THE HULLBRIDGE BASIN SURVEY

INTERIM REPORT No 3

T. J. Wilkinson
with contributions by
P. Murphy
&
K. Manson

ESSEX COUNTY COUNCIL

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Archaeology Section
Planning Department
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FOREWORD

This report presents the results of the second field season conducted in December 1982 and a third field season conducted during April/May 1983. The objective was to complete a reconnaisance survey of the south banks of the Crouch Estuary. Full descriptions of sites and exposed sections, are given in the gazetteer. Illustrations, analyses of artefacts together with palaeogeographic reconstruction are to appear in future reports.

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1.0 THE GEOMORPHOLOGY OF THE CROUCH ESTUARY IN RELATION TO THE ARCHAEOLOGICAL RECORD

1.1 Introduction

During the past fifteen years an enormous quantity of data on the geomorphology, Quaternary sediments and soils of SE Essex has been amassed and this provides a wealth of information directly relevant to the archaeology of the Crouch Estuary. The following sketch is merely intended as a framework for the archaeological survey and is not a comprehensive report of the geomorphology of the region.[1]

The Crouch Estuary is approximately 25 km long E-W and is cut into an area of low hills developed on Eocene rocks, mainly London Clay and Claygate beds to the N and London Clay and Bagshot beds to the S. The hills near Woodham Ferrers village are capped in places by a chalky boulder clay of presumably Anglian age recently mapped by C. R. Bristow (I.G.S. 6" maps TQ 89 NE & NW, TQ 79NE). In many places, the Eocene clays are obscured by a mixed superficial deposit of 'head' and it is this head, or the Eocene clay beneath, that forms the buried land surface encountered along the estuary.

The Eocene clay lands are characterised by imperfectly drained 'surface water gley' soils of the Windsor series or slightly better drained gleyed brown earths of the Ratsborough series (Sturdy, 1976). These heavy soils require careful management when under arable cultivation and even at the present day most of this land is given over to permanent pasture.[2]

The eastern edge of the Eocene outcrop is veneered by a series of Pleistocene terraces comprised of fluvial and fluvio-glacial deposits some of which accumulated within buried Pleistocene channels (Lake et al 1977; Simmons 1978). These terraces are mantled by patches of clayey 'head' and silty brickearth. Of the latter deposits some are evidently true wind-deposited loesses whereas others are probably of composite fluvial/aeolian origin. This complex of moderately well-drained and well-drained terrace soils has formed the main focus of settlement during prehistoric and later times. Two of the best known, Bradwell Roman shore fort (Othona) and Asheldham 'camp' are indicated on figure 1. The relative abundance of archaeological evidence on this terrain contrasts with the sparse record for the Eocene outcrop which forms the bulk of the Dengie peninsula.

[1] A more detailed account of landscape changes during the Flandrian transgression will be given when all C14 results have been received. To date only 3 preliminary results are known: 2 from the base of the upper peat: site 4 1580± bp; site 9 1510±70 bp. 1 from wood from the top of the lower peat: site 4, 3750±80 bp.

[2] Althorne parish had 45% of its land as permanent pasture in June 1971: Sturdy 1976, p.105.

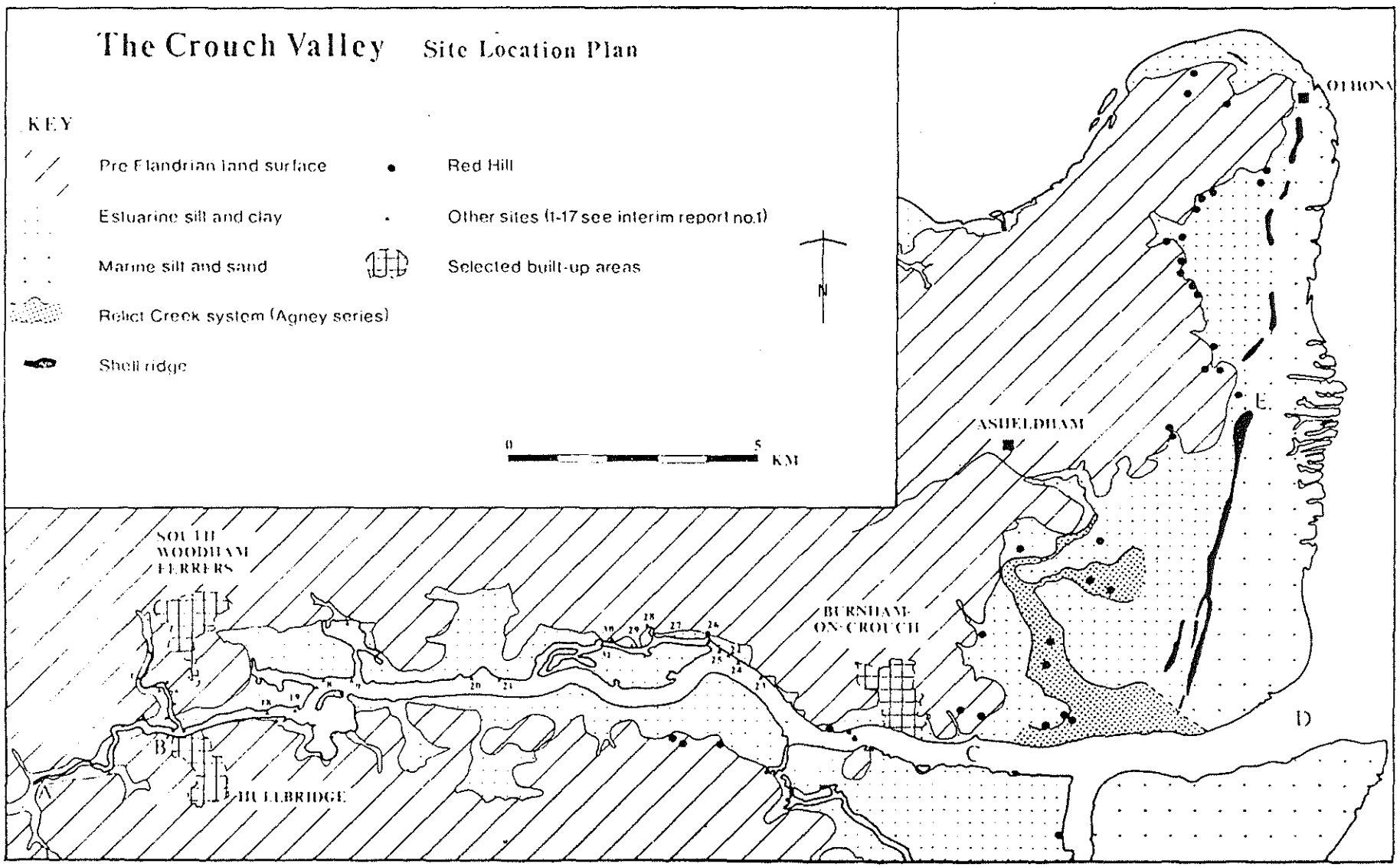
The Crouch Valley
Site Location Plan
KEY
Pre Flandrian land surface
Estuarine silt and clay
Marine silt and sand
Relict Creek system (Agney series)
Shell ridge
Red Hill
Other sites (1-17 see interim report no.1)
Selected built-up areas
N
0
5
KM
OTHONA
ASHELDHAM
E
D
C
SOUTH WOODHAM FERRERS
BURNHAM-ON-CROUCH
HULLBRIDGE
A
B

Fig 1

1.2 Physiographic Divisions

The evidence currently available suggests there are three major physiographic divisions within the estuary.

1. The upper estuary, which stretches from the tidal limit upstream of Battlesbridge at TQ 767941 to approximately the junction of Fenn Creek and the R. Crouch near S. Woodham Ferrers (TQ 805955) A-B Fig. 1. Although estuarine alluvium is present in this area, it is usually of limited extent and the old ground surface developed on London Clay or Head is never far below the surface of the estuarine clays. There is no record of submerged forest beds on this buried land surface. Artefacts are occasionally present near the boundary of the buried surface with the overlying estuarine deposits and the major known site of the area, site 4 (Interim report no. 1; Reader 1911 and Jacobi 1978) is located at the downstream end of this sub-region.

2. The middle estuary stretches from the junction of the R. Crouch and Fenn Creek in the west to the seaward edge of the Pleistocene terraces at TQ 960955 in the east (B-C Fig. 1). This sub-region consists of a broader expanse of estuarine alluvium, expanded in places by subsidiary basins to N and S, which appear to have developed where pre-existing tributaries entered the trunk valley. Today the basins form broad, flat areas of salt marsh or reclaimed salt marsh separated by peninsulas of London Clay or Head, occasionally capped by river terrace gravels. The main N bank spurs are found in the vicinity of S. Woodham Ferrers at TQ 810963, N. Fambridge at TQ 853969, Althorne, TQ 906975 and the 'Cliff' at TQ 922968. Additional minor spurs or relict valley sides occurred at sites 22 and 30 in the vicinity of Althorne.

   In general, outcrops of London Clay or Head are only found in the vicinity of such peninsulars or, where the present Crouch channel is situated along the extreme N. or S. edge of the valley, as at Cliff on the N. bank (23-24, Fig. 1) or at Hullbridge on the S. Bank. All the known submerged forest beds have been recorded from the west end of the middle estuary from the vicinity of the Marsh Farm Country Park at Woodham Ferrers (B-9, Fig. 1) although the lower peat <u>per se</u> is more generally present within the middle estuary.

During reconnaissance, all archaeological sites were encountered around spurs or islands of London Clay/Head or where old valley sides sloped down beneath the alluvium. The sites are classified and described in Section 4.0.

On the basis of borehole records it is possible to subdivide the middle estuary into eastern and western reaches. West of Fambridge (TQ 852963 site 20) the Crouch valley has been described as 'mature'; it has a relatively shallow Flandrian fill (extending probably no more than 3 m below O.D., see list, region No. 1, Fig. 2) and a gradient of c. 1:850 (Greensmith and Tucker 1971). The gradient of the buried valley floor steepens abruptly to the east of Fambridge to 1:188 and Flandrian fill extends to a depth of 13 m in the vicinity of Bridgemarsh island (TQ 877966, Greensmith and Tucker 1971). From Bridgemarsh Island to Wallasea Island at TQ 933952 the buried valley floor gradient again decreases to 1:500. The abrupt change of gradient in the vicinity of Fambridge has been interpreted as a knickpoint, which has resulted either from the outcrop of a resistant bed of rock or from the rejuvenation of the river system by relative movements of land and sea. This is of more than geomorphological interest because the presence of such an abrupt change of gradient within the valley system would have lessened the progress of the transgression up valley.[3] A relatively long lived shoreline or tidal limit may have existed here together with any associated archaeological sites. It is noteworthy that at 600 m across, this is one of the narrowest constrictions in the valley.

3. The outer estuary stretches as a complex of estuarine deposits, relict shell ridges and marine alluvium over a broad embayment stretching from Burnham-on-Crouch up to Tillingham. The triangular area C-D-E, Fig. 1. Already a considerable body of evidence relating to the archaeology and palaeoenvironments of this area exists in the ECC Sites and Monuments Record and in geological and soil survey sources.

3 The Crouch long profile is taken directly from Greensmith and Tucker (1971). Since that publication more recent borehole data indicates the likely presence of a deeper buried channel. When all available data has been compiled more detailed conclusions, regarding the long profile of the estuary will be drawn.

1.3 Geomorphological Divisions

The following geomorphological divisions can be recognised :

i) The pre-Flandrian land surface forms the western edge of the outer estuary and consists of London Clay, Head and Pleistocene terrace deposits described above. It appears to have formed the western limit of Flandrian estuarine deposits but no definite shorelines have been recognised to date. This land surface bounds two bays infilled by Flandrian sediments, the first stretches from Burnham-on-Crouch to East Ware near Tillingham (TM 010015) and the second from East Ware to Bradwell Roman Fort which occupies the N. promontory of the Dengie peninsular.

ii) The two bays are infilled with a complex of estuarine sediments reclaimed from old salt marshes and Creeks.[4] Today these deposits are drained by numerous winding drains (see for example on 1:25,000 map TQ99). With surface elevations between 0.90 m and 1.50 m O.D. this area is well below modern high water mark and drainage is effected via sluices which discharge into the sea at low tides. The area is bounded to the east by the shell ridges (iii). Detailed mapping by the Soil Survey (Sturdy, 1976) enables part of this area to be subdivided into two palaeoenvironments relevant to archaeology; (see figure 1).

(a) Ground water gleys of the Agney series. These soils are permanently waterlogged in the lower horizons throughout the year and are developed on fine silty estuarine alluvium that is calcareous below the top soil horizon. They appear to be the fill and related deposits of pre-existing estuarine creeks, two of which are clearly visible on figure 1 (from Sturdy, 1976, TQ99).

(b) The remainder of the estuarine alluvium is primarily a non-calcareous ground water gley mapped by the soil survey as the Wallasea series (Sturdy, 1976). This is developed on clayey estuarine alluvium which in places contains thin organic or peaty horizons between 1.30 and 2.00 m below the surface (cf. the 'upper peat' in the area of South Woodham Ferrers). Examination of modern salt marshes by Sturdy

[4] Localised reclamation had commenced by the 12th century A.D. but the details of this and the history of marsh settlements remains to be studied.

suggests that this division between non-calcareous and calcareous deposits exist during sedimentation and that the finer, non-calcareous deposits (equivalent to the Wallasea series) occupy the land between the tidal creeks.

As is evident on figure 1 there appears to have previously been a zone of salt marsh drained by two major tidal creeks. These discharged to the south into the Crouch and probably collected water from the uplands to the west especially via the Asheldham brook.

iii) Sediments in area ii are bounded on the east by a N.N.E.-S.S.W. line of relict shell ridges described by Greensmith and Tucker as 'cheniers' (Greensmith and Tucker, 1973). This feature stretches from Bradwell Roman fort across the northern bay to the spur of London Clay near Grange Farm at TM 018020. It then continues almost to the Crouch estuary at Holliwell Farm at TR 008962. Today the ridge is between 1.3 and 3.66 m O.D. (6-12 ft O.D.) and is clearly distinguished on maps by the line of farms such as Round Barn (TM 019013), Bridgewick (TR 016998) and Holliwell Farm (TR 008962). The ridge is a complex feature including broken shells of the following marine species: Macoma balthica, Ostrea edulis, Cerastoderma edule, Littorina littorea, Littorina sp. and abraded gastropod c.f. Nassarius sp. Intertidal mollusca derived from areas of sand- and mud-flats predominate in this collection of shells, but the beach ridge itself was formed in a very high energy marine environment.

The main and final phase of shell ridge formation has yielded the following C14 dates: 1434 ± 110 b.p., 1410 ± 100 b.p., 1340 ± 100 b.p., 1265 ± 100 b.p. which suggests that this feature was at least present between the 5th and 8th centuries A.D. but there is also a slight older feature at the south of the Dengie (Greensmith and Tucker, 1973, p.200). The writers in fact suggested two phases of shell ridge growth corresponding of two transgressions phases between 300 and 600 A.D. and 800 - 1000 A.D.[5]

The origin of the ridges is complex, but it is clear that they originally formed along a shoreline. They usually occur at the

[5] The latter might correspond to the suggested later occupation at Asheldham Camp (Drury 1980, p.50).

boundary of tidal flats (sub-division iv) and salt marshes (sub-division ii) and their formation depends on an influx of shells from adjacent tidal and sub-tidal areas, (Greensmith and Tucker, 1969). Their growth is maintained by shell accessions from off-shore but lengthwise extension can take place as a result of shell movement down the tidal current.

iv) Recently reclaimed former tidal flat deposits situated to the east of sub-division iii. These occupy a wedge of land, the point of which is to the north at Bradwell and which attains a width of 2 km. near the Crouch estuary. They have been mapped by the geological survey as marine or estuarine sandy silts and silty sands (I.G.S. 1978, Simmons). The plain level is similar to that of sub-division II but drainage is via a rectilinear network of more recently cut drains.

The detailed genesis of the above geomorphological sub-divisions, especially the shell ridges, cannot be discussed here as the subject has already been discussed by A.H.W. Robinson (1952, p.79-93) and Greensmith and Tucker (1967, 1969, 1971, 1973 and 1980).

In summary, it would appear that during at least the late Roman and much of the Saxon period the shoreline was represented by the shell ridges of iii. Tidal flats were present to the east and the area to the west consisted of tidal creeks with intervening salt marshes well exemplified by the pattern distinguished by Sturdy (1978). The western boundary of the estuarine alluvium may represent the extreme limit of the Flandrian transgression inland, but if or when there was ever an open coast unprotected by shell ridges is uncertain.

1.4 Archaeological sites and palaeogeography of the outer estuary

The coastal reconstruction offered on figure 1 shows that Bradwell fort and St. Peter's chapel originally occupied a more abrupt promonotory. Asheldham, thought to be a 'plateau' fort occupied during the Early Iron Age and re-occupied during the Saxon period (Drury, 1980, p.47 & p.50) was probably very close to the tidal limit and the limit of navigation in a tidal creek system similar to that indicated on figure 1. In the N.E. Dengie peninsular the relationship between red hills and the inland limit of estuarine alluvium has already been recognised by D. Gurney (1978) who suggested that the red hills occupied a shoreline contemporary with the red hills. He concluded that these red hills were

presumably located by the sides of tidal inlets thus allowing easy access to salt water during high tides.

In the S.E. Dengie, where the soil survey and geological survey information has proved invaluable, the red hills do appear to be along the old creeks represented by the Agney series (Sturdy 1976).

The red hills listed on the E.C.C. sites and monuments record for the S. E. Dengie (TQ 99) are listed below according to their geomorphological location.

GEOMORPHOLOGICAL LOCATION	NUMBER OF RED HILLS	SITES AND MONUMENTS RECORD NUMBER
Sites associated with creeks (i.e. within Agney series)	4½	TQ99: 13,41, part of 46, 65 and 71
Sites on creek edge. (boundary of Agney & Wallasea series)	1½	TQ99: part of 46, 47 " "
Site on Wallasea series but probably on old creek.	1	TQ99: 66 note the alluvium at TQ963980 (Sturdy, 1976) leading towards this site.
Site between major creeks (within Wallasea series).	1	TQ99: 64.
Sites on edge of estuarine clay.	2	TQ99: 48 and 67.

Of the ten red hills recorded, TQ99/41, situated well within the Agney series, is of Romano-British date and the red hill TQ99/67 situated on the boundary between the Pleistocene terraces and the Wallasea series is medieval. Although the data are limited, the preference for creek locations is evident and it would appear that these Agney series creeks were present during or before the Roman period (cf. the Roddons of the fens). Also, Greensmith and Tucker (1973, p.200) note that some red hills may have been covered by estuarine sedimentation during the later transgressions. It is therefore likely that the original pattern of red hills is rather different from that indicated on figure 1.

In general, prehistoric sites located on the buried ground surface are found wherever the sub-drift topography (i.e. the pre-Flandrian Land surface) corresponds approximately to modern sea level. When this is above sea level erosion has prevailed and only clay land sites remain, that is mainly lithic scatters. Alternatively where the

sub-drift surface occurs below sea level, Flandrian deposits cover the archaeological sites. This problem will be examined in future reports describing the palaeogeography of the Flandrian transgression.

1.5 Towards a Reconstruction of the Buried Land Surface

It is possible to reconstruct an approximate pre-transgression topography from borehole data relating to the elevation of buried pleistocene terrace deposits or the top of the London Clay/Head. This has already been attempted by Greensmith and Tucker (1971, Fig. 2) and in a later work (Greensmith and Tucker 1980) additional evidence of a buried land surface, with its associated peat, is cited for the following locations :

Off Sales point, Bradwell - 3.0 m O.D. 4959 ± 65 bp.
At Colne Marsh to the N. of Blackwater - 3.28 m O.D. 4277 ± 65 bp. (Butler 1978).

Also buried shell ridges have been recognised at c.6.0 m O.D. beneath Foulness Island - shell dates given as 3936-3580 b.p. (Greensmith and Tucker 1973). It is therefore possible that the palaeogeography sketched here (Figure 1) for the first millenium A.D. might have prevailed during earlier phases of the transgression.

Until the C14 dates from the first field season in June 1982 are received it will not be possible to attempt a meaningful reconstruction of the prehistoric palaeogeography. Also, the problem of differential subsidence of the land level, which according to Greensmith and Tucker (1980) amounts to 4.3 m over the past 4,000 years, must be taken into consideration when reconstructing the early coastlines.

2.0 HULLBRIDGE BASIN SURVEY DIATOM ANALYSIS BY KATHERINE MANSON.

2.1 Introduction and Methods

A total of 21 samples was analysed from three monoliths provided by P. Murphy plus one individual sample from Fenn Creek. Two monoliths were taken from site 8 (8 on Fig. 1), the first was in order to investigate the change in sedimentary environment that took place immediately above the lower peat. The second, which was to examine the contact between the base of the lower peat and the clay beneath, was particularly important because field examination suggested the possibility of a minor transgression having taken place before the development of the lower peat. In other words the peat did not develop everywhere upon an undulating old land surface.

The third monolith sample was taken from site 9 (9 on Fig. 1) with the objective of evaluating the change in environment of deposition immediately prior to and during the accumulation of the upper peat.

Sample locations with respect to the sedimentary layers are shown on Fig. 8. Interim Report No. 1 (Murphy and Wilkinson 1982).

The spot sample no. 4 was taken from site 1, context 17. Examination of plant macrofossils suggested that a river backswamp or lacustrine environment, within a wooded catchment, might have prevailed before the development of occupation in the vicinity. As is evident, the diatom studies amplify the original conclusions and provide ample scope for discussion.

Part of each of these samples was used to estimate % dry weight (drying at 100°C for 24 hours) and % loss on ignition (ashing at 500°C for 4 hours). The latter gives a relative estimate of % organic matter present.

A chromic acid-hydrogen peroxide mixture was used to clean the diatoms in the remaining sediment. Dilutions were made of the resulting diatom suspensions and aliquots counted by phase contrast microscopy. Counts are expressed as numbers per gram dry weight (no/g dry wt.).

2.2 Results

(i) <u>% dry weight and % loss on ignition</u>

(a) CONTACT BETWEEN TOP OF LOWER PEAT AND CLAY (Fig. 2a, c). (SITE 8).

The transition from peat to clay is visibly sharp in this monolith with little indication of a transition zone. The % dry weight and % loss on ignition curves reflect this with the most rapid change in both between samples 3 and 4. Here the dry weight increased from 25 to 40% and the % loss on ignition decreased from 53% to 15%.

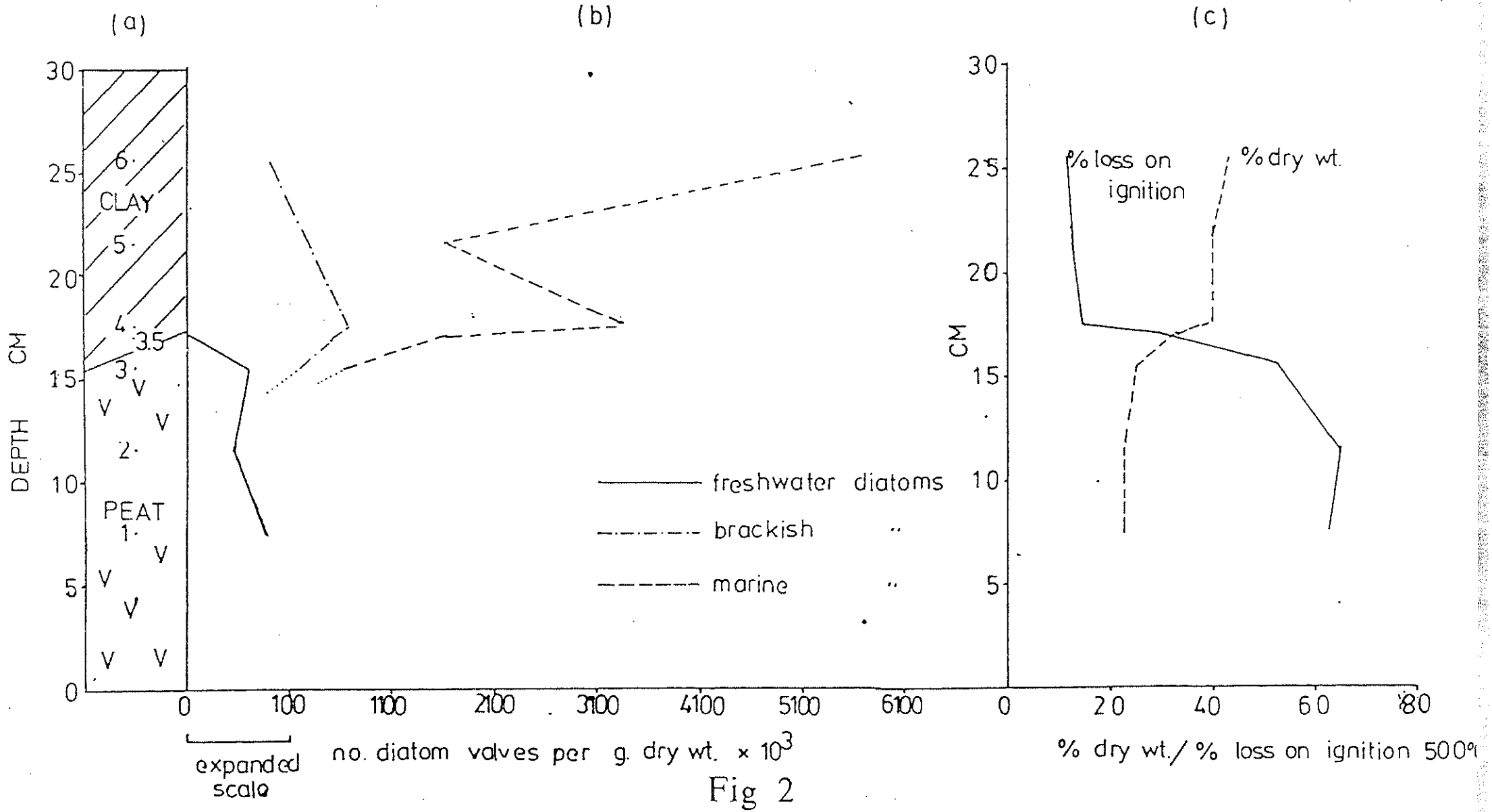
CONTACT BETWEEN TOP OF LOWER PEAT AND CLAY
(a)
(b)
(c)
DEPTH CM
CLAY
PEAT
6.
5.
4.
3.5
3.
2.
1.
freshwater diatoms
brackish
marine
% loss on ignition
% dry wt.
CM
0
100
1100
2100
3100
4100
5100
6100
20
40
60
80
expanded scale
no. diatom valves per g. dry wt. x 10³
% dry wt./ % loss on ignition 500°

Fig 2

(b) CONTACT BETWEEN BASE OF LOWER PEAT AND CLAY (Fig. 3a, c) (SITE 8)

The stratigraphy of this monolith indicates 4 to 5 cm depth of transition between the clay and the peat. The % curves however suggest that the transition is deeper and starts after sample 5.

(c) CONTACT BETWEEN CLAY WITH SCROBICULARIA AND BASE OF UPPER PEAT (Fig. 4a, c). (SITE 9).

Fig. 4c shows that the transition zone between clay and peat occupies almost two-thirds of the total length of the monolith.

ii) Diatoms

The counts plotted in Figs. 2-4 only include those diatoms that are in some way associated with a substratum e.g. mud, stones or plants. Planktonic diatoms, i.e. those that live suspended in the water body for most or all of their life cycle were excluded as these are susceptible to transport away from the area of origin. The 'substratum associated' diatoms are divided into freshwater, brackish and marine groups.

(a) CONTACT BETWEEN TOP OF LOWER PEAT AND CLAY (Fig. 2b)

The diatoms found associated with these sediments indicate that the clay above the lower peat is marine/brackish in origin. There is very little overlap between the decrease in freshwater diatoms and the increase in marine and brackish diatoms. The latter groups are found first in sample 3 which is just inside the top of the lower peat but this is probably due to downward movement from the overlying clay. The dip in numbers of marine diatoms at sample 5 is probably not significant - an increase in the sedimentation rate around this point could have had a dilution effect on the numbers of diatoms.

(b) CONTACT BETWEEN BASE OF LOWER PEAT AND CLAY (Fig. 3b).

Fig. 3b indicates that the clay preceding the lower peat was also deposited under marine/brackish conditions.

(c) CONTACT BETWEEN CLAY WITH SCROBICULARIA AND BASE OF UPPER PEAT (Fig. 4b).

The diatom analysis of this monolith indicates that the sediment for some 15 cm in depth below the peat was deposited in freshwater conditions.

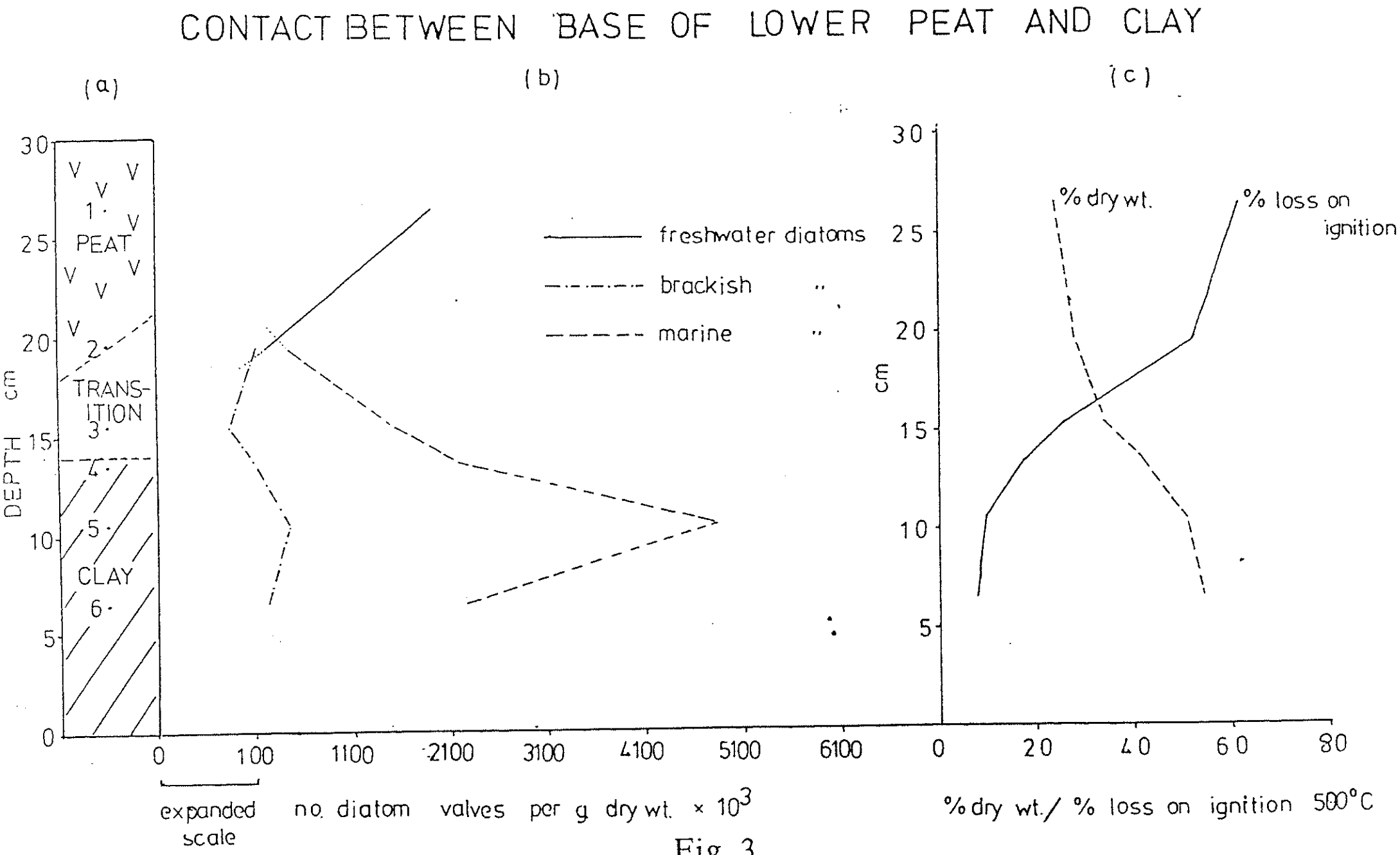
CONTACT BETWEEN BASE OF LOWER PEAT AND CLAY
(a)
(b)
(c)
30
25
20
15
10
5
0
DEPTH cm
1
PEAT
2
TRANS-
ITION
3
4
5
CLAY
6
freshwater diatoms
brackish
marine
0
100
1100
2100
3100
4100
5100
6100
expanded scale
no. diatom valves per g dry wt. × 10³
% dry wt.
% loss on ignition
0
20
40
60
80
% dry wt./ % loss on ignition 500°C

Fig 3

79% and 57% of the count of samples 5 and 6 respectively is due to three freshwater species - two of Gomphonema and one of Synedra (S. Vaucheriae). The former is commonly found attached to rocks and plants and the latter is often associated with attached algae. Presumably between samples 5 and 6 there was a phase very favourable to the development of these diatoms, possibly a shallow freshwater habitat. These species are almost undetectable in sample 4 and therefore seem largely responsible for the decline in numbers of freshwater algae at this point. It seems logical to assume that this is due to drier conditions and does not indicate that sample 4 was any less freshwater than sample 5. Small numbers of attached algae also occurred in samples 1 and 2 of the monolith of the base of the lower peat and clay. In samples 7 and 8 the marine and brackish diatoms predominate and it seems likely that sediments prior to this are marine/brackish in origin.

(d) FENN CREEK (Table 1)

Brackish and marine taxa form 93% of identifiable diatoms in this sample, however in comparison with the preceding work on the monoliths, it seems unusual to find significant numbers of freshwater diatoms as well. Since the original sample is clay mixed with decidious leaves, twigs and buds I suggest that either marine clay was deposited on freshwater vegetation or that these remains have been transported by stream action to be finally deposited in a marine environment.

The sharp transition between the lower peat and overlying clay, as shown by all indicators, is to be expected during a marine transgression which might have caused localised erosion. This supports earlier observations which showed eroded fragments of wood peat to be contained within the overlying clay (Interim report No. 1, p.16).

The sequence from beneath the lower peat indicates an initial increase in both brackish and marine diatoms which attain a peak in sample 5 and thereafter decline. The lowest sample, No. 6 may be very near to the underlying buried soil developed upon head but the monolith did not actually penetrate into the head. The transition upwards into peat, indicated by both organic content (represented by loss on ignition) and diatoms is what might be expected during a regression in which erosion is less significant than during a marine transgression. This marine phase may only have resulted in the deposition of 10-15 cm of sediment.

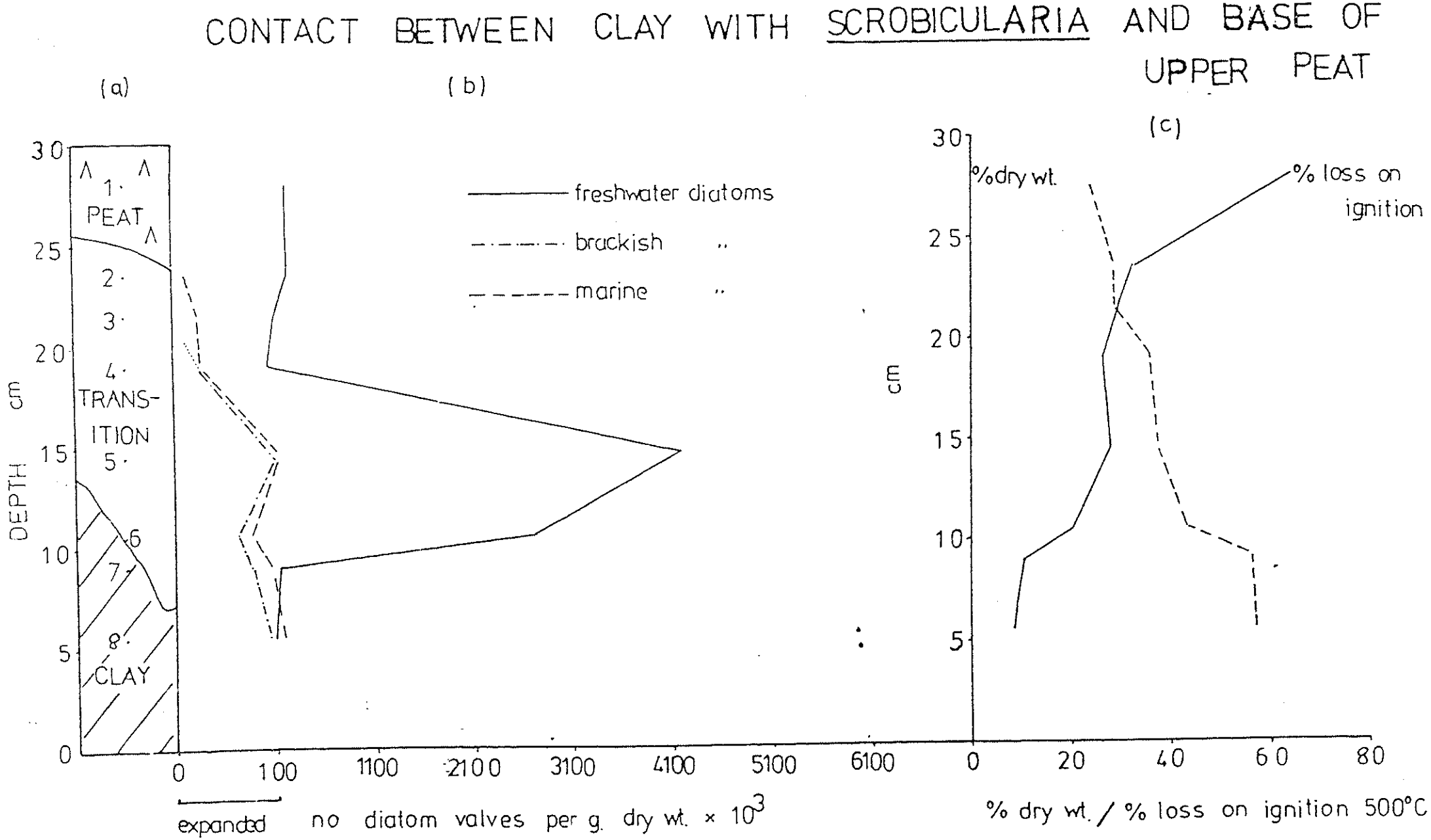
CONTACT BETWEEN CLAY WITH SCROBICULARIA AND BASE OF UPPER PEAT
(a)
(b)
(c)
1. PEAT
2.
3.
4. TRANS-ITION
5.
6
7
8. CLAY
freshwater diatoms
brackish ..
marine ..
DEPTH cm
cm
%dry wt.
% loss on ignition
0
100
1100
2100
3100
4100
5100
6100
20
40
60
80
expanded scale
no diatom valves per g. dry wt. × 10³
% dry wt. / % loss on ignition 500°C

Fig 4

The origin of the possible freshwater interlude recorded at the base of the upper peat is uncertain but may become clearer when the total extent of upper peat has been recorded and the C14 results are known.

TABLE 1 FENN CREEK DIATOMS

		Diatoms no/g dry wt x 10^3		
Dry Weight	Loss on Ignition	Fresh Water	Brackish	Marine
49	15	12	20	130

APPENDIX 1

NUMBERS OF FRESHWATER, BRACKISH AND MARINE DIATOMS FOR EACH MONOLITH SAMPLE

	Sample No	Diatoms no/g dry wt x 10^3		
		Freshwater	Brackish	Marine
Contact between top of lower peat and clay	1	76	-	-
	2	46	-	-
	3	63	177	626
	3.5	-	519	1577
	4	-	683	3345
	5	-	-	1596
	6	-	84	5668
Contact between base of lower peat and clay	1	1913	-	-
	2	233	105	427
	3	-	73	1512
	4	-	108	2262
	5	-	443	4871
	6	-	239	2232
Contact between clay with *Scrobicularia* and base of upper peat	1	230	-	-
	2	224	-	14
	3	115	-	25
	4	95	23	26
	5	4200	113	138
	6	2687	65	78
	7	148	78	97
	8	115	95	123

APPENDIX 2 : DIATOM SPECIES FOUND IN HULLBRIDGE SAMPLES

(a) Freshwater

ACHNANTHES
- hungarica
- lanceolata
- minutissima

CYMBELLA
- aspera
- turgida
- ventricosa

EUNOTIA spp

FRAGILARIA
- construens
- construens var venter

GOMPHONEMA
- angustatum
- constrictum
- intricatum

NAVICULA
- pseudoscutiformis
- pupula

PINNULARIA
- brevicostata
- cardinalis
- gentilis
- maior
- nobilis
- viridis

STAURONEIS
- phoenicenteron

SYNEDRA
- Vaucheriae

(b) Brackish

ANOMOEONEIS
- *sphaerophora

AMPHORA
- *ovalis

COCCONEIS
- *placentula

DIPLONEIS
- *puella

FRAGILARIA
- *brevistrata

NAVICULA
- *cincta
- *gracilis
- halophila
- marina
- peregrina
- *pusilla

NITZSCHIA
- acuminata
- *hungarica
- parvula

SCOLIOPLEURA
- tumida

SURIRELLA
- striatula

SYNEDRA
- pulchella

* also found in freshwater

(c) Marine

CALONEIS
- formosa

COCCONEIS
- sublittoralis

DIPLONEIS
- constricta
- didyma
- interrupta
- notabilis
- smithi
- vacillans

NAVICULA
- digitoradiata
- plicata
- ramosissima
- salinarum

NITZSCHIA
- bilobata
- punctata
- navicularis

RHAPHONEIS
- amphiceros
- surirella

RHABDONEMA spp.

SURIRELLA
- fastuosa

TRACHYNEIS
- aspera

The genera Gyrosigma and Epithemia were also present but individual species could not be identified due to fragmentation.

3.0 SITE GAZETTEER

3.1 Introduction

In the following gazetteer, Site refers to a location of a geomorphological, biological or archaeological exposure. Contexts are found within sites and are usually layers, structures or groups of artefacts.

At nine sites that were only small sediment or peat exposures, there is no threat to the archaeology, and the terms 'Threat' and 'Recommendations' are omitted. It must be emphasised that the sites described were only found during reconnaissance and were indicated it will be necessary in future to undertake more detailed recording.

Note on gravel exposures at 81509590.

Gravel exposed along some 500 m of the inter-tidal zone along N side of Crouch. Predominantly medium gravel, well rounded to angular; mainly flint in a black, silty clay. This has probably been eroded out from low river terraces (possibly below sea level) and re-distributed by tidal currents.

3.2 The Sites

SITE 18

TQ 8229 9589 Woodham Ferrers parish.

Description:

Over 1 m of upper peat and estuarine clay exposed adjacent to channel floor gravel sheets. At first it appeared that the peats and clays overlay a 'natural' substratum of gravel. It was shown that in places the gravel was derived from earlier deposits whilst elsewhere gravel was in situ and occurred within a stiff orange and grey mottled silty clay (Head). Two stratigraphic contexts were found :

Context 40 (Figure 6).

Gravel could be cleaned off an underlying grey clay, which was an estuarine deposit probably corresponding to that normally found between the upper and lower peats. This exposure clearly indicated that in places the channel gravel is mobile and has eroded from elsewhere to cover Flandrian sediments.

Context 41 (Figure 6)

The upper part of the gravel sheet was loose and was clearly a lag deposit. When the grey, estuarine clay, located below a reedy, upper peat, was cut away, the clay was seen to overlie a medium rounded to angular gravel contained within a hard, grey, silty clay (41). This deposit, apparently Head continued beneath the estuarine clay.

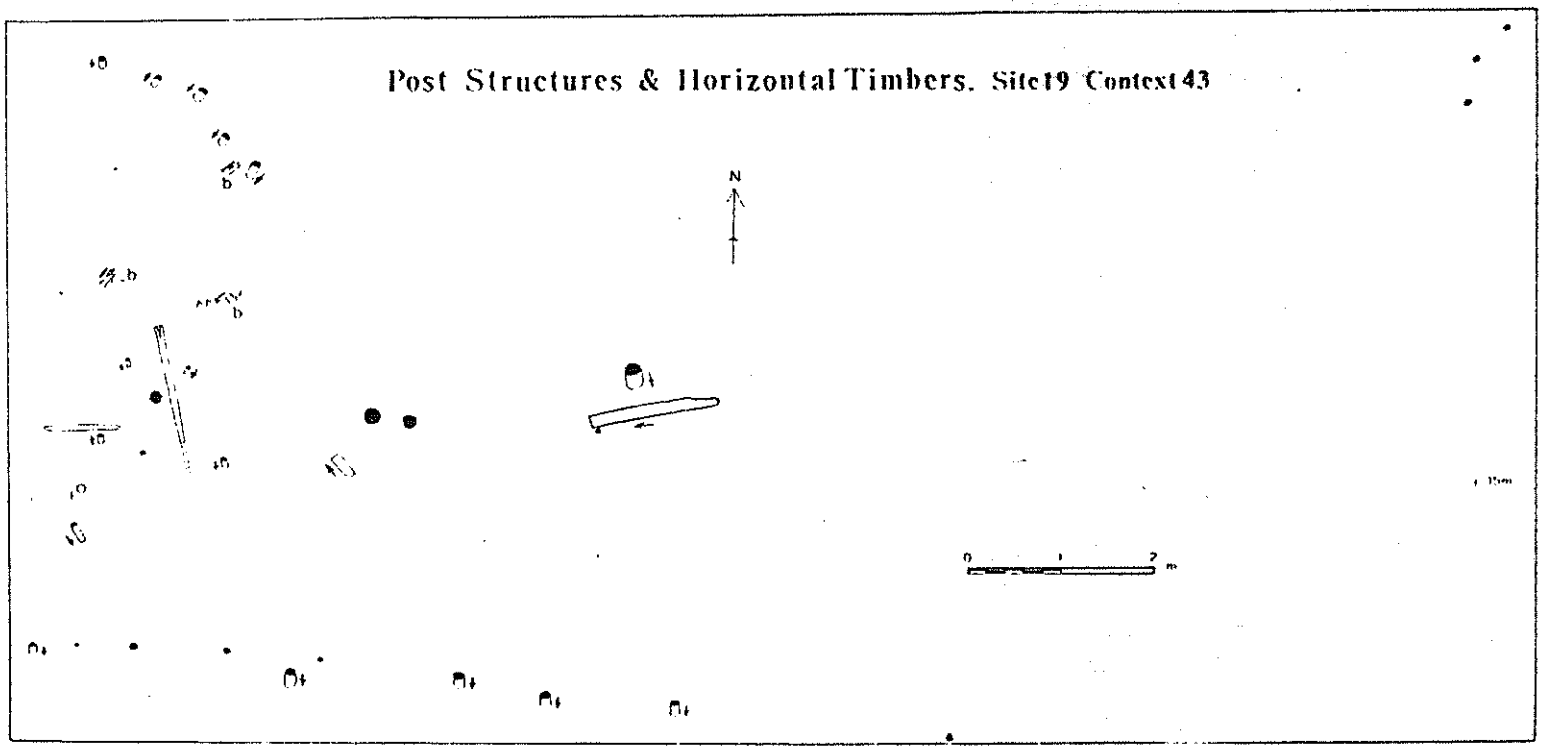
Post Structures & Horizontal Timbers. Site19 Context43
N
0
1
2
m

Fig 5

Three horizontal timbers occurred (figure 5) and although these may belong to the structure, it is common for more recent drift woods to become entangled with early structures (cf. site 1, Interim Report No. 1). None of the timbers were worked except presumably at the points which were set in the clay or peat.

Three groups of brushwood were present within the grey, estuarine clay. This clay appears to have accumulated around the posts.

Context 44 Sampled for C14

Brushwood sample. Surrounded by a moderately soft, sticky estuarine clay; olive grey (5Y 4/2) in colour. Although soft, this clay was not as soft as the 'unripened' modern estuarine clays. The brushwood varied in density from continuous masses to sporadic occurrences of twigs and branches. The twigs included Prunus spp[6] and were between 2 - 10 mm in diameter. They were not straight, and some were forked.

Context 45.

Wooden upright post of ash (Fraxinus sp)[7], sampled for C14.

N.B. The posts were well set into the estuarine clay which overlay the lower peat. The tops of the exposed posts are some 40 - 50 cm above the top of the lower peat (estimated) and the one post sampled (45) penetrated at least 30 cm. The posts may have been set in the lower peat, but equally may have been set into the shallow water of the estuary.

Interpretations

1. A building contemporary with the lower peat land surface. No artefacts or daub were found however, and the total length of the structure 15 m or 21.6 m argues against a single building. Also the sides are not parallel and the uprights are not all upright.

2. A prehistoric fish weir. Such a structure would have been in shallow water as this one appears to have been. The converging lines of post also would argue in favour of a fish weir. Furthermore, the arc to the N.W. could have been part of a funnelling device. The brushwood may have fallen from the side walls of the trap. Such features can extend for considerable lengths and if this was a fish weir it could be prehistoric.

6 & 7 Identifications by Peter Murphy

N.B. Some of the lag gravels were reddened as if by heat; these are in fact naturally formed (Greensmith and Tucker 1971, p.306). Only one or two clearly heat crazed flints were found. These were close to 41. There were no artefacts.

Interpretation

A low gravel terrace, possibly cryoturbated and incorporated within head, has been locally re-distributed by tidal scour. There is no sign of a lower peat.

SITE 19
TQ 8286 9597 (context 43) Woodham Ferrers parish.
TQ 8295 9595 (context 42)
Description:
North bank of R. Crouch, opposite Brandy Hole.

Context 42
Spread of 'submerged forest' and associated lower peat along low water mark. Only roots and a few small, straight trunks, 20 cm in diameter were found.

The lower peat is overlaid by and appears to overlie a grey, estuarine clay (see context 44) but there is no evidence of Head or associated artefacts in this area.

N.B. At this headland there is a full sequence of upper peat, middle estuarine beds, lower peat and lower estuarine beds.

Context 43
Post structure, located a little above low water at W. end of lower peat, Context 42.

Orientated approximately E-W and parallel to N. bank of R. Crouch. Consists of 2 lines of posts, 2.2 m apart at W. end, 3.5 m apart at E. end of measurable structure (see figure 5). About 50% of posts are set slanting into the ground at an angle of c.75-80° to that of the mud.

The main group of posts measured c. 6.5 m E-W by 2.2 - 3.5 m N-S. An isolated arc of 5 posts occurred to the N.W. of the main group and 3 more were located to the N.E. A single isolated post also occurred at 21.6 m east of point 0 on figure 5.

Post diameters appeared to range from 8-20 cm, but the former dimension is probably an under-estimate resulting from the decay of the post top. There were 29 posts.

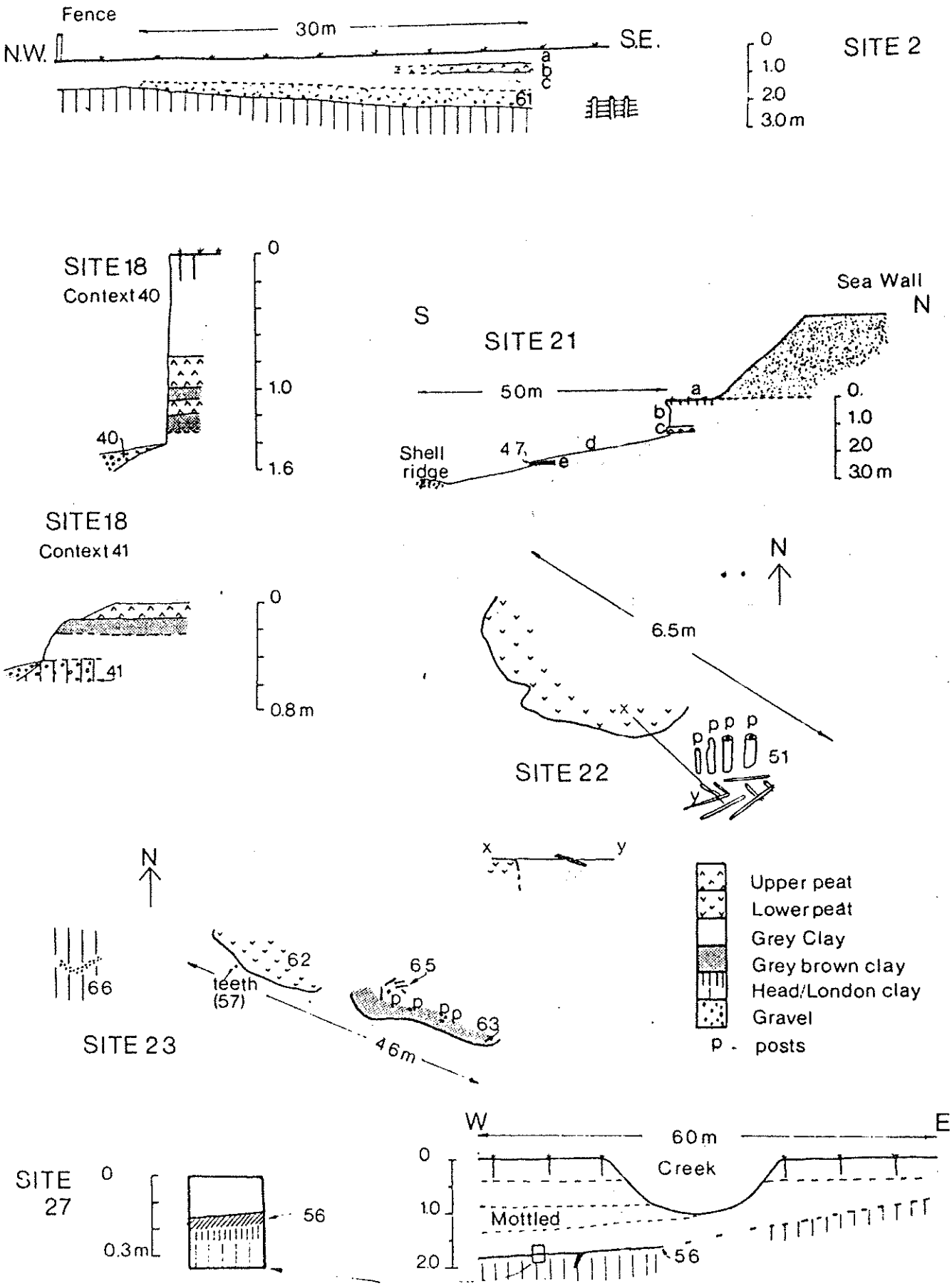
Fence
30m
N.W.
S.E.
a
b
c
61
0
1.0
2.0
3.0m
SITE 2
SITE 18
Context 40
0
1.0
1.6
40
S
SITE 21
Sea Wall
N
50m
a
b
c
d
e
47
Shell ridge
0.
1.0
2.0
3.0 m
SITE 18
Context 41
0
0.8 m
41
N
6.5m
x
y
p p p
p
51
SITE 22
N
66
62
teeth (57)
65
p p p p
63
46m
SITE 23
x
y
Upper peat
Lower peat
Grey Clay
Grey brown clay
Head/London clay
Gravel
p - posts
W
60m
E
0
1.0
2.0
Creek
Mottled
56
SITE 27
0
0.3m
56
SITE SECTIONS

Fig 6

3. An early sea wall revetment-medieval or post-medieval in date. The posts and brushwood are exceptionally low for such a structure but the main post alignment is parallel to the N. bank of the Crouch and also aligns on the headland of salt marsh c.120 m to the east. Such a salt marsh area may have originally accumulated behind a pre-existing sea wall.

Threats and Recommendations

No diagnosis of this structure can be attempted until the C14 determinations are received. Equally it would not be worth excavating if it merely proved to be an earlier phase of the present sea wall. In the long term it is vulnerable to erosion and its condition will be monitored in future seasons. If the C14 results demonstrate the feature to be pre-medieval, more detailed recording and limited excavation - between tides - should take place as soon as possible.

SITE 20

TQ 8638 9655 North Fambridge Parish

Description

North bank of River Crouch to S.E. of North Fambridge. Same as Vincent and George, site 14. Logs and trunks of 'submerged forest' at various angles and set in top of lower peat and estuarine clay immediately above. No tree stools are rooted in situ; upper part is not visible.

SITE 21

TQ 8697 9657 North Fambridge Parish

Description

Approximately 600 m E of site 20. The east end of Vincent and George site 15.

Context 47, exposure of drifted plant material; section illustrated diagrammatically on figure 6.

a) Salt marsh surface.
b) c.1.0 m of grey, upper estuarine clay.
c) 20 cm of relatively humified 'upper peat' - no monocotyledonous plant remains evident.
d) Approximately 1.0 m of grey, middle estuarine clay.
e) Context 47, c.10 cm of organic material containing what appears to be drifted plant material. Context 48 (part of 47).

Context 48 (part of 47)

Degraded woody stem fragments, species indeterminate.

Context 49 (part of 47)

Mass of part-degraded dicotyledonous and monocotyledonous stems with leaf fragments and poorly preserved inflorescences in a matrix of grey clay including foraminifera. The sample was disaggregated by soaking in NaOH solution, graded by wet-sieving in a sieve bank and sorted under a binocular microscope at low power. The vegetative plant debris was not identified, but associated fruits and seeds included the following taxa :

Sueda maritima (L) Dumort, Salicornia sp., Limonium/Armeria sp. (calyces), c.f. Aster tripolium (L), Triglochin maritima (L) Juncus sp and Gramineae. These macrofossils establish that 49 is composed of remains of salt marsh plants. However, this need not indicate close proximity of a shoreline since blocks of salt-marsh vegetation undercut by erosion could easily have been rafted considerable distances from the shore.

Description and identification supplied by P. Murphy.

A distinctive ridge of broken shells occurs in the inter-tidal zone parallel to the N. bank (see 1:10,000 map TQ 89NE). This feature is similar to those described by Greensmith and Tucker for the coastal Dengie and it is probably related to shell movement associated with tidal currents. Its stratigraphic position is unknown.

Additional context at SITE 7

Context 50

TQ 8322 9637 Woodham Ferrers Parish

Section of middle estuarine clays between concentrated sequence of lower and upper peats. Situated 60 m SE of end of salt marsh promontory. Section c.1.0 m deep; orientation of face 37° 30' Mag. Sediments were sampled for palaeomagnetic dating, a report by Austin, will appear in Interim Report No. 4.

SITE 22

TQ 9157 9707 Althorne Parish

Description

300 m E.S.E. of E end of Bridgemarsh Island. Two exposures of lower peat between 70 and 95 m N.W. of field drain. Same as Vincent and George site 12.

Approximately 10 cm of humified peat, 4 x 2 m forms the N.W. exposure. Its base was not found.

Context 51.

2-3 m to the east, 4 posts projected obliquely out of a moderately firm grey clay - not apparently of recent deposition. The clay extended up to the peat and overlay it on a nearly vertical eroded interface (see figure 6). Immediately S. of the posts, brushwood or wattles were revealed after a light scraping of the clay and these had obviously been related to the posts. The posts, and other wood extend over approximately 2.5 m E-W.

There were no artefacts and the structure had no obvious function. The grey clay in which the brushwood or wattles were found is clearly later than the peat and appears to overlie it following a spell of peat erosion. The wooden structure may be prehistoric in date but could be much later. This exposure lies immediately S.E. of a small spur of London clay on which Windsor series soils are developed. The intertidal zone to the N.W. is a wave cut platform developed on London clay. This site appears to have formed on the edge of a small island or rise in the valley floor.

Threats and Recommendations

The site is vulnerable to erosion. Further cleaning and recording is required together with a careful search for artefacts. A C14 date for the wood is necessary.

SITE 23

TQ 9224 9660 Burnham-on-Crouch Parish

Description

Immediately below the Cliff a wave cut platform has been eroded on very firm, brown London clay with septarian (cementstone) nodules. At the east end of this exposure, some 60 m below H.W.M., a small bed of flint gravel has been involuted by cryoturbation into the clay (context 61). The site is located at the east end of this wave cut platform where the old valley side slope is preserved (to the west the hill appears to have been eroded away to form the wave cut platform).

The N.W. part of the exposure consists of a 5 cm thick bed of humified peat (context 62) overlying a grey clay which yielded a small group of horse or cattle teeth (context 57). To the S.E. a similar exposure, but of 5 cm of grey brown slightly humic clay (context 63) was over the grey clay. Four posts (context 64), maximum diameter 10 cm, were

set into this grey brown clay. As with 62, 63 overlay a grey clay, again probably of estuarine origin. Brushwood (context 65) was exposed over the surface at the west end of the exposure. There was no obvious pattern in the post-hole layout but they cut 62 and 63 which appear to represent the buried ground surface contemporary with lower peats elsewhere (Figure 6).

Artefacts

None were found, but previous collecting has yielded, for example 2 type B1 microliths, several neolithic arrowheads (one leaf shaped) and a transverse arrowhead (Vincent and George 1980, 11). Much surface flint work is in the collections of B.E. Brett and A. A. Hammond. A large quantity of the collected artefacts are illustrated in the ECC Sites and Monuments Record (TQ 99/81). In general the lithics have been diagnosed as palaeolithic, mesolithic and neolithic. Only a little bronze age flint has been recognised together with some iron age pottery. This material however was collected from the adjacent fields as well as from the intertidal zone.

Threats and Recommendations

Under threat from continuing coastal erosion. More collection is required from reliable contexts; wooden structures should be cleaned and wood samples submitted for C14 if necessary.

SITE 24

TQ 9180 9696 Althorne Parish

Description

This is within the extent of Vincent and George site 12. It consists merely of a small patch of humified peat over grey (estuarine?) clay which in turn overlies London clay. This appears to be a remnant of old ground surface underlying a broad embayment of what is now Wallasea series soils on estuarine alluvium.

SITE 25

TQ 9135 9722 Althorne Parish

Description

Again within Vincent and George, site 12. Another small exposure of humified peat over clay.

SITE 26

From TQ 9118 9736 to 9126 9732 Althorne Parish

Description

At the west end of Vincent and George, site 12. Patches of grey clay, containing what appear to be patches of drifted plant material (context

55). These are similar to those already described at N. Fambridge site 21. The total length of exposure is c.100 m and towards the east end are a series of posts, some 10 cms in diameter. The general trend of these posts is parallel to the sea wall and they are likely to form the remains of an old sea wall revetment..

In general the clays are probably part of the 'middle estuarine clays' formation and accumulated within an estuarine environment. This is within an embayment of estuarine sediments (Wallasea series soils) and at this point sedimentation probably occurred in a low point or creek within the buried land surface. (cf. the island at site 22 and site 27).

SITE 27

TQ 9053 9741 Althorne Parish

Description

Vincent and George, site 13. Situated on the south edge of a small rise of land which now houses the small plot-land development around Bridgemarsh Lane. This rise has been mapped by the soil survey as the Windsor series of non-calcareous surface water gley soils (Sturdy 1976). This is the characteristic soil of the London Clay uplands and although it is seasonally waterlogged this area still forms a relatively well drained island within the reclaimed estuarine land.

The sketch section indicates the buried soil developed on London Clay covered by a wedge of estuarine/clay which varies from 1.0 m (at the east) to 2.0 m thick at the west end. At the west end a 30-40 cm thick band of clay, mottled orange is apparent (Figure 6).

The salt marsh is developed on the top of the wedge of estuarine clay, and towards the top of the estuarine deposits, a more humic layer is present. This may correspond to the upper peat elsewhere (see Vincent and George, section 7).

The buried soil (context 56) appears to consist of a dark greyish brown humic clay, 3-5 cm thick. There is one wedge of this material penetrating into the subsoil and one or two very small patches of charcoal were noted.

This horizon is probably a buried humic (Ah) horizon and it overlies a thin, very firm silty clay which contains occasional stones, some of which appear to have been calcined. This in turn overlies a grey brown and orange mottled London Clay/Head.

This soil appears to be of the Windsor series, which today is normally recorded with a ploughed topsoil. At site 27 however the separate components of humic Ah and silty A horizons can be distinguished. The high silt content of the latter horizon probably results from the addition of loess to the soil profile. Modern Ap horizons of the Windsor series still contain this high silt content but it is now thoroughly mixed through the top 15 cm or so of soil.

Threats and Recommendations

Although one flint artefact has been recorded (see Vincent and George, site 13) the main interest of this site lies in what appears to be a complete, unmixed soil profile of the Windsor series. It is suggested that this is examined in more detail by R. McPhail.

SITE 28

TQ 9002 9764 Latchingdon Parish

Description

At the north end of a small Creek, London Clay is exposed in the intertidal zone. No peat, wood or artefacts were observed but the area warrants further investigation.

SITE 29

TQ 8959 9717 Latchingdon Parish

Description

Area of Head, London Clay and Gravel (context 58 refers in general to this buried land surface) exposed immediately below salt marsh and to the west of a small creek draining the salt marsh. The buried ground surface contains occasional stones and in places, especially at the east end of the exposure, the upper layers of Head are grey and silty, possibly as a result of the addition of loess. Some of the stones in the top of the Head are clearly heat crazed whereas others are of the ubiquitous red type which do not result from heating.

A total of 45 m E-W of the exposure yielded evidence of occupation. At the W. end, occasional artefacts: blades and microliths were loose amongst the lag gravel. These tools were in excellent condition and clearly came from the adjacent buried ground surface.

At the E. end, a number of brushwood fragments and other pieces of wood, to 10 cm diameter, occurred near the interface between the head and the overlying estuarine clay. Some of the brushwood was set in a grey, apparently estuarine clay. The old land surface, approximately conforming to the top of the head was buried beneath c.1.0 m of estuarine clay.

This exposure of buried land surface is probably an extension of the small patch mapped by the geological survey to the east. If the lithics are contemporary with the wood it would seem that during the Mesolithic or Neolithic period a small settlement existed on the edge of a low rise in the valley floor. The fact that some of the brushwood appears to be in estuarine clay would suggest that this settlement was on the edge of a small inlet. There clearly has been occupation on this site but the relationship between the wood and artefacts requires clafification.

Artefacts

All Context 58: 2 flakes, 3 blades/blade segments, 2 small unretouched microlithis (microburins?). All of a dark grey-grey brown translucent flint; all in excellent condition. One flake has small areas of cortex on 2 sides and may have been struck from a pebble. In addition, two small microlith-like fragments were struck from a black, opaque flint, probably a pebble flint.

Total no. of clearly formed pieces.

Threats and recommendations

A long term erosion threat exists. The relationship between the lithics and wood must be established, further collecting is required and samples must be taken for C14. This is potentially one of the most interesting sites encountered and it requires more detailed recording and cleaning.

SITE 30

TQ 8922 9731 Latchingdon Parish

Description

An eroded platform of London Clay/Head which forms a continuation of the London Clay spur mapped to the N. by the Geological Survey. At the S.E. end of the exposure there is an extensive spread of lag gravel derived from an adjacent deposit of pleistocene gravel.

No artefacts, but as this exposure is close to site 29 more searching is necessary.

SITE 31

TQ 8903 9731 Latchingdon Parish

Description

A causeway, now almost obliterated, consisting of old bricks and other debris reveted in places by wooden posts. This continues the line of a winding track which follows on the W. side of a drain located to the N. of the sea wall. This was probably the droveway that led from the Bridgemarsh Island marsh up to the upland around Latchingdon.

SITE 2

TQ 8023 9644 Woodham Ferrers Parish

A re-investigation of the area originally noted by Vincent and George (p.14). The area originally described in Interim Report No. 1 was situated at the W. end of this exposure. The area described was situated between the fence line and a wooden revetment constructed for the protection of the sea wall.

A short length of upper peat - locally with monocotyledonous plant remains (b) - is interstratified with estuarine clays a and c, (Figure 6).

At the base of the estuarine clays, the sediments become dark grey, firmer and more silty (context 61). There are abundant fragments of red fired clay, resembling briquetage (see below), occasional small flecks of charcoal and occasional calcined flints. This layer overlies a grey to reddish yellow mottled Head which is relatively stone-free.

The face exposed in the creek side is oriented SE - NW and it appears that the briquetage has moved downslope from a site situated on the edge of the inlet (Later Fenn Creek) and a little to the N. N.B. There was no indication of any occupation deposit in the drainage ditch situated inland of the sea wall.

Briquetage

Four fragments collected; dimensions:

2.0; 1.5;,2.2; 3.0 cm long axis

0.8; 0.5; 0.5; 0.6 cm thick

Red, 10R 5/6 - 5/8; soft clay, readily dispersed. Some vegetable (possibly grass) temper but always sparse. Very fine sand evident in matrix.

Three relatively flat fragments, one with a cream coating less than 0.5 mm thick. One fragment is curved and may be a fragment of a trough base.

N.B. Vincent and George found briquetage pedestals at this location (Vincent and George 1980, 14).

Belgic pottery, out of context, has been found from this site (Interim report no. 1) but more datable finds are required as well as a levelled section drawing.

4.0 PRELIMINARY SITE CLASSIFICATION

The following classification is based upon topographic location and presence and absence of certain artefact types. It will undoubtedly change as more sites are found but it does show the expected preference for valley side slopes, Spurs of London clay projecting into the alluvium and low rises in the valley floor. Unfortunately, dating evidence is so meagre that all sites require more collections from good stratigraphic contexts.

I. Valley side occupation. Evidence in form of fired clay frequently briquetage, charcoal and calcined flints at base of estuarine clay adjacent to sloping buried land surface. Wooden structures present at site 1 only. Some of these sites, e.g. 2 and 16 were associated with salt winning. SITES 1, 2, 3, 12, 16.

II. Valley floor sites, usually but not always associated with low rises in the buried topography. Wooden 'structures' are associated with those sites indicated thus: (W) and lithics (L). Sites 4(L), 11(L), 22(W), 23(W), 29(L+W).

III. Valley floor sites with fired clay (site 9) or wooden structures (site 19) actually within the estuarine clays. These presumably date to some time after the commencement of the main transgression and they appear to be directly related to the presence of water, i.e. with salt working or fishing. SITES 9 and 19.

IV. Buried land surfaces, usually valley side slopes with rare to occasional lithics but not necessarily occupation sites. SITES: 13, 14, 15 and 27.

V. Buried land surface and/or lower peats without artefacts. SITES: 5, 6, 7, 8, 17, 20, 24, 25, 28, 30.

VI. Deeper estuarine clays. But land surfaces not evident during normal tides but drifted plant material is present and suggests previous high water marks. SITES: 21, 26.

VII. Unclassified sites. SITES: 10, 18, 31.

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