THE PLEISTOCENE GEOLOGY AND FAUNAS AT NEWTOWN, ISLE OF WIGHT

Martin Clive Munt and Ariane Burke

Site and situation

Newtown is situated on the north-west coast of the Isle of Wight between Thorness Bay and Hamstead Point. The site lies on the seaward side of Brickhouse Point and falls within the Newtown Harbour Nature Reserve, which is jointly administered by the Isle of Wight County Council and the National Trust (see fig. 1).

The solid geology of the area comprises a foreshore cut in the Osborne Marls and Fishbourne Members of the Headon Hill Formation behind which is a low cliff of Bembridge Limestone (nomenclature after Insole & Daley 1985).

The western tip of Brickhouse Point is covered by sand dunes. The harbour probably dates to the later middle Flandrian submergence, having been formed by the drowning of the confluencing flood plains of two rivers, one flowing from the east and the other from the south-west. The seaward cliff line rises to a maximum of 10 metres, and is fringed by broken ground. Cliff recession has resulted in the development of a wave-cut platform, the proximal margin of which is obscured by sand and shingle up to high water mark (base of cliff).

The tidal range rarely exceeds 4 metres with maximas between 5 and 6 metres. This range limits access to the Pleistocene deposits which lie seaward of the platform. Access is provided by a shingle bar visible for approximately 100 metres offshore at maximum low tides.

Site history

The earliest recorded finds of Pleistocene Mammalia at Newtown are mentioned by Adams (1877–1881). Adams records the presence of an ultimate upper molar of *Mammuthus primigenius* in the Woodwardian Museum, noting that the specimen displayed eight ridges in 4 inches. The enamel was thin, but the dentine and especially the cement was in excess.

In 1923 a number of bones were found on the shore at Newtown. The collector, Mr. M. Thorne believed the material to have come from a cliff fall (Museum of I.W. Geology records). The material, which was presented to the Museum of I.W. Geology, comprised lower molars (M.I.W.G. 1775), part of an ulna (M.I.W.G. 1777), fragment of a mandible (M.I.W.G. 1776) all of *Bos* sp. and a mandible of *Cervus elaphus* (M.I.W.G. 1778). All these specimens, with the exception of mandible M.I.W.G. 1776, have since been lost.

The significance of the Newtown site seems to have gone unnoticed after these early finds. Poole (1936) mentioned Newtown in his exhaustive study of the Mesolithic industries from the Island. He noted that an associated fauna at Newtown consisted of teeth and bones of horse and ox. The bones of ox were said to be numerous, many of the long bones having been split longitudinally. The fauna and industry were recovered from

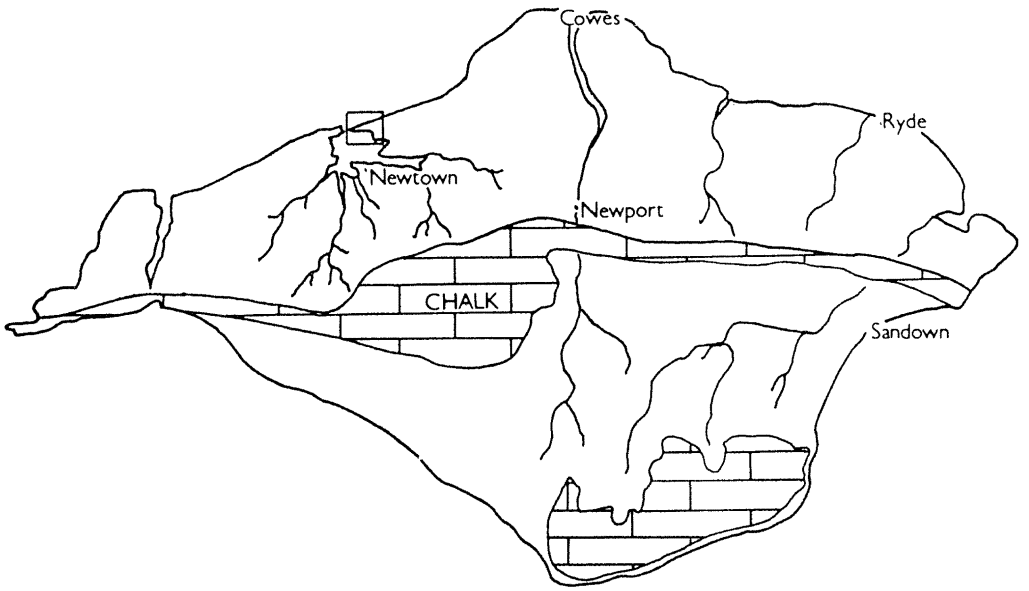

Figure 1a. Map of the Isle of Wight showing the location of the Newtown site.

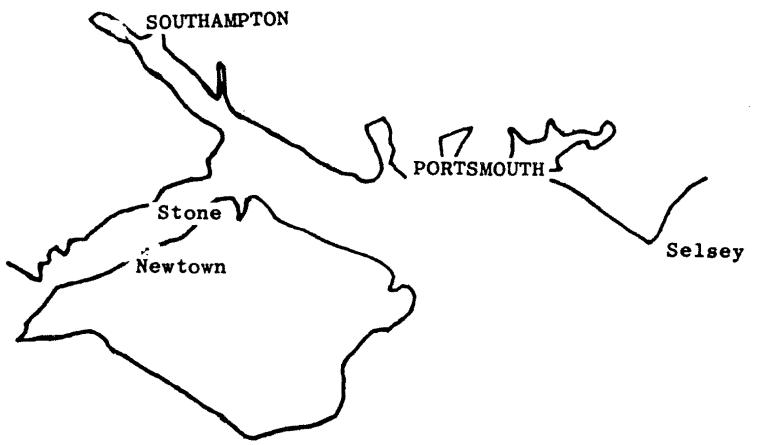

Figure 1b. Map of the Solent-Spithead area showing the location of Pleistocene localities mentioned in the text.

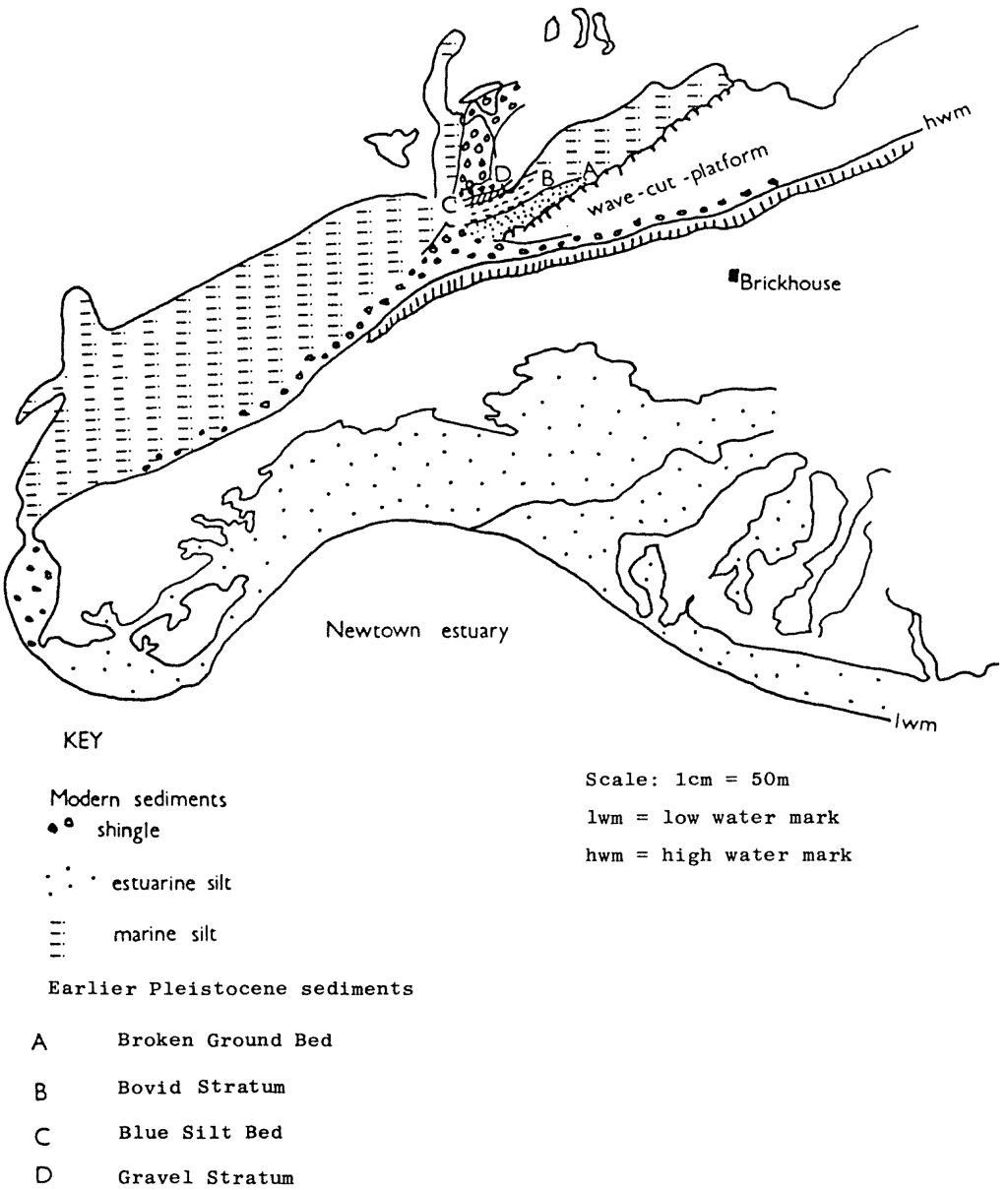

Figure 2. Brickhouse Point showing distribution of Pleistocene deposits.

an estuarine clay found below high water mark. From Poole's description of the location as being on the eastern bank of the estuary mouth, the Mesolithic site would seem to be some distance from the main faunal site, being 1 kilometre from the harbour mouth.

In 1939 interest was again roused, Jackson (1939) records the discovery of the bones of *Bos primigenius, Palaeoloxodon antiquus* and *Hippopotamus* sp. At this time it appeared that the *Bos* bones had come from a different context to those of the elephant and hippopotamus. Jackson proposed that the bones had been obtained from a composite

deposit, suggesting that wave action had intermixed the *Bos primigenius* bones (Mesolithic according to Poole) with the older *Palaeoloxodon* and *Hippopotamus*. Jackson's conclusions stemmed from the preservation and colour of the bones. Upon examination Jackson suggested that the colour of the *Bos primigenius* bones was suggestive of derivation from a soft, silty or peaty alluvium. This was in contrast to the matrix adhering to a portion of *Palaeoloxodon* tusk, which had been found projecting from the shore (*in situ*?). This matrix Jackson described as a very compact and tenacious brickearth. A similar matrix was found on an *Hippopotamus* sp. tooth.

Lucas (1971) produced an update on developments and finds from Newtown. In addition to *Palaeoloxodon* and *Hippopotamus*, the remains of *Cervus elaphus* were reconfirmed from fresh discoveries. The bones of *Bos primigenius* were re-identified as *Bison priscus* after the recovery of a number of partial and complete crania. *Sus scrofa* had also been found, although the antiquity of these remains was viewed as suspect. In addition, the bones of *Ovis* sp. and *Equus caballus* had been recorded, but the recent date of these remains was apparent from their condition.

With the exception of numerous references in Newtown Survey Reports (e.g. Cox 1976, 1977, 1978, 1979), the site has received no major coverage, although the 'reef fossil hunts' have continued annually.

Site geology

During the spring maxima tides of May 1985 the first systematic attempt to record the geology of the site was undertaken. With high tides in excess of 5.1 metres predicted, the two hour window of low tide exposed a horizontal area reaching up to 70 metres from high water mark. This revealed four distinct stratigraphic units seaward of the distal edge of the wave-cut platform (fig. 2). Each unit ran approximately parallel to the platform edge. A transect was selected at random and the width of outcrop of each unit was measured. It was not possible to gauge the thickness of each unit as all pits dug rapidly filled with water. The following sequence was recorded:

H.W.M. to distal edge of platform (28m; Osborne Marls and Fishbourne Members of Headon Hill Formation).

Unit 1. 28m to 50m (22m)

A mass of clasts, ranging up to 2m in diameter, of weathered blocks of mudstone in a matrix of clay with scattered pebbles of flint. Both angular and rounded clasts are present. These clasts can be attributed to the adjacent Palaeogene on the basis of their fossil content and colour (blue-grey with grey, green and brown banding). This bed has been designated as the 'Broken Ground Bed'.

Unit 2. 50m to 55m (5m)

Grey-blue (weathering brown) clay with laminations, parallel to the surface, containing clasts of mudstone (less than 1cm diameter) and derived fossils (*Polymesoda convexa, Corbicula* sp. and *Melanoides ?acuta*) common in the nearby Palaeogene beds particularly the Bouldnor Formation. During the survey numerous bones were collected from this bed attributable to a bovid. The bed was subsequently designated the 'Bovid Stratum'.

Unit 3. 55m to approximately 65m (approximately 10m)

Blue silty clay with no apparent structure. This bed yielded two elephant tusks and a *Palaeoloxodon antiquus* molar. Derived Palaeogene fossils are also present. This bed has been designated as the 'Blue Silt Bed'.

Unit 4. 65m to below lowest tide mark (seaward extent unknown)

Matrix-supported gravel with a maximum clast size of 7.5cm. The clasts are predominantly flint, being mostly sub-rounded and displaying both frost and impact fracture surfaces. The matrix is a sandy clay. No faunal remains were observed. This bed,

designated the 'Gravel Stratum', overlies the Blue Silt Bed. The contact with the Blue Silt Bed is irregular.

Gravel Bar

The site is partially obscured by a modern gravel bar which spreads out and covers much of the surface of the Blue Silt Bed. Within this deposit there is much bone material reworked from the underlying fossil beds.

Discussion of the site geology

Very few direct conclusions can be drawn as to the relative ages of each unit. What is definable is that the Gravel Stratum overlies (or even oversteps) the Blue Silt Bed, and is therefore younger. The Bovid Stratum is nowhere observed to either overlie or underlie the Blue Silt Bed. The horizontally laminated Bovid Stratum abuts against the Broken Silt Bed. This in turn abuts against the wave-cut platform of Palaeogene mudstones.

In terms of energy regimes during deposition, the Gravel Stratum stands out as a separate event. The fine grained sediments and the conservation of derived fossils from the Palaeogene beds points to low energy conditions, possibly even the in situ breakdown of the solid geology during the Blue Silt Bed depositional phase. The marked lamination of the Bovid Stratum points to cyclical influxes of locally derived sediment. The Broken Ground Bed may be interpreted by comparison with the modern cliff line as the remnants of ancient cliff instability. The breakdown and erosion of this ancient cliff line may well have acted as a sediment supply to the Bovid Stratum, the two units being contemporary. Three possible interpretations can be forwarded for the origin of the Blue Silt Bed: (i) that it represents an inlier created by erosion; (ii) that it represents facies variation contemporary with the Broken Ground Bed and the Bovid Stratum; or (iii) it represents a channel fill cut into the older Bovid Stratum.

Faunal analysis

From the outset it was apparent that the sample size of the Newtown collection was too small to withstand much statistical handling. This inhibited the calculation of minimum numbers, comparison with other assemblages and detailed fragmentation analysis. A hierarchical agglomerative cluster analysis (using the Clustan package) was carried out on the *Bos/Bison* sp. This resulted in the identification of two separate assemblages within that group (see below).

The following Mammalia were identified:

Proboscidea
- *Palaeoloxodon antiquus* (straight-tusked elephant)
- *Mammuthus primigenius* (mammoth)

Perissodactyla
- *Coelodonta antiquitatis* (woolly rhino)

Artiodactyla
- *Hippopotamus amphibius* (hippo)
- *Cervus elaphus* (red deer)
- *Cervus* sp.
- *Rangifer tarandus* (reindeer)
- *Bos primigenius* (aurochs)
- *Bos/Bison* sp.

In addition the following Recent species are present:

Equus caballus (horse)
Sus scrofa (pig)
Bos taurus (domestic cow)
Ovis capra (domestic sheep)

Division of the fauna on the basis of preservation and colour of the bones

On the basis of the type of preservation and the colour of the bones, four groupings can be identified.

Firstly a megafauna can be identified as a separate group on the basis of the orange/ochre colouration. This includes the bones of *Mammuthus primigenius, Coelondonta antiquitatis, Cervus elaphus* and *Rangifer tarandus*. This colouration could have resulted from inclusion in gravel.

The second and third groupings consist of *Bos/Bison* sp., the two clusters being divisible on the basis of preservation. These two groupings far outnumber the first group. The first *Bos/Bison* cluster consists of better preserved material. This includes an almost complete adult skeleton. Lucas (1971) reported that several articulated skeletons of adult *Bison* had been discovered. The excellent and unravaged state of the remains would seem to point to swift burial, possibly following some catastrophic event, such as drowning. The second *Bos/Bison* cluster may or may not derive from the same bed as the first. The cluster appears to represent mostly surface finds, poorly preserved and of unknown derivation. No further conclusions may be drawn concerning this cluster.

The fourth and final grouping consists of the Recent species, which are easily identifiable as intrusive to the collection by their colouration.

Discussion of the faunal results

Palaeontological evidence from Newtown supports the identifiation of a cold stage fauna consisting of reindeer, woolly rhino and mammoth. These remains would seem to have been derived from a gravel deposit. At the same time it is not possible to attribute all the megafauna to the gravels, i.e. *Palaeoloxodon* and *Hippopotamus*. *Palaeoloxodon antiquus* has been confirmed from the Blue Silty Bed by the authors. On the suggestion of Jackson (1939), the remains of *Hippopotamus* can also be attributed to this unit.

The recognition of a clearly definable Bovid Stratum places no doubt upon the origin of the 'better preserved' cluster. The second *Bos/Bison* cluster, as implied above, seems to have been collected as surface finds. This interpretation is borne out by the collecting strategy which has been applied to the site. As for most of the year the *in situ* material is below low water mark, many finds have been made on the bar which cuts across the site and on the beach. Collecting strategy would therefore favour recovery of redistributed material which is more readily available throughout the year.

Butchery and predation

No butchery marks (except on bones identified as modern intrusives) have been observed nor are there any marks which could indicate that the collection had been ravaged by predators. Wave-rolling and encrustation may have obscured such marks had they existed. However no remains of carnivores have been collected from the site. Neither is there any evidence of human occupation and/or exploitation of comparative antiquity.

Additional notes on the Newtown fauna(s)

In addition to Lucas's (1971) observations regarding the discovery of articulated *Bison*

skeletons, further interesting instances have been noted by collectors. S. Hutt (pers. comm.) noted the discovery of an articulated fore-limb of a proboscidean (radius, humerus and scapula). Sadly the poor state of preservation resulted in instant disintegration as attempts were made at excavation. D. Tomalin (pers. comm.) notes that fishing operations throughout the eastern Solent have resulted in the dredging up of large mammalian bones similar to those found at Newtown. P. Ewbank (pers. comm.) has observed that *in situ* proboscidean remains are only found during the maximum low tides and at a considerable distance from the shore. Divers have also remarked on the quantity of large mammal bones to be found on the estuary floor (V. Basford pers. comm.)

Discussion of the fauna and geology

From the geological and faunal observations made at Newtown, three distinctive biostratigraphic 'units' can be defined (excluding Recent intrusives). The most recent phase is demonstrably represented by the Gravel Stratum. Tentatively we may assign the cold stage fauna consisting of mammoth, reindeer and woolly rhino to this unit. These remains form a distinct group on the basis of colour and preservation which is tied in with burial in a gravel substrate. There are no other adjacent known gravel outcrops. It is proposed that this grouping forms a definable assemblage present in the Gravel Stratum.

Underlying the Gravel Stratum we encountered the Blue Silt Bed with its fauna of straight-tusked elephant, *Hippotamus* and possibly *Bos primigenius*. *Hippopotamus* is a warm stage animal and reflective of a freshwater environment.

It is proposed that the Broken Ground Bed and the Bovid Stratum be considered as contemporaneous but with only the Bovid Stratum yielding *Bos* and/or *Bison* remains. This occurrence can be explained if this fauna be viewed as a death assemblage, consisting of individuals caught by rising waters or as corpses floating in. The adjacent cliff line could have also contributed to the death trap scenario. *Bos/Bison* remains are fairly common throughout the Pleistocene and it is not possible to reach any conclusions as regards dating.

Conclusions

On the basis of the geological and palaeontological evidence the Newtown fossil beds appear to be a complex of sediments formed during Pleistocene warm and cold stages. The earliest phase of sedimentation is represented by units 1 (Broken Ground Bed), 2 (Bovid Stratum) and 3 (Blue Silt Bed) yielding a rich 'warm' fauna. Further investigations may reveal that bed 3 (Blue Silt Bed) represents a second phase perhaps of channel cutting more recent than beds 1 and 2. In terms of fauna, the Blue Silt Bed assemblage of *Palaeoloxodon antiquus* and *Hippopotamus* sp. represents a full interglacial of Ipswichian character (presence of *Hippopotamus*).

The Gravel Stratum (bed 4) represents a more recent phase of sedimentation under high energy conditions. If we accept the hypothesis that the cold fauna is derived from this deposit, a late Ipswichian glacial-stadial or a Devensian interglacial-stadial is probable.

The authors propose that the events at Newtown should be viewed in relation to those at comparable Pleistocene sites in the Solent area. At Selsey West and Sparks (1960) recorded a sequence of sediments which was interpreted as a marine transgression of Ipswichian age. A similar sequence has been described from Stone (Brown et al. 1975), a site geographically close to Newtown. Sadly it is not within the scope of this work to draw more precise correlations which may be achieved by detailed pollen analysis and/or the isolation of a Pleistocene molluscan fauna.

Appeal

The authors would like to hear from persons interested in the site and in particular those who would be interested in and could provide facilities and/or expertise in the field of palynology. Interested parties should contact M.C. Munt, c/o Museum I.W. Geology, Sandown Library, High Street, Sandown, Isle of Wight.

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