Channel Tunnel Rail Link

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Oxford Wessex Archaeology Joint Venture

Geoarchaeological recording at Tollgate, Cobham, Kent

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1 INTRODUCTION

Quaternary deposits infilling a dry valley were examined in four monolith samples, forming one sequence. Assessment of the monoliths provided evidence for the Late Glacial environment and an indication of Pleistocene and Holocene landscape change in the vicinity of the dry valley. This information and particularly that relating to the Late Glacial period will be compared, in the route-wide synthesis, to the evidence from other CTRL dry valley profiles in the Northfleet area: 330 Zone 2 WB (ARC STP99); and West of Northumberland Bottom (ARC TGW97); and with White Horse Stone (ARC WHS98) located east of the Medway. The monoliths were described and illustrated according to the geoarchaeological methodology designed for the route-wide scheme. Although no further palaeoecological or sedimentological analysis has been undertaken on the monoliths, a summary of the assessment results is given here. The location of the monolith samples is shown on Figure 2 and the monolith profile illustrated in Figure 3 of the site report (Bull 2006).

2 RESULTS

The monolith sequence was taken from the east-facing section of the northern part of the TLG98 evaluation trench, where the trench clipped the dry valley as it veers from roughly N-S to E-W trending. Thus the surface of most deposits in general dip down from south to north. The profile examined was about 3m deep, with a surface at *c* 47m OD. The sequence of natural deposits sampled in the monoliths comprise contexts [1] to [9]. Although weathered chalk was recorded in the southern part of the trench (further up the valley side) bedrock was not proved at the sampling location, in the north of the trench.

The sequence of deposits examined formed three main units below the modern ploughsoil. The lowest unit examined [9] was about 1m thick and consisted of a compact mottled pale brown (10YR6/3) and brown (10YR5/3) slightly clayey silty fine sand fining-up into a brown sandy clay-silt. In its upper 0.20m the brown sandy clay-silt was interbedded with pale brown sandy silt, dark yellowish brown (10YR4/4) sandy clay silt and occasional white (10YR8/1) sand laminae. Discontinuous laminae and lenses of white sand from 2-10mm diameter existed throughout the unit, which was also characterised by frequent iron nodules and manganese speckles.

A sharp, irregular sub-horizontal interface existed to the overlying deposit, poorly sorted chalk and flint rubble in a clayey sand matrix, which was in the north about 0.75m thick but thickened southwards, towards the valley side (contexts [4], [6] and [8]). A lense of dark yellowish brown (10YR4/6) clayey sandy silt, *c* 0.10m thick (context [7]), with occasional chalk granules and flint pebbles and fragmented bedding occurred in the lowest

part of the chalk rubble, where lenses of pelletty chalk were also common. Other fine-grained lenes were recorded in section (for example context [5])

The surface of the chalk rubble formed a sharp wavy interface, dipping downwards from south to north. It was overlain by yellowish brown (10YR5/6) slightly sandy silt ([3]), about 0.35m thick, but wedging-out towards the south (up the valley side) and thickening to the north (into the valley). It contained occasional fine chalk granules and frequent carbonate precipitations as flecks and threads in its lower part and became darker (dark yellowish brown 10YR4/6) and more clayey upwards (context [2]). It was overlain by the modern ploughsoil, about 0.30m thick (context [1]).

3 DISCUSSION

The dry valley sampled at Tollgate is a tributary of a major N-S trending dry valley, which lies to the west of the Wrotham Road (and was sampled at ARC TGW97, about 300m west of the TLG98 profile). The sequence has been subdivided into three main units.

The silty sand to sandy silt ([9]) at the base of the sequence is probably derived from the Thanet Beds, which would have been more extensive in the area of the dry valley prior to the Late Glacial period, when considerable erosion took place. However, the high silt content may be derived from inputs of loess (wind blown deposits, characteristic of the harsh tundra environment of the Late Glacial). A number of characteristics in the upper part of this deposit, in particular the frequent iron nodules, manganese speckles bleached/leached patches and white sandy laminae are characteristics of ice segregation and waterlogging in arctic soils. In arctic environments during seasonal thaw, waterlogging of the surface layers occurs, with impeded drainage as a result of the frozen subsoil (Fedorova & Yarilova 1972; Van Vliet-Lanoe 1985; Vepraskas *et al.* 1994) and similar characteristics have been recorded in Quaternary pedosedimentary profiles (Kemp 1985; Kemp *et al.* 1992). It is inferred that the lower part of the Tollgate sequence represents arctic soil formation in redeposited Thanet Beds during a period of periglacial climate following the incision of the dry valley.

A period of harsher climate and renewed erosion followed, during which the overlying chalk rubble (coombe rock, contexts [4], [6] and [8]) accumulated, probably also during seasonal thaw, when the upper layers of the soil and bedrock sludged downslope over the still frozen subsoil. However, the chalky nature of the coombe rock indicates that by this time chalk bedrock lay exposed at the ground surface, the Thanet Beds in the vicinity of the dry valley having already been eroded away. The fine-grained lenses ([5] and [7]) within the lower part of the coombe rock may represent former soil material (perhaps formed during a Late Glacial interstadial) eroded and redeposited downslope with the soliflucted chalk.

It is generally thought that the large-scale erosion that created the dry valleys of the North and South Downs occurred in the latter part of the Late Glacial period, between about

14-10ka BP and in particular during the Loch Lomond Stadial (Younger Dryas), the cold stage that took place between about 11-10ka BP, immediately prior to the Holocene (Preece 1994). However, the Tollgate dry valley appears to have already been incised and arctic soils developed prior to a final cold stage that eroded chalk from the valley sides and redeposited it as coombe rock within the valley. Similar arctic soils are rarely found in this area and its survival may be a result of the more sheltered and tributary nature of the Tollgate dry valley. Although massive re-shaping of the drainage system appears to have taken place during the Late Glacial, it is possible that the Tollgate tributary valley escaped drastic re-forming at this time and sediments with incipient arctic soils developed in them were preserved in relatively sheltered locations close to the valley side.

Other evidence for an earlier episode of valley incision, post-dating the Last Glacial Maximum (*c* 18ka BP) but predating the Loch Lomond Stadial, in which most of the dry valleys existing in the landscape today appear to have been formed, comes from the hand-axe found in soliflucted sediments at ARC TGS97, about 400m further up the Tollgate dry valley. It was reported that this (redeposited) implement was found (at about 60m OD) in soliflucted sediments dipping from the north-west. No higher land exists today north-west of ARC TGS97. The area from which this soliflucted material came must subsequently have been scoured out by a later episode of valley incision.

Thus in the Tollgate area, remnants of earlier valleys carved out during episodes of ice-melt in the fluctuating climate of the Late Glacial appear to be preserved. Although in other parts of Kent and East Sussex dry valleys, such as Holywell Coombe near Folkestone, have been found to predate the Loch Lomond Stadial (Preece and Bridgland 1998), such evidence is not common. The evidence from Tollgate is of interest for better understanding the evolution of the Late Glacial landscape and has implications for both the re-colonisation of Britain by people following the height of the last cold stage and for the survival of Late Upper Palaeolithic remains within the landscape.

The sandy silts (contexts [1] to [3]) that form the upper part of the sequence are likely to be Holocene colluvium, derived from soils developed upslope in Thanet Beds, Chalk or/and Loessic parent material. The modern ploughsoil ([1]) appears to have truncated a former argillic brown earth-type profile, with carbonate and clay translocation into the Cca (context [3]) and Bt (context [2]) horizons respectively. However the valley side location of the trench suggests that it would have been subject to both erosion and deposition during the Holocene.

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