

20. D'EWES, SIR SIMON, *Autobiography*, 1845, p. 59, cited by Drayton, M., *op. cit.*, vol. v, p. 141.
21. 'Ordeal', *Encyclopaedia Britannica*, 1884, vol. xvii, p. 819.
22. LEHMANN, K., 'Das Bahrrecht', *Germanist. Abhandl. für Konrad v. Maurer*, 1893, s. 42; cited by Reik, T., *op. cit.*, p. 112.
23. TIMBS, J., *Curiosities of History*, 4th ed., London, Kent, 1859, p. 124.
24. 'Ordeal', *Encyclopaedia Britannica*, 1884, vol. xvii, p. 819.
25. T'WAIN, MARK (Clemens, Samuel L.), *The Adventures of Tom Sawyer*, New York, Grosset & Dunlap, 1946, p. 108.

## OSTEOGENESIS IMPERFECTA FROM AN ANGLO-SAXON BURIAL GROUND AT BURGH CASTLE, SUFFOLK

BROADLY speaking, the identification of pathological processes in ancient peoples gives two kinds of information. It may reveal, often with great particularity, details about the way of life or environment of earlier populations. The recognition of malaria or tuberculosis in a group, a regularly recurring pattern of fractures, or the frequent appearance of a specific type of dental attrition or occupational osteoarthritis are of this kind. It may, however, in the present state of our interpretative capacity, tell us little beyond the fact that a certain condition has been identified as occurring in some ancient time or place. A single fractured femur and the sporadic occurrence of achondroplasia or Paget's disease are in this category.

The case here described is an interesting example of the recognition of a disease although little can be inferred from it.

This specimen comes from Burgh Castle, Suffolk, which is one of the 'Saxon shore forts' built by the Romans against the invading barbarians of Northern Europe. We know from Bede's *Historia Ecclesiasticae Gentis Anglorum* that in the time of King Sigeberht (A.D. 633) the Irish monk Fursey came with a few followers to convert the pagan Saxons and that he built a religious house here. The truth of this statement has recently been proved by excavation: Fursey's chapel has been found, together with its adjacent burial ground. Several centuries later the Normans occupied the same site and complicated its archaeology by building a motte and bailey castle on it. The bone discussed here comes from a disturbed burial in Fursey's Saxon cemetery.

It is a grossly deformed left femur which is also affected by post-mortem soil erosion—both the head and the condyles have become detached from the bone (Fig. 1). Its outstanding feature is the extreme distortion which has resulted in the distal two-thirds of the bone making an angle of about seventy-five degrees with the proximal third. A tentative reconstruction of the missing head and neck and of the condyles, suggests that its original length (if it could be straightened) would have been about 330 mm. In a normal bone this length would be appropriate to an age in middle childhood but the firmly united epiphysis of the lesser trochanter, with no sign of recent union, makes an age of at least seventeen or eighteen a more probable one for this specimen.

The shaft of the bone is slender and the ends, especially distally, are much expanded (Fig. 2). There is marked longitudinal ribbing on the posterior surface of the shaft on each side of the short *linea aspera*. At the level of sharpest angulation there is great irregularity of the posterior surface with deep fossae formed by what appear to be secondary struts or bars of osseous tissue (Fig. 3). There seems little doubt that the bone has been fractured at this level, probably at least twice. The damaged extremities

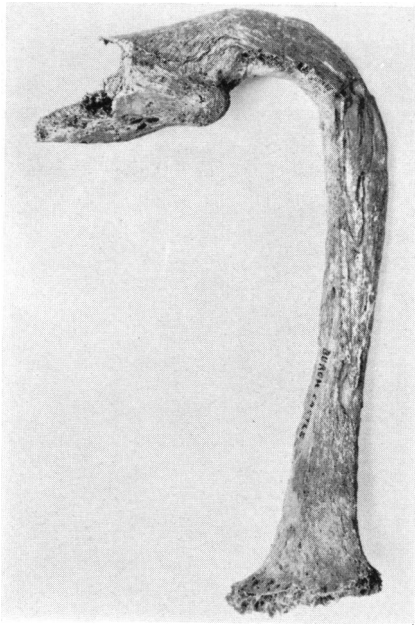


Fig. 1

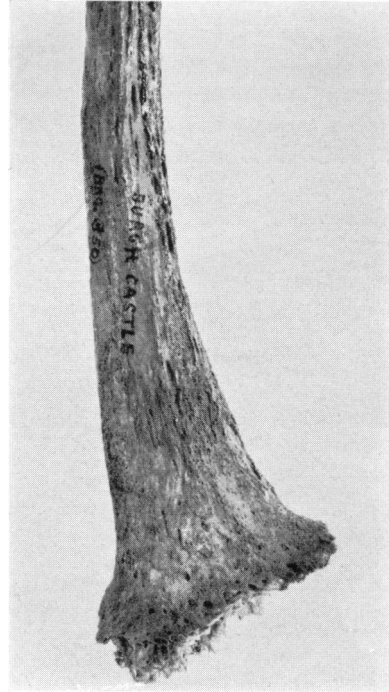


Fig. 2

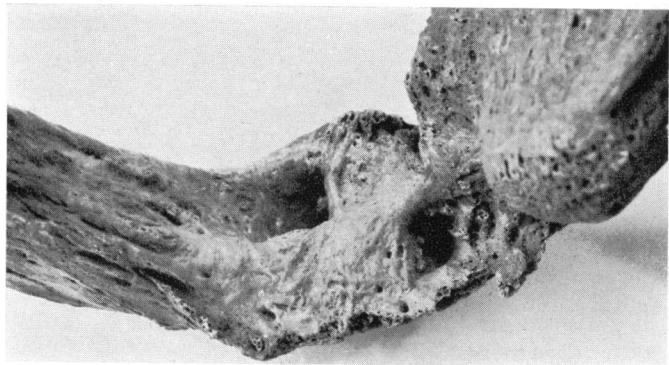


Fig. 3

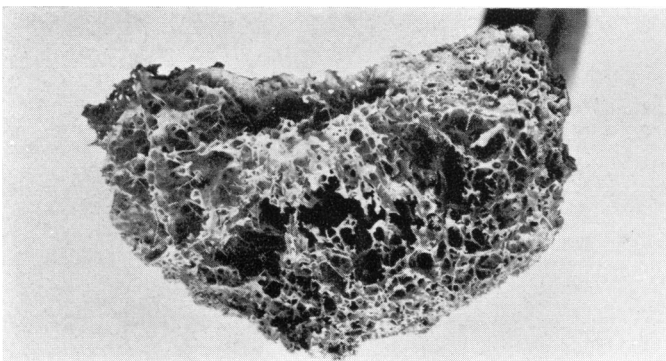


Fig. 4

Deformed left femur from Burgh Castle, Suffolk (see text for discussion of the special characteristics here illustrated).





Fig. 5. X-ray of the deformed left femur.

permit a view of its interior and reveal that the trabeculae are coarse in structure and greatly reduced in number (Fig. 4). Apart from the sharp angulation at the site of the fractures there is a slight increase in the curvature of the shaft distal to this level, and it is probable that the condyles would have been set in an abnormally oblique plane.

The following features are seen radiographically: (Fig. 5) the shaft is narrow with marked terminal flaring; the trabeculae are reduced, irregular and coarse; osteoporosis is present with localized thinning of the cortex; and evidence of healed sub-trochanteric fractures can be seen.

This combination of macroscopic and radiographic abnormalities is suggestive of osteogenesis imperfecta, the graded complex of osseous dysplasias which includes Vrolik's and Lobstein's diseases. In fresh bone additional confirmation of the diagnosis can be obtained from the greatly reduced ash content, which may be as low as 25 per cent. In a bone which has been exposed to the leaching effects of soil action for nearly fifteen hundred years this test would be quite unreliable.

It is most unfortunate that no other part of this skeleton survives. Although its antiquity is not in question it came from an area of the Saxon cemetery in which the burials had been disturbed by successive interments. Moreover, later agricultural use of the site, with ploughing, had caused further disturbance to some of the bodies.

Alternative diagnoses need to be considered and of these rickets is important. But I have no hesitation in rejecting this condition. Despite the superficial resemblance given by the angulated shaft and its spreading distal extremity there is much to be said against the diagnosis. Perhaps the strongest argument against it is that, although we know these people suffered intermittently from famines, rickets simply did not occur among them. Many hundreds of Saxon skeletons have been examined from this and neighbouring burial grounds without any hint of the disease being found—a sharp contrast to its frequency in Medieval and later periods. The reason for this is not entirely clear, but there is some evidence that these Burgh Castle people were largely dairy farmers who were able to get a good ration of milk in their diet.<sup>1</sup> Furthermore, the climate at that time was probably better and sunnier than it became later. Fracture in childhood might by itself produce this appearance, but I do not think it is a likely diagnosis. Anglo-Saxon fractures often united in bad position, but the union tended to be sound, with abundant callus, and subsequent growth of immature bones was usually good. Dysplasias of the Lichtenstein and similar types have little to recommend them in the present case.

Many other possibilities might be considered with decreasing probability, but on balance it seems that osteogenesis imperfecta, though not unassailable, is the likeliest diagnosis. This takes on an added interest in view of its archaeological associations and the rarity of the disease. Despite suggestions that this condition has been recognized in ancient burial grounds it is difficult to find an unambiguous and convincing case in palaeopathological records. The present example seems to be worth publishing on that account.

CALVIN WELLS

#### ACKNOWLEDGEMENT

I am indebted to Mr. Charles Green, the excavator, of the Ministry of Public Buildings and Works (Inspectorate of Ancient Monuments) for permission to publish this case.

#### REFERENCE

1. WELLS, CALVIN, *Bones, Bodies and Disease*, London, Thames and Hudson, 1964.