RESEARCHES AND DISCOVERIES IN KENT

A PREHISTORIC FLINT-WORKING SITE AT BERENGRAVE NURSERY, RAINHAM

In July 1996, Archaeology South-East (a division of the University College London Field Archaeology Unit) carried out a small excavation within the footprint of a telecommunications mast and cabin within the grounds of Berengrave Nursery, Berengrave Lane, Rainham (TQ 815 668, see **Fig. 1**).[1] A watching brief in June of the same year, during the

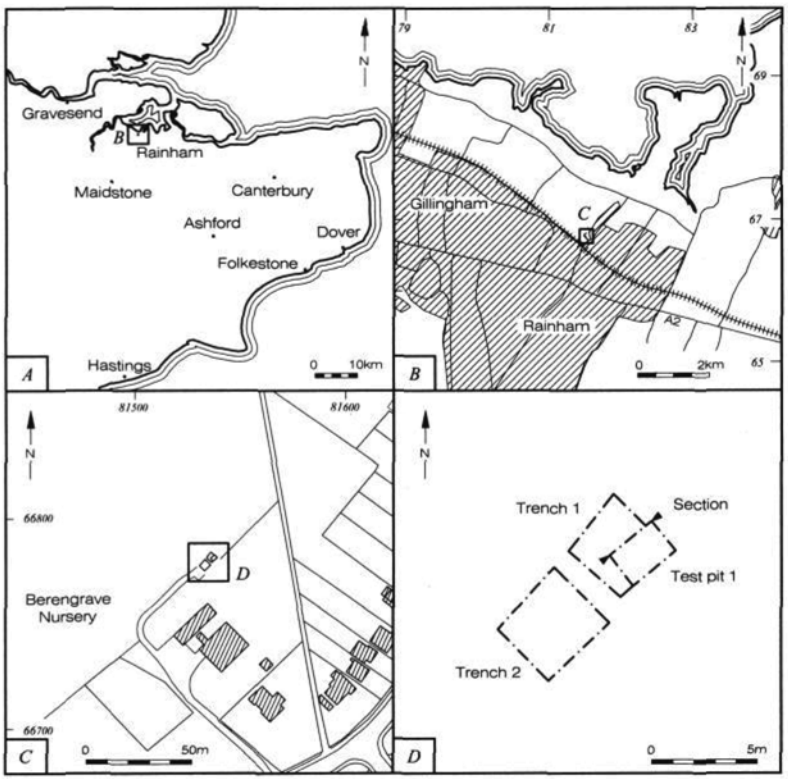

Fig. 1 Site and trench location plans.

removal of a mound of earth on the site of the proposed mast and the excavation of a geotechnical trial pit (Test-Pit 1), revealed two subsoil layers containing large quantities of struck flint. This find, together with further discoveries in the vicinity by the Lower Medway Archaeological Research Group (under the direction of John Jarvis), indicated that further investigation of the deposits was necessary prior to development taking place. The results are contained in an archive report to be deposited with the Guildhall Museum, Rochester.[2]

The underlying geology of the site, as recorded by the British Geological Survey,[3] comprises Head deposits overlying Upper Chalk. In order to provide a site-specific verification of the geology, a geoarchaeological assessment was conducted by Dr Martin Bates (Geoarchaeological Service Facility, UCL). This confirmed that the site geology comprises a straightforward sequence of solifluction deposits overlain by slope-wash sediments. Three main sediment units were identified (in order of deposition; see **Fig. 2**):

Archaeological Context 3: a basal chalky gravel consisting of chalk and flint clasts in a chalk silt matrix. The upper surface of this unit undulated, suggesting that it had been subject to solution processes. This unit fits the classic 'coombe rock' of the South-East and is considered to be a solifluction deposit that would form lobe-like deposits in three-dimensions. This cold climate deposit may have

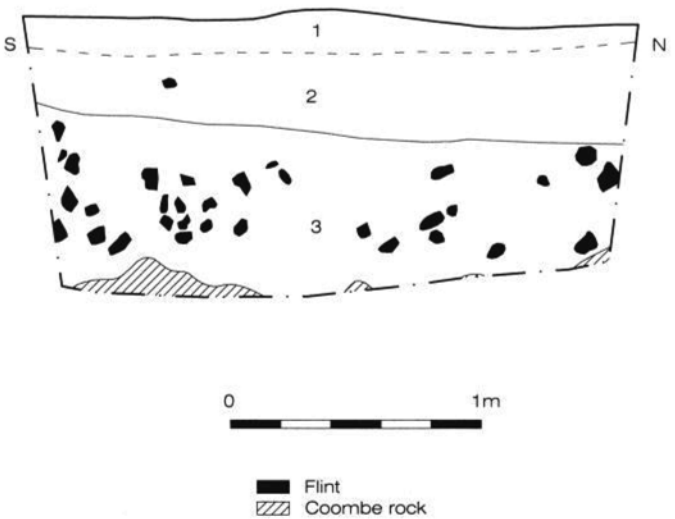

Fig. 2 Section of geotechnical test-pit 1.

been deposited in the Devensian or earlier, and may contain reworked Palaeolithic material derived from the Clay-with-Flints deposits capping the North Downs.

Archaeological Context 2: a decalcified red-brown silt containing large numbers of angular flint clasts. This unit is also likely to be a solifluction deposit. It is unclear whether this unit was originally chalk-rich and was subsequently decalcified, or was deposited in a decalcified state. This deposit would also be likely to form lobe-like bodies, and may contain reworked Palaeolithic material.

Archaeological Context 1: a brown silt containing occasional flint clasts and thin beds of flints (derived from high points in the underlying deposits).These sediments are probably Holocene slope wash sediments (colluvium). Any archaeological material within these sediments would be a mixture of *in situ* and derived assemblages.

Two trenches were excavated using a tracked mini-excavator. Both trenches were slightly wedge-shaped in plan. Trench 1 measured 3.4 x 3.2-4m, incorporating the geotechnical test-pit (Test-Pit 1) from the watching brief stage of the project, and was positioned on the site of the proposed mast. Trench 2 was slightly larger, measuring 4 x 3.4-3.7m in area, and was situated on the site of the proposed service cabin.

Trench 1

The topsoil/subsoil (Context 1) was initially stripped to a level 100mm above the Context 1/Context 2 interface. A 30 litre sample of (1) was sieved to recover artefactual material. A grid was established across the trench, dividing it into 38, 0.5m squares (or parts of squares). The excavation then proceeded by hand on a square by square basis, excavating in spits of approximately 50mm depth. Initially, all recovered flints were recorded three-dimensionally to determine the spatial patterning of artefacts within the colluvium. However, time restraints, and realisation that the site had suffered from deep ploughing, necessitated a modification of the recording strategy. Thereafter, finds were recorded according to square, spit and context.

Trench 2

This trench was initially stripped to a depth of 300mm (the proposed floor level of the cabin) and the site grid extended to cover the trench. A deeper foundation trench was to be excavated to a total depth of 600mm around the edges, so six 0.5m squares were chosen within the area of the foundation cut (Squares A - F). The squares were excavated by hand, and the spoil removed was sieved. Artefacts were recorded by square only.

The Flintwork *by Chris Butler*

A total of 1,310 pieces of struck flint were recovered during the excavation, and are summarised in Table 1. Of this total, 1,012 pieces came from the 0.5m grid squares excavated in Trench 1, 73 pieces from Test Pit 1, and 152 pieces from Trench 2, with the remainder coming from the topsoil and other contexts. Each flint was inspected by eye and, where necessary, with the aid of a hand held magnifying glass. In recording the pieces, note was made of any retouch and aspects of the technology used in the knapping process. The flint archive report includes a breakdown of the flintwork recovered from Trench 1, by each spit, within each 0.5m square. A total of 47 pieces of fire fractured flint was also found during the excavation.

The majority of the worked flint was debitage, with less than 3 per cent being implements. The debitage (Table 1) comprised a mixture of flakes, with large numbers of chips, fragments and shattered pieces, but very few blades or bladelets. Most of the flakes were very small, having a length and breadth of less than 20mm, and most being significantly smaller. The definition of chip has been used to describe the smaller pieces, which tend to have a minimal platform, and small bulb of percussion, but generally no other features. The chips tend to be less than 5mm in size, but some could be classified as very small flakes. Due to the small size of the flakes it has been difficult to split them between hard and soft hammer-struck pieces, however, some 30 per cent do appear to be soft hammer-struck.

Only seven cores were recovered from the site (Table 1). These are probably representative of the locally available raw material, which appears to be of a small size. This is also the probable reason for the small size of the debitage on the site, and the lack of both longer flakes and many blades or bladelets. A single fragment of a crested blade, and four rough core rejuvenation flakes were also found. These latter pieces, together with the evidence for platform preparation on some of the debitage, suggests that despite the small size and rough nature of some of the flintwork, some care was being taken in the knapping process.

The implements make up less than 3 per cent of the assemblage (Table 1), although retouched pieces, mostly fragments, account for a further 3 per cent. The most common type of implement is the scraper, with small numbers of piercers and notched pieces also being present. These implements were generally modified hard hammer-struck flakes; however, some of the scrapers and two other retouched pieces were made on natural flakes. Two probable microliths were recovered, together with two arrowheads, both of which are Later Neolithic transverse types.

Although the excavation produced no evidence for any archaeological features, a large quantity of struck and worked flints was recovered. The assemblage appears to contain pieces from a number of different

TABLE 1. THE FLINTWORK

Hard hammer-struck flakes	344
Soft hammer-struck flakes	152
Blades	2
Bladelets	5
Fragments	215
Chips	391
Shattered pieces	121
Spalls	28
Axe thinning flakes	2
Crested blade	1
Core rejuvination flakes	4
Single platform flake cores	4
Two platform flake core	1
Discoidal cores	2
End scrapers	13
Side scraper	1
Hollow scraper	1
Other scrapers	5
Notched pieces	3
Piercers	3
Microliths	2
Arrowheads	2
Misc. retouched pieces	4
Retouched natural pieces	2
Hammerstones	3
Total	1,310

periods ranging from Mesolithic to Bronze Age, although the small size of most of the material makes it difficult to assign a large proportion of it to any particular period. The large quantity of soft hammer-struck flakes, core rejuvenation flakes, spalls, evidence of platform preparation and microliths, indicate some activity in the Later Mesolithic period. Normally, the hard hammer-struck unprepared flakes found on this site would suggest a Neolithic or Bronze-Age date; however, due to the small size of most of the pieces resulting from the available local raw material, it is possible that some of this material could date to the Mesolithic as well.

The Later Neolithic arrowheads would indicate some activity in this period, but there is little else in the assemblage that could be assigned with certainty. Most of the remaining implements, especially those

involving re-use of earlier pieces or the retouching of natural flakes, together with some of the debitage, could be of Bronze-Age date.

The high proportion of debitage in the assemblage, together with the huge number of chips, fragments and shattered pieces suggests that flint knapping was the primary activity represented. The small quantity of cores could indicate that initial working of the flint took place elsewhere, and this assemblage, therefore, only represents the final working up of implements. The absence of the range and quantity of implements that would be expected on an occupation site would seem to support this theory, although earlier discoveries of flint artefacts and a sherd of Peterborough Ware from close to the site suggest the existence of some kind of settlement focus in the vicinity.

Due to the careful recording of material excavated from Trench 1, by square and spit, some spatial analysis of the flintwork has been possible (full details in archive). Unfortunately, this has not shown any concentration of either the total flintwork, flintwork by spit, or debitage. The only possible exception noted, is of the implements, which appear to be more concentrated in the south-west corner of Trench 1.

CONCLUSION

The excavation produced an interesting assemblage of flintwork, although it is difficult to provide a hard and fast interpretation for the prehistoric activity represented by this assemblage. A significant proportion of the assemblage consists of reworked pieces, including irregular flake removals carrying edge retouch. This apparent intensity of reworking has increased the difficulties of assigning the flintwork to any particular period. The presence of blades and microliths is indicative of Mesolithic activity, while the predominance of irregular flakes is more suggestive of later prehistoric flint-working. The apparent date range represented, together with the colluvial origin of the soils, suggests that a prehistoric activity site, encompassing several periods of use, may exist a short distance south (uphill) of the site, but close enough to prevent dispersal of the assemblage. This would also explain the complete absence of any archaeological features.

RICHARD JAMES

[1] Commissioned by Robert West Consulting, on behalf of Cellnet.

[2] R. James, *An Archaeological Excavation at Berengrave Nursery, Rainham, Kent* (unpublished Archaeology South-East client report No. 468, July 1996).

[3] 1:50,000 BGS Drift Map, Sheet 272, *Chatham* (1977).

DOUBLE TIDES IN THE WANTSUM – FACT OR FICTION?

Two contributors to volume CXXV of *Archaeologia Cantiana* referred to double tides in the Wantsum. In his article on the possible Brittonic origin of the place name Sarre, Andrew Breeze noted that 'ships avoiding the North Foreland waited [at Sarre] for the double tide'.[1] In her article on King Alfred's naval battle on the Stour, Christine Grainge quoted this writer's research suggesting that there was no double tide in the Wantsum.[2] Who is right?

The idea that there were double tides in the Wantsum seems to go back some time. The earliest mention of them that this researcher has been able to trace is in Sonia Chadwick Hawkes's contribution to the *Fifth Richborough Report* of 1968. In her description of the geography of Richborough she wrote of the existence of a crossing place of the Wantsum – whether by ferry or by ford – along the line of the present Sarre Wall: 'The existence of a ford here, presumably at low water, is plausible because Sarre was the meeting-place of the double tide, and the formation of some sort of bar would be expected under these conditions.' Later, on the same page, she spoke of Sarre in the late Saxon period as 'a royal port, or even a place where ships had to put in to wait for the tide'.[3] In 1982 Hawkes restated her proposition, asserting that Sarre was 'strategically placed where vessels using this inner route had to put in to wait on the double tide'.[4] In 1992 Susan Kelly repeated this, saying that 'Sarre dominated the principal haven of the Wantsum, where ships passing through the channel would have waited for the double tide'.[5] While Kelly quoted Chadwick's 1982 paper as her reference, Chadwick gave no source or reference in either of her papers for her claim. She may, however, have had in mind a paper published in 1927, in which Geo. P. Walker described 'two tides at Sarre', but what he was describing was not a double tide, but two separate tidal streams flowing into the Wantsum from the northern and the eastern ends of the channel and meeting at Sarre.[6] He saw the tides as 'ebb[ing] and flow[ing] through both entrances at about the same time'. He quoted a Dr Parks as saying:

> The two seas were distinct, and kept their tides so from one another. The one flowing from the north side of the Foreland and the other from the south, and each met the other at the low point of the highlands under Sarre, from whence they ebbed back again, each to its own sea.[7]

Even if Chadwick's 'double tide' was based on Walker's concept of two tidal streams flowing simultaneously into the Wantsum from each end to meet at a fixed point and then ebbing back to the entrance from which each came, the hypothesis of a double tide in the Wantsum still appears to have gained currency from the analogy of the behaviour of the tide at Southampton, where there genuinely is a double tide. The tidal cycle

from high water to high water lasts approximately 12½ hours; the height of the tide during this cycle can be plotted as a curve on a graph. A normal tidal curve, such as that for Dover and typical of that found at most places around the coasts of the British Isles, approximates to a cosine curve (**Fig. 1**).[8] The tidal curve for Southampton, however, shows marked anomalies: there is a prolonged 'stand' at high water, which at springs resolves into a second high water; there is also a 'stand' during the flood some two hours after low water, again particularly marked at springs; in addition the ebb is very short, lasting some 3½ to 4 hours (**Fig. 2**).[9] The argument goes that Southampton's double high tide arises from the existence of the Isle of Wight; the tidal streams, giving rise to the first high water, flow through the Needles Channel at the western end of the Solent, while the second high water is a response to the tidal streams flowing in through the eastern entrance to the Solent. If Southampton, why not Sarre, also standing on a channel created by an offshore island?

This researcher's interest in the tides in the Wantsum was stimulated, not so much by the claims that there was a double tide at Sarre, as by a suggestion by John Hind that the Wantsum 'might well have been treacherous, if open to tides at both ends'.[10] Hind was advancing the hypothesis that the Roman invaders of AD 43 landed in the Solent, rather than at Richborough on the Wantsum. His argument was that Julius Caesar's experience of fleet disasters while at anchor off east Kent in 55

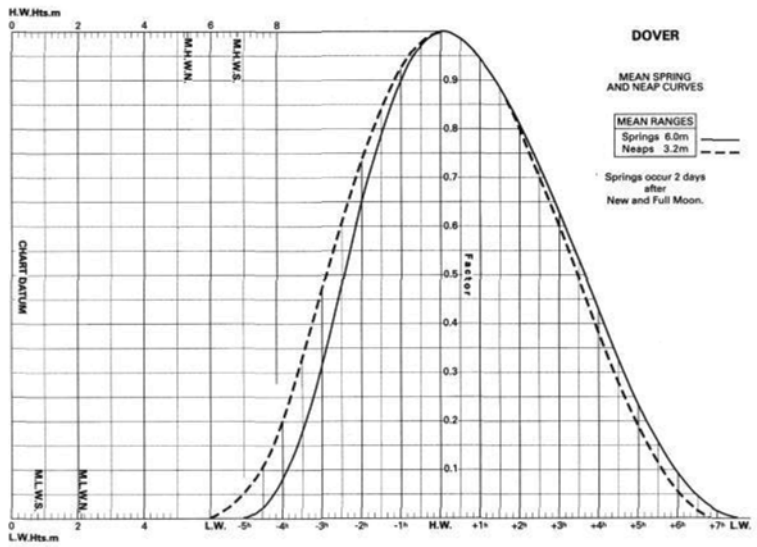

Fig. 1 The mean Spring and Neap curves for Dover.

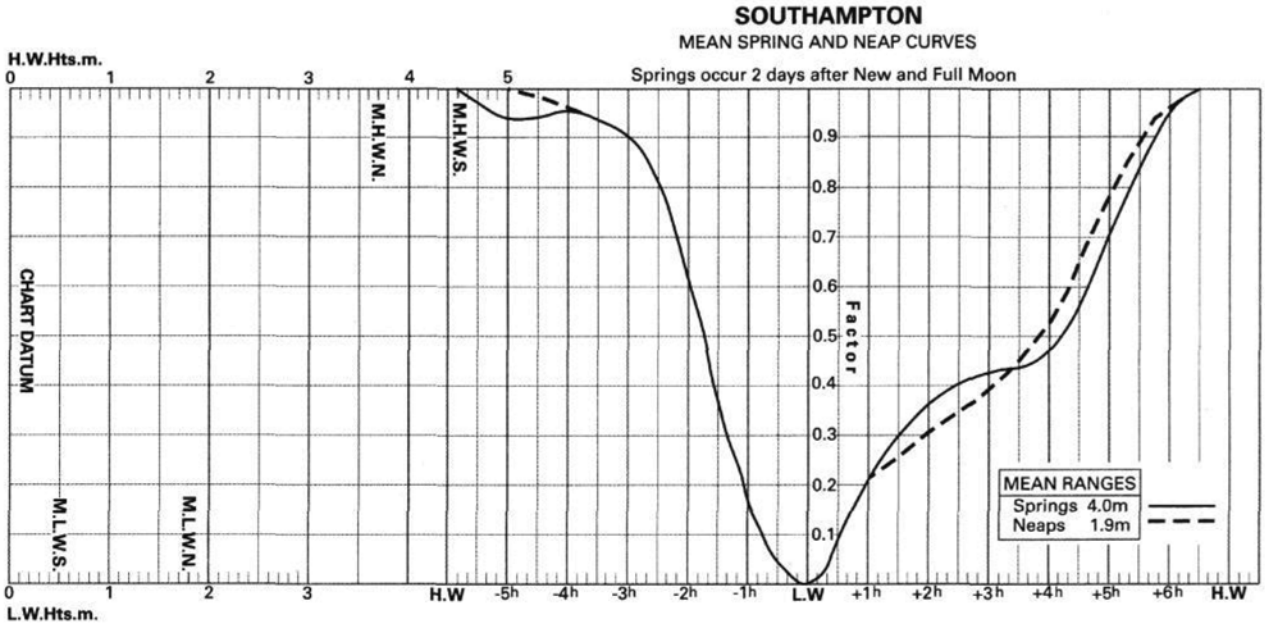

Fig. 2 The mean Spring and Neap curves for Southampton.

and 54 BC would have persuaded the Roman invaders of AD 43 to look elsewhere for their invasion beachhead; in that context he suggested that the Wantsum was not the sheltered waterway that it was taken to be.

The approach adopted by this researcher was to compare the tidal heights as they can be calculated from modern data at Ramsgate and Herne Bay. These two ports, situated close to each end of the former Wantsum Channel, were taken as proxies for Richborough and Reculver. The comparison of tidal heights was used to establish the hydrostatic differential between these two points and hence the direction of the tidal stream. At the same time the tidal curves derived from the data gave an indication of the height of the tide at each end of the Wantsum. The calculation of the data was done by a computer programme which was loaded with the harmonic constants for Ramsgate and Herne Bay.[11] Two dates were selected, 18 September 1993 (springs) and 25 September 1993 (neaps). The programme was run for each of these dates for the two ports and the height of the tide extracted at hourly intervals. An adjustment was made to the data for Herne Bay to allow for the difference between the mean tide level at the two places. The results were then plotted on a graph (**Fig. 3**).

This reveals the general trend that during the flood the tide is higher at Ramsgate than at Herne Bay, while the reverse applies during the ebb. This suggests that during the flood the tide would have been flowing westwards through the Wantsum Channel and eastwards during the ebb. This can be shown graphically (**Fig. 4**). Analysed in detail this shows that, as the tide ebbs, the flow is eastwards through the Wantsum Channel and continues so on the first of the flood. Somewhere between 3 and 4 hours before High Water Dover the flow turns westward and there is some hint of a continued westward flow over the hour or so of high water.

On its own this does not allow one to say whether the speed of the flow through the channel would have been such as to justify Hind's suggestion that the Wantsum might have been 'treacherous'. However, comparison with the data from other inshore channels can give an indication. The Menai Strait is well-known for the rates of its tidal streams, 'generally 3 knots, but 5 knots off Abermenai, 6 knots at the Bridges and 8 knots at the Swellies'.[12] The Swellies are the part of the Strait between the road and rail bridges where the constriction of the channel and numerous rocky islets not only increase the speed of the tidal stream, but also contribute to its treacherous reputation. On the other hand the Swale, a shallow inshore waterway, which divides the north Kent from the Isle of Sheppey and which survives to the present day, offers a considerable contrast with the Menai Strait. In the Swale the tidal streams are moderate, mostly less than 2 knots, and do not present a navigational hazard.

The same methodology was applied to both these channels by taking tidal predictions for Caernarfon and Beaumaris (Menai Strait) and for Sheerness and Herne Bay (the Swale) and calculating the net difference

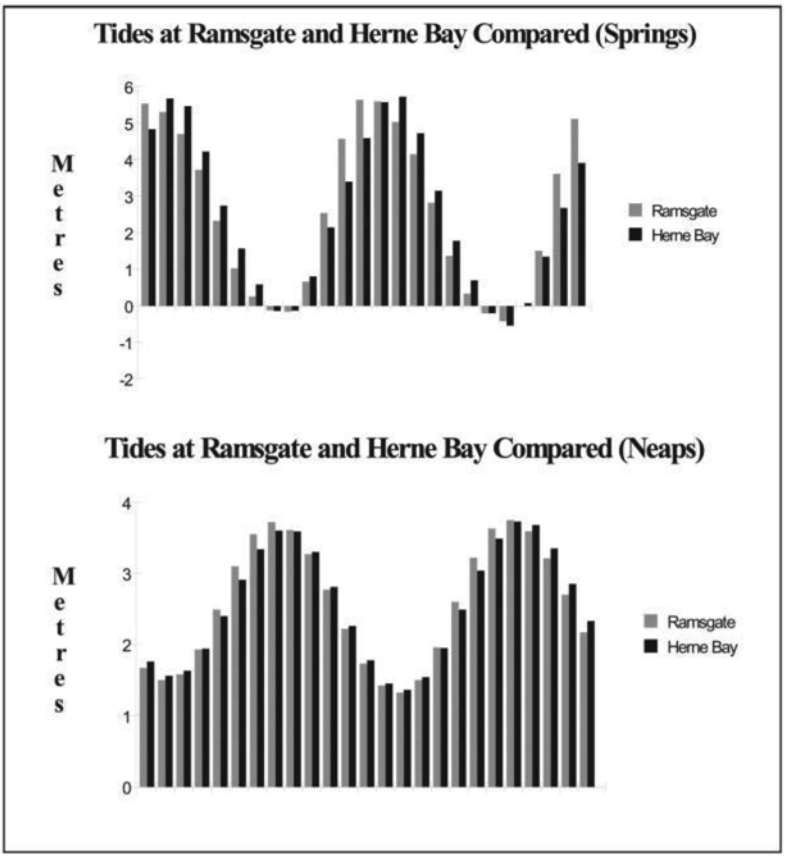

Fig. 3 Tides at Ramsgate and Herne Bay compared.

in tidal heights and thus the hydrostatic differential at the ends of each channel. The net difference in the Menai Strait rose to two metres or more at springs; this was significantly higher than the metre or just over for both the Swale and the Wantsum; a similar contrast was manifest at neaps, although as was to be expected the respective figures were rather lower. This suggested strongly that the Wantsum would have been much more akin to the Swale than to the Menai Strait and that, in particular, it would have shared its moderate tidal streams. Furthermore, it would not have presented the islets and rocky outcrops which create significant hazards in the Menai Strait. In this writer's view this analysis provided no justification for Hind's suggestion that the Wantsum might have been 'treacherous'. Nor did the data appear to provide a basis for supposing

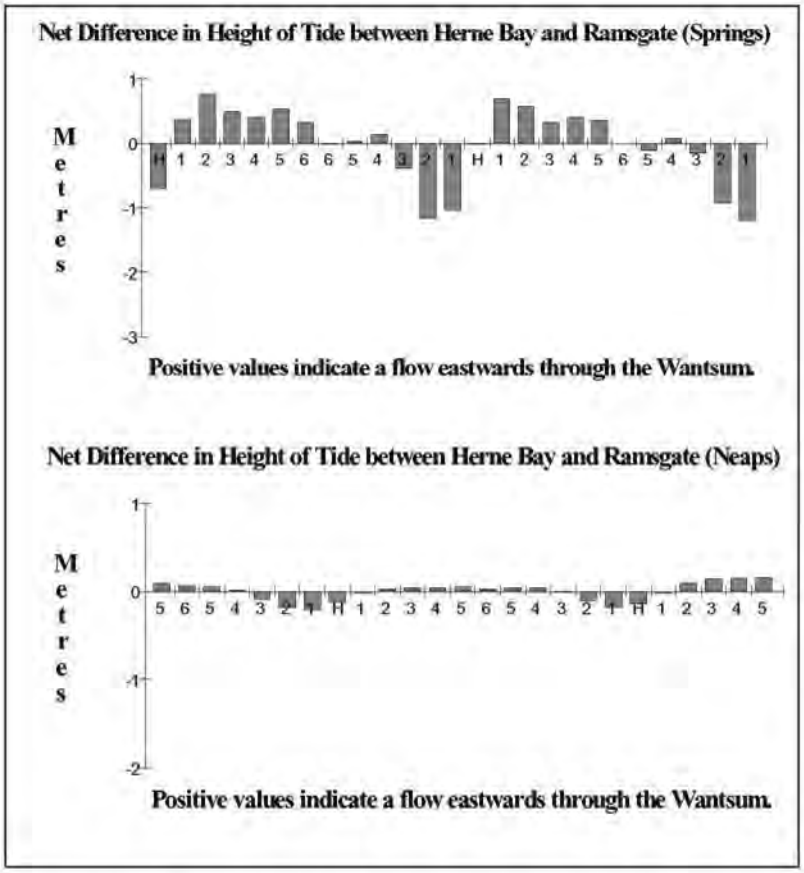

Fig. 4 Net difference in height of tide between Herne Bay and Ramsgate.

that the Wantsum Channel would have experienced a double tide or that the stand at high water would have been more significant then elsewhere in the immediate region.[13] Moreover, the analysis does not confirm Walker's concept of two tidal streams flowing simultaneously into the Wantsum from each end to meet at a fixed point and then ebbing back to the entrance from which each came.

In 2002 the researcher's concern was to examine Hind's claim that the Wantsum was a dangerous stretch of water and for that reason he did not take the issue of the double tide further at that time. However, there are other aspects of the question to be considered. The first is to consider whether, apart from the Solent, there are other cases in the British Isles

where channels between offshore islands and the mainland have double tides. Examination of tidal curves in nautical almanacs suggests that there are none.[14] The second is to ask whether the behaviour of the tide in the Solent can be taken as a reliable model of the way in which the tides would have behaved in the Wantsum. The phenomenon of the anomalous tides recorded at Southampton is not restricted to the Solent. It extends significantly further west along the south coast, as far west as Portland in fact. Portland exhibits a double low tide and the tidal curves at Poole Harbour are particularly complex, so much so that a third curve, intermediate between springs and neaps is published (**Fig. 5**). Any adequate explanation of the behaviour of the tide in the Solent must also account for its behaviour along this stretch of coast.

Commander John Page Royal Navy, Head of Tidal Section at the UK Hydrographic Office, advises that the double high water at Southampton has nothing to do with the tide entering the Solent separately via its east and west entrances. It is entirely due to the ultimate manifestation of the 'shallow water tide', which begins probably somewhere off Start Point, and which first manifests itself as the double low water at Portland and then becomes the double high water at Southampton.[15] This must invalidate any case for a double tide in the Wantsum based on the argument that the tidal flow would have entered the channel first from one end and then from the other. A double tide, if it existed, would have been manifest at other places in the immediate vicinity. So the third question arises. Do the tidal curves in the east Kent region – on either side of the English Channel – exhibit anomalies which might be comparable with those seen along the south coast between Portland and Selsey? In general they do not and conform fairly closely to a cosine curve, similar to the tidal curve for Dover (Fig. 1). However, one place on the Stour, Richborough, does show an anomaly at low water. Here the tidal curve shows an ebb lasting rather longer than the flood with a marked slowing up in the fall of the tide level in the last hour of the ebb. On certain days of the month this seems to give the appearance of a double low water. Commander Page advises that the low water phenomenon at Richborough is not strictly a double low water (such as occurs at Portland) but more a distortion of a low water stand. The reason could well be the influence of the 'shallow water tide'. He suggests that the physical shape of the River Stour is most likely to be the predominant factor producing this distortion of the low water curve. Other locations around UK displaying similar tidal characteristics are the ports in the upper Firth of Forth and Cromarty Firth, with the higher reaches of the River Clyde experiencing high water distortions.[16] This would, therefore, appear to be a river phenomenon, rather than one which would occur in the tidal pattern to be observed in an inshore channel open at both ends.

In sum, the particular tidal anomalies observed along the south-central

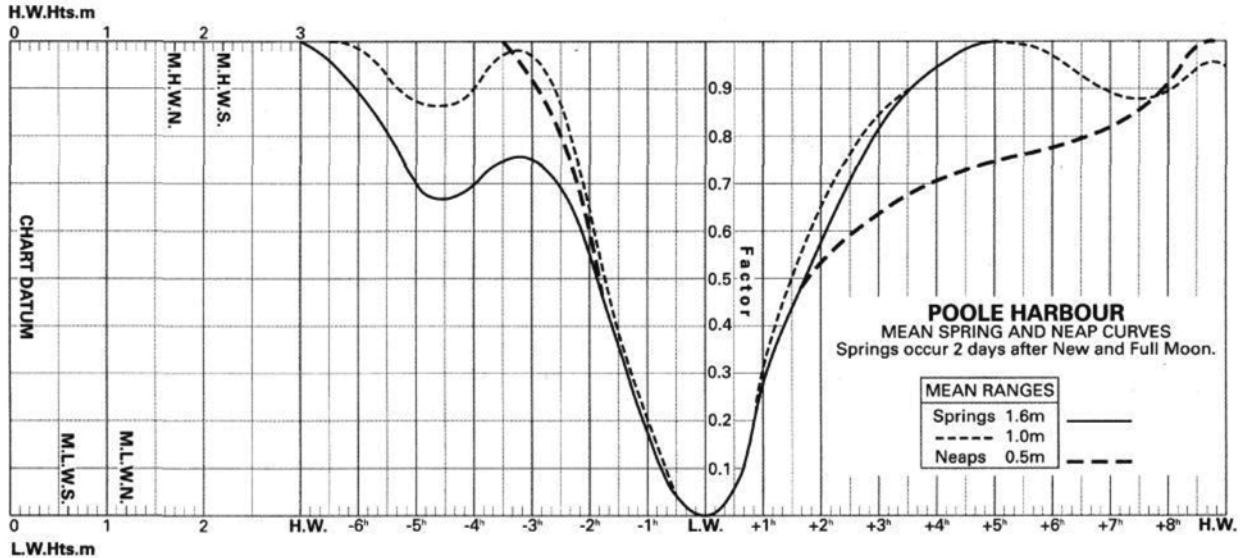

Fig. 5 The mean Spring and Neap curves for Poole Harbour.

English coast are unique in British waters and they certainly do not constitute a valid argument for supposing that similar anomalies would have been manifest in the Wantsum Channel. Nor is there any evidence in the tidal data in the east Kent region for arguing that there was a double tide – however defined – in the Wantsum; the evidence does not even validate Walker's concept of two tidal streams simultaneously flowing in and out of the two ends of the channel – for much of the tidal cycle a single tidal stream would have flowed in one end and out of the other.

Even so, does the claim by Sonia Chadwick Hawkes and others that ships had to put into Sarre to wait on the tide – even if it was not a double tide – make any sense? Small craft sailors know the importance of 'working their tides', that is to say of sailing with the tidal stream, rather than against it.[17] The pattern of tides in the Thames estuary and the southern North Sea is such that a ship can leave the lower Thames or the Medway and carry a favourable tide along the north Kent coast round the North Foreland and south to Ramsgate or Dover. However, this is not possible on the return trip. A vessel leaving a port on the east Kent coast and wishing to take the favourable flood tide along the north Kent coast into the Thames must first stem the tide up to the North Foreland. This is because the last hour or so of the ebb out of the Thames along the north Kent coast turns south to run along the east Kent coast. When the tide turns off the North Foreland the tidal stream divides, part to become the flood into the Thames, while the other part continues to run south to become the flood tide towards Dover. Much the same would have applied in the days of the Wantsum. The easterly flow through the Channel described above, running from just after High Water Dover and continuing for some hours after Low Water Dover would have made it possible for a ship to leave the Medway or lower Thames at high water and to carry the tide through the Wantsum and join the flood to Dover and possibly across the Strait to Boulogne and Quentovic. But a ship bound from Quentovic to the Medway or the London river would either have to anchor in the Wantsum to wait for a favourable tidal stream – or stem the tide. If she worked the Dover Strait tides correctly she would arrive off Richborough around 5 hours after High Water Dover. At this point the flow would be easterly in the Wantsum Channel and would continue so for another three hours or so. If she wished to carry straight on along the north Kent coast, she would have to stem the tide through the Wantsum; otherwise she would have to anchor; off Sarre?

In the Roman and Anglo-Saxon periods there is also the question of the direction of the wind to consider. A modern yacht sailing along the north Kent coast with a quartering breeze from the south-west will find, as she turns south off the North Foreland, that she is hard on the wind.[18] Ships of the Roman and Anglo-Saxon periods could not sail as close to the wind as modern yachts and would not have been able to make good a course of

much more than 90° from the direction of the wind. Thus, as a ship turned to enter the Wantsum – whether from the south or the west – she may well often have found that the wind became unfavourable for her continued passage through the channel. She would then have anchored to wait for a change in the wind, though probably not off Sarre.

There is a moral in all this. One does not claim that establishing that there was no double tide in the Wantsum is of any great historical significance. On the other hand it is somewhat disturbing that distinguished scholars should have made and repeated a claim – about something seemingly outside their immediate academic specialism – which appears to have no basis in research.

GERALD GRAINGE

[1] A. Breeze, 2005, 'Welsh *seri* 'causeway' and Sarre, Thanet', *Archaeologia Cantiana*, cxxv, 387-9, at 387.

[2] C. Grainge, 2005, 'King Alfred's naval engagement with the Danes in 885: which River Stour?', *Archaeologia Cantiana*, cxxv, 229-41, at 235, quoting G. Grainge, 2002, *The Roman Channel Crossing of A.D. 43: the constraints on Claudius's naval strategy*, BAR Brit. Ser. 332 (Oxford), Appendix X, 'Tides in the Wantsum Channel', 131-3.

[3] S.C. Hawkes, 1968, 'Richborough – the Physical Geography', in Barry Cunliffe (ed.), *Fifth Report on the Excavations at the Roman Fort at Richborough, Kent* (Oxford), 224-31, at 229.

[4] S.C. Hawkes, 1982, 'Anglo-Saxon Kent *c.* 425-725' in P.E. Leach (ed.), *Archaeology in Kent to AD 1500*, CBA Research Report 48 (London), 64-78, at 76.

[5] S. Kelly, 1992, 'Trading privileges from eighth-century England', *Early Medieval Europe*, 1, 3-28, at 10.

[6] G.P. Walker, 1927, 'The lost Wantsum Channel', *Archaeologia Cantiana*, xxxix, 91-111, at 110.

[7] Walker gives no further details for the source of this quotation.

[8] The cosine is one of six basic ratios in trigonometry.

[9] Spring tides occur twice a month a day or two after new and full moon. At springs tides have their greatest range between high and low water in each fortnightly period and tidal streams are at their strongest. Neap tides occur a day or two after half moon. At neaps tidal streams are at their weakest and tides have their least range between high and low water in each fortnightly period.

[10] J.G.F. Hind, 1989, 'The Invasion of Britain in AD 43 – an Alternative Strategy for Aulus Plautius', *Britannia*, 20, 1-21, at 14.

[11] Hydrographer of the Navy (NP 159A v. 2.0), 1990, *Tidal Prediction by the Admiralty Simplified Harmonic Method* (Taunton); Hydrographer of the Navy (NP 160), *Tidal Harmonic Constants (European Waters)* (Taunton), 4.

[12] T.B. Stableford (ed.), 1993, *Reed's Nautical Almanac: European 1993* (London, Hamburg and Boston), 483.

[13] For the detail of this analysis, see Grainge, *The Roman Channel Crossing of A.D. 43*, 131-3.

[14] For example, *Reed's Nautical Almanac: European 1993*.

[15] Personal communication from Commander Page. The 'shallow water tide' is the distortion of the oceanic tide due to the influence of terrestrial conditions (such as bottom friction) associated with shallow water in the continental shelf margins. Commander Page advises that there is a thoroughly comprehensive explanation of the 'shallow water tide' given in the *Admiralty Manual of Tides* (NP 120).

[16] Personal communication from Commander Page.

[17] Seán McGrail, 1987, *Ancient Boats in N. W. Europe: The Archaeology of Water Transport to AD 1500* (London and New York), 266.

[18] A quartering wind is one blowing some 45° one side or the other of directly astern.

EXCAVATIONS AT THE ANGLO-SAXON CEMETERY SITE AT GUILTON MILL, ASH-NEXT-SANDWICH

In connection with plans for the construction of a substantial new extension to Guilton Mill (now a private residence), the Dover Archaeological Group was invited to undertake excavations in the garden, ahead of the building work. The site was of particular archaeological interest as it lay within the area of the well-known early Anglo-Saxon cemetery (Faussett 1856; Meaney 1964, 121-2), now scheduled as an Ancient Monument (Kent No. 161). The site lies at the top of a south-east facing slope, overlooking the valley of the Durlock Stream, at an elevation of about 23m above OD. NGR TR 2816 5818 (see Hone 1987, fig. 16 for a location map). The natural subsoil here consists of Thanet Beds sand, which in this area has been dug for building material since at least the eighteenth century. The archaeological work was undertaken in extreme summer heat over a five-day period during July and August 2003 (Parfitt 2003). Thanks are due to the owners, Mr and Mrs Kaushal, for allowing access and providing essential refreshments.

Examination indicated that there had previously been extensive terracing of the area to be built across, when the surface of the natural subsoil had been lowered by between 0.10 and 0.15m. This was perhaps connected with the construction of a rear extension to the mill in the 1970s. Indeed, an Anglo-Saxon grave containing beads and an unusual disc brooch had been previously recorded very close to the present area during the building of a porch on the south side of the mill in 1973 (Avent 1975, Corpus no. 192; plate 78). The area investigated in 2003 was L-shaped in plan and lay immediately to the south and west of the extant building. Its maximum dimensions were 13.80m (N-S) by 7.20 m (E-W). Of this area, a portion on the west side, measuring 9.30m (N-S) by 4.00m (E-W) was excavated under controlled archaeological conditions, the remainder being inspected during a subsequent watching-brief of the building work.

In addition to several modern pits and service trenches, the work

revealed a single grave (designated in Richardson (2005, vol. II, 3) as Grave 109) cut into the natural sand. This was aligned north-east by south-west and lay about 4m to the west of the grave located in 1973 (designated by Richardson, Grave 108). The new grave was located during the controlled excavation just south-west of the brick mill tower. It was roughly sub-rectangular in shape, although its north-eastern end had been cut away by a modern pipe-trench and the top was truncated by the earlier terracing. As surviving, the grave was a minimum of 2.25m long, 0.74m wide and up to 0.28m deep, with steep sides and a flat base. Its filling consisted of compact yellow-grey, slightly laminated loamy sand, with very occasional small black pebbles. Traces of highly decayed bone occurred on the base in the south-western half of the grave. There was perhaps just sufficient remaining to identify two arm bones and suggest that the head was at the western end – but this cannot be certain. An area of iron staining in the natural sand near the north-east end of the grave could represent the position of an iron grave-object but it was impossible to determine what, if anything, this might have been. No other finds were recovered from the filling of the grave. A thorough metal-detector search of the entire area failed to locate anything of interest and nothing more was revealed during the watching-brief, despite a careful search.

Although a fairly extensive area (around 55m^2), within what was believed to form the central part of an important Anglo-Saxon cemetery, was examined only a single new grave was revealed. A very careful search of the area failed to reveal any additional graves and it can be safely assumed that no others survived here. What is less certain, however, is the extent of any damage caused by the earlier terracing of this area – it is possible that other graves were destroyed in such operations, although there appears to be no record of any previous discoveries here, other than the single grave found in 1973. A pipe trench cut across the area in 1987 also failed to reveal any burials (Hone 1987). The 1973 grave apparently lay just south of the mill tower and is now under the house, around 4m from the newly discovered grave. Thus, the general impression gained is that graves in this area might have been quite widely spaced. Such a layout would be more typical of a seventh-, rather than sixth, -century burial area (Parfitt and Brugmann 1997, 121-2) but the newly discovered grave cannot be dated.

KEITH PARFITT

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TOWARDS A PLAN OF DARTFORD PRIORY AND THE TUDOR MANOR

Wessex Archaeology undertook an evaluation and watching brief between June 2000 and May 2003 at Prospect Place Retail Park, Dartford, on behalf of Pillar Properties Plc, who were redeveloping the site for commercial use. The site (NGR 553950 174400) is known as the location of Dartford Priory, founded by Edward III in 1349, the only Dominican nunnery in England.[1] The buildings were largely, if not completely, demolished at the Dissolution and a royal manor house was built in their place. The site is also known for its rôle in the storage of ore for Frobisher's experimental and ill-fated smelting works (1577-78),[2] and for its association with John Hall's late eighteenth-century ironworks, and later industry.[3]

There are no surviving plans or surveys of the Priory, and only one rather sketchy view of the complete Manor House, dating from 1596.[4] Parts of the precinct wall survive, and medieval masonry is incorporated into the brick-built Grade II*-listed Manor Gatehouse, the only part of the Manor still standing. The site had clearly been impacted by intense industrial and commercial development in the nineteenth and twentieth century. Despite early antiquarian speculation,[5] the plan of the priory and manor were essentially lost until excavations on the site by A.W. Clapham,[6] the Dartford District Antiquarian Society (now Dartford Historical and Antiquarian Society),[7] the Dartford and District Archaeological Group (DDAG)[8] and the Kent Archaeological Rescue Unit (KARU)[9] on various occasions between 1913 and 1982. Regrettably, understanding of the site remains constrained by either the small scale of this work, or by the lack of detailed published accounts and plans: in some cases even the locations of excavations are unavailable.

The Wessex Archaeology project comprised a total of 35 evaluation trenches targeted on proposed development. Despite the impacts of earlier construction it was clear that significant islands of archaeological stratigraphy survived beneath the site. Results were used to devise a mitigation scheme which involved raising formation levels above surviving archaeology, so reducing the impact of construction to the localised effects of piled foundations and drainage runs, which were

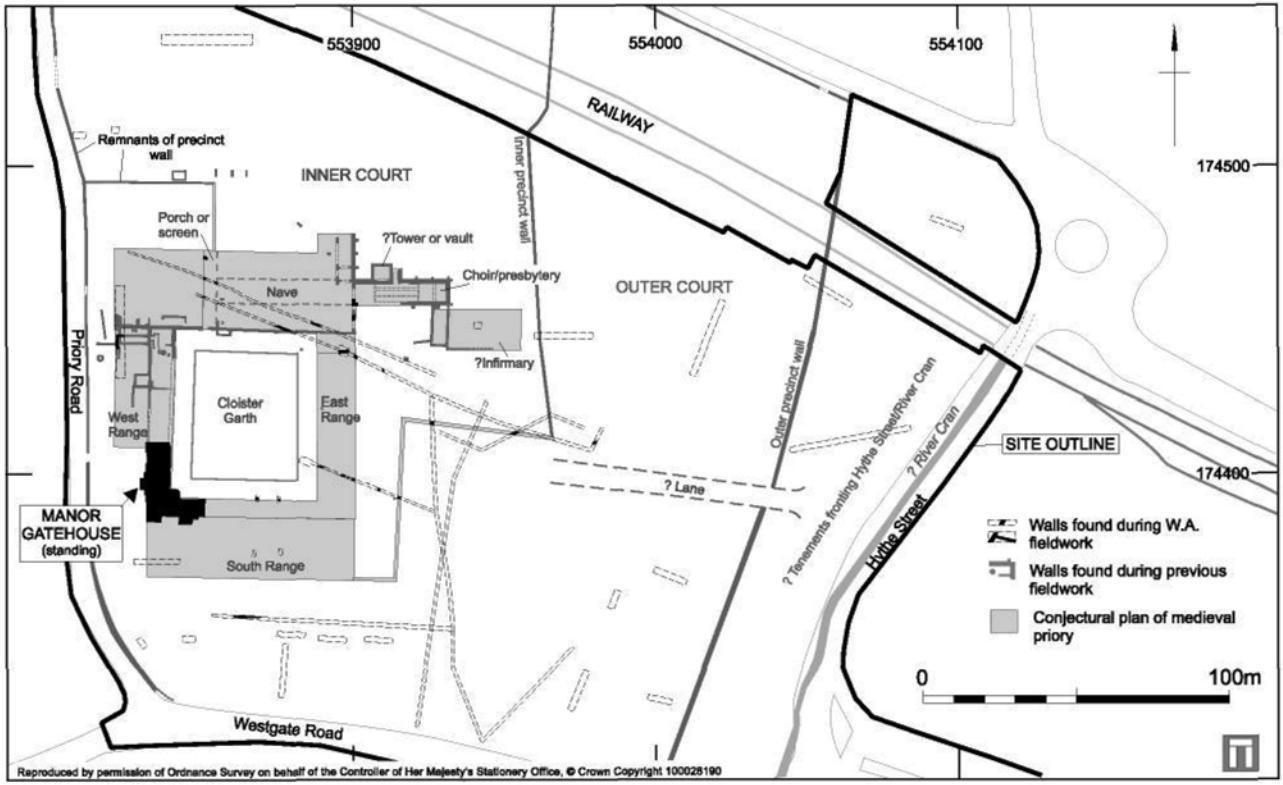

Fig. 1 Conjectural plan of Dartford Priory.

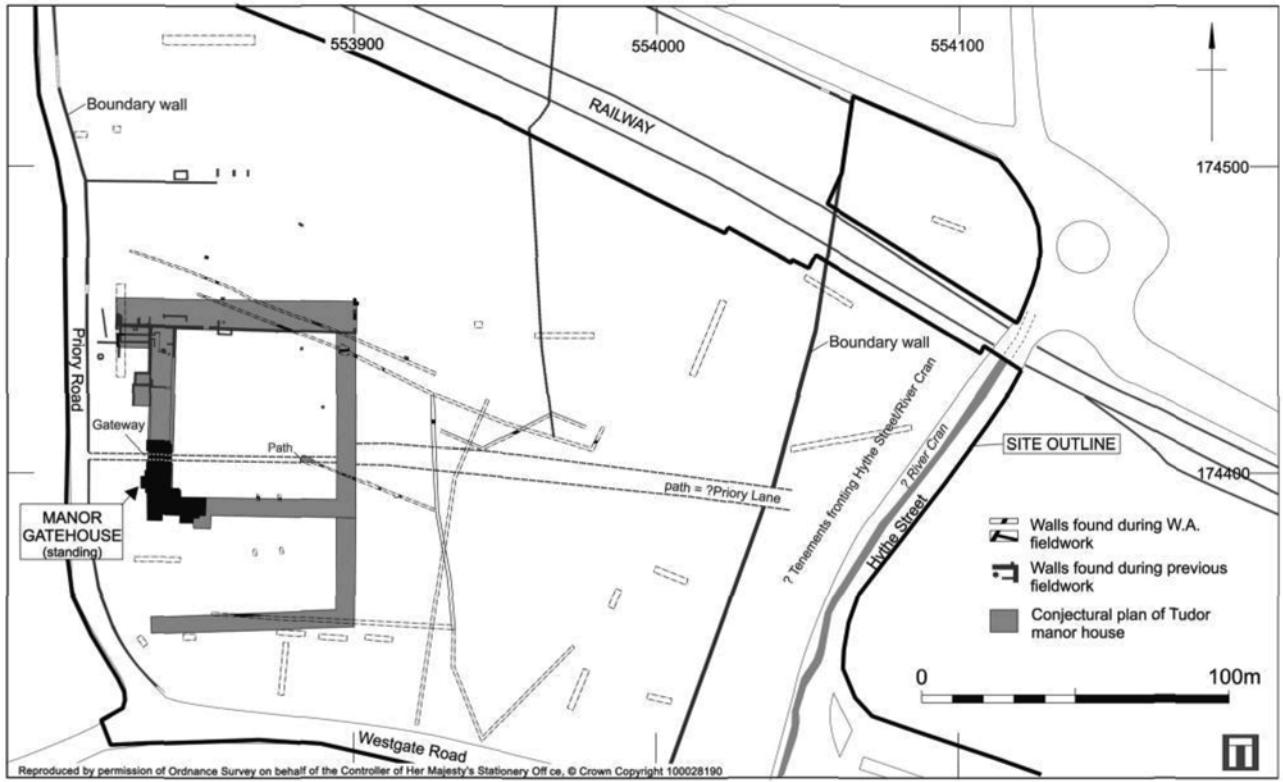

Fig. 2 Conjectural plan of the Manor House.

monitored as a watching brief. Full details of the findings are held in the project archive,[10] but it is only appropriate to present a summary here. Because of the nature of the fieldwork this mainly deals with matters of plan.

Natural gravel sloped gently from south-west to north-east across the site towards the confluence of the rivers Cran and Darent. Localised variations suggested the presence of former braided channels related to these watercourses. Alluvium occurred over most of the site, to a maximum height of 2.7m above OD, thought to indicate episodic flooding of nearby rivers alternating with marshy and perhaps drier conditions. Insect and waterlogged plant remains from these deposits confirm this interpretation. The fieldwork encountered no pre-medieval features, although a single unsystematic core from flint-working was found in an undated alluvial deposit, while single sherds of Roman pottery and glass came from a medieval context.

A single ditch, cut by a medieval wall and containing pottery dating from the fourteenth century, may have been a pre-Priory field drain or property boundary. Several sherds of Kingston- and London-type wares, as well as sandy shelly wares and coarse sandy wares indicate some level of activity on the site between the twelfth and early fourteenth centuries, but were all residual in later contexts.

Few features could be related to drainage or reclamation works, but extensive deposits of rammed chalk associated with the earliest foundations may relate to the preparation of this damp site. The main priory buildings were located towards the west of the site, where natural gravel was highest and alluvium thin or entirely absent. The suburban setting, on the highest available ground overlooking marshland is entirely typical of certain types of nunnery.[11]

No definite medieval floors were exposed. Walls were generally undated, and being seen in narrow trenches, can only be identified as medieval or Tudor on the basis of construction, apparent alignment or position in relation to the published location of previous observations. Foundations of chalk rubble and flint bonded with pale yellow lime mortar, 0.4-1.5m wide and surviving 0.4-0.7m deep seem generally to be of medieval date, while footings incorporating brick and re-used medieval moulded stone, sometimes built over earlier chalk footings can be tentatively taken as post-dating the Dissolution. As a Dominican nunnery, Dartford Priory was unique in England; it also belongs to the late period of medieval English monastic foundations. Its plan may thus have been somewhat more unusual than the rather conventional reconstruction plan offered here (**Fig. 1**),[12] which is put forward as a model only, and as an incentive to others to publish the results of their excavations.

Results from the Wessex evaluation and findings of the DDAG suggest that the conventual church had a large nave (like many Dominican/

mendicant churches). Traces of two north-south oriented foundations may be evidence for a western porch; it is probably too far west in a nunnery church for a pulpitum screen.[13] Clapham's presbytery, rather than projecting from the east walk of the cloister may now be provisionally reinterpreted as the east end of a cruciform church, with a southern cloister. Other walls may indicate elements of the west, east and south ranges.

The conjectural plan of the Manor House (**Fig. 2**) assumes the reuse of the south aisle of the nave and parts of the claustral ranges as the basis of the Tudor rebuilding. The standing Manor Gatehouse marks the south-west corner of the Great Court of the Manor, as suggested by Clapham,[14] but also potentially the south-west corner of the medieval cloister. The reconstruction locates the southern quadrangle shown on the 1596 plan (above) by reference to an excavated east-west wall footing, although as this wall contained 'Black Ore' (imported by Frobisher), it must post-date 1577.

An important result of the project is that significant deposits and features have been shown still to survive on the site, which will need to be considered in any future development. In conclusion, it will not be possible to present a comprehensive account of the layout and archaeology of this important site or an interpretation of the fragments of medieval and later walls recorded during this phase of fieldwork until the site archive can be integrated with those of earlier, more extensive excavations, particularly those of KARU.

BRUNO BARBER

[1] Page, W. (ed), 1926, *Kent,* Victoria County History, ii, London, St Catherine Press, 181-90.

[2] Hogarth, D.D., Moore, D.T., and Boreham, P.W., 1993, 'Martin Frobisher's mines and ores', in S. Alsford (ed.), *The Meta Incognita project: contributions to field studies*, Mercury Series Directorate Paper No. 6, Hull, Quebec: Canadian Museum of Civilization, 148-172.

[3] Miller, H., 1985, *Halls of Dartford 1785-1985*, London, Hutchinson Benham.

[4] Map of Dartford 1596, Collection of the Wardens of Rochester Bridge.

[5] Dunkin, A.J., 1844, *The history and antiquities of Dartford*, London.

[6] Clapham, A.W., 1929, 'The Priory of Dartford and the Manor House of Henry VIII', *Archaeological Journal*, 33, 67-85.

[7] This work, in 1926-27, may have consisted of surveying foundations which had been uncovered during the construction of factory buildings.

[8] Dartford District Archaeological Group, 1986, *Rediscovering Dartford with Dartford District Archaeology Group,* Dartford.

[9] Philp, B., 1977, 'Dartford Priory and Manor House', *Kent Archaeological Review*, 47; Philp, B. and Garrod, D., 1977, 'Rescue excavations continue at Dartford', *Kent Archaeological Review*, 49; Garrod, D., 1980, 'Important find from Dartford', *Kent Archaeological Review*, 61.

[10] The project archive, including all primary records, client reports and post-excavation assessment is expected to be curated by Dartford Borough Museum, where it may be consulted by prior arrangement.

[11] Gilchrist, R., 1994, *Gender and material culture: the archaeology of religious women*, London, 64-6.

[12] Clapham's suggestion (*op. cit.*, see note 6, 76-8) that the Dartford church lacked a nave and may have projected from the east side of the cloister, in the position usually occupied by the Chapter House, now seems less likely. However given the lack of knowledge about the KARU excavations, it remains possible (see also Gilchrist, R., 1995, *Contemplation and action: the other monasticism*, LUP, London, 134-6). The degree to which the late urban foundations of established orders might diverge from earlier 'standard' plans has been shown for example at St Mary Graces, London (Grainger, I., Hawkins, D., and Mills, P., in prep, *Excavations at the abbey of St Mary Graces, East Smithfield, London*, MoLAS Monograph Series; Coppack, G., 1998, *The White Monks. The Cistercians in Britain 1128-1540*, Stroud, Tempus, 83-4, fig 47).

[13] Gilchrist (*op. cit.*, see note 11, 97).

[14] Clapham (*op. cit.*, see note 6, 79-80).

AN EARLY TUDOR KILN AT LAMB'S CROSS, CHART SUTTON

The purpose of this short note is to place on record the existence of a previously unknown kiln, discovered in 1991. In his study of Medieval and Later Ceramic Production and Distribution in South-East England,[1] Dr Anthony Streeten included as his Group Liii the pottery from the Hareplain Kiln, Biddenden, and its products found, among other places, at Chart Sutton and Bayham Abbey.[2] The Chart Sutton sherds were found by Mr Scott-Moncreif of Brookside in his garden (TQ 791 483) and given by him to Maidstone Museum.

Towards the end of 1991 Mr Brian Mitchell brought some coins and pottery sherds to Maidstone Museum for identification, among the sherds a familiar looking bunghole from the base of one of the large jugs which, with bowls and dishes, were the main products at Hareplain. Mr Mitchell later brought to the Museum other sherds which appeared to be from pots of Hareplain type and fabric and two fragments of a clay kiln cover like those found in the pit north-west of the Hareplain Kiln.[3] One of the sherds was a waster.

Streeten has discussed the factors governing the location of remote sixteenth-century kilns like Hareplain.[4] Apart from the essential raw materials, clay, water and fuel, two important considerations were the availability of land, the potters being relatively poor men, perhaps only working as such part time, and the propinquity of customers. He

points out that kilns like Hareplain would only have had a short life.[5] If the potters at Hareplain were the same as those at Lamb's Cross, were they forced to move or did they choose to be nearer to potentially more profitable markets like Bayham Abbey and Maidstone?

Of the very small number of sherds from Lamb's Cross (there are only twenty two sherds from Brookside and the Kiln site), jugs of both types are best represented: for a type I rim (the waster) *cf.* Hareplain fig. 2,2; for a type II rim *cf.* fig. 2,11; bung-holes (*cf.* fig. 3,17-18) and handles both strap and oval-sectioned are the commonest sherds. Other diagnostic sherds are from rims of bowls/dishes (*cf.* figs. 3,26 and 4,33); there is also a damaged rim fragment from a cooking pot with a deep-seated ledge for a lid, but of a type not found at Hareplain, so the Lamb's Cross potter(s) were probably, given the short life of the kilns, but not certainly the same as the Hareplain ones. The clay must have been similar to that used at Hareplain.

Brookside (TQ 791483) is situated on the east side of a triangular area of land bounded by three minor roads and the Lamb's Cross Kiln is within this area, centred around TQ 790483.

Acknowledgements. The writer is grateful to Mr Giles Guthrie, Keeper of Human History at Maidstone Museum, for his help in checking and providing references and for allowing him to retain the sherds for examination.

D.B. KELLY

[1] 'Medieval and Later Ceramic Production and Distribution in South-East England : a study in ceramic archaeology and historical geography', unpublished doctoral thesis, University of Southampton, September 1987.

[2] D.B. Kelly, 'An Early Tudor Kiln at Hareplain, Biddenden', *Archaeologia Cantiana*, 87 (1972), 159-176.

[3] *Ibid*, 161and fig. 1.

[4] A.D.F. Streeten, 'Craft and Industry: Medieval and Later Potters in South-East England', in H. Howard and E.L. Morris (eds), *Production and Distribution: a Ceramic Viewpoint*, BAR International Series 120 (1981) 323-346.

[5] *Ibid.*, 340.

EDWARD CRESY, F.S.A.: A KENTISH ARCHITECT

Edward Cresy (1792-1858) is today best remembered for his books, the first two of which were the product of the Grand Tour, made largely on foot between 1817 and 1819, with his co-author and life-long friend George Ledwell Taylor.[1] The two splendid illustrated volumes of *The Architectural Antiquities of Rome* were published in 1821-2, followed

by *The Architecture of the Middle Ages in Italy* in 1829, dealing with the religious buildings of Pisa, including measured drawings of the Leaning Tower – of particular relevance to the recent engineering endeavours to correct its inclination. Cresy himself became increasingly involved in civil engineering, and in 1847 published the first encyclopaedia on the subject running to over 1,500 pages with 3,000 woodcut illustrations.

Cresy, born at Dartford in 1792, was an only child. Edward, his father, a master-carpenter and builder, was a churchwarden and feoffee of the grammar school; his mother, Lydia, the daughter of a well-off local farmer, William Muggeridge. They lived in some style at *Cranford Lodge* on Lowfield Street, a site now partly occupied by the *Cressy Arms*. They sent their son to Mr Rawes's Academy in Bromley, where he met Taylor, and later joined him in London as a pupil of J.T. Parkinson, Surveyor to the Portman Estate. He subsequently spent two years with George Smith, Surveyor to the Mercers' Company, on whose unfortunate attentions to the church and castle at Horton Kirby he later commented in his notebook.[2] During the 1820s Cresy was mainly in London, and from 1824 when he married Eliza Taylor, daughter of a prosperous City haberdasher, lived at No. 6 Suffolk Street, Pall Mall East, a house he built in the development laid out by John Nash as part of his 'Metropolitan Improvements'. Pevsner describes it '... with a big arched central window flanked by Ionic columns and a smaller window above flanked by pilasters – a curiously disjointed composition of Italian High Renaissance derivation',[3] the façade inspired by Palladio's villa at Vicenza. From about 1830 Cresy had an office in Trafalgar Square, and undertook various projects in London and Paris, working almost entirely for private clients because he was strongly opposed to the competition system regulating the award of public contracts. Nevertheless, he was an active participant in social and professional life. He was elected to the Society of Antiquaries in 1820, and became a member of the convivial Architects' and Antiquaries' Club[4] and the Architectural Society. He was one of the 'Original Members' of the Institute of British Architects in 1834, but 'retired' in the same year following a principled disagreement on policy matters.[5] Although Cresy continued to work in London, where he retained rooms, he evidently decided to bring up his family in the country, in his native Kent, for by 1830 he and Eliza had five children. It is with a brief outline of his activities here that this paper is primarily concerned.

Cresy had already undertaken a project in Dartford, where he was a shareholder in a company formed by local citizens in 1826 to bring the benefits of gas-lighting to the town.[6] He was engaged to supervise the construction of a gasworks in Duck Orchard. The work was successfully completed by October 1827, and he duly received his commission of £150 on a contract worth £3,364 to the builder. A description of the works is given in his *Encyclopaedia of Civil Engineering* (**Figs. 1-4**). In

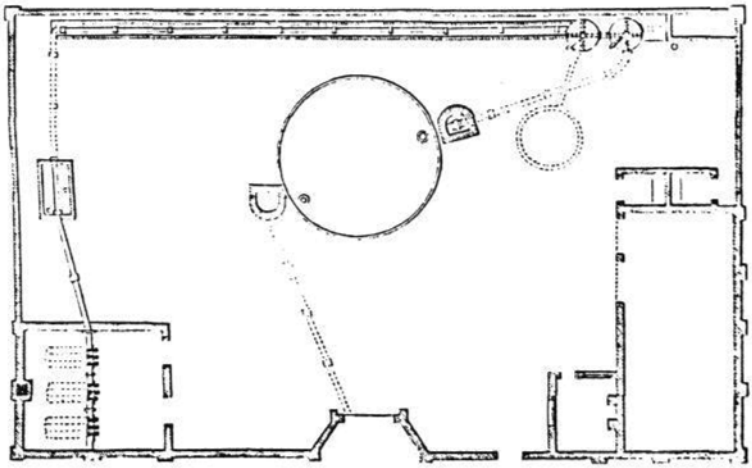

Fig. 1 Plan of Gas Works

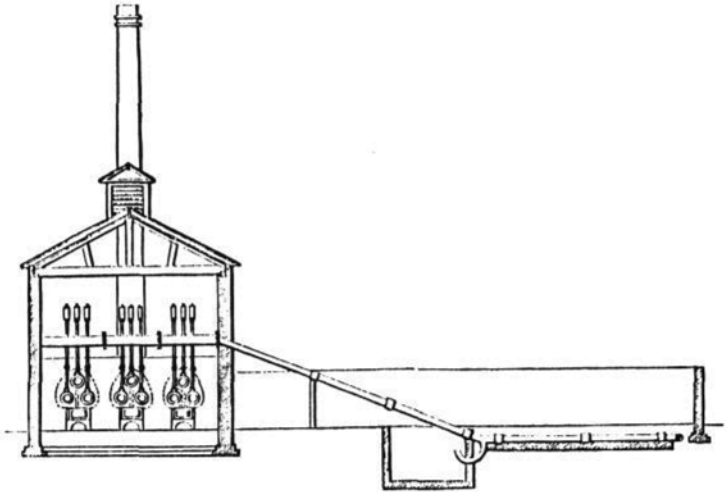

Fig. 2 Section of Retort-House

1828 Cresy began building his country house at South Darenth, in the parish where his mother's forebears had lived for centuries. He named it *Holmesdale*, the Saxon name for the Darent Valley. His description in his 1857 notebook runs as follows:

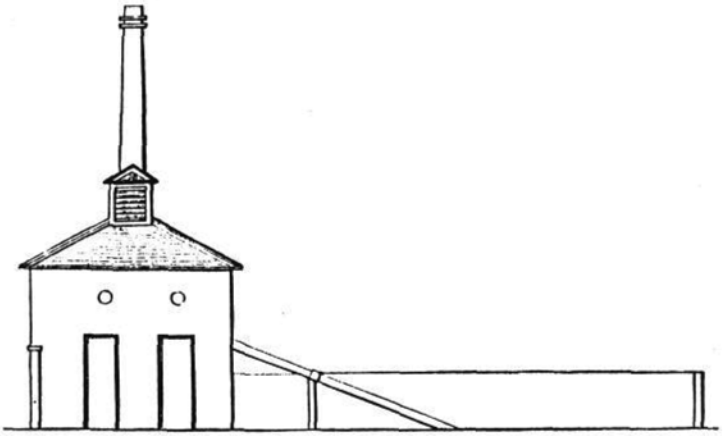

Fig. 3 Elevation of Retort-House

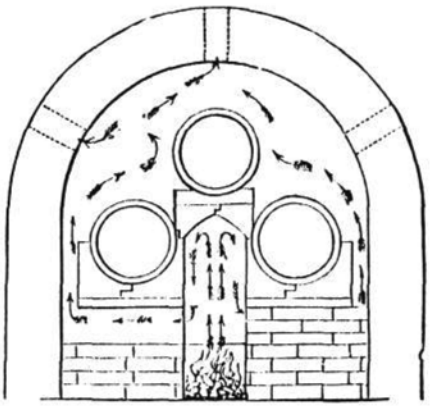

Fig. 4 Front of furnace

> It originally was composed of nine squares of an hundred square feet each. It was afterwards increased by adding a building two squares wide and five in length: so that if the dining room had been built the house would have comprised 25 squares or been about 50 feet square with two Towers and a Porch.

A drawing probably made by Cresy in the 1830s shows a building in an eclectic mixture of styles, with lofty shuttered mullioned windows, and crowned by two towers and massive chimneys rising from a steeply pitched roof. As well as a library for his extensive collection of books,

there was a separate building in the garden where architectural casts were housed. He came close to losing these treasures in 1844 when a forced sale of his property was narrowly averted.[7] Cresy, who farmed about 170 acres in the parish, was also an enthusiastic gardener, with a penchant for arboriculture. After his death, Eliza and her daughters moved to Riverhead, and the house, later known as *The Towers*, went through various vicissitudes until its demolition in the early 1970s.

When the Horton Kirby Vestry, on which Cresy served in various capacities until his death, decided in 1833 to improve access to the village by replacing the footbridge over the Darent by a carriage bridge and to widen the through road to Green Street Green, Cresy and Henry Hall, owner of the paper mill, were charged with investigating the costs to the contributing landowners of various types of structure.[8] In due course they erected a brick and iron structure, which survived until the 1960s.

Almost certainly Cresy was engaged in local building projects of which evidence has not yet come to light, but one that is recorded is a house designed for a Dartford solicitor (and/or banker) around 1834. Cresy recalled that he and Eliza visited Fontainebleau in the summer of 1831: 'From one of the buildings in the Gardens, which was the residence of the Chamberlain, I founded my design for Mr Hayward's house at Hulsewood, Dartford Heath'.[9] This house appears to have shared a number of features with *Holmesdale*, if perhaps in a more restrained form, though it contained a massive fireplace of exuberant Moorish influence.[10]

At about this time – 1835 – Cresy was carrying out an 'expensive modernisation' costing £1,500 of *Down House*, involving structural repairs, re-roofing, possibly the construction of an additional cellar, the installation of two marble chimneypieces, and exterior stucco.[11] On the strength of his knowledge of the house, Cresy urged Charles Darwin to acquire the property when he was searching for a country home in 1842, and subsequently drew up plans for a schoolroom, extra bedrooms, and improvements to the kitchen quarters. Darwin was characteristically anxious about his purchase and relied heavily on his friend: 'Mr Cresy is a sensible man, & very friendly – if I am deceived in him I am done for: but I don't think it', he wrote to Susan Darwin.[12] The two men and their families continued friends; Cresy introduced Darwin to his friend and colleague Henry Doulton, owner of the Lambeth Pottery, at *Holmesdale* around 1849,[13] and there were visits and an extensive correspondence between the younger Edward Cresy and the Darwins which only ended with Edward's tragic death in 1870.

Apart from the addition of a south porch – 'the porch that Goths built' – to Holy Trinity, Dartford in 1846, and possibly the supervision of the rebuilding of the north aisle of St Michael, Wilmington in 1839,[14] the only other public building with which Cresy was concerned was the

National School at Horton Kirby. If it was felt desirable to encourage the admission of the lower orders to Christian worship, albeit through a separate entrance, it was also felt advisable to 'communicate to the poor, by means of a summary mode of education such knowledge and habits as are sufficient to guide them through life in their proper stations and train them to the performance of their religious duties by an early discipline'.[15] The Vestry having acquired the site from the landlord, The Queen's College, Oxford, Cresy submitted some rather perfunctory plans to the diocese in 1857 for a neo-Gothic structure typical of the many such schools built at that period under the auspices of the National Society.[16] It is still in use, as a Field Centre.

Cresy's expertise in sanitary engineering led to his appointment by Edwin Chadwick as a Superintending Inspector under the 1848 Public Health Act, which resulted in the publication of Reports on his 'Inquiries into the Sewerage, Drainage, and Supply of Water, and the Sanitary Conditions of the Inhabitants' of sixteen towns and parishes in the South and Midlands. He also gave assistance to his friend William Ranger, who carried out the inquiry into Dartford in 1849, satirized in nauseating detail in the verses attributed to William Jardine or Richard Tippetts.[17] These Reports initiated schemes that brought about massive improvements in mortality and morbidity rates, not to mention comfort and amenity. Another improvement with which Cresy was associated proved unsuccessful. He was recruited by his old friend George Taylor, consulting engineer to a railway company, to assist him in a survey for a Darent Vale Light Railway linking Dartford and Sevenoaks. However, Taylor's eloquent advocacy failed to overcome local opposition.[18]

Like many contemporary architects, educated in the Classics and the study of ancient monuments, Cresy had strong antiquarian interests. He joined the British Archaeological Association on its formation in 1843 although he did not attend its first Congress at Canterbury, to which he contributed a paper on Barfreston Church.[19] His son's paper, a translation with notes of the monk Gervase's account of the burning and reparation of Canterbury Cathedral in 1174, was presented by Professor Willis. As long ago as 1820 Cresy and Taylor had contributed plans and sections to John Britton's volume on Canterbury in his *Cathedral Antiquities of England* (1821-3). Cresy negotiated with Roach Smith, a founder of the Association, on behalf of his friend A.J. Dunkin, the Dartford printer, to undertake the editorship of the *Proceedings*. Cresy corresponded regularly with Dunkin, and advised him at length on his projected new edition of Hasted's *History of Kent*.[20] As well as archaeological papers, including an account of excavations at Eynsford Castle in 1835,[21] Cresy produced a major illustrated study of Stone Church, near Gravesend, for the Topographical Society.[22] This was important not simply as a record, but for its elaboration of his original theoretical speculations on medieval

building construction, specifically on the origins of the pointed arch, on systems of proportion, and on the transition from the equilateral to the isosceles triangle as the basic geometrical form regulating the proportion of arches, generating patterns of tracery, and so on.

Cresy was actively involved in local affairs, in social improvements, and in the modernisation of agriculture, as is shown by the observations in his notebook. He also had first-hand knowledge of the Europe-wide movement for revolutionary change. In Greece with Taylor on the eve of the War of Independence, he had met and discussed politics with Ypsilanti and other leaders of the liberation movement. In Paris in the July Days of 1830, he was favourably impressed by the revolutionaries, who borrowed – and returned – the planks and scaffolding from his building site to erect barricades.[23] In 1848 he seized the opportunity to express his revolutionary enthusiasm nearer home in a talk to the Dartford Literary Institute on 'The Objects, Advantages, and Pleasures of Historical Science',[24] in which an account of history, not as a catalogue of dates and dynasties but as a record of emancipation to which even the humblest can contribute, closes with a rousing tribute to Lamartine and the revolutionaries of Paris.

Cresy died suddenly of a stroke on 12 November 1858, his last moments theatrically described by Taylor: 'No disappointment ever discouraged him in his favourite pursuit and death found him still busy at his post. Seated in his library, his Vitruvius open before him, he fell from his chair, pen in hand, ceasing his work only when he ceased to live'.[25] He was buried at Horton Kirby churchyard, his gravestone bearing a curiously candid tribute to his talents and his tribulations.

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[1] George Ledwell Taylor (1788-1873), the architect *inter alia* of Hadlow Tower and of important works at Chatham, Woolwich and Sheerness dockyards, provided much information about Cresy's life and career in his two-volume *Auto-Biography of an Octogenarian Architect* (London, Longmans, 1870-2).

[2] This small leatherbound pocketbook, entitled 'My Tour round the Parish and Reminiscences of the Past' (1857), is now in the Centre for Kentish Studies (Dartford Deposit). An edited version by Malcolm Scott, with a biographical note by Diana Burfield, was issued in 2000 by the South Darenth and Horton Kirby Local History Society. As well as matters of local historical interest, it contains some autobiographical information. Two other sources of incidental biographical material are Cresy's MS annotations to his 'Tracts on Architecture' (British Library) and his wife's translation of F. Milizia's *Lives of Celebrated Architects* (2 vols, London, J. Taylor, 1826) in the British Architectural Library.

[3] N. Pevsner, *London, I, The Cities of London and Westminster* (2nd edn, 1962, Harmondsworth, Penguin Books, p. 598).

[4] A Club founded in 1819 by the topographical publisher John Britton whose members, mostly associates of John Soane, had recently returned from the Grand Tour; see Society of Architects and Antiquaries of London (*Proceedings*, 1820).

[5] RIBA Fellows' Nomination Papers (BAL); Cresy's annotations to Milizia translation.

[6] Minutes of Dartford Gas Lights, 1826-59 (CKS).

[7] Poster advertising auction sale to be held on 2 January 1844; letter to A.J. Dunkin, 9 May 1844 (Dartford Public Library).

[8] Vestry Minutes, St Mary's, Horton Kirby (Medway Archives, Strood); Cresy's 1857 notebook.

[9] Cresy's annotations to Milizia translation.

[10] The house is mentioned by W.J. Lowles, Dartford Local History Leaflet, No. 10, Wilmington (Kent County Library, n.d., *c.*1980); photographs in Dartford Public Library.

[11] The building history of *Down House* has been exhaustively documented for English Heritage in a series of reports by Keystone Historic Buildings Consultants (1998).

[12] *Correspondence of Charles Darwin*, vol. 11, 1837-43, pp. 325-6 (F. Burkhardt and S. Smith, eds, Cambridge University Press).

[13] Edmund Gosse, *Sir Henry Doulton* (ed. D. Eyles, 1970, London, Hutchinson).

[14] J. Newman, *The Buildings of England: North East and East Kent* (Harmondsworth, Penguin Books, 1969, 2nd edn 1976); S.J. Stringer, *History of Wilmington Parish Church* (Dartford, 1988).

[15] National Society for the Education of the Poor in the Principles of the Church of England (*Report*, 1812).

[16] The documents, now in the CKS, include 5 sheets of approximately A4 blue paper signed by E. Cresy and dated March 1857, showing ground plans and elevations and a section. They carry some amendments in red ink dated 17 May 1857, presumably by the diocesan architect, Joseph Clarke.

[17] See P.H.G. Draper, 'The Report of the Committee appointed to enquire into the public nuisances existing in the town of Dartford' (*Dartford Historical and Antiquarian Society Newsletter*, No. 6, 16-20).

[18] Reports in the *Kentish Mercury*, etc., quoted by S.K. Keyes, *Dartford: Further Historical Notes*, pp. 607-18 (Dartford, Perry, Son and Lack, 1938).

[19] 'Barfreston Church, from observations by Edward Cresy', in A.J. Dunkin, ed., *Proceedings of the British Archaeological Association first General Meeting, Canterbury, Sept. 1844*, 287-97, London, 1845.

[20] Letters to A.J. Dunkin, 18 August 1845 and 12 January 1852 (Dartford Public Library).

[21] 'Eynsford Castle in the County of Kent', *Archaeologia*, 1835, vol. XXVII, p. 391 *et seq*.

[22] *Illustrations of Stone Church: with an Historical Account*, London, R. Hooper, 1840.

[23] Described by Cresy's friend, the journalist Charles Knight, who met him in Paris in 1830 (*Passages of a Working Life*, London, 1864-5, vol. 2, pp. 144-5).

[24] Reprinted as a 16-page pamphlet, presumably at the time of the talk in 1848 (Dartford Public Library).

[25] Obituary in *The Builder* (1858, vol. XVI, pp. 493-4).