

Anne Mowbray: skeletal remains of a medieval child

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IN 1965, DURING clearance of a site in The Minories, the lead coffin of Anne Mowbray was unearthed. Anne, a daughter and sole heiress of John Mowbray, 4th Duke of Norfolk, was born in 1472 and died in 1481, aged 8 years and 11 months. In 1478 she was married to the 4 year old Richard, Duke of York, younger son of Edward IV, later imprisoned in the Tower of London with his brother by Richard III. She was interred in Westminster Abbey, but construction of Henry VII's chapel displaced a number of burials, which were transferred to a monastery churchyard, north of the Tower.

The coffin (Fig. 1) was clearly labelled with name. When opened it was found partly filled with waterlogged mud, but the skeleton, with some traces of vestments, was lying in a supine position, and most elements of the skeleton were found and transferred to the writer's laboratory in Guy's Hospital Medical School. After drying out, they were carefully cleaned. They were much stained, to a dark brown colour. Since many parts had moved from their original positions, some smaller elements, such as hands and feet, which were partly decayed, could not be firmly identified. But the skull and all larger bones were easily recognised. However, many regions of children's skeletons are still partly cartilaginous, particularly near the ends of long limb bones (epiphyses, concerned with growth). It is from the condition of these, to a large extent, and the state of the teeth, that age, sex, and sometimes race, can be deduced.

The skull (Fig. 2) is almost complete; small amounts of damage exist in the right orbital and nasal cavities. The dimensions, proportions, condition of sutures, and especially the teeth, all indicate a young child. The comparatively large size of the cranial capacity (1230cc by rice, 1200cc by lead shot) and openings of the eye sockets (Fig. 2), relative to the face, is obvious, and these features are typical of young children. All the major cranial dimensions were measured (see Appendix), but apart from their similarity to such parameters in

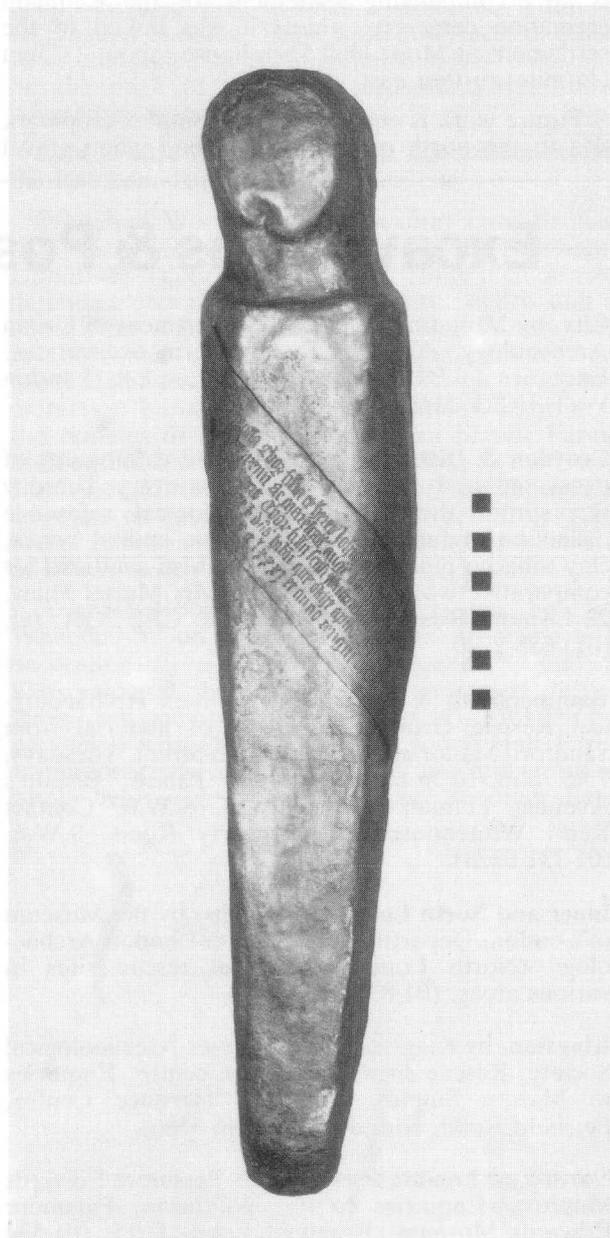


Fig. 1: The lead coffin of Anne Mowbray, after cleaning.
(Photo: Museum of London)

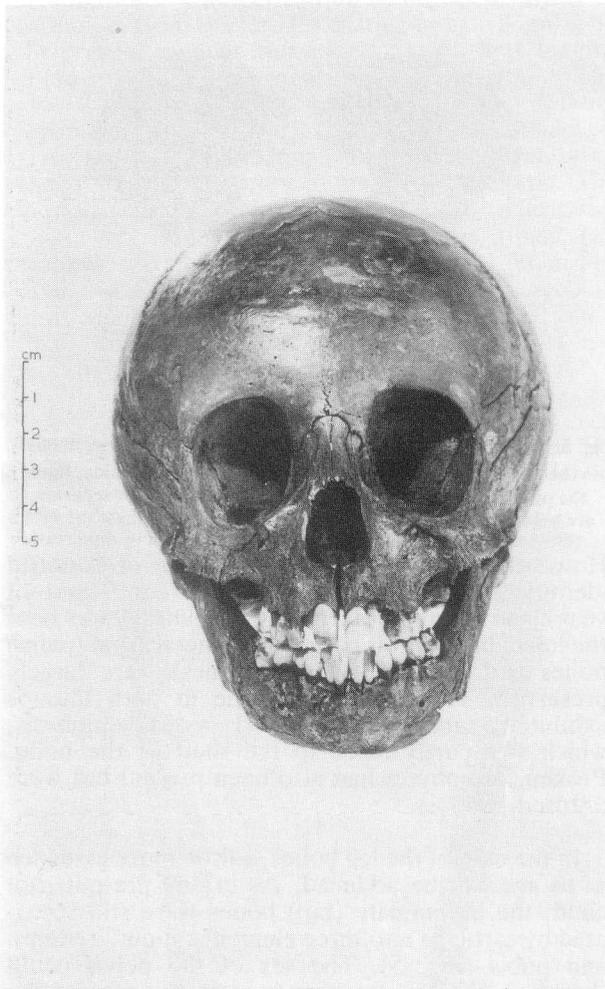


Fig. 2: Frontal view of skull. Note rounded orbital margins, open state of sutures, remains of metopic suture (just above nasal bones), large rounded "brain-box", and relatively small face.

prepubertal children in general, they do not provide an accurate basis for estimation of age or sex. The rounded, low profile of the forehead is feminine; but sex differences here are not marked until puberty and thereafter. The metopic (interfrontal) suture has disappeared; it may persist until the 8th year; there is a trace of the left petro-squamous suture, and this usually disappears by the 6th year. The tympanic elements of the temporal bones show deficient areas (foramina of Huschke) which are usually filled in by bone at six years. These characteristics, and others, do no more than indicate a young child of 6 to 9 years. The cranial sutures contain a number of sutural (Wormian) bones, especially in the lambdoid suture. The foramen magnum exhibits marked

asymmetry and the jugular foramina are very unequal.

All the vertebrae have survived and are mostly complete. Cartilaginous (unossified) parts, such as the tips of spinous and transverse processes are, of course, missing. The odontoid process of the axis shows a cleft, denoting loss of an incompletely ossified apex; this unites with the rest of the bone by the age of about 12. The third lumbar vertebra is damaged. The sacrum survives as four still separate vertebrae (the 5th was not found); these do not begin to fuse into a complete sacrum until puberty. The exact relation of these elements to each other (Fig. 3) cannot be ascertained, and hence the curvatures and length: breadth ratio (estimated as 75:70mm) cannot be accurately assessed. Hence no

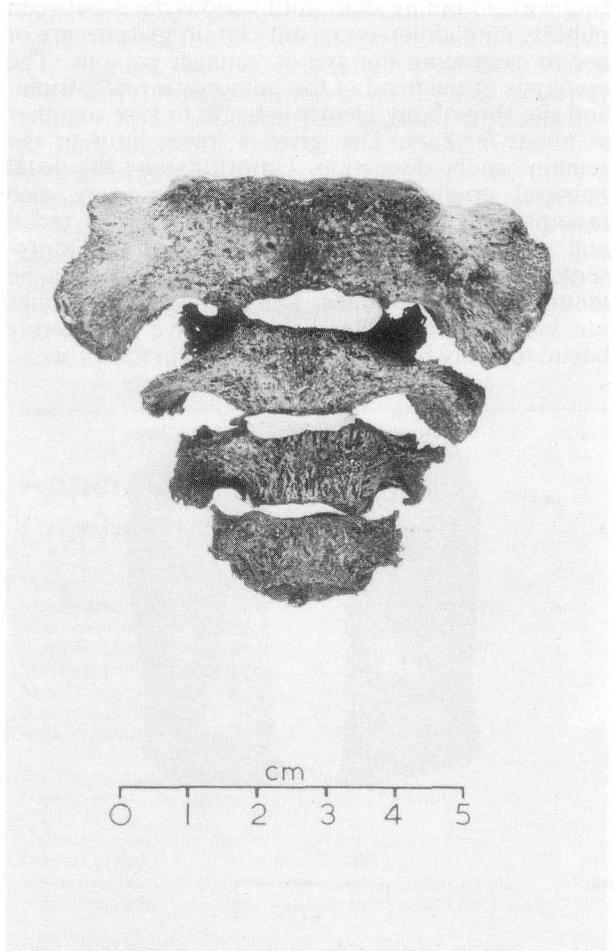


Fig. 3: Sacrum, anterior (front) aspect. The lowest (fifth) segment is missing. These four elements would be held together in life by cartilage, filling most of the gaps. White plasticine has been inserted between the vertebral bodies.

useful statement on sex is possible. The length of the vertebral column, excluding the sacrum but substituting inter-vertebral discs of plasticine, is 350mm.

Almost all the ribs have survived, but some are incomplete. The manubrium and three of the four segments of the sternum (sternebrae) are present. The state of growth of these bones can merely be said to be prepubertal.

All the larger bones of the four limbs are well preserved. Since all of these exhibit detached growing extremities, or epiphyses, their lengths and other dimensions can only be measured approximately, even though the detached epiphyses are in some cases preserved. Estimates of stature must hence be approximate.

The epiphyses of most of the limb bones do not fuse with adjoining shaft until various dates between puberty and adolescence, but certain features are of use in estimating the age of younger persons. The epiphysis of the head of the humerus is really triple, and the three bony elements begin to fuse together at about 6 years. This gives a lower limit to the remains under discussion. Unfortunately, the distal humeral epiphyses are missing (these are also multiple and fuse together at puberty). The radial and ulnar epiphyses are either lost or are represented by fragments of bone which cannot be identified with assurance. The carpal or wrist bones are mostly identifiable, i.e. they have not merely begun to ossify but are well advanced in this process.



Fig. 4: Metacarpal (palm) bones of the thumbs, from the back (right bone on left). Note the fused-on 'caps' of bone at the distal ends (a rare abnormality). The normal epiphyses at their bases (below) were not fused to their shafts and are missing (hence the jagged outlines to these parts of the bones).

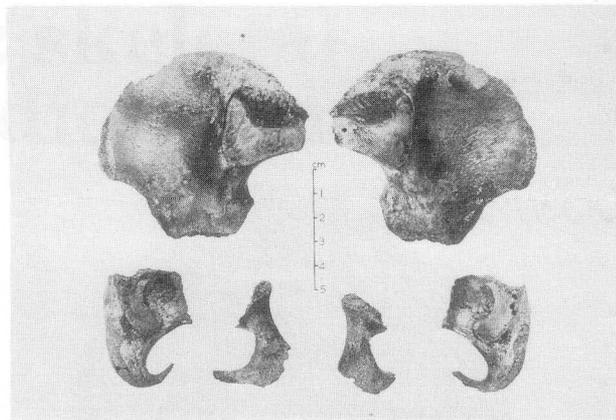


Fig. 5: The two innominate (hip or pelvic) bones, shown separated into their three elements (ilium above, ischium on each side, flanking the pubic bones). In life these three elements, though separate, are held together by cartilage until puberty, when they fuse into a common mass. No reliable indications of sex can be discerned.

However, the two pisiform bones are of doubtful identity; carpal elements ossify between 9 and 12 years, an indication that "Anne Mowbray" was near the lower limit of this period. The metacarpal (palm) bones and phalanges (finger bones) were largely preserved. The metacarpal bone in both thumbs exhibited a rare anomaly (Fig. 4) – a distal epiphysis, which was partly fused to the shaft of the bone. Proximal epiphyses had also been present but were unfused and lost.

In the case of the leg bones, a little more evidence at to age can be adduced. As in any pre-pubertal child, the innominate (hip) bones were still separated by cartilage into three elements: ilium, ischium, and pubis (Fig. 5). The sex of the pelvis could therefore not be ascertained; as in the case of the sacrum various dimensions and proportions could only be estimated. The condition of the symphysis pubis was obscured by damage to the adjoining parts of the pubic bones, but the pubic angle was assessed as feminine. The femoral epiphyses were all preserved except for the lesser trochanters (Fig. 6); the latter do not usually begin to ossify before the 10th and 12th years. Both patellae were well ossified, an appearance which suggests an age of at least 7 or 8 years. The stage of ossification of the proximal (upper) epiphyses of the tibiae indicates an age limit of 10 years. The tarsal bones were all preserved; unfortunately, the calcanei (heel bones) were much eroded. These latter bones have epiphyses (which ossify from 6 to 8 years onwards), but these were not found. All the metatarsal (sole) bones and most of the phalanges (toe bones) were preserved; they presented no abnormalities and were consistent in development with the later years of childhood.

Estimations of height can be made, by a variety of formulae, from the lengths of long bones of limbs. In the present case, as mentioned above, these lengths could in no case be measured with accuracy. The most complete limb bones were the two femora (estimated at 307mm right and 308mm left). This gives a height of 1.326m (4ft 4 1/4in), indicating an age of about 9 1/2 years by modern standards. The humeri (lacking their distal epiphyses) indicated a height of 1.226m (4ft 1/4in) and the tibiae (all epiphyses available) yielded a figure of 1.300m (4ft 3 1/4in). Other formulae which take into account more than one limb bone were also applied, but a final estimate of say, 4ft 1in to 4ft 4in (9 years \pm 6 months) must be regarded as an approximation.

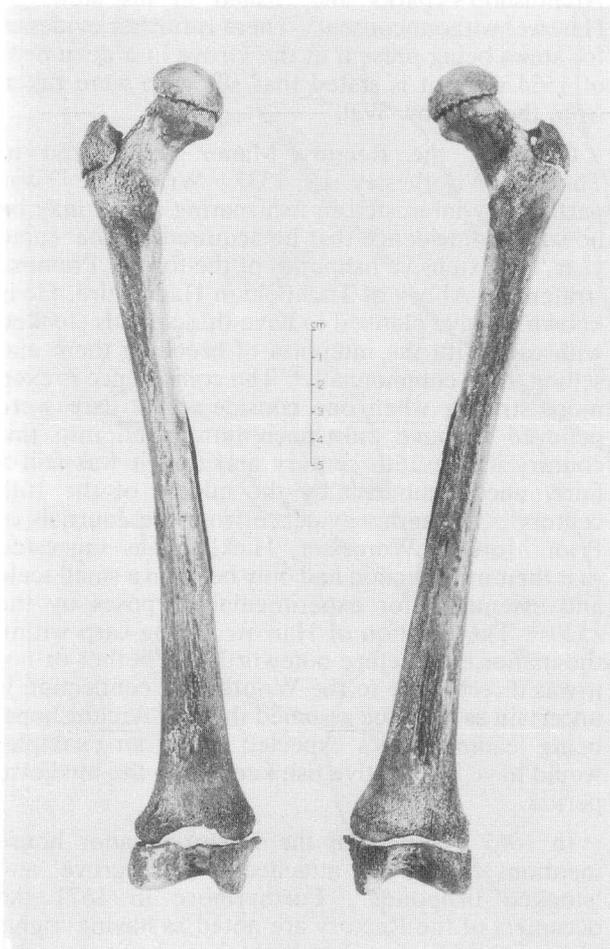


Fig. 6: The femora (right femur on the left), from the front. Most of the epiphyses are well preserved, permitting a tentative estimate of femoral length, from which an assessment of total body height can be formulated. The outward tilting of the femora, away from each other, is greater in the female, as is also the angle between the 'neck' (just below the 'head') and the shaft. Female bones are also relatively narrower in diameter for their length. In all these features these femora are probably feminine.

These estimates of height were made on the assumption that the remains were those of a female child. Although no certain diagnosis of this could be made, the proportions of many bones strongly suggested a female. The long limb bones of girls are on average more 'slender' than those of boys. That is to say, their diameters are less in proportion to their lengths. In sum, therefore, the skeletal evidence indicates that these are the remains of a girl, aged about 9 years. This age is in close agreement with the results of dental examination, which usually yields more accurate results at such ages¹.

No evidence of skeletal injury or disease was detected, findings confirmed by the radiological examination. Nor were there any signs of bodily deformity. The asymmetry of the base of the skull, which also affected the atlas, would not impair function. The curious anomaly in the metacarpal bones of both thumbs would not be visible externally and, again, would not affect function. Anne Mowbray, if this is she, was a well-formed, relatively healthy little girl, who had escaped fractures and perhaps most infections of childhood, for her limb bones display externally and radiologically none of the usual appearances of bony injury or interference with growth. These, of course, are just the scientific facts; beyond them we can imagine a pitiable little girl, with greatness thrust upon her, and fated to be a dynastic pawn and to enjoy a very short life on earth.

1. See A. M. Rushton, *Brit Dent J* 119 (1965) 355-8.

Appendix Cranial Dimensions

Maximum length:	163mm	Cranial index:	82.8%
Maximum breadth:	135mm		(Brachycephalic)
Maximum height:	118mm	Circumference:	482mm
Auricular height:	110mm	Capacity:	c 1200cc
Minimal frontal breadth:	85mm		
Maximal zygomatic breadth:	107mm		
Basion-nasion length:	81mm		
Basion-prosthion length:	71mm		

Nasion-menton (facial height): 93mm
Nasion-prosthion (upper facial height): 56mm

Orbital height:	35mm R., 34mm L.		
Orbital breadth:	31mm R., 30mm L.		
Nasal height:	41mm	External palatal length:	44mm
Nasal breadth:	20mm	External palatal breadth:	47mm

Bicondylar width:	103mm	Mandibular angle:	55%
Symphyseal height:	21mm	Height of ramus:	41mm
Bigonial width:	77mm		

Foramen magnum – length 34mm, breadth 27mm