



ALBERTO VIRDIS
Masaryk University, Brno

AT THE ORIGINS OF THE ART OF STAINED GLASS IN WESTERN EUROPE (FIFTH TO NINTH CENTURIES)*

Research in archaeology and the study of written sources have long demonstrated that the origins of the art of stained glass, although traditionally linked to the Middle Ages and Gothic architecture, can be traced back several centuries earlier.¹ The documented absence of stained-glass windows in late antique and early medieval churches or buildings prior to the year 1000 has, in recent decades, been offset by a significant number of archaeological finds of flat glass window fragments, dating mostly from the sixth to the tenth century. These findings help to partially fill the substantial gap in material evidence predating the earliest medieval stained-glass windows preserved *in situ*. Material evidence from archaeological excavations, combined with investigations of written sources, has confirmed the widespread presence of stained-glass windows in early medieval Western Europe, particularly from the eighth to the tenth century. Two main areas of diffusion have been identified: Merovingian and Carolingian Gaul

(especially the central and northern parts of present-day France) and Anglo-Saxon England. The purpose of this article is to present the progress and some partial results of a three-year research project (2023–2025), funded by the Czech Science Foundation, entitled *Fragmented Images: Exploring the Origins of Stained Glass Art*, which I direct as Principal Investigator. This project aims to investigate the origins of stained-glass art between the fifth and ninth centuries by analysing data from archaeological and written sources. Additional areas of inquiry include the techniques of stained-glass window-making (archaeometry of glass, materials and methods of glass-making, glass-colouring techniques, and the assembly of stained-glass windows, as well as their integration into architecture); comparisons with techniques used in related arts, such as glass-and-marble *opus sectile*, *cloisonné* jewellery with garnets, glass, or enamels; and the study of the relationship between glass windows and the architecture to which they once belonged.

The aim is to outline the development of stained glass in its early phases, from the earliest glazing traditions – which can be reconstructed only in part through the cross-analysis of material, textual, and iconographic sources – to the medieval stained-glass windows, that we know from the oldest surviving example *in situ*, dating to the 1120s.

This research approaches the study of archaeological window glass finds from an art-historical perspective, which adds to the archaeological and archaeometrical approach normally employed so far. We seek to understand the aesthetic motivations underlying the rise of stained glass, which appears to have originated in the Christian basilicas of Gaul around the second half of the fifth century, in the transitional period between the fall of the

* The present article is appearing under the auspices of the project *Fragmented Images: Exploring the Origins of Stained Glass Art* (GA23-05243S) implemented at RE:CENT Center for Medieval Visual Cultures and Research Communication (formerly the Center for Early Medieval Studies), Masaryk University, Brno, and funded by the Czech Science Foundation (GAČR).

¹ *Il colore nel Medioevo. Arte, simbolo, tecnica. La vetrata in occidente dal IV all'XI secolo*, Atti delle Giornate di Studi (Lucca, 23–24–25 settembre 1999), ed. by F. Dell'Acqua and R. Silva, Lucca, 2001; F. DELL'ACQUA, *Illuminando colorat. La vetrata tra l'età tardo imperiale e l'alto medioevo: le fonti, l'archeologia*, Spoleto, 2003; *De transparentes spéculations. Vitres de l'Antiquité et du haut Moyen Âge (Occident–Orient)*, exh. cat., Bavay, 2005; *Vitrail, verre et archéologie entre le V^e et le XII^e siècle*, ed. by S. Balcon-Berry, C. Sapin, and F. Perrot, Paris, 2010.

Western Roman Empire and the rise of the Merovingian Kingdom. To this end, the project investigates the role of the so-called ‘aesthetics of fragmentation,’² by examining its manifestations across various artistic expressions, including late antique Latin literature (especially poetry), and contemporary visual arts.

In the limited scope of this article, I will illustrate and discuss only selected objectives of the project, particularly those related to the first of its three research axes, which focuses on material evidence. The adopted methodologies will be specified, and some preliminary results will be presented. Progress in the other research axes will be briefly noted, but not discussed in detail, due to space constraints. Further research developments will be presented in subsequent publications following the completion of data collection.

METHODOLOGIES

To reconstruct the development of stained-glass windows in the early medieval centuries before the year 1000, we conducted a survey to collect all the published archaeological findings of window glass dating back to the fifth to ninth centuries, as documented in scholarly publications (articles, notes, and excavation reports). This process builds upon major surveys published in 2005 and 2010.³ The ongoing research continues to evolve owing to the constant emergence of new material evidence from archaeological excavations. As of February 2025, approximately 120 contexts of findings related to about 110 distinct archaeological sites, have been catalogued, and compiled into a continuously updated database.

For improved visualization and analysis – particularly concerning the geographic distribution and chronological phases of the findings – an open-access and open-source digital atlas is being developed. This tool will facilitate the digital mapping of the window glass finds, enabling data filtering and providing interactive functions that surpass the possibilities offered by static maps. The ultimate goal is to develop a tool that will make it possible to visualize, on both maps and timelines, the evolution of stained glass up to the end of the first millennium. This progression extends from the earliest stained glass – characterized by the insertion of glass or other translucent materials, such

as *lapis specularis*, into stone or stucco transennae (as in early Christian basilicas) – to the classic stained-glass technique. Intermediate stages include so-called mosaic windows (non-figurative and unpainted but featuring geometric glass arrangements), and figurative but still unpainted stained-glass windows. This survey of archaeological window glass materials aims to gather the following data, which are progressively entered into the database and visualized on the maps: the provenance of the materials (archaeological site, current town and country of relevance); dating of the window glass finds deriving from stratigraphic chronology or from archaeometric analyses; cultural and political context of the site of finding (e.g., ‘Merovingian Kingdom’, ‘Carolingian Ravenna’); current location of the materials (museums and deposits, where known); technical characteristics (e.g., window glass deliberately coloured via metal oxide pigments *versus* naturally coloured glass; finding of lead comes in connection with the glass shards or found sparse in the same archaeological layer); glass morphology (rectilinear or curvilinear edges, where they are the original ones and not due to accidental breakage);⁴ presence of painted or unpainted glass; archaeometric composition of glass (natron glass, potash glass, plant-ash glass, or recycled Roman glass);⁵ glass-making techniques (mould casting, cylinder-blowing, crown-blowing); evidence of glass workshops (or glass furnaces, or crucibles) in the same archaeological context that delivered up the window glass; traces of transennae or other frames used to set the glass quarries within the window; photographic documentation of the artefacts, and bibliographic references. The chronological scope of the survey ranges from the fifth to the ninth century – a period when stained glass featuring coloured glass connected by lead comes and decorated with dark grisaille painting had become widespread across much of Western Europe. The geographical scope presents greater challenges. The issue of window glass in the Byzantine Empire or in areas culturally associated with Byzantium, although occasionally raised in academic discussions, lacks sufficient material evidence to warrant a systematic survey at the present state of research.⁶ Known examples, such as the stained-glass fragments from the *Chora* and *Pantokrator* churches in Constantinople, variously dated to the twelfth or the thirteenth century, do not supply sufficient data to establish whether Constantinopolitan artisans possessed the skills and technologies to make stained

² J. ELSNER, ‘Late antique Art: The Problem of the Concept and the Cumulative Aesthetic’, in *Approaching Late Antiquity: The Transformation from Early to Late Empire*, ed. by S. Swain and M.J. Edwards, Oxford, 2004, pp. 271–309; J. HERNÁNDEZ LOBATO, *Vel Apolline muto. Estética y poética de la Antigüedad tardía*, Bern, 2012; *The Poetics of Late Latin Literature*, ed. by J. Hernández Lobato and J. Elsner, New York, 2017; *A Radical Turn? Reappropriation, Fragmentation, and Variety in the Postclassical World (3rd–8th centuries)*, (Convivium Supplementum, 2022/2), ed. by I. Foletti, M. Okáčová, and A. Palladino, Turnhout, 2022, pp. 10–21.

³ *De transparentes spéculations* [as in note 1]; *Vitrail, verre et archéologie* [as in note 1].

⁴ This information is useful for formulating hypotheses about the presence of figurative or geometric glass, as most glass windows with geometric compositions appear to favor polygonal patterns such as triangles, hexagons, and similar regular shapes.

⁵ Archaeometric data can supply more precise information regarding the dating of the glass itself.

⁶ E. KITZINGER, ‘The Byzantine Contribution to Western Art of the Twelfth and Thirteenth Centuries’, *Dumbarton Oaks Papers*, 20, 1966, pp. 25–47, esp. p. 33; E. CASTELNUOVO, *Vetrate medievali*, Turin, 1994, pp. 221–223.

glass-windows, unprecedented in the Byzantine craft tradition⁷. Nevertheless, the findings of coloured, crown-blown glass disks in the church of San Vitale in Ravenna, as well as other coloured window glass fragments excavated in the early Christian basilica of Philippi in Greece, both dating to the Justinianic period, suggest that the outcomes of future research and discoveries in this vast area of the ancient world should be closely examined.

Similarly, the decision was made not to include Islamic window glass evidence in the survey. The limited documented attestations (e.g., cold-painted glass from the eighth-century palace of Khirbat al-Mafjar, housed in the Israel Museum of Jerusalem),⁸ suggest that, while ongoing studies in this area should be monitored, the available material evidence is insufficient to justify inclusion within the project's predefined timeframe and scope.

STATE OF THE ART

GLASS WINDOWS IN LATE IMPERIAL ROME, WRITTEN SOURCES, AND MATERIALS

Window glazing can be traced back to at least the first century AD, as evidenced by material findings, including examples from Pompeii and Herculaneum. At these sites, windowpanes were employed in the *calidaria* and *tepidaria* of the thermal baths to help maintain interior temperatures. Between the first and fourth centuries, glass became the most widely used material for window screens in both private and public buildings, serving not only to illuminate spaces but also to facilitate ventilation [Fig. 1].⁹

Although glass was employed to glaze windows as early as the imperial period in Rome, there are many intermediate stages separating Roman glazed windows from their early medieval counterparts. Early medieval window glass (insofar as it can be reconstructed) and certainly fully developed medieval stained-glass windows, seem to

⁷ F. DELL'ACQUA, 'Enhancing Luxury through Stained Glass, from Asia Minor to Italy', *Dumbarton Oaks Papers*, 59, 2005, pp. 193–211; E. KOURKOUTIDOU-NIKOLAÏDOU, 'Vitreaux paléochrétiens à Philippi', in *XXXI Corso di cultura sull'arte ravennate e bizantina* (Ravenna, 7–14 April 1984), ed. by Istituto di antichità ravennate e bizantine, Ravenna, 1984, pp. 277–296, esp. 289; P. NOVARA, 'Gruppo di reperti in vetro altomedievali', in *Restituzioni. Tesori d'arte restaurati: diciannovesima edizione*, ed. by C. Bertelli, G. Bonsanti, and C. Di Francesco, Milan, 2022, pp. 156–165.

⁸ F.B. FLOOD, 'Palaces of Crystal, Sanctuaries of Light: Windows, Jewels and Glass in Medieval Islamic Architecture' (Ph.D. Diss. University of Edinburgh), 1993, p. 21; see also the museum's catalogue entry: <www.imj.org.il/en/collections/416605-0> [accessed 8 October 2025].

⁹ F. DELL'ACQUA, 'Le finestre invetrate nell'antichità romana', in *Vitrum. Il vetro fra arte e scienza nel mondo romano*, exh. cat., ed. by M. Beretta and G. Di Pasquale, Florence, 2004, pp. 109–119.



1. Window glass, Pompeii, Archaeological Park, House of Julius Polybius. Photo: A. Benestante

represent a rupture with the Roman classical and late antique tradition for several reasons. From a technical and material perspective, one must consider the discontinuity that marks the end of the ancient glassmaking tradition, characterized by soda-lime glass, and the emergence of potash glass, which begins to appear in the late eighth century in France and Germany and supplants soda-lime glass almost everywhere in the span of one century.¹⁰ This transition was neither abrupt nor chronologically precise; rather, it was a prolonged process which started in the late eighth century, during which diminishing supplies of natron from Egypt and raw glass from the Levantine coast of the Mediterranean led to new experimentation with alternative production techniques. These had included the use of fluxes derived from sodium-rich halophytic plants (plant-ash glass) and increasing phenomena of recycling of ancient Roman glass or mosaic tesserae removed from ancient monuments.¹¹

Moreover, certain regions, such as Roman Britain, apparently experienced a disruption in glass production between the late Roman Empire and the later Anglo-Saxon

¹⁰ A. SHORTLAND, et al., 'Natron as a Flux in the Early Vitreous Materials Industry: Sources, Beginnings and Reasons for Decline', *Journal of Archaeological Science*, 33, 2006, no. 4, pp. 521–530.

¹¹ D. WHITEHOUSE, 'The Transition from Natron to Plant Ash in the Levant', *Journal of Glass Studies*, 44, 2002, pp. 193–196; R.B. SCOTT, et al., 'Experimental Mixing of Natron and Plant Ash Style Glass: Implications for Ancient Glass', *Glass Technology: European Journal of Glass Science and Technology Part A*, 58, 2017, no. 1, pp. 8–16.

period (fifth to seventh centuries), with technical skills being reintroduced only in the late seventh century.¹²

From a formal perspective, one of the defining features of medieval stained-glass windows are their rich colours. Roman windows, with few exceptions, were made of colourless glass – that is, glass not intentionally coloured with metal oxides. Such glass was rarely fully transparent, as achieving complete transparency was difficult, but it often exhibited greenish or bluish hues. As an alternative to glass, *lapis specularis* – a variety of gypsum (selenite) cut into thin, nearly transparent sheets – was a material widely used for window screens. Various written sources attest to its use, including Lactantius, Jerome, Basil of Caesarea, and Isidore of Seville.¹³

Early basilicas in Rome featured window screens primarily made of stucco, pierced by geometric openings of various shapes. Some surviving examples still contain embedded fragments of *lapis specularis* within the stucco frames, testifying to its use in window screens. The use of this material produced a whitish, semi-transparent effect. A notable example is represented by the window transenna found by Antonio Muñoz in the basilica of Santa Sabina in Rome between 1914 and 1919, and which have recently restored and exhibited [Fig. 2].¹⁴

Some late Roman written sources have been interpreted as evidence for stained-glass windows in early Christian basilicas, leading to the hypothesis that medieval stained-glass windows ultimately derived from Roman basilican models.¹⁵ One such case is Prudentius' description of the Basilica of St Paul Outside the Walls, written around 405, in which he states that the curves of the arches in the nave walls were covered with various types of glass, making them resemble a flowering meadow in spring – a possible reference to polychrome glass:

Then he [the Emperor] covered the curves of the arches with splendid glass of different hues, like meadows that are bright with flowers in the spring.¹⁶

Similarly, around 469, Sidonius Apollinaris described the Cathedral of Lyon in a letter to Hesperius:

Marble diversified by various shining tints pervades the vaulting, the floor, the windows; forming designs of diverse colour, a verdant grass-green encrustation brings winding lines of sapphire-hued stones over the leek-green glass.

¹² R. CRAMP, 'Window Glass from the British Isles. 7th–10th Century', in *Il colore nel Medioevo* [as in note 1], pp. 67–85, esp. p. 70.

¹³ See the anthology of sources in F. DELL'ACQUA, *Illuminando colorat* [as in note 1].

¹⁴ S. PANNUZI, 'Illuminazione naturale e spazi finestrati nelle chiese paleocristiane ed altomedioevali: le transenne di finestra in stucco', *Hortus Artium Medievalium*, 26, 2020, pp. 45–59.

¹⁵ F. DELL'ACQUA, *Illuminando colorat* [as in note 1].

¹⁶ 'Tum camiros hyalo insigni varie cucurrit arcus: sic prata vernis floribus reident', PRUDENTIUS, *Peristephanon*, vol. 12, 53–54, trans. by H.J. Thomson, Cambridge, MA and London, 1953, pp. 326–327.



2. Stucco transenna. Rome, St Sabina, Museo Domenicano. Photo: P. Piccioni ICR

In both cases, the only certain conclusion that can be drawn is that, in St Paul's, it was not the windows that were covered with glass, but rather the spaces between the arches, possibly decorated with glass *sectilia* inlays, as has been proposed.¹⁷ As for Sidonius' description, it can be inferred that the window panes in the Cathedral of Lyon were green (*prasinum vitrum*), exhibiting the characteristic greenish tinge of Roman natural glass – that is, glass not intentionally coloured. The polychromy described in the passage of Sidonius likely pertained to the marbles and tesserae (*lapillos*) of the mosaics adorning the walls, vaults, and spaces between the windows, not to stained-glass windows.

¹⁷ N. CAMERLENGHI, 'St Paul's Outside the Walls. A Roman Basilica, from Antiquity to the Modern Era', Cambridge, 2018, p. 65; H.L. KESSLER, *Old St. Peter's and Church Decoration in Medieval Italy*, Spoleto, 2002, p. 51.



3. Decorative panel from the port of Kenchreai, glass *opus sectile*. Isthmia, Archaeological Museum. Photo: A. Virdis

STAINED-GLASS WINDOWS AND *OPUS SECTILE*

As for the material evidence, no archaeological findings conclusively attest to the presence of polychromatic glass windows in early Christian basilicas in Rome nor in other civil buildings of the late imperial age.

Nevertheless, one of the most widely accepted theories regarding the emergence of stained-glass windows in Late Antiquity suggests that its primary model can be traced to *opus sectile* wall decorations, in which coloured marbles – and often glass, a more affordable yet versatile substitute for marble – were arranged to create figurative compositions. These decorations were widely employed in both public and private settings, in both pagan and Christian contexts during the imperial period.

In particular, glass *opus sectile* wall decorations discovered in the 1970s during excavations at the ancient port of Isthmia-Kenchreai, near Corinth, led some scholars to consider these compositions as precursors to stained glass, thereby positing a direct link between a classical artistic tradition and a distinctly medieval one [Fig. 3].¹⁸ However, while late-antique examples of *opus sectile* wall decoration still exhibit a predominantly naturalistic figurative style, whilst the earliest known polychromatic glass windows of the early medieval period are far from displaying such figurative qualities.

The most archaic examples are archaeological fragments of coloured flat glass quarries (although naturally coloured pale green glass continued to be employed for a long time), usually geometrically shaped by means of a *grozier*. These glass quarries were presumably set into geometric grids, possibly made of wood (rarely preserved), but also in stone or stucco, such as those found in the basilica of St Sabina in Rome. These early examples



4. Fragments of stained glass from the ancient funerary church of Sion, Sous-le-Scex. Romont, Vitrocentre, VMR 727: www.vitrosearch.ch/de/objects/2503097 © Vitromusée Romont / Yves Eigenmann, Fribourg

of stained-glass windows have been dubbed ‘mosaic windows’, a term which has been applied to several archaeological finds primarily from the French-Swiss Alpine region and dating to between the fifth and ninth centuries. Notable examples include the glass finds from *Epomandurum*/Mandeure (France), as well as those from the cemetery church of Sous-le-Scex (Sion, Switzerland), and the Chapel of the Holy Cross of the Abbey of St John the Baptist in Müstair (Switzerland), dated to the fifth century, the fifth/sixth centuries, and the late eighth/early ninth centuries, respectively [Figs. 4–5].

PAINTING ON GLASS: GRISAILLE AND SILVER-STAIN IN THE EARLY MIDDLE AGES

None of the examples mentioned so far show any traces of glass painting, which apparently made its first appearance around the eighth century, but did not enter into use until the following century, in the Carolingian period.

¹⁸ R. BRILL, ‘Scientific Studies of the Panel Materials’, in *Kenchreai: Eastern Port of Corinth*, vol. 2: *The Panels of Opus Sectile in Glass*, ed. by L. Ibrahim, R. Scranton, and R. Brill, Leiden, 1976, pp. 227–255.



5. Fragments of stained glass from the monastery of St John the Baptist in Müstair (left). Romont, Vitrocentre, VMR 485: www.vitrosearch.ch/de/objects/2503060 © Vitromusée Romont / Yves Eigenmann, Fribourg

Reconstruction proposal of a group of green coloured glass pieces from the same site (right). After: C. KESSLER, S. WOLF, and S. TRÜMLER, 'Die frühesten Zeugen' [as in note 38], fig. 1b



6. Fragment of glass with anthropomorphic decoration from the basilica of Sainte-Reine d'Alésia, Alise-Sainte-Reine. After: P. WAHLEN, 'À propos d'un verre peint trouvé à Alésia (Côte-d'Or)', in *Vitrail, verre et archéologie* [as in note 1], p. 64

The distribution maps, made so far with partial data, indicate that on the sites analysed so far (c. 110 sites for 120 different find contexts), the finds of painted glass are overwhelmingly concentrated from the ninth century onward. A glass fragment from the French site of Alise-Sainte-Reine/Alésia – although its identification as window glass remains uncertain due to its very small size – bears traces of a painted decoration depicting a stylized face. Although the painting has faded away completely, the grooves left on the glass by the pigment remain [Fig. 6].

This glass fragment, which was found in a layer that dates to the ninth/tenth century, has been dated to an earlier period because of stylistic comparisons made with the paintings of some seventh/eighth century manuscripts produced in monastic *scriptoria* nearby (such as Flavigny). It represents the earliest evidence of painting on window glass to date.¹⁹ A closer chronology has been assigned to a very small fragment of blue glass decorated with superimposed semi-circular white lines (drapery folds?) from the site of Hamage in northern France, dated to the period between 700 and 820.²⁰

These very early examples of painted glass do not yet seem to make use of grisaille painting. The latter, which the twelfth-century treatise of Theophilus describes as a mixture of copper and glass powder mixed with vinegar or urine which is rubbed onto the glass with a brush and then fired in the kiln, would become established as the main glass painting technique in the Carolingian age, from the late eighth century onwards. However, grisaille was not the only painting technique used in the early medieval period.

Two different sets of painted window glass, found in two sites apart from each other, testify to the existence of a glass painting technique other than grisaille, known as silver stain, or *jaune d'argent* in French. It consists of a paint made of a compound of metal salts (nitrates, sulfides, silver chlorides, or simpler silver filings) that, when spread on glass and exposed to firing, takes on a golden hue. This technique, which became established on a Continental scale only in the fourteenth century (and changed the history of glass painting),²¹ is attested for the first time centuries



7. Fragments of stained glass from the church of San Lorenzo di Ammiana, Venetian Lagoon. After: VAGHI, VERITÀ, ZECCHIN [as in note 22]

earlier: in the early medieval window glass found on the island of San Lorenzo di Ammiana, in the northern part of the Venetian Lagoon, and dated between ninth and eleventh centuries,²² as well as by the fragments excavated in the church of St Hadrian of Zalavár-Mosaburg in Hungary, which are dated to the ninth century [Figs. 7–8].²³

¹⁹ S. BALCON-BERRY, 'Origines et évolution du vitrail: l'apport de l'archéologie', in *Vitrail: V–XXI^e siècle*, ed. by M. Hérold and V. David, Paris, 2014, pp. 19–30, esp. pp. 24–25; F. DELL'ACQUA, 'Early History of Stained Glass', in *Investigation in Medieval Stained Glass*, ed. by E.C. Pastan and B. Kurmann-Schwarz, Leiden, 2019, pp. 23–35, esp. p. 28. A fragment of a colourless, probably cylinder-blown vitreous disk, found at the basilica of San Vitale in Ravenna (now housed in Ravenna, Museo Nazionale), bears traces of an image of Christ standing with a cruciferous nimbus between the letter *Alpha* and *Omega*. Long considered to date from the Justinian age, it is now attributed to the late Carolingian period; see F. DELL'ACQUA 'Enhancing Luxury through Stained Glass' [as in note 7].

²⁰ É. LOUIS, 'Deux sites mérovingiens à vitraux du Nord de la France', in *Vitrail, verre et archéologie* [as in note 1], pp. 141–152.

²¹ Yellow or gold paint applied directly onto the stained glass, alongside the black or brown paint of the grisaille, made it possible to

enhance the overall chromatic effects. As Enrico Castelnuovo clearly explained in his history of medieval stained glass, before silver stain, 'to represent the light face and blond hair of a character it was necessary to change glass and insert a lead strip between the two fragments. With the use of the new finding the operation could be performed on the same fragment of glass without introducing an additional lead' simplifying the process and enriching the result. E. CASTELNUOVO, *Vetrare medievali* [as in note 6], p. 64.

²² F. VAGHI, M. VERITÀ, and S. ZECCHIN, 'Silver Stain on Medieval Window Glass Excavated in the Venetian Lagoon', *Journal of Glass Studies*, 46, 2004, pp. 105–108.

²³ B.M. SZÓKE, K.H. WEDEPOHL, and A. KRONZ, 'Silver-Stained Windows at Carolingian Zalavár, Mosaburg (Southwestern Hungary)', *Journal of Glass Studies*, 46, 2004, pp. 85–104; B.Z. SZAKÁCS, 'Silver-Stained Glass in Changing Light: The Carolingian Window-Fragments of Zalavár', *Hortus Artium Medievalium*, 26, 2020, pp. 163–171.



8. Fragments of stained glass decorated with silver stain from the church of St Hadrian in Zalavár. Budapest, Hungarian National Museum. Photo: A. Virdis

Silver stain was a technique used in Byzantium to decorate glasses, cups, and other vessels, it is attested in the Eastern Mediterranean in the early medieval period, but its use is not attested in window glass until later times, except for the examples mentioned above which, at the present state of research, stand isolated.

In such a picture, still full of grey areas, it is very difficult to determine when a particular technique was invented, since any new find can potentially shift its start date back.

The famous stained-glass window found in the excavations of the Carolingian abbey of San Vincenzo al Volturno in central-southern Italy, and discussed in more depth in the following paragraph, is also one of the earliest finds whose depiction can be identified with certainty, despite its fragmentary state. It is a portion of a stained-glass window depicting a bust of Christ, composed solely by unpainted glass. Christ's face itself, a face 'made of light', as Francesca Dell'Acqua has well pointed out, is made of a completely colourless and transparent glass (a very rare example) and bears no traces of painting. Other windowpanes from San Vincenzo al Volturno are much the same [Fig. 9].²⁴ However, when the fragment with the bust of Christ was made, in the first third of the ninth century, the technique of grisaille painting was already widely used in other areas of the Frankish Kingdom.

²⁴ F. DELL'ACQUA, 'The Christ from San Vincenzo al Volturno: Another Instance of "Christ's dazzling face"', in *The Single Stained-Glass Panel. XXIV International Colloquium of the Corpus Vitrearum* (Zurich, June 30th–July 4th, 2008), ed. by S. Trümpler, Bern, 2010, pp. 11–22.



9. Bust of Christ, fragmentary stained-glass window with original leads, from S. Vincenzo al Volturno. Venafro, Museo archeologico nazionale. Photo: A. Virdis

LEAD CAMES

The same can be said of another major crucial juncture in the history of stained glass, the introduction of lead comes. The origins of lead comes in stained glass remain to be fully clarified because the material data collected thus far only attest them from a relatively late stage of the Early Middle Ages, from the seventh centuries (with the majority of finds dating to an even later period corresponding to the eighth, and in particular, the ninth century). This does not necessarily imply that the introduction of leads to connect glass quarries is this late. Very often, in fact, lead comes were remelted and recycled; this is why lead is often not preserved along with the glass (which, in turn, was also heavily recycled and remelted, but to a lesser extent than lead, apparently).²⁵ A hitherto isolated find of a glass fragment connected to a lead coming from Tours is dubiously dated to the fifth century.²⁶ However, the find comes from

²⁵ Window glass was often remelted and recycled when a building was deliberately demolished to be expanded or modified, or in cases of destruction due to external causes (e.g., fires). This was a widespread practice, making the discovery of significant window glass elements – and even more so the lead comes associated with them – quite rare and largely fortuitous.

²⁶ J. MOTTEAU, 'Le verre à vitre dans la Vallée de la Loire moyenne dans le Haut Moyen Âge', in *De transparentes spéculations* [as in note 1], pp. 98–101; S. BALCON-BERRY and B. VELDE, 'Évolution et caractères techniques et esthétiques du verre plat et du vitrail de l'antiquité tardive à l'époque carolingienne', in *La mémoire des*



10. Elements of the treasure of Childeric (gold, *cloisonné*, garnets, agate). Paris, Musée de la Bibliothèque nationale de France. After: I. BARDIÈS-FRONTY, C. DENOËL, I. VILLELA-PETIT, *Les Temps Mérovingiens*, exh. cat., Paris 2016, p. 210

a stratigraphically problematic context and remains an isolated case. It can cautiously be concluded that the early introduction of lead came to stained-glass windows cannot be ruled out, at least in Tours or in the surrounding region of Gaul. However more evidence is needed to substantiate widespread use of lead in windows before the late seventh or early eighth centuries.

It seems to be only at a later time that the use of lead came became widespread, functioning not only as a connective element but also, and above all, as a figurative element, as demonstrated by the aforementioned stained-glass window with the bust of Christ from San Vincenzo al Volturno. Here, the details of the figure of Christ (the hair, the fingers, the beaded nimbus) and the capital letter *Alpha* (to which an *Omega* likely corresponded on the opposite side) were created thanks to the skillful working of lead, which took on a figure-creating function, probably to supplement the lack of painting on glass, which is not attested at that site, neither in this fragmentary stained-glass window, nor in other glass finds.

It can be partially concluded that the first attested figurative stained-glass windows featured closed forms, made up of coloured glass quarries framed by lead came that surrounded the glass and contributed to the figuration, creating images composed of a variety of fragments. In these early lead-and-glass images, the naturalistic effect was no longer privileged but rather the individual components were (the coloured glass panes and the dark net of the lead came). These shining images were created by the interaction between light and colour, and the geometric and abstract grid of the leads. The lead came were not supposed to disappear from the view, nor could they be perceived as mere functional elements which did not belong to the image itself. With their curvilinear profiles, the

pierres. Mélanges d'archéologie, d'art et d'histoire en l'honneur de Christian Sapin, ed. by S. Balcon-Berry, B. Boissavit-Camus and P. Chevalier, Turnhout, 2016, pp. 141–153.



11. Queen Arégonde's pair of brooches (gold, silver, garnets, and glass). Saint-Germaine-en-Lay, Musée d'Archéologie nationale. © Musée d'Archéologie nationale / photothèque (online resource)

lead came played a key role in defining the images, a role they shared with the glass fragments they simultaneously connected and separated.

CLOISONNÉ AND STAINED GLASS

Current research is demonstrating that the path from aniconic to figurative stained-glass windows in the Early Middle Ages can be closely compared to the path followed by *cloisonné* jewellery in the same centuries. This goldsmithing technique, widely used throughout the late antique and early medieval ages for brooches, fibulae, liturgical vessels, and other objects, is characterized by thin metal walls, soldered onto a metal plate, to create a regular grid of small compartmented cells, the *cloisons*, which are then filled with coloured materials: gems, inlays of red garnets or other (semi)-precious stones, cold-cut glass pastes and/or coloured glass, or vitreous enamels (especially in its later phase, from the seventh century onward). In some cases, the inlays, through their colours, do not merely fill the *cloisons* but also form simple designs (geometric figures, crosses). From the seventh century, the increased use of vitreous enamel as filling material for the *cloisons* introduced innovations in these precious objects.

Enamel, a powder of coloured glass, was poured into the *cloisons* and then melted; once melted, it could spread and easily fill up irregularly shaped cells with curvilinear contours. This process allowed the goldsmith to overcome the geometric layout of the early *cloisonné* objects (attested from the fifth to the seventh century) which usually featured gems, garnets and cut glass; consequently, figurative *cloisonné* jewels featuring anthropomorphic images or even small narrative scenes with several characters started to appear.

Although the enamelled jewellery technique has very ancient origins, it was not widely used in Roman or early



12. The Castellani Brooch, from Canosa di Puglia (gold, silver, enamel, pearls). London, The British Museum. © The British Museum (CC BY-NC-SA 4.0)

Christian art.²⁷ However, it found widespread application among Celtic and Germanic populations and was employed more frequently in Europe from the seventh and eighth centuries onward, particularly during the Carolingian period and in post-iconoclastic Byzantine art.²⁸

Examples of *cloisonné* jewels featuring a completely aniconic layout or simple symbolic shapes such as the cross, include such famous objects as those of the so-called Childeric Treasure (fifth century), the fragments of the Cross of St Eligius from the treasury of Saint-Denis (Paris, Musée de la Bibliothèque nationale de France) [Fig. 10], or the Merovingian brooches of Queen Arégonde (Saint-Germain-en-Laye, Musée d'Archéologie nationale), which feature crosses in a circular field in the centre, as though emerging from a background of the aniconic lattice of *cloisons* filled with red garnets [Fig. 11].

Examples of figurative *cloisonné* objects, characterized by glass enamels, are also numerous, but less ubiquitous than geometric *cloisonné*. They have been found in the territories of the Merovingian, Lombard, and Anglo-Saxon kingdoms from the seventh century. Examples include the so-called 'Alfred Jewel' (Oxford, Ashmolean Museum), an object with an enigmatic function (interpreted as the terminal of one of several sticks that Anglo-Saxon King Alfred the Great had sent to the bishops of



13. Medallion with bust of Christ ('The Cumberland Medallion'), from the Treasury of the Guelphs (*cloisonné* enamel and gold on copper). Cleveland, The Cleveland Museum of Art. Photo: The Cleveland Museum of Art (Public Domain)

his kingdom), dated to the ninth century;²⁹ the so-called 'Castellani Brooch' (London, British Museum), depicting a female face, coming from Canosa, in Apulia – once part of the *Langobardia minor* territories – and dated to a large timespan stretching from the seventh to the ninth century;³⁰ or the 'Cumberland Medallion' from Brunswick Cathedral, bearing a bust of Christ and dated to the late eighth century (Cleveland Museum of Art) [Figs. 12–13].³¹

Data related to *cloisonné* gold objects presented here is also the focus of a specific investigation axis of the research project (Axis 1: 'The Materials'). Within the project, we implemented a database containing information on early medieval *cloisonné* objects dating from the fifth to the eleventh centuries; the data had been collected from a survey conducted on about 400 pieces found in major museum collections in Europe and North America. Of the many objects decorated with this technique, we selected those with *cloisons* filled with glass or glass-related techniques (cold-cut glass, glass pastes, or enamels, often used in combination with garnets/precious and semiprecious stones). The present research aims to elucidate the reasons behind the varied geographical and chronological diffusion of this class of objects. A principal chronological distinction is emerging between the *cloisonné* jewels featuring garnets and cut glass, and those in which *cloisons*

²⁷ J. OGDEN, *Jewelry Technology in the Ancient and Medieval World*, Harpswell, ME, 2024.

²⁸ For a history of the art of enamelling in the early Middle Ages, see the seminal work by G. HASELOFF, *Email im frühen Mittelalter: frühchristliche Kunst von der Spätantike bis zu den Karolingern*, Marburg, 1990.

²⁹ D. HINTON, *The Alfred Jewel and Other Late Anglo-Saxon Decorated Metalwork*, Oxford, 2008.

³⁰ J. MITCHELL, 'La diffusione dello smalto "cloisonné"', in *Il futuro dei Longobardi. L'Italia e la costruzione dell'Europa di Carlo Magno*, exh. cat., ed. by C. Bertelli and G.P. Brogiolo, Milan, 2000, pp. 454–463.

³¹ G. HASELOFF, *Email im frühen Mittelalter* [as in note 28], p. 98.



14. Fragments of stained glass and original lead from the church of Notre-Dame-de-Bondeville. Troyes, Cité du vitrail. Photo: C. Stombellin

are filled with enamel. By comparing the maps of distribution of *cloisonné* objects with those showing the distribution of stained glass, a trend can be detected: objects decorated with cut glass, glass pastes, and garnets seem to have been produced predominantly in an earlier period (fifth to seventh centuries); their use began to decline from the seventh century onward, paving the way for enamelled *cloisonné* jewels.

One of the reasons behind this major change, may have been an interruption, after the seventh century, in the importation of large garnets from India and Sri Lanka to the Mediterranean region and the European continent. The large Indian garnets were partially replaced by smaller Bohemian garnets, although the latter met with less success on a continental scale, yet nonetheless spread to Scandinavia, the Carpathian region, and England.³²

In contrast, *cloisonné* enamelled jewels, whose origins are still debated, experienced greater success on a continental scale, starting from Merovingian France and Anglo-Saxon England, and then throughout the rest of Europe and the Mediterranean regions under Byzantine rule or cultural influence from the eighth century to the eleventh century.

³² T. CALLIGARO, P. PÉRIN, F. VALLÉE, and J.-P. POIROT, 'Contributions à l'étude de grenats mérovingiens (Basilique de Saint-Denis et autres collections du musée d'Archéologie nationale, diverses collections publiques et objets des fouillés récentes). Nouvelles analyses gemmologiques et géochimiques effectuées au Centre de Recherche et de Restauration des Musées de France', *Antiquités nationales*, 38, 2006–2007, pp. 111–144; T. CALLIGARO and P. PÉRIN, 'Le commerce des grenats à l'époque mérovingienne', *Archéopages. Archéologie et société*, hors-série no. 5, 2019, pp. 109–120, <<https://doi.org/10.4000/archeopages.9464>> [accessed 8 October 2025].

The rise of *cloisonné* enamelled objects featuring figurative images from the late seventh to early eighth century onward is paralleled by the appearance of the first examples of figurative – yet unpainted – stained-glass windows from the same time period. The finds from Notre-Dame-de-Bondeville (near Rouen) [fig. 14] offer an emblematic example. Even if the general aspects of these early figurative stained-glass window(s) cannot be reconstructed due to the limited number of the glass pieces unearthed, some fragments cut in shapes pertaining to human figures: legs, feet, and perhaps eyes, can be distinguished.

Two other very important examples confirm this trend toward figurative stained-glass windows: the reconstructed stained-glass windows from Jarrow, England, reassembled by modern archaeologists who connected the original early-medieval glass with newly-made lead came(s) [fig. 15],³³ and the aforementioned fragmentary stained-glass window from San Vincenzo al Volturno, dated to c. 830, in which the image of Christ is rendered with only glass and lead, not with painting.³⁴

It is difficult to determine the stages of this possible derivation, or of the mutual influence between the two techniques. At the present state of research, attention is focused on the possible interactions between glass working and metalworking ateliers within early medieval monasteries, which functioned as centres of mutual exchange of techniques and figurative motifs. In the monastic site of San Vincenzo al Volturno, for example, several workshops

³³ On Jarrow see the studies by Rosemary Cramp, R. CRAMP, 'Window Glass from the Monastic Site of Jarrow: Problems of Interpretation', *Journal of Glass Studies*, 17, 1975, pp. 88–96; eadem, 'Window glass from the British Isles' [as in note 12]; eadem, *Wearmouth and Jarrow monastic sites*, vol. 2, Swindon, 2006, pp. 56–161.

³⁴ F. DELL'ACQUA, 'The Christ from San Vincenzo al Volturno' [as in note 25].



15. Figure of a saint, stained glass reconstructed with glass fragments found in the church of St Paul in Jarrow and modern lead comes. Jarrow, Bede's World Museum. Photo: A. Viridis

and artifacts pertaining to glass, metal, goldsmithing, and enamel have been found.³⁵

Traces of glass workshops are often attested in the same churches and monasteries which yielded window glass; especially crucibles used for the secondary glass-production, are attested in at least fifty sites among those surveyed.³⁶

³⁵ J. MITCHELL et al., 'Le officine di San Vincenzo al Volturno. Fasi di produzione e dinamiche di un monastero di IX secolo', in *Medioevo: le officine*, Atti del convegno internazionale di studi, Parma, 22–27 September 2009, ed. by A.C. Quintavalle, Milan, 2000, pp. 105–117.

³⁶ *Au seuil du cloître: la présence des laïcs (hôtelleries, bâtiments d'accueil, activités artisanales et de services) entre le V^e et le XII^e siècle*, Actes des 3èmes journées d'études monastiques, Vézelay, 27–28 June 2013, *BUCEMA – Bulletin du centre d'études médiévales d'Auxerre*, hors-série no. 8, ed. by S. Bully and C. Sapin, 2015.

The trends observed in jewellery-making between the seventh and the ninth centuries raise the question of whether, and in what way, the creation of figurative *cloisonné* jewels – exploiting the combined potential of metal and enamel – may have served as a guiding-technique, later replicated on a larger scale in the production of stained-glass windows.³⁷

It could be argued that the change in scale between *cloisonné* objects and stained-glass windows presents an obstacle to this hypothesis. However, the small size of medieval stained-glass windows should be taken into consideration; the bust of Christ at San Vincenzo al Volturno is only about 19 cm high, a size similar to that of the stained-glass windows reconstructed in Jarrow. Research is therefore also focused on the shape and size of windows in churches and other early medieval buildings, with the aim of correlating the material evidence with data derived from contemporary pictorial representations and descriptions in written sources.

CONCLUSION

What has been reported in this article is only a part of a project hinged around three research axes: the first, around which the discussion in this article revolves, is devoted to the examination of material evidence (window glass, *cloisonné* objects). The second, only briefly mentioned in these pages, focuses on glass making (and enamel-making), and the architectural contexts (shapes and sizes of windows and window-screens, relationship with the monumental contexts, characteristics of glass working and metalworking sites, examination of archaeometrical data). The third research axis focuses on the diffusion of the so-called 'jewelled aesthetics' between Late Antiquity and the Early Middle Ages, with particular attention being given to instances of fragmentation as an aesthetic guiding principle.³⁸ We aim to investigate instances of this aesthetic in late Latin literature (particularly poetry) and

³⁷ On the goldsmithery as guiding-technique see E. CASTELNUOVO, *Vetrate medievali* [as in note 6], p. 9; M. COLLARETA, *Le radici dell'arte medievale*, Turin, 2024, pp. 47–51. The proximity between the outcomes of goldsmithing with garnets and gemstones and early medieval stained-glass windows has been reported as early as the late nineteenth century by H. OIDTMANN, *Die Glasmalerei*, vol. 2, Cologne, 1898, p. 64; more recently see also B. COE, *Stained Glass in England: 1150–1550*, London, 1981, p. 1; R. CRAMP, 'Window Glass from the British Isles' [as in note 12], p. 77; F. DELL'ACQUA, *Illuminando colorat* [as in note 1], passim; C. KESSLER, S. WOLF, and S. TRÜMPLE, 'Die frühesten Zeugen ornamentaler Glasmalerei aus der Schweiz. Die frühmittelalterlichen Fensterglasfunde von Sion, Sous-le-Scex', *Zeitschrift für Schweizerische Archäologie und Kunstgeschichte*, 62, 2005, pp. 1–30, esp. p. 11.

³⁸ M. ROBERTS, *The Jeweled Style: Poetry and Poetics in Late Antiquity*, Ithaca and London, 1989; J. HERNÁNDEZ LOBATO, *Vel Apolline muto. Estética y poética de la Antigüedad tardía*, Bern, 2012;

visual arts, with a special focus on the Gallo-Merovingian and Anglo-Saxon geo-cultural spheres. These regions are of crucial importance to the current research, given their significant role in the development of stained-glass art and jewellery-making.³⁹

This interdisciplinary investigation, involving literature and the visual arts, aims to verify whether they responded to the same aesthetic principles, based on non-classical models typical of Late Antiquity, and whether these aesthetic principles might have contributed to the rise and rapid success of new genres and literary forms, characterized by a fragmented figurativity, and an extensive use of vivid, saturated colours, which are among the typical features of medieval aesthetics.⁴⁰

SUMMARY

Alberto Viridis

AT THE ORIGINS OF THE ART OF STAINED GLASS IN WESTERN EUROPE (FIFTH TO NINTH CENTURIES)

The article examines the origins of the art of stained glass in Western Europe between the fifth and ninth centuries, preceding the earliest surviving stained-glass windows from the 1120s to 1130s. It presents partial results from a research project which aims to trace the development of stained glass during this period by exploring its dissemination, potential connections with jewellery-making (particularly *cloisonné* with garnets, glass, and enamels), and its relationship with late antique *opus sectile* in glass and marble. Despite the absence of intact stained-glass windows before the twelfth century, numerous archaeological finds of flat glass window fragments, mostly dating from the sixth to the ninth centuries, attest to the widespread presence of stained-glass windows in early-medieval Western Europe. Two main regions of diffusion have been identified: Merovingian and Carolingian Gaul, and Anglo-Saxon England.

The research project (2023–2025) analyses both archaeological and written sources to investigate the origins of stained glass, considering its techniques, connections with related arts, and its relationship with architecture. The goal is to outline the early history of stained glass, from the first glazing traditions to the fully developed medieval stained-glass windows.

Adopting an art-historical perspective, the study seeks to elucidate the aesthetic motivations behind the emergence of stained glass, which appears to have originated in Christian basilicas of Gaul in the second half of the fifth century. In addition, the project explores the role of the ‘aesthetics of fragmentation’ across various artistic media and late Latin literature.

A survey of published archaeological finds of window glass from the fifth to the ninth century has catalogued approximately 150 contexts of finds from about 120 sites. This data has been compiled into a continuously updated database, supplemented by the development of maps for enhanced visualization. The survey aims to document provenance, chronology, cultural context, current location, technical characteristics, glass morphology, presence of painting, archaeometric composition, glass-making techniques, evidence of workshops, traces of frames, photographic documentation, and bibliographic references.

Early medieval stained glass marks a departure from the Roman classical and late antique tradition, partly due to the technical and material shift following the end of soda-lime glass production and the emergence of potash glass. Roman stained glass was predominantly colourless, in contrast to the rich polychromy of medieval stained glass. Early Christian basilicas often employed window screens made of stucco or stone transennae, filled with green natural glass or *lapis specularis*. While some late

The Poetics of late Latin Literature, ed. by J. HERNÁNDEZ LOBATO and J. ELSNER, New York, 2017.

³⁹ This topic was at the center of a colloquium entitled ‘The Jeweled Materiality of Late Antique/Early Medieval Objects and Texts: From Cloisonné to Stained Glass to Experimental Poetry (4th–9th Centuries)’ organized in November 2024 at Masaryk University in Brno by the author and Marie Okáčová. The proceedings will soon be published in an edited volume.

⁴⁰ U. Eco, *Arte e Bellezza nell’Estetica medievale*, Milano, 1987.

Roman texts have been interpreted as references to early stained glass, they more likely describe coloured glass used in other forms, such as *sectilia* inlays, rather than true stained-glass windows.

Unlike the marble-and-glass late antique *opus sectile* wall panels, the earliest known stained-glass windows of the early medieval period were not typically figurative but rather 'mosaic windows', featuring geometrically shaped coloured flat glass quarries set into geometric frameworks. Painting on glass, specifically grisaille, appeared around the eighth century and became widespread in the Carolingian period.

Current research also examines the development of stained glass in relation to *cloisonné* jewellery. Early *cloisonné* (fifth through seventh centuries) utilized gems, garnets, and cold-cut glass, often arranged in aniconic or simple symbolic patterns. From the seventh century onward, the increasing use of vitreous enamel enabled the creation of figurative *cloisonné* jewels. A similar progression from aniconic to figurative forms can be observed in stained glass. The unpainted figurative stained-glass windows from Notre-Dame-de-Bondeville, Jarrow, and San Vincenzo al Volturno, dating from the late seventh/eighth to the ninth century, illustrate this transition. The research further explores the interaction between glass-working and metalworking ateliers in monastic contexts as centres of technical and artistic exchange.