PAUSE AND CAUSE: THE 'BUILDING BREAK' IN THE WHITE TOWER OF LONDON

Derek Renn

SUMMARY

Reappraisal of the published evidence for the dates of the break in the construction of the White Tower, claimed to have lasted from about 1080 until about 1090, suggests that its duration might have been much shorter. This pause may have been linked to a design change in St John's Chapel; the neighbouring Wardrobe Tower may have previously served as an Anglo-Saxon chapel. The probable reasons for the break in construction of the White Tower and the evidence for a contemporary interruption in the building of the great tower at Colchester (Essex) are discussed.

INTRODUCTION

Among the discoveries made during the White Tower Recording and Research Project during the White Tower's refurbishment were traces of a significant break in building, evidenced throughout the Tower (particularly internally) by changes in the stone types and finish, joint widths, mortar mix and ratio of ashlar to rubble walling (Crook 2008, 102–10; Harris 2008, 30–8). Dr Roland Harris (2008, 29) argued for 'a long building break beginning *circa* 1079–83 (and most probably *circa* 1080) and ending *circa* 1090–3'. *Circa* translates as 'about' and its approximate nature must always be borne in mind. John Stow's original statement that 'the Conqueror, built the [White] Tower of London; about the year of Christ 1078' (Stow 1603, 42), is an example of just such an approximation which has subsequently hardened into certainty.

The various types of dating evidence employed are summarised in a diagram by Harris (2008, 44), although his arrowheads do not mark absolute date limits. The dendrochronological 'middle range' of the drawbar socket lining which he used is 1049–81. Gundulf (appointed bishop of Rochester in 1077) may have been involved with the White Tower project at any time between his arrival in England in 1070 and his death in 1108 (Harris 2008, 42–5). He was concerned with caring for the poor in London, after the widespread famine in 1070 (Swanton 1996, 204, 207; Brett 2004, 235). The capitals in the chapel cannot be dated as closely as 1074x1080 (Phase 1) and 1090x1094 (Phase 2) nor need be separated by a decade. The watercolour on the cover of this volume shows one and a half capitals of Phase 1 to the right, and two of Phase 2 to the left.

DISCUSSION

Harris's case for a break commencing '*circa* 1083' depended upon calculations relating to an oak board lining a drawbar hole at entrance level, which had been tree-ring dated (WT17: Miles 2007, 41; 2008, 297). Only heartwood remained of several boards, but this one had a non-measured ring beyond those matched up to 1039, so that the heartwood/sapwood boundary ring was dated to 1040 (Table 1). A tree ring would not be measured if it was either incomplete through damage, or was a short section of core which was too short to be reliably crossmatched (Dr

Daniel Miles, pers comm 5 February 2011). A weakness of tree-ring dating (at least in 2008) was that, in the frequent absence of some (or all) of the sapwood, the interval between the heartwood/sapwood ring boundary and the estimated felling date could only be given as a range of years. The previously accepted estimated range for oak sapwood was 10 to 55 annual rings for the British Isles as a whole, although 10 to 46 was considered to be more realistic for England and Wales (Hillam 1998, 11). Dr Daniel Miles then refined the sapwood range with fresh data to between 9 and 41 annual rings (his 'middle range'; the absolute limits of his data were 3 and 56 rings) which included 95% of those 406 published examples of structural timbers of any date in southern England where the full (to bark edge) tree-ring series was present (Miles 1997, 45–6; 2006). So, in the case of sample WT17, the 'felling range' was estimated as 1049–81. Harris estimated that the 6.63m of masonry above the drawbar hole and below the building break took two years to build, leading him to posit a range of 1067 (the earliest possible post-Conquest date for the foundations) to 1083 (the maximum of Miles's 'middle range' of sapwood dates (41) after a sapwood/hardwood boundary of 1040 (Table 1), plus two years for subsequent building) for the start of the building pause. There are over 2.2m of solid foundation below the basement floor, and one annual building 'lift' of 2.8m has been identified elsewhere in the White Tower (Harris 2008, 40, 42).

Three other drawbar hole lining planks were tree-ring dated, together with two oak lintels to recesses in embrasures adjoining the fireplaces in the outer walls of the White Tower at first floor level. All six samples are shown in Table 1. Beech planks framing the internal well-bottom were felled after 1081 and, with the well's lining of later mortar type, were considered post-pause (Miles 2007, 40; 2008, 295–7) as, much higher up, were two oak timbers (early roof gutter supports), which had probably been felled after 1014 and 1101 respectively (Miles 2008, 298; Munby & Miles 2008, 311).

Several comments may be made on Harris's latest starting date of 1083 for the building pause:

- the quasi-maximum sapwood estimate only tells us that the tree in question was very probably felled before 1082 – a *terminus ante quem*.
- Miles's sapwood ring number distribution is Normal or bell-shaped, the most frequent number (mode) being 17 with 35 examples, half the examples having more than the median (19), and the arithmetic, logarithmic and weighted means being 20. Using any of these averages rather than the quasi-maximum of 41 would reduce the estimated felling dates by over twenty years.
- using Miles's data, Dr Alan Millard (2002) calculated a 95% 'highest probability density' range from 9 to 36 rings. Using 36 instead of 41 would produce a 'latest' starting date for the pause of 1078.

These three comments would put back the date of the start of the pause; another three would move it forward:

- another plank lining the same drawbar hole (WT18) had heartwood dated to *at least* 1043 (Miles 2007, 41, cp 124, fig 54), indicating a *terminus post quem* of 1044 for the heartwood/sapwood boundary of the lining (Table 1). Sample WT18 was considered to have come from the same tree (over one hundred years old) as WT17 (Miles 2007, 41; 2008, 297). Using WT18 alone would increase Harris's estimated date for the start of the building pause to 1087 *or later*. Even averaging WT17 and WT18 would lead to a pause estimated to begin *no earlier* than 1085.
- the felling date only provides a *terminus post quem* for the start of the building pause. Years of stockpiling have been demonstrated in many buildings (Miles 1997, 50–5; Hillam 1998, 12; Miles 2006, 85).
- two of the Norman cupboard lintels in the White Tower had redundant peg holes, suggesting reuse (Miles 2007, 5, fig 12; Munby & Miles 2008, 311).

Finally, a neutral comment: none of the Norman White Tower timbers sampled had *any* sapwood rings remaining. However,

Table 1. The oak dendrochronological samples obtained from the White Tower fabric (data from Miles 2007; 2008; Harris 2008)

Sample no.	Position	Function	Heart/ Sapwood boundary date	+9 years sapwood estimate[1]	+41 years sapwood estimate[1]	Distance above (+) or below (-) *local* building break[2]
WT06	Basement, spine wall	Drawbar hole lining	1060 *or later*	1069 *or later*	1101*or later*	-1300cm
WT14	Ground floor, entrance doorway	Drawbar hole lining (fragment 7)	1042 *or later*	1051 *or later*	1083 *or later*	-663cm
WT17	Ground floor, spine wall	Drawbar hole lining: left-hand board	1040[3]	1049	1081	-663cm
WT18	Ground floor, spine wall	Drawbar hole lining: right-hand board	1044 *or later*	1053 *or later*	1085 *or later*	-663cm
WT19	First floor, west wall	Lintel to south recess	1046	1055	1087	-37cm
WT21	First floor, east wall	Lintel to south recess	1063[4]	1072	1104	+30cm

Miles's sapwood data was necessarily based on medieval (and later) *structural* timbers with *all* sapwood rings surviving.

From the evidence of the small ashlar block size, wide masonry joints, the blind arcading of the middle storey and the style of the majority of the chapel's capitals, Harris (2008, 39–40) proposed that building started about 1075–9. If this was so, WT17 lost more than 35 sapwood rings if 'green' or unseasoned timber was used (Hillam 1998, 12). Only ten examples of 36 *or more* sapwood rings are recorded in Miles's histogram for southern England (1997, 46, fig 5c), far too few from which to draw conclusions.

A more robust calculation might be made from the later heartwood/sapwood boundary of the embrasure recess lintel in the east wall (WT21) dated 1063. Building to this height (about 23m: Harris 2008, 40–1) would have taken at least 8 years at <3m a year; adding a year for foundations, the lintel would have been placed in (1067+9=) 1076 *at the earliest*, having lost (1076-1063=) 13 sapwood rings *at least*. The weighted average of 13 *or more* sapwood rings in Miles's histogram is 21.5, leading to a pause beginning (or ending?) in (1063+22=) 1085. (To use the 95% 'upper bound' of about 34 rings would lead to a date of 1097.)

In the absence of suitable samples for tree-ring dating immediately above the building break, Harris's case for the earliest possible date for the resumption of building work depended upon the style of the later capitals. Dr John Crook (2008, 101) considered that all the capitals were carved from one consignment of stone and that the variations in abaci and bases were not significant. He divided the styles of capital between those of the 1070s and others of the 1090s (Crook 2008, 120), suggesting that the former were stockpiled until all the capitals were placed on top of Caen stone levelling courses after the building pause (*ibid*, 109). His best parallels for the single-cushion capital are of 'the earliest years of the 1070s' (*ibid*, 118), for the block and free-standing volute capitals 'a date in the later 1070s seems to be the most probable' (*ibid*, 114–15). However, styles of the 1070s could have continued after 1079: there seems to be no style unique to the 1080s. At Branston church (just south of Lincoln, Lincolnshire), the blind arcades flanking the west doorway have a sequence of both single- and double-cushion capitals (Stocker & Everson 2006, 26–7), and a respond in the nave of Winchester Cathedral (Hampshire) has a double cushion facing outwards and a single cushion on one side (Crook 2008, 119, fig 87D).

The double-cushion capitals were given a *terminus post quem* of 1089 from examples on the crypt wall-shafts of St Peter's Abbey, Gloucester (Gloucestershire), which was begun in that year (Crook 2008, 118), but Crook was cautious, mentioning possibly earlier examples at Chichester (Sussex) and Winchester Cathedrals and saying; 'on balance ... *circa* 1090 at the earliest'; 'a date much before 1090 seems unlikely' (*ibid*, 120, 122). Other pre-1089 examples have been suggested: at St Albans Abbey, Hertfordshire (Plant 2009), Southwell Minster, Nottinghamshire (Thurlby 2003, 132, fig 58), and York Minster, Yorkshire (Phillips 1985, 156–8, fig 34, pls 125–6). Even if all these are dismissed, the style of capitals for a prestigious royal chapel in London might well have pre-dated those surviving elsewhere in England by a few years.

According to the *Anglo-Saxon Chronicle*, in 1097 a wall was being built around the White Tower (Swanton 1996, 234) and the Tower itself was sufficiently complete by 1100–1 to be the comfortable prison of Ranulf Flambard, Bishop of Durham (Harris 2008, 30). Given the increased logistical problems of building the upper storeys of the White Tower, Harris's later *terminus ante quem* of 1093 for the resumption of work (2008, 42–3) seems reasonable, allowing five to seven years for completion.

Can this gap of 1085–93 be reduced? All five types of capital (see below) might have been available simultaneously. Some of them might have been intended for (or come from) elsewhere (*eg* St Paul's Cathedral, see below). The need to make up for lost time after a pause in building might have caused the purchase of a 'job lot', mistakes and substitutions. The three different sorts of stone in one capital, and the reuse of timber for some of the recess lintels (mentioned above) are evidence of such haste. The only apparent weather damage or precautions in the White Tower at the level of the building break are two floor drains in the chapel (Crook 2008, 101). I do not deny that a pause occurred, only that the start and finish dates of the break converge to make a shorter break. Rather than from 1080 to 1090, the pause might have been as short as a single building season, around 1085–7.

COLCHESTER CASTLE

There was a more obviously visible pause in the building of the analogous great tower at Colchester, Essex (Hull 1982, 319–20, fig 8), with battlements at a level just above the entrance door (Drury 1982, fig 8, pls XXIVa, XXV). Paul Drury (1982, 399–400) proposed a pause of about twenty years: from between 1079–82 and 1101. Professor Philip Dixon (2008, 252–3) supported this, arguing that the battlements demonstrate an *expected* long pause, accompanied by a redesign of the upper storey. Eudo *dapifer* was given the 'town, tower and castle' in 1101 by Henry I (Stephenson 1982, 410–11), but this probably signals the end (rather than a resumption) of building, being Eudo's reward for loyalty and past services (albeit now with a duty to maintain), rather than a fresh building task.

The *Colchester Chronicle*, a mid 13th-century compilation by St John's Abbey, says that the town was burnt by Danish pirates in 1071 and Eudo *dapifer* built the castle in 1076 (Crummy 1981, 26; Drury 1982, 399). Dr Stephenson pointed out that Eudo was the abbey's founder, and consequently his earlier role may have been exaggerated. The *Colchester Chronicle* dates have been questioned, but stand up: although in 1069 a large Danish fleet raided up the whole east coast of England, landing and helping to capture York before sailing away, it returned the next year to take Ely (Cambridgeshire), only finally leaving in the summer of 1071 (Douglas 1964, 218–22). Another Danish fleet arrived in 1075, too late to assist the rebellion which had ended in a siege of Norwich Castle, Norfolk (*ibid*, 232–3; Swanton 1996, 211). In these circumstances, William I's order to Archbishop Lanfranc to put the east coast in a state of defence (Douglas 1964, 233, note 4 citing Lanfranc, *Epistolae* 35) might have led to the beginning of a new royal castle at Colchester. Another Danish invasion expected in 1085 led William I to lay waste to coastal areas as a 'scorched earth' policy (*ibid*, 346–7). The threat was ended by the murder of the king of Denmark (Canute II) in the summer of 1086, and work might have resumed as early as the next year. The building break at Colchester might have only lasted from 1085 to 1087.

THE BREAK IN CONSTRUCTION OF THE WHITE TOWER

So we may have a start in 1076, a break in 1085–7 and completion by 1101, at both London and Colchester. This may imply a slow rate of construction, but this is not unlikely, bearing in mind the enormous task of erecting the two largest great towers ever built in England. The alternative dates offered by Drury and Harris would leave both towers half-built, open to the elements (unless temporarily roofed) for a decade or more. Harris (2008, 43) pointed to the events of 1084 onward (*eg* the economic difficulties leading up to the Domesday enquiry, another major London fire and William I's death [both in 1087] and the subsequent uncertainty and rebellion) which might have turned a brief pause into a longer one. Similar events occurred at other times: the *Anglo-Saxon Chronicle* records a succession of calamities in England between about 1070 and 1100 (earthquake, epidemic disease, famine, fire, flood, heavy taxation, rebellion and Danish raids: Swanton 1996, 210–37).

ST JOHN THE EVANGELIST'S CHAPEL

The chapel occupies the south-east corner of the White Tower, above two levels of crypts. The building break was first identified in the chapel masonry here, most obviously as the Quarr/Bembridge stone interface in the north and south wall responds (Crook 2008, 105). The elegant simplicity of the chapel (*eg ibid*, fig 63) is deceptive, since there are four or five different styles of capital, and minor differences between capitals of the same style. Numbering the capitals clockwise (starting with the north-west half-column respond):

- Eight [2–5, 7, 8, 10, 11] have each corner chamfered as an inverted fan of shallow flutings: normally four flutings per corner, but [4] has six, and [5] four on three corners and six on the fourth.
- Three have corner volutes, two [1, 14] being the western responds and the third [9] having a row of small curled leaves above the astragal.

Each of the above 11 capitals has an equal-armed **T** carved in the centre of each face.

- Two [12, 13] are carved as double cushions.
- One [6] is carved as a shallow single cushion, made up of seven stones: a thin slab of Taynton, capped by a piece of the same, together with three pieces of Quarr stone and two from Caen.

Whenever (and wherever) the capitals were carved, their standing on a levelling course of Caen stone suggests that they were all placed in position after the building pause (Crook 2008, 109). The present sequence seems to be wholly random. Was the apse planned to have only two piers (Fig 1, A), like those of the great late 11th-century churches at Gloucester and Tewkesbury (Gloucestershire)? This would have resulted in three semicircular arches similar to those to the west, not the five stilted arches of today. The exterior of the apse has two anomalous buttresses: a skewed one at the south-west and a very broad one at the north-east. Internally, the easternmost wall responds are much wider than the others. Crook's detailed analysis of the columns (piers) and responds provides some support for this hypothesis (again counting clockwise from the north-west):

- The easternmost pair of piers [7, 8] are significantly thinner than the rest, and seem to have been 'shrunk' after the stones had been initially carved, perhaps to allow in more light. The stones had been carved with too shallow a curve, so these piers are 'facetted' rather than being truly cylindrical (Crook 2008, 106–9).
- The piers and western responds are composed exclusively of Quarr and Caen limestone, and can be divided into three discrete groups according to the percentage of Quarr stone (Crook 2008, 103–6, fig 75):

  51–60%: [2, 3, 4]
  28–35%: [5, 6, 9, 10, 11]
  0–1% (a single stone): [1, 7, 8, 12, 13, 14]

Since the use of Caen stone internally succeeded that of Quarr, perhaps the last to be built were the western responds (inserted into a plain wall), the pair of piers at the

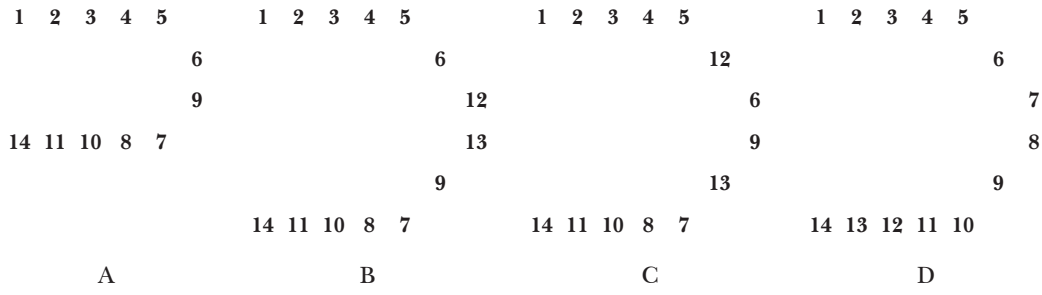

Fig 1. Diagram of St John's Chapel capitals (north at top). Alternative designs (A, B, C) and as erected (D)

south-west corner (allowing materials to be hauled up more easily into the Tower) (Crook 2008, 110) – and the easternmost pair. Harris (2008, 90–3) considered the geometry and proportions of the plan of the Tower and particularly that of the chapel. As his fig 62b shows (Harris 2008), while halving the angles of a regular pentagon allows for the setting-out of a four-pier apse, the difference between 30° and 36° puts the axes of their four capitals east of the chord of the apse. This complication would have been avoided with fewer piers, based upon an equilateral (regular) triangle.

Why the change? Perhaps when it was realised that the two piers of the apse would be perched on the chord of the semi-dome of the vault below, another two piers were added, so that all four stood on a solid wall (Fig 1, B, C). Given that the western responds were designed as such (Crook 2008, 103), the original intention might have been for the eight chamfered capitals to top the piers immediately to the east of the responds, with two Corinthian-style capitals flanking the altar; each had a **T** carved on each face. However, something went wrong in the carving or erection of one of the latter and had to be replaced quickly by [6], a simple single cushion made up of three different types of stone to hand. There was no time to get another large block of Taynton stone and carve it to match [9]. Was there a prior order for elsewhere, and supplies had to be shared? According to the *Anglo-Saxon Chronicle* much of London, including Old St Paul's, was burnt down in 1087 and the Romanesque cathedral contained a lot of Taynton stone (Swanton 1996, 218; Schofield 2011, 98, 230). The manor of Taynton, in Oxfordshire, had been given to the monastery of St Denis near Paris by Edward the Confessor, and was still held (with its quarry) by that monastery in 1086 (Domesday Book fol 157r: Williams & Martin 2002, 430). Perhaps the double-cushion capitals were added for the extra two piers. If, however, those piers were part of the original design, they may have been intended either to flank the altar (Fig 1, B) or to mark off the apse (Fig 1, C).

THE WARDROBE TOWER

The Wardrobe Tower is situated a little to the east of the White Tower, close to the line of the Roman city wall (Fig 2), which had a slight change of direction about a metre to the north with a rectangular internal turret (Butcher 1982, 101–5; Parnell 1985, 19, 22). The rounded external foundation of the Wardrobe Tower is usually taken to be a late Roman addition to the city wall, like most of the other 'bastions' found along the eastern portion of the city wall (Maloney 1980; Parnell 1985, 32–4). However, the Wardrobe Tower does not cover the change in Roman wall alignment. Until 1879 the Wardrobe Tower stood as high as the gallery of St John's Chapel, with pilaster buttresses of similar appearance and interval to those of the White Tower, forming the angle of a large 14th-century annex to the White Tower (Parnell 1982, 120–1 & note 9; Keay & Harris 2008, 204, fig 162). Just after its partial demolition, Loftus Brock (1882, 130) distinguished the lowest five feet (1.5m) with dark mortars from the surviving upper part with white mortar. The early photographs reproduced by Parnell, Keay and Harris seem to indicate a change from random rubble to coursed rubble (on the curved face at least) at the level of the White Tower chapel floor,

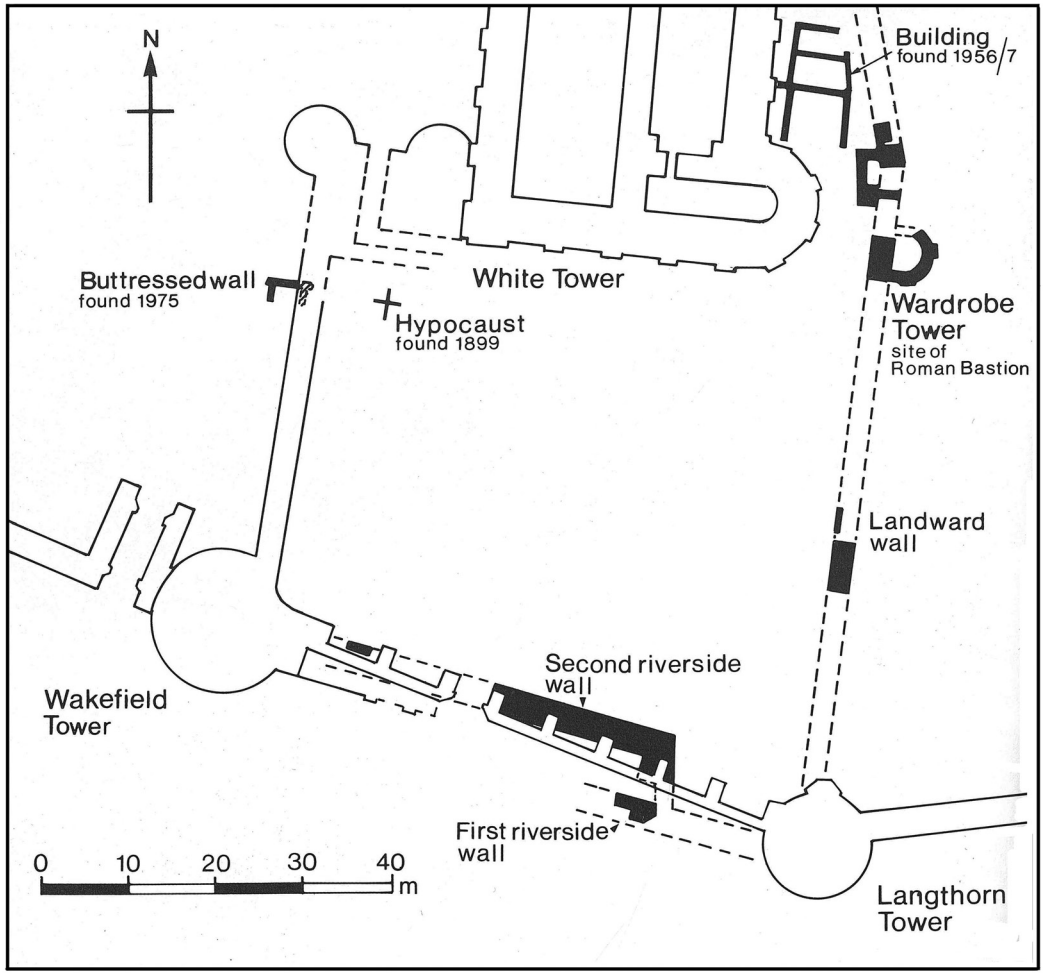

Fig 2. Plan of the Inmost Ward of the Tower of London showing the location of the White Tower, the Wardrobe Tower, the line of the Roman city wall (dashed) plus the various other excavated Roman structures (solid black) (from Parnell 1985, fig 17)

corresponding with the building break in the latter.

Dr Reginald Allen Brown and Peter E Curnow (1984, 71) stated that the Wardrobe Tower 'is generally attributed to Longchamp in the 1190s although it may just possibly date from Henry II's time', while Dr Edward Impey and Dr Geoffrey Parnell (2000, 21) have suggested Henry I's reign (1100–35). Three charters of 1141 (Cronne & Davis 1968, nos 274–6) refer to custody of the Tower of London *cum parvo castello quod fuit Ravengeri* or *cum castello quod subtus est*. The Ravengar in the Essex folios of the Domesday Book (Impey 2008, 349, note 131) is referred to in the past tense. Impey (2008, 21) has argued that this 'little castle' was the first enclosure round the White Tower. But the use of *subtus* (below) rather than *circa* (around) may indicate a building, not an enclosure. Stow (1603, 43) wrote that 'they [*sc* Kings William II and Henry I] also caused a castle to be built under the said tower, namely on the south side towards the Thames'. Perhaps this was the White Tower's forebuilding, demolished in 1674, or the addition to the Roman riverside wall (Parnell 1985, 30–4). But could the Wardrobe Tower be older than the White Tower? The Wardrobe Tower might even have been an Anglo-Saxon

chapel, becoming Ravengar's 'little castle' after the Conquest, perhaps London's first castle (Braun 1937). As at Colchester, a putative Wardrobe Tower chapel was soon outdone by a larger Norman chapel within the White Tower next door.

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derekrenn@btinternet.com

NOTES

1 Miles's '95% middle range' (1997).

2 Figures from Harris (2008, 40–1) except for: (WT06) -1300cm – very approximate, measured from section in Impey (2008, 4); the ground floor south entrance drawbar hole is assumed to be level with that in the spine wall; (WT21) +30cm – the difference between *average* heights of lintels and building breaks in this east room.

3 Allowing for one 'non-measured' boundary ring.

4 Including 22 rings measured from a high-resolution photograph, because the core sample was too short to be reliably crossmatched (Dr Daniel Miles, pers comm 5 February 2011).

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