
Spring conference at Ely, The Maltings, Ship Lane 10 March 2018

**The Architecture and Archaeology of Ely:
Papers in Memory of Anne Holton-Krayenbuhl.**

Anne Holton-Krayenbuhl (1947–2015)

Anne Holton-Krayenbuhl, who died after a short illness on 1st October 2015, was an active member of the Cambridge Antiquarian Society for many years, remembered and missed as a colleague and friend. The 2018 Spring Conference was dedicated to her memory and supported by her generous bequest to the society. Anne was a member of the CAS council, with a few intermissions, for nearly 25 years, between 1982 and 2006. She served as excursions secretary 1986–90 and had two terms as vice-president, 1993–6 and 2000–2003. Two of her papers were published in PCAS (1989, 1990) and she also contributed book reviews, including one of the *Ely Episcopal Acta* edited by Nicholas Karn (2006).

Anne's early archaeological experience was in Switzerland and Norway, and at the time of her death she was studying the archaeology of northern Norway. Most of her research, however, was dedicated to the history, topography and buildings of Ely. She was a founder member, committee member and chairman of the Ely and District Archaeology Society. Her major publications were on the topography of medieval Ely (2011) and the Infirmary complex at Ely (1998). The latter was a substantial paper which synthesized and summarized a series of detailed reports commissioned by the Dean and Chapter as part of a major restoration project in the 1990s. These reports can be found in the Ely Cathedral Archives. Besides the more extensive works listed below she also contributed notes to many other publications on the history and archaeology of Ely and Cambridge. She also contributed to two Time Team TV programmes, "Island of the Eels" (2001) and "The Dark Ages (2002), and went further afield for later work on the archaeology of Orkney (2009).

The CAS spring conference for 2018 was held at the Maltings, Ely, on 10th March, consisting of papers concerned with the history and archaeology of Ely, especially with buildings, including speakers who had worked with Anne. The programme began with a paper by Catherine Hills on the burials of seventh-century Anglo-Saxon women, contemporaries of Etheldreda, the founder of Ely. The cathedral archaeologist, Roland Harris, discussed the evidence for the

Romanesque cathedral at Ely, while Rebecca Lane, from Historic England, presented some results of a programme of survey and research on the buildings of the town of Ely. John Maddison discussed problems relating to the tomb of Bishop Hotham at Ely and Nick Webb and Alex Buchanan, from Liverpool University, explained the techniques and results of digital analysis of the fourteenth-century vaults at Ely. Lastly, Elizabeth Stazicker, the Ely cathedral archivist, described the history of the cathedral archives at Ely.

Principal works by Anne Holton-Krayenbuhl

- 1984 *The Three Blackbirds: a medieval house in Ely, Cambridgeshire* (Ely Preservation Trust and Ely & District Archaeological Society). With E M Davis and J Hardiment. Revised edition 2009.
- 1989 Excavations on the Paddock, Ely. *PCAS LXXXVII*, 119–124.
- 1990 'Ely Cathedral Precincts: The North Range'. *PCAS LXXXVIII*, 47–69. With T Cocke and T Malim.
- 1998 The Infirmary Complex at Ely. *Archaeological Journal* 154, 118–172.
- 1999 The Prior's Lodgings at Ely. *Archaeological Journal* 156, 294–341.
- 2006 Review: English Episcopal Acta 31, Ely 1109–1197 ed. Nicholas Kern. *PCAS XCIV*, 201–204.
- 2008 The Benedictine Monastery of medieval Ely. Ely Society.
- 2009 Contributions to the 'Orkney' supplement to *Archaeological Journal* 166; 'An introduction to the archaeology and history of Orkney' with P. Ottaway (7–24), and 'sites of the Norse period' with K. Stubbs (50–8).
- 2011 (ed.) *The Topography of Medieval Ely*. Cambridgeshire Records Society vol.20.

Many unpublished reports by Anne are contained within the Cambridgeshire Historic Environment Record maintained by Cambridgeshire County Council, some of which are also in the Cambridgeshire Collection, Cambridge Central Library. The detailed reports on the Ely Infirmary Buildings were deposited in the Ely cathedral archive.

Summaries of Lectures

Queens or Saints? Anglo-Saxon women's burials in the time of Etheldreda.

Catherine Hills

The story of Etheldreda is well known to anyone connected with Ely: she was the seventh-century queen and saint who founded the monastic house at Ely. This lecture looked at the archaeological evidence for her contemporaries. These were women whose burials included valuable and exotic artefacts, which indicated they had social status in their lifetimes and also that they shared Etheldreda's Christian beliefs. It used to be thought that Christian burials did not contain grave-goods, but the chronology and character of these graves shows that not to be true. What they also show is that there were other women, possibly many, who played a role in the conversion of the Anglo-Saxons to Christianity during the seventh century. Etheldreda and her sister Seaxburh and other historically recorded figures such as Hild of Whitby were not isolated examples, they were part of a wider group of influential women whose position within the new religion may have been built on significant roles accorded to women within older religions. The later dominance of men within the medieval Christian church is not so apparent at this stage.

Near Ely there are several cemeteries with seventh-century female graves, some excavated decades ago, such as Burwell (Lethbridge 1931), others much more recently, for example Westfield Ely (Lucy *et al.* 2009), Exning (pers. comm. A Peachey) and north of Ely (pers. comm. T Phillips). These graves have jewellery which is different from the necklaces of coloured glass beads and large brooches found in the sixth century. Instead, they have brooches and pendants of silver and gold set with garnets and glass, beads of silver or gold, and cowrie shells and amethysts, materials imported from the Red Sea or the Indian Ocean. Some pendants are in the shape of a cross and many of the ornaments have a cross as a prominent part of their decorative design. Some burials have delicate pins made of silver, linked by fine chains, probably used to fasten veils or headdresses. A silver pin was found in the recently excavated north Ely site, and a remarkable example of this kind of jewellery, a gold and garnet cross, together with gold and garnet linked pins, was excavated in 2011 at Trumpington and is now on display in the Cambridge Museum of Archaeology and Anthropology (Evans *et al.* 2018, 307–396). Some of the burials also have bags and boxes containing useful and/or precious items: glass vessels or pieces of blue glass, cowrie shells, shears and combs. There are also small copper alloy containers which used to be called “workboxes”, now reinterpreted as relic boxes. One of these was found in grave 2 Westfield Ely (Lucy *et al.* 2009, Hills 2015). The decoration of some of the boxes includes crosses and in one case, at Cuxton in Kent, (Booth *et al.* 2011 fig.

6.29) an incised representation of the crucifixion. The contents have mostly been lost but some had small pieces of cloth embroidered with silk, pieces cut from garments, plausibly interpreted as relics. These boxes can be compared with small containers used as reliquaries from Rome and elsewhere, some with labels such as “stones from the holy land”, “oil from the tomb of Christ” and with the accounts of holy relics recorded by Bede. One of the places where such reliquary labels have been preserved is Chelles in France, a monastery founded by Balthilde, an Englishwoman, contemporary of Etheldreda, who became a Frankish queen and then an abbess. At Chelles a tunic thought to have belonged to Balthilde is preserved. This tunic is embroidered with an elaborate necklace, preserving the image of the jewellery Balthilde would have worn as queen, but not as abbess. A story told of Etheldreda also relates to a necklace, that the tumour she suffered from on her neck had been sent as a punishment for wearing necklaces in her youth.

The graves of Etheldreda's contemporaries included jewellery and other items, such as the relic boxes, which indicate their engagement with Christian beliefs and iconography. The queens and abbesses who became known as saints were part of a larger group of women with secular and religious status, who may have been as much or more of the driving force behind the conversion of the Anglo-Saxons to Christianity as the foreign male missionaries who are usually credited with that achievement.

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Reconstructing the Romanesque cathedral at Ely Dr Roland B Harris (Ely Cathedral Archaeologist)

The Romanesque fabric of Ely Cathedral (begun c. 1083) has seen losses to the construction of Northwold's presbytery (c. 1234–52) and the Galilee porch (c. 1200–50); the collapses of the crossing tower

in 1322 (followed by construction of the Octagon and Hotham's choir bays in 1322–40), the north-west transept in the late 15th century, and the north-west part of the north transept in 1699; the raising of the nave galleries in the 1480s; the replacement of roofs from the 13th century onwards; and the piecemeal modification of windows with Gothic forms, in part disguised by subsequent 19th-century neo-Norman works that included the rebuilding of the south-west transept chapel in 1849–50.

Some of this lost fabric – such as the collapsed north-west transept – is relatively easy to reconstruct on the basis of that which survives, but some is less obvious. To reconstruct the almost completely removed eastern arm we can draw on excavations by Robert Willis in 1850, which revealed the Norman apse, along with surviving above-ground evidence in the form of the full-height shafts, an external buttress, remains of a spiral stair, and a fragment of the gallery arcade. The form and mouldings of the latter match those of the adjacent gallery in the south transept, which was built during a second phase of construction (i.e. during the later 1090s or, perhaps more likely, just after 1100): this strongly suggests that (whatever the original design intention in the 1080s – perhaps more akin to Winchester Cathedral) the eastern arm clerestory as built also matched that of the transepts. Almost certainly this would have required dropping the level of the clerestory passage

in the apse, as survives at Norwich Cathedral, to accommodate a semi-dome. For the missing roofs the most significant evidence comes from the nave roof, which currently is of a scissor-braced design dating from c. 1290–1310: Gavin Simpson identified reused timbers from an earlier common tiebeam roof dated to c. 1105–30, which had a lower pitch, collars and multiple struts, in common with what we know of Continental roofs of the period. Most recently, conservation work on the south side of the nave (2017–18) has allowed reconstruction of the gallery elevation, which was remodelled in the 1480s: this had windows flanked by blind arches, as survives in the east elevation of the north transept (Fig.1).

Historic England's investigation of early urban buildings in Ely

Rebecca Lane, Historic England.

This paper presented some of the results of a programme of building survey and research undertaken in the city of Ely in Cambridgeshire during 2014–2015 by Historic England. The project owed much to the support of Anne Holton-Krayenbuhl, who assisted in the early stages of identifying buildings. A selection of case-studies was presented from the fifteen buildings which had been examined in detail as part of the project. These reflected a range of dates from the



Figure 1. Details of the east side of the north transept (right), the south side of the nave (left), and the nave with its reconstructed Romanesque gallery (centre).

14th to the 17th centuries, many of which are now concealed behind 18th and 19th century facades. The results of a separate piece of work on St John's Farm, Ely, the site of the medieval hospital of St John and St Mary, were also presented. The building investigations were put in the context of other buildings in the city and its topography, reflecting on what these buildings tell us about the evolution of the settlement as a whole, and early urban building types more generally.

The Tomb of Bishop Hotham at Ely Cathedral

John Maddison

The lecture considered three objects at Ely traditionally associated with John of Hotham (bishop 1316–37): a tall box-like canopy in the north arcade of the presbytery, a tomb chest in the south arcade and a canopy (now in the stone store) designed to surround the head of an effigy. These elements are close contemporaries and related in style to the fourteenth-century work in the eastern arm and the Lady Chapel. The *Chronicon*, the lives of Ely's bishops, (Wharton 1691) makes clear that Hotham paid for the three presbytery bays and Montacute (bishop 1337–45) funded the completion of the Lady Chapel, each being buried in the midst of their respective works. The prior, John of Crauden, who died in 1341, was at Hotham's request buried at his feet.

The objects under discussion formed one assemblage attached to the east side of the eastern wall of the monastic choir when they were recorded in 1767 in an engraving for James Benthams' *History and Antiquities of the Conventual and Cathedral church of Ely* (1771). Benthams observes that the lost inscription panel, shown in the engraving, was of Elizabethan or Jacobean date. The four richly articulated elevations of chest and canopy show that neither was intended to be built into the choir wall and the divergent dimensions moreover show that they do not belong together. Similarities between the work of local post-reformation tomb builders and the composition shown in the print suggest that it was put together in the later sixteenth century, probably by the Dean and Chapter, and possibly in response to Elizabeth's injunction of 1559. This protected from iconoclasm church monuments whose significance was commemorative rather than superstitious, and required their repair.

Benthams and Essex moved the construction into the north arcade when they removed the choir from the Octagon to the presbytery of Bishop Northwold in 1770–1; it is shown in this position in an engraving in D J Stewart's *On the Architectural History of Ely Cathedral* (1868). The move involved the destruction of one side of both the chest and the canopy to allow the medieval choir stalls to be built against the arcade. In the restoration and re-ordering by the more archaeological Gilbert Scott (after 1849) the chest and the canopy were separated, restored and put in their present positions. The chest was henceforth described as

Hotham's tomb but the canopy was considered to be a fourteenth-century base for the shrine of Etheldreda, a function that is at variance with its dimensions being much broader than surviving fourteenth-century shrine bases. The head canopy was put into storage.

By making comparisons between the thirteenth-century monuments of Bishop Giles de Bridport at Salisbury (died 1262) and Archbishop Walter de Gray (died 1255) at York as well as the mid-fourteenth-century monument of Bernabò Visconti at Milan (1363) it was suggested that the canopy at Ely was plausible as an episcopal monument and, further, that this structure conformed generally to the description of Hotham's tomb in the *Chronicon* and that it could once have accommodated complex imagery and the seven-branched candlestick mentioned in that account. The tomb chest must therefore be associated with one of Hotham's close contemporaries. Although the phrase 'hanc aram' (this altar) in the lost inscription of John of Crauden's monument could be taken to refer to a tomb chest, the prior is recorded as having been buried in the pavement of the choir. The other candidate is Hotham's successor, Simon Montacute whose tomb was built before the altar of the Lady Chapel. It could be argued that the elevations of the tomb chest, in which carved figures in ogee-headed niches alternate with window tracery, are a simple paraphrase of the internal architecture of the Lady Chapel.

The head canopy relief of a soul carried in a sheet by angels seems to make reference to the earlier canopy round the head of Bishop Northwold's mid-thirteenth-century effigy. Given the 'typological' relationship between these two builders of the presbytery it is plausible as part of Bishop Hotham's tomb. But we know that Hotham's lost effigy was made of alabaster whereas the displaced head canopy is made of finely carved and delicately painted clunch. So no very persuasive answer to this part of the problem can be suggested.

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Tracing the Past: a digital analysis of the 14th century vaults at Ely cathedral

Dr Nick Webb and Dr Alex Buchanan, Liverpool University.

In 1841 Professor Robert Willis gave a lecture to the newly established Royal Institute of British Architects on the construction of vaults of the Middle Ages, which was published as a paper the following year (Willis 1842). Willis was connected to the restoration

of Ely cathedral, where his friend George Peacock was Dean, and rebuilt the vault of Prior Crauden's chapel. Willis drew on his experience at Ely to give a practical outlet to the more theoretical research of his paper, setting out how medieval vaults could be designed and constructed. However, he did not have enough survey data to prove his theories, therefore he used his lecture and paper as a call to architects to survey vaults to provide more information. Today digital surveying tools allow us to measure medieval vaults quickly and accurately, despite their height, and advanced digital modelling software enables us to analyse them. We are therefore using Willis's work as a starting point to investigate medieval vaults in England and explore how digital tools and techniques can extend and enhance this research, with particular focus on tierceron and lierne vaults.

In September 2016, we undertook a digital laser survey of the vaults at Ely cathedral, concentrating on the crossing eastwards, including the Lady Chapel. The focus of investigation has so far been on Bishop Hotham's choir bays 7–9, both the high vaults in the centre and those in the north aisle. According to Maddison (2003), these were most likely constructed during 1328–1337. The high vault of the choir features a complex pattern of ribs, including tiercerons (intermediate ribs that spring from piers in addition to the principal diagonal, transverse and longitudinal ribs forming a standard quadripartite vault, such as those in Northwold's presbytery aisles) and liernes (shorter

ribs connecting bosses). The north choir aisle also contains lierne vaulting. A Faro Focus x330 scanned the vaults, which uses a laser measure to record the distance between it and the solid surfaces it reaches. This occurs hundreds of thousands of times over, giving us a very detailed representation of the existing structure, known as a point cloud model. We repeat this process at strategic positions from the cathedral floor, after which we can digitally combine the clouds to form one model of the space. To give us our first glimpse of possible vault geometry we then produce orthographic images where, as per architectural drawings, perspective is removed. Next, we digitally trace vault rib intrados lines using 3D modelling software, which we can then use to extrapolate key geometry, notably arc radii, arc centre points (and their relationship to the impost or springing point) as well as arch apex or boss heights (Fig. 2).

Using the orthographic images, 3D digital model, traced intrados lines and vault geometry tables, we can hypothesise how the vaults may have been designed using a process of reverse engineering working backwards from the existing structures. We began by investigating the 2D design process, where the vault geometry is established on a tracing floor, then continued with the 3D design process where this pattern of geometry is projected to form the final vaults. Starting in 2D, it became clear that the masons were using a device which Stewart (2009) defines as the 'starcut diagram'. This is established

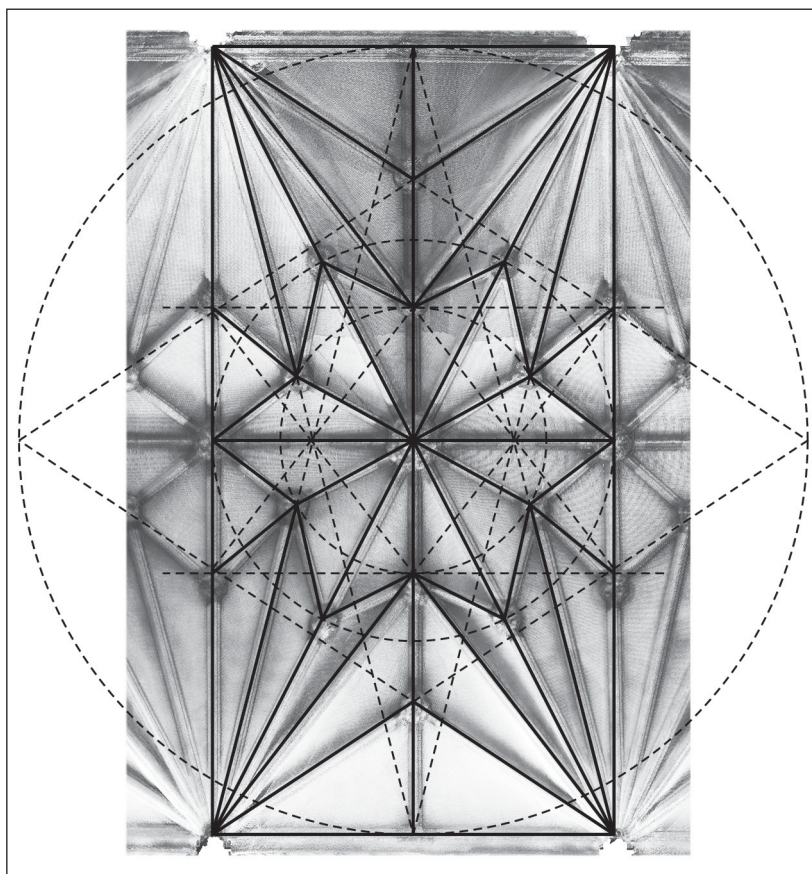


Figure 2. Plan of the Ely cathedral choir vaults visualised as an orthographic digital point cloud model, overlaid with a hypothesised tracing floor design.

by drawing from one corner of a bay to the opposite midpoint then back to the adjacent corner, repeated for all four sides of the rectangle. With the intersections this geometry creates, the masons can divide the bays into halves, thirds, fifths, sevens, elevenths and further, which enables them to create detailed patterns commonly seen in lierne vaults such as those in the choir. The geometry at Ely also highlighted a variation of the starcut where a circle is scribed with its centre point in the middle of the bay and outer edge either on the bay corners or at the midpoint of a bay side. Chevrons are then formed as before using this additional geometry. This is a technique we have identified elsewhere in our research, most notably in the east end of Wells cathedral. For the 3D process, knowns are first identified, which can then be used to ascertain the unknowns. For example, to establish the longitudinal wall ribs in the north choir aisle, we know the arch apex height, springing point and that the centre of each arc lies on the impost level. With these knowns we can use simple geometry to establish the unknown radii.

Our research at Ely has been complicated by the fact that in both the high vaults of the choir and those in the north choir aisle, the top of column abaci where vaults tend to spring from, are higher in the north of each bay than those in the south. Our next step is to investigate in further detail how the masons would have dealt with this difficulty and to extend our research into the Lady Chapel. Further information about our research project can be found at <www.tracingthepast.org.uk>

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So much more than a modest contribution – Anne Holton-Krayenbuhl and Ely Cathedral

Elizabeth Stazicker (*Cathedral Archivist*)

A review of the chequered history of the archives of Ely cathedral, to which Anne made significant contributions with her detailed reports on the buildings of the Infirmary complex and elsewhere.