

THE WOOLLY RHINOCEROS IN LEICESTERSHIRE

by

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ABSTRACT: Prior to 1938 Pleistocene rhinoceros remains in Leicestershire were known only from Belgrave and Thurmaston. Various authors referred these either to the Woolly Rhinoceros (*Coelodonta antiquitatus*), or, more doubtfully, to the Narrow Nosed Rhinoceros (*Dicerorhinus leptorhinus*). In 1938 abundant remains were found in Pleistocene river gravels at Quorn and since the War bones have been recovered from other sites in the County. These are described for the first time and the previous records re-examined. All the rhinoceros remains are now referred to *Coelodonta antiquitatus* and there is no certain record of *Dicerorhinus leptorhinus* ever being found in Leicestershire. All the material described has been recovered from the Flood Plain Terrace Gravels of the Soar Valley and is now housed in Leicester Museum.

INTRODUCTION

The earliest record of fossil rhinoceros remains in Leicestershire is given in *The Physical Geography and Geology of the County of Leicester* (Ansted, 1866). Ansted notes that the drift gravels around Leicester have yielded evidence of both *Coelodonta antiquitatus* (the Woolly Rhinoceros) and of *Dicerorhinus leptorhinus* (the Narrow Nosed Rhinoceros). Unfortunately he gives no precise localities or references to the specimens discovered so it is now impossible to verify his remarks. Eleven years later W. J. Harrison published *A Sketch of the Geology of Leicestershire and Rutland* in which he records finds of the woolly rhinoceros at Thurmaston (in association with mammoth remains) and at Belgrave, both in Pleistocene gravels of the Soar valley. Many of the specimens referred to by Harrison were eventually presented to Leicester Museum. While Montagu Browne was preparing *The Vertebrate Animals of Leicestershire and Rutland* (1889) he submitted some of these rhinoceros remains to A. S. Woodward, formerly Keeper of Geology at the British Museum (Natural History), and on Woodward's authority described them as '*Rhinoceros leptorhinus* (Owen) . . . hitherto regarded as *tichorhinus*', a practice which he repeated in his later publication (Browne, 1893).

Browne, like Harrison, could record rhinoceros remains from only two localities in Leicestershire, Belgrave and Thurmaston. Writing over seventy years later, Posnansky (1960) refers the specimens once again to *Rhinoceros tichorhinus* and could add only one additional locality, Sileby, recorded in error for Quorn. Posnansky attributes the specimens to a late glacial phase of the Pleistocene as they occur in the gravels of the Soar Flood Plain Terrace. He lists *Mammuthus primigenius* (mammoth), *Bison priscus* (bison), *Rangifer tarandus* (reindeer), *Cervus elaphus* (red deer), *Cervus dama* (fallow deer)

Equus caballus (horse) and *Bos primigenius* (great fossil ox) as coming from the same horizon. The records of associated remains are taken from Browne's work (1889) and of these *Cervus dama* is probably from post-Pleistocene deposits.

Harrison could record only one specimen which came from the same locality as rhinoceros remains, a lower left molar of *Mammuthus primigenius* (Leic. Mus. 53'74) from Thurmaston, all that remained of a complete skull found in 1874. Of the rhinoceros teeth known to Harrison from this locality, only one specimen (68'74) survived to be described by Browne. Browne could quote only one additional specimen as probably associated with rhinoceros, an upper left molar of *Equus caballus* (2389E'86) from Belgrave, presented to Leicester Museum together with five associated rhinoceros molars (2389, 2389A-D'86), by G. H. Nevinson. Both Harrison and Browne mention that mammoth teeth and tusks, and reindeer antlers have been found at Belgrave but it is not clear whether any of these were found in association with rhinoceros remains.

Since the publication of Browne's major work well preserved rhinoceros remains have been discovered at other localities in Leicestershire, all from the Soar Flood Plain Terrace Gravels, and new species have been found in association with the remains. In view of the confusion regarding the identification of the Leicestershire rhinoceros described by Browne and Harrison, all the known specimens are described below.

The synonymy of the woolly rhinoceros is confused. At different times it has been named *Rhinoceros tichorhinus* Fischer, *Rh. antiquitatus* Blum., *Tichorhinus antiquitatus* (Blum.), and *Coelodonta antiquitatus* (Blum.). In the present work the woolly rhinoceros is referred to as *Coelodonta antiquitatus* (Blum.). The narrow nosed rhinoceros has also been described under *Rhinoceros hemitoechus* Falconer.

DESCRIPTION OF THE SPECIMENS

I. THURMASTON

Harrison describes the locality as a large gravel pit opened by the side of the Midland Railway main line, near Thurmaston. This may be the abandoned workings in terrace gravels south-east of the village (S.K.615080). Apparently several specimens were obtained from this pit prior to 1877 but only one now survives. It is an upper right molar (68'74) of *Coelodonta antiquitatus*. The external lamina (ectolophus) showing the diagnostic costae has not been preserved but judging by its size it could be a first molar. Dawkins (1863) gives a full description of the dentition of the woolly rhinoceros. The only other species found at the same locality is represented by the mammoth molar referred to above.

2. BELGRAVE

Both Harrison and Browne record rhinoceros remains from Belgrave but neither gives precise localities and it is now impossible to determine from which of the several pits on the Belgrave Road these specimens were obtained. All of these pits are now levelled. Under *Rhinoceros tichorhinus*, Harrison records the discovery, in 1861, of the upper milk molars of an individual from under nine feet of gravel but these are no longer extant. Other separate teeth known to Harrison were preserved, to be alluded to later by Browne (1889) as *Rhinoceros ?leptorhinus* and included in his "thirteen upper and eight lower molars". These are preserved in Leicester Museum (9'61, 33'63, 58'67, 100'69, 10'70, 95'75 and 43'76) and were all

collected between 1861 and 1876. The individual specimens can no longer be referred to their original numbers and they are described below under distinctive letters. A re-examination of the teeth, none of which appear to be associated, shows there to be fourteen upper molars (eleven right, three left) and seven lower molars (two right, five left) all the permanent dentition of *Coelodonta antiquitatus*.

The Upper Right Molars (A-K).

The dimensions of the teeth (cms.) measured at the base of the crown, are:

	I pm3	E pm3?	A m1?	B m1	D m2
1. Antero-posterior diameter	3.2	—	4.3	4.5	4.4
2. Antero-transverse diameter	4.6	4.4	—	6.0	6.1
3. Postero-transverse diameter	4.4	4.1	—	5.4	5.4

The enamel is broken away from the inner side of specimen A so full measurements are not possible but identification as m1 or m2 is shown by the characteristic costae on the outer lamina. Specimen B is almost perfect and shows the median sulcus cutting the base of the crown and the wide and deep grooves on the inner side of the fangs. There is a small tubercle blocking the entrance to the anterior valley (medsinus). Specimen D, a second molar, lacks this tubercle and has its fangs broken. It has a strongly developed cingulum crossing the anterior face but this does not extend across more than a third of the tooth. Both A and D have small tubercles blocking the entrance to the posterior valley (postsinus). Identification of teeth on costae alone is not always certain and specimen A may well be m2 as it bears a small tubercle blocking the entrance to the posterior valley. In the dentition of the Quorn skull (described below) this tubercle occurs only on m2 but does not appear to have been described from this or any other tooth. It may be diagnostic of m2 or worn away so rapidly on the other molar teeth that it has escaped notice.

Specimen E is heavily worn, even the anterior valley forming a well defined fossette. The fangs, the antero-lateral margin and the posterior margin are broken. The median sulcus of the outer lamina does not appear to affect the base of the crown, suggesting that the tooth is a pre-molar. The outer lamina bears fine, parallel, vertical striae, and coarser, non-parallel, vertical rugae, as well as costae. The upper portions of the costae have been worn away making certain identification difficult. Specimen I (pl.II fig. 2) has reached a similar degree of wear with three fossettes on the surface. Otherwise it is perfect and accurate measurements are possible.

Of the other upper right molars, specimens C, G, H, J and K are too badly broken for more accurate identifications to be made. Unlike all the other teeth, J is little worn though the fossette formed by the fusion of the coombing plates is present. Specimen F (pl.II fig. 3) is an abnormal tooth. The upper end of the anterior valley (medsinus) has been cut off by fusion of the anterior (parastelidion) and posterior (stelidion) coombing plates. An antestelidion (a process projecting from the anterior collis into the anterior valley) almost isolates a second fossette in the anterior valley.

The Upper Left Molars (A-C).

Except for the fangs, specimen A is almost perfect. Its dimensions are:

1. Antero-posterior diameter	3.4 cm.
2. Antero-transverse diameter	4.6 cm.
3. Postero-transverse diameter	4.5 cm.

It is a third pre-molar of *Coelodonta antiquitatus*. Apart from its slightly larger size it is a mirror-image of specimen I, an upper right third pre-molar. The other specimens are too badly broken for accurate measurements or determinations to be made.

The Lower Right Molars (A, B).

Both teeth are broken and repaired. Their dimensions are:

	A	B
	pm.4	m1
1. Antero-posterior diameter	3.3	3.3
2. Antero-transverse diameter	2.8	2.9
3. Postero-transverse diameter	2.8	2.6

The Lower Left Molars (A-E).

Teeth A and B have only the outer lamina and exterior fangs preserved. Identification is based mainly on the form of the costae on the outer surface. The other teeth are almost perfect though D is heavily worn. Specimen E is illustrated in pl.III fig. 3. Their dimensions are:

	E	D	C	B	A
	pm2	pm4	pm4	m1	m2
1. Antero-posterior diameter	2.1	3.2	2.9	3.3	4.2
2. Antero-transverse diameter	1.8	2.7	2.9	—	—
3. Postero-transverse diameter	2.0	3.0	3.0	—	—

Browne mentions also an upper left molar from Belgrave presented by W. Gamble in 1881 (223'81). It is a last molar (m3), triangular in outline and well preserved. Its dimensions are:

1. Antero-posterior diameter	4.5 cm.
2. Antero-transverse diameter	5.2 cm.
3. Postero-transverse diameter	3.9 cm.

The anterior valley is deep and its entrance blocked by a small cusp. The coombing plates have cut off a small fossette in the anterior valley. The posterior valley is represented by a groove on the posterior aspect of the tooth, with a small cusp at its base.

The only associated teeth collected from Belgrave are a series of lower right molars (2389, 2389A-D'86) found in 1886 and shown in pl.III fig. 2. Probably from the same individual, they all show a similar state of wear and poorly developed rugae. Their dimensions are:

	2389	A	B	C	D
	m3	m2	m1	pm4	pm3
1. Antero-posterior diameter	4.3	4.3	3.6	3.0	2.4
2. Antero-transverse diameter	3.3	3.1	3.1	2.7	2.1
3. Postero-transverse diameter	2.6	3.0	3.0	2.8	2.3

The first pre-molar present in the woolly rhinoceros, pm2, is missing. All these teeth and the preceding are from the woolly rhinoceros.

The only bone known to have been found in Belgrave was identified by Browne as a second left metacarpal (8'76) though it agrees more closely to a right metacarpal IV (Brandt, 1877, Taf.IX, fig. 10). Comparison with similar specimens in the British Museum (Natural History) confirms the latter identification. It is shown in pl.IV fig. 5.

Dimensions:

1. Total length	14.7 cm.
2. Breadth of proximal end	4.8 cm.
3. Thickness of proximal end	4.4 cm.
4. Breadth at middle	4.2 cm.
5. Thickness at middle	2.4 cm.
6. Breadth of distal end	4.6 cm.
7. Thickness of distal end	3.6 cm.

The bone is well preserved and is believed to be from the woolly rhinoceros though other species may well have similar measurements.

3. QUENIBOROUGH

In 1955 the middle portion of the shaft of a left tibia (23'1955) was obtained from a sandpit near Queniborough though the exact locality was never recorded. Both articulations are missing but the bone shows the distinctive triangular cross-section and the anterior crest (pl.IV fig. 7).

Dimensions:

1. Total length of fragment	22.8 cm.
2. Breadth at middle	7.1 cm.
3. Thickness at middle	6.2 cm.
Ratio 2:3	1.16

Bernsen (1927) described a specimen from Krayberg for which the ratio is 1.22, slightly more than the Queniborough specimen.

4. WANLIP

Mammalian remains recovered from Wanlip Gravel Pit (SK 603115) besides rhinoceros, include mammoth and red deer, while from nearby excavations remains of the giant Irish deer have been found (Sizer, 1962). The only bones found are a complete right radius (367'1959) of *Coelodonta antiquitatus*, obtained in 1959, and a damaged left humerus collected in 1963.

The humerus (176'1963) is wanting the proximal articulation and the distal articulating surfaces are damaged (pl.IV fig. 1) though the coronoid and olecranon fossae are present.

Dimensions:

1. Total length of fragment	22.0 cm.
2. Breadth at middle	8.3 cm.
3. Thickness at middle	8.6 cm.
Ratio 2:3	0.97

The ratio is similar to Bernsen's specimen from Wiljui, unity.

The radius (pl.IV fig. 2) is perfect. Its dimensions are:

1. Total length	37.8 cm.
2. Breadth of proximal surface	11.3 cm.
3. Thickness of proximal surface	7.2 cm.
4. Breadth at middle	6.4 cm.
5. Thickness at middle	4.2 cm.
6. Breadth of distal surface	12.3 cm.
7. Thickness of distal surface	7.6 cm.
Ratios 2:3	1.6
4:5	1.5

5. QUORN (QUORNDON)

The most prolific source of woolly rhinoceros remains in Leicestershire was the gravel pit owned by Messrs. W. Moss and Sons Ltd. on the northern side of Quorn (SK 554170). In 1938 there were obtained from this pit part of a cranium, a lower jaw, one upper and one lower molar, two radii, two ulnae, a metacarpal, a femur and a tibia of rhinoceros, associated with bones, teeth and tusks of mammoth, and bones of horse and Bos or bison. Unfortunately no record was taken of the stratigraphy of the pit, which is now filled in, but the specimens are believed to have been found at the bottom of the gravel, some sixteen feet thick, resting on Keuper Marl. The specimens were housed in Loughborough Museum and in the collection of B. N. Wale of Loughborough. The Loughborough specimens were presented to Leicester Museum in 1951 (1234'1951) and the Wale Collection was bequeathed in 1961 (577'1961). The mammoth remains include a lower right molar (1234'-

1951/35a) and an upper left molar (577'1961/19), while the sole remains of horse is a right meta-tarsal cannon-bone (577'1961/181), and of Bos or bison a left meta-tarsal cannon-bone (577'1961/177).

The cranium (1234'1951/34d) is poorly preserved, extensive restoration with coloured plaster having obscured many of the finer details. It is extensively damaged on the left side and the anterior part is missing. The occipital crest is broken away. The lower jaw (described below) many have belonged to the same individual.

Viewed from above (pl.I fig. a) the cranium is narrowest just behind the zygomatic arches, widening posteriorly where it rises to the occipital crest, and anteriorly to a position just in front of the orbits. Here the bone is roughened for the attachment of the nasal (posterior) horn. The area of attachment for the frontal (anterior) horn is missing. Only the right zygomatic arch is present and the temporal fossae of both sides are damaged.

No important features are preserved on the left side but the right (pl.I fig. b) is in a fairly good state of preservation. Though damaged and repaired, the zygomatic arch is present with the glenoid cavity (for the articulation of the lower jaw) beneath its posterior part. The external auditory meatus is visible just posterior to it. The anterior margin of the orbit is damaged. Though the anterior of the cranium is broken, the infraorbital foramen and the posterior margin of the nasal opening can be made out. Part of the ossified nasal septum which supported the nasal bones is preserved. This feature is found complete only in the woolly rhinoceros and served to support the very long frontal horn.

Except for the posterior part, the underside of the cranium (pl.I fig. c) is badly crushed. The condyles are undamaged and the margin of the foramen magnum entire. Only on the right side is the condyloid fossa present together with the root of the para-occipital process. Fracture and repair of the back of the cranium has made measurement of the occipital, palato-occipital and palato-foramen magnum angles unreliable.

Teeth are present on both sides. On the left only the three molars are preserved, on the right the last pre-molar and the three molars are in place. The first two molars of the left side have their outer laminae missing, the last molar is entire. The teeth of the right side are almost perfect.

Dimensions:

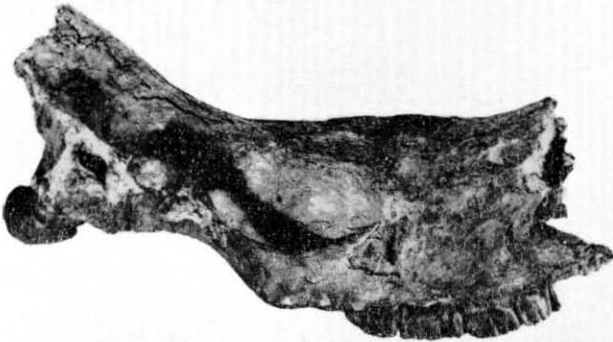
1.	Total length	62.0 cm.	
2.	Min. breadth of inter-temporal plateau	9.9 cm.	
3.	Breadth of occipital crest	15.0 cm. (app.)	
4.	Breadth at auditory foramen	21.0 cm. (app.)	
5.	Max. breadth across zygomatic arches	25.0 cm. (app.)	
6.	Breadth anterior to orbits	21.0 cm. (app.)	
7.	Breadth across nasal openings	9.0 cm. (app.)	
8.	Breadth across condyles	13.3 cm.	
9.	Length of condyles	8.0 cm.	
10.	Height, base condyles to occipital crest	24.0 cm.	
11.	Width of palate between pm4	5.8 cm.	
12.	Width of skull between pm4	15.6 cm.	
13.	Width of palate between m3	7.8 cm.	
14.	Width of skull between m3	25.0 cm. (app.)	
15.	Breadth of foramen magnum	4.1 cm.	
16.	Length of foramen magnum	5.0 cm.	
17.	Length of tooth row	Right	Left
	Pre-molars	4.6 cm.	— cm.
	Molars	16.0 cm.	15.0 cm.

Each tooth has a well marked anterior cingulum but rugae are only poorly developed. Only the last molar of each series has a small tubercle

PLATE I



a.



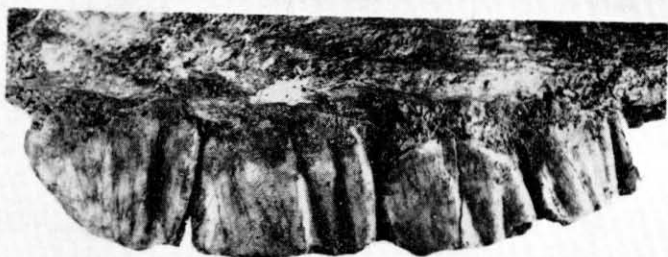
b.



c.

For explanation of the Plates see page 45

PLATE II



1a.



1b.



2a.



2b.



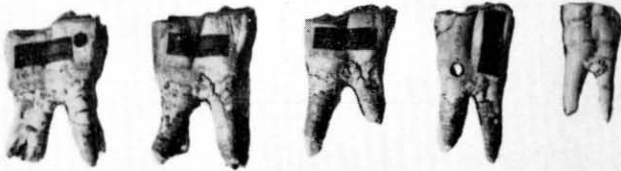
3.



1a.



1b.



2.



3a.



3b.

PLATE IV



blocking the entrance to the anterior valley (medsinus). The second molars of both sides have a small cusp blocking the entrance to the posterior valleys.

The isolated upper left molar (577'1961/202) does not belong to the cranium. It is heavily worn and the roots are broken away. The posterior valley is completely isolated, and the anterior valley nearly so, its entrance blocked by a cusp which has just come into wear. Rugae are poorly developed and on the inner surface vertical and horizontal striae can be seen. According to Dawkins the horizontal striae are most commonly seen in young pre-molars. The anterior aspect of the tooth shows the beginning of a strong cingulum springing from the inner side. Comparison with the teeth still present in the cranium suggests that this is a first molar.

Dimensions:

1. Antero-posterior diameter	3.9 cm. (app.)
2. Antero-transverse diameter	6.2 cm. (app.)
3. Postero-transverse diameter	6.0 cm. (app.)

The mandible is poorly preserved (1234'1951/34c), broken and repaired at the symphysis, the incisive border on the right side broken away (pl. III fig. 1). The left horizontal ramus is complete as far back as the end of the tooth row. Its inner surface is flat, the outer and lower surfaces convex. The outer surface of the right ramus is missing but enough of the bone remains to hold the teeth in position. Only the anterior margin of the right ascending ramus is preserved but the coronoid process is wanting. The symphyseal region appears to be slightly spatulate. All traces of the mental foramina are obscured.

Except for pm2 on both sides, the complete adult dentition is in place. The alveolar surface anterior to pm3 is damaged on both ramii but on the left side a faint trace of the pm2 alveolus remains. All teeth are but slightly worn on their crests. On both sides pm3 is the most heavily worn and m1, particularly on the right side, is below the level of the other teeth. The left teeth appear to have been removed during preservation and replaced incorrectly leaving gaps between pm4 and m1, and between m2 and m3. Marks on the posterior side of pm4 suggest that this gap was not present during life. All the teeth are well preserved and show the characteristic grooves and costae on their outer surfaces. Some of the teeth, particularly pm4 and m1 on the right side, show fine, horizontal and vertical parallel striae on both inner and outer sides. Horizontal striae only are present on the inner side of m2 (left and right). Rugae are but poorly developed on all teeth.

Dimensions:

1. Length of left horizontal ramus	44.0 cm.	
2. Height of left ascending ramus	22.4 cm.	
3. Length, incisive border to pm3	8.4 cm. (app.)	
4. Length of symphysis	10.2 cm. (app.)	
5. Min. breadth of symphysis	7.6 cm. (app.)	
6. Height of jaw	Left	Right
Behind m3	8.0 cm.	—
Behind pm2	5.4 cm.	5.8 cm.
7. Thickness of jaw	Left	Right
Behind m3	6.5 cm.	—
Behind pm2	5.3 cm.	5.1 cm.
8. Distance between horizontal ramii at alveolar level		
Behind m3	15.0 cm.	
Behind pm2	5.9 cm.	
9. Length of tooth row	Left	Right
Pre-molars	6.2 cm.	6.7 cm.
Molars	15.6 cm.	14.9 cm.

The only separate lower molar found is a second left true molar (577'-1961/201). Only the hollow crown of the tooth is preserved and this is broken

and repaired. Rugae are well developed but no striations are visible. Only the tips of the crescents are worn. On the anterior side the cingulum completely traverses the tooth, the posterior cingulum is strongly developed but the inner termination is broken. There is no sign of a cingulum on the inner side of the tooth.

Dimensions:

1. Antero-posterior diameter	4.0 cm.
2. Antero-transverse diameter	3.2 cm.
3. Sostero-transverse diameter	3.1 cm.

Two proximal fragments of right radii have been recovered from Quorn. One specimen is well preserved but is wanting the distal head (577'1961/178).

Dimensions:

1. Total length of fragment	25.3 cm.
2. Breadth of proximal surface	11.3 cm.
3. Thickness of proximal surface	7.4 cm.
4. Breadth at middle	6.4 cm.
5. Thickness at middle	4.6 cm.
Ratios 2:3	1.5
4:5	1.4

The ratios are very similar to those calculated for the Wanlip specimen.

Of the second right radius (1234'1951/34b) only the inner part of the proximal articulating surface and part of the shaft remains and no comparative measurements could be taken.

The ulnae, a right and a left, do not seem to be associated with the radii. Both are poorly preserved. The olecranon process and the distal extremity of the right ulna (577'1961/183) are broken off (pl.IV fig. 3) and the specimen has been crudely restored with plaster. The bone has a triangular cross-section, the anterior and lateral faces slightly convex, the inner surface concave. The posterior aspect shows the strong ridge which supported the olecranon process. Diagonally crossing the anterior face is an inter-osseous space.

Dimensions:

1. Total length	33.9 cm.
2. Length of trochlea notch	8.0 cm.
3. Length below trochlea notch	24.0 cm.

The left ulna (1234'1951/34c) is similarly broken below the olecranon process and at the distal extremity.

Dimensions:

1. Total length	25.5 cm.
2. Length of trochlea notch	7.2 cm.
3. Length below trochlea notch	15.0 cm.

Of the bones of the forefoot, only a right metacarpal II (577'1961/182) survives. It is entire and identification was confirmed by comparison with specimens in the British Museum (Natural History). It is shown in pl.IV fig. 4.

Dimensions:

1. Total length	16.6 cm.
2. Breadth of proximal end	4.8 cm.
3. Thickness of proximal end	4.0 cm.
4. Breadth in middle	4.1 cm.
5. Thickness in middle	2.6 cm.
6. Breadth of distal end	3.8 cm.
7. Thickness of distal end	4.2 cm.

Bones of the hind limb include a left femur (pl.IV fig. 6) and a broken right tibia. The femur (577'1961/176) is cracked and repaired, the outer

edge of the third trochanter broken away, the lateral condyle badly broken and the median condyle damaged.

Dimensions:

1. Total length	50.3 cm.
2. Max. breadth above trochanter III	20.7 cm.
3. Max. diameter of caput	10.4 cm.
4. Min. breadth above trochanter III	10.7 cm.
5. Min. breadth of shaft	9.0 cm.
6. Thickness at 5	6.5 cm.
7. Max. breadth of distal end	13.7 cm.
8. Max. thickness of distal end	18.6 cm.
9. Height, lower edge trochanter III to upper edge major trochanter	31.5 cm.
Ratios 5:6	1.38
7:5	1.52
8:7	1.36
7:4	1.28

Except for the first ratio (1.38:1.50), these figures are very close to those obtained by Bernsen for a specimen from Krayberg.

As with the Queniborough specimen, only the middle portion of the shaft of the right tibia remains (1234'1951/34a).

Dimensions:

1. Total length of fragment	20.5 cm.
2. Breadth at middle	6.2 cm.
3. Thickness at middle	5.9 cm.
Ratios 2:3	1.05

The ratio is smaller than for the Queniborough specimen.

CONCLUSIONS

All the rhinoceros remains described above are referable to *Coelodonta antiquitatus*. There is no reliable record of the occurrence of *Dicerorhinus leptorhinus* (Owen) in Leicestershire. The mammalian remains directly associated with rhinoceros, *Mammuthus primigenius*, *Cervus elaphus*, *Equus caballus* and *Bos primigenius* or *Bison*, and those known to come from the same horizon but not definitely from the same locality, *Rangifer tarandus* and *Megaceros giganteus*, suggest a mixed cold-temperate climate. The association of mammoth, reindeer and horse with woolly rhinoceros are indicative of tundra or cold steppe, a treeless scrub or grassland environment, but the occurrence of red deer and *Bos* or *bison* suggest also forest. Such reindeer remains as are preserved from nearby localities are tundra forms. Apparently *Megaceros* has no preference for any particular biotype. The narrow nosed rhinoceros was a grass feeder (Wüst, 1922, Zeuner, 1934) and though it has been found in association with mammoth it was more tolerant of warmth and is more typically found in association with hippopotamus and the straight tusked elephant (Falconer, 1868). Its occurrence in the Soar Flood Plain Terrace Gravels would be unusual.

Remains of the woolly rhinoceros are not uncommon in Pleistocene deposits. The best known are those from Siberia and Starunia. Both the bones (Brandt, 1877) and the soft parts (Nowak *et al.*, 1930) have been described, and Zeuner (1945) had deduced its appearance in life. Zeuner, from a study of the carriage of the head, concluded that the animal grazed on low growing vegetation. Well preserved remains from the British Pleistocene, apart from those found in cave deposits, are, however, rare. Finds of isolated teeth are fairly common but associated bones have been described only from Lawford, near Rugby (Cuvier, 1822, Buckland, 1823, Owen, 1846).

Crania have been found at Lawford, Stonesfield (Oxon.), Chartham (Kent) and dredged from the North Sea. The Leicestershire specimens are, therefore, an important addition to the remains known from the British Pleistocene.

The fauna obtained from the Flood Plain Terrace Gravels is very similar to that of the Baginton-Lillington Sands and Gravels and to the No. 2 Terrace of the Avon (Shotton, 1953). The Baginton-Lillington deposits are pre-Chalky Boulder Clay and it seems likely that the Leicestershire gravels are equivalent to the No. 2 Terrace Gravels of the Avon.

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REFERENCES

- ANSTED, D. T., 1866. *The physical geography and geology of the County of Leicester*. London.
- BERNSEN, J. J. A., 1927. *The geology of the Teglian Clay and its fossil remains of rhinoceros*. Diss. Univ. Amsterdam.
- BRANDT, J. F., 1877. Versuch einer Monographie der Tichorhinen Nashörner. *Mém. Acad. Imp. Sci. St. Petersburg*, (7), 24, (4), 1-135.
- BROWNE, M., 1889. *The vertebrate animals of Leicestershire and Rutland*. Birmingham and Leicester.
- BROWNE, M., 1893. A contribution to the history of the geology of the Borough of Leicester. *Trans. Leicester Lit. Phil. Soc.*, N.Q.S., 3, 123-240.
- BUCKLAND, W., 1823. *Reliquiae diluvianae*. London.
- CUVIER, G. L. C. F. D., 1822. *Recherches sur les ossements fossiles*, 2, (1). Paris.
- DAWKINS, W. B., 1863. On the molar series of *Rhinoceros tichorhinus*. *Nat. Hist. Rev.*, 3, 525-538.
- FALCONER, H., 1868. *Palaeontological memoirs and notes*, 2. London.
- HARRISON, W. J., 1877. *A sketch of the geology of Leicestershire and Rutland*. Reprinted from *White's history, gazetteer and directory of the Counties*. Sheffield.
- NOWAK, J. et al., 1930. The second woolly rhinoceros (*Coelodonta antiquitatus* Blum.) from Starunia, Poland. *Bull. Int. Acad. Polon. Sci. Lett. Cracovie*, B, suppl., 1-47.
- OWEN, R., 1846. *A history of British fossil mammals and birds*. London.
- POSNANSKY, M., 1960. The Pleistocene succession in the Middle Trent Basin. *Proc. Geol. Assoc., Lond.*, 71, 285-311.
- SHOTTON, F. W., 1953. The Pleistocene deposits of the area between Coventry, Rugby and Leamington and their bearing on the topographic development of the Midlands. *Phil. Trans.*, B, 237, 209-260.
- SIZER, C. A., 1962. Remains of the Irish giant deer in Leicestershire. *Trans. Leicester Lit. Phil. Soc.*, 56, 24-27.
- WÜST, E., 1922. Beiträge zur Kenntnis der diluviellen Nashörner Europas. *Centralbl. Min. etc., Stuttgart*, 641-656, 680-688.
- ZEUNER, F. E., 1934. Die Beziehungen zwischen Schädelform und Lebensweise bei den rezenten und fossilen Nashörnern. *Ber. naturf. Ges. Freiburg i Br.*, 34, 21-72.
- ZEUNER, F. E., 1936. Palaeobiology and climate of the past. *Probl. Palaeont., Moscow*, 1, 199-216.
- ZEUNER, F. E., 1945. New reconstructions of the woolly rhinoceros and Merck's rhinoceros. *Proc. Linn. Soc., Lond.*, 156, 183-195.

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EXPLANATION OF THE PLATES

PLATE I

Coelodonta antiquitatus

Cranium from Quorn. Spec. No. 1234'1951/34d.

- a. Dorsal view.
- b. Right lateral view.
- c. Ventral view.

PLATE II

Coelodonta antiquitatus

1. Cranium from Quorn. Spec. No. 1234'1951/34d. Views of upper right molars.
 - a. Right lateral view.
 - b. Oral view.
2. Third upper right pre-molar, Belgrave. Specimen No. I.
 - a. Right lateral view.
 - b. Oral view.
3. Abnormal upper right molar, Belgrave. Spec. No. F. Oral view.

PLATE III

Coelodonta antiquitatus

1. Mandible, Quorn. Spec. No. 1234'1951/34e.
 - a. Left lateral view.
 - b. Palatal view.
2. Lower right molars, Belgrave. Specs. No's. 2389, 2389A-D'86.
Left lateral view.
3. Second lower left pre-molar, Belgrave. Spec. No. E.
 - a. Left lateral view.
 - b. Oral view.

PLATE IV

Coelodonta antiquitatus

1. Left humerus, Wanlip. Spec. No. 176'1963.
Anterior view.
2. Right radius, Wanlip. Spec. No. 367'1959.
Anterior view.
3. Right ulna, Quorn, Spec. No. 577'1961/183.
Anterior view.
4. Second right metacarpal, Quorn. Spec. No. 577'1961/182.
 - a. Anterior view.
 - b. Posterior view.
5. Fourth right metacarpal, Belgrave. Spec. No. 8'76.
 - a. Anterior view.
 - b. Posterior view.
6. Left femur, Quorn. Spec. No. 577'1961/176.
Anterior view.
7. Left tibia, Queniborough. Spec. No. 23'1955.
Anterior view.