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Woolly rhinoceros from the Scottish Pleistocene

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Synopsis

Evidence for the existence in Scotland of the woolly rhinoceros, *Coelodonta antiquitatis* (Blumenbach), has previously been confined to one metacarpal bone. An additional tibia, humerus and molar tooth are now known and are briefly described. All finds are from different localities in the Kelvin valley of the Bishopbriggs district, Lanarkshire. Collagen from the humerus has yielded a radiocarbon date of 27 550 years B.P. This date implies either that the bone is derived from an earlier deposit or that the Kelvin valley sands and gravels are much older than recently suggested and of Middle/Late Weichselian interstadial age.

Introduction

Finds of fossil Quaternary mammals are rare in Scotland and satisfactory proof of the existence of the woolly rhinoceros *Coelodonta antiquitatis* (Blumenbach) was hitherto afforded by a single toe-bone from Bishopbriggs, Lanarkshire (Swinton 1927; Gregory and Currie 1928). Nineteenth-century records of supposedly fossil rhinoceros horns are unreliable (Buckland 1825, pp. 309–11) although horn might be expected to be preserved rather than bone (Cornwall 1958, p. 69) in the peat in which one of the horns was found. This note records three additional specimens from different localities in the Bishopbriggs district. Two of the specimens (2 and 3 below) were brought to the writer's attention by Mr C. E. Palmar of Glasgow City Museum in 1963; the third find was made by quarrymen in late 1963 and the bone was donated to the Hunterian Museum in 1964.

Finds from the Bishopbriggs district

1. The left second metacarpal previously known was found in 1925, in the south-west corner of Bishopbriggs No. 2 sand pit (Grid Reference NS 623732). The locality encircled on Fig. 1 is taken from that recorded on the 1:2500 sheet NS 6273 (*fide* A. Herriot). The bone was found in gravel *c.* 46 ft below a surface level of 150–60 ft O.D. (Flett 1927). Hunterian Museum specimen V.5570.

2. A crown of a right third upper molar was found on 8th January 1931 and acquired by the late L. M. Mann. It occurred in what Mann termed a " laminated gravel " in Crofthead pit (Fig. 1) at a depth of 16 ft below a surface level of *c.* 175 ft O.D. The crown of the tooth shows no signs of wear suggesting that it was unerupted or only recently erupted at the time of death. Since the third molar

is the last to erupt, however, the animal was probably not juvenile but a young adult. Glasgow City Museum specimen G66.29.a.

3. An abraded distal fragment of a left tibia, found 23rd August 1932 and acquired by L. M. Mann (Pl. 1, Fig. 1). The specimen occurred in a layer of sharp brown sand in the south-east corner of Crofthead pit at a depth of 18 ft below a surface level of 175 ft A.O.D. Glasgow City Museum specimen G66.29.b.

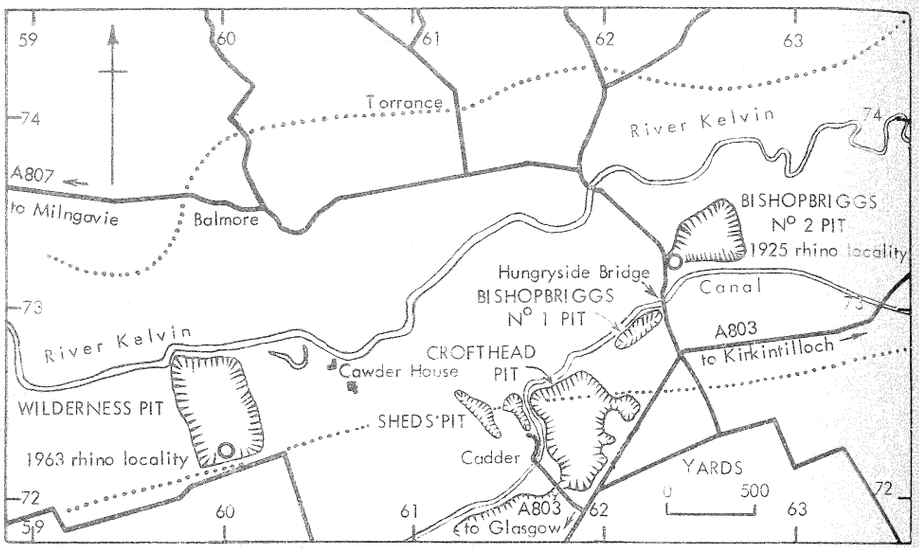

FIG. 1. Map of Cadder district of Bishopbriggs, Lanarkshire, showing sand and gravel pits referred to in the text. The 1925 and 1963 *Coelodonta* localities are shown by the circles but the other two localities are only known to be within Crofthead pit. Dotted lines indicate the Ordnance Datum contour on the rock surface of the buried channel of the River Kelvin. Some data from Robertson and Haldane (1937, pp. 150-154, Fig. 25) and Forsyth (1965) are incorporated.

This specimen was the subject of an address by Mann to the Glasgow University Geological Society on 2nd March 1933, when it was claimed to be a " Palaeolithic smoothing tool of shoe-horn type, fashioned from the femur (*sic*) of a young rhinoceros." Mann's main evidence for this being a Palaeolithic tool was that it measured a finite number of units on his chart of " Prehistoric Craftsmen's Measures " (Mann 1930). The lecture was reported in the *Glasgow Herald* for 3rd March 1933 (p. 4). Immediately there followed a lively correspondence which was to last until 10th June 1933 in the columns of that newspaper, challenging Mann's interpretation of this bone as an implement, with contributions from McCallien, Bailey, Tyrrell and others (Mann 1938). A. D. Lacaille (personal communication) deduced that the bone was not a Palaeolithic implement and on

FIG. 1

FIG. 2

FIG. 3

re-examination of the specimen in 1964, in the light of experience with many true and supposed Pliocene and Pleistocene bone implements, reaffirmed his earlier unpublished opinion.

4. A left humerus lacking proximal head and tuberosities and left lateral condyle (Pl. 1, Figs. 2, 3). This specimen was picked off a conveyor belt carrying sand and gravel to the washing plant at Wilderness pit in late 1963. The bone was donated to the Hunterian Museum (specimen V.5958) by Mr W. G. Collins of Alexandra Transport Co. in February 1964. Since the bone was not found *in situ* but was dug from the working face by a mechanical excavator the exact horizon is unknown. However, Mr Collins states that the sand horizon shown on Fig. 2 was being excavated at that time, and this is borne out by the presence of sand in the cavity of the bone shaft.

The site was visited immediately after receipt of the bone, but the working face had already retreated some 25 ft behind the face from which the bone had been excavated. The section shown as Fig. 2 was measured at the nearest available face. Since the position of this section was accurately surveyed a grid reference can be given to the nearest metre as NS 60060, 72297. The bone locality was estimated to lie 25 ft at 307° from this measured section (Fig. 1).

Age

Through the courtesy of Dr J. B. Sissons, part of a Carnegie Trust grant for Scottish Pleistocene radiocarbon dates was used to obtain a radiocarbon age for specimen 4 above. Approximately 400 grammes of the proximal end of the bone were sent to Geochron Laboratories Inc. Dr H. W. Krueger reported that *c.* 150 g of the cleaned sample were used and yielded abundant well preserved collagen. The collagen was dated at 27 550 (+1370, −1680) years B.P.

Stratigraphy and Correlation

The ossiferous sand shown in Fig. 2 is overlain by a reddish brown sandy clay with pebbles, recently regarded as a boulder clay of the Perth readvance (Sissons 1963; 1965, p. 478). It is not possible to interpret this clay as a soliflucted earlier till since it is too widespread and caps the Wilderness Plantation ridge south of the site (Macgregor *et al.* 1925, p. 223; Forsyth 1965). The top of the ossiferous sand in the measured section (Fig. 2) was penetrated by a clay-filled fissure, one of the numerous ice-wedge casts recently recognised in the pits of this area and thought to have been formed under periglacial conditions during the pre-Perth readvance interstadial (= Bølling interstadial, 13 500-12 500 B.P.) or during "some earlier phase" (Galloway 1961a, pp. 177-9; 1961b, p. 348, Fig. 2), or even during the Perth readvance itself (Sissons 1964, p. 32; 1965, p. 495). The sands have been regarded as deposits laid down in a lake dammed up in the Kelvin valley by the

advancing Perth ice sheet (*cf.* Robertson and Haldane 1937, pp. 110-5; McCallien 1938, pp. 132-3; Sissons 1964, p. 32; 1965, p. 478). This interpretation would invalidate Galloway's estimate of the age of ice-wedge formation. It is also difficult to envisage how ice-wedges could have been formed and preserved under lake conditions.

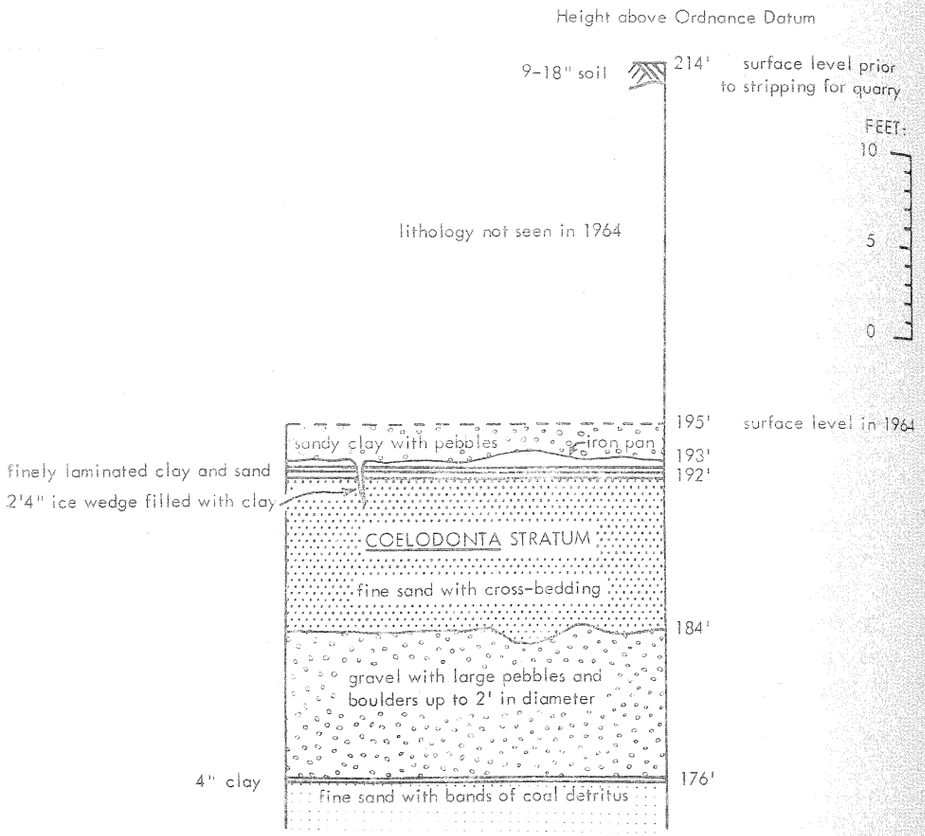

FIG. 2. Measured section of succession exposed in 1964 in Wilderness pit (at NS 60060, 72297), taken as near as possible to the site of the 1963 *Coelodonta* find.

The date obtained from the humerus implies that either the current correlation of the Kelvin valley deposits, as outlined above, is wrong or that the humerus, and by implication the other bones and the tooth, are derived from an earlier deposit. All the bones are abraded to some extent, but in such sands and gravels abrasion would doubtless occur rapidly and need imply only a short *post mortem* transport distance. Whether all the bones and tooth belong to one creature, even though separated by over one and a half miles laterally and by *c.* 80 ft fall from west to east, it is impossible to say without detailed statistical investigation of *Coelodonta* skeletons. The abrasion of the metacarpal is slight and the regions of the other bones that are preserved are known to be those least vulnerable to damage. Thus Cornwall (1957, pp. 201, 202) notes that it is usually the distal end of a tibia which is found and that the head and tuberosities of a humerus decay first. At least part of the humerus abrasion probably occurred during mechanical excavation. If the bones are derived a source rock of suitable age is as yet unknown, but could be presumed to have been destroyed by later readvances.

If the bones are accepted as being *in situ* a reinterpretation from the radiocarbon date would indicate that the containing deposit was laid down during a Middle/Late Weichselian (Würm II/III) interstadial (? = Paudorf or Breda interstadial— Godwin 1960). In this connection the radiocarbon date of 28 140 B.P. obtained by Fitzpatrick (*in* Sissons 1965, p. 471) for a podsol beneath a till in the Elgin district seems significant. The till referred to is presumably that left by the Aberdeen-Lammermuir readvance (Sissons 1965, Fig. 14.4). The new radiocarbon date is remarkably close to Fitzpatrick's and suggests that the *Coelodonta* sands were laid down in front of the ice sheet either during the retreat prior to, or during the advance of, the Aberdeen-Lammermuir sheet and not the Perth sheet. It may be recalled that Lacaille (1954, Fig. 6, pp. 20, 22, 28, Table 1) attributed this deposit to the even older Würm I/II interstadial.

Possibly the deposits occur near the top of the sequence filling the Kelvin buried channel (Fig. 1), as Dr W. G. Jardine has suggested to me. If so it would indicate an older infilling of the channel than allowed by Sissons (1964, p. 34). The revision of the correlation of the Kelvin valley drift, and indeed of Scottish drift generally, that this radiocarbon date may necessitate can best be left until detailed local mapping of these deposits, at present in progress, has been completed. Such regional correlations would require a redrafting of the limits of the last glaciation stages proposed by Sissons (1965, Fig. 14.4), if the bones are indeed not derived.

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Explanation of Plate

Limb bones of woolly rhinoceros *Coelodonta antiquitatis* (Blumenbach) from Cadder district, Bishopbriggs, Lanarkshire.

Pl. 1, Fig. 1. Distal fragment of left tibia, specimen 3 in text, posterior view. Glasgow City Museum G66.29.b, ×0·5.

Pl. 1, Figs. 2, 3. Distal half of left humerus, specimen 4 in text, prior to cutting off sample for radiocarbon dating. Hunterian Museum V.5958, ×0·3. Fig. 2. Posterior view. Fig. 3. Anterior view.

An ice-wedge and associated phenomena in the Lower Limestone Series of Fife

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Synopsis

A previously unrecorded ice-wedge structure in the carbonaceous shales above the Charlestown Main Limestone at Cults, Fife, is described. Associated fracturing and distortion of the bedding are ascribed to an origin during Pleistocene periglacial conditions. Intense fracturing of the uppermost 5 metres of the shales suggests that the active layer penetrated to this depth for some time, its base being marked by sub-horizontal breaks.

Introduction

The prominent escarpment which runs south-westward from Cupar towards the Lomond Hills forms the southern boundary of the Howe of Fife. Its upper slopes are composed largely of thinly bedded limestones and shales. The limestones have been worked extensively at Cults, some 4 miles (6 km) south-west of Cupar.

The Charlestown Green Limestone (Robertson *et al.* 1949, p. 108) is exposed in many small workings beside the Chance Inn-Coaltown of Burnturk road. Above it are 35 m of dominantly arenaceous beds below the base of the Charlestown Main Limestone. Carbonaceous shales, 20-23 m in thickness lie between the Charlestown Main Limestone and a white calcareous sandstone which caps the hill. During recent years these upper shales have been worked to provide material for the manufacture of bricks. A well-developed ice-wedge structure is present in the superficial zones of the western end of the quarry in the shales [NO 338083].

Geometry of the structures

Ice wedge

The principal ice wedge consists of a central prism filled with partly indurated sandy material containing erratic blocks. Around this core the carbonaceous shales are markedly fragmented and disoriented for an average of 12 cm.

The wedge is 5 m in length and extends to a depth of 3·7 m below ground level at its apex. At the bedrock surface below 1·2 m of soil and drift it has a width of 0·85 m. The wedge is inclined southwards at an angle of 70 degrees to the horizontal. Excavation has shown that the wedge trends along N. 18° E. for