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THE PLEISTOCENE MAMMALIA OF THE SEWERBY–HESSLE BURIED CLIFF, EAST YORKSHIRE

BY P. J. BOYLAN

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CONTENTS

SUMMARY

The Pleistocene mammal material from the deposits of the buried cliff of Holderness has been re-examined. Revised faunal lists are given, and the identification of material previously described as *Rhinoceros leptorhinus* Cuvier and *Arvicola praeceptor* Hinton is discussed. The former is now identified as *Didermocerus hemitoechus* (Falconer) and the latter as *Arvicola terrestris* (Linnaeus). The Sewerby material, from the raised beach and associated deposits, is believed to be Ipswichian in age, whilst that of Hessle, from a chalk rubble solifluxion deposit, is of Weichselian age.

I. INTRODUCTION

An up-to-date review of the stratigraphical position and significance of the buried cliff which runs from Sewerby to Hessle, beneath the later Pleistocene deposits of Holderness, has been given by Catt and Penny (1966), who also give a locality map. The buried cliff is clearly the key to the dating of the Pleistocene deposits of Holderness, and is of wider significance in the interpretation of the Pleistocene of north-eastern England. The cliff and its associated deposits can be traced in boreholes in a number of places, and have been seen at the northern end at Sewerby, near Bridlington (Reid, 1885; Lamplugh, 1888, 1889, 1891), and at the southern end at Hessle, near Hull (Phillips, 1868; Walton, 1895; Sheppard, 1899, 1903; Crofts, 1906). At both localities the lowest deposit was a beach shingle, on a wave-cut platform of chalk. This was overlain by various subaerial deposits, sealed by a thick chalk rubble, which appears to be a solifluxion deposit.

According to the published records (e.g. Lamplugh, 1888), fossil bones and teeth were first found at the classic Sewerby buried cliff site in the Spring of 1884 by J. R. Mortimer. However, there is a fragment of a *Palaeoloxodon antiquus* tusk (an unregistered

specimen in the Geological Survey Museum), which is labelled "first tusk found at Sewerby given by J. Brow 1850, found *ca.* 36 years previous" (i.e. 1814), and which is almost certainly from the blown sand horizon of the buried cliff. A further tusk was purchased by the Geological Survey in 1879 (Geological Survey Museum No. 21634). Nevertheless, it was certainly Mortimer's work that drew attention to the site (Reid, 1885). The deposits were investigated and described in more detail by a committee established by the Yorkshire Geological Society (Lamplugh, 1888), which was succeeded by a British Association Committee (Lamplugh, 1889, 1891). Lamplugh's 1888 and 1889 lists of the mammalian fossils were prepared largely by H. M. Platnauer of the Yorkshire Museum, assisted by E. T. Newton of the Geological Survey. It is clear from correspondence and manuscripts (Geological Survey) that Platnauer and Newton were uneasy at the publication of their provisional determinations by Lamplugh (1889), particularly since the material was not fully consolidated and restored until early in 1890, and Newton did not see the Yorkshire Museum material until the Spring of that year. When the whole of the material was examined, Newton had to delete three of Platnauer's determinations: "*Elephas* (? *primigenius* Blum.)", "*Bos primigenius* Boj.", and "*Equus*", which were based on mis-identifications.

The specimens from the Yorkshire Geological Society excavations were given conditionally to the Yorkshire Museum, York (Lamplugh, 1888); the bulk of the material from the British Association excavations was deposited with the Geological Survey (Lamplugh, 1891), although a small series was presented to the Mortimer Museum, Driffield (Sheppard, 1900, and MS. notes, Hull Museums), and was subsequently purchased for the Hull Museums with the rest of the Mortimer Collection. A small amount of material has been found since the British Association excavations but, with the exception of the remains of *Arvicola* (Bisat, 1940), the museum material does not seem to have been re-examined.

The mammal-bearing gravels associated with the buried cliff at Hessle were already well known as early as 1828 (Phillips, 1868), and faunal lists were given by Phillips (*op. cit.*), Reid (1885), and Walton (1895). In about 1899, T. Sheppard gathered together the main collections for examination by E. T. Newton, after which the material was placed in the Hull Museum, and was subsequently destroyed by fire in 1943, except for a few fragments in the Mortimer Collection. Newton's determinations were published by Sheppard (1899), who subsequently amended Newton's list (Sheppard, 1903, 1908).

I have re-examined the published records and all of the surviving material from the buried cliff, but must emphasize that a substantial proportion of the specimens is now lost as a result of war-damage and of the disintegration of some of the more friable specimens.

II. The Mammalian Faunas

(a) Sewerby

Hyaena, *Crocuta crocuta* (Erxleben). Carnivore gnawings were recognized on a number of specimens (Lamplugh, 1888, 1889), and Newton found a hyaena ulna, which was recorded as "*Hyaena crocuta* var. *spelaea*? Goldf." (Lamplugh, 1891). I have seen some suggestion of gnawing, but the ulna has not been found; however, it seems very unlikely that Newton would have mis-identified such a characteristic specimen.

Bear, *Ursus* sp. Canon J. S. Purvis found the lower jaw of a young bear in the rainwash beneath the blown sand in about 1950 (J. S. Purvis, personal communication). The specimen was deposited in a public collection but, unfortunately, it cannot be traced at the present time. This is the first record of the genus from the deposit.

*Straight-tusked Elephant,[1] *Palaeoloxodon antiquus* (Falconer and Cautley). This species was recognized (as "*Elephas*" *antiquus*) by Platnauer and Newton (Lamplugh, 1888, 1889, 1891). Elephant remains are quite common in the surviving collections (GSM. 6274–5, 21633–6, inclusive; 6 unreg.; YM. several fragments, unreg.). The material includes four tusk fragments which are only slightly curved and are easily distinguished from those of mammoths (*Mammuthus* spp.). The large tusk fragment figured by Sheppard (1934) was also of this species, although the specimen was destroyed in 1943 (HM.). I have seen parts of at least ten molars; these all have the long, narrow crown, the thick, crimped enamel, the thick development of dentine within each "plate" and plate formulae characteristic of this species (Soergel, 1912); in addition, several molars clearly have a loxodont pattern on the worn crown. None of the molars resembles those of *Mammuthus primigenius* (Blumenbach).

[1] Abbreviations:
GSM, Geological Survey Museum, London.
HM, Hull Museums (Mortimer Geological Collection).
YM, Yorkshire Museum, York.
unreg., Unregistered specimen(s).
* Determination confirmed from the surviving museum material.

*Narrow-nosed Rhinoceros, *Didermocerus* [="*Dicerorhinus*"] *hemitoechus* (Falconer). Newton finally decided that the rhinoceros remains from Sewerby should be attributed to "*Rhinoceros leptorhinus* Cuv." (=Cuvier) (Lamplugh, 1891). Apart from a few post-cranial fragments which are not specifically determinable, a rhinoceros is represented by the remains of approximately sixteen cheek teeth, many of them fragmentary (GSM. unreg.; YM. unreg.; HM. 53/65/1). All of the specimens that are specifically identifiable (particularly the complete and diagnostic M^2 and M^3 crowns in the Yorkshire Museum) are of *Didermocerus hemitoechus* (Falconer).

The taxonomy and nomenclature of fossil and recent rhinoceroses are still in a rather confused state: many "species" have been based on very imperfect material, and there is still no general agreement on the classification at generic and sub-family levels (Hooijer, 1966, pp. 120-1). The Sewerby rhinoceros material has almost invariably been recorded as *Rhinoceros leptorhinus* Cuvier (Lamplugh, 1891, and subsequent authors). Cuvier and his contemporaries used this name for several "non-tichorhine" rhinoceroses, including forms later described as *Rhinoceros etruscus* Falconer, *Rh. megarhinus* de Christol, *Rh. kirchbergensis* Jäger (=*Rh. merkii* Jäger), and *Rh. hemitoechus* Falconer. Cuvier based his *Rh. leptorhinus* on a skull from the "Pliocene" (? Lower Villafranchian) of the Val d'Arno which was drawn and described for him by Professor Cortesi, although it appears that he did not see the specimen himself. He considered that the absence of a bony nasal septum was particularly diagnostic, and emphasized this in his vernacular name for the species: *Rhinocéros à narines non-cloisonnées* (rhinoceros with undivided nostrils). Subsequently there was considerable confusion, since it was claimed that the specimen was badly drawn and that a nasal septum was present. A series of specimens, including a cranium with a partial nasal septum, from the Clacton Channel, Essex, were described by Owen (1846, pp. 356-82), and were attributed by him to *Rh. leptorhinus* Cuvier. Some later workers, recognizing that Owen's material differed from Cuvier's type specimen, began to attribute the species *Rh. leptorhinus* to Owen, using the Clacton cranium as the type. Since such usage was both invalid and extremely confusing, Falconer (1868, pp. 311-54) proposed the name *Rh. hemitoechus* for *Rh. leptorhinus* Owen *non* Cuvier. Falconer (*op. cit.*, p. 309) is probably correct in suggesting that *Rh. leptorhinus* Cuvier is the valid name for the Villafranchian species *Rh. megarhinus* de Christol, but the name *Rh. leptorhinus* has been so widely and indiscriminately used that it would be best suppressed.

There is also some difficulty concerning the generic attribution of *Rh. hemitoechus*. It was certainly a slender-limbed, two-horned rhinoceros allied to the present-day Asiatic Rhinocerotinae rather than to the African Dicerotinae. Modern authors usually ascribe it to *Dicerorhinus* Gloger (1841): type species *Rhinoceros sumatrensis* "Cuvier" (=Fischer), the present-day Sumatran Rhinoceros. This is, however, an objective synonym of *Didermocerus* Brookes (1828) (type species, *Rh. sumatrensis* Fischer). Simpson (1945, p. 142) argued that *Didermocerus* should be suppressed, largely on the grounds of disuse, although he did not ask the International Commission on Zoological Nomenclature to do so. Ellerman and Morrison-Scott (1951, pp. 339-40) argued in favour of *Didermocerus* and rejected Simpson's suggestion that the Brookes "Catalogue" was not a valid publication: Simpson himself accepts the generic name *Acinonyx* which Brookes established in the same work. Unfortunately, both *Dicerorhinus* and *Didermocerus* are now in current use so I have recently requested the I.C.Z.N. to determine which name is to be used (Boylan, 1967).

*Hippopotamus, *Hippopotamus amphibius* Linnaeus. Lamplugh (1891) refers to a fragmentary canine, which I have seen (YM. unreg.), and to a molar, which appears to be lost.

? Giant Deer, *Megaceros giganteus* (Blumenbach). During his survey of the area, Reid (1885, p. 49) found antler fragments of "*Cervus megaceros*" in an excavation at the Sewerby buried cliff. It is clear that Lamplugh and Newton were very anxious to trace these fragments (GSM. MS.), so that the identification could be confirmed. Reid thought that the specimens were sent to the Geological Survey Museum at Jermyn Street, London, in 1885, but they do not seem to have been seen since that date.

*Bison, *Bison* cf. *priscus* (Bojanus). The remains of a large bovid are quite common in the collections (GSM. 6276 and 14 unreg.; HM. 53/65/2-6; YM. approx. 14 unreg.). Most specimens could be ascribed to either *Bos* or *Bison*, but a left metatarsal (GSM. 6276) and a left metacarpal (GSM. unreg.) are clearly of bison. A tolerably complete calcaneum (GSM. unreg.) also shows the characters that Olsen (1960) considers to be diagnostic of *Bison* rather than *Bos*. The metapodials are quite large, corresponding with those of, for example, the interglacial "Hyaena Stratum" of Tornewton Cave, Torbryan, Devon (Sutcliffe and Zeuner, 1962),

and can be tentatively referred to *Bison priscus* rather than to the living European *Bison bonasus* (Linnaeus).

*Water Vole, *Arvicola terrestris* (Linnaeus). Lamplugh (1891) listed a first lower cheek-tooth and two incisors under *Arvicola amphibius* (Linnaeus). The cheek-tooth has been seen (GSM. unreg.) but the location of the incisors is not known. In about 1937 M. A. C. Hinton re-examined the cheek-tooth, apparently at the request of A. S. Kennard, who was then cataloguing the Pleistocene collections of the Geological Survey. Hinton considered that the tooth was of *Arvicola praeceptor* Hinton, and the re-determination was published by Bisat (1940, p. 143). *Arv. praeceptor* was based on a small amount of material from Ipswichian Interglacial deposits at Grays Thurrock, Ilford, and Barrington (Hinton, 1926); it differs slightly from the present-day British water voles. Ellerman and Morrison-Scott (1951, pp. 677-81) considered that the British *Arv. amphibius* (Linnaeus) is conspecific with the continental *Arv. terrestris* (Linnaeus). This view has now been confirmed by independent cytological and taxonomic studies, and is now generally accepted, although the name *amphibius* is valid for the English subspecies. In addition to the Sewerby specimen, which is poorly preserved, I have examined Hinton's type material of *Arv. praeceptor*, which is now in the Palaeontology Department of the British Museum (Natural History), and there is little doubt that all of the specimens are within the normal range of *Arv. terrestris*. There is considerable variation between individuals within the same population of species of *Arvicola*, and in view of this the characters noted by Hinton in his very small sample are of little value, even at sub-specific level.

(b) Hessle

Elephant, "*Elephas*" sp. This was recorded as *Elephas primigenius* by Phillips (1868) and Reid (1885). The records seem to have been based entirely on post-cranial fragments which are rarely diagnostic. If this is so, the material should more properly have been recorded as "*Elephas*" sp.

*Horse, *Equus* cf. *caballus* Linnaeus. Abundant horse remains were noted by Phillips (1868), Reid (1885), Walton (1895), and Sheppard (1899, 1903). In addition a lower incisor was figured by Owen (1846, fig. 148). A single determinable specimen has survived, which confirms these records; this is a proximal phalange (HM. 2/38/394) from the Mortimer Collection.

? Rhinoceros, "*Rhinoceros*" sp. Fragments of long-bones were attributed to *Rhinoceros* sp. by Reid (1885), and by Newton (Sheppard, 1899, 1903). However, there are no details or figures of the material on which the identifications were based.

? Red Deer, *Cervus elaphus* Linnaeus. Phillips (1875, p. 58) included "Deer" in his list of the Hessle fauna, and E. T. Newton recognized *Cervus elaphus* in the material examined by him (Sheppard, 1899, 1903).

? Reindeer, *Rangifer tarandus* (Linnaeus). A medium-sized cervid was noted as "*Cervus* sp." by Newton (*in* Sheppard, 1899), and as ? *Cervus tarandus* (Sheppard, 1903). Later Sheppard (1908) claimed to have confirmed his earlier provisional identification of the material. This record was based on a humerus, radius and ulna that Sheppard had found some time previously. Unfortunately, he did not make it clear whether these were the specimens which Newton had been unable to determine specifically nine years previously. Presumably Sheppard ascribed the specimens to reindeer largely on the grounds of size, since it is very difficult to make positive identifications of this species in the absence of either the antlers or the metapodials. Sheppard considered that some antler fragments were probably of this species, although a positive determination was not possible. The record should therefore be treated with caution.

III. Discussion

The recorded fauna of the Hessle deposit differs from that of Sewerby, and this led Melmore (1935) to argue that there was a considerable difference in age between the two ends of the buried cliff. However, the mammal remains are from quite different horizons in the sequence: at Sewerby, bones and teeth were found in the beach shingle and in the overlying rainwash and blown sand. The distribution of the specimens is summarized in Table 1. However, nothing was found in the thick chalk rubble which was the sole source of the Hessle mammals. It is most likely that the rubble represents a cold period of some length between the end of the Sewerby interglacial and the Dimlington interstadial, as suggested by Catt and Penny (1966), so the Hessle fauna cannot be compared directly with that of Sewerby. The detailed descriptions of the stratigraphy are closely comparable, and the minor differences are probably geographical. For example, the molluscs of the beach shingle at Sewerby ("*Purpura*" *lapillus*, *Littorina littorea*, *Ostrea edulis*

and *Mytilus edulis*) are typical of a marine shore, whilst those of Hessle (*Cardium* and "*Tellina*") prefer a more estuarine habitat. It is interesting to note that a calcreted bed was found at Hessle (Sheppard, 1903, pp. 165-6) in a situation comparable with that recently described at Sewerby by Catt and Penny (1966, p. 387). The only real difference of note is that the chalk platform beneath the beach is alleged to be somewhat higher at Hessle than at Sewerby. According to Crofts (1906) the top of the platform is at 20·0 feet O.D. at Hessle, compared with 7·5 feet O.D. at Sewerby.

TABLE 1
Distribution of Sewerby mammal remains, based largely on Lamplugh (1891, p. 376), but revised by the author

Species	Beach shingle	Rainwash	Blown sand
Crocuta crocuta (Erxleben)	X	—	X
Ursus sp.	—	X	—
Palaeoloxodon antiquus (Falconer and Cautley)	X	—	X
Didermocerus hemitoechus (Falconer)	X	—	"*Rhinoceros*" sp.
Hippopotamus amphibius (Linnaeus)	X	—	—
? Megaceros giganteus (Blumenbach)	—	X	—
Bison cf. *priscus* (Bojanus)	X	X	X
Arvicola terrestris (Linnaeus)	—	X	—

However, in the series of boreholes drilled by the Hull Water Department in 1924, the platform at the foot of the buried cliff was found at 8 feet O.D., less than five miles north of Hessle (Newton, 1925) so the accuracy of Crofts' figure is in doubt. Unfortunately it is not possible to re-examine the Hessle sections at the present time.

Catt and Penny are firmly in favour of an Ipswichian (=Last) Interglacial date for the Sewerby beach, although this view was questioned by D. B. Smith (in discussion of Catt and Penny, 1966). It is clear that the interglacial elephant *Palaeoloxodon antiquus*, a large (probably interglacial) *Bison* and, almost certainly, the interglacial *Didermocerus hemitoechus*, were all found even as high up as the blown sand and it appears that the material from the Sewerby beach, rainwash and blown sand represents a single relatively homogeneous fauna (although the apparent fall in sea level and the

absence of *Hippopotamus* above the beach shingle may indicate some deterioration in the climate during the "rainwash" and "blown sand" periods). The Sewerby fauna is undoubtedly interglacial in character, and is quite typical of assemblages from the warmest parts of the Ipswichian, such as those of many cave sites, for example, the Hyaena Stratum of Tornewton Cave, Torbryan, Devon (Sutcliffe and Zeuner, 1962), and of the Lower Floodplain Terrace deposits of Trafalgar Square, London. The latter is especially important, since it has been assigned to pollen zone f of the Eemian (=Ipswichian) Interglacial by Franks (1960). The significance of the records of *Hippopotamus*, *Crocuta* and "*Arvicola praeceptor*" has already been discussed by Catt and Penny. The re-determination of the vole as *Arvicola terrestris* does not affect their argument since this species, like hippopotamus, is not known in the British Hoxnian, although it occurs in great abundance in many Ipswichian faunas.

The recognition of the rhinoceros as *Didermocerus hemitoechus* is of considerable significance. Recent studies by Sutcliffe (1964) indicate that *Didermocerus kirchbergensis* (Jäger) and *D. hemitoechus* both occur in the Hoxnian, the former being more abundant in the Lower Gravel at Swanscombe, and the latter being rather more common in the slightly later deposit at Clacton. In the earlier Ipswichian deposits of the Ilford Terrace both species again occur, but *D. hemitoechus* is more numerous. In the later deposits of the climatic maximum of the Ipswichian, such as those of the Lower Floodplain Terrace and of a number of caves, *D. hemitoechus* is very common, but *D. kirchbergensis* appears to have become extinct. The absence of *D. kirchbergensis* at Sewerby is therefore suggestive of Ipswichian age. The absence of certain other species is also considered to be of some significance, although it must be remembered that the surviving sample of the fauna is very small. There are no traces of any horse remains at Sewerby, although species of *Equus* are frequent members of most British Pleistocene assemblages, except those of the Cromerian and the climatic optimum of the Ipswichian, during which periods horses seem to have been rare or absent (Sutcliffe, 1964). A fairly late date within the Ipswichian is also suggested by the elephant remains, since only *Palaeoloxodon antiquus* is present. In the earlier deposits of the Ilford Terrace early forms of mammoth (*Mammuthus* cf. *trogontherii* (Pohlig) or *Mammuthus primigenius* (Blumenbach)) are also present.

The fauna of the Hessle chalk rubble is not diagnostic, but the abundance of horse remains clearly distinguishes it from that of Sewerby. If Sheppard's identification of reindeer is correct, then a

cold phase (either Saale or Weichsel) is definitely indicated. It should be noted that in their important study of Tornewton Cave, Torbryan, Sutcliffe and Zeuner (1962) found both horse and reindeer in the Glutton Stratum (Saale Glaciation), the Elk Stratum (earlier Weichsel) and in the Reindeer Stratum (later Weichsel), although these two species were absent from the Ipswichian Hyaena Stratum. Nevertheless, I believe that the evidence in favour of an Ipswichian age for the Sewerby fauna is so strong that the Hessle material can be confidently referred to the Weichsel.

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Patrick J. Boylan, B.Sc., A.M.A.,
Kingston upon Hull Museums,
23/24 High Street,
Hull, Yorkshire.