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Production Practices In Medieval Stained Glass Workshops: Some Evidence In The Glencairn Museum

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PRODUCTION PRACTICES IN MEDIEVAL STAINED GLASS WORKSHOPS: SOME EVIDENCE IN THE GLENCAIRN MUSEUM

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TEN YEARS AGO, within an article that sought to distinguish among the painting styles and techniques of three master painters who collaborated on the revolutionary glazing of the Abbey Church of Saint-Denis during the 1140s,[1] I speculated historiographically and critically concerning the development, acceptance, and use of a widely shared construct of the 12th- and 13th-century stained glass workshop. I proposed that most, if not all, of our assessments and conclusions concerning the working methods and organization of those who produced medieval windows were based on some highly problematic, but difficult to discard, assumptions.

My experience with the windows of Saint-Denis inspired me to call for a re-evaluation, based on alternative criteria, of the notion of the medieval stained glass workshop. The assumptions that concerned—and continue to concern—me fall principally into two groups. The first centers around the relationship between style and production. The second involves hierarchical assessments of the organization of labor.

Style is the glue that holds our concept of the medieval stained glass workshop together. The arguments that support our interpretive conclusions about production practices are largely stylistic. Formal analysis provided the initial criteria that allowed me to separate the 12th-century glass painters of Saint-Denis. Under pressure, however, I have found that stylistic glue does not hold art-historical conclusions very firmly.

Style is a slippery concept. It relies heavily on modern or post-modern visual analytical structures. It can reveal too many different things. For example, when and at what level do stylistic similarities indicate the dissemination of influence among artists, models, and workshops, and at

Acknowledgments. The material presented here was first delivered at the Sixteenth International Colloquium of the Corpus Vitrearum, held in Bern in 1991, as part of a several-day discussion of stained glass workshop practices. (For a summary, see Madeline H. Caviness, "Tagungen: Corpus Vitrearum —Tagung für Glasmalereiforschung 16. Internationales Kolloquium," *Kunstchronik*, v. 45, no. 7, July 1992, pp. 288–296.) I benefited greatly from discussions with colleagues during this colloquium, as well as from their comments on my talk. For wise counsel and warm assistance in subsequent work on this topic, I am especially grateful to Madeline Caviness, Roy Newton, and Lisa Pilosi. But without the gracious collaboration of the staff of the Glencairn Museum, which has for two decades made its rich collection of stained glass available for me to study, these observations of data and their interpretation would not have been possible.

1. Michael W. Cothren, "Suger's Stained Glass Masters and Their Workshop at Saint-Denis," in *Paris: Center of Artistic Enlightenment*, Papers in Art History from the Pennsylvania State University, v. 4, 1988, pp. 46–75. Many of the ideas I explored in this article were confirmed and developed in Claudine Lautier, "Les Peintres-verriers des bas-côtés de la nef de Chartres au début du XIII^{e} siècle," *Bulletin Monumental*, v. 148, 1990, pp. 7–45; and Alain Matthey de l'Étang, "Les Peintres d'ornement de la vitrerie de l'abbé Suger," *Vitrea: Revue du Centre International du Vitrail*, vv. 5/6, 1990, pp. 14–22.

FIG. 1. *Kings from the Jesse Tree windows of Beauvais Cathedral* (left) *and Agnières* (right). *(Photos: Paris, Archive Photographique des Monuments Historiques)*

what point do they identify the character of a particular artist or workshop? Do artists who produce related windows in separate churches—such as those who painted the Jesse Tree kings at Agnières and Beauvais (illustrated here as Figure 1)—share artistic formation, iconographic source books, compositional model books, cartoons, or a communal working situation?[2] In cases such as these, how can we separate influence from identity of authorship when evaluating stylistic relationships?

Our assumptions concerning the hierarchical organization of labor—the work aspect of the shops—seem to be grounded principally in modern common sense, in qualitative assessments, or in generalizing backwards from better-documented late medieval or Renaissance workshop/guild practices. For instance, we initially assume that there was a hierarchy of skilled labor—masters and apprentices and assistants of various sorts—in early medieval shops. Then we assign to the masters those portions of a glazing, window, or panel that we judge to be highest in quality or narrative significance, such as the prominent parts of figural compositions. Areas we consider marginal or substandard in execution, such as minor figures or ornamental borders and backgrounds, we consign to the work of assistants or apprentices. But at Saint-Denis, a stylistic and technical analysis demonstrates that the same

2. I have dealt with the questions raised by the relationship between these windows more thoroughly in Michael W. Cothren, "The Choir Windows of Agnières (Somme) and a Regional Style of Gothic Glass Painting," *Journal of Glass Studies*, v. 28, 1986, pp. 40–65.

artists were involved in the painting of ornament and figural compositions.[3]

Hierarchical assessments can even transcend the interpretation of individual monuments to affect the way we discuss related windows in separate buildings. Works made for rich and powerful churches are usually assigned to masters; those produced for more modest situations are believed to rely more heavily on the work of assistants or at least followers. Was the Jesse Tree king from the illustrious glazing program of the grandiose Cathedral of Beauvais (Fig. 1, left) painted by the master of a regional workshop, and the close counterpart from a nearby parish church (Fig. 1, right) created by a lesser artist, perhaps an apprentice, working in the same atelier from the same model or cartoon?[4] Hierarchical assumptions about labor, subject, and quality are involved in such formulations, but in most cases the yardsticks employed have to be modern rather than medieval, given limited textual information concerning the production and reception of medieval art.

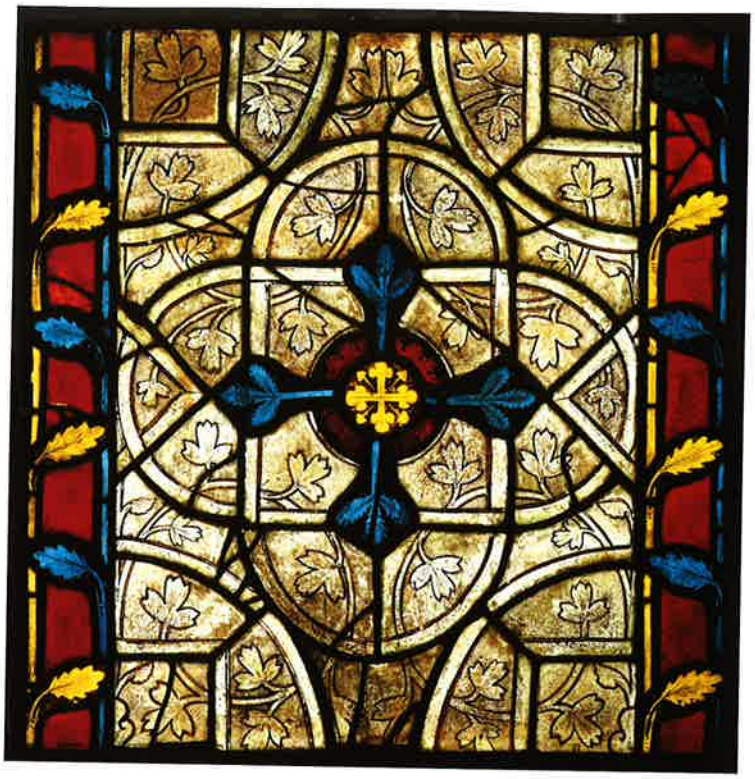
As the examples cited thus far from Saint-Denis and the Beauvaisis imply, the more I have studied medieval stained glass, the more uneasy I have become about our generalized concept of the 12th- and 13th-century workshop. The physical and technical character of the surviving works of art—our primary, and to a certain extent our only, source material[5]—is frequently ambiguous or frankly at odds with widely held stylistic and hierarchical assumptions. I believe we need to rethink these assumptions by paying renewed critical attention to the panels of stained glass themselves, with special attention to physical and technical evidence. For a while, at least, we could profit from turning our conventional reasoning and working procedures around by using the windows to re-evaluate received notions concerning early stained glass workshops rather than using our construct of the workshop as a basis for interpreting what we see in the surviving glass. And in this process, studying patterns of production could be more revealing than studying patterns of style. Workshops are, after all, about production, and—as I have already mentioned—style can be about something else, such as influence, individual artistic personality, broadly shared regional traditions, or dependence on icon-

3. This is hinted at in Cothren [note 1], p. 50, and developed but left unresolved in Matthey de l'Étang [note 1], pp. 18–21. Subsequent examination of the panels themselves has convinced me of the validity of this statement. The hand of my "Jeremiah Master" can be identified with certain pieces of ornament in the border of the Moses window (Cothren [note 1], lower pictures of figs. 2-21 and 2-22), and the painting technique of his collaborator, the "Simeon Master," characterizes other pieces in the same panels (*ibid.*, upper pictures in figs. 2-21 and 2-22).

4. In Cothren [note 2], especially pp. 60–61, I argued, on the basis of technical as well as stylistic evidence, for two separate workshops.

5. There is textual as well as artifactual knowledge of the early medieval art of stained glass in the thorough, if tendentiously voiced, 12th-century treatise *De diversis artibus*, written by a German monk who calls himself Theophilus Presbyter. For this text, see Theophilus, *On Diverse Arts*, ed. and trans. John G. Hawthorne and Cyril Stanley Smith, Chicago: University of Chicago Press, 1963, reprinted New York: Dover, 1979; and Theophilus, *De diversis artibus. The Various Arts*, ed. and trans. C. R. Dodwell, London: Thomas Nelson & Sons, 1961. For its dating and interpretation, see Lynn White Jr., "Theophilus Redivivus," *Technology and Culture*, v. 5, 1964, pp. 224–233; and John Van Engen, "Theophilus Presbyter and Rupert of Deutz: The Manual Arts and Benedictine Theology in the Early Twelfth Century," *Viator*, v. 11, 1980, pp. 147–163.

Although Theophilus tells us how an individual would make a stained glass window—as well as metalwork, panel painting, and manuscript illustration—he says virtually nothing concerning workshop organization or division of labor. Acknowledging the corporate nature of this enterprise might have undermined his "political" agenda. He never implies a hierarchical distribution of tasks in this labor-intensive art, except for a single reference (ed. Dodwell, p. 41) to a boy who will carry a newly blown bladder of glass to the annealing furnace. For a survey of other textual evidence (much of it late) concerning medieval stained glass workshop production, see Meredith Parsons Lillich, "Gothic Glaziers: Monks, Jews, Taxpayers, Bretons, Women," *Journal of Glass Studies*, v. 27, 1985, pp. 72–92; Sarah Brown and David O'Connor, *Medieval Craftsmen: Glass-Painters*, Toronto: University of Toronto Press, 1991 (who agree that "today we too approach the medieval glass-painter with all kinds of preconceptions," p. 15); and Richard Marks, *Stained Glass in England during the Middle Ages*, London: Routledge, 1993, pp. 40–51.



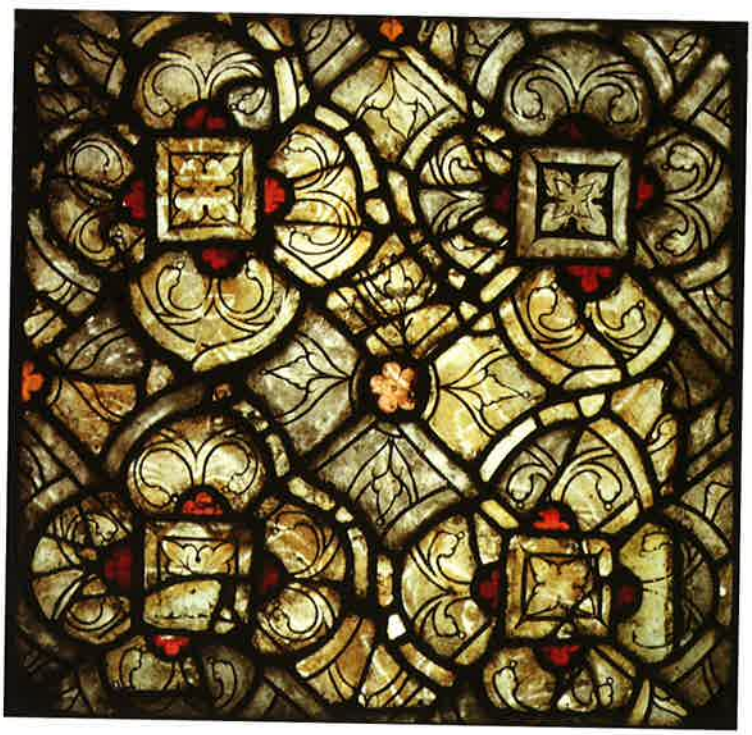


FIG. 2 (opposite, top). *Panel of grisaille from the axial chapel of Sées Cathedral, now in the Glencairn Museum (03.SG.78). (Photo: L. Cook)*

FIG. 3 (opposite, bottom). *Panel of grisaille from a clerestory window of the church of Saint-Urbain in Troyes, now in the Glencairn Museum (03.SG.56D). (Photo: L. Cook)*

FIG. 4 (right). *Panel of grisaille from a choir window of Saint-Martin-aux-Bois, now in the Glencairn Museum (03.SG.124). (Photo: L. Cook)*

ographic models. In this short article, I will offer two examples of the sort of technical and physical evidence of patterns of production that could be useful in rethinking our understanding of the structure and practices of early medieval stained glass workshops.

Ghost Images in Glencairn Grisailles

The first artifactual information about workshop practices appears in unexpected locations: on the exterior surfaces of 13 panels of French grisaille. These panels, which date from the 1250s to the 1270s, are now housed in the Glencairn Museum in Bryn Athyn, Pennsylvania. Two of the panels (Fig. 2), identical in design, are from the axial chapel windows of the Norman Cathedral of Sées;[6] nine panels are from a window in the choir clerestory of Saint-Urbain in Troyes (Fig. 3);[7] and there is one panel each from Saint-Martin-aux-Bois (Fig. 4)[8] and the Commanderie of Sainte-Vaubourg.[9] On each panel, an enigmatic set of ornamental patterns appears in the weathered corrosion on the exterior surface. Since they have only accumulated over time, the corrosive deposits creating the designs would have been invisible when the panels of grisaille were initially installed. What is most interesting, however, is that the patterns bear a compelling relationship to the painted articulation of the interior surface of each piece of glass on which they appear (Fig. 5).

When I first noticed the exterior corrosive designs on these panels, I thought I had found what Roy Newton has called "back-matching corrosion," a phenomenon he has ascribed to accelerated decay caused by the collection of water in the shading wash that was originally painted on the exterior surface of some pieces of glass to enhance the designs of interior painting.[10] In other words, these are corrosive replicas of back painting, which has itself disappeared in weathering. With the Glencairn grisailles, however, there is rarely a near or exact correspondence between exterior shadow and interior painting. For example, the ornamental design created by corrosion on the exterior of the central boss of one of the panels from Sées (Fig. 6, right) is rotated 45 degrees in relation to that same design painted on the interior of the same piece of glass (Fig. 6, left). The motif is the same, but the alignment does not match. It would be difficult to explain this juxtaposition as the result of reinforcing back painting.

Moreover, even in pieces where alignment is maintained, the interior and exterior patterns do not quite match, as can be seen in details from the Saint-Martin-aux-Bois panel (Fig. 7). In this panel, the transparency of the colorless glass is maintained (presumably as a result of its relative strength), and when viewed from the exte-

6. Acc. nos. 03.SG.48 and 03.SG.78. See Michael W. Cothren in Madeline H. Caviness and others, *Stained Glass before 1700 in American Collections: Mid-Atlantic and Southeastern Seaboard States*, Corpus Vitrearum Checklist II, Studies in the History of Art, v. 23, Washington: National Gallery of Art, 1987, p. 135, which cites earlier bibliography. For the glazing of Sées, see, most recently, Meredith Parsons Lillich, *Armor of Light: Stained Glass in Western France, 1250–1325*, Berkeley: University of California Press, 1994, pp. 168–220, especially pp. 202–205 for the chapel that once held these panels, and pp. 198–201 for grisailles.

7. Acc. nos. 03.SG.56 A–H and J. See Cothren in Caviness and others [note 6], p. 134, which cites earlier bibliography. For the glazing of Saint-Urbain, see, most recently, Jane Hayward, "The Church of Saint-Urbain at Troyes and Its Glazing Program," ed. Meredith Parsons Lillich, *Gesta*, v. 37, no. 2, 1998, pp. 165–177.

8. Acc. no. 03.SG.124. See Cothren in Caviness and others [note 6], p. 129, which cites earlier bibliography.

9. Acc. no. 03.SG.160. See *ibid.*, p. 128, which cites earlier bibliography. Since this panel is less well preserved than the other 12, and since the evidence is more difficult to read in photographs, the analysis in this study will address it only indirectly, in passing.

10. Roy G. Newton, "The Effects of Medieval Glass Paint," *Stained Glass*, v. 71, Winter 1976/1977, pp. 228–229; *idem*, "Unusual Effects of the Weathering of Ancient Glass," in *Crown in Glory: A Celebration of Craftsmanship—Studies in Stained Glass*, ed. Peter Moore, Norwich: Jarrold & Sons Ltd., 1982, pp. 74–75; *idem*, "W. E. S. Turner—Recollections and Developments," *Glass Technology*, v. 26, no. 2, April 1985, pp. 96–97; *idem* and Sandra Davison, *Conservation of Glass*, London: Butterworths, 1989, p. 145.

FIG. 5. *Details of Fig. 2:* (left) *interior view with transmitted light, highlighting painted articulation;* (right) *exterior view with surface light, highlighting corrosive deposits. (Photos: author)*

rior, the interior paint is visible through the glass, offset when juxtaposed with the corrosive pattern. Discrepancies are even more dramatic in the case of the panels from Saint-Urbain (Fig. 8). Although the assembled patterns of several pieces can be made out on the reverse, they overlap from piece to piece in a blatantly misaligned relationship with the painted articulation on the other side of the panel.

Given such discrepancies between interior paint and exterior corrosive patterns in the panels of the Glencairn grisaille group, it is unlikely that they are instances of "back-matching corrosion." They seem instead to be examples of what Roy Newton has called "ghost images," corrosive imprints that result from vaporized deposits transferred from one piece of glass to another when they were fired in the kiln.[11] If so, this corrosion could transmit a clue concerning the working procedures, specifically the firing habits, of some stained glass workshops during the second half of the 13th century. According to Newton, "ghost images" can occur when two pieces of glass have been stacked in the kiln—"presumably without any powdered chalk between them

11. Newton, "The Effects of Medieval Glass Paint" [note 10], pp. 227–228, figs. 2–3; *idem*, "Unusual Effects of the Weathering" [note 10], p. 75; *idem* and Davison [note 10], p. 145.

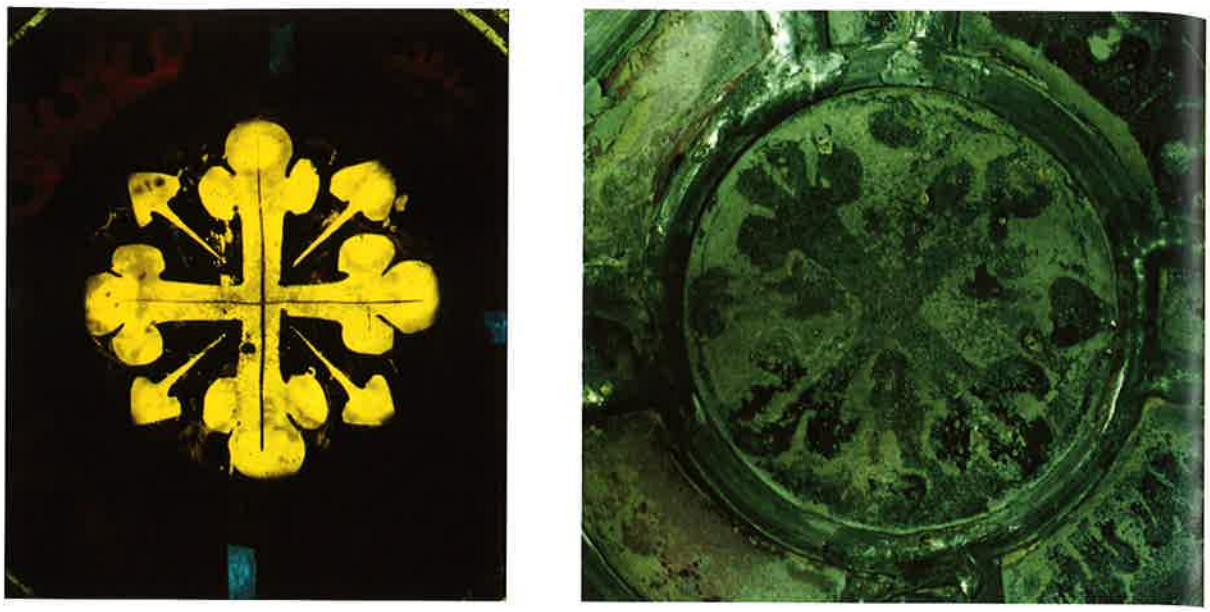


FIG. 6. *Details of Fig. 2:* (left) *interior view with transmitted light, highlighting painted articulation;* (right) *exterior view with surface light, highlighting corrosive deposits. (Photos: author)*

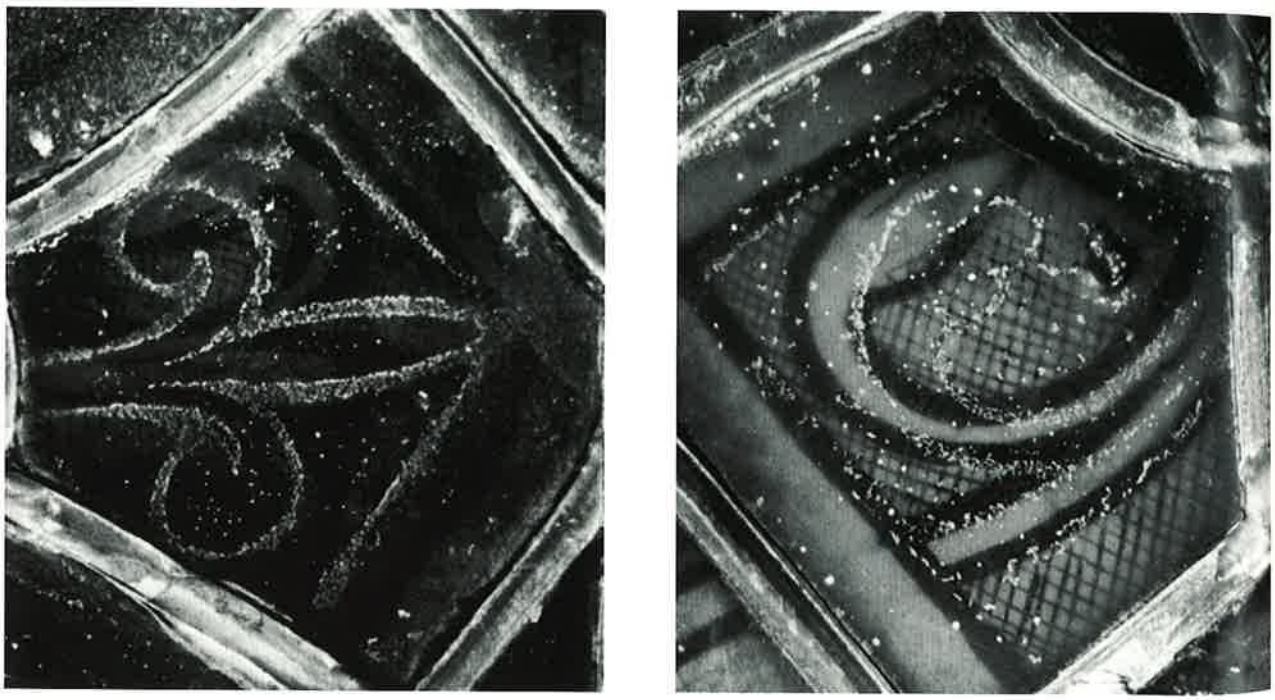


FIG. 7. *Details of Fig. 4: exterior views with surface light, highlighting corrosive deposits; interior painting is visible through the transparency of the glass. (Photos: author)*

to prevent any sagging of the glass during the firing"[12]—in such a way that the painted surface of one piece faced the unpainted reverse of the other. During firing, the alkali potash from the paint could vaporize and condense on the facing, blank exterior surface. The condensed potash would not have been visible initially, but since it weakened the glass surface where it settled, its presence encouraged corrosion. Thus the "ghost image" would have emerged only gradually, as the exterior surface deteriorated.

It is noteworthy that, in the case of the panels from Saint-Martin-aux-Bois and Sées (Figs. 5–7), exterior designs are created entirely of corrosive deposits, while the area surrounding them is relatively clean, in a disposition comparable to that noticed in the 12th-century glass from York Minster studied by Newton[13] and used as the basis of his analysis of the phenomenon. With the panels from Saint-Urbain (Fig. 8), however, this situation is reversed. The design is produced by selective protection rather than enhanced vulnerability; that is, here the "ghost image" is uncorroded while the area surrounding it is significantly degraded.[14] Presumably the vaporized material rendered by the paint of one piece and deposited on the exterior surface of

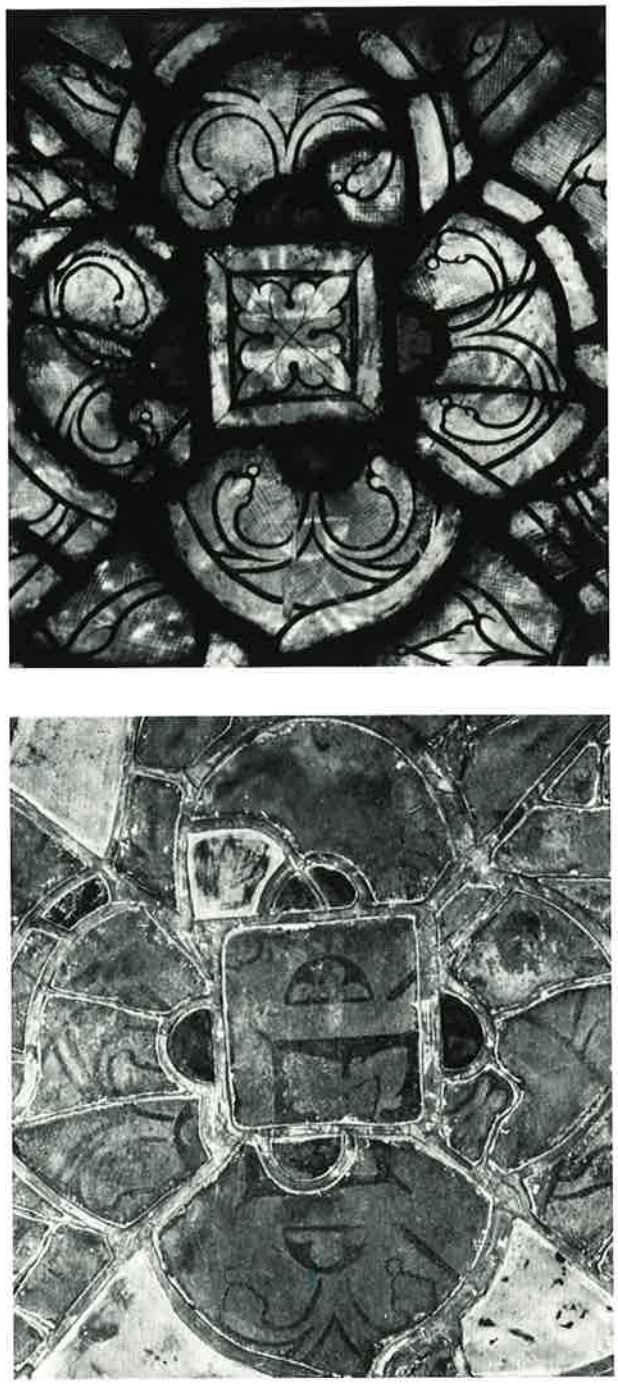


FIG. 8. *Details of Fig. 3:* (top) *interior view with transmitted light, highlighting painted articulation;* (bottom) *exterior view with surface light, highlighting corrosive deposits. (Photos: author)*

12. Newton, "Unusual Effects of the Weathering" [note 10], p. 75.

13. Illustrated in Newton, "The Effects of Medieval Glass Paint" [note 10], figs. 2–3; and *idem*, "Unusual Effects of the Weathering" [note 10], p. 76, pl. 56.

14. I have recently discovered similar "ghost images" created by selective protection on the exterior surface of two roughly contemporary panels of French grisaille now in the collection of Claude Violette in Montreal (panels numbered 1 and 2). One of them (which appears in Maija Bismanis and others, *Canada Collects the Middle Ages/Le Moyen Âge au travers des collections canadiennes*, exhibition catalog, Norman Mackenzie Art Gallery, University of Regina, 1986, pp. 102 and 162) has a central, circular boss that shows the same design replication and rotation noted here on the Glencairn panel from Sées (Fig. 6). I am grateful to Roland Sanfaçon, Ariane Isler-de Jongh, and James Buckslag, who made it possible for me to examine with them the stained glass in the Violette collection in November 1993.

another protected the areas it affected, making them less rather than more susceptible to corrosion. Gottfried Frenzel has noted this kind of prophylactic "ghost image" in a Coronation of the Virgin from Freiburg.[15]

In the examples cited by Newton and Frenzel, however, the "ghost images" are freak occurrences. They are neither regularly nor generally distributed. There is no logical relationship between the exterior "ghost image" and the interior articulation of the piece on which it appears.[16] With the Glencairn grisailles, on the other hand, the "ghost images" are quite closely related to the interior articulation of individual pieces of glass, and such pieces are distributed regularly over broad areas of the panels. In the case of the panels from Sées, Saint-Martin-aux-Bois, and Sainte-Vaubourg, the "ghost image" in every case is imprinted from a piece of glass that took the same design location in another panel of grisaille from the same series (Figs. 5–7). This suggests that the individual pieces of glass that were eventually to be leaded together to form a panel were fired in neatly arranged stacks, already assembled. Such a procedure would allow for the slight offsetting of paint and "ghost" in the case of leaf patterns (Figs. 5 and 7) and for the rotation evident when comparing interior and exterior surfaces of the central boss from Sées (Fig. 6). Although those who loaded the kiln at Saint-Urbain were perhaps not as compulsive, the panels there also seem to have been fired in assembled layers. The imprints legible in the exterior weathering (Fig. 8) show patterns created by deposits from a group of individual pieces of glass that had been arranged in design order, even if they had not been stacked on top of each other as neatly as those fired at the other three sites.

Therefore, the corrosive designs on the backs of the Glencairn grisaille group seem to document a working procedure that extended over several sites at about the same time. From the 1250s to the 1270s, some workshops, when loading the kiln, stacked in assembled order the individual pieces of glass for grisaille panels composed of repeated modular shapes and designs. Theophilus does not describe such a working procedure; nothing he says implies layering. Artists are simply instructed to arrange the painted glass carefully on a bed of quicklime or ash to shield it from the intense heat of the iron tray used to load the kiln.[17] Newton cites an absence of comparable powdered insulation between layers of glass as an explanation for the proximity necessary for the exchange of vaporized paint during firing. Presumably such close quarters would also have allowed the maximum number of pieces within the kiln for a single firing, perhaps to optimize the saving of time, fuel, and effort, which would also have reduced cost. But the "ghost images" may reveal another streamlining measure in the layering of glass in addition to a reduction in the number of firings necessary for the production of a window. When pieces were stacked in assembled order—as they seem to have been in the case of the Glencairn grisailles—those responsible for unloading the kiln would not have needed to spend time sort-

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15. Gottfried Frenzel, "The Restoration of Medieval Stained Glass," *Scientific American*, May 1985, p. 129.

16. This is also true of "ghost images" that were discovered by members of the Austrian Corpus Vitrearum in the late 13th-century windows of Heiligenkreuz, where ornamental patterns created by the interplay of corrosion and vaporized imprints are visible on the interior surface of the glass, presumably indicating that pieces were fired with painted sides facing each other, rather than with painted interior surfaces facing unpainted exterior surfaces, as in the case of the grisailles at Glencairn. I am grateful to Dr. Elisabeth Oberhaidacher for providing me with photographs of three examples of the "ghost images" at Heiligenkreuz.

17. Theophilus, ed. Dodwell [note 5], pp. 52–53. According to Pierre Lebrun, by 1635, both stacking pieces of glass and separating those stacks with beds of powder were standard practices in the production of stained glass: Mary Philadelphia Merrifield, *Original Treatises, Dating from the XIIth to XVIIIth Centuries on the Arts of Painting, in Oil, Miniature, Mosaic, and on Glass; of Gilding, Dyeing, and the Preparation of Colors and Artificial Gems*, London: J. Murray, 1849, v. 2, p. 794.

ing and assembling fired pieces into panels, but would have simply maintained the order already established by those who had loaded the kiln. In other words, once unloaded, the pieces would automatically have been ready for leading.

Clearly it would be imprudent to interpret too broadly from so few examples and conclude that these observations have uncovered a standard workshop practice in this area at this time. In fact, a hasty generalization would vitiate the potential richness of this physical evidence. Three grisaille windows from Sées are represented by four panels now in the Glencairn Museum,[18] but vaporized "ghost images" transferred from neighboring stacked glass appear on only two panels, both of them originating from one of these windows. Interestingly enough, on the basis of clear stylistic distinctions among the Glencairn panels, those without "ghost images" have already been assigned to a separate workshop.[19] Perhaps there were two workshops active at the cathedral in the 1270s, each with distinctive working procedures, especially as far as loading the kiln was concerned. Or perhaps they used distinctive formulas or suppliers for paint and glass that had an effect on whether vaporization of paint occurred or imprints adhered. In either case, the physical singularity represented by the exterior ghost images on the panels produced by one of the ateliers provides confirming evidence for stylistic sorting at Sées, even if, in formulating the relationship in this way, the cart may be attached in front of the horse.

Sorting Marks on Glencairn Bishops

There is, however, additional evidence for generalizing somewhat more broadly about a desire on the part of some glass painters, beginning in the 13th century and extending into the 14th century, to streamline the sorting and/or assembling of individual pieces of ornamental patterns that would recur throughout a series of windows or panels. Such a concern seems to have generated a solution—in painting rather than firing practices. This is evident in the architectural canopies framing the standing clerestory figures from the band windows of the Norman abbey church of Evron, which date from the second decade of the 14th century.[20]

Again, the evidence discussed here is drawn primarily from panels now in the Glencairn Museum, which houses three standing bishops from Evron (Figs. 9 and 10).[21] Visible in the canopies sheltering these figures are a series of marks that at first glance might seem to be part of the articulation system; however, they are specific to the baldachin of an individual figure. On the pieces of glass comprising the canopy and flanking towers of Saint Julian, for example, a motif resembling the letter *Y* has been painted (Fig. 11). On most elements in the baldachin of Saint Thuribius, an *S* appears (Fig. 12), and in the architectural forms of the third Glencairn bishop (Fig. 13), two parallel lines are used. On pieces of glass comprising the canopy of a fourth panel from Evron, now in the Philadelphia Museum of Art (Fig. 14),[22] a *T* has been painted.

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18. In addition to the two panels already discussed, two other patterns are represented by one panel each: acc. nos. 03.SG.53 and 03.SG.54. See Cothren in Caviness and others [note 6], p. 135.

19. Lillich [note 6], pp. 198–200.

20. For the glazing of Evron, see, most recently, *ibid.*, pp. 251–296.

21. Acc. nos. 03.SG.28–30. See Cothren in Caviness and others [note 6], pp. 138–139, which cites earlier bibliography; and Meredith Parsons Lillich, "Bishops from Évron: Three Saints in the Pitcairn Collection and a Fourth in the Philadelphia Museum," in *Selected Papers from the XIth International Colloquium of the Corpus Vitrearum, New York, 1–6 June 1982*, ed. Madeline H. Caviness and Timothy Husband, Corpus Vitrearum, United States, Occasional Papers, v. 1, New York: The Metropolitan Museum of Art, 1985, pp. 93–106.

22. Acc. no. 19-69. See Madeline H. Caviness in Caviness and others [note 6], p. 149, which cites earlier bibliography; and Lillich [note 21]. I am deeply grateful to Renée Burnam, who facilitated my access to the panel in the Philadelphia Museum of Art, who examined it with me, and who shared the results of her detailed study of the panel, including a chart of restorations.

FIG. 9. *Three standing bishops*—(left) *Saint Julian,* (center) *Saint Thuribius, and* (right) *Saint Martin[?]—from the choir of the abbey church of Evron, now in the Glencairn Museum (03.SG.28–30). (Photos: The Metropolitan Museum of Art)*

Marks like this, of course, need not be interpreted as sorting or assembly marks, as implied in my introductory assessment. They could be makers' marks, signifying authorship through artistic signatures or ensuring proper payment for personal labor. Madeline Caviness and Suzanne Newman offered such an explanation for comparable marks on the backs of pieces of glass in the border of a grisaille panel from Saint-Urbain in Troyes, now in the Williams College Art Museum in Williamstown, Massachusetts.[23] They proposed that these signs, drawn from the same repertoire of letters and slashes used in the Evron canopies, distinguished among the works of a series of painters, allowing them to be paid by the piece for their production.

23. Madeline H. Caviness and Suzanne M. Newman in *Medieval and Renaissance Glass from New England Collections*, ed. Madeline H. Caviness, exhibition catalog, Busch-Reisinger Museum of Harvard University, Medford, Massachusetts: Tufts University, 1978, p. 43.

FIG. 10. *Detail of Saint Julian (Fig. 9, left). (Photo: L. Cook)*

But there are important distinctions of distribution that lead me to propose a divergent interpretation for the marks in the Evron canopies. In the border from Saint-Urbain, a number of different marks occur within a single panel, and they appear on the reverse, otherwise unpainted surface of the glass. In the Evron canopies, the marks do not vary within a single canopy and thus within a single panel, and they are painted on the interior surface, along with the rest of the painted articulation. Both of these features, I propose, would facilitate sorting and assembling pieces of repetitively designed architecture for leading an individual panel.

Although marks are consistent within, they are not consistently unique to an individual pan-

FIG. 11. *Details of Fig. 9, left. (Photos: author)*

el. The *Y* used in one Glencairn canopy (Fig. 11) reappears in an Evron canopy now at Forest Lawn Cemetery in Glendale, California.[24] Perhaps these motifs served as installation as well as sorting marks, or perhaps it was necessary only to use a sufficient number of different marks to distinguish the contents of a single firing. This study would need to be extended to the Evron panels *in situ* before any more conclusions could be drawn from this limited evidence, but since the panels are installed within the church, they would have to be removed in order to permit the kind of close study of the sorting marks that is possible in a museum setting.

There are many other instances of sorting or assembly marks in panels of stained glass—either painted on, scratched out of painted areas,

24. Other pieces of glass in the Forest Lawn windows are marked with a wavy line. For these panels, see Jane Hayward and Madeline Caviness in Madeline H. Caviness and others, *Stained Glass before 1700 in American Collections: Midwestern and Western States*, Corpus Vitrearum Checklist III, Studies in the History of Art, v. 28, Washington: National Gallery of Art, 1989, p. 51. I am grateful to Madeline Caviness and Laura Good for providing me with copies of photographs of this glass; I have been unable to examine it personally.

FIG. 12. *Details of Fig. 9, center. (Photos: author)*

or engraved into the surface of the glass itself—but most of those that have been cited occur in later glazings.[25] Hilary Wayment has discussed their use in certain 16th-century windows at Fairford[26] and King's College, Cambridge;[27] Madeline Caviness has discovered them in late 14th- and 15th-century glass at Canterbury;[28] Marina Flügge has documented their employment in the

25. The practice is considered general enough to be mentioned as a possible factor in standard production practice in Brown and O'Connor [note 5], p. 63; Marks [note 5], pp. 36–37; and Madeline H. Caviness, *Stained Glass Windows*, Typologie des Sources du Moyen Âge Occidental, fasc. 76, Turnhout, Belgium: Brepols, 1996, p. 52.

26. Hilary Wayment, "The Glaziers' Sorting Marks at Fairford," in *Crown in Glory* [note 10], pp. 23–28; *idem, The Stained Glass of the Church of St. Mary, Fairford, Gloucestershire*, The Society of Antiquaries of London, Occasional Paper (New Series), v. 5, 1984, pp. 45–51.

27. Hilary Wayment, *The Windows of King's College Chapel, Cambridge*, Corpus Vitrearum Medii Aevi, Great Britain, supplementary v. 1, London: Oxford University Press, 1972, pp. 34–35 and 101, and pls. 12, 33.4, and 136.

28. Madeline Harrison Caviness, *The Windows of Christ Church Cathedral Canterbury*, Corpus Vitrearum Medii Aevi, Great Britain, v. 2, London: Oxford University Press, 1981, pp. 235 and 256; *idem* [note 25], fig. 4.

FIG. 13. *Details of Fig. 9, right. (Photos: author)*

15th-century glazing of the church of the Holy Blood in Wilsnack;[29] and Michel Hérold has noted engraved marks in the 16th-century glass of Saint-Nicholas-de-Port.[30] Caviness has also drawn my attention to marks in ornamental ensembles from the mid-14th-century windows of Gerona that seem to be assembly or installation marks,[31] and Antoni Vila Declós has discussed marks on the Catalan windows of Santes Creus that could also be interpreted in this same con-

29. Marina Flügge, "Eine mittelalterliche Glasmalereiwerkstatt in Mitteldeutschland," in *Corpus Vitrearum: Tagung für Glasmalereiforschung. Akten des 16. Internationalen Kolloquiums in Bern 1991*, ed. Ellen J. Beer, Bern and Stuttgart: Haupt, 1991, pp. 39–42.

30. Michel Hérold, *Les Vitraux de Saint-Nicholas-de-Port*, Corpus Vitrearum, France, v. 8, no. 1, Paris: CNRS, 1993, pp. 137 and 152–153. During the discussion at the 1991 Bern Colloquium of the Corpus Vitrearum (devoted to questions concerning stained glass workshops), Hérold also cited engraved exterior assembly marks on the windows (about 1530) of Valentin Bousch in the Cathedral of Metz.

31. I am grateful to Madeline Caviness for sharing with me her own slides of panels of foliate ornament in the tracery lights of the Chapel of Sant Miquel at Gerona. Although the marks are not visible, the panels themselves are illustrated in Joan Ainaud i de Lasarte and others, *Els Vitralls de la Catedral de Girona*, Corpus Vitrearum Medii Aevi, Espanya v. 7, Catalunya v. 2, Barcelona: Institut d'Estudis Catalans, 1987, where the marks themselves are also discussed (p. 187) and reproduced (p. 191) in the accompanying text.

FIG. 14. *Saint Nicholas with Orphaned Boys, from the choir of the abbey church of Evron, now in the Philadelphia Museum of Art (19-69). (Photo: the museum)*

text.[32] Closest in date to the marks in the Evron canopies are early 14th-century sorting marks that have been noted at Wells.[33] The marks in the Glencairn panels fit precisely the pattern seen in many of these other examples: the use of several different marks within a glazing program, but the consistent use of only one of them within an individual panel. Unlike the later English examples, however, the sorting marks at Evron are restricted to passages of ornamental design repeated from panel to panel and from window to window. They do not appear on the figures within the same panel.

By gathering together related evidence from grisailles and canopies at several sites, it may be possible at this point to hazard a preliminary generalization about a French workshop practice that began in the second half of the 13th century and extended into the 14th century. Both "ghost images" and sorting marks seem to document a de-

32. Antoni Vila Declós, "Les Marques d'assemblage du vitrail 'Reial' du monastere de Santes Creus," in *Corpus Vitrearum* [note 29], pp. 145–146.

33. J. Armitage Robinson, Dom. Ethelbert Horne, and J. A. Knowles, "Marks on the Glass at Wells, a Discussion," *Journal of the British Society of Master Glass Painters*, v. 4, no. 2, October 1931, pp. 71–80, which contains one of the best general discussions of the questions surrounding the interpretation of sorting, assembly, and installation marks in connection with stained glass.

sire to facilitate the assembling and arranging of repeated, modular pieces of fired ornamental glass so as to save time and, consequently, money in the production of stained glass windows. Perhaps the practice did not extend to figural compositions—at Evron, at least—because their individualized character would have made them easier to assemble on a wooden cartoon[34] for leading. Alternatively, the glass painters' awareness that the observer's central focus would be on figural aspects of the window during viewing may have made "extraneous" markings potentially distracting, whereas within peripheral ornamental surrounds, they are all but invisible, especially from a distance.

Before accepting such a generalization, however, what has been shown here in a very small set of examples needs to be tested against what can be found, or has been found, elsewhere. The reassessment of stylistically based art-historical constructs of the medieval stained glass workshop will require concerted looking and continual sharing of technical and physical evidence. Answers will not derive from the study of individual programs; instead, they will be found within the coordinated study of a variety of programs and places, both diachronically and synchronically.[35] Our work has just begun.

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34. Of the sort discovered at Gerona: Joan Vila-Grau, "La Table de peintre-verrier de Gérone," *Revue de l'Art*, v. 72, 1986, pp. 32–34.

35. A museum collection in which I am able to examine, on a light table and in a single day, panels of stained glass from various times and places has provided me with an ideal place to begin to formulate questions. But this is not where the majority of the evidence is located. It is spread all over the place, and when the windows are installed, such evidence is often so distant from the viewer that indications of patterns of production—such as paint type, painting technique, and assembly and makers' marks—are impossible to notice, much less to study and evaluate. General photographs are also of limited utility. Meredith Lillich graciously lent me a suite of Monument Historique photographs of Evron canopies *in situ*, but although a magnifying glass allowed me to find what I could construe as sorting marks here and there, I could evaluate neither their form nor their distribution in photographs.