16 Image-Enhancement Procedures for Medieval Manuscripts

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Abstract

Much of the musical repertory that predates the invention of music printing (1492) survives in a single manuscript copy. Such sources can suffer from various problems of preservation including natural decomposition of the materials; physical deterioration aggravated by water, dirt, and vermin; and willful damage caused by intentional alteration of the original writing. Until recently, these problems seemed insoluble. Recent and current projects demonstrate, however, that content "lost" from the original material is sometimes recoverable through the graphical manipulation of digital images. This article describes some post-processing procedures for scanned images in re-establishing the content of medieval sources for sacred vocal music preserved in the Vatican Library.

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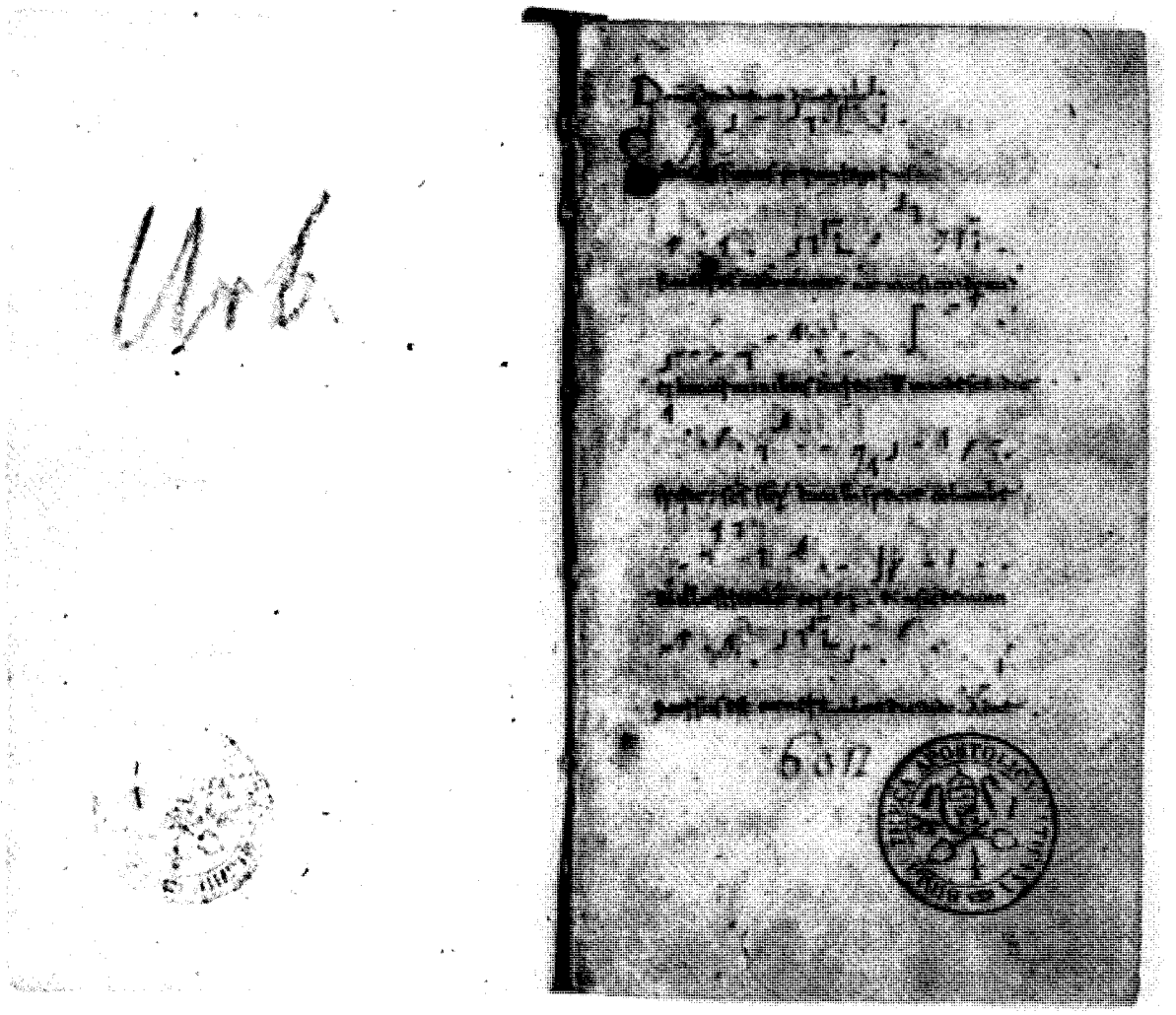
Figure 1a. Folio 1 of MS 546 from the Archivio della Badia, Montecassino, containing the introduction to the gradual *Sanctissimus papa Gregorius.* Note the erasure of text at the right side of lines 1 and 2. Permission pending.



Scanned images that can be manipulated in a considerable number of ways can be particularly useful to a scholar dealing with manuscripts that have suffered severe damage or have been tampered with. Among such sources a group that is particularly vexing to paleographers is palimpsests.[1]

[1] A palimpsest is a document which has been overwritten one or more times, usually with traces of earlier writings still visible, due to incomplete erasure.

In the late nineteenth and early twentieth centuries a number of such sources, where the lower writing contained material of immense importance, the manuscripts were treated with chemical reagents in an effort to bring up the lower writing—usually with disastrous results to the long-range preservation of the manuscript. Today the most common approaches to dealing with such sources are (1) to make a close examination of the source itself under ultraviolet light (which works less well with palimpsests than with sources where water damage has obscured the text) and (2) to make infrared photographs that do bring up some of the lower writing in sharper contrast.

16.1 Case 1: Retrieving Erased Script

One source affected by this problem is the Vatican manuscript Urbinas lat. 602. The original manuscript is a beautifully executed troper copied most likely at Montecassino or at one of its immediate dependencies. The original scripts have detailed punctuation, absolutely precise diastemat[2], and are virtually free of errors.

[2] Diastematy is the placement of neumes on a real or imagined staff so that their relative positions in the vertical dimension yield a more or less precise indication of intervallic relationships.

In the thirteenth century, however, folios 1v through 23v, containing virtually all the tropes to the propers of the mass and the beginning of the Kyries, were erased and written over with processional antiphons and responds. Folios 99v–100v were also erased, although at an earlier time (Boe 1985).

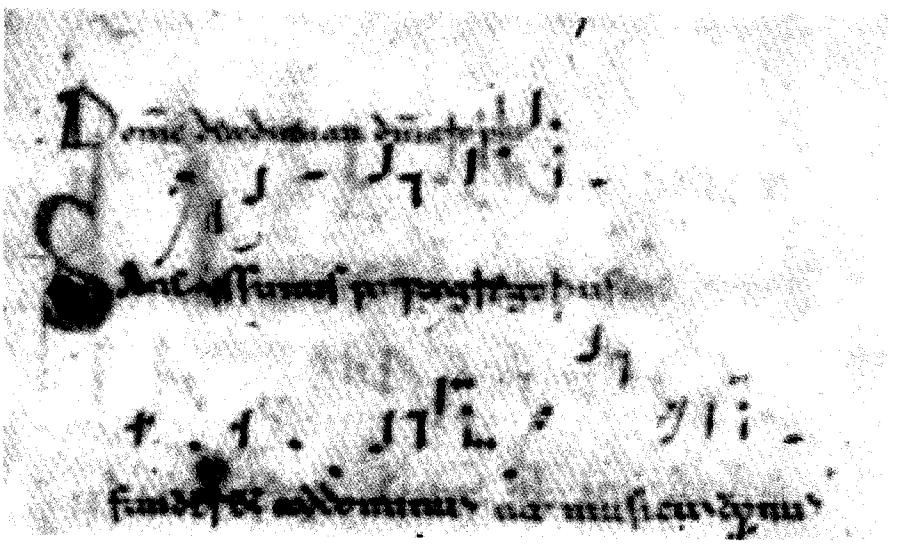
The loss of the proper tropes was particularly grievous because, although a number of graduals with tropes and sequences survive from the area of Benevento, the only other such source from Montecassino is from the Archivio della Badia, MS 546, a gradual with tropes and sequences for use only from the season of Advent (before Christmas) to the Easter Vigil. It is therefore missing the entire second half of the liturgical year (Planchart 1994, xviii).

The erasure of the text was done with considerable thoroughness, although some of the colored initials are still clearly visible. The erasure of the music was less carefully done. In addition, since the melodic contour of the pieces in the upper writing is often very different from that of the earlier melodies, the neumes of the lower writing, unlike the text, are often not directly under any of the newly written neumes.

An examination of the manuscript under ultraviolet light proved not particularly helpful in this case, and neither did a number of infrared photographs taken. Oddly enough, a set of Ektachrome color slides that the Vatican Library made on request showed considerably more of the lower writing. It was these slides that were then subjected to scanning and manipulation by the computer.

The first of these [Figure 1a], used as a simple test case, is from fol. 1r, the only folio with proper tropes not entirely erased, but where whoever erased these folios had begun the process and then probably thought better of it, since the piece on that folio was the famous introduction to the gradual *Sanctissimus papa Gregorius*, which was viewed throughout the middle ages with particular veneration. Still, the person preparing the manuscript for the new writing had begun to erase the first line, starting on the outside of the folio, and had completely erased two words and the music above them.

Figure 1b. Close-up view of lines 1 and 2 of the gradual.



The words could be easily recovered from concordant sources, but the melody posed a problem for two reasons:

> (1) Italian melodic traditions in the trope repertory are extremely unstable from region to region, and
>
> (2) our other surviving sources for "Sanctissimus papa Gregorius" come from well to the north of Rome and often differ considerably from the south Italian version (Planchart 1994, 8f).

The scanned image, once one begins to enhance the shadowy outlines of the notation, reveals clear traces of a *clivis*, g-f, a *punctum*, f, and a *virga*, g. These are far more clearly visible on the computer screen than in any reproduction that one can print on paper [see *www.ccarh.org/publications/cm/12/*].

The second example, from the Vatican Library MS Urbinas 602 [Figure 2], reveals a long line of neumes that fortunately did not fall directly under the second writing. The neumes allow one to reconstruct virtually the entire melodic line of the passage.

Figure 2. Restored neumes in the Vatican Library MS Urbinas 602. Permission pending.

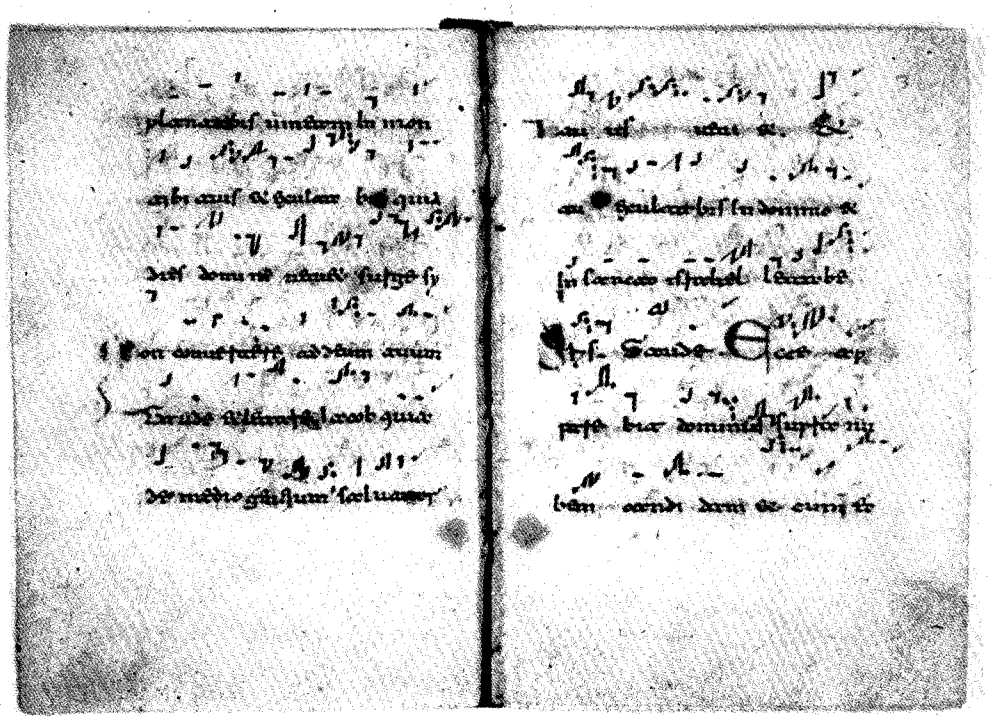
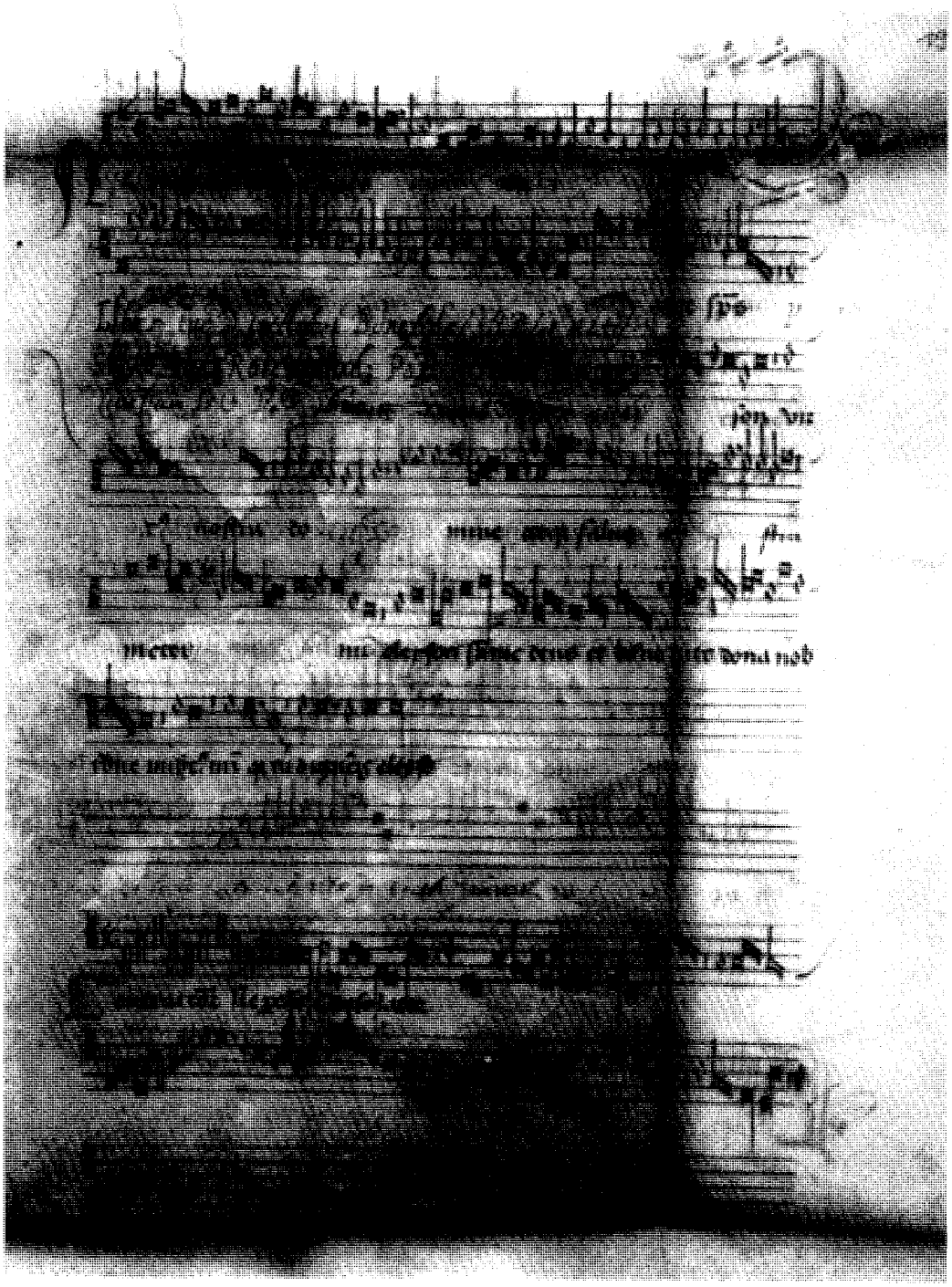


Figure 3. Remnant of the Bruges choirbook from Lucca Archivio di Stato MS 268. Permission pending.



16.2 Case 2: Dismembered Sources

The case of MS 268 in the Archivio di Stato in Lucca [Figure 3 opposite] is in some ways similar to the case of MS 602 [Figure 2]. The manuscript consists of the remnants of a once sumptuous choirbook copied in Bruges in the 1470s and taken to Italy, probably by John Hothby. In the late sixteenth or early seventeenth century it was dismembered and its individual leaves used as bindings for a number of registers now in the Archivio di Stato.

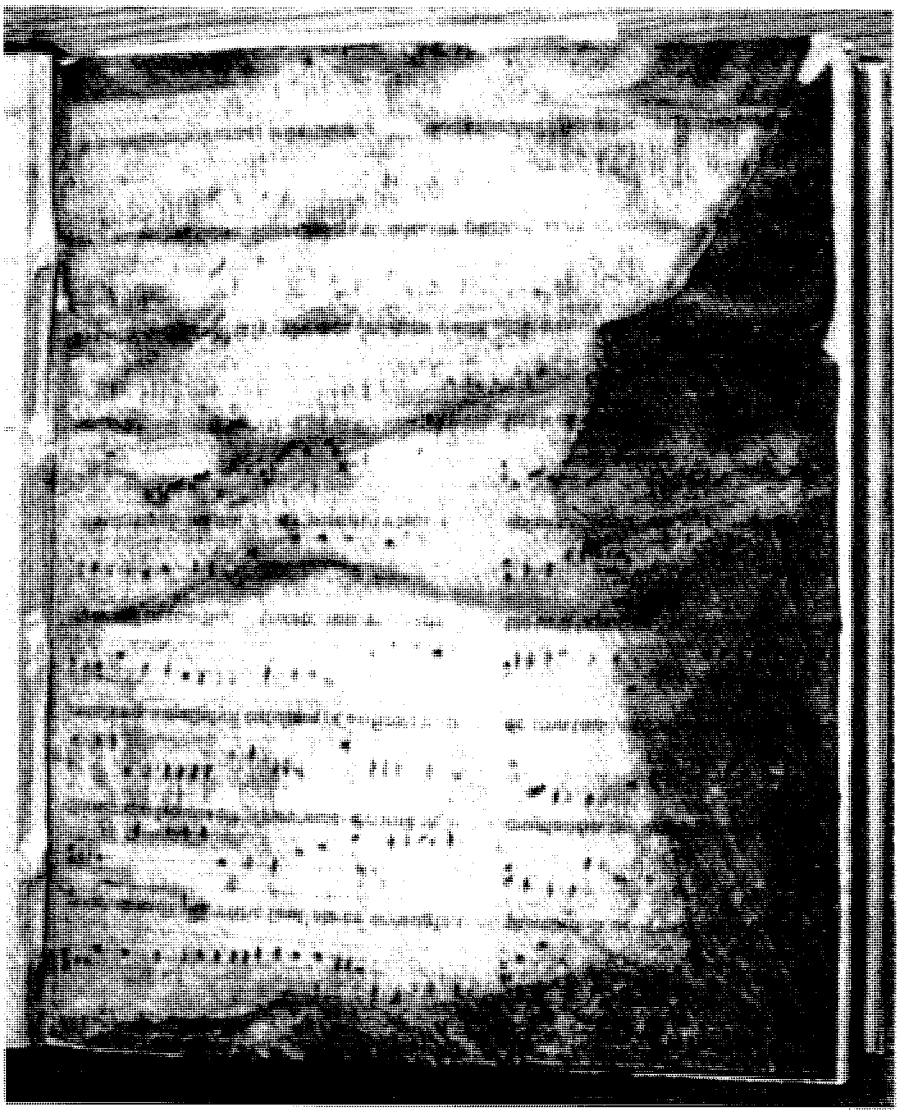
The leaves were discovered and studied by Reinhard Strohm in 1967 (Strohm 1968, 40–42). He later found further leaves and has published an extended study of the manuscript in his monograph on music in Bruges (Strohm 1985). Strohm most kindly provided me a film of the manuscript shortly after his discovery, since I was working on a study of the English *Missa Caput*, which was thought at the time to be a work of Guillaume du Fay (Planchart 1972).

The manuscript proved particularly useful, despite its fragmentary state, in providing correct readings of a number of passages that were corrupt in the Trent Codices and which had been emended in my earlier edition of the work (Planchart 1960). Most of the corrupt passages contained notes copied a second or a third apart, errors that could easily result from the elongated note shapes used by a number of fifteenth-century scribes, or by the misreading of a clef. But there was one passage (measures 133–134 of the contratenor in the *Christe eleison*) which was mystifying, because although it was clearly a contrapuntal error, there was no way to reconstruct something (1) the shape of which could lead to what the Trent scribes had set down on paper, but (2) which would be contrapuntally correct [See Figure 3].

This was all the more puzzling because if the passage was indeed authorial it would be the only such lapse in a work that otherwise is a wonder of melodic inventiveness and contrapuntal skill.

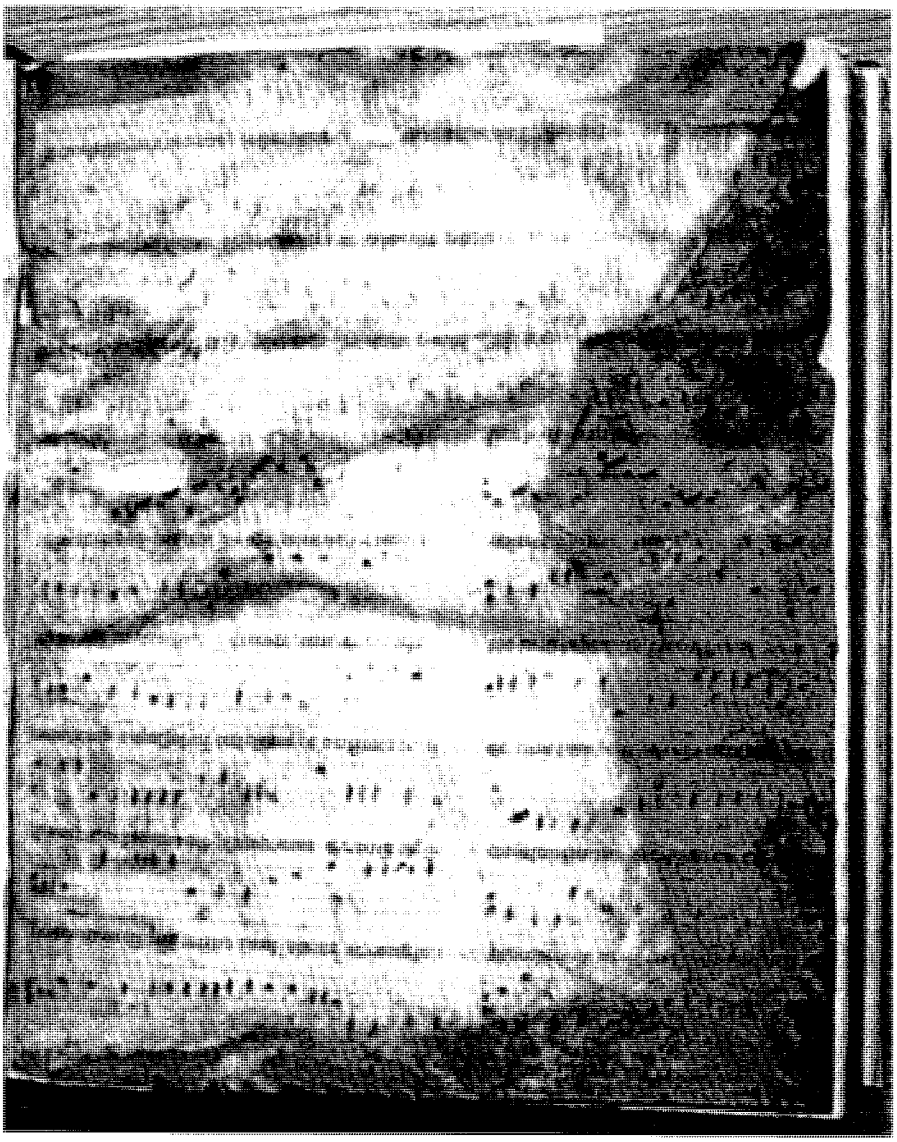
Although the Lucca manuscript has enormous lacunae, the folio with the contratenor of the *Christe eleison* does survive. However, the measures in question are in a place that was damaged and partly erased with writing by the notary, who used the leaf as binding almost directly above. Once again, the manipulation of the image with the computer allows one to begin to see the faint traces of the notation. Where the Trent Codices

Figure 4. Leaf of Cambrai Bibiothéque Municipale MS 1328. Permission pending.



show sb [semibreve], and a ligature *cum opposita proprietate*, B-A-C-G, sb-sb-dotted br-br, one can make out a dot after the sb A in Lucca. The bottom of the ligature is roughly at the same level both times it dips, suggesting that the passage should read dotted sb A, and then a ligature *cum opposita proprietate* that reads B-G-C-G, with none of its notes dotted. The change brings the passage entirely within the contrapuntal world of the "Caput master." Once again, in this case the image is infinitely clearer when seen directly on the computer screen than when printed on paper.

Figure 5. Leaf of Cambrai MS 1328 after stain removal.



16.3 Case 3: Stain Removal

The final examples [Figures 4, 5] come from the leaves of Cambrai Bibliothéque Municipale manuscript 1328 discovered by David Fallows (Fallows 1976, 275–280). In a number of cases the leaves are badly stained, but the notation is readable. In these cases the stain can be slowly

removed, allowing the notation to be seen more clearly so that indeed a facsimile reproduction that is in some ways clearer than the original can be achieved.

In other instances, where what we have left is a mirror image of the music, the image can be readily reversed with the computer. This, of course, could be done and was done with simple negative photography, but the computer allows the reversed image to be cleaned and different aspects of the image to be enhanced at different times, allowing one to read, however slowly, images that were considered a few years ago virtually beyond recovery.

References

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