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Summary

A bone deposit overlying a stone cairn covering the main burial contained the remains of approximately 185 cattle skulls (including one aurochs skull), and a much smaller number of mandibles, scapulae and pelves. Very few other cattle bones or bones of other animals were found. (Four 14C dates, two from aurochs teeth and two from domestic cattle teeth, cluster around 3800 bp). Most of the cattle were young adults. The relative scarcity of premolars suggests that the skulls were deposited on the cairn some time after death. Cattle skulls probably played an important role in ancient British ritual although there is only one other case similar to the one described here known in the archaeological literature. An interesting ethnographic parallel is found today in Madagascar where the skull serves as an emblem of virility and power.

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INTRODUCTION

In the 1960s David Hall discovered a barrow at Irthlingborough, Northamptonshire, on an island in the river Nene, one kilometre west of the modern village of Stanwick. This barrow was excavated in 1986 under the supervision of Claire Halpin of the Central Excavation Unit (Historic Buildings and Monuments Commission for England; see Halpin, 1987). It has been dated to the Beaker period (Early Bronze Age; c. 2100 - 1700 bc).

Excavation of the entire barrow revealed a limestone cairn below which was the skeleton of an adult man (Primary Beaker burial 30426; Henderson, 1988). The associated grave goods are of an unusually fine quality which indicates that this man was probably of very high rank. The cairn was covered by a deposit at least 1 metre thick and extending over an area of approximately 9 square metres containing abundant cattle teeth and bone fragments (see fig. 1)*.

A preliminary examination of the faunal remains from this deposit indicated that they include the remains of approximately 185 cattle skulls, and a much smaller number of mandibles, scapulae and pelves, and an aurochs skull. Very few limb bones or bones of any other animal are present. Teeth are generally well preserved but bones are in very poor condition. The extraordinary nature of this assemblage, presumably evidence of some kind of ritual associated with the death of the man, called for special methods.

Objectives. This study has several aims: to identify the status - domestic or wild - of the cattle; to determine their sex and age at slaughter; to ascertain how many different parts of the skeleton from how many animals were originally deposited; to try and understand the manner in which parts of the animal were placed over the cairn in antiquity; to ascertain the length of time during which the remains were assembled and finally, to speculate upon the meaning of this unusual assemblage of cattle remains at Irthlingborough.

METHODS (see also Davis, in prep.)

Retrieval of bone in the field. When exposed during excavation, each bone or group of teeth was assigned an AOR (Archaeological Object Record) number. Its position was recorded three dimensionally using a "Nikon DR1 Electronic Distancemeter". It was then lifted from the soil and bagged - an operation supervised by Mr. Roger Jones of the Ancient Monuments laboratory. The concentration of finds was so dense that little residual soil remained after specimens had been lifted (Jones pers. comm.); the residual soil was not sieved. Initial examination, washing and re-packing of the faunal remains was undertaken by Mrs. Alison Locker.

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* The faunal remains from Irthlingborough are packed in 37 boxes and will be housed in the Northamptonshire county museum.

State of preservation. Since much of the bone was poorly preserved, many of the teeth had broken out of their jaws and hence are isolated. However, most teeth have fared quite well - especially their enamel. But some teeth have lost part or all of their dentine making the remaining enamel structure very fragile. Some of these dentine-less teeth have collapsed, probably during or after excavation, leaving numerous strips of enamel. None of the bones at Irthlingborough is charred.

Identification and Counting. Many of the teeth are isolated. Isolated upper molars are not always easy to distinguish from one another. M^3s are usually, though not always, differentiated from M^1s and M^2s a) by the presence of a keel up the posterior-external corner of the tooth, b) by the absence of an interdental wear facet on the posterior face of the crown and c) by the very wide posterior root (fig. 2). M^1s and M^2s are more difficult to separate from one another, but usually the width of the posterior root, wider in M^2 than M^1 (fig. 2), is helpful. Many isolated molars, especially the damaged ones, could not be assigned their position in the jaw and had to be recorded as "$M^{1/2}$" or just "upper molar". Some of the isolated teeth had completely collapsed as a result of dentine loss: their numbers were estimated by counting the bovine pillars (fewer than 5% of the teeth were affected in this way). All identifiable bones and teeth are recorded in table 1.

Double counting of an element was avoided by only recording cases in which 50% or more of the element in question was present. For a tooth this requires the presence of 50% or more of the crown, for the scapula 50% or more of the glenoid. (See also Davis, in prep.)

Measurements. Bones were measured in the manner suggested by von den Driesch (1976). Both the antero-posterior length of the lower third molar tooth and the external-internal (i.e. bucco-lingual) width of its anterior pillar were measured.

Measurements of cattle upper teeth are not described by von den Driesch and these teeth are rarely measured by zoo-archaeologists. At Irthlingborough upper teeth have been measured since they are much more common than lower ones. Upper teeth presented a problem since they vary considerably in width (more so than lower teeth) from occlusal surface to root. Measurements taken across the occlusal surface therefore vary with the animal's age at death. In order to obtain an age-independent estimate of size the crown-base circumference* (fig 3) was measured. Using this procedure it was possible to measure approximately 20% of the dp^4s and upper molars. (Many teeth had no roots or were badly damaged. Their circumferences could not therefore be measured.)

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* Starting at point "a", the corner between the anterior and external sides of the tooth where the enamel of the crown meets the root (fig 3) a thread was wrapped around the base of the crown approximately perpendicular to the tooth's root-occlusal axis (as indicated by the points arrowed in fig. 3) and marked where it overlapped, allowing the circumference to be measured to the nearest millimetre.

Ageing. Relative age estimates were obtained by measuring crown height and noting wear stage:

a) Crown height. Bovids, like most grass eating mammals, have high crowned teeth. The crown gradually wears away in the course of the animal's life: the older the animal, the shorter the crown. At Irthlingborough, the crown heights of dP^4, P^4, M^1, M^2 and M^3 and M_3 were measured to the nearest 0.1 mm up the external (buccal) surface from the occlusal edge to the crown-root junction as shown in figure 4.

b) Wear stage. The pattern on the occlusal surface of a bovid tooth changes as wear proceeds. Each dP^4, P^4, M^1, M^2 and M^3 was assigned to a wear stage similar in principle to the wear stages described in Payne (1987) for sheep and goat mandibular cheek teeth (figure 5). Mandibular teeth were assigned to the wear stages suggested by Grant (1982).

DESCRIPTION

Observations during excavation. Jones (pers. comm.) noted that some complete skulls had been present during the excavation but that these subsequently broke up due to poor preservation. He also noted that maxillary teeth were generally pointing into the ground (i.e. with their occlusal surfaces facing down) indicating that skulls had been incorporated into the assemblage "the right way up". Skulls and tooth rows were not facing in any particular direction.

Species and numbers present (table 1)*. Most of the bones and teeth found at Irthlingborough belonged to cattle which, on the basis of their small size, were undoubtedly domestic (figs. 6 and 7). (Like many domesticated animals, bones and teeth of domestic cattle are smaller than those of their wild ancestor the aurochs.) At least 185 domestic cattle are represented (see over). A few bones and teeth of other animals are also included as follows:

Five very large cattle teeth, a left M^1, one left and one right M^2, and one left and one right M^3, all came from within one metre of each other (figure 1 and plate). Their circumferences (table 2) are much greater than those of the rest of the Irthlingborough cattle teeth: note the wide separation shown in figure 6. There can be little doubt that these larger teeth belonged to the aurochs or wild cattle, *Bos primigenius*. Near these five teeth, a fragment of a large horn core was found. It is too large to belong to domestic cattle and is very similar to the horn core of a fossilised but undated male aurochs skull from Lincolnshire in the AM laboratory collection (AML no. 756). The five aurochs teeth and the horn core fragment may derive from the same skull.

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* Since most of the soil from the bone deposit was not sieved it is not possible to determine whether certain teeth had been missed by the excavators. A small sample from the grave infill (context 30467) was sieved; it included an unerupted cattle P^4 (not included in the tables and figure).

Measurements of the scapulae (table 5, fig 10) also reveal two specimens - numbers 34258 and 34977 (left and right sides respectively) - which on account of their large size may have belonged to an aurochs. The aurochs survived in Britain at least until the Late Bronze Age: Clutton-Brock and Burleigh (1983) dated aurochs remains from Somerset to circa 1300 bc. Caesar made no mention of this beast in England and blame for its demise must lie with the native Britons (Owen, 1846:503)

Six teeth and two limb bones belonged to a small equid. The protocone of an $M^{1/2}$ is elongated (the other upper teeth are damaged), and on an $M_{1/2}$ the internal (lingual) fold is "U" shaped and the external (buccal) fold partially penetrates between ento- and meta-flexids. These are caballine (i.e., horse/pony) characters.

A few teeth and bones of a caprine (sheep or goat), a pig, and a single palate of a canid (probably dog), are also present.

Thus, apart from the domestic cattle, at least three pigs, two sheep/goat, a single aurochs, a single canid and a single equid are represented in the Irthlingborough assemblage.

Distribution of elements across the barrow (see fig. 1). Distributions of cattle left upper M^3s, right and left lower M_3s, right and left ischia (the ischium is part of the pelvis) and right and left scapulae across the site indicate that these form a single cluster around the grave within which the bones are scattered at random.

Parts of the anatomy* (see table 1 and fig. 8). It is clear that cattle skulls, mandibles, scapulae and pelves are most common almost to the exclusion of the rest of the skeleton. A few vertebrae are also present but limb bones are conspicuously rare. The cattle limb bones and 13 rib fragments may have originated from other sources and are presumably not part of the ritual assemblage (i.e. the skull and girdle complex) at Irthlingborough. An approximate estimate (rounded to the nearest five) of the smallest number of individual cattle from which the bones are derived is as follows:

skulls	from	185**	individuals
mandibles	from	40	"
scapulae	from	35	"
pelves	from	15	"

Table 1 also shows that incisors are rare (only one was found, there should have been approximately 320; i.e. 8 X 40) and premolars are less common than expected (for example there are 1100 upper molars but only 480 deciduous and permanent upper premolars when there should have been at least 1100).

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* Estimates of the numbers of different parts of the anatomy, particularly the more fragile and smaller ones may be somewhat biassed due to a) the poor preservation of faunal remains and b) the fact that residual soil was not sieved during excavation.

** Computed from the total of 1100 upper molars (table 1) divided by 6.

The sheep/goat, pig and equid remains comprise a random selection of different parts of their skeletons. There does not seem to have been any deliberate selection of any one particular part of the body in the case of these three animals and like the few cattle limb bones and rib fragments they are probably not part of the ritual assemblage.

Age at death of the cattle. Table 3 gives the numbers of cattle maxillary teeth in each successive wear stage. Figure 9 shows the plots of the crown heights of these same teeth. (Table 4 provides the wear stages of the mandibular teeth and M_3 measurements.) The plots of crown height show a progressive decline in numbers with crown height (i.e., age) and suggest that most of the teeth belonged to young adults. Calves are rare: for example only one of the dP^4s is in wear stages 0-9. None of the M^1s is in wear stages 0-6. These are approximately equivalent to Andrews' (1982)* eruption stages 0-7 which, for the M^1, he suggests include individuals aged between birth and c. 373 days old, i.e., calves. Similarly for M^2, Andrews' stages 0-6 are roughly equivalent to stages 0-7 in this study. Andrews gives a mean age of c. 636 days (or 1.75 years) for the beginning of his stage 7. This would mean that most of the 34 Irthlingborough M^2s in stages 0-6 came from cattle which were probably slaughtered during their second year of life. The remaining 228 M^2s came from cattle aged 1.5 years or more. Teeth from very old individuals are absent from the sample: none of the permanent teeth are very worn.

Despite careful measuring of crown heights and the unusually large sample size, there is no clear evidence for grouping of teeth (neither upper teeth nor M_3s) into a series of discrete "cohorts" (or peaks in the crown-height plots) each with a progressively smaller crown height due to slaughtering at one time of the year. The reason may simply be that the individual crowns of cattle teeth vary too much - observe the amount of variation of crown height of unworn P^4s (shown cross-hatched) in fig. 9. Any "peak and trough" effect due to seasonal slaughter would be masked by the large amount of random variation. The recognition of discrete age cohorts would also require that Bronze Age cows gave birth during a short season (for example in spring) - something which does not happen today and probably did not happen in the early nineteenth century AD**. The detection of seasonal culling practices by measuring tooth crown heights is probably only possible for deciduous teeth. And even then reliability has yet to be tested using modern specimens of known age. The dP^4 measurements at Irthlingborough unfortunately do not (in the absence of modern known-age comparative data) provide an interpretable picture. (A single dP^4 with a crown height of 16-17 mm probably belonged to a calf.)

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* Andrews' data refer to modern breeds of cattle and may therefore not be entirely appropriate when comparing them with Bronze Age cattle but nonetheless are, in the light of Payne's (1984) findings, preferred to the data for nineteenth century cattle published by Silver (1969).

** Burke (1834:II p.441) recommends that when meant for stock, cows should be managed "as to calve down by the middle of the month of May at the farthest; as late calves will not be sufficiently grown to hardily stand the winter, and the earlier they are dropped in the spring the better will they be able to meet the inclemency of the season."

Cut and burn marks. Several scapulae and basi-occipitals have fine cut marks probably made by a sharp instrument during the removal of flesh. Unfortunately most of the bone was so poorly preserved that it is not possible to determine how widespread these marks were on other bones. None of the teeth show any signs of intentional damage post-mortem. None of the bones or teeth show any signs of burning.

Sex. Biometrical data are sometimes useful in discerning the sexual composition of a sample since the sexes generally differ in size: in most mammals males are slightly larger than females. Therefore, the Coefficient of Variation (CV) of a single-sex sample will be lower than the CV of a sample containing both sexes. This can be observed in the table below which gives the coefficients calculated from the M_3 lengths of sexed aurochs skeletons from Denmark published by Degerbøl and Fredskild (1970):

	Irthlingborough	aurochs from Denmark		
		males only	females only	both sexes
M_3 length	4.6 *(n=55)*	4.9 *(n=24)*	4.8 *(n=11)*	6.5 *(n=48)*

This measurement is independent of age and a CV as low as 4.6 suggests, if tentatively, that the Irthlingborough cattle were all of the same sex.

Ten pubes are well preserved and are roughly square in cross-section (i.e. robust). A pubis with this shape is probably male and therefore the cattle pubes from Irthlingborough probably derive from young bulls rather than cows. This raises the interesting possibility that only bulls were killed at Irthlingborough.

Date. Two cattle and two aurochs M^2s were submitted to the Oxford Radiocarbon Accelerator for ^{14}C dating. The results are as follows:

Specimen AOR number and identification	OxA number	Uncalibrated radiocarbon age using 5568 half-life	Calibrated age range (68% confidence)
34628 cattle right M^2	2084	3610 +/- 110 bp	2180 - 1780 BC
35082 cattle right M^2	2087	3810 +/- 80 bp	2460 - 2140 BC
34873 aurochs left M^2	2086	3810 +/- 80 bp	2460 - 2140 BC
34873 aurochs right M^2	2085	4040 +/- 80 bp	2860 - 2470 BC

These dates agree with the cultural assignation of the barrow to the Early Bronze Age. The time span is rather wide, but not enough to question the derivation of these teeth from the same archaeological context (Haddon-Reece, pers. comm.).

DISCUSSION

An archaeological site containing skulls of some 185 cattle, and mandibles, scapulae and pelvic girdles from some 15-40 cattle and few other parts of the skeleton is a rare if not unique occurrence. It poses a number of questions. What was the sequence of events which led to the deposit of this unusual assemblage? Are there other known examples in ancient Britain? Did cattle and cattle skulls have some religious significance? Can parallels be found today? Answers to some of these questions call for some speculation.

What do the bones represent? In general animal bones found in an archaeological site and presumed to be butchery or kitchen waste are derived from most parts of the skeleton - including the limb bones, ribs and girdle elements. Skull fragments are represented but are no commoner than other parts of the skeleton. An interesting ceremonial use of cattle is the so-called 'hide and hooves' burials - reported at several Neolithic and Beaker barrows such as Tilshead Lodge, Fussell's Lodge and Hemp Knoll - where the dead person and the feet and sometimes the head of a cow were found associated (Grigson, 1984). Irthlingborough, however, is quite different. With the kind of frequencies of bones at Irthlingborough, and their provenance over the cairn, there can be little doubt that they were put there as part of a ritual associated with the dead man. It is possible that the cattle skulls represent tribute brought by members of the dead man's tribe (and perhaps even by members of neighbouring tribes) on the occasion of his death. Can we interpret the assemblage any further than this?

Most of the cattle at Irthlingborough were prime adults when slaughtered, few (perhaps only one) calves and no very old individuals are represented. They were not retired dairy cows or stud bulls. Did the skulls at Irthlingborough derive from animals slaughtered primarily for meat - the prime beef cattle? Were they slaughtered in the usual course of events - their skulls being set aside prior to the death of the buried man, or were they especially slaughtered for this occasion?

The suggestion that skulls were brought to the funeral as tokens may be over-simplified. The presence of a significant number of limb-girdles (scapulae and pelves) but no limb bones is most puzzling. Even more strange is the similarity between the numbers of mandibles and scapulae. One explanation might be that the Irthlingborough assemblage includes the remains of tributes from peoples who had slightly different customs. For example most of those attending the ceremony might have done so with skulls only, but some 35 or so might have brought girdle bones too. Another possibility is that 150 (i.e., 185 - 35) skulls were token tributes from people living far from Irthlingborough, and 35 skulls plus girdles derive from 35 animals slaughtered and consumed at Irthlingborough during construction of the cairn and/or at the funeral of the dead man. (But what became of the rest of the skeletons and why put only the girdle bones on the cairn?)

What of the original state of the skulls? Do the unequal numbers of teeth (there are far fewer premolars and only one incisor was found) reveal anything about the state of the skulls when laid upon the cairn? Poor recovery during excavation may have contributed to this disparity. However it is so great that other factors were probably responsible and may be relevant to the question of how the assemblage was formed in antiquity. Following death and as putrefaction sets in, bovid incisors and premolars with their tapering

roots tend to fall out easily compared to the molars which remain "locked" in their sockets. Could this loss of incisors and premolars have occurred during a delay between slaughter and final incorporation of the skulls/mandibles into the Irthlingborough barrow? A delay might have to be of the order of a month or more to allow time for the flesh to rot and teeth to drop. A mechanical factor might also have helped. A long journey may have provided the time for these skulls to rot and jolting may have promoted loss of teeth. In sum then, I speculate that many or all of the cattle skulls were placed on the cairn a) as skulls without flesh and b) some time after slaughter (perhaps, in some cases from far away) to allow time for incisors and premolars to fall. The possibility that defleshed and dry skulls were placed over the cairn may be of some significance as I shall discuss later.

The cut marks were presumably made while flesh was removed from the bone and imply that beef was consumed before cattle skulls were placed on the cairn. In other words we are not dealing with the sacrifice of joints of meat "on the bone" as was often practised in the classical world to provide the soul with nourishment on its journey into the next world or as a gift to the gods. I suggest that the skulls and limb girdles were devoid of flesh when laid upon the cairn.

The resulting quantity of beef conjures up images of orgiastic feasting on the banks of the Nene. 185 cattle could have provided at least 40,000 kgs (= approximately 40 tons) of meat, which on a ration of 1 kg per person per day equals 40,000 man days. Put another way, 500 people could have been sustained for 2.5 months. Darvill (1987:94) quotes some estimates of the labour requirements for several well known English prehistoric earthworks. For example Devil's Quoits henge in Oxfordshire is over 110 metres diameter and may have required over 1,000 man days to construct. Durrington Walls in Wiltshire covers 30 acres and may have required some 37,000 man days to construct. These two sites are certainly much larger than the barrow at Irthlingborough suggesting that 184 cattle were more than would have been required during its construction. Was the beef cut up in Irthlingborough and distributed to the thousands who attended the funeral? Did the beef supply a smaller work-party during construction of the barrow and ditches over a period of several months? Or were many of the cattle slaughtered in different places and only the skulls brought as tribute? Some kind of large scale feasting at Irthlingborough does seem to be a strong possibility.

For how long could the defleshed skulls have lain exposed to weathering in antiquity before becoming covered? While the bone is poorly preserved, most of the teeth are in good condition and show little sign of the kinds of shattering damage that can result from exposure to frost and temperature change for a few years. The enamel is generally complete. Instances in which a tooth is poorly preserved are the result of dentine loss - probably through leaching within the soil. In many of these cases enamel probably collapsed during and after excavation. Thus it would seem that both dentine and bone from the skulls have been leached in the same manner within the soil (i.e., following their burial). According to Balaam (pers. comm.) Irthlingborough barrow was probably waterlogged intermittently and for much of its existence by rising and falling of the water table in the Nene valley. The unweathered nature of the teeth (many are in pristine condition) suggests that in antiquity these skulls were not exposed to the elements for more than a few years at most. They were presumably covered with earth fairly rapidly. If this hypothesis is correct then the accumulation of skulls at Irthlingborough may have been formed within a year or two rather than several decades or centuries. The funeral of the important person and laying of skulls over his cairn may well have been a ceremony of relatively short duration.

The ^{14}C dates indicate that the aurochs skull was derived from an individual which was probably a contemporary of the other cattle and may, therefore, have been hunted by the people who attended the funeral. The presence of an aurochs may be of some significance. Perhaps this animal, the largest terrestrial quadruped known to ancient Britons, signified great strength and hence the great power of the buried person.

Jones' observation that the occlusal surfaces of the cattle maxillary teeth faced downwards indicates that the skulls had been placed the right-way-up and on the ground in antiquity (rather than, say, on the ends of poles). Since the area of the cairn was 9 square metres and given the size of a cattle skull (c.30 X 50 cm), these 200 skulls must originally have been stacked on top of one another in three or four tiers.

Have assemblages like the one here at Irthlingborough been reported elsewhere in Britain? It is unfortunate that many prehistoric barrows were "opened" in the 18th and 19th centuries when little or no attention was paid to animal bones and teeth. We shall probably never know how common the practise of cattle-skull tribute was in ancient Britain. There is only one similar occurrence of this kind referred to in the literature* and it comes from Harrow Hill - an Iron Age hill fort in west Sussex excavated in 1936 by Holleyman. On page 250 of his report Holleyman (1937) wrote:

> "Although there was a paucity of occupation material, animal bone was abundant and, with few exceptions, represented only the heads of what Dr. Wilfrid Jackson has identified as a species of Early Iron Age ox. Hardly a limb-bone was found, yet the skulls, represented principally by mandibles and teeth, must number between fifty and one hundred from our small cuttings alone. This would mean, at a very conservative estimate, that the whole earthwork must contain remains of well over a thousand heads. Dr. Jackson knows of no analogous example, and at present we can do no more than record the strange fact."

Here in Sussex is another example of a cattle head/skull accumulation perhaps similar to Irthlingborough. (The fact that Holleyman only dug several test pits lends some doubt as to the precise cultural assignation of the cattle skulls at Harrow Hill.) Jackson never published a report on these "ox skulls" (Holleyman pers. comm.). Further hints that cattle skulls may have had some significance in ancient English mortuary practises comes from Bateman's (1861: 128-130) account of barrows "opened by Mr. Carrington in 1849". Bateman reported the careful interment of part of the head of an ox, an occurrence which he had discovered on several earlier occasions. He also mentions the presence of the upper jaw of an ox which was "...the fifth instance, of the intentional burial of the whole or part of the head of the ox", and which according to Bateman "goes far to prove the existence of some peculiar superstition or rite, of which no notice has reached modern times." 'Hide and hooves' burials cited above (Grigson, 1984) are further evidence for special treatment of the skull. These finds suggest then that cattle heads/skulls were especially revered in ancient Britain.

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* I am grateful to Caroline Grigson for drawing my attention to this reference.

If indeed the suggestion that skulls rather than heads with their flesh intact were placed over the cairn is correct, then Irthlingborough differs from Hellenistic sacrificial deposits such as the one at Halikarnassos (southwestern Turkey; Hojlund, 1981). Here whole joints of meat and/or quarters of animals (several species) were sacrificed. My own understanding of the classical sources does not provide any examples of a parallel between Irthlingborough on the one hand and the classical world on the other. Irthlingborough cannot have been a Hekatomb in which joints (i.e. meat) from large numbers of animals were placed over the grave of the dead person. The ancient Greek emphasis was upon the flesh and blood of the animals being sacrificed and I could find no described instance in which only skulls of a single species were placed over a tomb.

What of other cultures? The ancient Sanskrit texts indicate that in Indo-Iranian times cattle sacrifice was fairly common, but Zarathustra's condemnation of it and the development of the doctrine of "ahimsa" in India led to a decline of this practice (Lincoln, 1981). The Biblical "Golden Calf" (Exodus, 32) may also reflect an earlier reverence paid to cattle in the Near East. One may wonder, too, whether the public slaughter of bulls in modern Spain has something to do with prehistoric practises in Britain.

Whereas a search of the archaeological and classical literature did not reveal much that could shed light upon the meaning of Irthlingborough, modern ethnographic accounts of death and mortuary rites provide a little that is of possible relevance and might help us to understand the Irthlingborough faunal assemblage. Where are large numbers of a single species of animal sacrificed at a funeral or second burial? Where are skulls deposited over a grave? What is the meaning of animal bones associated with a tomb? Some useful clues are to be found in the works of Hertz (1907), Bloch (1971), Huntington and Metcalf (1979) and Mack (1987).

People who perform elaborate funeral rites involving large numbers of cattle are to be found in Madagascar*. Among many Malagash peoples great reverence is paid to their ancestors - dead and living form a single society in constant contact. The body of the deceased is first placed in a temporary burial place. A period of waiting ensues before a second burial can take place. An important distinction is made between, on the one hand, a putrefying corpse in which the bones are still "wet" and, on the other hand, the end product of putrefaction i.e. the dry bones. This period may vary from several months to as much as 10 years - on average 2 years. During reburial, known as "Famadihana", bones of the deceased are examined and re-wrapped in a special shroud. This is accompanied by a feast. Reburial cannot take place until the corpse has completely decomposed and only the dry bones remain. An evil power, linked with the smells of putrefaction, is thought to reside in the corpse. Hence as desiccation of the bones progresses, so the deceased is freed from this evil. Its soul is then deemed worthy of admittance to the company of its ancestors. But in the intermediate period it wanders incessantly waiting for the feast which will put an end to its restlessness (Hertz, 1907).

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* I have not found references to this kind of practice in other parts of the world, except passing mention of 200 buffaloes slaughtered in the case of a chief of the Batak of Pertibi (Von Rosenberg, 1878). This is in Indonesia, a region whence the Malagash originated.

While not necessarily the main source of sustenance, cattle reflect status and wealth. Cattle play an important role in the burial and re-burial of the dead (see for example Mack, 1986). A second burial may last several days or even a whole month and may be accompanied by elaborate preparations and very great expense, often reducing the family of the deceased to poverty. Many cattle are sacrificed and eaten in banquets that often develop into huge orgies. In parts of southern Madagascar (for example among the Antandroy) Famadihana is not practised: the dried human bones cannot be seen. Instead cattle skulls - symbolising the desiccation of the human skeleton - are placed over the tomb or on some high place nearby such as up a tree or on a cenotaph. These are the skulls of cattle sacrificed during the funeral and of course their numbers reflect the status of the deceased. The skull serves as an emblem of the virility and power whose increase is implied in the act of sacrifice. For these reasons skulls are often displayed at funerals (Mack, pers. comm.).

While drawing parallels between the culture of modern Madagascar and Bronze Age England is extremely speculative, there may be a lesson in the contrast between the composition of the faunal assemblage at Irthlingborough and the usual English Bronze Age faunal assemblages with their predominance of sheep and pigs as well as cattle. Perhaps, as they are today in Madagascar, cattle in Bronze Age England were valued as status symbols and were kept mainly to serve in funerary rites. The great accumulation of cattle skulls and the aurochs above the cairn of the dead man at Irthlingborough may be a reflection of the power he was able to wield during his life.

CONCLUSIONS and SUMMARY

The faunal remains at Irthlingborough Barrow 1 derive from approximately 185 domestic cattle skulls and one aurochs skull. Cattle mandibles derive from c.40 individuals and scapulae and pelves derive from c.35 and 15 individuals respectively. Scapulae from a single aurochs may also be present. Bones belonging to other parts of the cattle skeleton and bones of other species are conspicuously rare. It is obvious that this faunal assemblage was deposited as part of a ritual associated with the man buried in the cairn.

The low variability of measurements of the lower third molar teeth suggests that the domestic cattle belonged to a single sex - perhaps male in view of the robustness of the few pubes that were found. Examination of tooth eruption and wear indicates that most of the cattle were young adults when slaughtered with few calves (probably only one) and few old animals. The relative paucity of premolars may reflect their loss before incorporation into the archaeological site. If this interpretation is correct, then skulls (rather than heads) were stacked on the cairn some time following removal of flesh (or simply following rotting). Skulls were found within a restricted area of 9 square metres and their maxillary teeth were facing downwards. Skulls must therefore have been stacked "the right way up" in several tiers above the cairn. The good preservation of many of the teeth and absence of frost-induced shattering on the enamel suggests that the Irthlingborough skulls were not exposed to weathering for very long. It is therefore possible that this accumulation of skulls was made during a relatively short period

(perhaps less than one year?) while the cairn was being built and the man buried. Some of the skulls may have derived from cattle slaughtered in order to sustain the gang of workmen during construction of the barrow or to feed the people attending the funeral, while the majority of skulls were possibly brought to the funeral as tokens. This reconstruction of events at Irthlingborough (my own preferred one) is, however, one of several likely ones.

Only one other possibly similar instance of an accumulation of cattle skulls has been reported in England, although cattle skulls appear to have had an important ritual significance in ancient English mortuary practises. The closest analogy today is to be found in parts of southern Madagascar where cattle skulls are placed over or near the tomb and their desiccation symbolises that of the bones of the deceased person. Cattle in Madagascar as in many other societies are a symbol of wealth and the skull symbolises virility and power. The large number of cattle skulls at Irthlingborough probably reflects the great power which the buried man - perhaps chief of an important tribe - was able to wield in life, an interpretation certainly borne out by the quality of the grave goods.

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Table 1.

Numbers of bones and teeth found at Irthlingborough barrow. SH/G refers to sheep/goat. Teeth in parentheses are those observed below jaw ramus i.e. unerupted. These are only minimum counts since an unknown proportion of teeth in the main count were probably also unerupted. UM and LM refer to counts of upper and lower molars whose precise identification within the tooth row could not be ascertained. L and R refer to the left and right side of the animal. Those parts of the skeleton not listed were either absent from the assemblage or could not be identified. Note that at Irthlingborough more parts of the skeleton have been recorded than are recommended in Davis (in prep.) such as ilia, pubes, proximal metapodials, etc. A tooth, premaxilla, horn core base, petrosal, occipital condyle, vertebra, scapula (glenoid joint surface), limb bone (proximal or distal end), pelvic girdle element (acetabulum part) was only recorded if 50% or more of that bone/tooth was present. The rib fragments and the aurochs horn core fragment, however, represent less than 50% of the original bone.

Bone/tooth	CATTLE L	CATTLE R	AUROCHS L	AUROCHS R	HORSE L	HORSE R	SH/G L	SH/G R	PIG L	PIG R	Other species
Skull and mandible											
Premaxilla	17	27	-	-	-	-	-	-	-	-	
Maxillary tooth: dP^2	-	1	-	-	-	-	-	-	-	-	
" " P^2	6 (+6)	5 (+11)	-	-	-	-	-	-	-	-	
" " dP^3	11	14	-	-	-	-	-	-	-	-	
" " P^3	43 (+21)	49 (+25)	-	-	-	-	-	-	1	1	
" " dP^4	27	27	-	-	-	-	-	-	-	-	
" " P^4	95 (+26)	88 (+25)	-	-	-	-	-	-	2	-	
" " M^1	128	138	1	-	-	-	-	-	2	1	
" " M^2	148	162	1	1	1	-	-	-	2	1	
" " M^3	163	171	1	1	-	1	1	-	3	-	
" " $M^{1/2}$	46	50	-	-	-	1	-	-	-	-	
" " UM	22	52 20	-	-	1	-	1	-	-	-	
Horn core	50		1		-		-		-		
Petrosal bone	275		-		-		-		-		
Occipital condyle	144		-		-		-		-		
											?DOG parietal
											?DOG palate
Incisors	1		-		1		-		-		
Mandibular tooth: dP_2	?1	-	-	-	-	-	-	-	-	-	
" " P_2	1	4	-	-	-	-	-	-	-	-	
" " $P_{2/3}$	1	1	-	-	-	-	-	-	-	-	
" " dP_3	-	-	-	-	-	-	-	-	-	-	
" " P_3	9 (+3)	8 (+2)	-	-	-	-	-	-	-	-	
" " $dP_{3/4}$	-	1	-	-	-	-	-	-	-	-	
" " $P_{3/4}$	2	4 (+1)	-	-	-	-	-	-	-	-	
" " dP_4	2	5	-	-	-	-	-	-	-	-	
" " P_4	11 (+4)	15 (+2)	-	-	-	-	-	-	-	-	
" " M_1	25	30	-	-	-	-	-	-	-	-	
" " M_2	28	36	-	-	-	-	1	-	-	-	
" " M_3	30	33	-	-	-	-	1	2	-	-	
" " $M_{1/2}$	7 (+1)	10	-	-	-	1	1	1	-	-	
" " LM	1	(1)	-	-	-	-	-	-	-	-	
Mandible condyle	10	12	-	-	-	-	-	-	-	-	

table 1

Bone/tooth	CATTLE		AUROCHS		HORSE		SH/G		PIG		Other species
	L	R	L	R	L	R	L	R	L	R	
Vertebral column											
Atlas	7		-		-		-		-		
Axis	1		-		-		-		-		
Cervical vertebrae	14		-		-		-		-		
Thoracic vertebrae	6		-		-		-		-		
Lumbar vertebrae	10		-		-		-		-		
Sacra	3		-		-		-		-		
Forelimb girdle											
Scapula U	-	-	-	-	-	-	-	-	-	-	
" F	16	20	-	-	-	-	-	-	-	-	
" ?	16	13	-	-	-	-	-	-	-	-	
Forelimb											
Humerus proximal	-	-	-	-	-	-	-	-	-	-	
Humerus shaft frag	- 1	-	-	-	-	-	- 1	-	-	-	
" distal end F	2	1	-	-	-	-	-	-	-	-	
Radius prox F	1	-	-	-	-	-	-	1	-	-	
" distal end	-	-	-	-	-	-	-	-	-	-	
Ulna	-	-	-	-	-	-	-	-	-	-	
Carpals	-	-	-	-	-	-	-	-	-	-	
Metacarpal proximal	-	1	-	-	-	-	-	-	-	-	
" shaft	-	-	-	-	-	1 -	-	-	-	-	
" distal end	-	-	-	-	-	-	-	-	-	-	
Rib cage											
Rib fragments	13		-		-		-		-		
Hindlimb girdle											
Pubis	14	10	-	-	-	-	-	-	-	-	
Ischium	13	8	-	-	-	-	-	-	-	-	
Ilium	15	12	-	-	-	-	-	-	-	-	
Hindlimb											
Femur proximal	-	-	-	-	-	-	-	-	-	-	
" distal end F	1	-	-	-	-	-	-	-	-	-	
" " epiphysis U	-	-	-	-	-	-	-	-	1	-	
Tibia proximal end F	1	-	-	-	-	-	-	-	-	-	
" shaft fragment	- 2	-	-	-	-	-	-	-	-	-	
" distal end	-	-	-	-	-	-	-	-	-	-	
Fibula	-	-	-	-	-	-	-	-	-	-	
Astragalus	-	-	-	-	-	1	-	-	-	-	
Calcaneum	-	-	-	-	-	-	-	-	-	-	
Naviculo-cuboid	-	-	-	-	-	-	-	-	-	-	
Metatarsus proximal	1	-	-	-	-	-	-	-	-	-	
" shaft frag	- 1	-	-	-	-	-	-	-	-	-	
" distal end	-	-	-	-	-	-	-	-	-	-	
Phalanges											
Phalanx 1	-		-		-		-		-		
Phalanx 2	-		-		-		-		-		
Phalanx 3	1		-		-		-		-		

table 1 (continued)

Table 2

Wear stage, crown height and circumference (see figs 3-5) of domestic cattle and aurochs upper (maxillary) teeth from Irthlingborough.

Data for all 5 aurochs teeth are given but for the cattle only instances where 2 or more adjacent teeth (left side only) are present are given. "L/R" = left or right side, "-" = tooth present but too damaged to measure. Values in parentheses are approximate: in order to save space data for the left side only are given. The figures are based on both sides. Data for the right side and for isolated teeth are available upon request.

			WEAR STAGE					CROWN HEIGHT (mm)					CIRCUMFERENCE (mm)		
AOR No.	Box No.	L/R	dP^4	P^4	M^1	M^2	M^3	dP^4	P^4	M^1	M^2	M^3	M^1	M^2	M^3
34181	1	L	11A		10A	8A		11.1		27.4	36.8				
34148	1	L		0	11A	9A	3C		29.9	28.4	39.9	45.9			
34186	1	L			9A	3B	0			32.8	43.8				
34669	1	L		4A	11A	9A	9A		26.8	21.9	38.4	40.3	80	86	93
34599	1	L		4A	11A	11A	11A		29.1	13.1	24.7	28.0			
35047	2	L		1A	9A	9A	2A		32.2	31.1	39.6	43.3	76	84	89
34614	2	L		4A	10A	9A			26.8	25.8	35.8				
34614	2	L		3A	11A	11A	8A		27.5	21.6	30.7	34.7	75	81	90
34409	2	L				11A	10A				28.2	36.3			
34413	2	L			11A	9A	?			17.8	25.3	29.6			
34400	2	L	11A		9A	5A	0	7.9		31.0	39.8				
34391	2	L		1B	11A	9A	4A		29.7	23.6	34.4	41.6			
34415	2	L		4A	11A	9A	9A		27.6	16.6	28.1	36.8	72	79	85
34984	3	L	11A		9A	6C		8.0		31.9	38.6				
35141	3	L	11A		7B	0		11.2		33.0					
34523	3	L		4A	11A				24.0	16.7					
34571	3	L	11A		7B	4A	0	6.3		36.0	44.9				
34551	3	L		4A	11A				18.2	12.7					
34925	3	L			10A	5A	0			30.1	42.1				
34953	3	L		4A	11A				17.9	12.0					
34295	4	L			10A	5A	0			28.6	36.9				
34301	4	L		4A	11A	11A	9A		28.1	19.6	29.1	-			
34293	4	L		4A	11A	9A	9A		-	29.0	36.9	42.7			
34265	4	L			11A	11A				20.4	31.9				
34313	4	L		2A	11A				-	21.5					
34171	4	L		0	10A	9A	5A		30.9	24.5	33.4	39.1			
34170	4	L			?11A	9A	9A				30.3	30.6			
34174	4	L			11A	10A					26.2				
34144	4	L	11A		7B	0		10.2		35.4					
34317	5	L			10A	9A	8A			29.0	36.0	37.9			
34326	5	L		4A	11A	9A	6A		29.9	25.4	34.2	38.3			
34205	5	L			?	10A				27.2	28.7				
34330	5	L		4A	11A				23.7	25.6					
34198	5	L			11A	9A	9A			18.0	31.0	37.2			
34197	5	L			?11A	9A	8A			25.5	33.5	36.6			
34195	5	L		4A	?				23.0	13.6					
34178	5	L		4A	?	?	?		27.6	23.1	35.6	39.6			
34827	6	L	11A		10A	8A	0	8.6		30.0	40.3				
34897	6	L		U	9A	6D	0			21.8	39.2				
34218	7	L		?3B	11A	9A			26.1	24.5	33.4				

Table 2

			WEAR STAGE					CROWN HEIGHT (mm)					CIRCUMFERENCE (mm)		
AOR No.	Box No.	L/R	dP^4	P^4	M^1	M^2	M^3	dP^4	P^4	M^1	M^2	M^3	M^1	M^2	M^3
34217	7	L			11A	10A	9A			(17.5)	(30.3)	34.4			
34225	7	L				8A	0				36.1				
34210	7	L				10A	8A				29.0	36.4		87	90
34474	10	L				10A	9A				32.0	36.2			
34486	10	L		4A	11A	10A	8A		24.4	23.1	33.2	36.1	77	84	91
34483	10	L		4A	11A	11A	8A		22.7	18.1	27.4	32.0	78	81	87
34628	10	L		3B	11A	9A	8A		28.7	26.8	36.4	40.2			
35075	11	L				10A	9A				34.1	37.6			
35071	11	L			7B	0				32.8					
35067	11	L			11A	9A	8A			27.1	38.4	39.8	78	84	88
35078	11	L	11A		8A	0		11.8		35.1			75		
34698	11	L			9A	6C	0			31.8	41.0				
34708	11	L				9A	7B				38.4	37.5			
34684	11	L				8A	0				40.8				
34692	11	L				11A	9A				33.2	39.2		84	94
35018	12	L			11A	10A	9A			20.2	29.7	34.1	76	83	83
34278	13	L		U	10A	7B	0			31.7	41.2		82	88	
34280	13	L			11A	9A	6E			28.4	40.2	42.7			
34284	13	L		4A	11A	11A	9A		18.6	15.7	21.7	25.9	75	79	83
34274	13	L				9A	6C				34.6	43.6			
34913	14	L		2A	11A	9A	8A		27.7	26.7	37.3	40.0			
34996	14	L			11A	9A	3B			24.5	34.2	37.8	74	80	86
34847	14	L		4A	11A	11A	10A		24.7	20.1	31.1	35.0	81	87	98
34385	15	L				9A	8A				33.6	36.2			
34384	15	L				9A	5B				-	40.3			
34896	15	L	11A		9A	5A	0	6.1		33.3	40.9				
34730	16	L		4A	11A	10A	9A		31.0	22.5	32.6	36.9	78	82	86
34727	16	L		4A	11A				18.2	16.3					
34732	16	L	11A		8A	1A		10.7		32.2	44.1				
34608	16	L		4A	11A				18.7	16.9			80		
34608	16	L				11A	11A				22.0	23.9		87	94
34991	17	L	11A		11A	8A	0	9.0		13.1	31.3		76	80	
34969	17	L		4A	11A	11A			27.7	19.1	26.9		83	87	
30414	18	L			11A	10A				24.7	-				
35083	19	L		2A	10A	9A	4C		30.4	27.5	38.4	42.8	77	88	94
34539	20	L			11A	11A	?			16.7	23.7	25.5			
34705	20	L			9A	?	0			28.7	36.6				
34392	21	L			11A	2A	0			31.5	41.2				
34502	21	L		4A	11A	11A	10A		18.9	14.3	22.5	27.2	81	85	88
34507	21	L			11A	8A	?			29.6	43.1				

Table 2 cont.

			WEAR STAGE					CROWN HEIGHT (mm)					CIRCUMFERENCE (mm)		
AOR No.	Box No.	L/R	dP4	P4	M1	M2	M3	dP4	P4	M1	M2	M3	M1	M2	M3
34508	21	L			?	9A	8A			26.5	36.2	39.8			
34503	21	L				9A	8A				36.4	39.7		82	88
34350	24	L				?	4A				41.5	45.0			
34345	24	L				7B	0				41.0				
34810	24	L		U	9A	9A			28.3	29.5	37.0		82	85	
34777	24	L				10A	5C				35.4	39.4		88	93
34883	24	L		3B	10A	9A	5B		27.5	26.3	37.0	41.4	81	85	94
3476?2	24	L	11A		9A	8A	0	5.5		30.7	40.3				
34873	24	L			11A	9A	3B			26.1	35.9	38.7	78	83	85
35109	25	L		3B	11A	9A			28.4	21.5	33.7		80	83	
34462	26	L		U	9A	7B	0			30.5	40.0				
34453	26	L		4A	11A	10A	9A		23.2	18.4	27.1	35.8	79	82	89
34469	26	L				11A	9A				24.3	30.5		83	93
34447	26	L			9A	8A	0			33.0	43.9				
34466	26	L		4A	11A	11A	10A		19.6	14.8	24.1	30.8	80	85	94
34461	26	L	11A		9A	5A	0	8.2		33.9	41.8				
34363	26	L			10A	8A				31.7	40.4				
34112	26	L		U	9A	8A	0			(25.9)	37.0				
34356	26	L			11A	10A				16.9	22.6				
34359	26	L				8A	0				37.4				
34229	27	L		4A	11A	10A	9A		21.7	17.5	28.5	32.8			
34237	27	L			10A	9A				26.9	35.0				
34237	27	L			10A	8A				28.2	35.2				
30417	27	L	11A		9A	5A	1A	-		34.0	41.6	42.2	82	85	95
34622	29	L		4A	11A				28.4	23.8					
34190	29	L	11A		9A	6B	0	10.0		33.5	44.1				
34542	30	L		4A	11A	10A	8A		29.1	21.2	31.3	38.7	77	82	90
34587	30	L			11A	9A	5A			26.6	38.4	40.3			
34549	30	L				9A	3B				38.4	43.0			
34553	30	L		4A	11A	10A	9A		22.4	19.5	27.5	31.9		83	91
34591	30	L		2A	11A	10A	8A		26.8	22.7	35.0	40.3	75	80	88
34643	31	L			11A	10A	8A			23.0	33.6	38.4	77	86	91
34261	31	L				8A	0				41.7				
34361	31	L			11A	9A	8A			35.9	42.6	46.0			
34370	31	L				10A	9A				37.0	36.2			
34246	31	L		U	9A	8A	0			(31.2)	41.4				
34254	31	L		4A	11A	10A			29.7	22.7	35.1				
34262	31	L			8A	1B				33.8	42.4				
34682	32	L				10A	9A				23.8	28.3			
34682	32	L		4A	11A	10A	8A		22.8	22.1	27.5	31.4	76	80	85

Table 2 cont.

			WEAR STAGE					CROWN HEIGHT (mm)					CIRCUMFERENCE (mm)		
AOR No.	Box No.	L/R	dP^4	P^4	M^1	M^2	M^3	dP^4	P^4	M^1	M^2	M^3	M^1	M^2	M^3
34521	33	L			?	11A				17.9	27.0				
34368	33	L		4A	11A	11A	11A		-	17.1	21.8	24.5			
34440	33	L				11A	9A				26.0	33.4			
34738	33	L				10A	9A				30.9	37.5			
34531	33	L	11A		7B	0		9.4		34.4					
34923	34	L			?11A	10A	10A				(28.8)	33.8			
34695	34	L				8A	0				39.3				
34308	34	L		4A	11A				28.6	24.2					
34228	34	L			11A	11A	9A			22.1	31.3	36.6			
34974	34	L		4A	11A	11A	10A		24.1	21.2	29.8	30.1	84	89	93
35030	34	L				11A	10A				22.8	30.7		90	95
34962	35	L			11A	9A	4A			24.0	33.0	38.5			
34680	36	L		0	9A	8A	0		28.6	30.4	38.7				
35096	36	L	12A	U	9A	8A	0	-	30.6	31.7	38.9				
35085	36	L	11A		10A	7B	0	8.2		34.8	42.7				
34433	36	L				9A	3A				36.8	42.4		89	
Aurochs:															
34872	24	L			11A					18.4			99		
34873	24	R				11A					29.2			109	
34873	24	L				11A					29.6			109	
34814	28	R					11A					31.5			115
34814	28	L					11A					31.3			115

Table 2 cont.

Tooth		Wear stage												
		0	1	2	3	4	5	6	7	8	9	10	11	late 11
dP^4	A	-	-	-	-	-	-	-	-	-	1	-	48	1
	B	-	-	-	-	-	-	-	-	-	-	-	-	-
	C	-	-	-	-	-	-	-	-	-	-	-	-	-
	D	-	-	-	-	-	-	-	-	-	-	-	-	-
	E	-	-	-	-	-	-	-	-	-	-	-	-	-
M^1	A	-	-	-	-	-	-	-	-	10	45	28	133	-
	B	-	-	-	-	-	-	-	6	-	-	-	-	-
	C	-	-	-	-	-	-	-	-	-	-	-	-	-
	D	-	-	-	-	-	-	-	-	-	-	-	-	-
	E	-	-	-	-	-	-	-	-	-	-	-	-	-
M^2	A	7	1	1	-	3	10	-	1	35	90	51	45	-
	B	-	2	-	2	-	-	3	6	-	-	-	-	-
	C	-	-	-	-	-	-	4	-	-	-	-	-	-
	D	-	-	-	-	-	-	1	-	-	-	-	-	-
	E	-	-	-	-	-	-	-	-	-	-	-	-	-
M^3	A	73	3	7	2	12	4	5	1	53	70	27	8	-
	B	-	1	-	5	-	2	-	3	-	1	-	-	-
	C	-	-	-	3	2	1	1	-	-	-	-	-	-
	D	-	-	-	-	-	-	2	-	-	-	-	-	-
	E	-	-	-	-	-	-	1	-	-	-	-	-	-
P^4	A	79	2	16	6	102								
	B	-	5	-	11	-								

Table 3. The cattle from Irthlingborough. Numbers of maxillary teeth in successive wear stages (figure 5).

Table 4

Cattle mandibles and mandibular teeth from Irthlingborough - wear stages (following Grant, 1982), crown heights (measured from the crown/root junction to the occlusal surface up the external side of the central pillar; see fig 4) and third molar dimensions (external-internal width of the base of the crown and antero-posterior crown length). "U" = an unerupted tooth. Teeth whose exact location within the tooth row is uncertain are noted with a "?" in the comments column. Measurements are in millimetres and approximate values are in parentheses. Data for the left side only are given. Data for the right side are available upon request.

AOR no.	Box no.	L/R	----GRANT WEAR STAGE--- dP_4	P_4	M_1	$M_{1/2}$	M_2	M_3	----------M_3---------- Crown ht.	width	length	Comments
34695	34	L		?								
34677	34	L		?d	k		g	f	45.3	16.0	38.5	
34699	35	L			m		l	?g	21.9	16.4	36.4	
34961	35	L			k		f	a				
14262	37	L				k						

Table 4 cont.

Table 5

Irthlingborough barrow 1. Measurements, in millimetres, of cattle scapulae. L/R = left/right, F/U = fused or unfused coracoid. Approximate values are in parentheses.

AOR No.	Box No.	L/R	F/U	SLC	GLP	LG	BG	comment
34617	1	L	F	51.2	-	-	-	
34795	2	L	?	-	-	(54.5)	-	
34479	3	L	?	43.2	-	-	-	
34289	4	L	?	40.9	-	-	-	
34298	4	L	F	(54)	-	-	-	
34376	4	L	?	47.1	-	-	-	
34333	5	L	?	(44)	-	-	-	
34158	5	L	F	-	-	64.1	-	
34750	6	L	?	45.5	-	-	-	
35074	11	L	F	39.4	-	-	-	
34679	11	L	?	46.2	-	-	-	
34931	17	L	F	49.5	(62.6)	55.0	-	
34975	18	L	?	43.3	-	-	-	
34874	24	L	F	44.9	(62.3)	50.3	42.5	
34465	26	L	?	41.5	-	-	-	
34421	28	L	F	-	-	57.9	-	
34585	29	L	F	(49.4)	-	-	-	
34258	31	L	F	-	-	68.8	-	?aurochs
34760	32	L	F	39.3	-	52.0	-	
34538	34	L	F	51.0	-	55.6	-	
34193	34	L	F	47.5	-	-	-	
34721	34	L	?	45.2	-	-	-	
34784	34	L	F	54.5	-	(56.2)	-	
35088	36	L	F	49.0	67.4	53.4	-	
34425	36	L	F	52.4	-	60.6	-	
34631	1	R	F	45.0	58.9	51.5	41.8	
34792	2	R	F	46.6	67.2	53.5	44.7	
34414	2	R	F	51.6	-	-	-	
34412	2	R	F	(52.3)	64.5	50.9	-	
34544	3	R	F	53.4	-	-	-	
34557	3	R	F	39.5	-	-	-	
34215	7	R	F	(51.7)	-	-	-	
34997	14	R	F	45.1	(64.7)	52.9	43.4	
34956	17	R	F	-	-	61.8	56.3	
34977	17	R	F	65.9	83.2	67.6	-	?aurochs
34528	22	R	F	(53.0)	66.3	50.6	-	
34947	23	R	F	50.4	-	-	-	
34774	24	R	F	49.9	-	61.8	-	
34355	26	R	F	(49.2)	-	-	-	
34428	29	R	F	53.8	-	-	-	
34363	31	R	F	47.9	-	-	-	
34709	35	R	F	(49.5)	-	50.8	-	

Table 5.

Plate

The aurochs molars from Irthlingborough Barrow 1.

Above
The five aurochs upper molars, from left to right: left M^1, left M^2, left M^3, right M^2 and right M^3.

Centre and bottom
Cattle upper molars to show the size difference between aurochs and domestic cattle.

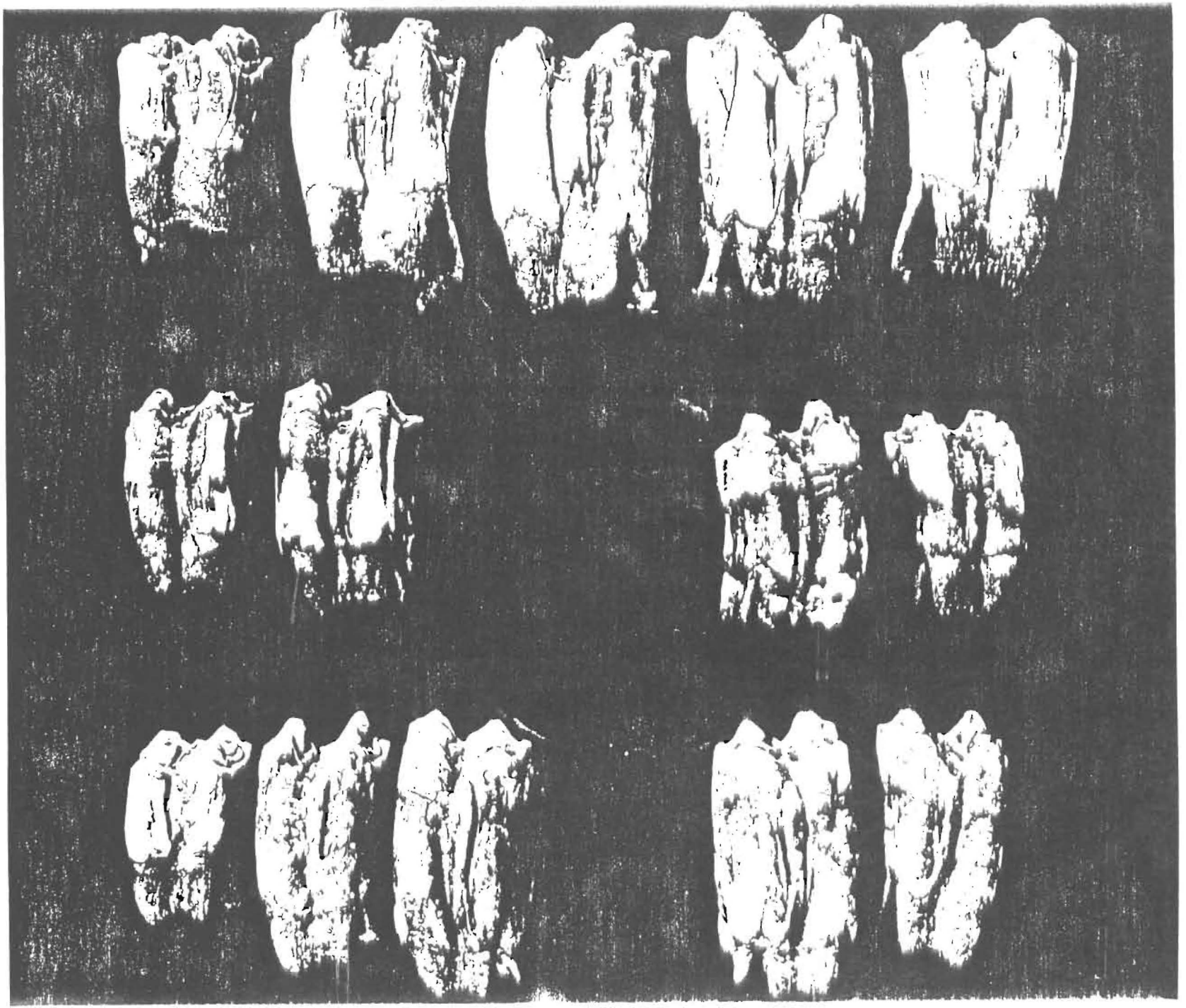


Figure 1

Irthlingborough Barrow 1: general plan and extent of bone scatter. On the left a plan of the site shows the position of the grave within the limestone cairn, surrounded by an area of gravel (stippled). This central cairn plus gravel scatter was surrounded by three concentric circular ditches. On the right are three enlarged plans of the area of the cairn to show the distribution of cattle scapulae, ischia, lower third molars, upper third molars and the aurochs remains. The hatched area shows the extent of modern disturbance.

Figure 2

Posterior views of cattle M^1, M^2 and M^3 to show the distinction between them. "a" = posterior keel on M^3, "b" = wear facets on posterior surfaces of M^1 and M^2 (absent from the posterior surface of M^3), "c" = the increasing internal-external width of the posterior root from M^1 to M^3.

Figure 3

Measurement of the circumference of a cattle upper molar. A sketch of the four sides of an isolated M^2 showing the region (arrowed) around which cotton thread is wound in order to measure the circumference of the base of the crown.

Figure 4

Measurement of crown height. Sketch of the external sides of a cattle upper molar (in this case an M^2) and lower third molar to show how "crown height" was measured from the crown-root junction to the occlusal surface: up the central trough of the upper molars and up the middle of the central lobe of the M_3: P^4s were measured up the centre of the external side.

Figure 5

Wear stages (numbered) and variants (lettered) of cattle upper teeth (after Payne, 1987): the pattern of cusps and enamel folds on the occlusal surface of a tooth changes as wear proceeds. "U" = an unworn cusp, "-" = a cusp with exposed dentine. Adjacent cusps with continuous dentine are joined.

Figure 6

Circumferences of upper first, second and third molars of cattle from Irthlingborough. Teeth identified at Irthlingborough as domestic cattle are illustrated hatched and the 5 large teeth identified as aurochs are illustrated in black.

Figure 7

Size change in north European cattle lower third molars and the identification of the Irthlingborough cattle (measurements of both left and right sides are included). Data come from the following sources: Grigson, 1983 (Danish aurochsen and English Neolithic cattle), Davis, 1988 (Dodder Hill cattle), and Davis, 1987 (Prudhoe Castle cattle).

Figure 8

Sketch to show which body-parts are represented at Irthlingborough (shown stippled and in black). The numbers represent the approximate number of cattle which must have been slaughtered to contribute each part of the skeleton.

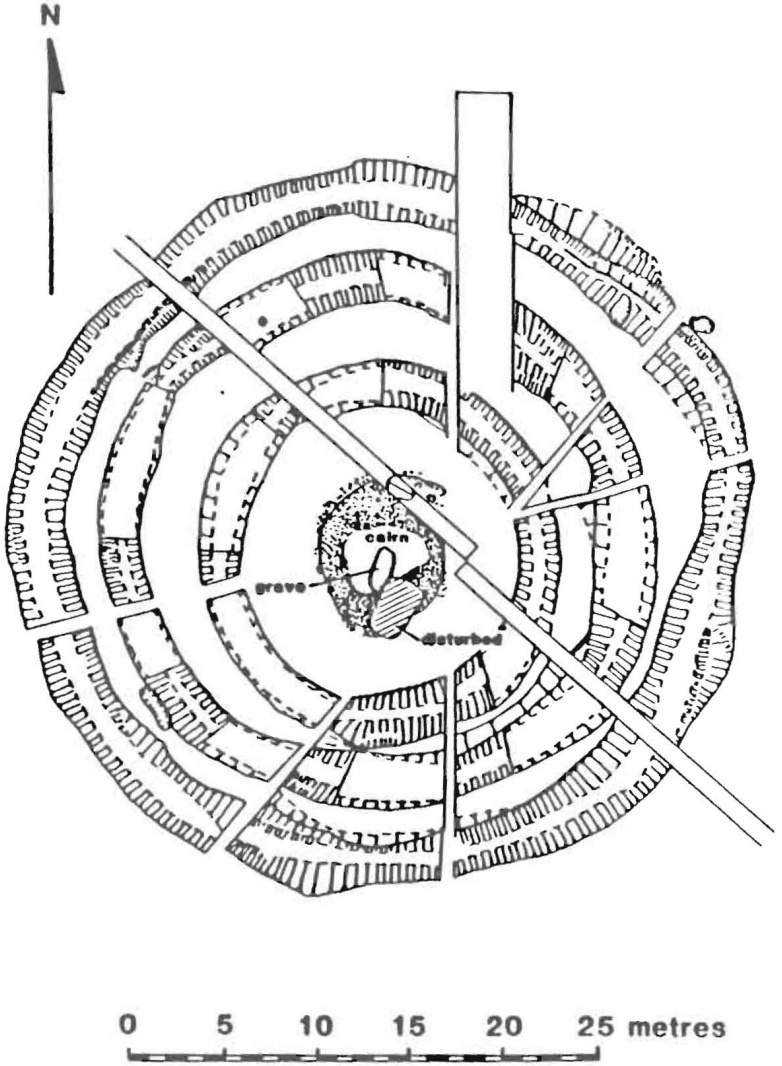
Figure 9

Distributions of crown heights of cattle upper teeth and crown height variation (measurements of both left and right sides are given). These show that the majority of the Irthlingborough cattle were young adults, fewer older animals are represented and none can be described as "senile". Crown heights of 28 cattle P^4s from Irthlingborough in wear stages "0" and "1B" (i.e. with no wear on the external cusp) are depicted cross hatched to show the amount of variation in crown-height not due to attrition.

Figure 10

Cattle scapula SLC (smallest length of the Collum). Scapulae from sexed (circles = females, squares = males) Danish aurochs are shown in the lower graph (data from Degerbøl and Fredskild, 1970). Irthlingborough cattle scapulae (both left and right sides) are shown hatched and above are cattle scapulae from the General Accident site, 24-36 Tanner Row, York (c. AD 170-250; unpublished data kindly supplied by T. O'Connor) and Dorchester Greyhound Yard (Romano-British; unpublished data kindly supplied by M. Maltby).

Fig 1


N
cairn
grave
disturbed
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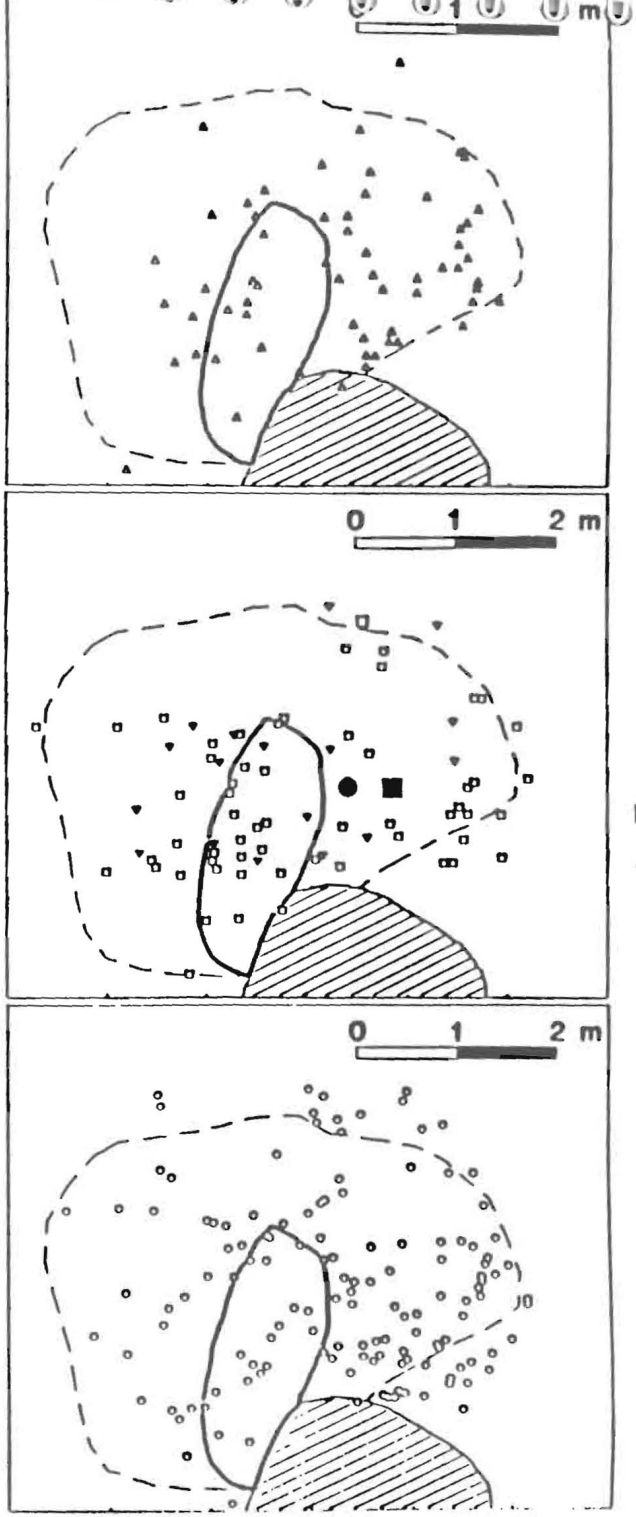

0 1 2 m
0 1 2 m
0 1 2 m
scapula
aurochs horn
aurochs teeth
Ischium
M3
M3 (left)

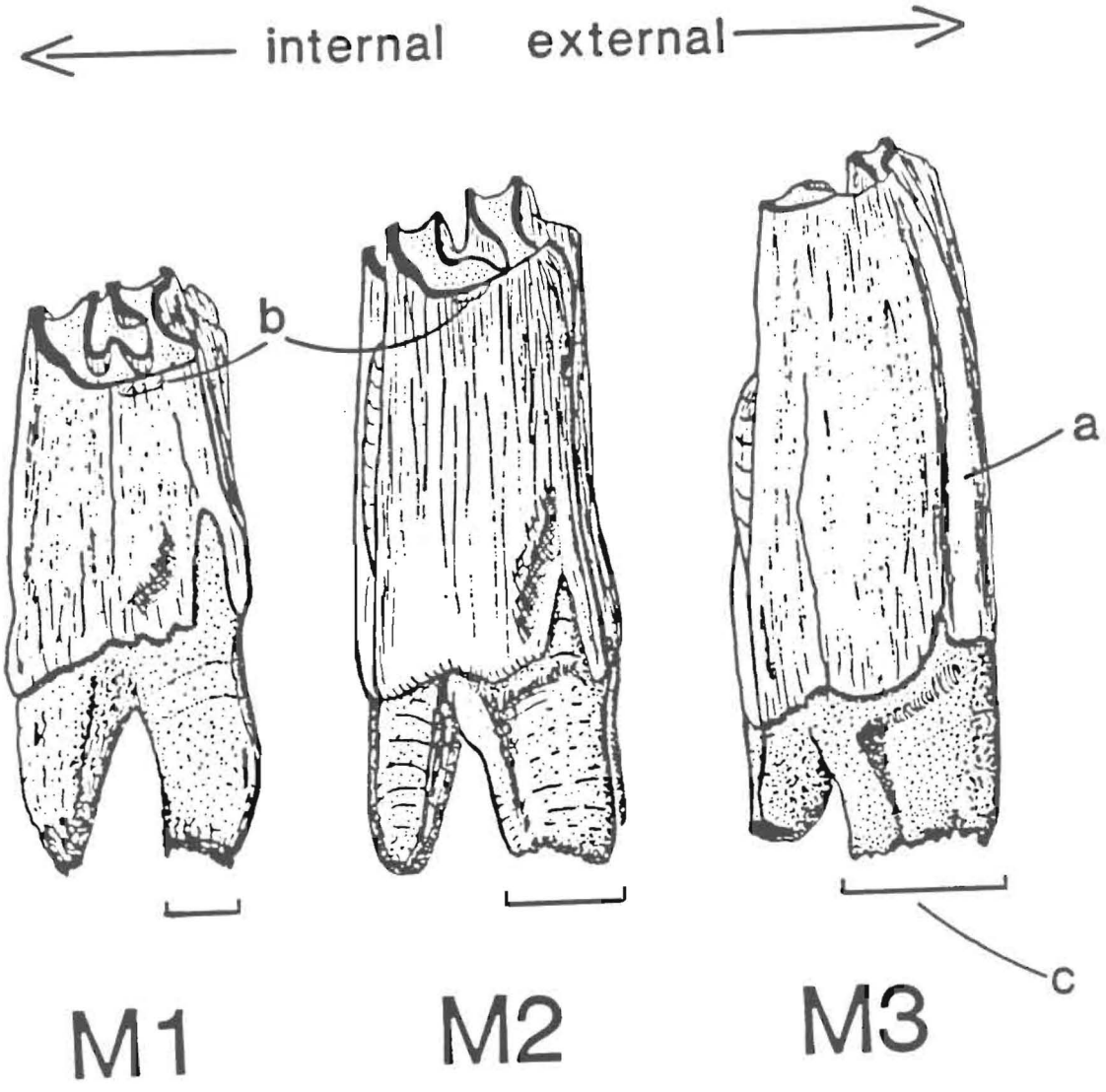
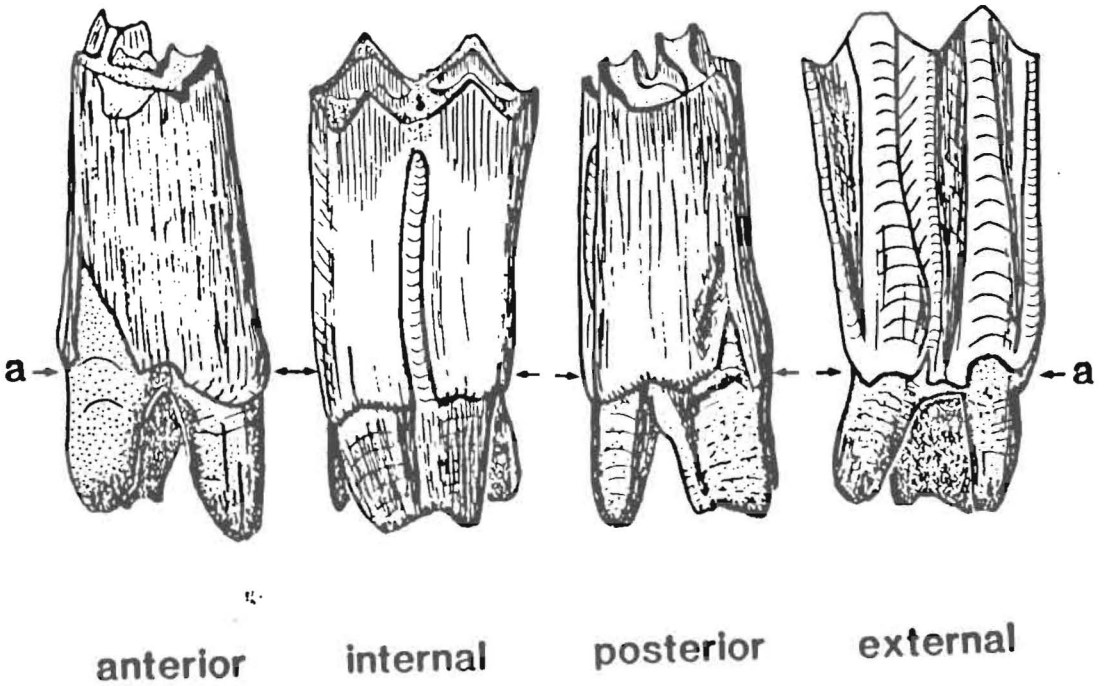


fig 2.


a
a
anterior
internal
posterior
external

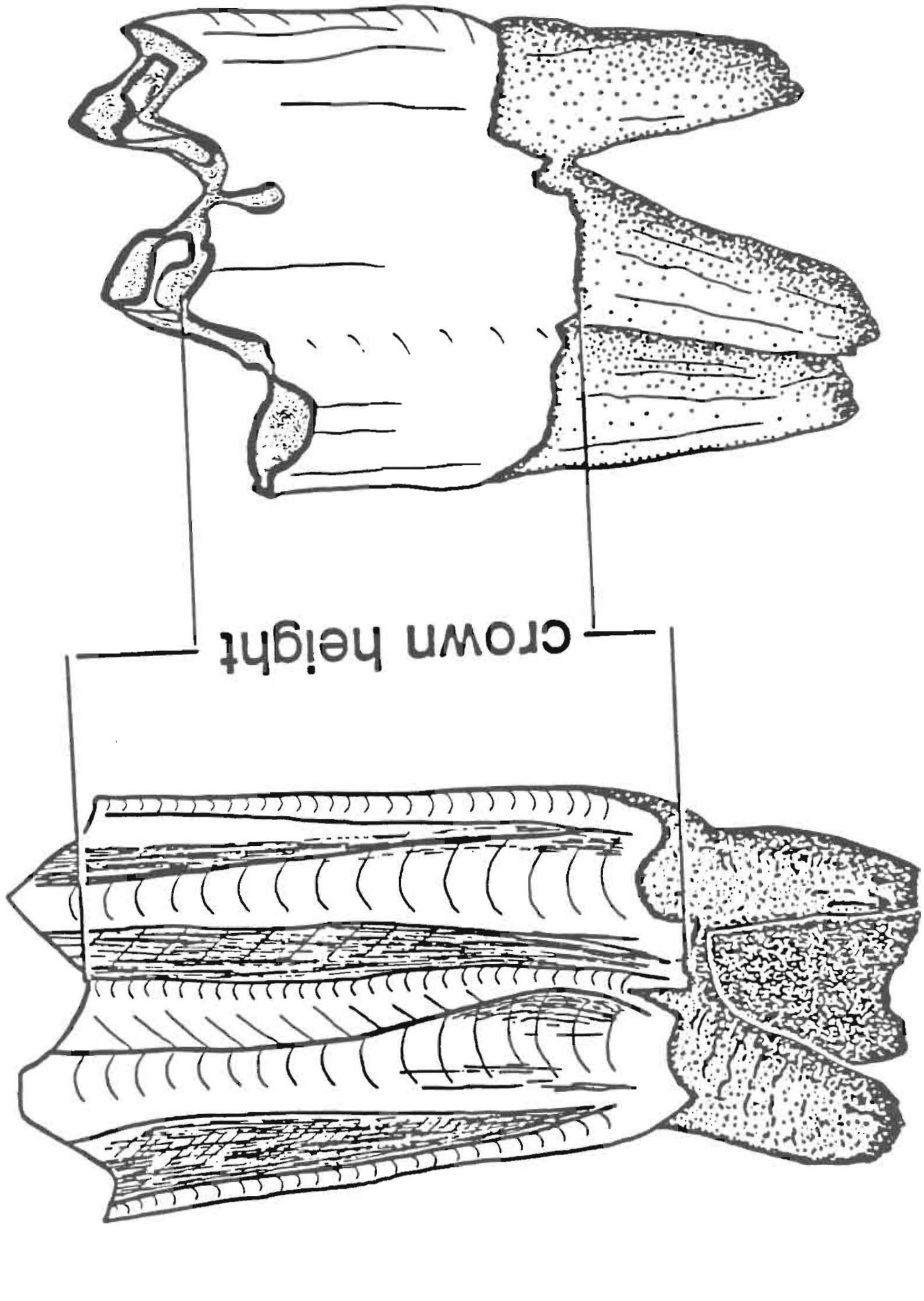


fig 4.

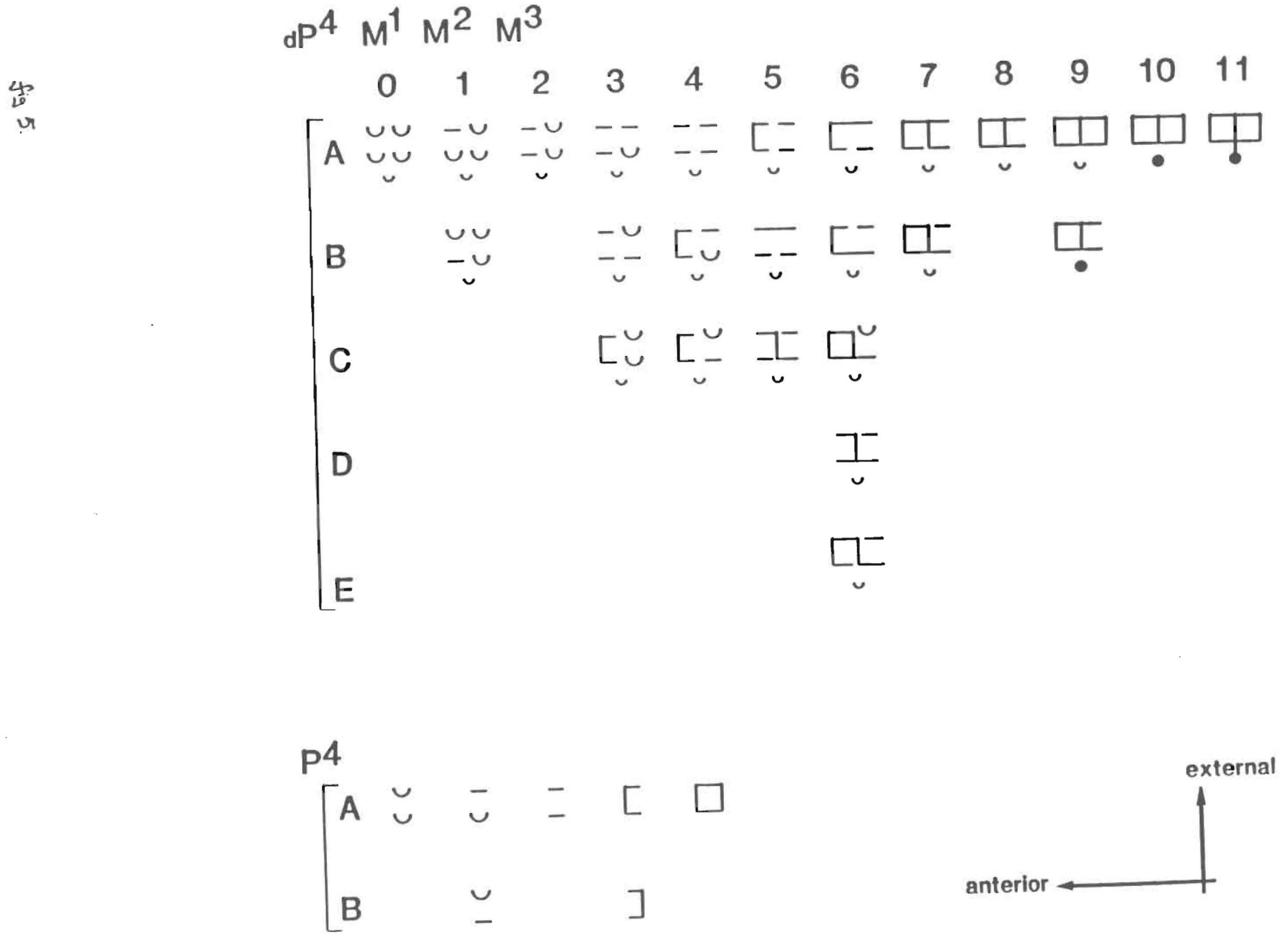
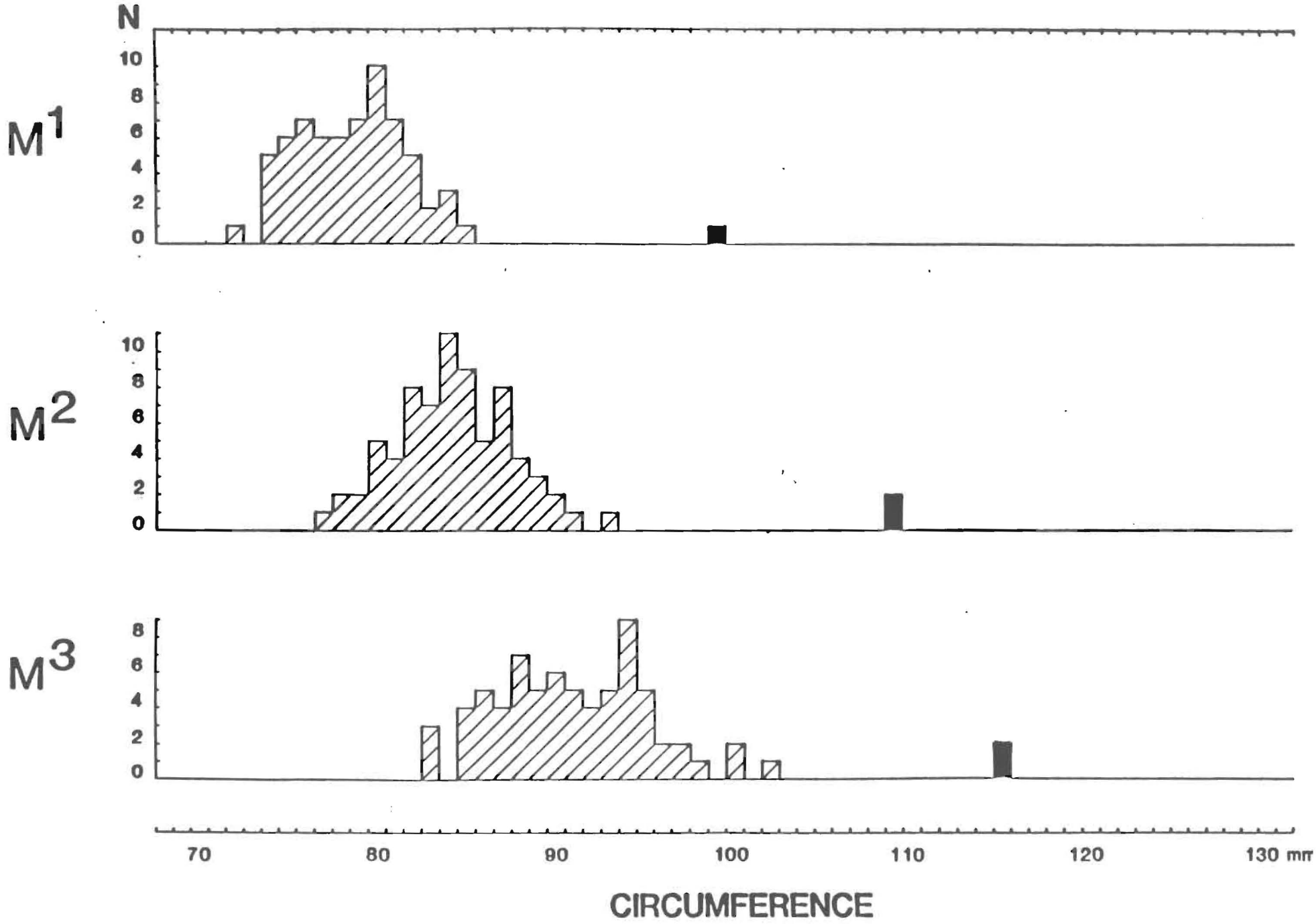

dP4 M1 M2 M3
0 1 2 3 4 5 6 7 8 9 10 11
A
B
C
D
E
P4
A
B
external
anterior

Fig 6.



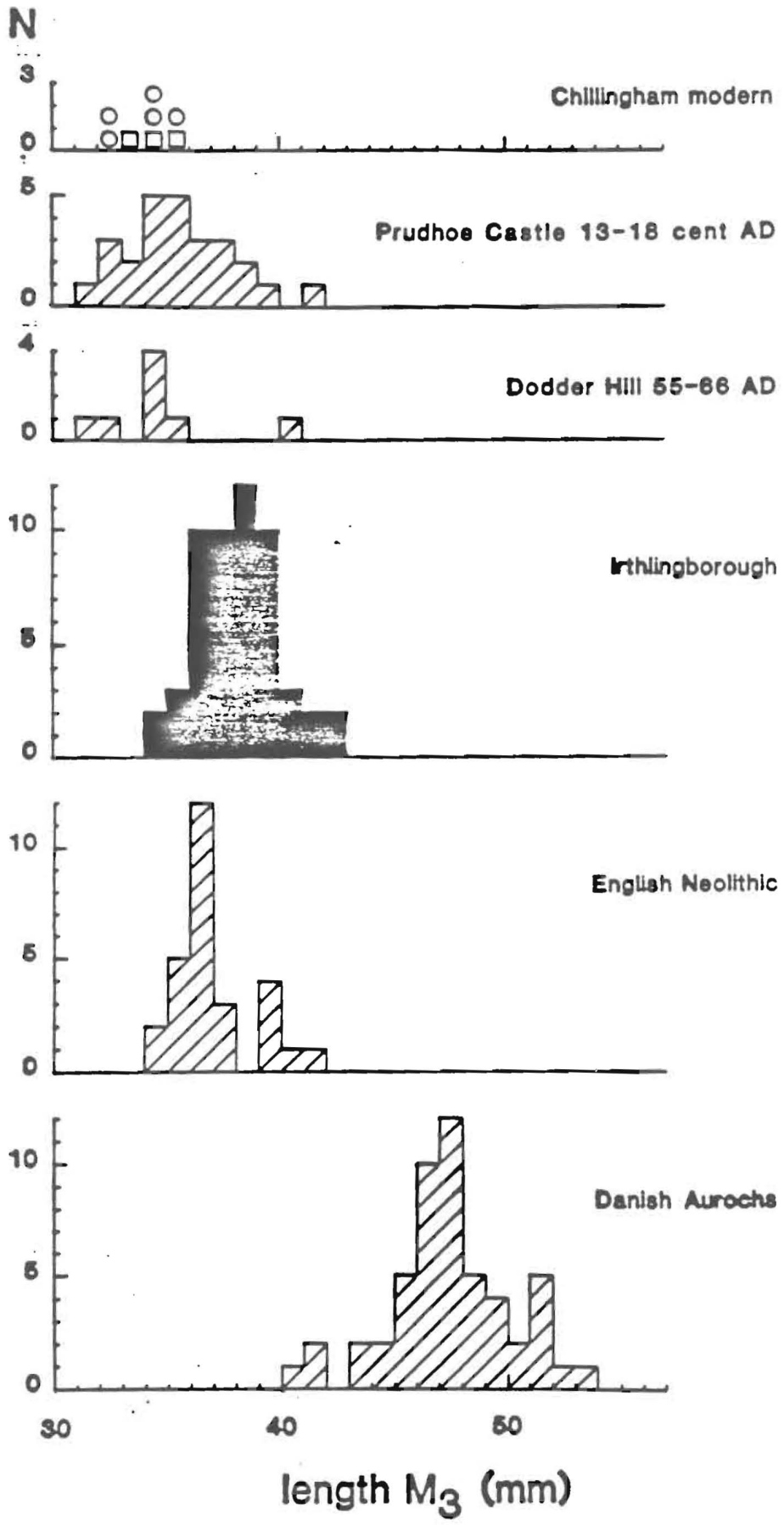
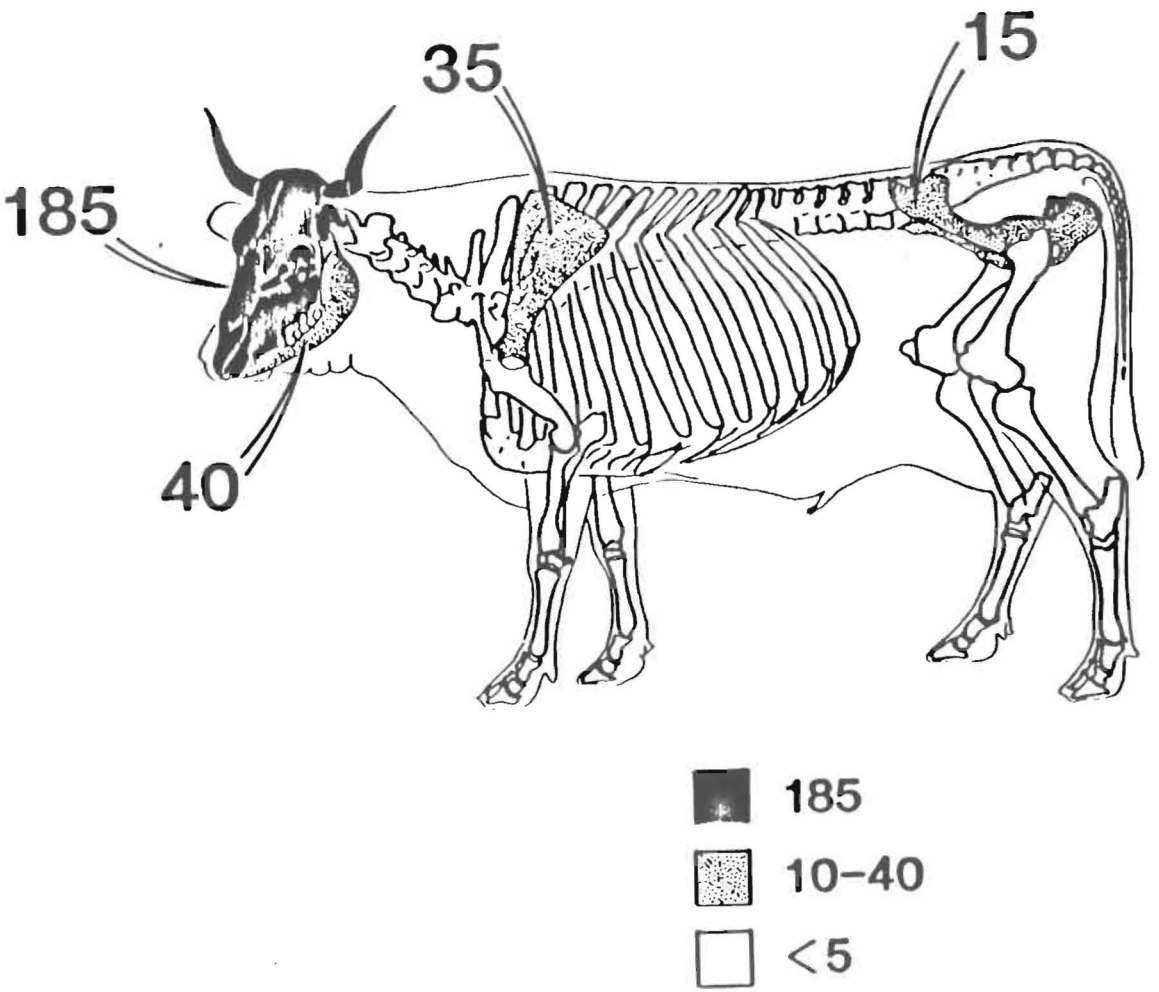

N
3
0
Chillingham modern
5
0
Prudhoe Castle 13-18 cent AD
4
0
Dodder Hill 55-66 AD
10
5
0
Irthlingborough
10
5
0
English Neolithic
10
5
0
Danish Aurochs
30
40
50
length M_3 (mm)

fig 7.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35
15
40
185
10–40
<5

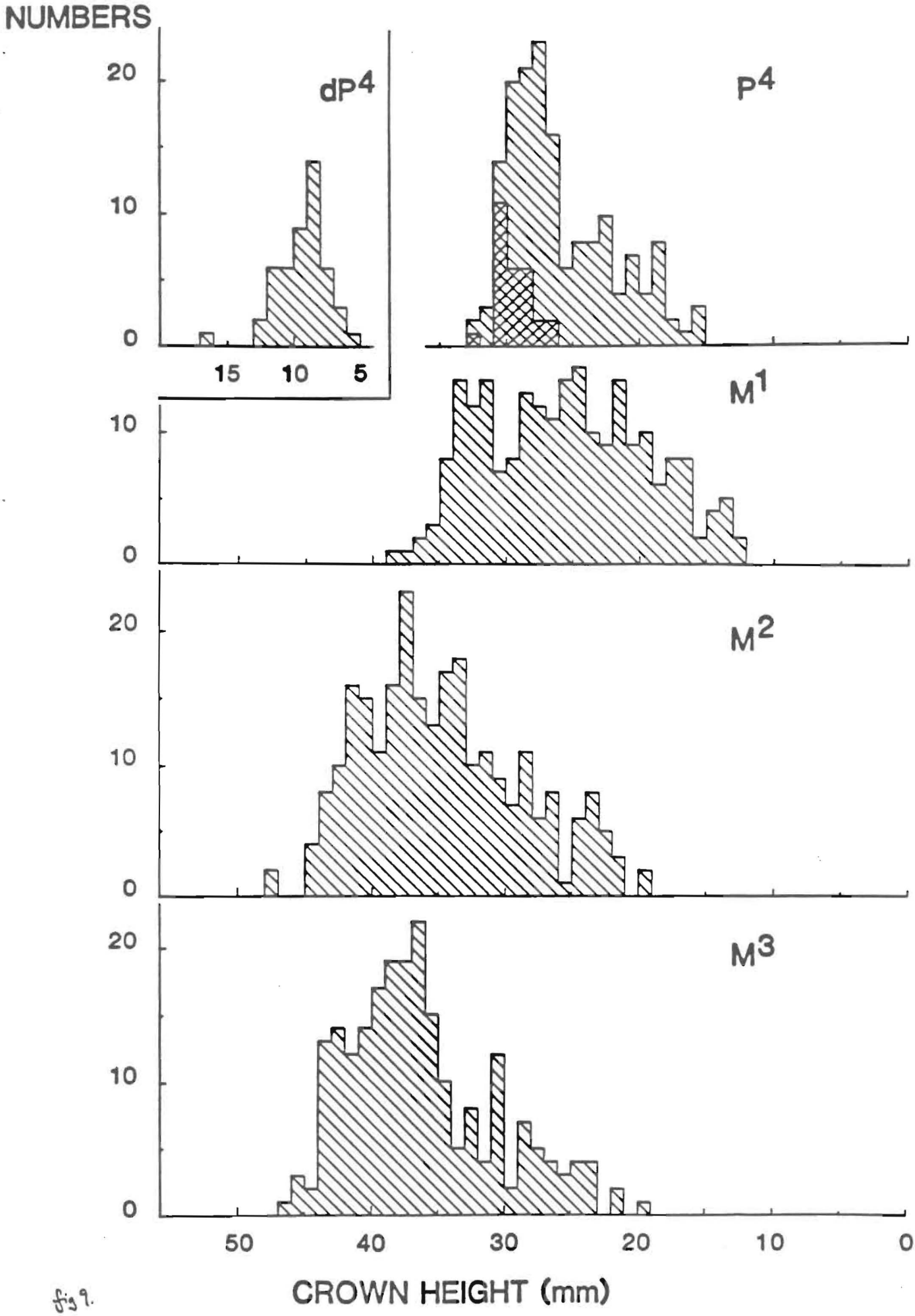
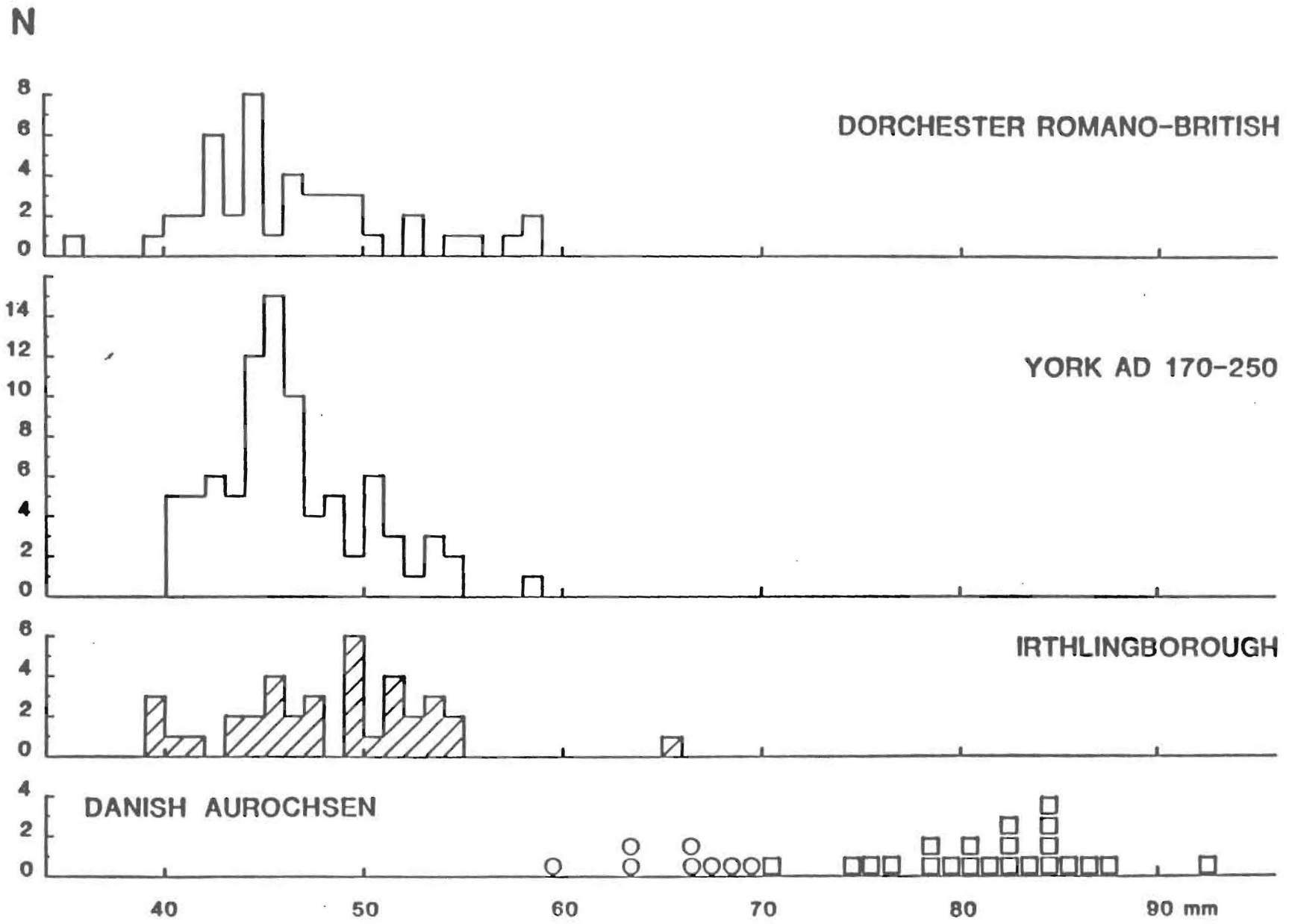

NUMBERS
dP4
P4
M1
M2
M3
20
10
0
15
10
5
50
40
30
20
10
0
CROWN HEIGHT (mm)

fig 9.

Fig 10.



SCAPULA SLC