, indicates the true position of this distribution.

M V F3

Fig.214 Scattergram of measurements of cattle pelves.

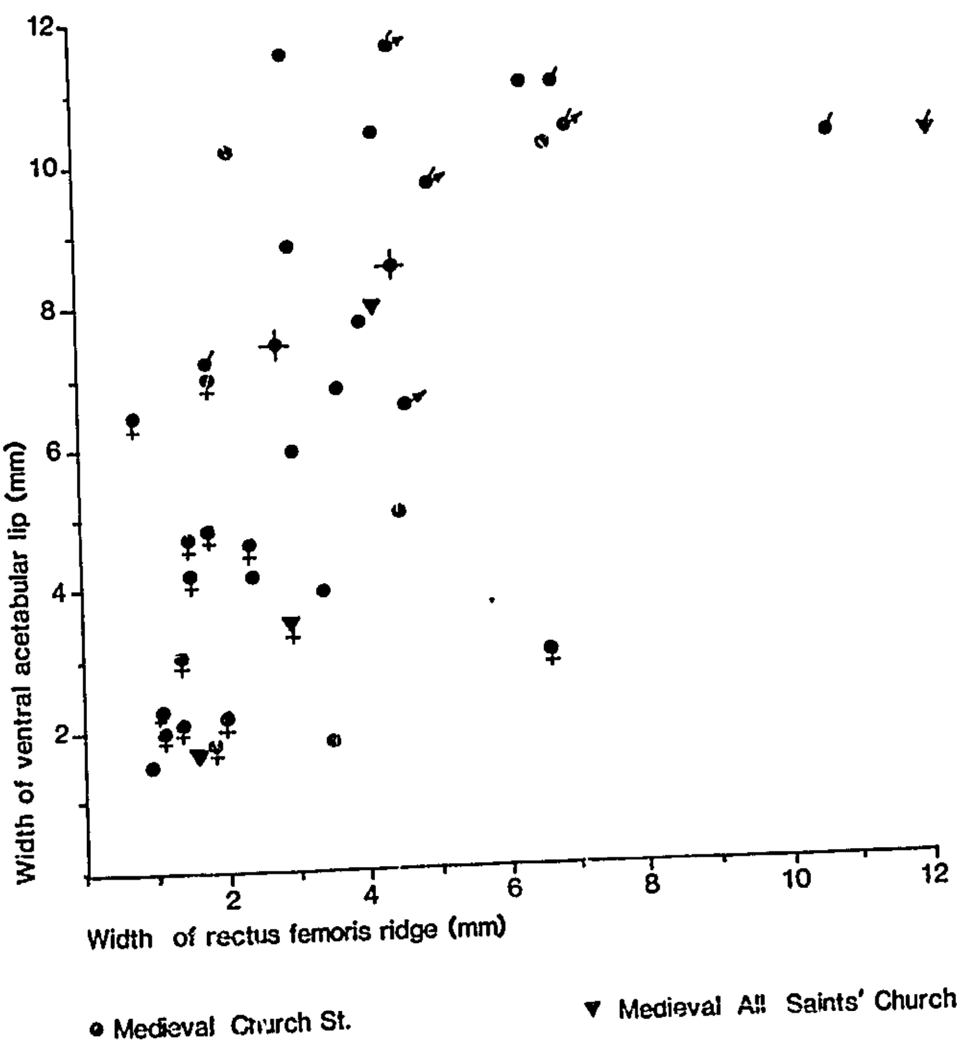


Fig.215 Scattergrams of 11th- to 15th-century and 16th- to 19th-century width measurements of the distal metacarpal of cattle.

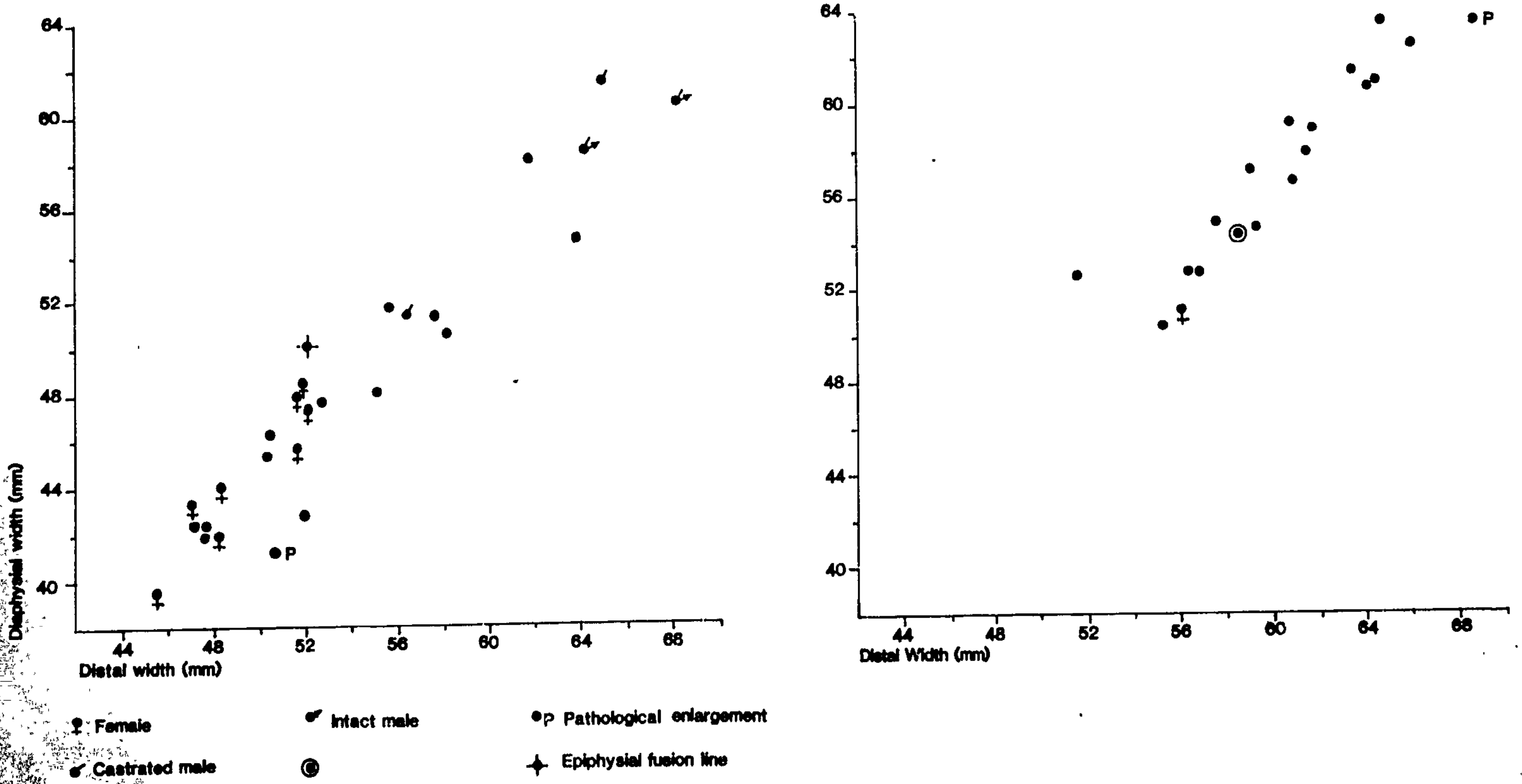
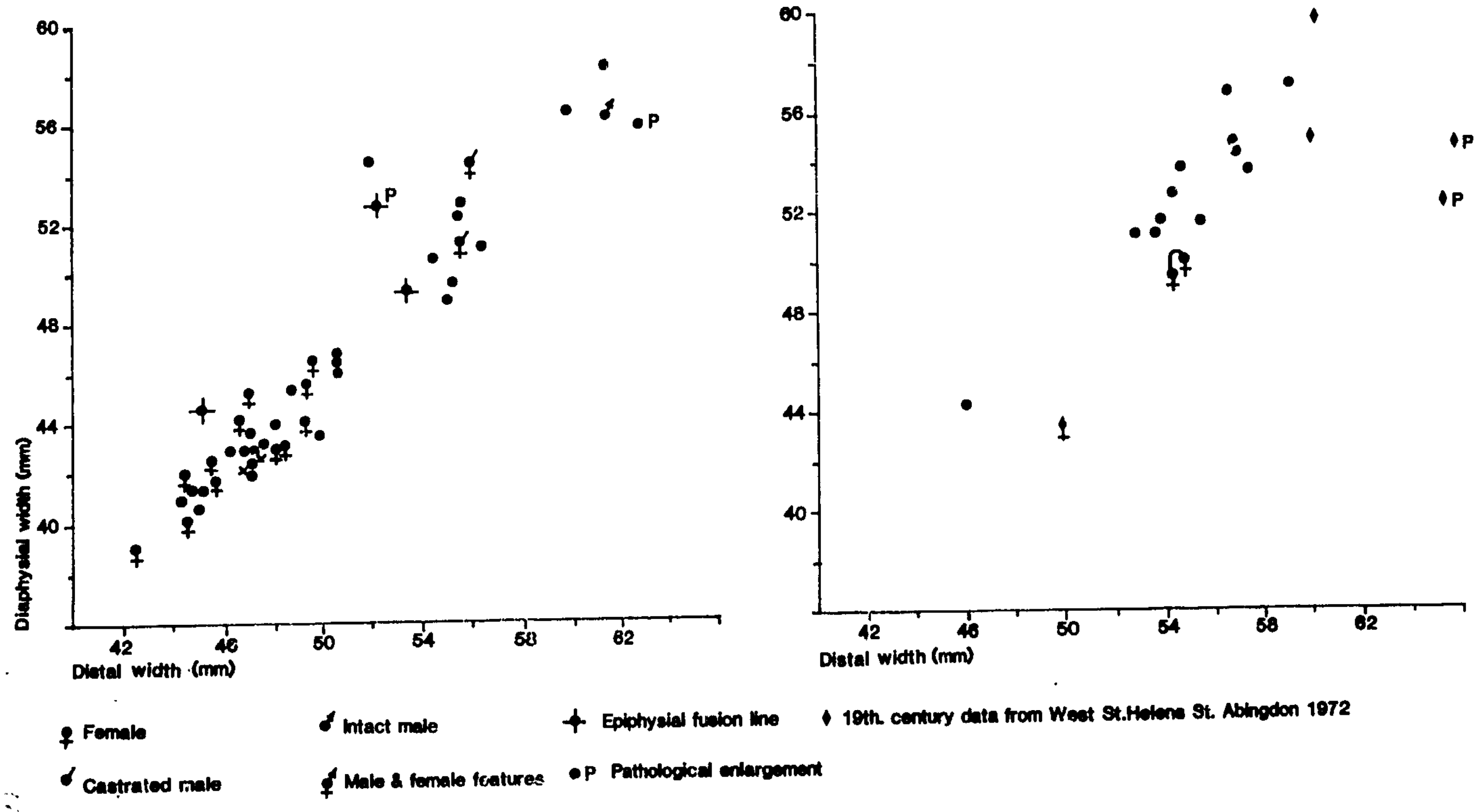


Fig.216 Scattergrams of 11th- to 15th-century and 16th- to 19th-century width measurements of the distal metatarsal of cattle.



The identification of the two smaller clusters of larger bones, other than collectively as probable castrates or intact males, is less certain. That these two clusters are both of 'males' is reinforced because the females of the large clusters already comprise nearly two thirds of the measured metapodials as compared to the relatively even proportions of males and females indicated by the pelvic material. An even greater reduction by slaughtering of the males would have to have occurred if the intermediate clusters were to be interpreted as females as well: 'females' would then comprise as much as 87% of the metapodials. This figure is marginally possible if the kill off pattern from mandibles is counted generously in favour of this interpretation. But it should be rejected anyway for other reasons:

a) The interpretation of the intermediate clusters as females is contradicted by evidence of male sexuality from the metapodial indices of Howard. This method itself might be disputed but any complete dismissal would contradict other modern evidence of sexual size and form of bones.[1]

b) There is a trend for incompletely fused bones to be present in the intermediate cluster or area of these distributions. These bones are best interpreted primarily as of immature males and part of the normal slaughtering pattern. Less common slaughtering of sterile cows would also be expected; this is barely indicated by one or two bones among the cluster of smallest bones in the various samples and which are acceptably interpreted as bones from cows.

c) There appears to be no consistent explanation as to why there should be two separate clusters of 'cows'. Maintenance of breeds or herds of distinctively different sized cows across at least four centuries is implausible. Crossbreeding would be expected as well as selection preferences in favour of large cows. The result would be a unitary though diffuse scattergram of cow measurements and not of two clusters.

1. For example, by Fock, cited by C. Grigson, in Ageing and Sexing animal bones, (BAR British ser. 109, 1982), Fig. 2.

d) It is possible that some cows were given preferential feeding and shelter and this husbandry difference formed separate clusters of cow bones of different size. To be detected this however requires an extremely constant pattern of divided cow husbandry over the centuries when poorer and better environmental conditions would tolerate variable husbandry of cows, and produce variability of their bone size and homogeneity of the cumulative pattern.

e) It is probable that environmental and farming conditions in some localities of Oxfordshire were better than most grazing and shelter near Oxford because of town pressure on local resources. Yet if two different sizes of cows were marketed from different sources, the evidence of the high proportion of unfused bones in the intermediate cluster would have to be considered as of a greater proportion of supposedly better treated 'cows' being slaughtered immature and earlier than smaller cattle which are implied to have been treated worse. As the reverse outcome would be expected, environmental factors do not appear to explain these two clusters as a product of differential husbandry of females.

All these arguments show that only the cluster of smallest bones in Figs. 215 and 216 should be interpreted as of females and that the two clusters of large bones must be from intact or castrated males. The size difference between the two groups implies that each cluster consists entirely of bones of one of the two male 'sexes'. Unfortunately this simple explanation does not appear to be valid.

By the method of Howard one metatarsal in the largest group is classified as bull while a few of the intermediate cluster only end up classified as indeterminately castrate or female. Sexing of the metacarpals indicates the presence of castrates in the two equivalent regions of the scattergram.

Though this result again questions this method of sexing it is very doubtful that the parallels of modern size differences among the sexes can be rejected.[1] Instead a more complicated explanation appears necessary. This is as follows:-

1. C. Grigson, in Ageing and sexing animal bones, (BAR British ser. 109. 1982), 7-23.

Both groups of intermediate and large sized bones are of intact and castrate males but the largest bones are probably from individuals which were given preferential husbandry as large males selected for breeding and/or draught purposes. The group of bones of intermediate size probably come from bulls and steers which were part of the lower natural size range of males, were rejected from breeding or draught functions, were least well fed and housed, and were killed off before maturity as beef animals. Thus primarily, environmental and, or cultural factors are held to explain the separation in size of the male animals.

The earlier slaughtering of individuals in the intermediate clusters is supported by the epiphysial fusion evidence. The age evidence of the two extreme clusters indicates fully developed individuals and presumably those which were the most useful in terms of the 'secondary' uses of cattle.

Minor pathology of the metapodials attributable to long term mechanical damage or stress in draught oxen[1], is in fact found in all three clusters of the metapodial distributions. It occurs just once among as many as 46 bones of females, two of 15 intermediate sized males and one or two of 5 of the large sized males. A similar pattern appears repeated at the Hamel and elsewhere.[2]

Thus this type of pathology is not exclusively related to one sex or one group but does indicate that, where possible, large and male animals were trained as draught oxen. It is interesting that one metatarsal in the intermediate clusters shows both pathological symptoms and incomplete fusion and indicates an immature ox which did not prove satisfactory.

Post-medieval metapodials A lesser separation into clusters similar to the medieval ones is shown by the complementary graphs of post-medieval measurements though there is little evidence from the other skeletal elements to support an interpretation of the metapodial data. One possible source of bias, that of contaminated deposits of bones, can largely be rejected because the medieval and post-medieval measurements tend to fall in different areas of the graph.

1. R. Wilson, in Ashville, Abingdon, (CBA Res. Report 28, 1978), 118.

2 R. Wilson, in The Hamel, Oxford, Oxoniensia, xlv (1980), Fiche F06; in Harding's Field, Chalgrove, held by OAU.

Several observations are of interest. The size range of post-medieval bones is smaller than the medieval. The largest metapodials of both periods are not very different in size; the smallest tend to be substantially different. The frequencies of bone measurement classes indicate left side skewing indicative of a predominance of females and this indication is partly reinforced by metapodial indicies which identify females from the few complete bones.

All this evidence indicate a decrease in the presence of small females and an increased presence of larger ones, but not necessarily an equivalent size increase of the largest males - data of pathological bones from Abingdon and presumably from oxen, is included for comparative purposes in Fig. 216 .[1]

Genetic improvement, selective culling, and improved feeding and shelter, especially of cows, could all have brought about this observed contraction and increase in overall size of post-medieval metapodials of cattle.

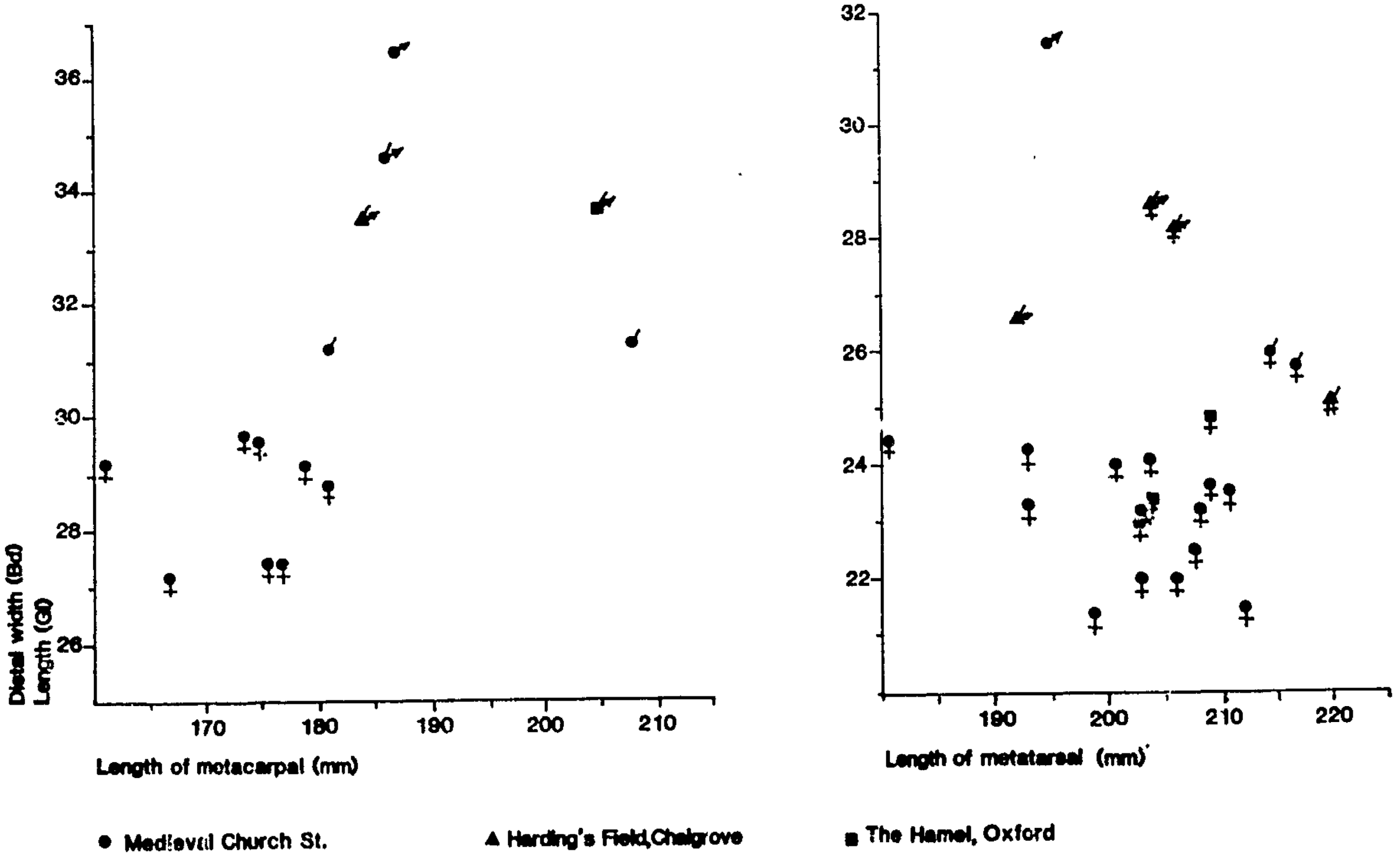
Further evidence from metapodial data As a further examination of the available evidence another plot of the medieval data from complete metapodials was made. In Fig. 217 , female bones determined by the method of Howard mainly cluster together while the separation of some intact or castrated males is distinct but others again fall into an uncertain intermediate area.

Fig. 217 could be interpreted as further evidence of unreliable methodology, except that a clear separation of the sexes was obtained for large Saxon metacarpals from Hamwih, Southampton but less from small Iron Age metacarpals at Gussage, Dorset and, perhaps, from medieval bones at Lincoln.[2] A better separation of the sexes might be obtained from bones of cattle

1. R. Wilson, unpublished data from West St Helens Street, Abingdon (D. Miles in Oxoniensia xl (1975), 79-101).

2. J. Bourdillon & J. Coy, Melbourne Street, Southampton (CBA Res. Report 33, 1980), Fig. 17, 17; R. Harcourt, in G.J. Wainwright, Gussage All Saints: on Iron Age Settlement in Dorset (DoE Archaeol. Report 10, 1979), Fig. 109; T. O'Connor, Flaxengate, Lincoln (Archaeol. of Lincoln xviii, 1982), Fig. 20 - the author's interpretation of the evidence differs from that here.

Fig.217 Scattergrams of 11th- to 14th-century cattle metapodial indices (DBL) against length



which grew to greater size, presumably under favourable environmental or economic conditions. These differences of bone size at different periods confirm the arguments about an impoverished environment affecting the size of medieval Oxford cattle and particularly some of the 'males' which are suggested to have been steers.

Size of the distal radius Fig.218 shows a plot of measurements of the distal radii from medieval Church Street and other sites in the town. A solitary large distal measurement lies distant from a large cluster of small ones. This type of scatter is also typical of Iron Age and Romano British measurements.

The large cluster of measurements would generally be interpreted as bones from females, the outlying one to be from a large bull or draught ox and to be equivalent to those of the upper range of metapodials. Bones of any intermediate group may be either absent or merged with the lower group. Some lack of homogeneity appears indicated by the signs of incomplete epiphysial fusion which are also present among the intermediate group of metatarsals. If approximately this difficulty is allowed for, females appear to outnumber males by around 12:2 by this stage of skeletal development of the radii from Church Street. The high ratio of females to males appears to be less if data from other town sites is taken into account.

Other size data The width measurements from the distal tibia indicate a greater proportion than usual of bones of intermediate size - chiefly in the 12th- and 13th- century samples. This inconsistency may be due to an anomaly of sample size and is borne out by a comparison to length measurements of the astragalus where a greater proportion of females are indicated. Although this last trend might also be explained by the presence of small male calves because epiphysial fusion does not occur in the astragalus, the presence of such immature bones is recognisable and would have been noted as each measurement was recorded. Only one astragalus in this state was noted.

Height estimates of cattle Comparisons of estimates of the withers heights of cattle at different periods are given in Table 34. Medieval cows at Oxford were as small as or slightly smaller than Iron Age cows and 5-10 centimetres smaller than Roman or early Saxon cattle in the Upper Thames Valley.

Size of pig bones Summaries of these are given in Table 35. Medieval measurements are variable, show little consistent evidence of size change, but are smaller than those of the post-medieval period. The measurements of

Fig.218 Scattergram of 11th- to 16th-century measurements of the distal radius of cattle.

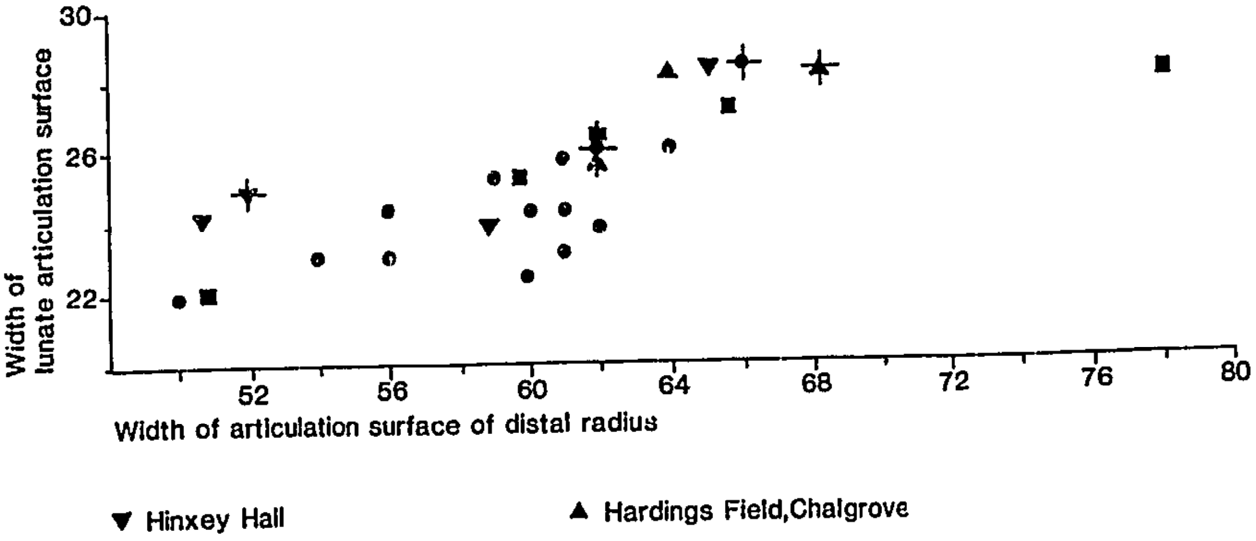


Table 34 Comparison of shoulder height estimates of cattle in the Upper Thames Valley from the Iron Age to the Post-medieval period

| | from cow metacarpals[a] | | |
|---|---|---|---|
| | n | r | x |
| UTV1A | 8 | 100-110 | 105-6 |
| MF1A | 5 | 101-112 | 105.2 |
| UTVRB | 11 | 96-120 | 111.0 |
| UTV5&6 | 8 | 108-124 | 115.5 |
| OX11 to 13 | 11 | 97-114 | 105.1 |
| OX17 | 1 | | 128.0 |
| | Bull/steer | | |
| OX11 to 13 | 4 | 113-130 | 119.1 |
| OX16 | 1 | | 128.1 |
| | from radius (not sexed)[b] | | |
| OX11 to 13 | 4 | 106-114 | 109.3 |

| | from cow metatarsals[a] | | |
|---|---|---|---|
| | n | r | x |
| UTV1A | 6 | 101-114 | 108.9 |
| MF1A | 10 | 104-113 | 109.3 |
| UTVRB | 20 | 107-127 | 116.0 |
| UTV5&6 | 4 | 113-125 | 118.6 |
| OX11 to 14 | 18 | 97-113 | 108.3 |
| OXA18 | 2[c] | 102-102 | 101.7 |
| OX12 | 1 | | 108.2 |

a After Fock (1966)

b After Matolcsi (1970). Both quoted in J. Boesneck and A. von den Driesch, 'Kritische Anmerkungen zur Widdersthohenberchnung, aus Langenmassen vor und fruhgeschichtlicher Tierknocken, Saugetierkdl. Mitt. 22,4 (1974), 325-48, Tables 4 & 5. There are differences in the methods of these two authors.

c A pair which appear atypical of post-medieval bones, eg see Table 33 (M V E12)

Table 35 Selected measurements of pig bones (mm)

**width of distal humerus Bd**

| | n | r | x | s |
|---|---|---|---|---|
| OXA10 | 2 | 35-39 | 37.0 | |
| OXA11 | 8 | 34-39 | 37.50 | (1.77) |
| OX11 | 17 | 34-43 | 37.71 | 1.96 |
| OXA12 | 15 | 33-43 | 36.80 | 2.83 |
| OXA13 | 13 | 32-49 | 38.23 | 3.98 |
| OXA14&15 | 5 | 35-42 | 38.0 | (3.32) |
| OXA16&17 | 4 | 37-47 | 42.0 | |
| OXA18&19 | 4 | 45-59 | 49.0 | |

**width of distal tibia**

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 5 | 27-28 | 27.4 | |
| OXA11 | 7 | 27-29 | 27.57 | (0.79) |
| OXA12 | 9 | 26-32 | 29.56 | (1.41) |
| OXA13 | 3 | 29-32 | 30.0 | |
| OX14&15 | 3 | 24-31 | 27.07 | |

**length of radius GL**

| | n | x |
|---|---|---|
| OXA13 | 1 | 154[a] |
| OXA16/19 | 1(p.m.skeleton) | 171[a] |

**length of astragalus GL**

| | n | r | x |
|---|---|---|---|
| OXA11 | 3 | 37-39 | 38.0 |
| OXA12&13 | 4 | 34-37 | 35.8 |
| OXA15&16 | 2 | 40-41 | 40.5 |
| OXA19 | 1 | | 49.0 |

a These yield height estimates respectively of 81.0cm and 90.0cm. After M. Teichert (1966/1969) cited in Boesneck and A. von den Driesch (1974). See footnote b, table 16 (M V G3) the distal humerus and tibia appear slightly greater than Iron Age measurements but, as for other species, are less than the Romano-British and Saxon.[1]

Measurements of the length and distal width of the pig metapodials are plotted in Fig.219 and these tend to cluster into two groups. The graphs of medieval urban bones are complicated by the inclusion of:-

a) extra large measurements of metapodials from the manor at Harding's Field, Chalgrove, and which indicate wild boar or large domestic pigs[2], and,

b) metacarpal measurements from the post-medieval skeleton, believed to be of a sow, an unusually 'broad headed' pig (the least breadth of the parietals is 45 mm)[3] which may not be of the same genetic stock as the medieval pigs.

Despite the variability of this data, sexual di- or trimorphism probably explains the clustering effect. Incomplete fusion is again evident among the largest bones presumably of intact or castrate males. Around this stage of skeletal development bones of females appear to outnumber males by about 4:3.

Size of other domestic species Further data of domestic and wild species are given in Table 36. Comparable measurements of horse are few but indicate small to medium sized medieval individuals and one larger post-medieval individual. Two length measurements of dog indicate individuals of medium size. A very small 19th-century humerus of dog was found also.

Length measurements of cat bones are generally of small individuals but show no consistent trend. More numerous measurements of the distal width of the humerus (which average up to 0.3 mm smaller than Bd) in Fig.220 however, indicate a similar chronological pattern to that observed or suspected for other species. Post medieval widths are larger than medieval ones and smaller than three of Iron Age and early Romano-British humeri from Abingdon and Berinsfield, Oxon.[4] The latter however may be of wild cat rather than of large domestic cats.

1. R. Wilson, in Barton Court Farm (CBA Res. Report 50, 1986 ), Fiche Table 24.

2. R. Wilson, in Harding's Field, Chalgrove, held by O.A.U.

3. R. Wilson, in post-medieval Church Street, St Ebbe's, Oxoniensia, xlix (1984), Fiche M VI A4.

4. R. Wilson, unpublished data from Ashville & Barton Court Farm, Abingdon; report for G. Lambrick, Excavs at Mount Farm, Berinsfield, Oxon, in prep, Fiche Table 42.

Fig.219 Scattergrams of measurements of pig metapodials.

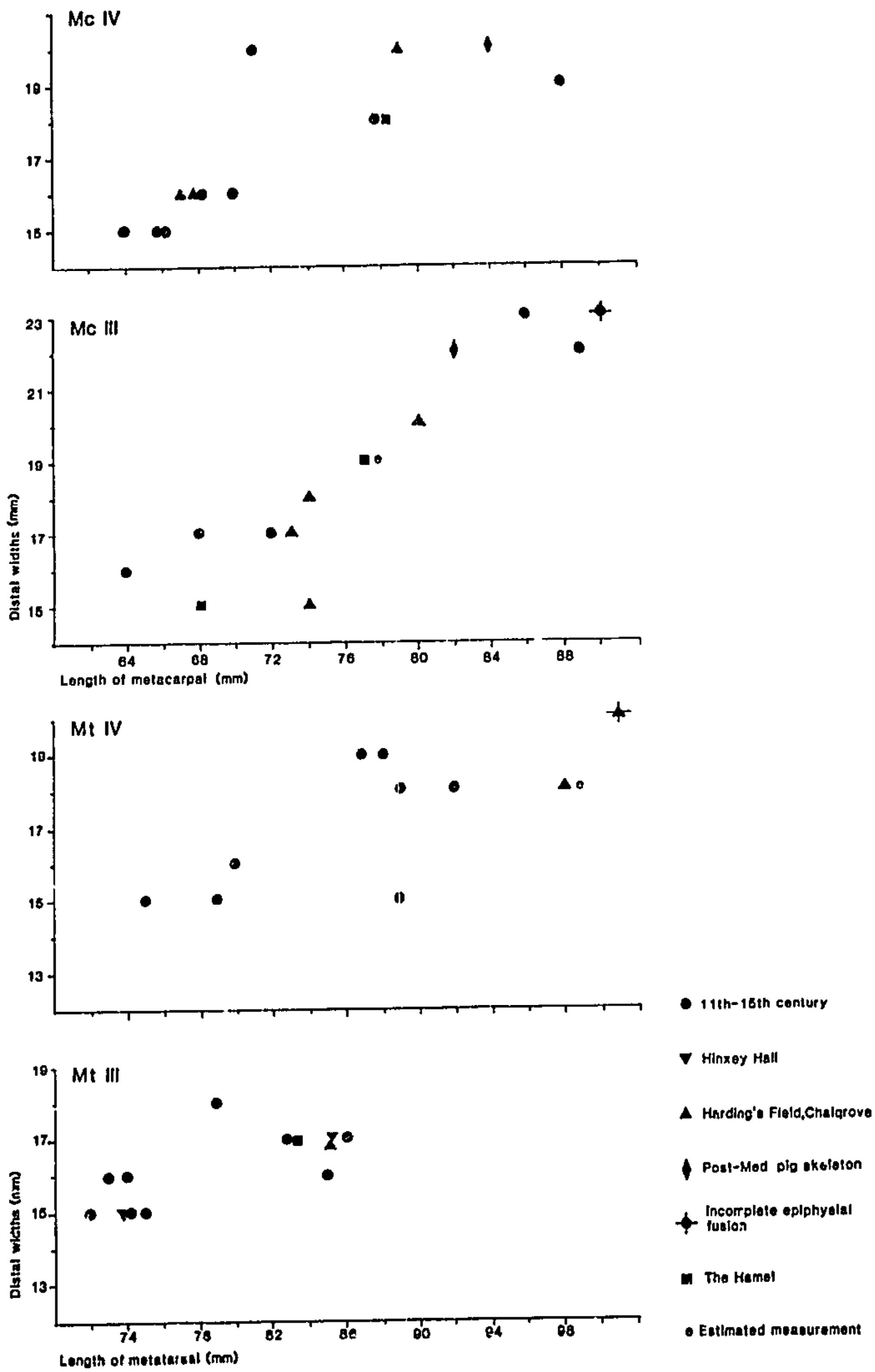


Table 36 Measurements of bones of other species (mm)

**Horse**

| | | length GL | dw |
|---|---|---|---|
| humerus | OXA11 | 275 | 77 |
| | OXA13 | 268 | 77 |
| radius | OXA11 | 321,321 | 73 |
| | OXA13 | 321e | 70 |
| metacarpal | OXA12 | 217e | |
| femur | OXA12 | 395e | |
| tibia | OXA11 | 344 | 68 |
| metatarsal | OXA17 | 278 | 55 |

**Cat**

humerus length GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 2 | 87 | 87.0 | |
| OXA12 | 2 | 86-87 | 86.5 | |
| OXA13 | 2 | 84-86 | 85.0 | |
| OXA11 to 13 | 6 | 84-86 | 86.17 | |
| OXA18&19 | 2 | 88-89 | 88.5 | |
| OXA US | 3 | 92-93 | 92.3 | |

femur length GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA13 | 1 | | 89.0 | |
| OXA14 | 2 | 89-90 | 89.5 | |

tibia length GL

| | n | r | x | s |
|---|---|---|---|---|
| OXA11 | 2 | 99-101 | 100.0 | |
| OXA12 | 1 | | 110.0 | |
| OXA13 | 1 | | 106.0 | |
| OXA14 | 1 | | 94 | |
| OXA11 to 14 | 5 | 94-110 | 102.0 | (6.20) |

**Ferret/polecat skeletons A F17**

| OXA17 | a GL | b GL |
|---|---|---|
| humerus | 46,46 | 41,41 |
| femur | 49,49 | 44,45 |
| tibia | 53 | 47 |
| ulna | 44,44 | 39 |

**Red deer**

| | | length GL | dw |
|---|---|---|---|
| humerus | OXA US | | 57 |
| metacarpal | OXA13 | 244 | 37 |
| | OXA13 | | 38 |

**Fallow deer**

| | | | |
|---|---|---|---|
| calcaneum | OXA17 | 75 | |
| tibia | OXA16 | | 32 |

**Dog**

| | | GL | dw |
|---|---|---|---|
| humerus | OXA13 | 174 | 33 |
| | OXA19 | - | 19 |
| tibia | OXA15 | 164 | |

**Fox skeletons A F1540**

| $M_1$ (ma) length | n | r | x |
|---|---|---|---|
| OXA F1540 | 8 | 14.3-16.1 | 15.2 |
| BER WC | 6 | 14.0-15.0 | 14.7 |
| **Fe(GL)** | | | |
| OXA F1540 | 7 | 120-133 | 126.7 |
| BER WC | 4 | 122-133 | 129.0 |
| **Ti(GL)** | | | |
| OXA F1540 | 7 | 131-147 | 138.0 |
| BER WC | 2 | 136-138 | 137.0 |

**Rabbit**

humerus length

| | n | r | x | s |
|---|---|---|---|---|
| OXA15 to 18 | 5 | 58-62 | 60.20 | (1.48) |

femur length

| | n | r | x |
|---|---|---|---|
| OXA17 & 18 | 4 | 78-81 | 79.5 |

**Hare**

| | |
|---|---|
| | femur length |
| OXA13 | 126 |
| | humerus length |
| OXA17 | 91 |

**Black Rat**

femur length

| | n | r | x |
|---|---|---|---|
| OXA18 | 4 | 32-35 | 32.8 |

**Hedgehog skeleton A F1535**

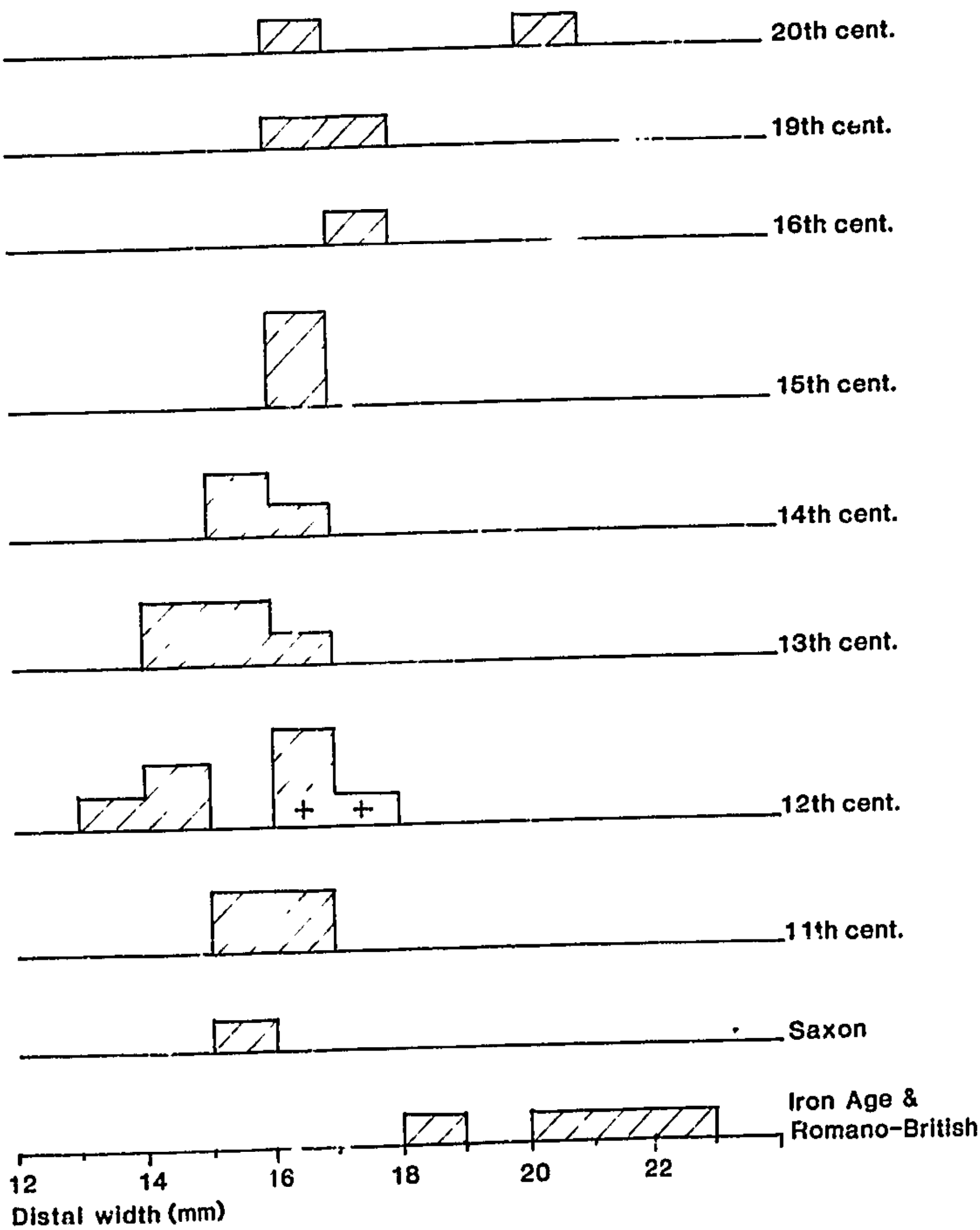
| OXA14 | |
|---|---|
| humerus | 42,43 |
| femur | 41,41 |
| tibia | 49,49 |

**Roe deer**

| | | | dW |
|---|---|---|---|
| humerus | OXA11 | | 23 |
| radius | OXA11 | 160[a],151[a] | 22[a],22[a] also 24 |
| | OXA12 | | 25 |
| metatarsal | OXA11 | 180[a] | 20[a] |
| | OXA12 | 179[a] | 21[a] |
| | OXA13 | 193 | 25 |

a,b Separate individuals

Fig.220 Width measurements of the distal humerus of cat.



Mean length measurements of cat and rabbit bones appear slightly smaller than means from a few measurements at Chalgrove but slightly larger than a further few 12th-century bones at Middleton Stoney.[1]

Size of wild species Comparisons of rare measureable elements are not easy to make. Measurements of two red deer metacarpals are small compared to those of Roman and earlier periods and one smaller than some at 12th-century Middleton Stoney. So was a 13th-century distal tibia from the Hamel measuring 43mm. However a less well dated medieval humerus of red deer from A F1028 is from a larger individual.[2]

Measurements of fallow appear comparable to those made elsewhere for the medieval period. Those of roe may be similar or smaller than those of earlier periods.

Continued on Fiche VI

1. R. Wilson, Harding's Field, Chalgrove, held by O.A.U, Fiche Table 31; B. Levitan, in Middleton Stoney (1984), Table 5: 13/18.

2. B. Noddle, 'The size of red deer in Britain - past and present - with some reference to fallow deer', in Archaeological aspects of woodland ecology, ed. M. Bell & S. Limbrey (BAR International Ser. 146, 1982), Tables 4 & 6; R. Wilson in Barton Court Farm, Abingdon (CBA Res. Report 50 1986 ), Fiche table 25; Levitan in Middleton Stoney (1984), Table 5: 13/19; & R. Wilson, unpublished datum from The Hamel, Oxford.

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Photocopies of the microfiche can be obtained from the Oxford Archaeological Unit, 46 Hythe Bridge Street, Oxford, OX1 2EP.

LEVEL III REPORT ON THE MEDIEVAL ANIMAL BONES AND MARINE SHELLS FROM CHURCH STREET (SITE A) by BOB WILSON WITH ALISON LOCKER

## Section Headings of Fiche V (con.)



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## List Tables for the Church Street report



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## List of Figures for the Church Street report



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