WELLS CATHEDRAL: Architecture and Conservation

By John H. Harvey and L.S. Colchester

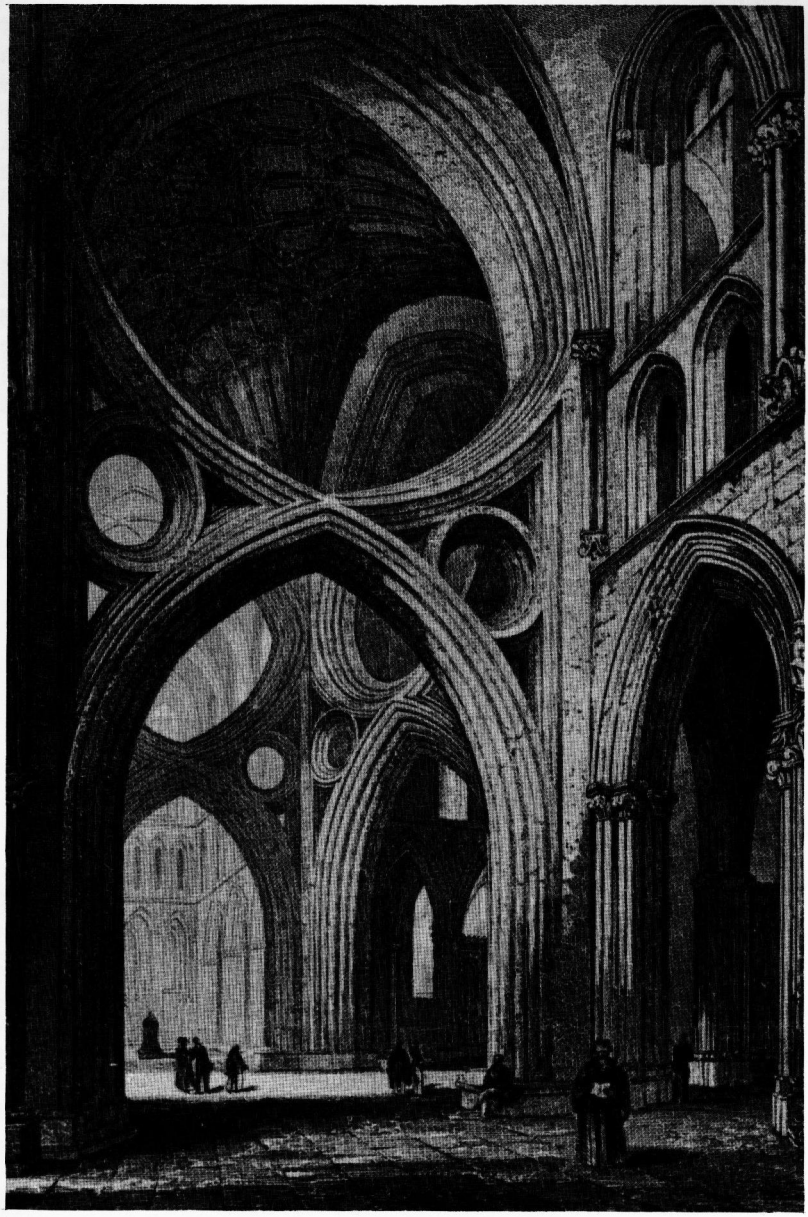
1. *The Significance of Wells in the History of Architecture.*

Wells Cathedral in Somerset is the mother church of a diocese of 1600 square miles, an area one-tenth of the Netherlands, yet larger than the state of Rhode Island. When building began about 1180, it was not the cathedral, for the see had been transferred to Bath Abbey in 1090. Yet it was intended that the new church should share with Bath. It has done so in name ever since 1245 as it did in fact up to the dissolution of the monastic co-cathedral in 1539. The church built at Wells from 1180 was the first in England (of 17) to be designed wholly in Gothic style.

Like its successors at Lichfield (begun about 1195) and Salisbury (1220), Wells is free from remains of the Romanesque period, as it is from any stylistic traces. Wells thus has unique significance in the history of architecture, not merely in England, but in the world. To understand this we must consider how it was that, in a single century, European architecture underwent a revolution of taste. After 1180 buildings everywhere looked *completely* different: changes beginning a century earlier had transformed the scene. The changed looks were carried pick-a-back upon a correspondingly revolutionary advance in science and technology.

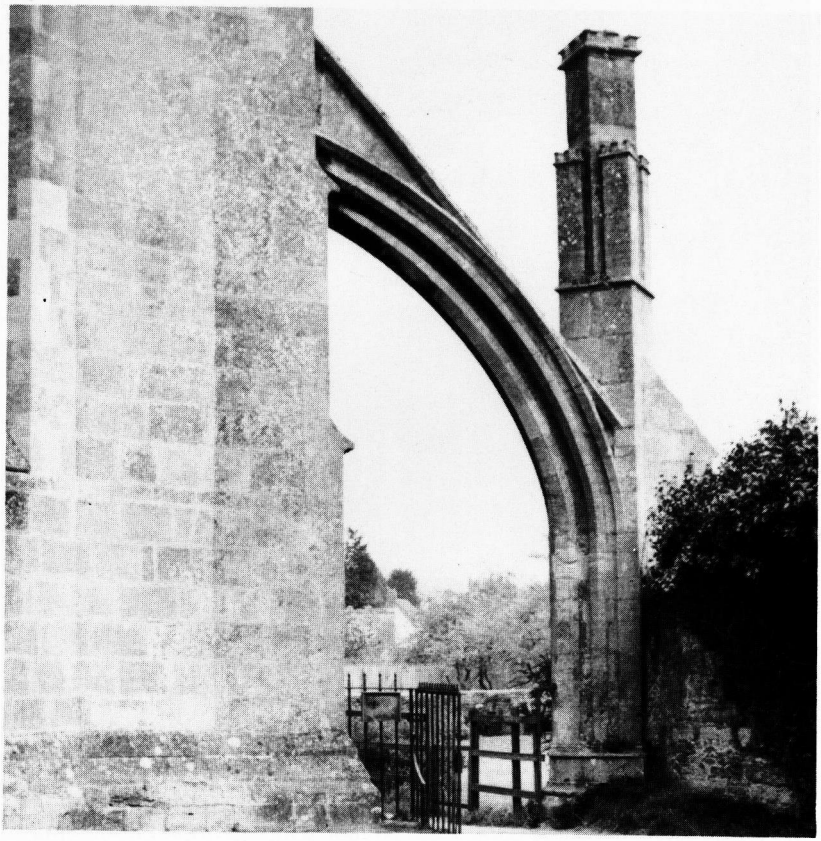
After the collapse of the Roman Empire, scientific knowledge and craftsmanship declined in the West. The Eastern or Byzantine Empire carried on in suspended animation, possessed of ancient Greek thought, literature, and mechanics. The world was utterly changed by the rise of Islam and the vast conquests of the Arabs in the seventh century. In less than a hundred years from Mohammed the desert warriors had taken over much of the civilized world and set about acquiring all they could of its higher culture and technical know-how. Helped by the learned and proficient among the vanquished a new civilization was launched. By the ninth century, when western Europe was slowly creeping out from the Dark Age, the Court of Baghdad had founded an institute to translate into Arabic all ancient learning. The Greek philosophers, mathematicians and scientists provided the basis for a fresh start.

The Arab Empire used pointed arches, in contradistinction to the round arches universally employed in the Roman and Byzantine styles. In the three centuries from A.D. 700 to 1000 the ruling visual characteristic of what was built from Egypt to Iran was this radically different pointed arch. The European ideas began to be affected by the grand culture of the Near East, and something happened to give western men new hope. The troublous times of the fifth to tenth centuries had seemed signs of the end of the world, expected at the year A.D. 1000. The



The north transept of Wells Cathedral as drawn by R. Garland and engraved by W. Woolnoth for Winkles's *Cathedrals,* published in 1835. Apart from being an unusual view of the scissor-arches, it shows clearly the built-in buttress crossing the clerestory.

moment it was realised that the world would continue, grandiose schemes were devised for churches and palaces of altogether larger scale. The means to achieve this had to be sought. In repeated waves the needed ideas returned from the East. We cannot here recount the resurgence of western culture in the eleventh century. What concerns us is that men once again set about building big. Immensely improved skills led to more efficient assembly of men and materials together with mechanical processes and plant. For a long time appearance was derived from that of ancient Roman buildings. These were ruinous and dimly understood, but debased copies of round columns derived from the classical Corinthian Order were characteristic and have resulted in the modern name of Romanesque. To begin with the work was clumsy, of small blocks that could be lifted by hand, and poor mortar. Trading contacts with the East through southern Italy and Sicily were beginning to bring better infor-



Flying buttress at the south-east corner of the Lady Chapel. (All photographs reproduced in this article are by George H. Hall).

mation, and glimpses of pointed style, before the First Crusade of 1097—99. Then on the return of triumphant Crusaders, a new age dawned. Soon after 1100 master craftsmen knew more about building and had better hoists which could raise heavier stones. These could be cut more precisely, with chisels instead of axes, and detail set out accurately by improved geometry and draughtsmanship. Within a few years clumsiness had disappeared. Greater mechanical skill devised more efficient construction. This in turn was assisted by better eastern ideas and probably by the personal skill of Arab prisoners-of-war. By 1140, in northern France around Paris, a new architectural style was born: Gothic had arrived. Its leading feature was the consistent use of the pointed arch, structurally combined with ribbed vaults and flying-buttresses to resist vaulting thrusts. The reduction of walls and supports has to be added as essential to Gothic style.

Probably intended as supports for flying buttresses: Toothings on the corners of the Lady Chapel under the retroquire roof.

The first ribbed vaults and the first flying-buttresses were used by the Normans in England after 1066. Knowledge of these inventions returned to France and formed an essential contribution to the new style. At the Abbey of St.-Denis, at Chartres and at Sens cathedrals, the first Gothic buildings arose. In

England, because of the chaos of Stephen's reign, architecture fell behind. It was not until 1174, when fire swept the eastern part of Canterbury Cathedral, that an opportunity came for Gothic. A competition was held for the advice of English and foreign architects: the monks of Canterbury appointed the Frenchman, William of Sens. He, fresh from Sens Cathedral where the first great Gothic church had just been completed, brought with him French Gothic. Although far removed from Romanesque in its use of pointed arches and slender shafts, vaults of fine ribs and excellently cut stonework, this style was still largely Roman in inspiration. The round column with its base and classical capital shared the work with shafted piers.

Contemporary with this French work at Canterbury a more revolutionary Gothic took shape in the West and in South Wales. This western English Gothic differed radically from French style; every scrap of Roman influence was removed. Seen in fragmentary glimpses at a few transitional works, this total-Gothic seems never to have been fully revealed before 1180. It was then that the Master of Wells produced the drawings for the cathedral. Starting on a cleared site and marked out with Euclidean precision, a function of the new learning of the Twelfth-Century Renaissance, Wells Cathedral rose as the pioneer of a better world.

2. Mediaeval works of Conservation at Wells

Wells Cathedral is not only of outstanding importance in the development of Gothic, but also on account of its mediaeval works of conservation. The church was complete apart from the west front at the death of Master Adam Lock in 1229; the front, built under his successor, Thomas Norreys, was finished before the end of the thirteenth century. It remained to build a chapter-house, completed between 1286 and 1307, and to erect a central tower, built in 1315—22 under one Master Thomas. This was Thomas of Witney, already employed to build a Lady Chapel east of the cathedral. Witney, from the town in Oxfordshire, had trained on the royal works of St. Stephen's Chapel, then worked on the new presbytery of Winchester Cathedral, and at Exeter Cathedral by 1312. He was an outstanding and inventive designer and his highly individual style appears in the Wells Lady Chapel, begun about 1310 and finished certainly by 1326. The Chapel is unusual, not only aesthetically, but also in plan and structure.

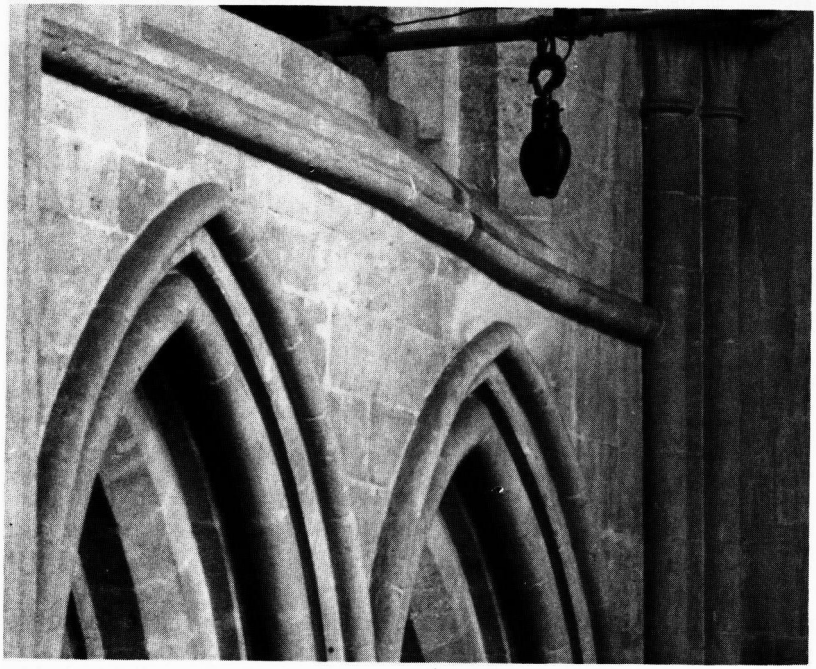
The plan is an irregular octagon, designed to be linked to an extended presbytery. In a manner unique in English architecture the polygonal chapel is covered by a ribbed vault with characteristics of a dome. Before it was abutted by the new retrochoir it presented an unusual problem. Five sides had walls pierced with traceried windows, but the western three were bays opening into

Square grids, dating from about 1356, in the central tower. They were inserted to stabilise the structure.

the intended retrochoir by arches carried on two free-standing piers with mouldings and slender shafts. Pending erection of the retrochoir it was necessary to support these piers, and the architect's intention was to build temporary stone flying-buttresses. Between the vaults and the roof, above each pier, is a projecting block of toothed masonry for abutment. Since there is no old mortar in the toothing, it seems likely that the flyers were never built. Probably raking timber shores, of the sort still usual until the present century, were applied.

Besides this use of temporary falsework to maintain the Lady Chapel, another expedient was used to eliminate a different risk. To the south-east the foundations were close to one of the underground springs that give Wells its name and feed the moat of the Bishop's Palace. There were two separate dangers: subsidence into an area scoured away by the water might so weaken the angle that the vault's thrust would cause overturning; and the 'toe' of the buttress foundations might slide outwards. Both were counteracted by a single flying-buttress abutting the wall-buttress at the best point. In addition to this visible support above ground-level, the flying-buttress has a foundation underground bonding it to the footings of the wall-buttress and further preventing slipping by an inverted arch. The date of this flying-buttress is uncertain: certainly added after completion of the Lady Chapel by 1326, the detail of its pinnacle suggests the battlemented

cresting of the South-West Tower designed by William Wynford after 1365 and built about 1385—95.



The effect of inadequate foundations: A dramatic view of the string course on the west side of the south transept.

Wells was fortunate in having a good source of lead for the roofs readily available. For not only were the lead-mines, four miles away on the Mendips, owned by the Bishop, but transport, downhill almost all the way, was easy. Lead, especially on a steep roof, tends to creep, and after about 100 years on the south (sunny) side it becomes too thin and flaws may produce leaks. Wells was originally built with overhanging eaves: to reach the roof for repairs required tremendously long ladders, and there would be no support for the lead or the men working on it. About 100 years after building the eaves were cut off and parapets added, where workmen could walk, and from which ladders could be raised quite easily. At Wells the parapets seem to have been made c. 1320, after completion of the Lady Chapel and following the design of its parapet. Before the ends of the rafters could be cut they had to be supported until the ashlar-pieces and rafter-ends could be held by the heightened walls. The oak dead-shores then put in to support the rafters like queen-posts still remain inside the nave roof.

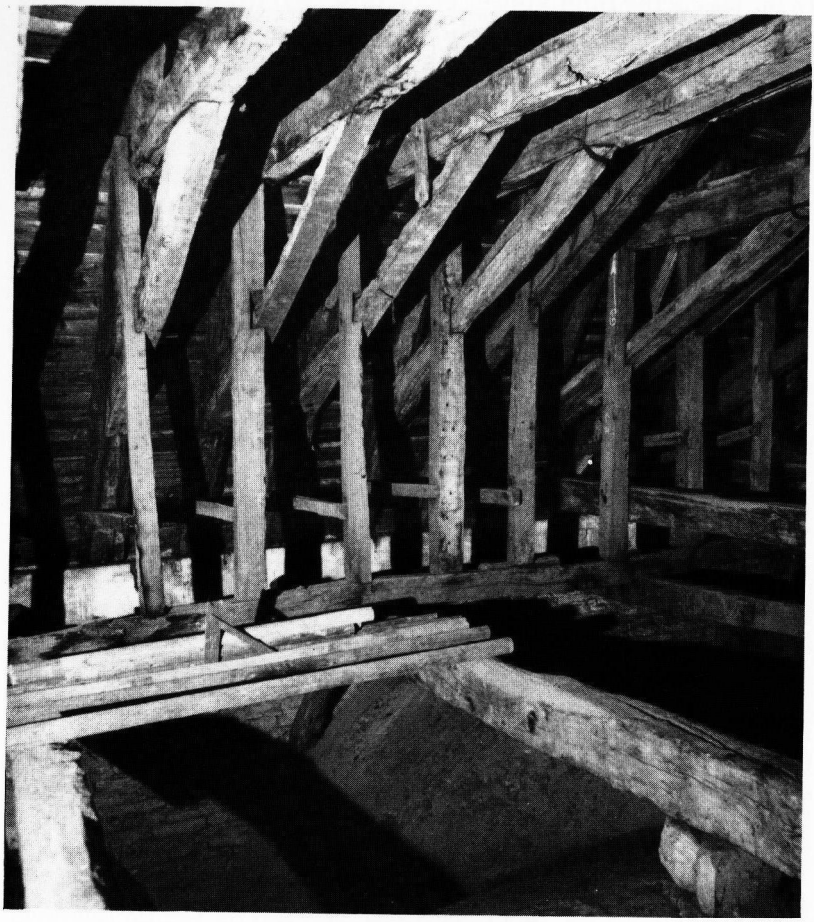
At about the same time the central tower, first mentioned in

1315, was being built above the piers of the crossing. It was being roofed by 1322. Already while it was nearing completion the western piers of the crossing were sinking. To arrest this movement additional orders were added to piers and arches in the first bays of nave and transept. This may have served as a temporary remedy, but by 1338 the church, apparently meaning the crossing and tower, was said to be inordinately broken down and disfigured. This can refer to the serious cracks still visible inside the tower above the crossing vault, and to the unequal subsidence of the piers. The defects were not due to the added load upon masonry of inadequate strength: the four piers were well built and solid. No deflection — a common fault at crossings — can be seen opposite the thrusts of the lower arcades. So the problem had nothing to do with crushing or bending. It would seem that, in contrast to the south-east pier founded on solid rock, the other three had inadequate foundations and sank to different depths through the subsoil. To this unequal settlement the inevitable moving stresses set up by wind-pressure (the chief risk to all towers and spires) must have contributed. There was undoubtedly a timber spire and this would increase the amount of sway from the pressures on the stone tower itself.

In association with the scissor-arches, flying-buttresses were built into the masonry at the north-west and south-west corners of the crossing from clerestory to main arcade levels of nave and transepts. Massive timber underpinning must have been necessary while stonework was removed at these four bays, the new flyers built in and the mortar allowed to set. It is difficult to see how it could be completed in ten years; but with the work being interrupted by the Black Death (very severe in Somerset) it must have taken considerably longer.

The second phase consisted in stabilising the tower itself so as to make it resistant to the heavy winds. The thin outer skin is supported on a strong inner framework of masonry. Halfway up this, square stone 'grids', with mouldings similar to those of the scissor-arches, were added. The Abbot of Glastonbury had granted to the Dean and Chapter 50 loads of freestone from his quarry at Doulting 'for the repair of the tower' in May 1356; and an earlier grant of 20 loads in December 1354 may have been for the same work. This would appear to be designed by William Joy, master mason from 1329, although, as he had been succeeded at Exeter by 1352, it is likely that he was dead when the 'grids' were inserted. The genius responsible for scissor-arches, built-in flyers and tower 'grids' was entirely successful, for there has been no movement since.

At the west end between the three lancets of the great window there seem to have been huge shafts, probably of Blue Lias, up to one foot in diameter. Elsewhere in the Cathedral lias shafts, being



Oak dead-shores still remaining inside the nave roof.

set against the bed, have crumbled. Shafts of this size and in this position would certainly be a danger to people below if decay set in. During the latter part of the 14th century they were removed, and over the round lias bases and supporting the round lias caps, pilasters of Doulting stone in Perpendicular style were built into the western wall. At the same time, and bonded into them, the parapet of the west gallery was built, typical of the work of William Wynford (master mason 1365—1405). These works may be associated with the glazing of the west window at the expense of Bishop Harewell (1366—86), a window which, because of the gales which batter the West Front, has gone long ago and been replaced at least three times since.