"Kiesel, Cailloux, Pebble, Keien": Curious Material in the Eighth Century

Lutz-Henning Meyer
RWTH-University Aachen, Germany

ABSTRACT: The paper reports on a rather unknown building technique with round stones, pebbles, developed before 800 in several parts of Europe. The regions where this material and method can be found are separated from each other and scattered over Italy, Germany, France, Belgium, the Netherlands and Britain. In fact, two characteristic ways of building walls used contemporarily are the topic: not just the one transferred by imperial master builders but also a second kind, where knowledge perhaps was transported by English missionaries on the older route of St Jacob. On their way to Rome, monks would have travelled by boat to Spain, from there along the Pyrenees to France where they saw the buildings of the Christian Ostro- and Visigoths and then to Italy where the Lombardian churches built out of pebble could be seen. Further scientific research is necessary to date the "Kieskirchen" more precisely and maybe prove an expected relationship.

Figure 1: St. Martin in Wassenberg-Orsbeck, opus spicatum and pebbles; (Author)

UNEXPECTED BUILDING MATERIAL IN EUROPE

Preservation of historical monuments requires research into a monument before any restoration can be started. The fundamental principle of science is the inspection of sources. The practise of preservation of historical monuments turns this rule. Often, peripheral matters are given an unexpected importance by the state of a monument. The possibilities of intervention into a monument can be compared to medical treatment. A diagnosis requires the case history, the consultation of architects or owners, the study of comparable conditions and known results and their comparison with investigations on the object. This analysis brings to light the facts and circumstances which have endangered or damaged the monument and prescribes a specific treatment. Every therapy is based on this indication. But to be successful in research you also need inspiration, the helpful fortune of coincidence. This was true for the "Kieskirchen".

GERMANY: ST. MARTIN IN SELFKANT-MILLEN, ST. MARTIN IN WASSENBERG-ORSBECK AND ST. MARGARET IN LINNICH-KOFFEREN

The best preserved example of a "Kieskirche" in Germany is the catholic parish church of St. Martin in Selfkant-Millen (fig. 2). While giving advice on the restoration of the brickwork of the clock tower in 1980, the author as curator of monuments got to know the special matter of this church. The outer walls of the nave were built out of pebble-stones. In preservation of historical monuments source research usually starts with the inventory, the official "description of works of art". It contains, referring to the following definition of Brockhaus, "the ascertainment of findings, the citation of all historical dates and illustrations of the work". In "Die Kunstdenkmäler des Kreises Heinsberg" (Oberaspach; Renard 1906, p. 547/79) the importance of the masonry seems undervalued. It is obvious that the the age was fixed according to a purely formal point of view:

> The choir of the church, especially the port, points to the age about 1000AC. The date 1008, fixed in the 17th century in the chapel of Quirinus, does not seem to unfounded as tradition. […] The portal is a very characteristic and rare work of early Romanesque times.

Figure 2: St. Martin in Selfkant-Millen, walls out of pebble; (Author)

Since the publication of the inventory nearly 100 years have passed. But even the succeeding curators of monuments responsible for the church were misled by the outstanding interior décor from baroque times. However, for every operation in medicine as well as in the preservation of historical monuments a diagnosis once made must be constantly doubted and verified. It absolutely depends on the knowledge available to the author and his individual assessing prowess. In art history, it had become a custom to date objects by an analysis of shape. Artificial dressed parts of architecture occupy the attention. Simple masonry seems to be trivial. The sections giving dressed parts support, their material and their use in inventories are mentioned. Surpassing ordinary inventories but still in the spirit of the times, Oberaspach and Renard recorded the building material in Millen as erratic boulders. Sources verifying the results begin in 1121/26 with the document about the foundation of a subsidiary of the Benedictine monastery Siegburg. The patron Saint of St Nicolas complemented the one of St Quirin. The resolution from 1144 by archbishop Arnold I. (1138-1148) from Cologne on the cooperation between parish priests and monks points to an older chapel of a manor house. Since it was unlikely that the mentioned sources contained further hints to the structure, the attention turned to examples by analogy.
In the Middle Ages Millen was part of the deanery Wassenberg in the diocese Liège. Therefore, searching in that region seemed to be promising. Indeed, the parish church St. Martin in Wassenberg-Orsbeck (see fig. 1) shows a comparable building material, identified by the inventory as "rough stone" (Oberaspach; Renard 1906, p. 560/92). The documents of "Landeskonservator" yielded another parish church, St Margaret in Linnich-Kofferen (fig. 3). In the inventory the building material of this example was called "conglomeration of erratic boulders" (Renard 1904, p. 81/325). However, the expression is inadequate because it is normally used for churches built later in Northern Germany. The publications by Ehl and Badstübner show that the stones used there have very different dimensions (Ehl 1926, Badstübner 2002). Considering the size of the stones it could be "opus caementitium" or "opus signinum" following Virtuv (Fensterbusch 1964, p. 94, note 86). Von Cohausen describes the masonry:

> Anyway, during the whole Middle Ages and until recent times bricks were used in horizontal and integrating layers to level out a more or less thick unstable stratum of pebble-stone bedded in a form of fishbone […] (Cohausen 1887, p. 233)

Figure 3: St Margaret in Linnich-Kofferen, dated beam; (Author)

Monographs on single objects usually only include components notable for their excellence. When a phenomenon demanding an answer is found scattered over several countries investigations across the borders are hindered by modern political and lingual frontiers (Slinger; Janse; Berends 1982, p. 15). Research is faced with the priorities of the chairs of history of art. At best, there are regionally restricted publications which are difficult to investigate. An exception in several regards is Kubach / Verbeek suggesting itself due to the time of its origin. Their entry on the church of Millen describes the masonry as "pebbles in regular layering containing roman used material and irregular ashlared corners out of sandstone". The account of pebble as building material does justice to the size of the used stones. In the description of the aforementioned church in Orsbeck it is said:

> 65 cm thick irregular masonry built of erratics and pebbles, grey-wacke, sandstone which contains quartz of Doveren und meadow-ore containing roman tiles; two fishbone layers of tiles in a level of 1 m and 3.6 m on both sides having given the outer walls a colourful face, if they were not plastered […] the heart of the Western tower perhaps mediaeval […] consists of rubble stone in repeated layers out of fishbone stonework (Kubach; Verbeek1976, p. 915)

and in Kofferen:

> From a 10th century chapel (beam felling date 987 according to dendrochronicle examination by Hollstein), […] stonework of rubble-stone of different kinds - sandstone, tuff, greywacke, picked-up-stones, pebbles out of the Rur - with irregular placed parts of roman tiles in continuous layers and a partly triple strip of fishbone out of tiles too; corners strengthened by bigger stones […] (Kubach; Verbeek 1976, p. 915).

The dated beam, however, is situated on top of the described masonry. The dating as 10th century can only refer to the latest possible erection of the masonry beneath. It supports the form-based dating of the building in Millen:

> Phase 1: The latest building was a chapel with retracted square of choir out of the 10th or 11th century. Phase 2: Probably after the arriving of monks in 1121/26 a greater nave was added in the west. The port of the now gone western wall was probably moved into the southern wall of the chapel (Kubach; Verbeek 1976, p. 915).

The dating of Millen followed an argument by analogy absolutely usual in art history. A verification by natural science would give certainty.

First of all Kubach / Verbeek is to be thanked for a general appreciation, They describe the phenomenon of Millen exemplary. But in the following they use less specific terms for the stones used: erratics, pebble-stones, picked-up-stones and pebbles out of the Rur. Pebbles out of the Rur refers to the term used in the neighbouring Netherlands: "Maas-Keien" (Dressen; Dusar; Doperé 2001, pp. 206-211). Hence, "erratic" became the geological and linguistic expression "pebble". This indifferent naming of building material rounded by nature and the size of a fist makes search for more examples more difficult and on top of everything a subject index is missing. For Kubach / Verbeek pebble often appears between Maas and Rhine, mostly in the foundations or inside masonry of buildings.

NETHERLANDS: SINT-ODILIENBERG AND SINT-AMELBERGA IN SUSTEREN; BELGIUM: SINT-MARTINUSKERK, BREE-BEEK

In the Netherlands, Kubach / Verbeek report visible masonry out of pebbles in the northern wall of the chapel at Sint-Odilienberg, Prov. Limburg. The monastery was founded by the Anglo Irish missionaries Wiro, Plechelmus und Otger about 700" (Kubach; Verbeek 1976, pp. 1026f.) and "old masonry […] in clearstory of the nave, in the northern transept and in the apse […] contains mainly pebble and rubble stone in concrete, with pieces of bricks and tuff in a hard lime-mortar" in the parish church Sint-Amelberga in Susteren, Netherlands. This brings us back to the problem of dating already mentioned:

> Due to missing documents about the building we have to rely on comparison with allied buildings of the Essen-Werden group for dating. The outside crypt of Susteren consecrated in 1051 seems to repeat the threefold choir of Essen Minster and it simplifies many an irregularity in the structure of the choir wall of the Lucius church in Werden consecrated in 1063 (Kubach; Verbeek 1976, p. 1064).

The church of Susteren (fig. 4) was renovated in "1885-92 by plans of architect Lambert von Fisenne under assistance of P. J. H. Cuypers […] Before and during the restoration v. Fisenne has performed and published conscientific archaeological investigations." (Kubach; Verbeek 1976, p. 1064).

At Susteren we also meet Iro Scots again:

> In 714 there already existed an oratory at the villa Suestra consecrated to the Salvatory and apostles. It became a Benedictine abbey for Anglo Saxon monks influenced by Pippin II. of Heristal and his wife Plektrudis. Saint Willibrord became the co-owner and first abbot creating a mission center for Frisians and Eifelians (Fisenne 1882, p. 1).

According to Habets, St Willibrord the bishop of Utrecht is named a donator to the abbey. The abbey was the first to unite "a convent and a monastery" (Fisenne 1882, p. 1), a combination usually confined to early abbeys in England. Fisenne and von Cohausen show that 19th century architects discovered basic knowledge which was seldom recognized later on. Nowadays, their ideas can be seen as pioneering work:

> Maas and Alde-Suster have delivered most of the material, the walls are carried out in pebble and rubble stone, of which the biggest pebbles have a size of only 10 to 10 centimetres. I would like to accept, that the walls were founded by mortar in the same way that nowadays walls are made of so-called cast concrete where a strong case in the size of the wall is built, a layer of mortar is put in, stones are added and so on […]. The mortar contains pieces of bricks and tuff (Fisenne 1882, p. 11).

An aspect which weakens von Fisenne's theory of semi concrete is that the pebble stones are bricked up in so called opus spicatum. This technology was used by Romans in unplastered brickwork (Krause 1965, p. 269). In Belgium "Kieskirchen" (fig. 5) can also be found, for example at Bree-Beek in Middenlimburg (Dressen; Dusar; Doperé 2001, pp. 206-211).

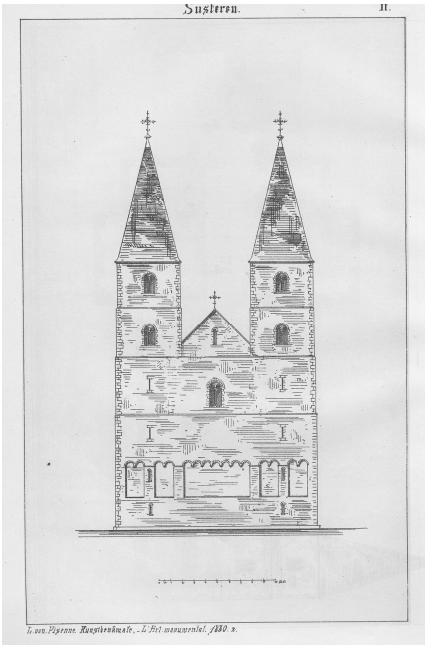
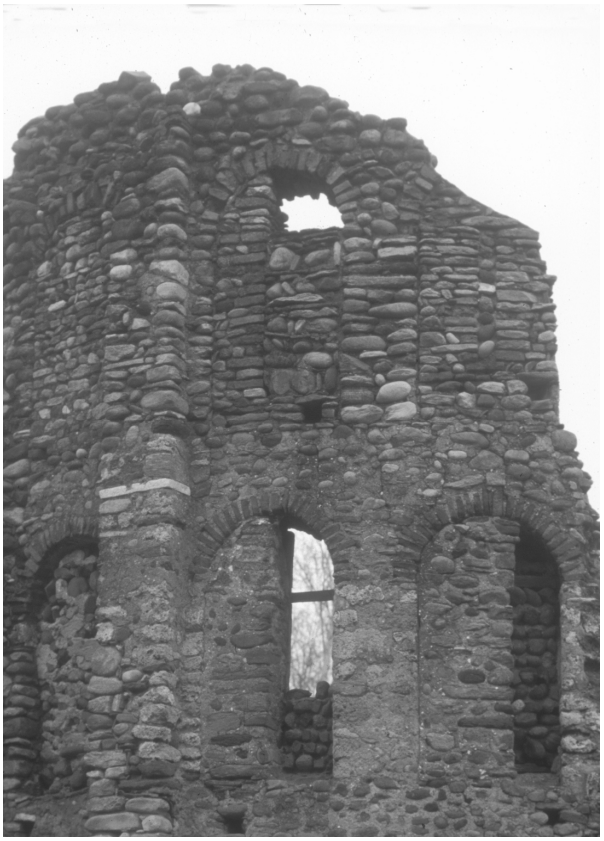


Figure 4: St Amelberga in Susteren, front-view (Fisenne 1882, fig. 10)
Figure 5: St-Martinuskerk, Bree-Beek, detail (Author)

ITALY: SAN GIOVANNI AT LOMBARDIAN CASTEL SEPRIO

Soon the author's main focus of work was shifting (Meyer 2003, pp. 126-130). He had several discussions with the architect of the cathedral in Aachen about how to preserve the Carolingian stone structure. But the problems the author was confronted with were the same as mentioned in the research on "Kieskirchen". No helpful recent investigation could be found. On investigating the knowledge sources of Carolingian architects, scientists were faced with the opinion of authorities, that the Franks just took whatever they found. That was not very satisfactory. When the Roman Empire was destroyed the Romans had left the Rhineland. The Franks could have gained experience in Italy after conquering Lombardia. But the church of S. Vitale often mentioned is this respect was built out of bricks. For the palatinate chapel of Aachen, the Franks instead used slabs of greywacke comparable to bricks. The mortar resembles the aforementioned mortar of Susteren, which is well-preserved and nearly untouched until today. During the investigations on the Carolingian sources of building techniques the author contacted Rosa Auletta, a colleague from Milan. Very interesting visits at Sant'Ambrogio and a fruitful exchange of ideas about the architect of the cathedral of Milan ensued. The excavated chapel below the cathedral of Milan showed a stone structure technically comparable to Aachen. In the case of the mortar there were no relevant results because pozzuolan was used. But the ruined San Giovanni at Lombardian Castel Seprio was built out of the same material as the aforementioned churches along the river Maas (fig. 6). The technology clearly was of opus spicatum but the considerable distance from the mountains entailed a different building material. Turning to Chierici, he does not mention the technology at Castel Seprio but says about the basilica San Pietro situated eastwards at Agliate: "The masonry consists of pebble-stone in a pattern of fishbone. […] Concerning the dating of the complexes at Agilate art historians veer between the 9th and the 11th century" (Chierici 1978, pp. 277, 282). "Kieskirchen" were no regional symptom. The German visitor and his Italian colleagues discussed the influence of Rome and the Byzantine Empire. The author was certain that the Lombardian method of wall building must have been used by the Goths, too. With generous dating the local speciality could grow into a European phenomenon, particularly on including von Cohausen's findings:

> It can be proved that in southern France brickwork continued to exist from Roman times to the times of the Carolingians, […] Near the foot of the Eastern-Pyrenees at Perpignan gothic Cathedral walls and buttresses are built out of pebbles in the form of fishbone with intervals or corners dressed with bricks in the about size of the largest Roman bricks (Cohausen 1887, p. 234).



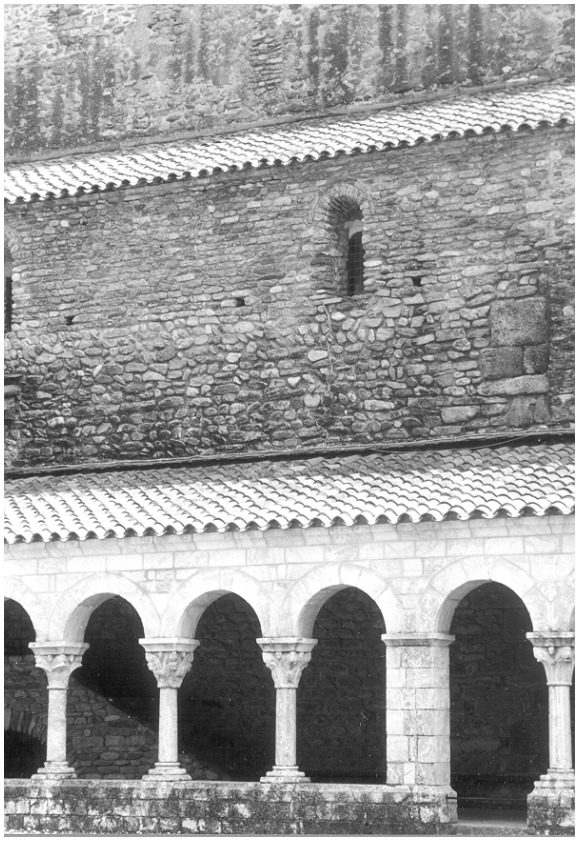


Figure 6: San Giovanni at Lombardian Castel Seprio (Author)
Figure 7: Saint-Michel de Cuxa pebbles above Cloister (Author)

FRANCE: SAINT-MICHEL DE CUXA AND SAINT-MARTIN DU CANIGOU

A following visit in Roussillon removed any doubt about dating. The desired pebble-stonework was brought to light at old parts of the buildings of Saint-Michel de Cuxa, "incunabulum of Pre Romanesque in France" as it was called by French colleagues. In contrast to the "charter of 28th September 975" (Durliat 1986, p. 23), Durliat assigned Cuxa more "to the tradition of Visigoths" (Durliat 1986, p. 28). Although pebble does not turn up in literature it is what was found in the mounting stonework as well as in the walls above famous cloister (fig. 7). The mortar even showed added granular brick as mentioned in case of Susteren. But "the early Romanesque Art of the Mediterranean region in Roussillon does not manifest itself first in the buildings of abbot Oliba in Cuxa but at Saint-Martin du Canigou" (Durliat 1986, p. 61). There the expected pebble appeared in parts of walls above the famous cloister thought to be original. The hardly accessible location high in the mountains was of little concern. On the author's question, the nun guiding him answered, that the abbey of Saint-Martin was erected at the pilgrims' route to St Jacob. In the early Middle Ages this path ran along the Pyrenees at the level of the abbey. Down in the valleys people had "to suffer very much from the Moslem invasion in the 8th century and several escape attempts of Pippin the short afterwards" (Durliat 1986, p. 163). Inhabitants nowadays call France part of the former Visigoth empire "Catalunya" like the Spanish. So it is not surprising that the hospital of the abbey S. Pere de Roda on the Spanish side of Pyrenees well known for its church was seen to be built out of pebble.

FLINT AND PEBBLE STONE

In addition to that, in Roussillon it becomes obvious, how mentality shapes architecture. Pebble-stonework seems to be treated as an equivalent to integrity. European banks used to demonstrate solvency by facing their buildings with stone slabs. In order to create a good image relatively young buildings at Perpignan are covered with pebble. A comparable intention reflects flint-work at Canterbury. One recent impression is a new tower covered with flint filling a gap in the long mediaeval Canterbury city wall built out of flint. Flint as building material was already known by the Romans. The well preserved city wall of the Belgian city of Tongern gives evidence of the continuous use of flint from Roman times to the Middle Ages. Canterbury, too, was a Roman city at first. But flint and pebble stone should not be confused. The use of pebble stone seems to be an early medieval technique used by monks.

FROM LOMBARDIA AND "CATALUNYA" TO ENGLAND

Based on the knowledge acquired up to now, the question arises how it is possible that a comparable technology of building was used at nearly the same time in such distant regions? Between Lombardia and "Catalunya" this problem seems to be resolved by the migration of Visigoths in 553 from the plain of the Po to France and Spain and the Lombardians following in 569 (Bognetti 1977, p. 12). Although the region of Rhine-Maas is far in the North, the allusion to the pilgrims' route to St Jacob and – concerning the Dutch examples – their founder, Willibrord, point to the fact that the innovation of "Kieskirchen" was transferred by Iro-Scottish monks. Ireland which was converted by Patrick could keep Christianity save by being isolated from the continent in times of great migration. The Irish brought Christianity back to former Christian territories. Celtic-Roman Brittany was overrun by the Anglo-Saxons. "From the Island of Iona, outpost on the Western coast of Scotland and from the Island of Lindisfarne on the Eastern coast of Northumbria the Irish have impressed Christian England." (Stoll; Roubier 1966, p. 11). The Churches of Lindisfarne (Holy Island) and Durham are built out of red sandstone in Romanesque forms. They confirm that the Irish could not be responsible for transferring pebble-stonework, although the missionary Willibrord of York was made bishop of Utrecht during the times of Pippin. Ripon with its neatly treated ashlars in the oldest Crypt of England proves this theory.

GREAT-BRITAIN: ST MAG AT RECULVER

But England was converted to Christianity by St Augustin, too. After his arrival in Kent in 597 he founded "the first diocesan town in England" at Canterbury (Stoll; Roubier 1966, p. 276). From this diocese came Wynfrith or Wynfrid, later Missionary of Germans, Bonifatius. The diocese of Utrecht was "held by Bonifatius in 753/54" (Rütten 2001, p. 464). If he was the transporter of knowhow into the region between Rhine and Maas, an exemplary building must be found in Kent. This is a church, of which two preserved towers directly in front of the sea are known by sailors as "The Twins". On St Mag at Reculver the Anglo-Saxon-Chronicle notes "that in 669 King Egbert of Kent gave the place of Reculver, in the area of the Roman Castrum Regulbium at the northern coast of Kent to his priest Bassa, to build a church there". The remains of the choir show the well-known stonework of pebble (fig. 8). In Canterbury itself "indeed the surviving section of the dormitory may give some idea of the appearance of Lanfranc's crypt in the cathedral" (Woodman 1981, p. 43). But the wall of the ruined dormitory bordering on the palace of the bishop and on the library shows the phenomenon of pebble as well-known from Italy to Britain,l to France, Germany, Belgium and the Netherlands.

Figure 8: St Mag at Reculver; rest of choir and "The Twins"; (Author)

ANALYSIS OF FORM SHOULD BE COMPLETED WITH ANALYSIS OF MATERIAL AND CONSTRUCTION

At Castel Seprio scientific researches on mortar were begun very early as "analisi di datazione con dosimetria termoluminescente" (Sibilia; Della Torre; Surace 1990, p. 183). The results are not able to confirm the author's opinion of dating. However, experience with this very new technology made at Aachen cathedral shows risks and progress likewise. It can only acquire the necessary status of routine by many more of such researches. Hopefully, these and other methods of research can be used in the cases of the other examples as well, thus enabling a more precise dating and perhaps proving an expected relationship. The much-cited Darkness of the Middle Ages could become a little brighter.

REFERENCES

Angenendt, A., 1994: Bonifatius. In: *Lexikon für Theologie und Kirche*, 2. Freiburg: Herder, pp. 575-577.

Badstübner, E., 2002: *Feldsteinkirchen des Mittelalters in Mecklenburg-Vorpommern*. Rostock: Hinstorff.

Bognetti, G.P., 1977: *Castelseprio. Guida storico-artistica*. Vicenca

Chierici, S., 1978: *Romanische Lombardei*. Würzburg: Echter Verlag.

Cohausen, A. von, 1887: Die Mauerverbände an alten Bauwerken des Rheinlandes. In: *Zeitschrift f. Bauwesen XXXVII,* p. 51-68, 231-244, 587-598.

Durliat, M., 1986: *Romanisches Roussillon*. Würzburg: Echter Verlag.

Dressen, R.; Dusar, M.; Doperé, F., 2001: Atlas natuursteen in Limburgse monumenten. *Geologie, Beschrijving, Herkomst en Gebruik*. Genk.

Ehl, H., 1926: *Norddeutsche Feldkirchen*. Braunschweig.

Fensterbusch, C., 1964: *Vitruv; Zehn Bücher über Architektur*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Fisenne, L. von, 1882: *Kunstdenkmale des Mittelalters*. Aachen: Cremersche Buchhandlung C. Cazin.

Fociani L., 1995: Castelseprio - Cascina S. Giovanni: analisi delle malte. In: *Notiziario della Soprintendenza Archeologica della Lombardia*, 1992-93, Milano.

Habets, J., 1870: *Geschiedenis van de Stad Susteren en van de adellyke abdy Sint Salvator aldaar*. Maastricht.

Krause, C., 1965: Römische Architektur. In: Andresen, et al. (Eds) C. *Lexikon der Alten Welt*. Zürich: Artemisverlag p. 269.

Kubach, H.E.; Verbeek, A., 1976: *Romanische Baukunst an Rhein und Maas*. *Katalog der vorromanischen und romanischen Denkmäler*. Berlin: Deutscher Verlag für Kunstwissenschaft.

Meyer, L.H.; Flören, 2003: Das Geheimnis der "Maas-Keie". In: *Denkmalpflege im Rheinland* 3. Brauweiler, pp. 126-130.

Muret-Sanders, 1908: *Dictionary*. Berlin: Langenscheid.

Oberaspach, K.F.; Renard, E., 1906: *Die Kunstdenkmäler des Kreises Heinsberg*. Düsseldorf: L. Schwann.

Renard, E., 1904: *Die Kunstdenkmäler der Kreise Erkelenz und Geilenkirchen*. Düsseldorf: L. Schwann.

Rütten, F. 2001: Willibrord. In: *Lexikon für Theologie und Kirche*, 10. Freiburg: Herder, p. 464.

Stoll, R.Th.; Roubier, J., 1966: *Britannia Romanica*. Wien: Verlag Anton Schroll.

Sibilia, E.; Della Torre, L.; Surace, A., 1990: Castelseprio (VA), Zona archeologica: Area a Nord della basilica di San Giovanni – Analisi di datazione con dosimetria termoluminescente. In: *Notiziario della Soprintendenza Archeologica della Lombardia*, 1988-89, Milano.

Slinger, A.; Janse, H.; Berends, G., 1982: *Natuursteen in Monumenten*. Baarn: Rijksdienst voor Monumentenzorg. Bosch & Keuning.

Woodman, F., 1981: *The architectural history of Canterbury Cathedral*. London: Routledge & Kegan.