Hightown

[SD 2950 0290]

Potential GCR site

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Introduction

Hightown, Sefton is famous for an important submerged forest of Flandrian age (Figure 8.114), which currently is being eroded extensively, along with the overlying dunes. Most of the early descriptions of submerged forests are of little scientific value, for example, Camden's description of the Mersey Flats in his Magna Britannia. However, there was correspondence in the July 1786 issue of the *Gentleman's Magazine* where a reader (Holt) reported a submerged forest at Crosby that extended upward of a mile towards Formby and was the earliest account that tried to interpret and understand the depositional history of the submerged forests. The distribution and characteristics of such submerged forests in England and Wales were described by Reid (1913) and in the British Isles by Wright (1914) and Heyworth (1978, 1986). In the intertidal zone of the eastern Irish Sea there are many records of such submerged forests, reviewed by Huddart and Tooley (1972), Huddart *et al.* (1977) and Tooley (1978a), but there is no consistent relationship between the age and altitude of these deposits. Many different palaeoenvironments are represented and the presence of submerged forests in the intertidal zone, or exposed in cliff sections, is simply a consequence of recent processes exposing the sites that have been recorded (Tooley, 1985). Some are related to former positions of sea level whereas others are not, and only a study of the stratigraphy and fossil content can indicate the proximity of the sea.

The Hightown deposits were described in the 19th century by Reade (1878a, b, 1883a, 1908) and De Rance (1869b, 1877), and the macrofossils and pollen from the peat provide much information about the development of a Holocene forest in a coastal location (Travis, 1926; Erdtman, 1928; Tooley, 1977a; Clapham *et al,* 1997; Clapham, 1999). It is a site that provides one of the regressive overlap points for the sea-level curve for north-west England (Tooley, 1977a, 1978a, 1982) and it has produced several chance archaeological finds that have not been *in situ.* However, in September 1996 the first example of a prehistoric trackway on the southwest Lancashire coast was noted and subsequently excavated in detail.

Description

Intertidal stratigraphy at Hightown

De Rance (1869b) described the stratigraphy and showed that an upper peat with woody remains overlaid a laminated grey clay that contained the shell *Cyclas cornea* (synonymous with *Sphaerium corneum*)*,* after which the clay was named. Reade (1871) also described the stratigraphy at Altmouth and assigned the laminated clays to the Formby and Leasowe Marine beds on the basis of the included shells, diatoms and Foraminifera. The submerged forest was part of his Superior Peat and Forest Bed. Travis (1926) and Erdtman (1928) were probably the first to examine the pollen content of submerged forests and although Travis provides a list of pollen and spores from the intertidal peat beds at Hightown, Erdtman published the first pollen diagram for such a site and concluded that the peat bed could be assigned to the Atlantic–Boreal period (*c.* 5000 years BP). Travis (1926) described the peat between 20 cm and 1.2 m thick, averaging between 45 and 53 cm, underlying a dark peaty sand, 45 cm to 1.5 m thick, which formed the base of the sand dunes.

The stratigraphy, age and palaeoecology of the site has been described in detail by Tooley (1970, 1974, 1978a, 1982) and the changes in palaeoenvironment placed in a local, regional and national context. The intertidal stratigraphy from Tooley (1977a) for the area west of the Blundellsands Sailing Club and north of the jetty described, at the base, at least 1.25 m of shell-rich, grey sand, with fragments *of Macoma balthica, Barnea candida, Chlamys opercularis* and

Cerastoderma edule and plant remains, including *Zostera* species. Above were alternations of quiet brackish-water clays with fruits of tasselweed (*Ruppia*)and sands. This was succeeded by a peat unit that gave a basal ^{14}C date of 4545 years BP The non-arboreal pollen was dominated by low but persistent values of Chenopodiaceae, *Plantago maritima* and *Armeria maritima.* The fen peat in the lower part showed a tree pollen dominated by alder and oak and this passed up into a woody, detrital peat with branches and trunks of alder, oak, birch and much royal fern (*Osmunda regalis,* see (Figure 8.116). A more recent stratigraphy is given in (Figure 8.115)a, where below the peat was located 1.45 m of silt and fine sand that generally fines upward. In samples H7 and H9 there are characteristic saltmarsh Foraminifera, whereas in samples H10, H15 and H16 there are foraminiferal indicators of nearshore environments. Above 21.5 cm of peat at the back of the beach there is a transitional change into 13.5 cm of organic, black, sandy mud with wood fragments and 48 cm of organic sands with woods fragments and tree stumps in some layers. This is overlain by 15 cm grey, leached sands and 3 m of brown and orange sands, with humic horizons. The stratigraphy associated with the trackway approximately 200 m to the south of (Figure 8.115)a is illustrated in (Figure 8.115)b. At the base is 18 cm of blue clayey silt overlain by a 20 cm complex interdigitation of wood associated with the trackway (Figure 8.116)a and (Figure 8.116)b and silts, which is overlain by organic-rich, dark brown, clayey silt, in which are located red deer hoofprints ((Figure 8.116)c. The ^{14}C dates associated with the Hightown succession are given in (Table 8.19).

Palaeovegetation at the Hightown site

Travis (1926), Clapham *et al.* (1997) and Clapham (1999) described in detail the plant macrofossil assemblages from the submerged forest and these assemblages represent spatial variation within a fen-carr woodland. The upright stools of the larger trees varied in size from 30 cm to 91 cm and in one case 1.8 m in diameter (Travis, 1926). The prostrate trunks were between 1.8 m and 3.6 m in length (Travis, 1926). The tree and shrub species with the type of fossil remains identified by Travis (1926) are shown in (Table 8.20). Pollen analysis from Tooley (1970) in (Figure 8.117) shows that the peat is dominated by arboreal pollen, with a maximum of 60% at 27 cm depth. As with Travis' (1926) analyses, Tooley's pollen spectra do not show much variation in the profile. The proportion of hazel appears to be constant throughout the profile within a smaller shrub component.

Interpretation

The first description by Holt (1786) explained the submerged forest and the exposed sediments as an encroachment of the sea on the land at the mouth of the Mersey estuary. Hume (1865), concluded that the submerged forests formed as a result of in-situ woods being engulfed by rising sea levels and the submergence of the land and maintained that the seaward exposure of the forests was an extension of the landward subterranean forests. As De Rance (1869b) interpreted the Lower Cyclas Clay as being of freshwater, lacustrine origin and Reade (1871) suggested the clays were marine there was a lively exchange (e.g. in Reade, 1883a) that was not resolved until further stratigraphical details established the context of the Hightown site. De Rance (1877) explained the stratigraphy of this area as a consequence in part of frequent alternations of estuarine and lacustrine conditions, whereas Reade (1871) argued that three periods of subsidence and two periods of uplift were necessary to explain the lithostratigraphy of south-west Lancashire. Potter (1876) added to the controversy by suggesting the drifted nature of the submerged forest deposit. However, Reade (1878a, b) proved that the roots and stumps of the trees penetrated into the blue clay or silt below the peat and he concluded that the trees of the submerged forest grew and fell in the same location. The arguments for the in-situ formation of the peat and forest bed deposits are now accepted rather than the drifted origin, especially as Birks (1964) for Chat Moss showed no evidence for mass eruptions of peat from this moss.

Travis (1926, 1929) interpreted the plant assemblages from both the Forest Beds at Leasowe and Hightown as representing an area that initially was woodland but which developed subsequently, with wetter conditions, into fen-or swamp-carr, brought about by one, or a combination of, the following: impeded inland drainage by the coastal sand dunes, by the depression of the land or by rising sea level. The rhythmic series of clays and sands beneath the submerged forest indicated to Tooley (1977a, 1978a) an unstable coastal environment in which intertidal sedimentation was interrupted by lagoonal and estuarine sedimentation. The organic sedimentation provides evidence of progressive removal of the marine and freshwater influence and their replacement by terrestrial conditions. A complex pattern is indicated by the changing ratio of oak pollen to alder pollen, which shows three oak peaks, interpreted as dry phases, the most recent coinciding with a peak frequency in the spores of *Osmunda.* At the base of the peat, the saltmarsh communities are replaced by reedswamp communities dominated by *Phragmites australis,* with *Typha angustifolia* and *T. latifolia.* The reedswamp is replaced by fen woodland with alder, oak and some birch. This woodland had an understorey of *Myrica* and willow, with woody climbers such as *Solanum dulcamara.* The conditions probably varied considerably, with areas of standing water colonized by *Potamogeton* species and *Hydrocotyle vulgaris.* The pine, elm and lime pollen represent regional components of the pollen assemblage.

(Table 8.19) Radiocarbon dates associated with the Hightown stratigraphy illustrated in (Figure 8.115).

Sample number	**Laboratory number**	**Date (years BP)**	**Description**
56.01	Beta-119011	1180 ± 50	Silver birch tree growing in organic sand
56.02	Beta-119012	4270 ± 60	Silver birch bark from the top of the peat bed
56.03	Beta-119013	4310 ± 50	*Osmunda regalis* (Royal fern) stems from the top of the peat bed
49.01	Beta-119007	4750 ± 80	Intermittent thin band of *Phragmites* peat covering the trackway
49.13	Beta-119009	4430 ± 80	Wooden peg into the trackway
49.16	Beta-119010	4910 ± 60	Part of lowest trackway resting on blue clay
49.11	Beta-119008	5080 ± 60	Part of wooden trackway

The ^{14}C dates in (Table 8.19) and Tooley's (1977a) date confirm Erdtman's (1928) estimate based on the pollen assemblage for the end of minerogenic sedimentation in the intertidal zone and the beginning of high saltmarsh sedimentation. The age and altitude (+3.11 m OD) of the stratigraphical contact identifies this position, as it is the highest and youngest, unequivocal sea-level index point in south-west Lancashire and provides evidence for regressive overlap 8 for northern England (Tooley, 1982).

(Table 8.20) Tree and shrub species and the type of fossil remains at Hightown (from Travis, 1926).

Species	**Type of remains**
Pinus sylvestris	Bark, wood
Pinus sp.	Pollen
Myrica *gale*	Cones, seeds and leaves
Quercus sp.	Bark, wood, acorns, pollen
Betula sp.	Bark, wood, pollen
Alnus glutinosa	Cones, seeds
Corylus avellana	Wood, nuts, pollen
Tilia europaea	Pollen
Salix cinerea	Leaves
Salix aurita	Leaves
Salix sp.	Pollen, wood
Ilex aquifolium	Leaves

Clapham (1999) showed that the fen-carr woodland of the submerged forest was dominated by birch species, but with alder, willow and oak present in smaller quantities. *Cornus sanguinea* and *Frangula alnus* were present as an understorey in some parts, with small pools present where the water table reached the surface as a result of the undulating nature of the underlying sediments. In the pools *Potamogeton* species were present, along with *Alisma* species growing on the margins, and *Menyanthes trifoliata.* The herb layer was dominated by plant species that tolerate high water tables, whereas in other parts large tracts were dominated by a dense growth of royal fern. Other areas, especially those on the edge of the exposure, may have been more open or may represent small clearings within the woodlands where the herb layer was dominated by a mixture of *Phragmites australis, Carex* species and Poaceae. Thus both the work of Travis (1926) and Clapham (1999) on the macrofossil species show plants that need, or can tolerate, a high water table. However, it is obvious that this water table was not high enough to stop the tree growth, as indicated by the presence of tree and shrub seeds and the ubiquitous presence of twigs, wood and bark fragments throughout the peat. This indicates a continuous growth of trees since woodland was initiated on the underlying sediment.

Hume (1863) quotes that some of the smaller trees seemed to be in rows at Dove Point on the Wirral and that Dr Aikin had described the same at the mouth of the River Alt, where part of the trunks 'being in a line at equal distances, were undoubtedly planted'. However, there is no evidence for this view today. The quantitative evidence provided by Clapham (1999) suggests that a complex multi-cohort stand was present, as indicated by the large number of small diameter stumps created by frequent, although not severe, disturbances and the more or less clumped, or random, spatial distribution of these stumps. The angle of fall measured by Clapham (1999) shows that the majority of the trunks lie between ESE and south, unlike the result of Travis (1926), who recorded that most of the stumps, although not showing a main direction of fall, all lay between north-east and north-west.

Clapham (1999) used the community indicator method (Rodwell 1991a, b, 1992, 1995) to interpret the woodland ecology, and found that the dominant woodland types were wetland ones (W1, *Salix cinerea–Galium palustre;* W2, *Salix cinerea–Betula pubescens–Phragmites australis;* W5, *Alnus glutinosa–Carex paniculata*). Aquatic communities were present but not to the same extent as the tall herb fen and swamp communities, which were dominated by S24 (*Phragrnites australis–Peucedarma palustre*)tall herb fen. Clapham (1999) also deduced changes in the water table from the samples, with a rise in the water table followed by a drier phase, which he suggested was caused by local changes in the microhabitats as a result, perhaps, of a rise in sea level.

Charcoal fragments were recorded at the junction of the base of the peat and top surface of the underlying sediment, but Clapham (1999) found it difficult to attribute this, to an anthropogenic or natural origin. However, in light of the use of the coast by humans documented both at Formby Point and at Hightown, it is more likely that the charcoal is of anthropogenic origin. The trackway at Hightown has been interpreted as a structure built to facilitate human movement across a saltmarsh towards low water for hunting or fishing activities. There is archaeological evidence too from the recovery of two Early Neolithic axes on the surface of the intertidal zone south-west of Hightown and the presence of Mesolithic–Neolithic sites in the Alt valley to the east (Cowell and Innes, 1994).

Conclusions

Hightown is an important site because it documents important stratigraphical and vegetational changes and woodland development associated with a fall in sea level during the Neolithic period. The site has been documented in detail using many techniques and the environmental changes have been dated accurately. An associated Neolithic intertidal prehistoric trackway has given much new archaeological information and is the first example of its kind in northern England.

References

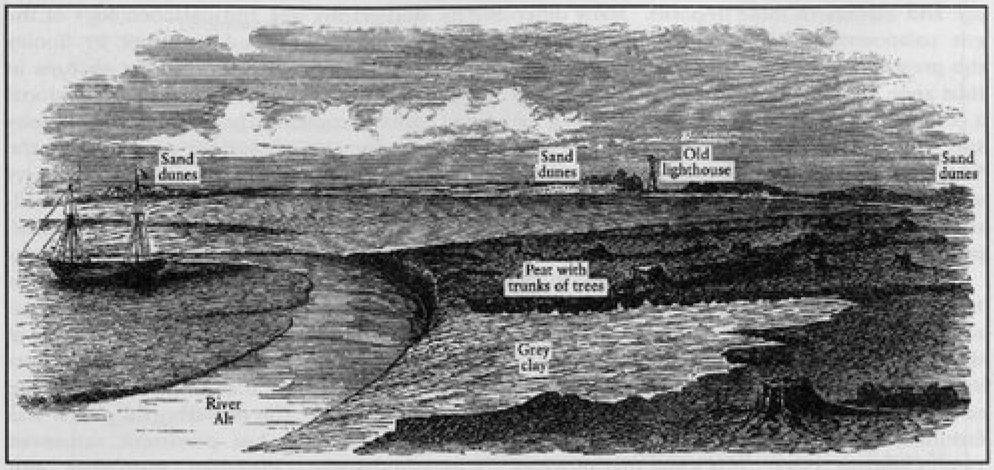
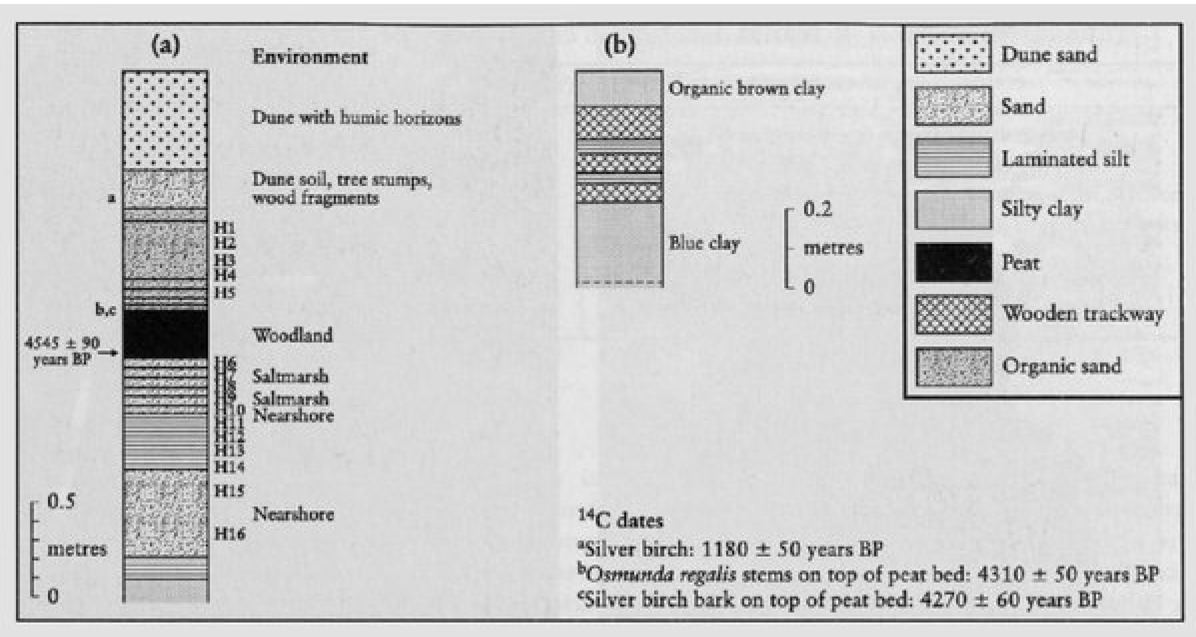


Figure 8.114a A view of the submerged forest at Hightown taken from De Rance (1877).

(Figure 8.113) Stages in the Holocene evolution of the Sefton coast (after Neal, 1993).

(Figure 8.115) Stratigraphy at Hightown: (a) based on recent work by the authors; (b) associated with the prehistoric trackway.



(Figure 8.114) a. A view of the submerged forest at Hightown taken from De Rance (1877). b. Submerged forest at Hightown. Note surface log and root system through the peat. (Photo: S. Gonzalez.)

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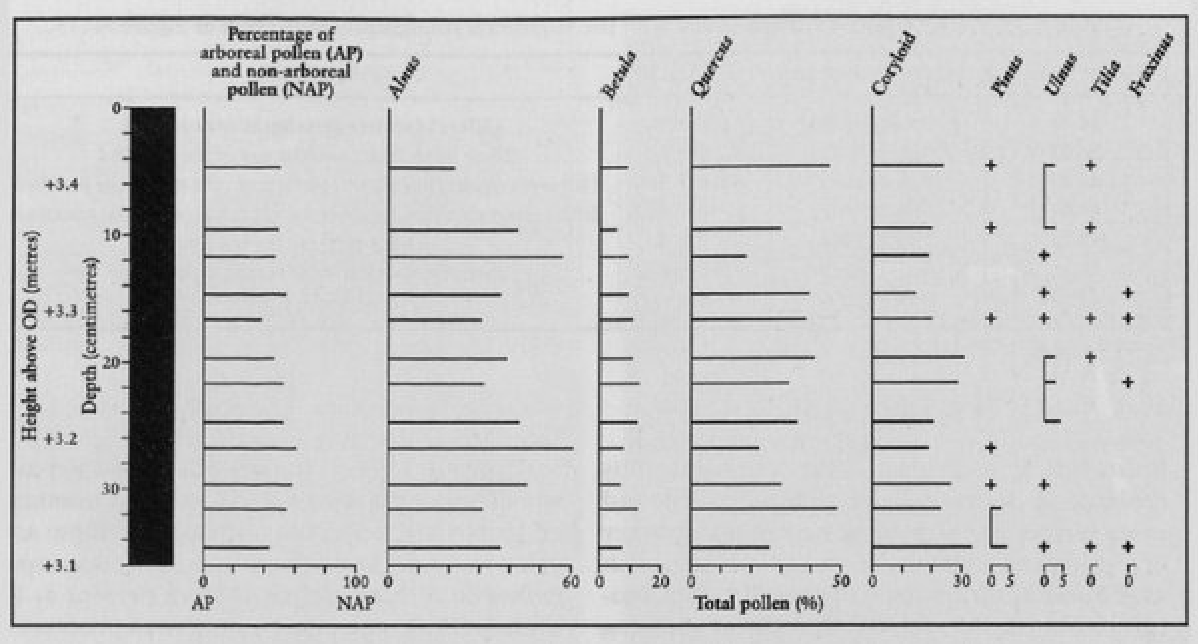

(Figure 8.116) a. Prehistoric trackway, Hightown: as it appeared in September 1996 before excavation b. Prehistoric trackway, Hightown: during excavation c. Prehistoric trackway, Hightown: deer print in silts close to the trackway. (Photos: S. Gonzalez.)