# Bar Locks and Early Church Security in the British Isles

*Professor John F. Potter BSc, PhD, FGS, CBiol, FSB, FIEnvSc*
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Cover: The north aisle door at Stragglethorpe, Lincolnshire (SK 913 524) which is retained in position by a bar lock. Whilst this Monograph largely describes and pictures holes in church walls, these helped to provide security to churches in the past. To remind ourselves that behind those holes are attractive church buildings, the back cover picture provides a view of the south side of Meldreth church in Cambridgeshire; a church kindly brought to the author's attention by Peter Draper.



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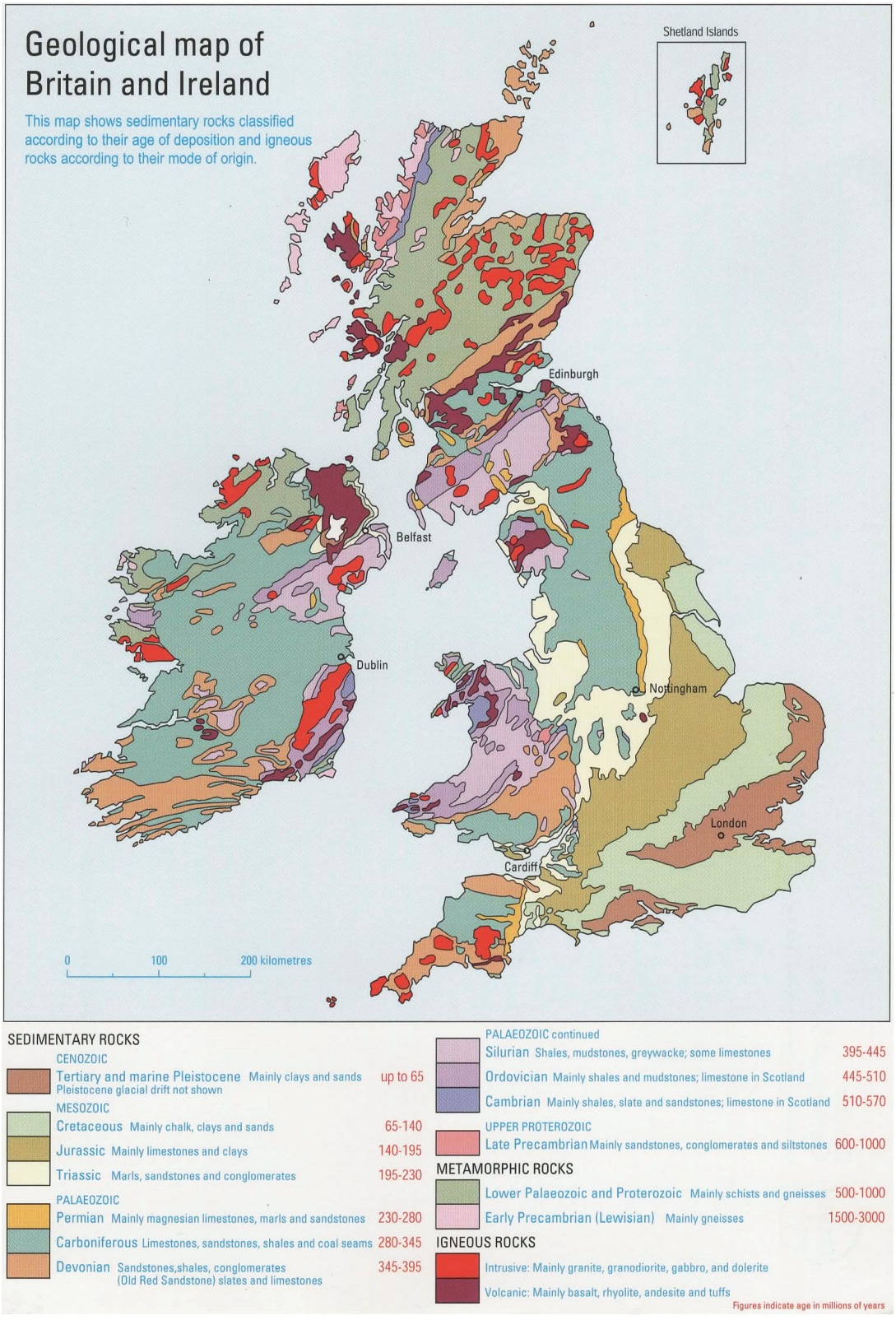


*Frontispiece: A simplified geological map of Britain and Ireland after the British Geological Survey. Published here by kind permission of the Natural Environment Research Council.*

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*ALWAYS IN MY THOUGHTS*

# Chapter One
# Keys and Bar Locks

## 1.1 The evolution of this study

Forty plus years of detailed study of the fabrics and structures of early Christian ecclesiastical sites and buildings, throughout the British Isles (as, in more recent years, Potter, 2005b, 2009c, 2013a, 2015, 2016b), have led the author to some unexpected discoveries. One, in particular, has been that very little examination, discussion or observation has been made as to how the earlier of these buildings were made secure when they were first built. That castles should possess defensive features such as the moat, drawbridge, portcullis and thick walls, all constructed to provide defence and security, has never been questioned. In 2004, Harrison in a description of many of the larger, predominantly monastic, religious structures in the northern hemisphere described them as 'Castles of God'. Indeed, he states (page 4), that paramount to inclusion in his excellent study, *'architecturally, the ecclesiastical edifice is subservient to the military'*. Early churches, perhaps erected at much the same time and on occasions presumably in the possession of valuables, would often appear to remain lacking in any similar level of protection.

The populace at large today, and most persons associated with churches, including those whose work or study embraces these churches, in response to comment or the question as to how the early protection of the buildings was accomplished, may well answer *'with doors and keys, of course'* (Manning, 2010). A very limited number of persons have used, or are aware of instances of, a means of locking a church door without a key. Scrutiny of some older doorways does, however, certainly reveal evidence in the jambs of what might be termed 'wooden sliding cross bar security systems', or briefly, 'bar locks' (Figure 1.1). Figure 1.1 In the British Isles, as far as the present author originally believed, no attempt had been made to fully describe the function, distribution, or use and implications of this means of security. In the earliest years of the second millennium the present author identified and recognised the importance of bar locks which he had observed in Wales for the first time. At that time, bar locks, had been recently reported in churches in Southern Sweden and described in the PhD thesis of Dr Raine Borg (2002). Possibly without intention, Dr Borg intimated, in correspondence, that this occurrence was the first to be recorded in Europe. More recently, the present author was to discover the large amount of study (as that of Brooke, 2000) undertaken in recent years on the subject of the defence of churches and like buildings. An earlier study in France (Bonde, 1994) also refers to the defensive aspects of large churches.

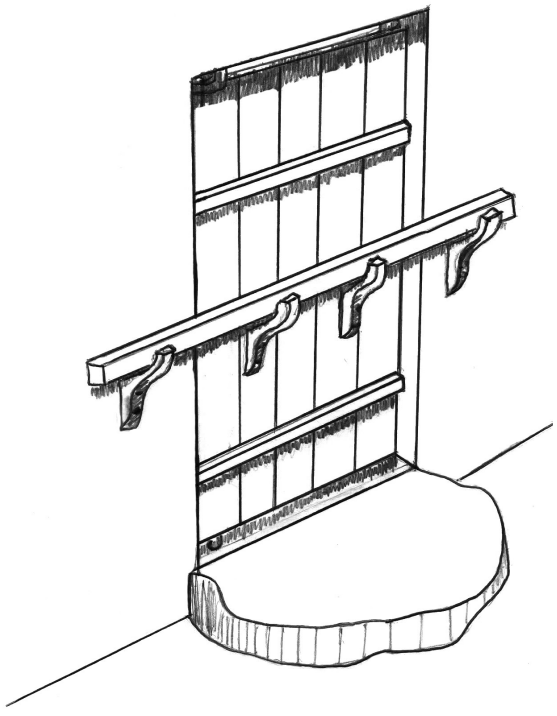

*Figure 1.1. Simple bar lock as figured by Dr R. Borg in his 'Lexicon of locks and keys'. The bar locks in churches are typically held within holes in the wall. As illustrated here the principle of operation can be more easily observed.*

### 1.2 Church security

In past times, just as today, it has always been necessary for buildings to provide security. This has been sought in order to protect various possessions, and to offer personal refuge and safety within the building. Before the invention of the locking devices with which we are familiar today, and in particular, the innovation of keys, the requirement must have created major and significant problems. For those with money and power, the ultimate protective structure in the past was provided by the sanctuary of the castle. At that time, in contrast to the castle, the early churches and the smaller monastic properties of the period were established to provide religious services and leadership, as well as the facility for personal private prayer. These were offered by invitation, and as today, they were dependent upon the buildings involved being open for attendance. Unless permanently supervised and controlled, the churches and their valuable contents could have, therefore, been subject to substantial damage and possible loss.

The historical records disclose that Viking, Norse and Danish marauding visitors found churches especially, relatively easy picking. Some of these raids have been documented by the current author (Potter, 2009c, 168-169, and Figure 6.5) and certain periods of Viking and Danish activity are referred to in Table 1.1 of the present work. These particular accounts highlight the need for church security in fraught circumstances, but it is easy to imagine the routine need for church security in much less difficult 'everyday' circumstances, both in earlier and later periods. At the simplest level there would be a need to keep undesirables, animals and the weather out of churches. (The special circumstances of the churches in the Border country between England and Scotland in the early medieval period are examined below).

The relatively recent recognition that some early churches, in the absence of keys, were kept secure from the inside of the church, by means of thick wooden bars (bar locks), confirms the requirement that often permanent occupation by a person or persons must have become a necessity. Only from within the church was the positioning of bar locks possible.

The capability to lock a strong church door from the inside would have been the first fundamental step in securing the building and possibly providing some sanctuary for temporary occupants who had fled from their more fragile dwellings. The shuttering and provision of bar locks for windows is analogous. Instances are evident where the original church may have needed supplementary structural protection beyond that provided by the installed door bar locks, and these measures could have major implications for structural change and design in the buildings. These supplementary protective requirements and methods for achieving them are many and various and are considered below. The recognition of the role of bar locks in securing churches led the present author to consider the further measures introduced to enhance church security, but the starting point of this study is an examination of the evidence for bar locks which takes up the first half of this work. The more varied measures taken to enhance more general church security provide the basis for the second half of this work.

### 1.3 What is a bar lock?

Typically constructed of metal such as iron or steel, a modern bar lock might be described as a long bolt which may be attached to the inside or outside of a door, so that the shaft of the bolt may be slid into a housing either built into, or attached to, the door jamb on the opposite side of the door to the door's hinge. Commonly, in current modern systems, the bolt may be additionally secured, or prevented from further movement, by some form of locking system involving a key. An enormous range of modern bar locks exists and modified forms of this type of security range from the standard 'push-bar' emergency

*Table 1.1. Itemising, for the period 800 to 1350, some of the more critical periods of unrest throughout the British Isles. These would no doubt require religious buildings to require maximum security. Brooke (2000) effectively describes the extent to which both the English and the Scottish actively pursued the destruction of both churches and other property in the Border country over the period 1290 to 1590.*

| Period | Events/Activity | Area particularly involved |
|---|---|---|
| 9th C | Viking raids began (790).<br>In Mercia, Offa and Wat dykes built.<br>Mercia, partially Christian, conquered by Wessex (829).<br>Alfred, King of Wessex, (886) | Initially north and east.<br>Presumably to subdue those to the west.<br>North and central England.<br>Captured London and halted Danish advances (Edlington, 878) |
| 10th C | Wessex defeats -<br>Edgar, first King of England (973).<br>Danish (Viking) raids intensify (980-1016). | Scots, Welsh, Irish and Vikings (937) |
| 11th C | Cnut, King of England (1016-1035).<br>King Harold and the Norman Conquest (1066); King William (1066-1087).<br>Stone castle building commenced. | British defeated (at Ashingdon).<br>Battle of Hastings<br>First from the south, raids into Wales, Scotland and Ireland (with eventual infiltration and dominance). |
| 12th C | Civil war on King Henry I (1100-1135) death and anarchy of King Stephen (1135-1154), and Matilda<br>Becket murder (1170), King Richard I (1189-1199) absent at crusades. | Widespread upheaval.<br>Unsettled conditions |
| 13th C | King John (1199-1216) and Magna Carta (1215). Barons' wars (1260s).<br>De Montfort (defeated 1265).<br>King Edward I (1272)<br>Scots Wars of Independence (1290-1320s) – William Wallace and Robert the Bruce (1300) | Widespread disagreements with Barons.<br>Evesham.<br>Subdued Wales (Castles).<br>Scotland and North England (Bannockburn, 1314 and Halidon Hill, 1333). |
| 14th C | Black Death (1348-1351) | Population reduced to possibly quarter size (perhaps to 1-2 million persons) |

exit, to other instances of longer bars across a full door width, such as where a central key withdraws a catch from the housings on both door jambs.

If security is required only from one side, as in the home, it is more common to separate the mechanical functions of the bolt from those of the lock and key. Simple effective door bolts may be applied manually. Outside the scope of this discussion there are the many non-mechanical means of modern origin (such as electronic and electrical methods), which can provide safe-keeping.

The term 'draw bar' has been used by certain authors (as Brooke, 2000) as an alternative term for bar lock, placing the emphasis on the unlocking rather than the locking process.

### 1.4 Keys and locks

The security of buildings today may be optimised both inside and outside by using a locking system which typically involves one or more keys. For a single key to access both sides of a door locking system, a key-hole is necessary. The simplicity of this form of security poses the question as to

how long locks and keys have been available, and in particular, for how long have they been used in churches? Both locks and keys vary enormously in their structure. Raine Borg has defined keys as being instruments that are programmed or coded through the shape of the bit, which matches the pins and wards of the lock (See Figure 1.2). The turning of the key typically closes or opens the lock. The bit is that part of the key which acts directly on the locking mechanism.

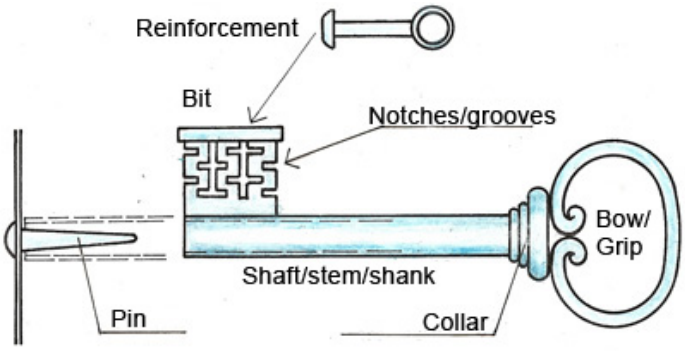


*Figure 1.2. The essential parts of a key from Borg's 'Lexicon of locks and keys'.*

It is possible that the earliest locks and keys were constructed five or six thousand years ago and wooden keys and locks are recorded from ancient Egypt. Such a wooden device was recorded in Assyria in the city of Nineveh at the palace of Khorsabad (in Iraqi, Kurdistan) and said to date from 704BC (de Vries, *et al.*, 1992, 32). It is probable that originally gravity-controlled pins fell into position to control the movement of a security bolt. The bolt was then freed by inserting a large and cumbersome wooden key which was used to manually lift and free the pins. The ancient Greeks may have invented and certainly used the keyhole and metal (typically bronze or iron) locks and keys. Homer's Odyssey (Book 21) recounts how Penelope, wife of Odysseus, '*... quickly undid the thong attached to the hook, passed the key through the hole, and with an accurate thrust shot back the bolt*.' Elsewhere, Penelope is said to use a '*well-made bronze key with an ivory handle*' and the '*bolting and barring*' of the courtyard gate is requested. Metallic bronze and iron keys were widely used by the Romans. Raine Borg suggests that the Romans could manufacture sufficiently suitable iron to create springs to enable padlocks to be created. The craft indeed was so sophisticated to allow the creation of somewhat similar so-called small 'puzzle padlocks' bearing a face or 'mask' in Celtic style. The padlocks were designed to secure small bags or money pouches and their distribution extended across Europe (Slocum and Sonneveld, 2017)

Keys are collected widely but dating them and determining where, or for what purpose, they were used is difficult to ascertain. A useful 'lexicon of locks and keys' can be found on the web site www.historicallocks.com/en/site/h/historicallocks/dictionary/. This site gives details of the many varied locks and keys which may be found and their possible functions. Figure 1.3, again from a sketch by Raine Borg, illustrates several iron keys with claws, each long

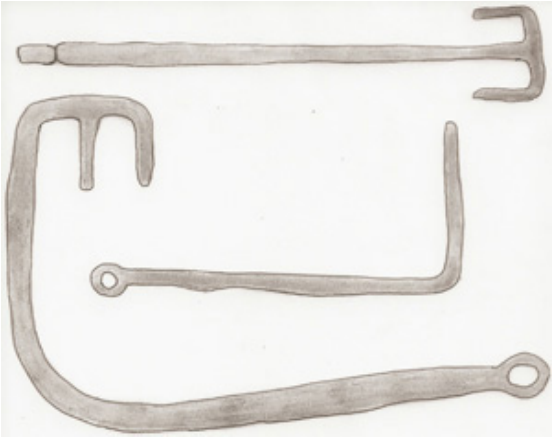

*Figure 1.3. Borg's sketches of Celtic Viking long iron keys from the Värnamo area of Sweden.*

*Figure 1.4. A bronze key with a clawed blade probably of Viking origin dated to about AD 300.*

*Figure 1.5. A further clawed key thought to be of Anglo-Viking origin and dated to about AD 900.*

*Figure 1.6. A pull-ring lock Swedish key (dated to 1312-1313) photographed by Dr R. Borg. The mechanism requires two hands operate – one to draw the bolt, the other to turn the key.*

key, used to manually release different locking systems. They were probably of Viking (Celtic) age and were found in the Värnamo area of Sweden. They were in all probability used in much the same manner as described by Homer. Figure 1.4 illustrates a bronze key identified as of Viking source with a clawed blade (*Historia om nycklar 3 liten*) which is believed to have been used about AD 300; while Figure 1.5, which is a similar clawed key, has been described as of Anglo-Viking origin and dated to about AD 900 (author J. F. Smith). Dr Raine Borg holds a large personal collection of keys, and he has produced a drawing of one of his keys from southern Sweden which is thought to date from the early 1100s. It is believed to have been operated as a metallic (iron) mechanism within a block of wood and, as the key is more than 150mm long, it is possible to presume that locking could be achieved from either side (of a door) by means of a keyhole. In many locking mechanisms little of the action can be readily viewed and the workings may be encased. The pull-ring lock from Sweden (shown in Figure 1.6) required two hands to operate, one for pulling the ring whilst the other turned the key. It is dated to 1312-13 and is photographed here by Raine Borg.

### 1.5 Early bar locks

Figure 1.1, taken from the above-mentioned web site, shows the very simplest of bar locking systems created in timber. It has no key. Critically, it would protect only those people or objects on the side of the door bar lock. Such a locking system has not been observed by the present author in an ecclesiastical site. However, on occasions somewhat modified examples exist. Typically they are strengthened with metal parts and padlocks, to be used on rarely-used doorways in small churches, in order to secure the building. Such an example may be observed at Stragglethorpe church (SK 913 524), in Lincolnshire (Figure 1.7). The door illustrated must be of relatively modern construction. In other churches, bar locks of no great age and without supportive padlocks may provide security to a minor entrance, where the church has keys with locks to control principal entrances to the building.

There is ample evidence that bar locking systems were used in many churches of much greater age. In the oldest examples it is possible to attribute their origin to the Anglo-Saxon period. Typically, thick wooden doors were barricaded by an interior bar locking system. This amounted to a long, bulky

*Figure 1.7. The north aisle door at Stragglethorpe, Lincolnshire (SK 913 524) which is retained in position by a bar lock.*

length of solid wood about 0.08 to 0.12m in cross section, which ran across the back of the door and was held in position by a hole in the wall on either side of the door. On occasions there were two bars of this nature, one towards the top of the door, the other towards the bottom. This (or these) left the door immovable between the door rebate and the bar. To open the door the bar was slid into a cavity in the wall which was deep enough to accommodate the full length of the bar. The cross bars were typically at least 1.5m long, more than sufficient to cover the full width of the doorway aperture. Full evidence of the door (or the cross bar) involved is observed only rarely in the British Isles, but it is possible that, for ease of use, the weight of the bar was supported by appropriate attachments on the back of the door.

In his studies in Southern Sweden, Borg (2002) discovered three instances where remains of the cross bar were still present (all in Gotland County), and in all, 16 instances of churches with cross bar holes or 'grooves'. Twelve of these were in Gotland County. In many examples in Southern Sweden, two, three or even four doorways (but generally all the doorways in an individual church) carried evidence of cross-bar locking. The churches involved, were given building dates mainly within the early 13th C., but in the range of 1086 (Lärbro, Gotland) to 1400 (Sjösås, Kronoberg County). Dr Borg has advised that the work is to be published in the www.historicallocks.com web site (of which he is the author).

In the British Isles, with the invention of simple, cheap and effective mechanical key locking systems, the bar locks tended to fall into disuse and the holes for the bars were often filled and forgotten. In many instances the presence of a bar lock hole is difficult to ascertain for it may have been infilled with stone or wood when it was no longer required. It must be accepted that if all entry points to a church possessed a bar locking system those persons involved in locking the church (or other building) would have to remain inside the premises.

In the majority of churches where bar locking systems of the type just described occur, it is evident that the buildings were secured, therefore, for the defence of both people and property. This involved both the clergy and, if necessary, local inhabitants. According to the number of doors, each door would have been similarly protected in times of potential danger or need for security. It is clear that those involved in security by this means remained within the church until any imminent danger had disappeared. Occasionally these bars would have been of such a size and weight as to require more than one person to be able easily to fit them into position, rather than individuals.

What regrettably cannot be determined is the date from which each church acquired a key locking system to permit both exit and entry. That keys were readily available to the wealthy is clear from carvings on gravestones, typically those dated to about the 15th C.. Keys were certainly known much earlier but they were uncommon. King Henry VIII is known to have been accompanied always by a door key locking system which was fitted for his privacy, wherever his geographical locality. The British Museum holds three keys, described as padlock keys, tentatively dated to the period 9th to 11th C.. Although they might possibly have been used in a church, they have not been related to any specific church by locality: neither has their precise function been suggested.

### 1.6 Dating bar locks

The earliest bar locks go back to the earliest days of the church and the security system lasted for many centuries. Other than obviously modern structures (which may in their fabric include metals or plastics), bar locks appear rarely to have been created later than the 16th C. From about that date (or a century or so before), church doors appear to have generally been secured with door locks and keys, enabling a means of protection which could be offered and operated from both inside and outside the church. However, because they remained effective, and were simple and easy to use, the bar locks in many instances, continued to provide a service until overcome by their dereliction. Even today, there are rare instances of their use, as for example, in the west front doors of Exeter Cathedral (see Table 2.1, Figures 2.6 to 2.9).

Preserved bar locks, or their past evidence as seen through the bar lock holes, are clearly not all of the same age. This may be particularly evident in certain instances; especially where the door-frame into which the holes of the bar lock is constructed can be dated. It is very difficult to prove, without demolishing the wall, but there are occasions where the holes for bar locks appear to have been built at the same time as the wall containing them. In these circumstances it is vital to be able to date the door construction.

In some instances, features such as the shape of a door or window arch, have been thought to be sufficiently distinctive to be datable. The terms in Table 1.2 are widely applied in standard architectural literature, each recognisable by features which are distinguishable in the period. Typically the features involved are related to arch shapes (with variants such as triangular, round or pointed), window shape and the varieties of window elaboration, and to ornamentation. For *Anglo-Saxon,* the current author has suggested that *'Patterned'* should be used, because of the distinctive stonework (Potter, 2008d, and see below). This provides a term which enables use in areas beyond England and that of Anglo-Saxon dominance. It is used until the Norman Conquest.

*Table 1.2. Architectural Styles c. AD 800–1530*

| | |
|---|---|
| *Anglo-Saxon* | (better referred to as *'Patterned'*). About 800 to the Norman Conquest. |
| *Norman* | (often described as '*Romanesque*'). Typically post 1066, and 11th or 12th C. In the south of England may sometimes be slightly earlier. |
| *Transitional.* | About 1175 to 1200. Introduces the *Gothic* pointed arch. From this period quoin stones are laid with bedding horizontal in all structures. |
| *Early English*. | 1190 to 1250. A popular name for a division of this period of *Gothic* architecture. |
| *Decorated*. | About 1290 to 1350, the name derived from the type of window tracery. |
| *Perpendicular*. | Approximately 1335-1350 to 1530. The main time interval referred to in the period collectively known as the *Gothic*. This commences with Transitional architecture and is increasingly typified by tracery windows with vertical panels, etc.. |

Table 1.2 Provides the customarily-recognised intervals of time in architectural fashion and literature over the approximate time interval of AD 800 to 1530. It is clear that it is likely to be very difficult to date bar locks accurately, indeed their earlier existence may well be obscured by the infilling of cavities related to the bar locks in later centuries and the reconstruction or partial re-building of the church doorways and associated structures. The identification of the presence of early bar locks is often only likely to be possible by the very careful 'excavation' of the remaining structures which opportunity is only likely to occur in the rarest circumstances. In any event, it will be very important to consider the detailed construction methods of the associated doorways which may be able to confirm the contemporaneity of any bar lock holes present, or indeed their filling in at a later date, while also providing a guide to the general dating of the construction beyond that provided simply by architectural styles. The analysis of church doorways, in particular, in the light of the methodology presented below, will be essential to help to determine the possible presence and date of bar locks and associated structures.

Until recently, the distinctions between the architectural styles listed in Table 1.2 were determined by viewing the differences in the detail of items such as window tracery and features such as the shape of arches. The present author has in recent years been able to illustrate that it is possible to determine differences between the main periods of architecture (Anglo-Saxon, Norman and Gothic) by different and perhaps simpler means. This involved examining the structure of the building blocks of stone which make up important elements of the buildings, such as those which create the quoins between walls and in arch and window jambs (Potter, 2003b; 2005a; 2005b, 2006a, 2006b, 2009c, 2009d).

For those who are unfamiliar with the articles by the present author (as referred to above), a limited explanation is provided immediately below. Certain distinctive patterns in the use of stone were archaeologically originally recognised more than a century ago, as for instance one in which the stones used in wall quoins were thought to be of Anglo-Saxon age (Rickman, 1836). The identified pattern, described as 'long and short', was related to the stone shapes. This author wrote:

> '*....there is a peculiar sort of quoining... consisting of a long stone set at the corner and short one laying on it...*'
> Rickman (1836, 28-29)

Other authors have contributed to the gradually-increasing understanding of the stonework and masonry detail which is typical of the earliest periods of English ecclesiastical architecture. The works of Micklethwaite (1896; 1898); Brown (1903; 1925) and Clapham (1930; 1934) each assisted extensively in determining characteristic features of Anglo-Saxon architecture and distinguishing it (in the British Isles) from Norman and later Post-Conquest work. Ultimately, Taylor and Taylor (1965) and Taylor (1978) produced a work in three volumes detailing all the then recognised features which were distinctive of Anglo-Saxon architecture, relating these to almost all the recognised churches of that period in England.

The present author, a geologist by training, has examined the stones used in the church construction in rather more detail. Often this has involved using a powerful hand lens to enable close examination of the stone used. The rock magnification enables any layering or lines of weakness within the rock (and, therefore, directions of strength) to be more readily identified.

Those first working and using stone for building purposes, must have acquired the knowledge that most rock types varied in strength in different directions. This would have been noted particularly as the rocks were hewn or worked into shape (Figure 1.8.). Any planar layering would have been used to help break or split the rock, and provide evidence that the rock was stronger in a direction normal to (perpendicular to) any layering. When stone was used for building purposes, the stones would be laid normally to carry the weight of the building, that is, the planar surfaces would be placed horizontally.

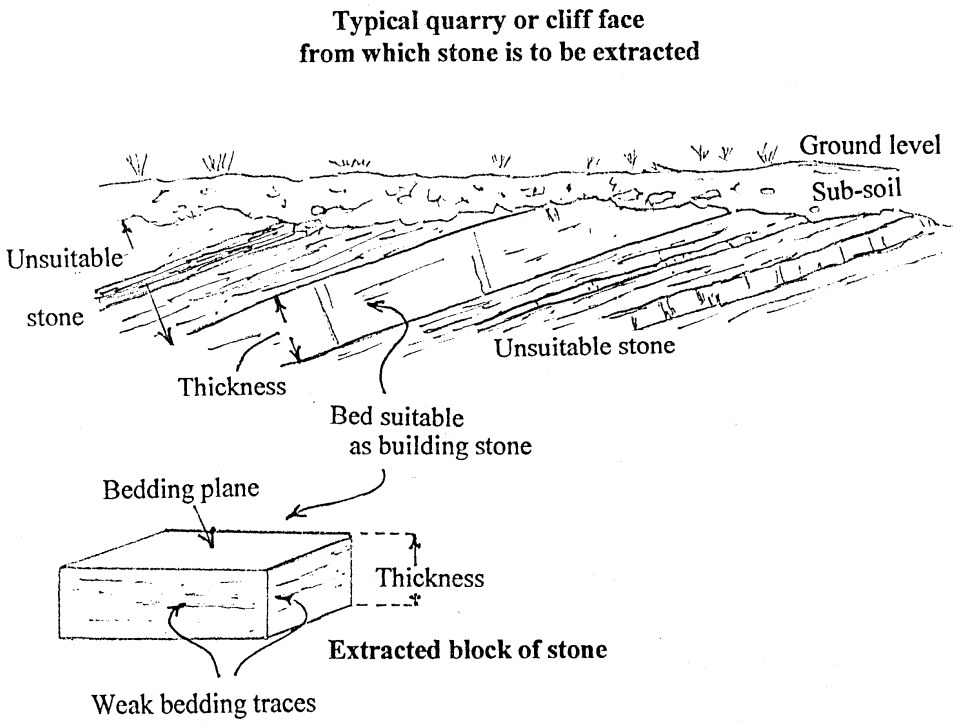


*Figure 1.8. Bedding stratification in sedimentary rocks and the resulting typical shape of hewn rocks (after Potter 2005b).*

Thus, in walls built by the Romans, stones were always placed in this situation. It was also recognised that stonework was less susceptible to water penetration and weathering when the planar surfaces were set horizontally. Most rock built structures, both today and over time, have been built, therefore, to this attitude. If wall features show evidence of having been built with their rock planar surfaces vertical, it is possible to assume that this was not without reason.

Most people possess sufficient geological knowledge to be aware that the commonest rock types that can be extracted in the British Isles are collectively described as 'sedimentary'(involving rocks such as sandstones, limestones and mudstones); and that these rocks develop this planar structure, which is generally spoken of as bedding, and developed naturally in the processes of deposition. The two additional collective terms used to describe rocks are 'igneous' (rocks cooled from a molten state) and 'metamorphic' (rocks altered by heat and/or pressure). These rocks may also show planes of weakness: in igneous rocks possibly due to the crystallisation processes or flow in the molten state and, in metamorphic rocks due especially to pressures (as may be well seen in slates).

In 2005, the present author published the results of his examination of the stonework of those churches in England previously described by Taylor and Taylor, 1965, as of Anglo-Saxon age. Most of these churches were built to display structural stones which possessed vertical planar surfaces or lineation, and it was realised that this orientation was adopted for a reason. This practice of inserting critical stones with vertical orientation could be found in wall quoins, pilasters, and window and arch jambs, as recorded in Potter, 2005b. Where the local rock failed to provide a suitable stone with a lineation, as in the flint or septarian nodule areas of south-east England, lineated rock was in some instances imported from elsewhere to provide the patterning. Indeed, in order to use rock types which remained strong and resilient when used with their bedding in a vertical situation, the Anglo-Saxons, presumably based on experience, were very selective. In south-east England, for instance, they found the compacted shelly rock types, such as Quarr Stone from the Isle of Wight and Barnack Stone from near Peterborough, particularly suitable. Both these

important quarrying sites became monastically controlled and the rocks, thanks to their included fossil shells, provided an easily visible lineation. Elsewhere in the British Isles, other rock types were chosen selectively in order to meet the requirements of visible lineation and strength.

The Anglo-Saxon use of stones with clear patterning for decorative purposes affords a means of identifying their churches. To enable their rock patterns to be described and individual rocks distinguished the present author then proposed a simple nomenclature (Potter, 2005b). Stones placed in their orthodox attitude, with bedding or lineation horizontal were to be simply described as BH, Bedding Horizontal. Those stones placed with their lineation vertically, however, could for instance in a quoin, have the face of the plane (the bedding plane) directed to the left or to the right. They could be Bedding Vertical Face Left, BVFL, or Bedding Vertical Face Right, BVFR. This terminology is illustrated in Figure 1.8. and an example of such work in rocks which display the structures clearly is shown in Figure 1.9. In 1946, Gilbert had recognised that Anglo-Saxon stonework in certain churches displayed patterns but he related this to stone shape and for this reason his classification could not be used universally. The BVFR-BH-BVFL classification may be used for rocks regardless of their shape.

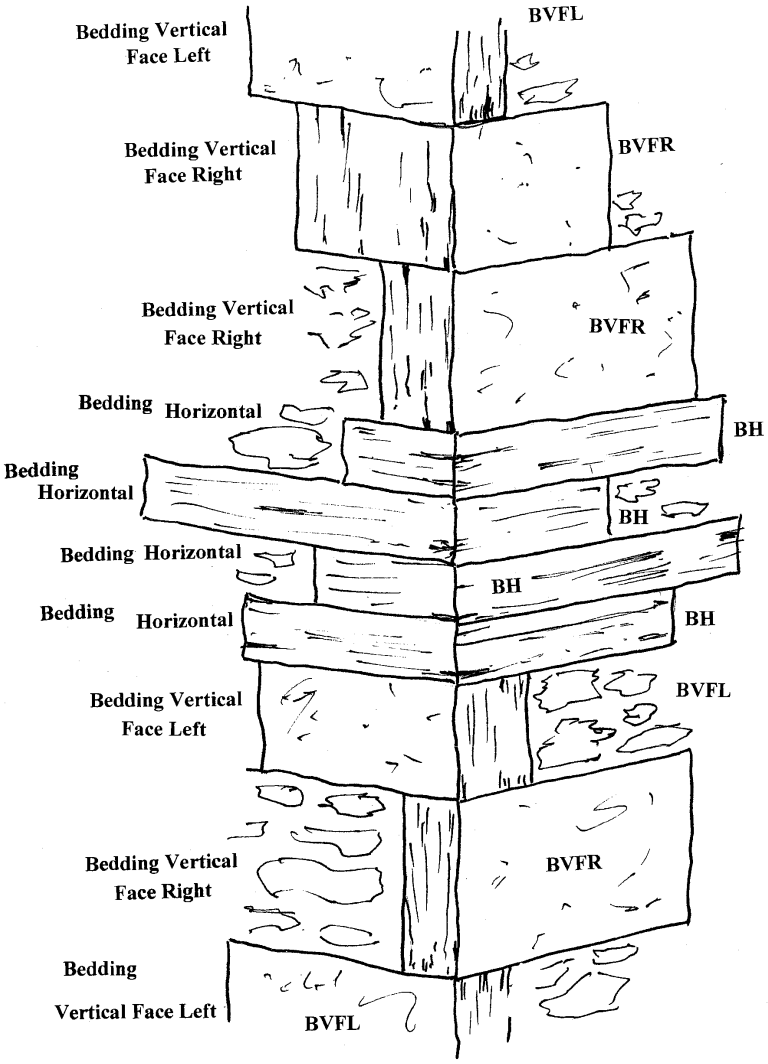


*Figure 1.9. The Anglo-Saxon quoin illustrated displays all possible orientations in which a stone may be positioned within the structure and the annotation first proposed (Potter, 2005b) to describe them. The notation (BVFR-BH-BVFL) refers to the bedding orientation in each stone and not to the stone shape.*

The author's study in England revealed that Anglo-Saxon workmanship with vertical stone emplacement was not confined just to wall junction quoins. Vertically bedded stones played an important role in the construction of their doorways, arches and windows and in decorative pilasters. In such instances the descriptive nomenclature required an element of modification. Horizontally layered stones (BH) helped to tie all these structures into the adjoining walls, functioning just as BH stones in wall quoins.

Some of the significant differences between the stonework of Anglo-Saxon and Norman doorways and windows are shown in Figures 1.10 and 1.11. There are further differences between the stylistic details of the two periods of building - evident in the structure of features such as pilasters and walls – or

the presence of Anglo-Saxon cut backs. These, however, have been described elsewhere as in Potter, 2009c and Potter 2009d. It has been shown that the differences between Anglo-Saxon and Norman stonework relates to the manner in which the stone was used. In both periods, the smoothest faces of the stones were decorated with carvings and the masonry was appropriately orientated. The Norman doorway typically displays these carvings being best illustrated as the doorway is approached; the mason preferred to work on the BVEIA stones to utilise the flattest outward facing rock surface available (Figure 1.12). Anglo-Saxon masons selected the smooth BVFIA stonework to carve and their resulting carvings may be observed where they face into the arch (as at Monkwearmouth church, NZ 402 577, in Durham; Figure 1.13).

*Figure 1.10. Detail of the lowest three stones (in the long and short Anglo-Saxon style) in the south-west nave quoin at Strethall church (TL 484 398) in Essex (after Potter, 2009c). From the lowest stone upwards, the bedding orientations are BVFR, BH, BVFL. The rock type used is Barnack Stone, imported into the region.*

Although both Anglo-Saxon and Norman structures and church walls included bedded vertical stones in their creation, by about 1200, vertically emplaced stones ceased to be used and in Gothic work all masonry was with bedding set horizontally, BH. Gothic influences, therefore, tended to stabilise wall thicknesses.

### 1.7 Limitations of this study

The identification and dating method outlined above have been applied to the material which the author has been able to consider in each of the principal countries of the British Isles and the results are set out below. However, these studies as they may have been applied to early ecclesiastical buildings are far from complete. To achieve a fully comprehensive cover, every church of any age would have to be examined, for instance, for traces of any past or present bar locks. For such an analysis all churches would of necessity have to be open, and all doors unlocked (the whole task whose requirement would extend beyond the length of a normal lifetime).

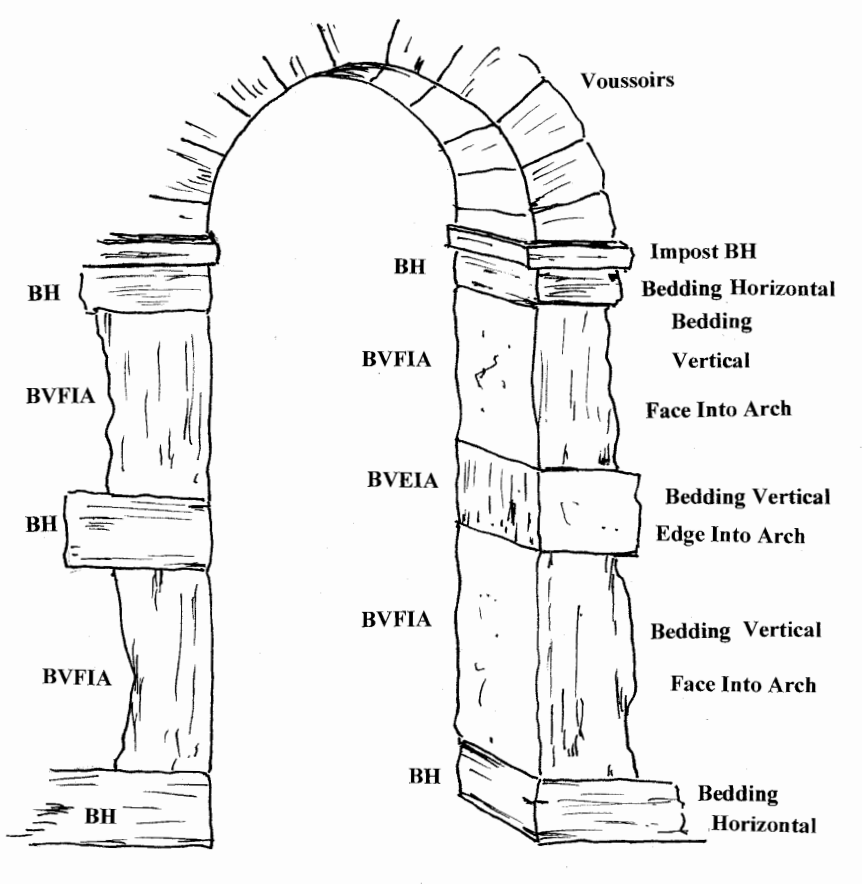


*Figure 1.11. A slightly modified Anglo-Saxon arch to illustrate the disposition of its possible stonework. The stone notation, first proposed in Potter, 2005b, permits the bedding orientations to be distinguished. Anglo-Saxon masons appear to have used only BH (Bedding Horizontal) and BVFIA (Bedding Vertical Face Into Arch). The figure, however, shows one stone (on the right) set BVEIA (Bedding Vertical Edge Into Arch) an attitude which together with BH stones would indicate the work of Norman masons.*

*Figure 1.12. The Norman north nave door at Hales Church, Norfolk (TM 383 960). Note all stone carving occurs on the relatively smooth bedding plane surfaces of stones which face to the north (or BVEIA).*

*Figure 1.13. At Monkwearmouth, Durham (NZ 402 577) the Anglo-Saxon sea-bird carvings related to the west doorway can be seen on the relatively smooth bedding plane surfaces in the north jamb, and therefore on stones orientated BVFIA.*