Early Settlement on the North Wirral Coastal Area

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Introduction

During the last two years there has been a renewed interest in prehistoric and early settlement in Cheshire and the north Wirral coast. Chitty and Warhurst (1977) discuss the history of the site of 'Ancient Meols' and, like Hume (1863) and Smith (1865), suggest that the artefacts indicate an almost continuous occupation of the site from prehistoric times to the 14th century. Alexander (1977) refers to the few prehistoric sites and finds in Cheshire and the lack of new evidence for prehistoric settlement. He mentions the need for pollen analysis, the study of old land surfaces, ecology and soils.

The writer is currently researching the geological, geomorphological and environmental history of the north Wirral coast during the Flandrian Stage, covering approximately the last 10,000 years. Two of the difficulties confronting the geologist and archaeologist on this low-lying coastal plain are the lack of natural exposures of Flandrian (ie post glacial) strata and the presence of high water tables, making trenching and augering difficult. However the data obtained from over 700 borehole logs and from additional boreholes sunk by the writer have proved invaluable in interpreting the major stratigraphical and lithological changes. From these data, stratum contours for the boulder clay and other surfaces can be plotted, as can the thicknesses of the various strata. Open sections have been logged in civil engineering excavations (usually dewatered) and geological and feature mapping carried out. Palaeontological studies have also been necessary, with pollen and microfossil analyses, and radiocarbon dating on peat samples, ***in situ*** tree stump heartwood and bone from a midden. Further information has been gathered from a study of early maps and charts, and aerial photographs.

The radiocarbon dates (half life = 5,570 years) for assays on the writer's samples are here given without their standard deviations (which are generally insignificant), and are suffixed in lower case, ie bp, as they have not yet been published in ***Radiocarbon.*** At this stage it is hoped that the observations, alternative interpretations, suggestions and tentative conclusions may be of use to the archaeologist, who will frequently need to apply a multi-disciplinary approach to archaeological investigations. Most of the comments relate to the area shown on the map. It is not intended to make detailed comments as to whether or not all marine incursions and regressions are related to actual rises or falls in sea level (Tooley 1978a, 1978b). Earlier references relating to Tooley's very detailed research are found in the bibliographies of his latest publications (Tooley 1978 a and b). Some of the events recorded by Tooley (1978a, 141-148) for the Lancashire coast can be correlated with events recorded by the writer for the north Wirral coast, but these will be the subject of a later discourse.

Evidence of Coastal Change from Peat and Other Deposits

At the beginning of the Flandrian Period, about 10,000 years BP, there were times when the land mass extended many kilometres to the north of the present Wirral coastline, and there were probably land connections joining Wirral and Lancashire to the Isle of Man. Although the sea level was generally rising during the Flandrian Period, there were times when the north Wirral landmass extended at least 10 km to the north of the present coastline. There have also been marine incursions extending several kilometres to the south. This is evidenced in the sections by the alternating sequences of marine/estuarine silts and clays with peat/forest beds, culminating in the formation of sand dunes. The 'Lower Peat/Forest Bed' (LPFB) is equivalent to the 'Inferior Peat and Forest Bed', and the 'Upper Peat/Forest Bed' (UPFB) to the 'Superior Peat and Forest Bed', of Reade (1871). The boulder clay (till) surfaces D and E appear to be sea-washed as the overlying thin, sandier detritus is shelly in places and includes ***Cardium sp, Mya sp*** and ***Mytilus sp***. The mapped sections (B, C, D and E) are examples of the stratigraphical sequences. Lensing and thinning of strata is however very much in evidence, and non-sequences of strata have been recorded.

The base level of the early post boulder clay buried valley of the river Fender shown on the map from Ford Bridge to A, is in excess of -10.0 m OD at C, 162 m north east of Leasowe Station, whereas under the old Fender Lane bridge the bed level of the present artificial Fender cut is +1.7 m OD. These differences in base levels indicate a period of low sea level when the land mass would have extended to the north of the present coastline. From the borehole data early river or drainage profiles can be plotted. The earlier deposits of silts and clays in the buried post boulder clay valleys are not shown in section. They reflect the silting up process of the valleys during the post glacial rise of sea level, and the intercalated peats reflect pauses or regressions suitable for terrestrial biogenetic sedimentation.

The buried valleys shown on the map have been plotted from borehole data, surface features, and data from seismic and resistivity surveys. The contour on the junction of earlier channel deposits resting on boulder clay (till) at Ordnance Datum is shown for the sides of the channels. Less data is available for the north western part of the coastal plain, but over much of this area the boulder clay surface is below Ordnance Datum. A marine seismic survey shows that the boulder clay surface dips very gradually to the north and west; 3.5 km north north west of Dove Point its surface is -12.0 m, and there is evidence of a buried channel with a base of -13.0 m some 2.8 km north north west of Dove Point. Evidence for a marine incursion to the south of the present coastline is indicated where, for example, the UPFB is overlain by grey clay with ***Scrobicularia,*** 46 m north of section C. An earlier sequence of estuarine clays and silts has been recorded at Stanlow (Morton 1888) and at Helsby (Tooley 1978a, 134-135), where radiocarbon dates on peats subjacent to and above estuarine clays and silts date a marine incursion at 5,470 $\pm$ 155 years BP with a regression at 5,250 $\pm$ 385 years BP (Tooley 1978a, 134-135).

During the period of silting up of the post boulder clay Fender, drainage must have been sluggish, as there is little evidence of later scouring. In places, the LPFB is absent, eg in the northern part of the early Fender and the tributary entering it from the north west (a tributary previously flowing from this direction indicates the later loss of land seawards). The sluggish northerly outlet into Liverpool Bay could have been blocked by encroaching sand banks and vegetation. (Tooley (1978a, 148) recognises a dune building period for the Lancashire coast between 4,000 and 2,400 years BP). From mapped sections, eg C, and borehole data, the UPFB can be traced across the early Fender valley, but there are variations in its thickness, partial washouts are evident, and channelling has occurred in the upper part of the brown peat near C. East of the course of the Fender and south of the course of the Birket shown on the 1840 edition of the Ordnance Survey map, the LPFB is found recorded in borehole logs, but washouts appear to be present in the UPFB, and there is evidence of puckering and feathering, particularly in the black lower sequence of the UPFB. It will be shown that the easterly diversion of the early Fender, causing it to flow sluggishly into Wallasey Pool, could have occurred 4,000 years BP or a short time later.

The alignment of the present Birket system before 1845, when it was diverted during the construction of the Birkenhead Docks, seems to be unrelated to earlier drainage patterns, except, perhaps, in the case of a north west-south east tributary flowing into the early Fender valley.

The major terrestrial and estuarine/marine sequences are evident from the sections (the lower channel sequence at C is not shown), but pollen analyses and microfossil assemblages indicate environmental and ecological changes in more detail. The UPFB and LPFB reflect a more complicated series of events, not necessarily continuous, over a longer period of time than Erdtman (1928) and, particularly, Travis (1929) infer. Pollen analyses on the LPFB D with high frequencies of ***Chenopodiaceae*** pollen, and low frequencies of ***Artemisia*** and ***Armeria,*** point to the proximity of salt marshes at the sampling level. The pollen assemblage is pre elm decline (within the Atlantic climatic zone, ie pre 5000 BP). This is confirmed by a radiocarbon date of 6420 years BP on the peat, which correlates with the radiocarbon date on the oak stump in B – which is Flandrian II (ie 7,200 to 5,000 bp).

Pollen analysis of the black ***Phragmites*** peat, D, just above the junction between the silty clay and the base of the UPFB shows an arboreal assemblage dominated by ***Quercus, Alnus*** and ***Ulmus,*** with some ***Pinus.*** The non-arboreal pollen of grasses, sedges, ***Taraxacum***-types, ***Malva,*** Rosaceae and Umbelliferae indicate lightly wooded or open conditions. The presence of ***Taraxacum***-type pollen may be associated with prehistoric clearance episodes, even though the assemblage is again pre elm decline.

The pollen assemblage of the black ***Phragmites*** peat at the base of the UPFB C in the channel area shows similar arboreal pollen frequencies to that of D. Evidence for nearby marine conditions is recorded by peaks in the value of Halophyte pollen such as ***Chenopodiaceae*** with other plants having possible coastal affinities: ***Artemisia, Ranunculus, Taraxacum*** and Umbelliferae. The weed pollen may again reflect the nearby presence of man. The regional vegetation seems to have been that of damp fen areas within mixed deciduous woodland. Relatively high ***Pinus*** values suggest the possible local occurrence of this tree, perhaps in sandy coastal locations. The pollen assemblage is again pre elm decline – and this horizon is possibly related to that of Helsby referred to above. A sample from the base of the black peat at C has been submitted for radiocarbon dating to confirm the conclusions based on the pollen assemblage, ie that this peat is a Flandrian II deposit.

The brown amorphous peat immediately above the black ***Phragmites*** peat C is post elm decline (ie post 5,000 BP, which is Flandrian III) within the sub Boreal climatic zone. Local vegetation appears still to be that of an alder fen community, while the regional picture is still one of forest clearance, with higher weed values. At the top of the brown peat pollen is present from many plants of disturbed ground, but pollen associated with marine conditions is lacking. Marine ***Scrobicularia*** are, however, present in the overlying clay, especially where channelling is evident in the upper surface of the brown peat; pollen associated with marine type taxa is absent in the peat below the channelling, and this may be indicative of rapid channelling, perhaps during a tidal surge. Further seaward (885 m north west), brackish water and marine to brackish water diatoms are present in the clayey silt overlying the UPFB, ie ***Diploneis interrupta*** and ***Diploneis incurvata*** respectively, and other estuarine/marine microfossils occur in this stratum. The main interfaces of strata seen in the section 46 m north of C, where channelling is evidenced, are grey clay with ***Scrobicularia*** to 2.62 m OD, brown laminated peat to 2.58 m OD, black ***Phragmites*** peat to 2.42 m OD (lower sequence not seen, due to water).

The frequencies of the main pollen and spore types for the laminated brown peat and the black ***Phragmites*** peat are shown below, and the results obtained from pollen analysis so far indicate that peat formation was not continuous in the case of the UPFB: pauses in deposition seem to have occurred.

Pollen Analyses 46 m North of C

SAMPLE LEVEL	TREE POLLEN %							SHRUB POLLEN (as % of total tree pollen)	HERB POLLEN (as % of total tree pollen)									SPORES (as % of total tree pollen)				CHRONOLOGY
	Betula (birch)	*Pinus* (pine)	*Ulmus* (elm)	*Quercus* (oak)	*Tilia* (lime)	*Alnus* (alder)	*Fraxinus* (ash)	*Corylus* (hazel)	*Salix* (willow)	*Calluna* (heather)	*Gramineae* (grasses)	*Cyperaceae* (sedges)	*Chenopodiaceae*	*Rosaceae*	*Rumex* (dock)	*Urtica* (nettle)	*Plantago lanceolata* (nibwort)	*Plantago maritima* (sea plantain)	*Pteridium* (bracken)	*Polypodium* (polypody)	*Filicales* (ferns)	*Thylepteris* (ferns)	FLANDRIAN
2.62 m	6	3	2	19	10	60	(<1)	84	0	2	18	12	0	0	1	2	1	0	4	12	24	6	III
2.53 m	13	3	11	36	2	35	(<1)	56	14	0	9	14	22	3	2	0	0	49	5	2	8	0	II

The radiocarbon dates on heartwood from ***Pinus*** and ***Quercus*** of 3,800 and 3,910 years bp E indicate that the seedlings germinated on the earlier black peat. The stumps appear to be embedded in the earlier lower peat, but this is probably due to the later weight of overlying high sand dunes causing compression and compaction; this is further evidenced by the flattened appearance of woody material in the peat. In places tree stumps are preserved ***in situ***, but trunks are usually found in the horizontal position. A radiocarbon date on a tree trunk found lying horizontally on top of the UPFB at 3.05 m OD approximately and 305 m west north west of Section C (written communication from Dr G Tresise) is 3,965 $\pm$ 110 years BP (Godwin & Willis 1964, 116). The radiocarbon dates suggest a period of afforestation between about 3,910 years bp and about 3,600 bp. The wood debris recorded at the junction of the brown and black peat at C may be similar in age to ***in situ*** stumps or the horizontal trunk referred to above. Impeded drainage could have caused rotting at the base of trunks and breakage could have been caused by gales; the stumps exposed under the embankment seem to have been relatively young when they died and there was no evidence to indicate felling by axes, although this possibility should not be ruled out. This period of impeded drainage could have been caused by sand dunes encroaching from the north about 4,000 years BP or a short time later, and after this drainage may have been diverted to the east.

The radiocarbon date on the tree trunk of 3,695 years BP (Godwin & Willis 1964, 116) is used by Tooley (1978a, 26 and 136) to date the beginning of a marine transgression about 3,700 years BP Sections examined by the writer, together with pollen and other data, indicate that this tree trunk may have been lying on later brown peat. However, if there was a marine transgression in the area at this time, then a rising water table could have caused rotting near the base of the trees. Furthermore, diversion of the drainage to the east may not have occurred until the subsequent marine regression recorded for the Lancashire coast about 3,160 years BP (Tooley 1978a, 136) or later. The sequence of events after 3,800 years BP to the beginning of sand dune conditions is unclear.

The succession of strata above the UPFB differs between sections. A radiocarbon date on the upper part of the peaty ***Soil Bed*** (Morton 1891, 238 plxvi) of 550 years BP at E correlates with the radiocarbon date of 540 years BP for the lens of later freshwater sandy peat with seeds of ***Menyanthes trifoliata*** and charcoal at D. However, these dates may err on the late side. The ***Soil Bed*** or compact black sand (of varying thicknesses up to 0.75 m) with the overlying laminated beds of sand alternating with sandy peat was traced east to west over 250 m under the old embankment. The peaty ***Soil Bed***, where visible, appears to have been the basal organic bed of a large east to west dune slack, and the laminated sands between the sandy peats have the appearance of having been deposited in water as the slack was infilled. The time taken from the initial blow out giving rise to dune slack conditions to the time when sand covered the basal organic horizon (the ***Soil Bed***) could have been 150 years or more. This chronology is thus compatible with that based on the medieval artefacts found in the ***Soil Bed*** (Smith 1865, 214 plii). Assuming that the radiocarbon dates for the ***Soil Bed*** and sandy peat err on the late side, then the sand dunes existing before and during the formation of the dune slack could be assigned to the second phase of the Younger Dunes of the 12th and 13th centuries (Tooley 1978a, 145). Pollen is rarely present in the ***Soil Bed*** (due to subsequent oxidation) except where it is more peaty. Where conditions are suitable, however, seeds and pollen of wet and dry dune slack taxa are present. An alternative mode of origin for the ***Soil Bed*** and overlying laminated sands could be that they were formed in a sheltered lagoon.

The normal sequence of dune alignment seen on the Ainsdale and Formby coastal region, ie ranging from outer young dunes to an inner belt, has not been established in the area under consideration. However, on this coast, the amount of sand erosion in historical times has been high, and Tooley (1978a, 145) refers to documentary proof of dune instability on the Lancashire coast in the latter half of the 15th century. Hume (1863, opp 1), the original of which has been examined by the writer, shows a section of the coast illustrating the amount of land lost to the sea between 1771 and 1813, and his accompanying map of the Wirral shows the coastline of 1736/7. Further loss is obvious when comparison of the 1840 OS map is made with more recent maps. Since 1736, between Leasowe Lighthouse and Dove Point, the evidence suggests the loss of a strip of land, probably sand dunes and dune heath, about 400 m wide.

This great seaward loss of land complicates the interpretation of the upper sequence. Comparison of successive charts of the coastal area, from that of Captain G Collins (1689) to the present charts, gives some idea of the relatively recent coastal changes. Climatic changes have obviously affected sand movement, accretion and erosion, and there are periods on record when winds were stronger and more continuous from the east (Brooks 1949, 312-314), and more east and north winds between 1799 and 1820 are referred to by Goudie (1977, 133). Smith (1865, 203) mentions the 'rare conjunction of strong north or north east winds with higher Spring tides' when he refers to the decreasing number of artefacts being found on the Cheshire shore.

The actions of man in historic times have affected the Dee Estuary; the construction of the weir at Chester in the 11th century and, particularly, the construction of the New Cut in 1737, increased the natural silting up rate of the Dee. In the case of the Mersey, the scouring effects would have been increased by the construction of the docks; however, controls up river will have reduced the outward flow of sediment. Erosion at Formby Point may have been accelerated by dredging, not only by the removing of sand, but also by the channel so formed acting as a submarine sand barrier. These interferences, together with the construction of Wallasey Embankment, begun in 1829, and the construction of the training walls of the Mersey Channel have masked natural coastal processes.

Opportunities and evidence for Prehistoric Settlement

During the last 10,000 years the landmass has extended to the north of the present coastline, although, at times, marine incursions have submerged parts of it, and these incursions have submerged land south of the present coastline. Some of the marine incursions may have been sudden, due to surge tides and, at times, blocked inland waters may have ruptured peat deposits and sand dunes. At times, Wallasey's rocky promontory and knolls of boulder clay may have appeared as islands, at least at high tide. Over the same area, environmental conditions have fluctuated with marine incursions and regressions. Remapping of the Wallasey Embankment, together with evidence and illustrations of previous writers (Reade 1871 & Morton 1891, pl 1, frontis) and old photographs suggest that afforestation was more prolific to the north. The tree stumps previously exposed on the Formby shore (Travis 1926) may be similar in age to those of the Wirral coast.

Conditions for settlement varied on this coastal plain; they were unfavourable when saltmarsh and mud flats existed, but more favourable during periods of afforestation and sand dune stability when shelter was provided. The presence of man in the area may be inferred tentatively from the pollen data, ie about 5,000 years bp (and later).

An abundance of animal bones at A, almost certainly a bone midden found in grey silt below the UPFB in a gully exposed on the shore during storm tides in 1967, included a skull and other bones of an ox (***Bos sp***) with bones and antlers of red deer (***Cervus elaphus***). The contents of the midden have been examined by the writer. From the difference in the size and shape of the antlers, it included the remains of at least two deer, and bones of at least two oxen were present. A radiocarbon date of 3,980 years bp has been obtained from an assay on an ox rib bone from the midden. (The finder claims to have seen a more or less circular floor on peat, showing evidence of burning, a short distance inland of the midden). The correlation between tree and bone radiocarbon dates suggests the presence of man and settlement in the wooded coastal area about 4,000 to 3,600 years bp. There is insufficient data to determine whether or not the settlers were semi-nomadic hunters and fishermen, or early farmers supplementing their diet with meat and probably fish, and living in natural or man made clearings. Tillage would have been possible where the boulder clay was sandier or overlain by sands, silts and peat with good drainage. Settlement after this time is clearly evident from pollen data of the later peats.

The writer has been informed that two canoes were found at the base of the UPFB 400 m north west of Section C during building work in 1961. In the absence of accurate stratigraphical provenance or other substantiating data, there are two periods when the canoes could have been in use, about 5,000 years bp, or by the settlers in the wooded coastal area between 4,000 and 3,600 years bp. The canoe and midden sites are close to the buried channel of the early Fender and communication over shallow water between these sites would have been possible by canoe. Evidence for more recent freshwater lakes and reed swamps on the plain, particularly east of Moreton, is indicated by the presence of grey silts and clays with freshwater shells above the UPFB and below the topsoil.

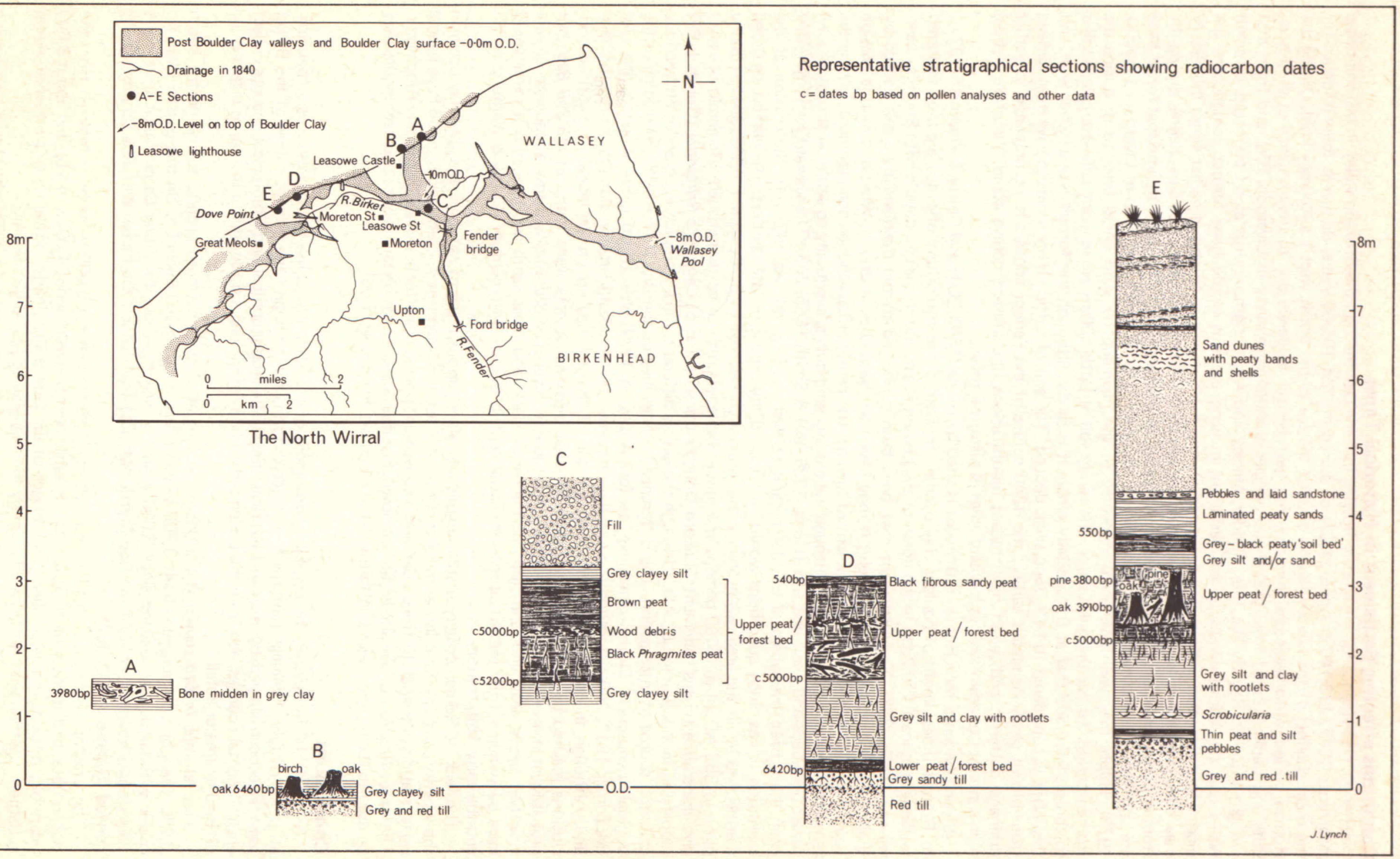
Post Boulder Clay valleys and Boulder Clay surface −0·0m O.D.
Drainage in 1840
A–E Sections
−8mO.D. Level on top of Boulder Clay
Leasowe lighthouse
N
WALLASEY
BIRKENHEAD
Leasowe Castle
10mO.D.
Dove Point
R. Birket
Moreton St
Leasowe St
Moreton
Fender bridge
Great Meols
−8mO.D.
Wallasey Pool
Upton
Ford bridge
R. Fender
0 miles 2
0 km 2
The North Wirral
Representative stratigraphical sections showing radiocarbon dates
c = dates bp based on pollen analyses and other data
A
3980bp
Bone midden in grey clay
B
birch
oak
oak 6460bp
Grey clayey silt
Grey and red till
O.D.
C
Fill
Grey clayey silt
Brown peat
c5000bp
Wood debris
Black *Phragmites* peat
c5200bp
Grey clayey silt
Upper peat / forest bed
D
540bp
Black fibrous sandy peat
Upper peat / forest bed
c 5000bp
Grey silt and clay with rootlets
6420bp
Lower peat / forest bed
Grey sandy till
Red till
E
Sand dunes with peaty bands and shells
Pebbles and laid sandstone
Laminated peaty sands
550bp
Grey – black peaty 'soil bed'
Grey silt and/or sand
pine 3800bp
oak 3910bp
pine
oak
Upper peat / forest bed
c5000bp
Grey silt and clay with rootlets
Scrobicularia
Thin peat and silt pebbles
Grey and red till
8m
7
6
5
4
3
2
1
0
J. Lynch

Figure 1

Conditions affecting Settlement in Historical Times

There is no evidence for the Mersey flowing into the Dee through the Broxton valley in historic times (Mortimer 1847, 193-140 & Appx 21-27) or during the last 10,000 years; neither is there evidence for the main channel of the Mersey having entered the sea to the north west via Wallasey Pool. During the Roman period, a navigable entrance may not have been in evidence due to the existence of sand bars, spits and banks formed from glacial and periglacial sediment already in Liverpool Bay, and from that brought into the Bay by the Dee, Fender, Mersey and Alt. Longshore drift along the coasts of north Wales and the Wirral peninsula and variations in wind patterns would have further complicated the marine and sub-aerial sedimentary processes. During the Roman period and at earlier times the Mersey may have been more deltaic in appearance, backed by uninviting saltmarsh. The Dee channel during the Roman period and before could have been further to the west (it is of interest to note that ***forest beds*** are still shown to the east of Dawpool Bank on the Geological Survey's Drift Map of Liverpool 1:50000, 1975). Hilbre may well have been connected to the mainland by sand dunes prior to or during the Roman period. Under the microscope, the sandy soil of Little Hilbre shows many characteristics similar to those of the ***Soil Bed*** at E, especially where it is sandy, although the former is at a higher level, and the latter is considered to be a dune slack deposit. The soil of Little Hilbre seems to have been derived from blown sand. As stated earlier, the 1840 course of the Fender appears to be unrelated to earlier drainage patterns, and, apart from recent modifications, the present course could, therefore, reflect man's attempt to drain the wet lowland areas in historical times.

Strong evidence for a Roman settlement is cited by Hume (1863, 391) and Chitty & Warhurst (1977). In Roman times, knolls of boulder clay overlain by sand dunes could have afforded areas of sheltered settlement at least 1 to 2 km to the north of the present coast, and this is compatible with Smith's observations (1865, 203). The settlement may have been connected to the mainland by a spit backed by shallow water, or, more speculatively, it may have been backed by a lagoon. Wind and marine erosion could have led to the later abandonment of such a settlement, perhaps sudden abandonment, leaving the remains of the occupation to sink through the eroding sand dunes, eventually to settle on already eroded forest/peat beds and clays and silts (Hume 1986, 391 & Smith 1865, 203). The seaward fertile ***Soil Bed*** could have been overwhelmed by blown sand or destroyed by the sea and, with the erosion of the sheltering dunes, such conditions would have caused the retreat of later settlers. The earliest recorded marine disaster in the area was probably the inundation referred to by Benjamin (1868, 391) as taking place in 353 AD when '5000 persons and innumerable quantity of cattle perished'. Benjamin does not give the source for his statement. Richard Gough's transcription of ***Camden's Brittannia*** (Gough 1789) reports an inundation in 563 AD. Although the date is different, the accompanying description implies a common source of information. The difference in dates may have arisen from a different reading of the original manuscript. Storms damaging Stanlow Abbey in 1279, also affecting the shores of the Dee (Mortimer 1847, 260 & footnote), could have hastened severe coastal erosion along the northern coastline. Although the radiocarbon date near the top of the soil may err on the late side, it verifies conclusions reached by Smith (1865, 214, pl II) that medieval objects were found in the ***Soil Bed,*** but probably at a lower level than the radiocarbon sample level. The ***Soil Bed*** is below a sequence of well stratified sandy peats and sands infilling the earlier slack, and these sands and later blown sands could have overwhelmed the remaining seaward settlement in the late 14th century (Chitty & Warhurst 1977) and the early 15th century.

The lack of Roman pottery is still inexplicable, since various types of red, blue and grey clay occur in the vicinity, and the function of the settlement, at least in Roman times, is unclear. It could have been a signal station or a small fortified post, and a convenient port and shelter between Chester and Ribchester. The exact location of the site is still unknown, but it is possible that certain geophysical techniques may be used to locate any major concentration of stone (eg hearths) or metal.

Conclusions

From 10,000 years BP, the coastal environment of the north Wirral has been continuously changing, at times rapidly. Drainage patterns have altered during this time and the present course of the Birket may have been shaped by man in historical times. The stratigraphical and lithological changes reflect environmental changes, and from the pollen assemblages of the peats these environmental changes can be defined in greater detail.

Tree stumps ***in situ*** represent periods of ancient afforestation (more prolific to the north) about 6,460 years bp and between about 3,900 years bp and about 3,600 years bp. On this coastal plain no major woodlands have existed since 3,600 years bp except perhaps for Alder Carrs. Pollen from dune slacks does, however, contain the Bog Myrtle (***Myrica***) from which the name 'Wirral' is supposed to be derived (Dodgson 1970, 167).

The presence of man in this low lying coastal area from about 5,000 years bp is inferred from the pollen data, and there is firmer evidence for settlement between about 4,000 years bp and about 3,600 years bp. After this time, pollen assemblages of the later peats clearly indicate man's presence. Areas suitable for settlement have been affected by the changing coastal environment.

During the writer's mapping of the area, no artefacts have been found ***in situ.*** Local farmers and market gardeners have found no artefacts of importance but during ploughing and ditching operations in fields near the Birket tree stumps and trunks are dug out from time to time. If a settlement existed during and after the Roman occupation, there can be no doubt that it was north of the present coastline; however, major coastal changes in historical and recent times have obliterated all visible evidence.

Further and more detailed evidence of changing environments, ecology and prehistoric settlement requires pollen analysis of complete sections of the coastal peats, and subsequent radiocarbon dating. The shore should be monitored regularly as, under certain tidal and storm conditions, Flandrian strata and the surface of the boulder clay may be revealed beneath the later covering of sand and silts.

Radiocarbon assays on samples from the black peat and the top of the brown peat at C are currently under way. The radiocarbon date on the brown peat may help to clarify the sequence of events after 3,800 years BP.

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Radiocarbon dating on wood and peat has been undertaken by the National Environment Research Council's Radiocarbon Laboratory under the direction of Dr D D Harkness, and bone dating has been carried out by Mr R E G Williams at the University of Birmingham's Radiocarbon Laboratory. Geophysical surveys have been undertaken with the cooperation of Professor R L Wilson and Dr C D V Wilson (University of Liverpool). Other members of the staff of the University of Liverpool have been most helpful, and I am grateful to Professor W S Pitcher and Professor D Flinn for allowing me the use of facilities within the Geology Department, also to Mr J Lynch for producing the diagrams. Land owners, Leasowe Golf Club and, particularly, Messrs E R Squibb and Sons Ltd, together with many other people not referred to by name, have been most cooperative, and Mr W Henderson provided the ox rib bone for radiocarbon dating. Finally, this multi-disciplinary approach has been greatly facilitated by Mr B Sheppard and his colleagues of the Archaeological Survey of Merseyside.

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Abbreviations

BP	Before present
OD	Ordnance Datum
OS	Ordnance Survey
UPFB	Lower Peat Forest Bed
UPFB	Upper Peat Forest Bed