AN EXAMINATION OF THE ITALIAN GLASS INDUSTRY AND ITS INFLUENCE ON NATIVE STAINED AND PAINTED GLASS

by

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ABSTRACT

From a quantitative point of view, the churches of Italy offer far less stained and painted glass than the cathedrals of Northern Europe. The four most popular though theoretical explanations for this situation include: one, the "modern" French architectural style of the early twelfth century, now called Gothic architecture, with its integral expanses of stained glass windows, was simply not as popular in Italy as it was in the rest of Europe; two, the popularity of traditional and contemporary Italian art forms such as mosaic, fresco, panel painting and cosmati work, were visually incompatible with stained glass; three, the warmer Italian climate was not conducive to cathedrals with large expanses of glass; and four, the scarcity of raw materials necessary for the manufacture of glass did not permit the development of a stained glass tradition.

The subject of this thesis is an examination of the Italian glass industry and its influence on the production of native ecclesiastical stained and painted glass windows. Through the presentation of literary, physical and documentary evidence, it is first shown that there existed in Italy an old and well established literary tradition

concerned with the transmission of technical information related to the manufacture of glass. Secondly, it is shown that in Italy the earliest surviving evidence of glass used as a window-fill can be dated to the first century A.D., and, that in ecclesiastical settings, the use of figurative windows dates back to the sixth century while the general employment of glass in windows is well established by the ninth century. Thirdly, that while documentary evidence suggests the eleventh century for an actual glass producing industry in Italy, archaeological evidence dates the industry earlier to the seventh-eighth century.

Our conclusion based on the foregoing evidence is that at no time during the Middle Ages would Italy appear to have had an ineffectual glass industry or one that would have negatively influenced the production of Italian stained and painted glass windows.

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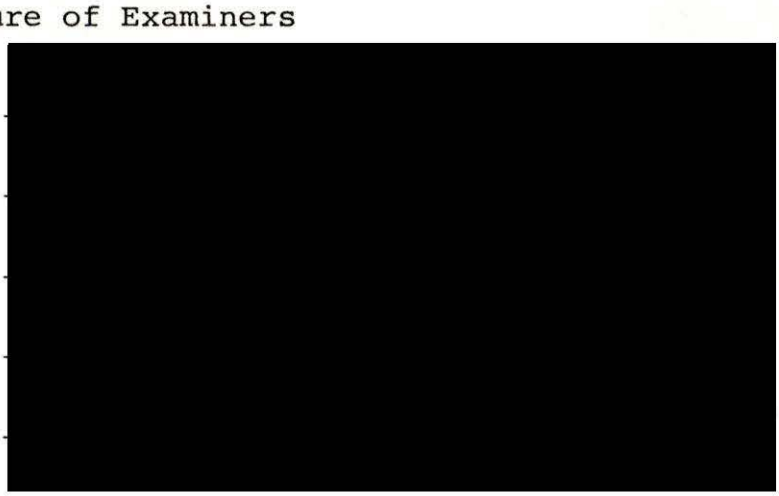

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INTRODUCTION

Not until 1955, when Giuseppe Marchini's *Le vetrate italiane* was published,[1] did the first serious and comprehensive art historical examination of Italian stained glass appear. Prior to that time the subject was either treated in a very cursory way or alternatively only in specialized monographs.[2] In Jacob Burckhardt's introduction to his chapter devoted to Italian stained glass, we find expressed the most prevalent attitude toward the subject:

> basically this artistic genre has never really squared with the predominating interest of the Italian Church, which turned upon fresco painting and altarpieces; in fact it has almost always the character of an extraneous appendage, a pure luxury . . . I would advise against examining the storied windows to avoid straining the eyes and to preserve the visual faculties for the study of the frescoes.[3]

After examining the extent to which scholarship has tended to ignore this subject, it would appear that Burckhardt's advice was followed. Most curious is the fact that art historians who pride themselves for thoroughness and keenness of eye have allowed their examination of the arts in Italy to remain incomplete. Even today most survey courses and texts specifically concerned with Italian art contain few, if any, references to stained glass. These same surveys, that would be considered incomplete without

discussions of such Italian luminaries as Guido da Siena, Cimabue, Duccio, Taddeo and Agnolo Gaddi, Lorenzo Ghiberti, and Donatello, to mention a few, frequently fail to consider the work of these men in the area of stained glass design - surely an integral part of their artistic oeuvre.

From a quantitative point of view, the churches of Italy offer far less glass for study than the cathedrals of Northern Europe, a situation which unfortunately has resulted in a rather myopic, Northern European, stained glass literature. Scholars, assuming "the bigger the better," generally avoided any careful qualitative examination of glass south of the Alps. Often art historians, not wishing to avoid the subject of Italian stained glass entirely, formulated an "obvious explanation"[4] for Italy's stained glass impoverishment. The four most popular theories include: one, the "modern" French architectural style of the early twelfth century, now called Gothic architecture, with its integral expanses of stained glass windows, was simply not as popular in Italy as it was in the rest of Europe;[5] two, the popularity of traditional and contemporary Italian art forms such as mosaic, fresco, panel painting and cosmati work, were visually incompatible with stained glass;[6] three, the warmer Italian climate was not conducive to cathedrals with large expanses of glass;[7] and four, the scarcity of raw materials necessary for the manufacture of glass did not permit the development of a

stained glass industry.[8]

Unfortunately, these explanations do not reflect serious scholarly research, and thus they currently remain little more than highly questionable hypotheses. Consequently, I have undertaken the following research with the intention of disproving what I think is possibly the least likely explanation for the comparative paucity of stained glass in Italy - namely an investigation of the fourth theory: Italy's supposed ineffectual native glass industry.

The format of this study is based primarily on the presentation of surviving documentary evidence relevant to the early history of glass technology and stained and painted glass windows. First, by way of an introduction to the medium, we will examine the origins of glass and some of the earliest extant manuscripts which contain recipes for glass manufacture. Next I shall examine glass as a window-fill and shall discuss surviving literary and physical evidence of its early use as such. In the third chapter I will discuss technique and review surviving manuscripts and treatises relating to the manufacture of stained and painted glass windows, which will serve as a preface to my examination of Italy's earliest glass centres and surviving and/or documented stained glass monuments.

Geographically our evidence will be drawn primarily from Western Europe as it is in this context that

ecclesiastical stained glass (the majority of surviving stained glass) is most often considered. Finally, we shall primarily limit our examination to materials antedating the sixteenth century - a time which marked the art's general dissolution.

Notes to Introduction

[1]Marchini has revised, translated and republished his *Le vetrate italiane* (Milano: Electa Editrice, 1955) in English, French and German. The English version was published in two editions: *Italian Stained Glass Windows* (New York: Harry N. Abrams, Inc., 1956) and *Italian Stained Glass Windows* (London: Thames and Hudson, 1957). The content and pagination of these two editions are exactly the same. In the context of this research the English editions have been consulted interchangeably and will hereafter be cited as *ISGW*.

[2]For an annotated bibliography of works on Italian stained glass, see Marchini, *ISGW*, p. 235 (note 8).

[3]Jacob Burckhardt, *Der Cicerone: eine Anleitug zum Genuss der Kunstwerke Italiens* (Basel: Schweighauser'sche Verlagsbuchhandlung, 1855), p. 855, as translated in Marchini, *ISGW*, p. 235 (note 8).

[4]I draw the phrase "obvious explanation" from Ada Buch Polak, *Glass: Its Makers and Its Public* (London: Weidenfeld & Nicolson, 1975), p. 50, who states in reference to Mediterranean flat glass for windows, that "for obvious reasons, window-glass never played such an important part in the general production pattern in the south as in the north." Nowhere in the course of the text are those "obvious reasons" explained.

[5]This view is summarized in Wim Swaan, *The Gothic Cathedral* (Garden City, New York: Doubleday & Co., Inc., 1969), p. 289. Also see Lewis F. Day, *Windows: A Book About Stained and Painted Glass* (London: B. T. Batsford, 1897), p. 261.

[6]Walter Lowrie, *Art in the Early Church*, rev. ed. (New York: W. W. Norton & Co., Inc., 1969), p. 125; Charles Hitchcock Sherrill, *A Stained Glass Tour in Italy* (London: John Lane the Bodley Head, 1913), p. 33.

[7]Swaan, *The Gothic Cathedral*, p. 289; Banister Fletcher, *A History of Architecture on the Comparative Method*, 17th ed., rev. R. A. Cordingley (New York: Charles Scribner's Sons, 1963), pp. 169 and 254.

[8]N. H. J. Westlake, *A History of Design in Painted Glass*, 4 vols. (London: James Parker and Company, 1881-94), II, 96; Vincenzo Fortunato Marchese, *Lives of the Most Eminent Painters, Sculptures & Architects of the Order of S. Dominic*, trans. C. P. Meehan, 2 vols. (Dublin: James Duffy, 1852), I, 296.

CHAPTER I

THE ORIGINS AND EARLY TECHNOLOGY OF GLASS

The basic materials and techniques for glassmaking have changed little from the earliest surviving recipes (seventeenth century B.C.) right through our period of interest (sixteenth century A.D.). With a situation so static, the oral transmission of information could have easily been developed and maintained; indeed, it might seem that there would have been almost no need to record anything in writing. Nevertheless, such information was recorded and some of it does survive and this documentation, however fragmentary in nature, does enable us to understand where and when glassmaking developed. It is important that we examine these manuscripts as they will serve to show that in Italy there survived and flourished a recorded technical tradition for the manufacture of glass long before the advent of stained and painted glass windows in Western Europe. In doing so it is important to keep in mind that related recipes for glazes, glass mosaic, imitation stones, etc., often employ ingredients and techniques similar to those used for making and working with glass. By way of an introduction to our examination of the technical documents

we will briefly review the rather elusive origins of glass itself.

The Origins of Glass

Although there are several accounts of its discovery, the historical origin of glass remains a mystery. The most popular version is found in the *Natural History (Historia Naturalis)* of Pliny the Elder (Gaius Plinius Secondus, A.D. 23-79).

> That part of Syria which is known as Phoenicia and borders on Judea contains a swamp called Candebia amid the lower slopes of Mount Carmel. This is supposed to be the source of the River Belus, which after traversing a distance of 5 miles flows into the sea near the colony of Ptolemais. Its current is sluggish and its waters are unwholesome to drink, although they are regarded as holy for ritual purposes. The river is muddy and flows in a deep channel, revealing its sands only when the tide ebbs. For it is not until they have been tossed by the waves and cleansed of impurities that they glisten. Moreover, it is only at that moment, when they are thought to be affected by the sharp, astringent properties of the brine, that they become fit for use. The beach stretches for not more than half a mile, and yet for many centuries the production of glass depended on this area alone. There is a story that once a ship belonging to some traders in natural soda put in here and that they scattered along the shore to prepare a meal. Since, however, no stones suitable for supporting their cauldrons were forthcoming, they rested them on lumps of soda from their cargo. When these became heated and were completely mingled with the sand on the beach a strange translucent liquid flowed forth in streams; and this, it is said, was the origin of glass.[1]

There are of course other stories, two of which follow here. Lewis Day recounts a fable to the effect that glass "dates from the building of the Tower of Babel, when

God's fire from heaven vitrified the bricks employed by its too presumptious builders."[2] Bernard de Palissy, we are told,

> relates a legend according to which the Israelites set fire to some forests causing so fierce a conflagration that the natron melted with the sand until the mixture ran down the mountain-sides as liquid glass, and that, from then on, efforts were made to obtain by art what chance had revealed.[3]

The implausible aspect of these fantastic stories lies in the fact that enormously high temperatures (between 1000-1100 degrees centigrade) are required to melt and fuse the raw materials. Though the discovery of glass may have been accidental, it is more likely that it occurred in the laboratory of an inquisitive alchemist than anywhere else.

Just when or where the manufacture of glass originated will probably remain a mystery. However, it is well established that among the earliest examples of glass were those which imitated precious or semi-precious stones. Such imitation jewels, along with coloured glass perfume bottles and cosmetic jars, are found early in Egypt's history. The oldest glass objects which have come down to us were discovered in the tombs of the Pharaohs, with the earliest dating from the Eighteenth Dynasty (1567-1320 B.C.). One famous example is the goblet of the Pharaoh Tuthmosis III (Plate I). The glass, dating from around 1450 B.C., has the shape of a lotus bud with the cartouche of the Pharaoh on its side. Only 8.4 cm. high, it was moulded on a clay

core.[4]

The advent of the Roman Empire at the end of the first century B.C., marked the beginnings of glass production in a modern sense. With the Romans came the exploitation of the blowpipe, a tool which was probably known at a much earlier date by both the Syrians and Egyptians (Plate II).[5] It revolutionized the craft, making it possible for glass vessels and other objects to be produced in an infinite variety of shapes and sizes with a relative amount of ease. By the first century A.D., glass had become a common commodity with its wide-spread use following the proliferation of Roman colonization in Western Europe and the Near East.

Manuscripts and Treatises Containing Recipes Related to Glass Technology

The earliest known and recorded recipes that survive concerning the manufacture of glass are not Egyptian but rather Babylonian and Assyrian. The Babylonian formulae are the older and come down to us in the form of cuneiform tablets. They date from the seventeenth century B.C. and describe in an intelligible terminology the ingredients for the making of glazes.[6] W. E. S. Turner tells us that it "has been shown that the [Babylonian] recipes will apparently produce the glazes described."[7]

The Assyrian recipes also survive in the form of clay cuneiform tablets.[8] These are by far more extensive

and also more clearly expressed than those found in the Babylonian tablets. They date from the seventh century and draw their origin from the Royal Library at Nineveh set up by Assurbanipal or Sardanapalus (668-c. 626 B.C.). These tablets present a collection of technical recipes on chemistry and metallurgy but chiefly deal with the manufacture of glass.[9] They tell of the construction of glass furnaces and the composition of batches for clear and coloured glasses.[10] The essential ingredients of all glass making, silica, an alkali, and lime, are duly specified here.[11]

Pliny's *Natural History*, dating from the first century A.D., is our next noteworthy source of glass making information. In addition to his previously discussed story concerning the discovery of glass,[12] we find descriptions of the "old method of producing glass"[13] and how it is done "now."[14] In his explanation of the contemporary method, Pliny states that in Italy

> a white sand silica which forms in the River Volturno is found along 6 miles of the seacoast between Cuma and Literno. Wherever it is softest, it is taken to be ground in a mortar or mill. Then it is mixed with three parts soda, either by weight or by measure, and after being fused is taken in its molten state to other furnaces. There it forms a lump known in Greek as 'sand-soda.' This is again melted and forms pure glass, and is indeed a lump of clear and colourless glass.[15]

Pliny's mention of the sand deposit near the mouth of the River Volturno[16] is quite significant, as it represents the

only other surviving and specific classical reference (beside those to the River Belus on the Syrian Coast) to a site for obtaining sand for glassmaking.[17]

More important to us are those tracts that originated in Western Europe between the late eighth and early fifteenth century. These include the texts known as the *Compositiones variae*, the *Mappae clavicula*, *De coloribus et artibus Romanorum*, the *Diversarum artium schedula* and the *Segreti per colori*.

The so called Lucca manuscript, or *Compositiones variae*, was written by an unknown author in Lucca, Italy between the years 787 and 816 (Plate IV).[18] It represents the earliest surviving significant Medieval manuscript containing recipes concerning glass. Those relevant to our concerns include information on making, colouring, gilding and writing on glass. In addition, there are several others that specifically call for the employment of ground glass, glass mixing bottles and the glass-blower's furnace.[19]

The earliest recorded manuscript of the *Mappae clavicula* is listed in the year 821-22 in the catalogue of the Benedictine monastery library at Reichenau, Germany.[20] Although that manuscript is now lost, a tenth century copy does exist.[21] Contained in it are recipes for making green, blue and deep red glass.[22] Of the several copies of this anonymous manuscript known to exist, none have been found in

Italy.[23]

The manuscript *De coloribus et artibus Romanorum* is attributed to a certain Heraclius, who is thought to have been an Italian monk writing in the Lombard duchy of Benevento (Plate V).[24] It is divided into two books of verse containing twenty-one chapters and a third book containing fifty-eight chapters of prose.[25] A possible date for the first two books has been set at the tenth century,[26] although the existing copies can be dated only as early as the eleventh century. Book III is a compilation of recipes that would appear to have been added sometime between the twelfth and thirteenth centuries.[27] Only select chapters from Books II and III contain recipes of interest to us.[28] Those in Book II deal with the manufacture of glazes that are green (Chapter XVIII), white (Chapter XIX), black (Chapter XX), and very green (Chapter XXI). In Book III we find a wealth of useful information. Chapters I and IV contain recipes for glazing green glass. Chapter II has a recipe for glazing with white glass. Chapters V and VI offer information on the discovery and early history of glass (probably based on Pliny) with Isidorus (Bishop of Seville in the seventh century A.D.) specifically mentioned.[29] The most valuable chapter is VII, as it contains data for the construction of a glass furnace and for the manufacture of glass of various colours (e.g. red, yellow, purple, etc.) for the formation of "whatever you

please."[30]

The *Diversarum artium schedula* or *De diversis artibus* is by far the most complete treatment of glass technology to be found in a Medieval manuscript[31] (Plate VI). The treatise is attributed to a German Benedictine monk called Theophilus Presbyter who is sometimes identified with the metalworker Roger of Helmarshausen (fl. c. 1100).[32] The original manuscript does not survive and the earliest known copies date from the twelfth century.[33] Although it has been suggested that the original manuscript may have been compiled as early as the tenth century, a twelfth-century date seems more likely.[34] The tract consists of three books; one each on painting, glass and metalwork. Book II, "The Art of the Worker in Glass," contains thirty-one chapters pertaining to the subject of glass. Eighteen of those chapters include information on building furnaces, tools of the trade, making coloured glass, glazes, vessels, mosaics, finger rings and a variety of other things. The remaining chapters contain information for making stained and painted glass windows and will be discussed in Chapter III.

Among the seven known virtually complete copies of Theophilus, we find only one in Italy and it dates from the seventeenth century.[35] A manuscript containing parts from Book I and dating from the fourteenth or fifteenth century can be found in the Biblioteca Nazionale Centrale in Florence,[36] although Book I contains no information on

glass. The absence of any earlier Italian manuscript of Theophilus may be explained perhaps by the presence of an already firmly established glass technological tradition dating from at least as far back as the *Compositiones variae* and the *De coloribus et artibus Romanorum*.

In the centuries following *Diversarum artium schedula* no new treatises concerning glassmaking appear to have been written. Only copies of or additions to those already mentioned survive. Then, after a gap of some three hundred years, no less than four Italian treatises make their appearance. Three of them (called "trattalli") were published by Gaetano Milanesi in 1864.[37] Tract I, from the end of the thirteenth century, is by an unknown author who may have been Tuscan.[38] It is entirely devoted to glass for mosaics, containing eighty-seven recipes on the subject. Tract II, from about the same time, has been attributed to the Florentine Benedetto Ubriachi (di Benedetto di Baldassare Obriachi).[39] It contains in its entirety, forty-eight recipes concerned basically with colouring glass and making crystal. Tract III, dated 1443, is by an unknown author and contains in its entirety, one hundred recipes concerning the production of various kinds of crystal. Our fourth manuscript, entitled *Segreti per colori*, also dates from the first part of the fifteenth century and seems to have been written in Bologna.[40] It contains fifteen recipes on a variety of subjects concerning the making and working of

glass.

In the sixteenth century there were several authors that wrote on glassmaking. They include Peder Månsson, Bishop of Västerås, Sweden, active around 1520; the Italian Vannoccio Biringuccio who wrote in 1540 and Georgius Agricola from Basel whose work appeared in 1556.[41] These authors were followed in 1612 by the widely translated *L'Arte Vetraria* by the Italian Antonio Neri[42] (Plate VII). Neri's treatise became the most important work on glass-making during the next two hundred years,[43] thereby perpetuating the almost unbroken Italian literary tradition in that area.

Notes to Chapter I

[1]Pliny, *Natural History*, trans., D. E. Eichholtz, 10 vols. (1962; rpt. London: William Heinmann, Ltd., 1971), X, 148-151 (Book XXXVI, chapter lxv).

[2]Day, *Windows*, p. 4. No source for this information is cited.

[3]*Glass and Stained Glass Windows*, The Artistic Crafts of Italy, III (Rome: the Ministry of Agriculture, Industry and Commerce, 1913), 3.

[4]Fritz Kämpfer and Klaus G. Beyer, *Glass: A World History*, trans. Edmund Launert, rev. (Greenwich: New York Graphic Society, 1966), Illustration I (text) and p. 266.

[5]The Egyptians were acquainted with the art of glass blowing "upwards of 3,500 years ago" as the "process is represented in the paintings of Beni-Hassan [-el-Gadim, Thebes], executed during the reign of that monarch and his immediate successors." John Gardner Wilkinson, *The Manners and Customs of the Ancient Egyptians*, re. Samuel Birch, 3 vols. (London: John Murray, 1878), II, 140.

Scholars who agree with Wilkinson's interpretation of these paintings which apparently depict workmen with blowpipes in the process of glass blowing, include Charles Winston, *An Inquiry into the Differences of Style Observable in Ancient Glass Paintings: Especially in England with Hints on Glass Painting*, 2nd ed. (Oxford and London: James Parker and Co., 1867), pp. 1-2 (note a); and Westlake, *A History*, I, 4 (note a).

For the opinion that the scenes "represent some other craft, not yet satisfactorily determined," see Gustavus A. Eisen, *Glass: Its Origins, History, Chronology, Technic and Classification to the Sixteenth Century*, 2 vols. (New York: William Edwin Rudge, 1927), I, 2.

For a very similar representation which has been identified as "metal-workers" and dated c. 2500 B.C., see Henry Hodges, *Technology in the Ancient World*, (Baltimore: Penguin Books, 1971), pp. 64-65 (ill. 63).

What is generally accepted as the earliest surviving representation of a glass factory can be seen in Codice 132, Biblioteca dell'Abbazia di Montecassino ("De Universo" of Rabanus Maurus), and dates from A.D. 1023. Astone Gasparetto, *Il vetro di Murano dalle origine ad oggi* (Venice: Neri Pozza, 1958), ill. 18 *Bis* (Plate III).

[6]For a critical examination of the glass related recipes contained within the Babylonian tablets, see W. E. S. Turner, "Studies in Ancient Glass and Glassmaking Procedures," *Journal of the Society of Glass Technology*, XL (1956), 39T ff.

For a translation and dating of these tablets, see C. J. Gadd and R. C. Thompson, in *Iraq*, III (1936), 87-88, as cited in Turner, "Studies," p. 42T.

[7]Turner, "Studies," p. 42T.

[8]The Assyrian cuneiform tablets (the Nineveh tablets) have been published by Robert Eisler, "L'Origine Babylonienne de l'Alchemie," in *Revue de Synthèse Historique*, XLI (1926), and R. Campbell Thompson, *On the Chemistry of the Ancient Assyrians*, London, 1925, both cited in Rozelle Parker Johnson, *Compositiones Variae: From Codex 490, Biblioteca Capitolare, Lucca, Italy, An Introductory Study*, University of Illinois Studies in Language and Literature, Vol. XXIII, No. 3 (Urbana: Univ. of Illinois Press, 1939), 30.

[9]For a critical examination of the glass related recipes contained within the Assyrian cuneiform tablets, see Turner, "Studies," pp. 39T ff. For an examination of the similarities between the glass recipes found in the Assyrian tablets and those found in the *Compositiones Variae*, see Johnson, *Compositiones Variae*, pp. 31-32 ff.

[10]For examples, see Johnson, *Compositiones Variae*, pp. 31-32.

[11]Thompson, *On the Chemistry*, pp. 12, 13 and 15, as cited in Johnson, *Compositiones Variae*, p. 31.

The Use of the same ingredients in the window glass from Pompeii demonstrates the continued use of these recipes in the first century of our era. E. J. Holmyard in *Nature*, CXVI (1925), 703, as cited in Johnson, *Compositiones Variae*, p. 31. Also, *infra*, p. 31.

[12]*Supra*, p. 7.

[13]Pliny, *Natural History*, pp. 150-53 (Book XXXVI, chapter lxvi).

[14]*Ibid.*, pp. 152-53 (Book XXXVI, chapter lxvi).

[15]*Ibid.*

[16]The River Volturno is located in Southern Italy just north-west of the harbour of Pozzuoli (west of Naples).

For an analytical discussion of a quantitative mineral analysis of the sand to which Pliny refers, see Turner, "Studies," p. 300T.

It is quite possible that the sand from this site was used in the production of glass for windows found at Pompeii which date from the time of Pliny (who died there during the eruption of Mt. Vesuvius in 79 A.D.). *Infra*, p. 31.

[17]For the writings concerning sand used for glass-making from the River Belus and the source of this observation, see Turner, "Studies," p. 279T.

[18]The *Compositiones variae* are found in Codex 490, fols. 211^{v} and 217^{r}-231^{r}, of the Biblioteca Capitolare in Lucca, Italy. For what must certainly be the latest and most definitive examination of the MS., see Johnson, *Compositiones Variae*.

[19]For the original Latin text and an English translation, see John M. Burnam, *A Classical Technology: Edited from Codex Lucensis, 490* (Boston: Richard G. Badger, [1920]).

[20]On the paleography of the *Mappae clavicula*, see Rozelle P. Johnson, "Notes on Some Manuscripts of the 'Mappae Clavicula,'" *Speculum*, X (1935), 72-74.

[21]*Ibid.*, pp. 73 and 75.

[22]For a copy of the Latin original, see Thomas Phillipps, "Letter . . . communicating a transcript of a MS Treatise on the preparation of Pigments, and on various processes of the Decorative Arts practiced in the Middle Ages, written in the twelfth century, and entitled 'Mappae Clavicula,'" *Archaeologia: or Miscellaneous Tracts Relating to Antiquity*, NS 32 (1847), 183-244.

[23]This observation is based on the fourteen collated manuscripts and various fragments presented by Johnson, "Mappae Clavicula," pp. 72-81.

[24]Mrs. Mary P. Merrifield, *Original Treatises on the Arts of Painting*, 2 vols. (1849; rpt. New York: Dover, 1967), I, 170-71 and 179.

[25]An English translation with Latin text and notes can be found in *ibid.*, I, 181-252.

[26]John Chatterton Richards, "A New Manuscript of Heraclius," *Speculum*, XV, No. 3 (July, 1940), 255, 257, 259.

[27]*Ibid.*, pp. 257 and 259.

[28]All subsequent references to Books and Chapters in the *De coloribus et artibus Romanorum* will be made in reference to the numeration of Merrifield, *Original Treatises*, I, 166-252.

[29]*Ibid.*, I, 172-73 and 208 ff.

[30]*Ibid.*, I, 212-17.

[31]The title *Diversarum artium schedula* is actually a descriptive phrase in the "Prologue" that has been adopted by various scholars in place of an actual title. *De diversis artibus* is the title which was found on a twelfth and thirteenth century copy of the manuscript.

For an English translation and documented paleographic observations, see Theophilus, *On Divers Arts*, trans. John G. Hawthorne and Cyril Stanley Smith (Chicago: University of Chicago Press, 1963). For the Latin text with English translation, see Theophilus, *The Various Arts*, trans. C. R. Dodwell (London: Thomas Nelson and Sons, Ltd., 1961).

[32]Theophilus, *On Divers Arts*, pp. xv-xvii.

[33]Daniel V. Thompson, Jr., "The 'Schedula' of Theophilus Presbyter," *Speculum*, VII (1932), 199, 210-213. Also, see Rozelle Parker Johnson, "The Manuscripts of the 'Schedula' of Theophilus Presbyter," *Speculum*, XIII (1938), 86 ff.

[34]Theophilus, *On Divers Arts*, pp. xv-xvii.

[35]Venice, Biblioteca Nazionale Marciana - MS. Latin 3597 (Latin Class VI Cod. CXCIX). For paleographic information on this manuscript, see Thompson, "The 'Schedula,'" pp. 213-14.

[36]Florence, Biblioteca Nazionale Centrale - MS. Palat. 951, fols 1^{r}-8^{v}, 10^{r-v}. See Johnson, "Manuscripts of the 'Schedula,'" p. 97.

[37]Unless otherwise noted, the description of the following three tracts has been drawn entirely from Gaetano Milanesi, ed., *Dell'arte del vetro per musaico; tre trattatelli dei secoli XIV e XV ora per la prima volta pubblicati*, Scelta di curiosità letterarie inedite o rare dal secolo XIII al XVII,

Dispensa 51 (1864; rpt. Bologna: Commissione per i testi di lingua, 1968).

[38]Astone Gasparetto, "A proposito dell'officina torcellana-Forni e sistemi di fusione antichi," *Journal of Glass Studies*, IX (1967), 59.

[39]Gasparetto feels that the author was probably Venetian based on the character of the terminology used within the tract. *Ibid.*

[40]For an English translation and paleographic examination of the Bolognese manuscript, see Merrifield, *Original Treatises*, II, 325-600.

[41]For an English translation of those sections in Månsson's work and Agricola's *De Re Metallicis* which deal with glass, see S. E. Winbolt, *Wealden Glass*, Hove, England, 1933, as cited in Theophilus, *On Divers Arts*, p. xx.

Vannoccio Biringuccio was born in Siena in 1480 and probably died in Rome sometime in 1539. *La Pirotechina* was published posthumously in Venice in 1540. For an English translation of that portion which contains information on glassmaking (Book II, chapter xiv) and paleographic information, see Vannoccio Biringuccio, *The Pirotechnia*, trans. Cyril Stanley Smith and Martha Teach Gnudi (New York: the American Institute of Mining and Metallurgical Engineers, 1942), pp. 126-33.

[42]For a bibliography of the Neri translations, see George Sang Duncan, *A Bibliography of Glass; from the earliest records to 1940* (London: Dawsons of Pall Mall, 1960), pp. 292-93.

[43]For a critical examination of Neri's book, see Polak, *Glass*, pp. 134-38.

CHAPTER II

GLASS AS A WINDOW-FILL

The tradition for glassmaking in Western Europe can be traced through artifacts from the time of the Roman Empire, whereas recorded documentation of the region's industry can be dated only as far back as the late Middle Ages. Nevertheless, our examination of Italy's glassmaking heritage during the first millenium A.D., will primarily depend upon both extant physical and literary evidence. It is fortunate that in the history of glass as a window-fill, there survives a continuum of such evidence dating from the beginnings of Christianity.

This chapter explores that evidence in order to determine when and where window glazing first developed, and to demonstrate that the native development of that practice in Italy is at least as old, if not older, than elsewhere in Western Europe. By way of an introduction, we shall first briefly survey the major forms of Medieval window-fills taking leave to then consider more carefully the manufacture of window glass and its employment.

Forms of Early Window-Fills

Prior to and during the period of our interest the general use of glass as a window-fill was rare. In fact, the occurrence of glazed windows in the British Isles was still considered uncommon as late as the sixteenth and seventeenth centuries.[1] Usually the practice was to screen window spaces with transparent oiled parchment, trellises, shutters, or thinly split marbled stone such as alabaster or onyx. Italian examples of these various types of fills are numerous.

Oiled parchment and waxed linen were probably the most commonly used of the early window-fills. They allowed the sunlight in, kept the bad weather out, were cheap and easy to replace. Yet they did little to deaden street noise, nothing to eliminate the hazard of fire, and frequently needed replacement. The Bolognese manuscript *Segreti per colori* from the first part of the fifteenth century offered the craftsman three different recipes "to make a window . . . which will appear to be real glass."[2] Two involved the preparation of goat or sheep skin and the third linen cloth. They all required soaking in some kind of solution, then stretching and drying.

Staley draws an amusing picture of the situation in early Florence:

> Shabby enough were the fronts of many of those grand old houses, in spite of titanic stones and massive metal-work, for, were not their windows, -

> if such we may call the many shaped openings for light and air, - covered only with dirty strips of oiled linen, stretched tightly over wooden frames? Window-glazing was a luxury of the rich, and even many of the *Magnificos* were content to live in the semi-darkness of their poorer neighbours.[3]

He goes on to say that

> the dwellings of the Florentines were much exposed to fire: their linen windows, the wooden framework of their fittings, and their doors, the vast expanse of drying clothes, - woollen and linen, - waving their lengths from the topmost stories, all these, and many another object, favoured conflagration.[4]

However, we are told that in Pisa, by the late thirteenth century there were notable declines in the use of oil soaked leather (parchment) for windows as a result of the growing popularity of glass.[5]

At the Basilica of Santa Sabina in Rome (fifth century) we find huge stucco ("metallo gypsino") transennae inset with mica panes which fill thirty-four windows (Plate VIII). The windows, approximately 2.34 meters wide and 4.24 meters high, form the clerestory, one above each intercolumniation. While those currently in situ are modern reproductions, fragments of the originals, which can be dated in the ninth century, are on display in the vestibule.[6]

Although early shutters were probably generally of wood, the eleventh century Basilica at Torcello has four shutters in the form of stone slabs (Plate IX). Made from Istrian marble they are movable on pivots, "used, perhaps, in default of panes and for safety."[7]

Giorgio Vasari, the sixteenth century Italian artist and biographer, tells us "Of Transparent Marbles for filling window openings" in his "Introduction" to the *Lives of the Painters, Sculptors and Architects* from 1568, that,

> Some sorts of marble are found in Greece and in all parts of the East, which are white and yellowish, and very transparent. These were used by the ancients for baths and hot-air chambers and for all those places which need protection against wind, and in our own days there are still to be seen in the tribune of San Miniato a Monte, the abode of the monks of Monte Oliveto, above the gates of Florence, some windows of this marble, which admit light but not air. By means of this invention people gave light to their dwellings and kept out the cold.[8]

Similar window-fillings are to be seen at the Mausolem of Galla Placidia in Ravenna, the Church of the Pieve in Arezzo and the Duomo in Orvieto.[9]

The earliest glass employed as a window-fill was moulded (a crude form of modern "cast" or "plate" glass).[10] Its widespread use as a window-fill in the West was inevitably bound up with glass-blowing which provided for mass produced panes of "crown," "muff" and "bull's-eye" glass.

Crown or spun glass, is made by twirling a bubble of glass on a rod, and cutting one end open so that under centrifugal force the bubble opens to a large circular sheet[11] (Plate X). Muff glass, also referred to as "broad" or "cylinder" glass, is made from a blob of molten glass collected on a blowpipe and blown into a long bubble, the

ends of which are cut off. This leaves a cylinder which, when cut down one side and heated, opens to a flat sheet[12] (Plate XI).

When making windows from crown of cylinder-blown glass, the Medieval glazier had to first decide the style of window he wished to construct. The most common employed a lozenge pattern, while one surviving glazier's book shows how the customer could choose from a variety of different patterns, some with names like "star and double cross," "hearts," "dice," "fish bladders" and "bishops' staffs"[13] (Plates XII-XIII). The panes of glass were then cut into the required shape and dimension by passing a heated iron along a trace line which had been moistened with water or spittle.[14] It is of vital importance to a neat and durable result that the edges of the panes be clean and even, so the glazier trimmed them with a pincer known as a "grozing-iron." The pieces of glass were then ready to be fitted together. This was done with strips of lead, called "came," that were moulded in a double-channel H-shape so that adjacent pieces of glass could be accommodated. When an entire panel was thus leaded, the cames were soldered together and iron "saddle bars" attached for strength and fastening.

Frequently windows were made up of parallel rows of small circular panes. The manufacture of these panes drew its origin from the production of crown glass. When the sheet of crown glass was cut, the central nob, where the rod

was attached, produced a roundel which is described as a "bull's-eye" pane. This was called by the English "bullion," the French "boudine" and the German "Butzen." Although they were considered a waste product during the Middle Ages, they served along with separately blown roundels (called "rui" in Italian) to supply the public with an inexpensive and therefore popular type of glass window[15] (Plate XIV).

To make a bull's-eye window, the round panes were fastened together with lead came in much the same manner as previously described. In addition, special efforts had to be made when filling the intrinsic spaces which resulted from the use of circular panes. This was accomplished by the use of either clear, coloured or patterned triangles (in French "coins"), squares or paterae[16] (Plate XV).

After the panes from these early glass window-fills had been leaded, they were fitted into frames of wood (called "telaio di legno" in Italian) or iron which were then mounted in the window embrasures. Often the frames were detachable so that the windows could be taken from place to place. In fact such windows were not considered as fixtures of the house, but as independent and often valuable objects. If the owner of the house moved, he took them with him; and he could give them away as a gift or make them objects of bequest in his will if he so desired.[17]

Early Documented Use of Glass As A Window-Fill

To understand the extent to which glass was employed as a window-fill we must turn to documents and the surviving physical evidence. Early references to this function of glass tend to be rather elusive and are frequently vague. Still worse are modern allusions to these earlier references, which either employ poor documentation or none at all. I have therefore made an attempt to cite only the more reliable examples.

The earliest reports date from the time of the Roman Empire and suggest that Caligula was the first emperor (A.D. 37-40) to employ glass windows in his palace.[18] Dating from the third century

> we find [Flavius] Vopiscus numbering this luxury [glass windows] amongst the extravagancies of the merchant Firmus, whose riches enabled him for some time to contest the sovereignty of Egypt with the troops of Aurelian [Lucius Domitius Aurelianus, Emperor of Rome 270-75].[19]

From the East, we have three noteworthy references to the use of glass in windows. The earliest is found in the thesis by Lactantius (Lucius Caelius Lactantius Firmianus) entitled *On the Workmanship of God (De Opificio Dei)* which dates from 304-5. Written following his religious conversion and probably while he was still at Nicomedia in Bithynia, where he taught rhetoric, it is considered the first of his many Christian works. It is in part an

analysis of the physiological nature of man, showing how the perfect adaptation of the parts of the body to their function can be due to none other than the Divine Creator. Our interest lies in chapter eight where Lactantius describes the function of the eye:

> We do behold all things that are placed before us, it is very true and very evident that it is the mind which by means of the eyes sees through to the things placed opposite, as if through windows covered with transparent glass or transparent stone.[20]

In the writings of St. John Chrysostom (Johannis Chrysostomos, c. 347-c. 407), Bishop of Antioch, we find mentioned that panes of glass set in wooden frames were the usual form of window-fill at that time. Whereas the glass in these windows may have been coloured, they were certainly not painted.[21]

Reference to sixth century windows come down to us in remarks made by Paul the Silentiary[22] concerning the church of Santa Sophia at Constantinople. In his "ekprasis," probably recited as an Opening Ode at the "Encaenia" of 24 December 563,[23] he describes the eastern semidome and observes: "through fivefold openings pierced in its back it provides sources of light, sheathed in thin glass, through which, brilliantly gleaming, enters rosy-ankled Dawn. . ."[24] It has been suggested that this glass was inserted in pierced marble and also may have been coloured.[25]

During this period in Western Europe, St. Gregory of

Tours (George Florentius, c. 538-c. 594), in his historical writings mentions a window in Auvergne, and also coloured glass windows he placed in the Church of St. Martin of Tours in France.[26] Also St. Philibert (c. 608-c. 685), is reported to have glazed the cloisters of Limoges in 655.[27] The Venerable Bede states in his writings on English history that in the last quarter of the seventh century (c. 674), Abbot Benedict Biscop, founder of the monasteries at Monkwearmouth and Jarrow, brought craftsmen from abroad to glaze these sites as the glazing trade was as yet "unknown" to the English.[28] Not long afterwards, St. Wilfrid (Walfridus, 634-709), Archbishop of York, placed windows in York Minster.[29]

From the Western Mediterranean area we have several references to the early use of glass in windows. The earliest dates from the fourth century and is found in the writings of Prudentius (Aurelius Clemens Prudentius of Spain, 348 - early fifth century), where he refers to coloured glass windows.[30]

Anastasius, the papal librarian, in his examination of the life of Pope Leo III (795-816), notes the installation of coloured glass windows among the Pope's many accomplishments at St. Peter's in Rome ("et alias fenestras de vitro diversis coloribus decoravit").[31] Leo III is also credited with having decorated the apse windows of the Lateran (San Giovanni in Laterano)[32] and the basilica of

Salvatoris[33] with coloured glass.

Pope Sergius II (844-47) decorated the apse of SS. Silvestro e Martino ai Monti (S. Martino ai Monti) in Rome, with windows of coloured glass.[34] Coloured glass is again mentioned in connection with a restoration of Santa Maria in Trastevere, carried out by Pope Benedict III (855-58).[35]

It would seem that painted figurative designs on glass appeared in windows around the year 1000,[36] with the Abbot Gosbert of Tegernsee in Bavaria calling himself fortunate in that his church, the windows of which had until then been covered with old pieces of cloth, now had windows of coloured glass, through which "the golden haired sun beams upon the floor through the colors of the painted glass, filled with joy the hearts of the faithful who marveled at the unaccustomed work of art."[37] An anonymous historian from the monastery of St. Benignus at Dijon, writing about 1052, affirms that there was still in existence in his time, in the church of the monastery, a very ancient window representing the martyrdom of St. Paschasia and that this painting had been taken from the old church restored by Charles the Bald.[38] Under the direction of Abbot Desiderius (c. 1027-1087), later Pope Victor III, the Benedictine Monastery at Monte Cassino in Italy was rebuilt and decorated. Consecrated in 1071 by Pope Alexander II, a detailed account of the abbey at this date exists in the "Chronica monasterii Cassinensis" of Leo of Ostia (Leo

Marsicanus), who states that his predecessor "renovated the structure and filled the windows with glass . . . painted with various colours."[39]

Early Physical Evidence of Glass Used As A Window-Fill

Although the physical evidence of early glass window-fill is sparse, that which does survive helps to illustrate the aforementioned documented references and also serves as an indicator of the extent to which glass was so employed. The earliest examples that come down to us correspond to the earliest reports from the time of the Roman Empire. The sites of Pompeii and Herculaneum in Italy (dating prior to the disasterous eruption of Mt. Vesuvius in A.D. 79) offer us our oldest examples. The most sophisticated of these was excavated from the Villa Diomede at Pompeii. It utilized a moveable wood frame that held four panes of cast glass, each about six inches square.[40] Glass plates for windows have also been found in the Basilica of Junius Bassus on the Esquiline and would seem to be from the fourth century.[41]

A recent excavation in Northern England has uncovered a number of windows made of glass that date from Roman-Britain. The site, called Vicus I which flourished from about A.D. 170 to c. 250, was a civilian settlement built outside the west gate of Vindolanda, a Roman garrison located one mile south of Hadrian's Wall.[42] A find such as

this, associated with a civilian population, might suggest the common usage of glass for windows in Roman settlements throughout England. Further evidence in support of this theory has been discovered in the remains of the Roman-British towns of Calleva Atrebatum (Silchester)[43] and Uriconium (Wroxeter)[44] near Shrewsbury. Curious though is the fact that among the ruins of Vicus II, a more industrial settlement built upon the leveled rubble of Vicus I and dating from the end of the third century to the end of the fourth century, window glass is entirely absent.[45]

The earliest surviving ecclesiastical examples of glass window-fill betray a Christian tradition for glass staining and painting that would seem to be quite ancient. A very early piece of transparent glass-painting exists from the sixth century which is thus perhaps the oldest surviving specimen. Discovered along with other fragments of coloured glass at the basilica of San Vitale in Ravenna, Italy, which must have been part of the window-fillings there, it represents a Christ in benediction drawn only in outline[46] (Plate XVI). Painted glass fragments dating from the ninth century have been unearthed from Lorsch Abbey in Germany. Now reconstructed, these fragments suggest a nimbused head of Christ or possibly that of an Apostle or Saint[47] (Plate XVII). The earliest painted glass image to survive intact dates from the eleventh century. Originally in the Abbey Church of Wissembourg, Alsace but now housed in

the Musée de l'Oeuvre Notre-Dame, Strasbourg, it represents the image of Christ which may have been the central portion of a larger programme[48] (Plate XVIII). The oldest surviving complete stained and painted glass windows can be found in Augsburg Cathedral in Bavaria. The windows, possibly glazed towards the end of the eleventh century, portray five Old Testament figures: Moses, David, Daniel, Hosea and Jonas[49] (Plate XIX). More than eight feet tall and Romanesque in style, each holds in one hand a scroll bearing a quotation in Latin from his own writings (Plate XX). They are, evidently, all that remain of a longer series.

Following these examples, we find in England, France and Germany by the twelfth and thirteenth centuries the survival of literally "walls" of stained glass windows. In the South, the earliest windows date from the mid-thirteenth century and they are from Italy. Unfortunately, only fragments remain of stained glass windows in the East from this period.[50] To illustrate the abundance of stained glass in the North during this time, let us briefly examine some of the restrictions placed upon their use. The Cistercian interdict of 1134 prohibited all figurative art in the houses of their "strict orders."[51] This ban, in turn, led to a great upsurge of ornamental work, both in the sculptural decoration of monastic buildings and in the use of stained glass. The glass motifs range from simple

geometrical and ribbon-garland patterns to delicate floral designs (Plate XXI). In 1260, at the chapter of Narbonne, Saint Bonaventura, then Minister General of the Franciscan Order (1257-74), established among the rules for the church, that "curiositas" in pictures, ceilings, windows and columns is to be avoided.[52] Exception was made only for the window behind the great altar of the choir where it was permitted to represent the "Redeemer, the Virgin, St. John, St. Francis and St. Anthony of Padua."[53] It is interesting to note that Bonaventura's interdict had little effect on the Order's Mother Church in Assisi, as its rather complex decorative programmes dating from this time would seem to indicate.[54]

Notes to Chapter II

[1]For specific references, see Dionysius Lardner, *The Cabinet Cyclopaedia: a treatise on the progressive and present state of the manufacture of porcelain and glass* (London: Longman, Rees, Orme, Brown and Green, 1832), pp. 134-35.

[2]Merrifield, *Original Treatises*, II, 492-93 (items 214-16).

[3]John Edgcumbe Staley, *The Guilds of Florence* (London: Methuen & Co., 1906), p. 471.

[4]*Ibid.*, p. 473.

[5]David Herlihy, *Pisa in the Early Renaissance: A Study of Urban Growth* (New Haven: Yale Univ. Press, 1958), p. 143 and note 42. Also, see Lodovico Zdekauer, *La vita privata dei Senesi nel dugento* (1896; rpt. Bologna: Arnaldo Forni Editore, 1964), p. 37.

[6]For a definitive examination of these gratings, see Antonio Muñoz, *Il restauro della basilica di Santa Sabina* (Roma: Fratelli Palombi, 1938), pp. 29-33. Also see Richard Krautheimer, *Early Christian and Byzantine Architecture* (Baltimore: Penguin Books, Inc., 1965), pp. 130 and 132 (notes 9 and 10).

For a discussion of other Italian sites with this type of window-fill, see Muñoz, *Santa Sabina*, pp. 29-33.

[7]Antonio Niero, *The Basilica of Torcello and Santa Fosca's* (Venezia: Ardo/Edizioni d'Arte, n.d.), p. 46.

[8]Giorgio Vasari, *Vasari On Technique: Being the Introduction to the Three Arts of Design, Architecture, Sculpture and Painting, Prefixed to the Lives of the Most Excellent Painters, Sculptures and Architects*, trans. Louisa S. Maclehose (1907; rpt. New York: Dover Publications, Inc., 1960), p. 43.

[9]"The five eastern window-openings of S. Miniato are filled with slabs of antique pavonazzetto with red-purple markings, nearly two inches thick and measuring in surface about 9 ft. by 3 ft. The windows are square headed. The slabs transmit the light unequally according to the darker or lighter patches in their markings, but the effect is pleasing." *Ibid.*, p. 43 (note 49).

On the "translucent light grey alabaster" at the Church of the Pieve in Arezzo, see Sherrill, *A Stained Glass Tour in Italy*, p. 77.

[10]In the East, the use of cast glass plates for stained glass windows seems to have continued well into the Middle Ages as fragment examples dated c. 1126 and found in the church of the Pantocrator at Zeyrek Camii would seem to indicate. Arthur Megaw, "Notes on Recent Work of the Byzantine Institute," *Dumbarton Oaks Papers*, No. 17 (1963), p. 363 and note 91.

[11]For a series of engravings illustrating the production of "Crown Glass", see Denis Diderot, *A Diderot Pictorial Encyclopedia of Trades and Industry*, ed. Charles Coulston Gillispie, 2 vols. (New York: Dover Publications, Inc., 1959), II, Plates 235-48.

[12]For a series of engravings illustrating the production of "Broad Glass," *ibid.*, II, Plates 249-54.

[13]Polak, *Glass*, p. 120.

For representations of lozenge patterned windows in painting, see: Roger van der Weyden's "Annunciation" from c. 1435, "St Luke Drawing the Virgin" from c. 1435-37, and "Von Werl Altarpiece" from 1438.

[14]By the first half of the fifteenth century, the process of cutting the glass had become much eased by the diamond point. Merrifield, *Original Treatises*, II, 494 (Bolognese MS., item 217).

[15]Bull's-eye windows are frequently seen in the paintings of Jan van Eyke, but the most noteworthy example must be Albrecht Dürer's engraving of "St. Jerome in His Study" from 1514 (Plate XIV). Bull's-eye windows were to become so common that their image came to be associated with glaziers and their shops. Examples include a mural painting on the vaulting of a burgher's house in Český Krumlov, Southern Bohemia, depicting a glazier's workshop and dated 1548, see Václav Husa, *Traditional Crafts and Skills: Life and Work in Medieval and Renaissance Times* (London: Paul Hamlyn, 1967), Ill. 107. Also Jost Amman's woodcut of "Der Glaser" in his *Ständebuch* of 1568, see Jost Amman and Hans Sachs, *The Book of Trades: [Ständebuch]*, intro. Benjamin A. Rifkin (New York: Dover Publications, Inc., 1973), p. 31 (illustration).

Italian examples of this form of window-fill in architectural settings are numerous. Sites include: the Church of the Annunziata in Arezzo, S. Maria Novella in Florence, Sta. Maria della Salute in Venice, S. Anastasia in Verona and many others.

[16]Designs for the various space-fillers are illustrated in Day, *Windows*, p. 292 (ill. 199).

[17]Polak, *Glass*, pp. 120-21. For examples see: Vasari, *On Technique*, p. 266 (note 3).

[18]Sir William Gell, *Pompeiana*, London, 1875, 4to [*sic*] ed., vol. ii, p. 101, as cited in Westlake, *A History*, I, 4 (note e). Also, see Robert and Gertrude Metcalf, *Making Stained Glass* (Newton Abbot: David and Charles, Ltd., 1972), p. 16.

[19]Sir William Gell and John P. Gandy, *Pompeiana: The Topography, Edifices, and Ornaments of Pompeii*, 3rd ed. (London: Henry G. Bohn, 1852), p. x. No documents are cited.

[20]Lactantius, *Lactantius: The Minor Works*, trans. Mary Francis McDonald (Washington, D.C.: the Catholic University of America Press, 1965), p. 27. "Verius et manifestius est, mentem esse, quae per oculos ea, quae sunt opposita, transpiciat quasi per fenestram lucente vitro aut speculari lapide obductam." Westlake, *A History*, I, 5 (note y).

[21]Day, *Windows*, p. 3; Heribert Hutter, *Medieval Stained Glass* (New York: Crown Publishers, Inc., 1964), p. 5.

[22]"The Silentiaries, of whom Paulus was one, were court officials. Their office was an exalted one, as they ranked with the senators, and were employed on all kinds of service, not unfrequently becoming the historians of the emperor. Paulus belonged to the cultivated and literary circle, who during Justinian's reign interested themselves in literature, and to him are attributed more than eighty poems in the Anthology." W. R. Lethaby and Harold Swainson, *The Church of Sancta Sophia Constantinople: A Study of Byzantine Building* (London: Macmillan and Co., 1894), pp. 33-34.

[23]*Ibid.*, p. 34.

[24]Cyril Mango, *The Art of the Byzantine Empire 312-1453: Sources and Documents*, in the history of art series (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1972), p. 82. Also, see Lethaby and Swainson, *Sancta Sophia*, pp. 289-90.

[25]Lethaby and Swainson, *Sancta Sophia*, pp. 289-90.

[26]Westlake, *A History*, I, 4 (note n). There are no documents cited for this reference.

[27]*Ibid.*, I, 4 (note o). There are no documents cited for this reference.

[28]Bede, *Bede's Ecclesiastical History and the Anglo-Saxon Chronicle*, ed. J. A. Giles, 2nd ed. (London: Henry G. Bohn, 1849), p. ix; Beda Venerabilis, *Vita Quinque SS. Abbatum*, as cited in P. J. Migne, *Patrologia Latina*, Parisiis, 1844-66, v. 94 (1850), col. 717A, as cited by Johnson, *Compositiones Variae*, p. 71 (note 112); Westlake, *A History*, I, 4 (note q); F. Sydney Eden, *Ancient Stained and Painted Glass* (Cambridge: University Press, 1913), p. 25.

I might note that in *Glass and Stained Glass Windows*, p. 34, we find mentioned that "the Venerable Bede writes that in 674 A.D. glaziers were brought from Venice to execute the stained glass for Wearmouth Monastery." This is the only reference I have found to "stained glass" or "Venice" in conjunction with Bede's writings on Wearmouth or Jarrow Monasteries. All other sources have referred only to "windows" and to "Gaul."

Of course the practice of employing glass in windows before Bede's day was not entirely unknown in England. *Infra*, pp. 31-32.

[29]Abbé Claude Fleury, *Histoire Ecclésiatique*, vol. viii, book xxxix, p. 527, as cited in Westlake, *A History*, I, 4 (note r).

[30]Hutter, *Medieval Stained Glass*, p. 5. There are no documents cited for this reference.

[31]Anastasius, *De vita Romanorum Pontificum*, Mayence [Mainz], 1602, p. 186 (M. le Comte Ferdinand de Lasteyrie [Ferdinand Charles Léon Lasteyrie du Saillant], *Histoire de las peinture sur verre d'après ses monuments en France*, Paris, 1853-57, p. 9), as cited in Westlake, *A History*, I, 4 (note s); and in L. M. O. Duchesne, *Le Liber Pontificalis*, Paris, 1886, v. 2, p. 8, and Muratori, *Rerum Italicarum Scriptores*, Mediolani, 1728, v. 3, pt. 1, p. 200, col. 1B, both cited in Johnson, *Compositiones Variae*, p. 74.

[32]"Fenestras de apside es vitrodiversis coloribus conclusit." Fleury, *Histoire Ecclésiatique*, 12 mo. vol. x. p. 158, as cited in Westlake, *A History*, I, 5 (note z).

[33]"Simul et fenestras de absida ex vitro diversis coloribus decoravit, atque conclusit." Duchesne, *Liber Pontificalis*, v. 2, p. 25, and Muratori, *Rerum Italicarum Scriptores*, v. 3, pt. 1, p. 208, col. 1B-C, both cited in Johnson, *Compositiones Variae*, p. 74.

[34]"quas ex vitro et diversis coloribus decoravit;" Duchesne, *Liber Pontificalis*, II, p. 94, as cited in Carlo Cecchelli, "Vetri da finestra del S. Vitale di Ravenna," *Felix Ravenna*, XXXV (August, 1930), 11-12.

[35]"Fenestras vero vitreis coloribus ornavit et pictura mussivi decoravit;" Anast. in Migne, *Patrol.*, cxxviii, 1354, as cited in Ferdinand Gregorovius, *Geschichte der Stadt Rom im Mittelalter, vom fünften Jahrhundert bis zum sechzehnten Jahrhundert*, 4 vols., Stuttgart, 1859-62, iii, p. 134, as cited in *Quarterly Review*, CXV, No. 229 (Jan., 1864), 214. Also see Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, trans. Mrs. Gustavus W. Hamilton, 8 vols., 2nd ed., rev. (1903; rpt. New York: AMS Press, Inc., 1967), III, 120 (Book V, chap. iv), wherein the same information is transmitted but the source is cited as *Lib. Pont.* n. 572.

[36]"The oldest document extant, relating to glass painting, is a letter written by the Abbot Gosbert de Teugersee [*sic*], in Bavaria. It was composed between 983 and 1001." Marchese, *Lives*, II, 196 (note 1).

[37]Franz L. Müller, "The World's Oldest Stained-Glass Windows," *Art and Archaeology*, XXVII (January, 1929), 41. The exact source for this quote is not given.

[38]Whether this window was painted in fluxed colours or merely a painting on a piece of glass in infusible colour remains a mystery.

Emeric David, *Hist. de la Peinture*, 1847, p. 79, as cited in Westlake, *A History*, A History, I, 5 (note z).

[39]"Capitulum funditus renovavit illudque vitreis fenestris consternens . . . colorum varietate depinxit." *Chronici Casiensis*, lib. iii. cap. x, as cited by Dubreuil, I Vol. in folio. Paris, 1603, as cited in Westlake, *A History*, I, 4 (note t). For interpretive comments, see Westlake, *A History*, I, 1-2 and 4 (note u).

[40]Nixon, *Philos. Trans.*, xi. 86; abridged, 1757, as cited in Westlake, *A History*, I, 4 (note t). For references to other finds at Pompeii, see Westlake, *A History*, I, 4 (notes c and d).

From the *Letters* of Pliny the Younger (Gaius Plinius Luci filius Caelius Secundus, c. 61-c. 113), we find contained in his correspondence to Clusinius Gallus (Book II. xvii) several references to the windows of Pliny's

villa at Laurentium, 26 km south of Rome (just down the Tyrrhenian Sea coast from Ostia). Pliny describes his covered arcade as having "windows on both sides, but more facing the sea. These all stand open on a fine and windless day, and in stormy weather can safely be opened on one side or the other away from the wind." ("Utrimque fenestrae, a mari plures, ab horto singulae sed alternis pauciores. Hae cum serenus dies et immotus, omnes, cum hinc vel inde ventis inquietus, qua venti quiescunt sine iniuria patent.") Pliny, *Letters and Panegyricus*, trans. Betty Radice, 2 vols. (London: William Heinemann, Ltd., 1969), I, 138-39 (Book II. xvi. 16) and II, 554-55 (Appendix B) for a reconstructed plan of Pliny's villa.

Although no mention is made of glass in these windows, it is probably safe to assume that they were glazed with panes set in wood or bronze frames like contemporary examples unearthed at Pompeii and Herculaneum.

For further information concerning the Roman practice of using glass as a window-fill, see Middleton, *Anc. Rome*, i. 31., as cited in Lethaby and Swainson, *Sancta Sophia*, p. 289 (note 1).

[41]Eisen, *Glass*, p. 168.

[42]Robin Birley, "A Frontier Post in Roman Britain," *Scientific American*, CCXXXVI, No. 2 (February, 1977), 41.

[43]Metcalf, *Making Stained Glass*, p. 16. No date for this evidence is cited.

[44]*The Builder*, vol. xxvii. pp. 372, 517, as cited in Westlake, *A History*, I, 4 (note 1). Uriconium was destroyed in A.D. 415.

[45]Birley, "A Frontier Post," p. 41.

[46]The colours of the glass found here include: deep blue, greenish, dark purplish brown, off-white, yellow and light purple. For further description, see Cecchelli, "Vetri da finestra," pp. 1-20.

[47](Exhibition catalogue) *L'Exposition Charlemagne Oeuvre, Rayonnement et Survivances*, Düsseldorf, 1965, pp. 449-50 (item 641) and Plate 113.

[48]Lawrence Lee, George Seddon and Francis Stephens, *Stained Glass* (New York: Crown Publishers, Inc., 1976), p. 38.

[49]"They are probably in their original position in the clerestory of the nave, but the frames in which they are fitted are later and smaller, as several of the figures seem to be hemmed in and others truncated." Lee, et al., *Stained Glass*, p. 67. Müller, "World's Oldest," p. 42, dates the windows to about 1000. Edward Liddal Armitage, *Stained Glass: Technology and Practice* (London: Leonard Hill [Books] Limited, 1959), p. 20, attributes them to the monks of Tegernsee and assigns their date to 1065. H. Wentzel, *Meisterwerke der Glasmalerei*, Berlin, 1954, p. 16, as cited by Megaw, "Notes on Recent Work," p. 353 (note 61), prefers an early twelfth century date.

[50]For example see Megaw, "Notes on Recent Work," pp. 349-67.

[51]Refer to Jane Hayward, "The Glazed Cloisters and Their Development in the Houses of the Cistercian Order," *Gesta*, XII, Nos. 1-2 (1973), 93-109.

[52]John Moorman, *A History of the Franciscan Order: From Its Origin to the Year 1517* (Oxford: the Clarendon Press, 1968), p. 149.

[53]Giustino Cristofani, "L'iconographie des vitraux du XIII^{e} siècle de la Basilique d'Assise," *Revue de l'art chrêtien*, LXII (1912), 111-12, who refers to Adolfo Venturi, *La Basilica di Assisi*, Roma, 1908, pp. 40-41.

The standard text on the Constitutions of Narbonne is the one edited by Fr. Bihl in *Archivum Franciscanum Historicum*, XXXIV (1941), 13-94 and 284-358, as cited in Moorman, *Franciscan Order*, p. 148.

[54]*Infra*, p. 79, note 137.

CHAPTER III

EARLY ITALIAN GLASS HOUSES AND STAINED GLASS

The purpose of this chapter is to examine the earliest records relating to Italy's glassmaking industry and the early stained glass monuments. The addition of this information to what we have already presented will offer further proof of an early Italian glassmaking tradition. The geographical areas to which we will limit our investigation include those known today as the Veneto, Tuscany and Umbria.[1] By way of an introduction we shall first examine how stained and painted glass windows are produced and discuss the earliest treatises that include this topic.

Manufacturing Stained and Painted Glass Windows

Essentially stained and painted glass windows are a fabric composed of small pieces of coloured glass painted with monochrome enamel, fastened together with narrow strips of lead and held in place with cross-bars. It is not an art which underwent a long period of evolution but rather developed quite rapidly as the result of many influences. It is clear that four distinct arts associated

with the Orient, were drawn upon as models for this new art form: mosaics, enamels, frescoes and manuscript illuminations.[2] These arts and their techniques combined with the changing taste in architectural style to provide what was to be the necessary inspiration and motivation for the craft's development.

Any thorough study related to stained and painted glass windows ought to contain a note as to their construction. Below is a brief description of the procedures as practiced during the Middle Ages. First, after careful measurements of the window space, the design of the composition with light and shade was drawn life-size on a bench surfaced with a hardened chalk and water compound. By the fifteenth century this process was somewhat altered as large sheets of paper were substituted for the table's surface,[3] a practice which has continued to this day (Plate XXII). Life-size paper designs, called "cartoons" (in Italian "cartone"), offered greater working ease as they could be easily stored, transported and re-used.[4]

The design of the cartoon differed in its origin in Northern and Southern Europe. In the North Countries the window derived its design generally from the glaziers' workshops or simply from the glazier himself. The glazier, due to the rapid growth and development of window staining and painting which began in the tenth century,[5] became quite

an important, independent and accomplished creative artist. The final result was entirely of his own devising: he was both the creator of the work and the executor of the complicated process of its realization. In Italy the situation was different. The glaziers were generally more adept executants than designers. Consequently, they were compelled to rely on the expertise of the painter in matters of design.[6] Such assistance came either in the form of a small sketch or a full-sized cartoon.

After the cartoons were drawn, the way the various pieces of glass were to be arranged and the different colours that were to be used was marked out. Next, the glazier proceeded to select and cut the glass. Care had to be taken in choosing the glass sheets so as to exploit the unequal intensity of colour which resulted from varying thicknesses inherent to certain production procedures[7] and unequal "staining" while mixing the batches.[8] The glass was then cut by means of a hot iron (as outlined in Chapter II). The next step was to paint the glass pieces with a vitreous pigment. In Italy, it was generally the case that the glazier contracted an artist to do the painting. The final mechanical operation of soldering the glass together with double-grooved rods of cast lead followed next.

Because the Italian glazier may have sought outside assistance from professional painters, there is no reason to disregard the importance he played in the window's concep-

tion. In the field of stained and painted glass windows, where the lead-lines are often of intrinsic value in the figurative effect, cutting and leading can assume decisive importance in translating the idea. In most cases it was up to the glazier to choose the colours he would use in the composition and hence to choose the glass he would cut. This was not an easy task. After the glass was chosen and pieces finally cut, he could not really tell what the end product would look like since coloured glass laid against a cartoon loses its transparent quality. Hence only a general effect could be gained (Plate XLIV).

It is easy to see how a composition reflecting the energies of both the painter and glazier could take on quite an unusual style. Glaziers and artists rarely signed their windows and as a result attributions to a specific artist are difficult and generally based on such surviving documents as payment records and work orders or contracts.

Manuscripts and Treatises Related to the Manufacture of Stained and Painted Glass Windows

Those technical tracts that specifically contain information relative to the production of stained and painted glass windows (prior to the sixteenth century), include the *Diversarum artium schedula* attributed to Theophilus; *De coloribus et artibus Romanorum* attributed to Heraclius; the "Trattato" of Antonio da Pisa; *Il libro dell'arte*

by Cennino d'Andrea Cennini; *De la practica di comporre finestra a vetri colorate* attributed to Frate Formica and the Bolognese manuscript *Segreti per colori* by an unknown author.

In Chapter I, we have seen how Book II of the *Diversarum artium schedula* survives as the most complete treatment of glass technology to be found in a Medieval manuscript. It contains not only chapters concerned with the production of glass but also some fourteen others related to the manufacture of stained and painted glass windows. Topics range in scope from the design of the windows to their assembly and final installation. Procedures described include glass cutting, preparation of the glass-painting pigment, building the kiln in which the painted glass is fired, and casting of the cames.[9]

As previously indicated, the earliest known Italian copy of Theophilus to contain information from Book II dates from the seventeenth century. At first this might appear to be a considerable loss but the need for information offered by a manuscript such as the *Diversarum artium schedula* was probably not required in Italy during the twelfth century. The majority of the subtleties of the craft seem to have been well known by then. This can be construed by the presence of only one recipe in *De coloribus et artibus Romanorum* which specifically relates to the production of stained and painted glass windows. The recipe outlines how to prepare the unique pigment required for painting on glass.[10] It

dates from the twelfth-thirteenth century and although it may draw its origin from a Northern European, possibly French source,[11] its presences in the Heraclius manuscript serves to indicate only the slightest need for supplementation of the already established knowledge on the subject.

All the remainder of the extant technical treatises concerned with the production of stained and painted glass windows after Theophilus (and prior to the sixteenth century) originate in Italy. From the end of the fourteenth century we have the "Trattato" of Antonio da Pisa,[12] who was active in Florence as a master glazier. A specialist well versed in the art of glazing and design, he reveals many of the practices involved with the craft. He describes the methods of designing and executing windows. He gives advice on the best method of obtaining commissions and for quoting prices to customers. On matters of aesthetics, he recommends rules for colour combinations freely citing his own work as example, some of which still survives today.[13] Concerning questions of appropriate dress or colour for the various saints, he suggests the glass-painter look to fresco for the precedents laid down there.

Il libro dell'arte, written about 1390 by the Florentine Cennino d'Andrea Cennini, survives as the earliest Italian treatise on the art of painting. In this work, Cennini devotes a small chapter to stained and painted glass.[14] Although quite similar in technical content to the

others, it does present additional information concerning methods and materials important to the craft. We are told, for example, that "ordinarily those masters who do the work possess more skill than draftsmanship, and they are almost forced to turn, for help on the drawing, to someone of all-round, good ability."[15] Cennini is here of course suggesting that the glazier turn to the painter for assistance, a practice that was frequently employed in Italy as the evidence presented in the following pages will clearly indicate.

From the last years of the fourteenth, or possibly the first of the fifteenth century, there survives a tract entitled *De la practica di comporre finestra a vetri colorati.*[16] It has been attributed to a Franciscan father by the name of Francesco Formica who is documented as having worked on the principal window in the Duomo of Florence.[17] The tract is entirely technical in nature and is primarily concerned with information relating to the preparation of the furnace used in the production of stained and painted glass for windows.

The last manuscript we shall mention is the *Segreti per colori* from the first half of the fifteenth century. Besides the recipes it contains for the preparation of coloured glasses, there is one other relevant to the production of stained and painted glass windows. That recipe is specifically concerned with the preparation and use of the vitreous pigment required for painting on glass.[18]

As was the case with the corresponding recipe in the Heraclius manuscript,[19] our author here probably felt the need to include only this one essential recipe for the production of stained and painted glass windows.

The Veneto

Recent excavations on the island of Torcello in the Venetian lagoon have revealed what is believed to be the earliest surviving evidence of an Italian glass-house (Plate XXIII).[20] Finds at the site include debris of a glass furnace, fragments of small glass drinking vessels, mosaic tesserae and other remains of glassmaking activity, all of which can be dated to the seventh-eighth centuries.[21]

The earliest surviving literary reference to the glass industry in Italy is found in a Venetian document of 1090 where we find mentioned a certain "Petrus Flavianus phiolarius."[22] Following that, "one regulation in the 'mariegola dei phioleri de Muran' is said by Zanetti to bear as early a date as 1180."[23] By the beginning of the thirteenth century the industry was flourishing, though probably under the direction of "I Guistizieri Vecchi" (the Republic's officials for the surveillance of the crafts).[24] In 1268, at the time of the election of the doge Lorenzo Tiepolo, the chronicler Martino da Canale speaks of the procession of the craft guilds that marked that event. He describes the glass workers as being "with scarlet and

decorations of gold and rich garlands of pearls and decanters and scent bottles and many other nice glass objects."[25]

The glassmaker's *Capitolare* of 1271 serves as testimony to the early organization of the Venetian glass industry.[26] It is comprised of "mariegole" ("madre regole" or chief rules) which governed the manufacture of glass weights, beakers and bottles for wine and for oil to which the "fioleri" or glass blowers were required to adhere. The *Capitolare* essentially articulates rules for quality control, a schedule for factory operations, and guidelines for selling the finished product. Also included, in an attempt to protect the Venetian glass industry, was a provision which forbade the importation of foreign glass.

Further protection for the Venetian glass industry was afforded in a law of 1275, mentioned in the *Chronicle of Dandolo*.[27] It prohibited the exportation from Venice of any tool or material including sand used in the fabrication of glass.[28] Also prohibited was the exportation of any fragment of broken glass "which other nations might melt and fashion into new forms."[29]

> In 1295 the Great Council renewed the prohibition of the year 1275 against the exportation of the materials of glass, and increased the fines to be levied upon glass-makers who should return to Venice after a sojourn in other states, a petition presented on this occasion states that furnaces had been established in Treviso, Vicenza, Padua, Mantua, Ferrara, Ravenna, and Bologna.[30]

By 1278 the majority of the glass workers from Venice had settled in Murano "under the protection of San Donato,"[31] one of the four parishes on the lagoon island situated less than two kilometers north of Venice (Plate XXIII).[32] The immigration was involuntary but necessary, as the industry had become both a health hazard and fire danger to the populace of Venice. Still, there must have been a considerable number of glass-houses in Venice, for a decree of the "Consiglio Maggiore" or Great Council, dated November 8, 1291, ordered the removal of the glass-furnaces at Castello to Murano,[33] though in the following year special leave was granted to make "veriselli" (small glass wares) in Venice.[34] By about 1300 the removal was more or less complete[35] and from that day to this Murano has been the geographical centre of the Venetian glass industry.

The history of Venetian glassmaking is dotted with privileges granting rights to individual glassmakers, thereby allowing them to produce new and specialized kinds of glass. In 1317, one Giovanni "fioler di Murano" received from the Consiglio Maggiore a privilege to make coloured glass for windows, being superior in that art to any other ("melior in dicta arte aliquo alio").[36]

The earliest mention of stained glass work in the Veneto comes from a public record at Treviso dated 1335. We are informed that a certain "Maestro Marco, a painter who dwells in Venice with the Fratri Minori, executed . . . some

glass windows . . . which are at Treviso in the Church of St. Francis, belonging to the Fratri Minori."[37] These were apparently copied from originals at the Fratri Minori (Sta. Maria Gloriosa dei Frari) in Venice and sent to Treviso.[38]

The earliest and almost the only traces of Medieval stained glass in Venice are fragments that repose in the Galleria dell'Accademia and in the Museo Vetrario Murano. These are from the fourteenth century and belong to what may have been a series of "Saints" standing under Gothic arches. Their style reflects that of a follower of Lorenzo Veneziano (fl. 1356-79).[39]

The earliest surviving documented stained and painted glass in the Veneto is a window found in the Basilica of Ss. Giovanni e Paolo (also called S. Zanipolo) in Venice (Plates XXIV-XXVII). Located in the southern transept of the church it has been dated to c. 1473[40] and identified as a product of the Murano glass furnaces.[41] The window was executed by Gian' Antonio Licinio da Lodi and draws its design from no less than the combined efforts of three artists: Bartolomeo Vivarini da Murano, Cima da Conegliano and Gerolamo Mocetto da Verona.[42] Included within the programme of the window are "Old Testament Prophets," the "Doctors of the Church" and various "Dominican Saints."[43]

Also from the end of the fifteenth century, are a set of three double lights in the Cornaro (or San Marco)

Chapel in the Fratri Minori in Venice. Depicted under flowery canopies are the "Madonna" and a series of "Saints."[44] Marchini tells us that

> it is a poorly preserved work by two [unknown] artists from the valley of the Adige [in northern Italy], . . . one of whom is worthy of note and shows marked characteristics of [Michael] Pacher [c. 1435-98].[45]

The last example of Venetian stained glass that we will examine is a small window in the cupola of Santa Maria dei Miracoli (Plate XXVIII). Appropriately located directly behind and above the high altar, it represents a bust of "Christ Emerging from the Sarcophagus" and dates from the end of the fifteenth or beginning of the sixteenth century.[46] The window reflects in its delicacy the style of the Venetian painter Giovanni Bellini, called Giambellino (c. 1430-1516).[47]

Tuscany

The origin of Tuscan glassmaking is uncertain. The earliest surviving (glass) artifacts in the province are believed to be either Egyptian or Greek in origin.[48] Actual glass production in Tuscany dates from the time of Imperial Rome.[49] Early glassmaking in Tuscany was centred around the rather remote inland forest regions and supplied the local needs of the people. Products included simple utilitarian vessels such as beakers ("bicchieri" in Italian) for wine-drinking, bottles and containers for the transport and

storage of wine and olive oil, and for the serving of wine in everyday domestic life (Plate XXIX). Although not an important part of the general production, a certain amount of flat glass for windows was also manufactured.

The Elsa and Era River Valleys, situated just south-west of Florence, encompassed the earliest documented glass producing region in Tuscany. The area includes such sites as Gambassi, Montaione, Pisa, San Gimignano and San Miniato. The earliest record survives from the commune of San Gimignano. It comes down to us in the form of a provision dated 1265 which allowed for a certain glass-blower, called Cheronimo, to set up a furnace "per l'arte dei bicchieri."[50] A similar document dated 1335, also from San Gimignano, agreed to permit Bartolo Bennati to manufacture and sell "bicchieri" provided they were "more reasonably priced than those produced in Gambassi."[51]

The survival of litigation dating from 1382 between the commune of Montaione and the town of San Miniato serves to establish the existence of a glass-making industry in those areas.[52] Briefly, the action involved the Montaionesi seeking to regain possession of woodlands that they had previously leased to interests in San Miniato. It would seem that the glass furnaces of San Miniato were consuming the wooden fuel from the forest at such an alarming rate that the Montaionesi sought the return of their land in order that they might "conserve and enjoy its

benefits."[53] Record of Montaione's ownership of the land, dating 1257, possibly suggests a much earlier date for the employment of its wood for glassmaking in the Valdelsa.[54]

Pisa has the distinction of having the earliest documented stained glass artist in the region. Recorded in 1222 is the name of a certain Andrea who, it is said, was born in Poland and later became a Dominican friar in Pisa.[55] He is credited with having executed the window in the choir of Sta. Caterina. Unfortunately, Fra Andrea's window is no longer preserved. It would seem to have been lost relatively recently as Merrifield, in 1849, reports that his name appears "at the foot of it."[56]

Recorded in the *Chronicle* of the Convent of Sta. Caterina from the first half of the fourteenth century is the name of Fra Domenico Pollini, a native of Cagliari in Sardinia.[57] He is described as a priest skilled in music, miniaturing and glass painting who died in 1340.[58] In the same *Chronicle* we find eulogized Fra Michele Pina da Pisa.[59] He is described as a "grave and solitary" father who was also a "perfect master" of the art of glass-painting.[60] Fra Michele is further credited with having painted a large window in the church of the Dominicans at Pistoia (in Tuscany) and one in the refectory of Sta. Caterina in Pisa, prior to his death in 1340.[61]

In the "Breve di Mercanti" of 1341, we find noted the earliest surviving reference to the Pisan "bicchierai."[62]

From the following year (1342),[63] survives some of the earliest stained and painted glass to be found in Pisa. Located in the lunette of the apse window in the church of San Francesco, it represents the sole surviving part of the original stained glass ensemble there[64] (Plate XXX). Marchini suggests that the style of the work is that of a Pisan artist from the circle of Francesco Traini (fl. 1321-63).[65]

In the Sacristy of the same church a window survived up until the nineteenth century which was inscribed: "Hoc opus fecit Magister Jacobus Castelli de Senis An. D. 1391."[66] The glass-painter referred to here is Jacopo (Giacomo) di Castello di Mino di Martinello from Siena, whose activity in that city shall later be discussed.[67]

By the fourteenth century glassmakers, who from early times had been at work in the Tuscan mountain villages of Gambassio and Montaione, began to move down to Florence and to set up their glass-houses there.[68] Among the various craft guilds operative in Florence during the fourteenth century, workers in glass did not have their own organization though their importance did warrant special group recognition as revealed in a tax roster, dated 23 November 1316.[69] Nevertheless, glassmakers of the fourteenth century were enrolled among the memberships of the "Arte de Pizzicagnoli e Oliandoli"[70] and the "Arte dei

Medici e Speziale" (Guild of Doctors and Apothecaries),[71] guilds to which they belonged until the end of the eighteenth century.[72] Also enrolled in the "Arte dei Medici e Speziale" were the painters of Florence.[73] Often their names come down to us as documented painters of stained glass. Staley tells us, for example, that:

> Under the patronage of the "Guild of Doctors and Apothecaries," many eminent artists turned their attention to stained-glass. Ghiberti, Ghirlandajo, Perugino, Lorenzo di Credi, Pierino del Vaga, Vivarini were only a few of those who designed subjects and also undertook the process of staining. . . .
>
> The vitreous glories of the Duomo, Santa Croce, Santa Maria Novella, San Spirito, La Nunziata, Or San Michele, and many another shrine of Religion and of Art, owe their creation to these renowned masters. Working with them were Moise - in 1350, Domenico di Gambassi - in 1431, Guaspare di Giovanni, a priest of Volterra, - in 1440, and Alessandro Fiorentino - in 1491.[74]

Surviving Florentine stained glass windows are numerous. In fact, they are more numerous than those found in any other Italian city. The earliest surviving windows date from the fourteenth century[75] - a period when the arts flowered despite the economic and social disasters that accompanied the last half of the century.[76] The following sites and artists represent only a few of the many outstanding examples from fourteenth century Florence. In the façade of Santa Maria Novella we find a rose window depicting the "Coronation of the Virgin," which was executed c. 1365 after a design by Andrea da Firenze

(Andrea Bonauito or di Buonauito)[77] (Plate XXXI). In the Sacristy of the same church is a recently restored Gothic triforium depicting stories from the life of St. John the Baptist and Christ. It was executed in 1386 by Leonardo di Simone, a Vallombrosan monk from the monastery of San Pancrazio, who worked from a cartoon supplied by Niccolò di Pietro Gerini.[78]

In the Baroncelli Chapel in Santa Croce, the largest church of the Franciscan Order in Florence, we find windows designed by Taddeo Gaddi (Plate XXXII). A student of Giotto, he also frescoed the walls of that same chapel in the fourth decade of the Trecento.[79] In the apse of the same church one finds three fourteenth-century eye-windows or occhio. Two were executed from designs attributed to the Florentine painter Pacino di Bonaguida[80] (fl. c. 1303/39). They represent the "Apparition of St. Francis in Arles," over the left double window, and the "Crucifixion of Christ," over the central double window (Plate XXXIII). The third occhio, over the right double window, represents the "Transfiguration of Elijah" (Elijah in the Flaming Chariot) and has been assigned to the previously mentioned Taddeo Gaddi[81] (Plate XXXIV).

We find recorded in the archives of the "Opera del Duomo" (Board of Works of the Cathedral of Santa Maria del Fiore), the fourteenth century Italian painter Agnolo Gaddi,[82] son of Taddeo Gaddi. He supplied cartoons for the

majority of the nave windows in S. Maria del Fiore to the glaziers Antonio da Pisa,[83] the author of the treatise on stained glass,[84] and Leonardo di Simone,[85] the glazier who also worked at Santa Maria Novella.

The windows in the Florentine church of Or San Michele represent possibly the greatest advancement in stained glass to come out of fourteenth century Tuscany. Set in the lunettes of the three-lited windows in the arcade of the antique loggia, they contain the largest cycle of scenes ever offered by the Florentine school in this field. The loggias were closed to form the Oratory in 1380 but it was not until 1397-98 that funds were set aside for the production of windows.[86] In 1409 coloured cartoons were designed and in 1410 the windows were completed.[87]

The cartoons have been tentatively assigned to Lorenzo Monaco[88] (fl. c. 1370-c.1422), although they may have been designed by a number of other artists who were called upon to decorate the Oratory; namely: Agnolo Gaddi,[89] Niccolò di Pietro Gerini[90] and Ambrogio di Baldese.[91]

The twelve scenes illustrate "Miraculous Works of the Virgin" and represent a pictorial story line unique to the period[92] (Plates XXXV-XXXVI). Although they seem to reflect a little of every tendency in existence in the painting of the time (last two decades of the Trecento and the first decade of the Quattrocento), their ultimate

importance lies in their function as prototypes for future creative advancements in the art of glass painting in Italy.

Later in the fifteenth century, we find among the names recorded in the archives of the "Opera del Duomo," the most eminent Florentine artists, many of whom turned their talents to stained glass. The activity of these men is exemplified in the following briefly outlined history of the clerestory windows in the octagonal drum below Filippo Brunelleschi's Dome (in Italian "cupola").[93]

The construction of the eight circular windows in the drum of the cupola of Santa Maria del Fiore was completed in 1413.[94] In 1433 three of the windows were blocked with canvas and a project was advanced for filling one of them with glass.[95] Cartoons for this window, which was to contain a "Coronation of the Virgin," were submitted in December 1433 by Lorenzo Ghiberti,[96] and in April of the following year by Donatello[97] (Donato de'Bardi), whose cartoon was preferred by the "Opera" although both men received compensation for their designs.[98] The window of "The Coronation of the Virgin" was completed from Donatello's design by the glass-painters Domenico di Piero da Pisa and Angelo di Lippo in 1438[99] and can still be seen today[100] (Plate XXXVII). In July 1443, Ghiberti received a payment for the cartoon for a window depicting "The Ascension,"[101] which was executed by the glass-painter Bernardo di Francesco in 1444[102] (Plate XXXVIII). A payment

to Paolo Uccello (Paolo di Dono) of 2 May 1443,[103] for a cartoon of "The Ascension" seems to imply that in this case, as in that of the preceding window, two alternative cartoons were prepared.[104] On 11 September 1443 we find record of a payment to Ghiberti for a cartoon depicting "The Agony in the Garden"[105] and on 7 December 1443 for a cartoon of "The Presentation in the Temple"[106] (Plates XXXIX-XL). Both windows were executed soon afterward by Bernardo di Francesco.[107] In February 1444, Andrea del Castagno[108] received a payment for the cartoon of "The Deposition,"[109] and although executed and extant,[110] the name of the glazier has not come down to us[111] (Plate XLI). On 21 February 1443, Uccello's name appears as one of two witnesses to the commissioning of two windows for the cupola from the glass-painter Carlo di Francesco Zati.[112] On the following day Uccello was entrusted with the designs of two windows which, according to the terms of the commission, were to be completed in the course of March of the same year.[113] The subjects of these windows are elucidated by payments to Uccello on 8 July 1443 for a cartoon of "The Resurrection"[114] and on 5 November 1443 for a cartoon of "The Nativity."[115] On 18 February 1444 Uccello received a further payment for a cartoon of "The Annunciation."[116] The execution of the windows of "The Resurrection" and "The Nativity" was entrusted respectively to Bernardo di Francesco[117] and Angelo di Lippi[118] and were completed in

1444[119] (Plates XLII-XLIII). Bernardo di Francesco was also responsible for executing "The Annunciation,"[120] which was subsequently removed from its location above the central position in the drum directly over the nave (in 1828) and lost.[121]

Any thorough examination of early Tuscan stained glass requires an inspection of Siena's treasures, for among them we find the oldest surviving windows in the region. The two most outstanding examples date from the last quarter of the thirteenth century. The first that we shall examine has been considered by some as possibly the oldest Italian stained glass extant.[122] It has been dated c. 1275[123] and depicts a "Madonna and Child Enthroned" (Plate XLV). The site at which the window was originally located is not known, but since the eighteenth century it has been situated in the Oratory adjacent to the Santuario della "Madonna della Grotta" just beyond the Porta S. Marco on the outskirts of Siena.[124] Though the original location and author of the little window are unknown, it is distinctly Sienese in character and stylistically very similar to the oeuvre of Guido da Siena.[125]

The circular window found in the apse of Siena Cathedral is our second example of thirteenth century Sienese stained glass[126] (Plate XLVI). Stylistically comparable to the work of Duccio di Buoninsegna, it has been assigned a date (1287-88) corresponding to the earlier stages of that painter's career.[127] Dedicated to the

Virgin, it depicts not only scenes from her life but full length portraits of various saints.[128]

The third example of early stained glass to be seen in Siena is a fragment located in the Palazzo Pubblico. Inserted in a glass partition over the doorway of the Sala della Guinta on the piano terreno, it represents "St. Michael the Archangel Slaying the Dragon" and "proves to be an exquisite work by the hand of Ambrogio Lorenzetti"[129] (Plate XLVII). Marchini dates it round about 1330 and states that it "apparently came from the Monastery of Monte Oliveto ai Tufi"[130] located just south of San Gimignano in the Valdelsa. The piece is in excellent condition although not advantageously mounted for public viewing.

Recorded in the "Breve dell'Arte de' Pittori Senesi" ("Statutes of the Sienese Painter's Guild"), preserved in the Archivio di Stato in Siena, are the names of two painters who also turned their talents to stained glass. "Maestro Jachomo del Vetro" (Giacomo or Jacopo di Castello di Mino di Martinello), recorded under the year 1355,[131] represents possibly the first artist in that guild to participate in stained glass activities. His work included commissions documented both in Siena and in Pisa (as previously cited).[132] We find the second painter, "Benedetto di Bindo zoppo" (Benedetto da Siena), enrolled in the list of 1389 and again in the one of 1414-17.[133] Benedetto is documented as having worked on windows both in

Siena Cathedral and in the church of San Domenico in Perugia.[134]

Umbria

The oldest stained glass windows in Italy are to be found in the region south of Tuscany called Umbria. This discussion of the windows there will be limited to only the earliest glass which includes specimens found in the Basilica of San Francesco in Assisi, the Cathedral at Orvieto and the Galleria Nazionale dell' Umbria.

Marchini tells us that "the stained glass windows in the upper basilica at Assisi must be considered the oldest ones extant in Italy."[135] We are soon to realize that they also represent the most controversial Italian windows as all documents relating to the glazing of the church before 1352 have been lost.[136] Consequently, the voluminous body of literature dedicated to these early windows reflects a variety of viewpoints concerning both authorship and dating.[137] An example of the ensuing controversy can be seen in the conflict of scholarly opinions concerning the three double-lighted windows in the apse which portray in columns of medallions stories from both the Old and New Testaments (Plate XLVIII). These windows have been attributed in design to "Cimabue" (Cenni di Pepo), "northern masters" and "German masters,"[138] while their date of origin has been variously set at the late twelfth century

to the mid-thirteenth century.[139]

The windows in the lower church of San Francesco offer similar problems of attribution and dating. Nevertheless, research on the chapel dedicated to Saint Martin has produced a number of valuable discoveries. The actual decoration of the chapel dates from 1312, the year when Cardinal Gentile di Partino da Montefiore willed funds to the church specifically for that purpose.[140] The frescoes there seem to have been produced at about that time or in the following decade and were executed by Simone Martini[141] (c. 1280/85-1344). The designs for the three double lancet windows which depict various saints are also by Simone Martini, but since they reflect a style more in keeping with his later work, they have been dated to the fourth decade of the trecento[142] (Plates XLIX-LI). Their execution has been assigned to Giovanni di Bonino (fl. 1325-45) who was probably responsible for most of the window glazing in the lower church.[143]

In its direct approach to colour the great apse window of the Cathedral at Orvieto (completed in 1334), reflects the influence of Simone Martini upon its designer Lorenzo Maitani[144] (Plate LII). The windows, divided into forty-four sections, embody "Evangelical Stories" thematically arranged (from the bottom upward), alternating with figures of "Prophets" (Plate LIII). The backgrounds are comprised of chequered patterns in ruby-coloured and

sapphire-coloured glass which as a further variation alternate from section to section and window column to window column. The "Evangelical Stories" start with the "Driving of Joachim from The Temple" and finish with the "Crucifixion." The glazier of the Montefiore Chapel at Assisi, Giovanni di Bonino, is credited with their execution.[145]

Another extant example of work by Giovanni di Bonino can be seen in the Galleria Nazionale dell'Umbria in Perugia. There we find a stained glass window panel depicting the "Crucifixion" as witnessed by the Madonna and St. John (Plate LIV). The panel is in an excellent state of preservation and was originally located in the church of S. Agostino in Perugia.[146] It dates from the first half of the fourteenth century and reveals characteristics similar to those found in windows at Assisi and Orvieto.[147]

Notes to Chapter III

[1]Our main interest here is to examine only the oldest documented sites; for further information concerning Italy's stained glass heritage, I direct the reader's attention to Giuseppe Marchini's well illustrated and fully documented survey on the subject.

[2]For the influence of the art of the mosaicist on stained glass, see Sherrill, *A Stained Glass Tour in Italy*, pp. 7-12 ff; Day, *Windows*, pp. 5-6.

The notion of making windows of coloured glass joined together with lead cames may well have been suggested by the cloisonné and champlevé enamels. Day, *Windows*, pp. 17-18; and Metcalf, *Making Stained Glass*, p. 19.

Concerning the influence of manuscript illumination on stained glass, see Hayward, "Glazed Cloisters," pp. 96 ff. Concerning the influence of stained glass on manuscript illumination, see Emma Pirani, *Gothic Illuminated Manuscripts*, trans. Margaret Crosland (London: Hamlyn Publishing Group, Ltd., 1970), pp. 106-7.

[3]Documentation dated c. 1350-51 on the use of tables can be found in John Thomas Smith, *Antiquities of Westminster; The Old Palace; St. Stephen's Chapel, (Now the House of Commons) & c. & c.* (London: T. Bensley, 1807), p. 191.

Among the lists of expenditures on the stained glass in the Siena Cathedral we find paper mentioned in 1355. Enzo Carli, *Vetrata duccesca*, Florence, 1946, p. 15, as cited in Marchini, *ISGW*, p. 233 (note 6).

[4]On the re-use of cartoons, see Arthur Lane, "Florentine Painted Glass and the Practice of Design," *Burlington Magazine*, XCI (February, 1949), 47 and notes 16-17.

[5]*Ibid.*, p. 44.

[6]*Infra*, p. 48.

[7]*Supra*, pp. 24-25.

[8]It is in the actual production of the glass that the "staining" or colouring takes place. The molten glass is mixed with various oxides so as to "stain" it green, yellow, blue, purple, red, etc. *Supra*, pp. 9 ff.

[9]Listed below are the chapter titles as translated in Theophilus, *On Divers Arts*:

Chapter 17. Laying Out Windows
Chapter 18. Glass Cutting
Chapter 19. The Pigment with Which Glass Is Painted
Chapter 20. Three Shades of Color for Highlights on Glass
Chapter 21. The Enrichment of Painting on Glass
Chapter 22. The Kiln in Which Glass Is Fired
Chapter 23. How Glass Should Be Fired
Chapter 24. Molds of Iron
Chapter 25. Casting the Cames
Chapter 26. The Wooden Mold
Chapter 27. Assembling Windows and Soldering Them
Chapter 28. The Setting of Gems in Painted Glass
Chapter 29. Simple Windows

[10]Merrifield, *Original Treatises*, I, 242-45 (Heraclius, Book III, chapter lix).

[11]*Ibid.*, I, 174-75.

[12]This tract can be found translated from its original Medieval Italian into German with comments, in Robert Bruck, "Der Tractat des Meisters Antonio von Pisa über die Glasmalerei," *Repertorium fur Kunstwissenschaft*, XXV (1920), 240-69.

[13]*Infra*, p. 59.

[14]For an English translation, see Cennino d'Andrea Cennini, *The Craftsman's Handbook: The Italian "Il Libro dell'Arte,"* trans. Daniel V. Thompson, Jr. (1933; rpt. New York: Dover Publications, Inc., 1960), pp. 111-12.

[15]*Ibid.*, p. 111.

[16]This tract has been published with comments, in Alessandro Lisini, "De la practica di comporre finestre a vetri colorati," *La Diana, rassegna d'arte e vita senese*, V (1930), 261-90.

[17]*Infra*, p. 78, note 127.

[18]Merrifield, *Original Treatises*, II, 526-29 (Bolognese MS., item 270).

[19]*Supra*, pp. 46-47.

[20]Gasparetto, "A proposito dell'officina vetraria torcellana," pp. 50-75.

[21]*Ibid.*

[22]*Ducale di Vitale Faliero del 1090*, quoted by Cecchetti, *Monografia della Vetr. Ven. e Muranese*, Venezia, 1874, p. 7, as cited in Pompeo Gherardo Molmenti, *Venice: Its Individual Growth from the Earliest Beginnings to the Fall of the Republic*, trans. Horatio F. Brown (Chicago: A. C. McClurg and Co., 1906), II, 66. Also, see Alexander Nesbitt, *A Descriptive Catalogue of the Glass Vessels in the South Kensington Museum* (London: Chapman and Hall, 1878), p. lxxviii, who cites *Monografia della Vetraria Veneziana e Muranese*, p. 259.

[23]Alexander Nesbitt, *Glass*, South Kensington Museum Art Handbooks ([London]: Chapman and Hall, [1878]), p. 67, Nesbitt here is probably quoting from Abate Vincenzo Zanetti, *Guida di Murano e delle celebre sue fornaci*, Venice, 1866. Zanetti was the founder of the Museo Vetrario and historian of old Murano.

[24]Liber Plegiorum, Reg. ed. Predelli, n. 149, as cited in Molmenti, *Venice*, p. 66 (note 6).

[25]"Con scarlatti e fregi d'oro e ricche ghirlande di perle e guastade ed oricanni ed altrettali vetrami gentili." Da Canal, *Cron.*, p. 625, as cited in Molmenti, *Venice*, p. 67 (note 1).

[26]For a more detailed examination including subsequent additions and bibliography on the *Capitolare* of 1271, see Molmenti, *Venice*, pp. 67-68; and Polak, *Glass*, pp. 53-54.

[27]Merrifield, *Original Treatises*, I, xc.

[28]"The Venetians crushed their sand from pebbles, first from the river Silè, which runs into the lagoon near the island city, then later, when they became ambitious to make the very finest glass, from the bed of the river Ticino." Polak, *Glass*, p. 11.

[29]Merrifield, *Original Treatises*, I, xc. No source for this quote is cited.

[30]Cecchetti, *Monografia*, p. 10, as cited in Nesbitt, *A Descriptive Catalogue*, p. lxxviii. Also, see Westlake, *A History*, II, 96; and Polak, *Glass*, pp. 25-26 and 53.

[31]Molmenti, *Venice*, p. 67.

[32]*Ibid.* For a brief discussion of the quarter and bibliography, see Polak, *Glass*, pp. 56-57.

[33]Molmenti, *Venice*, p. 67; Polak, *Glass*, p. 54, who cites a date of 1292.

[34]Arch. di Stato, M. C., *Pilosus*, foll. 15 B, 22 A, as cited in Molmenti, *Venice*, p. 67 and note 3.

[35]Polak, *Glass*, p. 54.

[36]Cecchetti, *Monographia*, p. 11, as cited in Nesbitt, *A Descriptive Catalogue*, p. lxxix.

[37]"Et nota quod magister Marcus pictor qui moratur Veneciis penes locum fratrum Minorum, fecit panos Theotonicos qui sunt Tarvisii ad sanctum Franciscum Minorum; qui pani sunt picti etiam Veneciis in loco ff̃ Minorum: et sunt ibi fenestre vitree facte manu dicti magistri, et bene facte. Nam quidam Frater Theotonicus fecit omnia ab antiquo ibi in Veneciis, et Mag̃r Marcus exemplavit et misit Tarvisium. Et nota quod supradictus Mag̃r Marcus pictor, qui moratur penes Sanctam Mariam fratrum Minorum de Veneciis, habet unum fratrem, nomine Paulum, pictorem, qui moratur penes dictam Sanctam Mariam ff̃ Minorum: qui habet in carta designatam mortem Sancti Francisci, et Virginis gloriose, sicut picte sunt ad modum Theotonicum in pano ad locum Minorum in Tarvisio."

Guid' Antonio Zanetti, *Nuova Raccolta delle Monete e Zecche d'Italia*, Bologna, 1775, vol. iv, p. 151, as cited and translated in Charles Lock Eastlake, *Methods and Materials of Painting of the Great Schools and Masters*, 2 vols. (1847; rpt. New York: Dover Publications, 1960), I, 90-91.

For the identification of Maestro Marco, see Michelangelo Muraro, *Paolo da Venezia* (University Park: the Pennsylvania State University Press, 1970), pp. 23 ff.

[38]Eastlake, *Methods and Materials*, I, 91.

[39]Marchini, *ISGW*, pp. 61 and 252 (note 72).

[40]For a discussion and illustrations, see *ibid.*, pp. 62, 252-53 (note 76), Ill. XIV, Fig. 69 and Plate C.

[41]P. Angelo M. Caccin, *The Basilica of SS. John and Paul in Venice*, trans. John W. Franklin, 5th ed., rev. (Venezia: Edizioni Zanipolo, 1969), p. 60.

[42]Marchini, *ISGW*, pp. 62 and 252-53 (note 76).

[43]The images portrayed in the window are, from top to bottom and left to right: "The Eternal Father;"

1st row, to the sides: the "Annunciation," in the centre: "David" and "Isaiah;"

2nd row: "St. Paul," the "Virgin and Child," "St. John the Baptist" and "St. Peter" (see Plate XXV);

3rd row quadrifoils, symbols of the four Evangelists: the "Eagle" for John, the "Lion" for Mark, the "Bull" for Luke and the "Angel" for Matthew;

4th row, busts of the Doctors of the Church: "St. Ambrose," "St. Gregory," "St. Jerome" and "St. Augustine;"

5th row, half-length figures of Dominican saints: "Vincenzo Ferreri," "Dominic," "Peter the Martyr" and "Thomas Aquinas" (see Plate XXVI);

6th row, full-length figures of the four warrior saints: "Theodore" (with Mocetto's signature), "John," "Paul" and "George" (see Plate XXVII).

The identification given here is drawn from Caccin, *The Basilica of SS. John and Paul in Venice*, pp. 60-61.

[44]The saints depicted here include: "St. Jerome," "St. Catherine of Alexandria," "St. Mark," "St. Gregory the Great" and "St. Lucy." Their identification is drawn from P. Angelo M. Caccin, *The Basilica of S. Maria Gloriosa dei Frari in Venice*, trans. John Guthrie (Venezia: Edizioni Zanipolo, 1968), p. 89.

[45]Marchini, *ISGW*, p. 252 (note 76).

[46]Leon Auguste Ottin, *Le vitrail* (Paris: H. Laurens, [1897]), p. 256; and Marchini, *ISGW*, pp. 61 and 252 (note 76).

[47]The church of Santa Maria dei Miracoli was built between 1481-89 by Pietro Lombardo and his school. For further details on the church, see Touring Club Italiano, *Venezia e dintorini*, 2nd ed. (1969), pp. 222-23.

[48]Guido Taddei, *L'Arte del Vetro in Firenze e nel suo Dominio* (Firenze: Felice le Monnier, 1954), p. 9.

[49]*Ibid.*

[50]Luigi Pecori, *Storia della terra di San Gimignano*, Firenze, 1853, p. 348, as cited in Taddei, *L'Arte del Vetro*, p. 10.

[51]*Ibid.*

[52]The litigation is outlined in Antonio Angelelli, *Memorie storiche di Montaione in Val d'Elsa*, Firenze-Roma, 1875, p. ccxxxiv, as cited in Taddei, *L'Arte del Vetro*, p. 10.

[53]Taddei, *L'Arte del Vetro*, p. 10.

[54]Angelelli, *Memorie*, p. xvi, as cited in Taddei, *L'Arte del Vetro*, p. 10.

[55]Paolo Tronci, *Memorie istoriche della citta di Pisa* [running title: *Annali pisani*], Livorno, 1682, cited under the year 1222 (Marchese, *Memorie dei Pittori* etc. *Domenicani*, I, 350), as cited in Thieme-Becker, *Künstler Lexicon*, I (1907), 447. Valtancoli, *Annali Pisani*, vol. i, p. 428 (Marchese, *Vite de' Pittori*, & c., *Domenicani*, vol. ii, p. 438), as cited in Merrifield, *Original Treatises*, I, lxi (note 3).

[56]Merrifield, *Original Treatises*, I, lxi. The present choir window in Sta. Caterina dates from 1950. Touring Club Italiano, *Toscana*, 4th ed. (1974), p. 143.

[57]"Frater Dominicus Sardus de Pollinis Kallaritanis fuit valde gratiosus et probus, soavissimae conversationis. Cantabat bene, scribebat pulcre, et fenestras vitreas operabatur optime. . . . Migravit ut supra. (1340.)" Marchese, *Vite de' Pittori*, & c., *Domenicani*, vol. i, p. 390, as cited in Merrifield, *Original Treatises*, I, lxi (note 2); Marchese, *Lives*, I, 297 and 298 (note 1).

[58]*Ibid.*

[59]"Frater Michael Domine Pine, dictus Pisanus fuit antiquus pater coellicula continuus. Fuit perfectus magister in arte vitrorum ita ut fenestram pistoriensis conventus faceret in ecclesia, et in refectorio nostro, et quidquid in conventu reficiendum videbat, promptissime resarcire curabat. Migravit ut supra. (1340.)" Marchese, *Lives*, I, 297-98 (note 1).

[60]*Ibid.*

[61]*Ibid.* The window at Pistoia no longer survives. *Ibid.*, p. 297; and Merrifield, *Original Treatises*, I, lxi.

[62]Alessandro Brugaro, "L'artigianato Pisano nel Medioevo," in *Studi storici* del Crivellucci, Vol. XX, fasc. 1°, p. 411, and Francesco Bonaini, *Statuti inediti della città di Pisa*, Firenze, 1854, Vol. III, p. 178, both cited in Taddei, *L'Arte del Vetro*, p. 12.

[63]A. Da Morrona, *Pisa illustrata*, Pisa, 1793, III, 63, as cited in Marchini, *ISGW*, p. 243 (note 39).

[64]Marchini, *ISGW*, p. 243 (note 39). The lunette contains in the rose of the twin-lights the busts of the "Virgin" and "St. John," in the large rosace the half-figure of "Christ in Benediction" in the midst of "Cherubs," with two "Prophets" in the triangles on either side. *Ibid.*

Records indicate that the window was repaired in 1585 by P. Johanne Antonio Nerucci. Ciampi, *Notizie*, & c., p. 116, n. Morrona, *Pisa illustrata*, vol. iii. p. 56, as cited in Merrifield, *Original Treatises*, I, lxi and note 4. The main body of the window is now modern and dates from 1926. The date 1926 is inscribed on the window.

[65]Marchini, *ISGW*, pp. 32 and 243 (note 39).

[66]Morrona, *Pisa illustrata*, 2nd ed., 1812, III, 60, as cited in Thieme-Becker, *Künstler Lexicon*, XVIII (1925), 274; Gaetano Milanesi, *Documenti per la storia dell'arte Senese*, 3 vols. (1854-56; rpt. Soest, Holland: Davaco Publishers, 1969), I, 312. Also, see Merrifield, *Original Treatises*, I, lxi and note 5, who does not cite the quotation from Morrona and gives the date for the window as 1390.

The window showed the "Assumption of the Virgin" with "S. Francesco," "S. Antonio," "S. Gherardo" and the donor "Datuccia Sardi" kneeling below. Morrona, *Pisa illustrata*, 2nd ed., 1812, III, 60, as cited in Thieme-Becker, *Künstler Lexicon*, XVIII (1925), 274; Merrifield, *Original Treatises*, I, lxi and note 5; Milanesi, *Documenti*, I, 312.

[67]*Supra*, p. 63.

[68]Polak, *Glass*, p. 50.

[69]Noted, along with seventy-three other professions, their's was designated as the trade of "making and selling glass." Alfred Doren, *Entwicklung und Organisation der florentiner Zümfte*, Leipzig, 1893, p. 106, as cited in Taddei, *L'Arte del Vetro*, p. 11.

[70]Arch. St. Fir. - Arti, Pizzicagnoli e Oliandoli, 4, c. 1., as cited in Taddei, *L'Arte del Vetro*, p. 33.

[71]*Statuti dell'Arte dei Medici e Speziali*, a cura della Camera di Commercio e Industria di Firenze, Firenze, 1922, p. 23, Statuto del 1314: "Merciarii autem sint et esse intelligantur qui iurare et subesse debent consulibus et art predictae, ut supra dicitur, hii videlicet: omnes et

singuli vendentes vel vendi facientes. . . . infulas, bichieres et urceos, . . ."; p. 133, Statuto del 1349: "Merciai sieno et essere s'intendino. . . . tucti et ciascuni vendenti o faccenti vendere. . . . mezine, bicchieri e orcia. . . .". As cited in Taddei, *L'Arte del Vetro*, pp. 33-34 (note 4).

[72]The Grand Duke Pietro Leopoldo abolished all corporations and magistracies of the guilds in 1770. Taddei, *L'Arte del Vetro*, p. 37.

[73]During the fourteenth and fifteenth centuries painters of "pittori" are recorded in guilds of most major Italian cities, e.g., Florence, Padua, Perugia, Pisa, Siena, Venice, Verona, etc.

[74]Staley, *Guilds*, pp. 271-72.

[75]The earliest recorded Florentine stained glass site would seem to be the church of Santissima Annunziata. There, it is reported that Nozzo (Giovannozzo) di Perino, called "Calandrino," in 1288 "decorated the central round window" which was ultimately closed and consequently lost during alterations of the church carried out in 1384. Eugenio Casalini, *The Basilica of the SS Annunziata* (Firenze: Tipo-Litografia S.T.E.F., 1957), pp. 21-22. No documents are cited. Also, see Thieme-Becker, *Künstler Lexicon*, V (1911), 373.

[76]On the state of the arts in fourteenth century Florence, see: Millard Meiss, *Painting in Florence and Siena After the Black Death* (1951; rpt. New York: Harper and Row, Publishers, 1973); John Larner, *Culture and Society in Italy 1290-1420* (New York: Charles Scribner's Sons, 1971); Frederick Antal, *Florentine Painting and its Social Background* (London: Kegan Paul, 1948).

[77]Marchini, *ISGW*, pp. 40 and 245 (note 48). Also, see Pietro Toesca, "Vetrate dipinte Florentine," *Bolletino d'Arte*, XIV (1920), 3-5 and full illustration.

[78]Ser Lapo Mazzei, *Lettere*, Firenze, 1880, II, pp. 387 ff., as cited in Pietro Toesca, *Il Trecento*, Storia dell' arte Italiana, II (Torino: Editrice Torinese, 1964), 872 (note 86) and Fig. 752 (p. 871). Also, see Thieme-Becker, *Künstler Lexicon*, XIII (1920), 465-67.

[79]Marchini, *ISGW*, p. 39 (for a comparative analysis) and p. 245, note 44 (for a descriptive analysis and bibliography).

[80]*Ibid.*, pp. 34 and 244 (note 41) and Fig. xii.

[81]*Ibid.*, pp. 34 and 244 (note 41).

[82]For a concise and documented discussion of Agnolo Gaddi's work in stained glass, see Bruce M. Cole, *Agnolo Gaddi*, Diss. Bryn Mawr 1969, pp. 47, 57 (note 3), 72-73 and 154-55.

[83]Giovanni Poggi, *Il Duomo di Firenze: documenti sulla decorazione della chiesa e del campanile tratti dall' archivio dell' opera* (Berlino: Bruno Cassirer Editore, 1909), pp. LXXIX-LXXX and p. 92 (Doc. 480). On questions concerning the identification of Antonio da Pisa, see John Gage, "Ghiberti's 'Third Commentary' and its Background," *Apollo Magazine*, LXXXXV (May, 1972), 365 and 369 (note 13).

[84]*Supra*, p. 47.

[85]Poggi, *Documenti*, p. 87 (Doc. 456) and p. 93 (Doc. 488).

[86]Marchini, *ISGW*, pp. 246-47 (note 50).

[87]*Ibid.*

[88]*Ibid.*, pp. 40 and 247 (note 50).

[89]*Ibid.*

[90]*Ibid.* For Niccolò di Pietro Gerini's work at Santa Maria Novella also in Florence, *supra*, pp. 57-58.

[91]Marchini, *ISGW*, pp. 40 and 247 (note 50).

[92]For a detailed examination of the iconographic programme, see Marchini, *ISGW*, pp. 41-43 and 246-47 (note 50); Werner Cohn, "Zur Ikonographie der Glasfenster von Orsanmichele," *Mitteilungen des Kunsthistorischen Institutes in Florenz*, IX (1959/60), 1-12; Giuseppe Marchini, "Miracoli d'Orsanmichele," *Mitteilungen des Kunsthistorischen Institutes in Florenz*, XVII, Nos. 2-3 (1973), 301-6 (129-34). All with illustrations.

[93]The organization of the following chronological summary is drawn in part from John Pope-Hennessy, *Paolo Uccello*, 2nd ed. (London: Phaidon, 1969), p. 145; and Poggi, *Documenti*, pp. LXXXVII-LXXXIX and associated pp. 135-47 (Docs. 709-72). For a complete bibliography, see W. Paatz, *Die Kirchen von Florenz*, Frankfurt a.M., 1940-53, as cited in Marchini, *ISGW*, pp. 248-49 (notes 55-58).

[94]Poggi, *Documenti*, pp. LXXXVII and 135 (Doc. 710).

[95]*Ibid.*, pp. LXXXVII and 135 (Doc. 711).

[96]*Ibid.*, pp. 136-37 (Doc. 717). For an illustrated discussion of Ghiberti's other designs produced for stained and painted glass windows in the Duomo, see Ludwig Goldscheider, *Ghiberti* (New York: Phaidon Publishers, Inc., 1949). For commission documents, see Richard Krautheimer, *Lorenzo Ghiberti*, Princeton monographs in art and archaeology, 31 (Princeton: University Press, 1970).

[97]Poggi, *Documenti*, p. 137 (Doc. 719).

[98]*Ibid.*, p. 138 (Docs. 722 and 723).

[99]*Ibid.*, pp. LXXXVII-LXXXVIII.

[100]For a stylistic examination of "The Coronation," see Marchini, *ISGW*, pp. 50-51.

[101]Poggi, *Documenti*, p. 144 (Doc. 751).

[102]*Ibid.*, p. 144 (Doc. 758).

[103]*Ibid.*, p. 143 (Doc. 749).

[104]Pope-Hennessy, *Paolo Uccello*, p. 145.

[105]Poggi, *Documenti*, p. 144 (Doc. 752).

[106]*Ibid.*, p. 144 (Doc. 756).

[107]Marchini, *ISGW*, p. 249 note 56. For a stylistic examination of "The Agony in the Garden" and "The Presentation in the Temple," see Marchini, *ISGW*, p. 51.

[108]Displayed in the Museum of Sacred Art at Chianciano (in Tuscany south of Florence) is a window depicting "St. John the Baptist" which has been stylistically compared to the work of Andrea del Castagno although attributed to an "imitatore" (Plate XLIV). Mario Salmi, "Nuove rivelazioni su Andrea del Castagno," *Bolletino d'arte*, XXXIX (1954), 36 and fig. 39 (p. 42). An identification card on the window's frame states that the design is sometimes attributed to the circle of Verrocchio (Andrea de' Cione, 1431/32-98) but more often to the shop of Pollaiolo (Antonio di Jacopo Benci, 1435-88).

[109]Poggi, *Documenti*, p. 14 (Doc. 762).

[110]For a stylistic examination of "The Deposition," see Marchini, *ISGW*, p. 52. Also, see *Catalogo della mostra di quattro maestri del primo Rinascimento*, Florence (Palazzo Strozzi), 1954, as cited in Marchini, *ISGW*, p. 249 (note 58).

[111]Marchini, *ISGW*, p. 249 (note 58). "The panel which includes the head of the Virgin and the raised arm of Christ has been lost and now contains a replacement. It is generally believed that it was partially executed by the artist responsible for the painting." *Ibid.*

Sandro Botticelli's "Pietà" of the late 1490's, painted for the convent of San Paolino in Florence and now in the Alte Pinakothek in Munich, draws its "pose of the Christ, with His long, hanging arm," from Castagno's window. Frederick Hartt, *History of Italian Renaissance Art* (New York: Harry N. Abrams, Inc., 1973), p. 297 and fig. 359 (p. 296).

[112]Poggi, *Documenti*, p. 142 (Doc. 746).

[113]*Ibid.*, p. 142 (Doc. 747).

[114]*Ibid.*, p. 143 (Doc. 750).

[115]*Ibid.*, p. 144 (Doc. 754).

[116]*Ibid.*, p. 145 (Doc. 761).

[117]*Ibid.*, p. 145 (Doc. 765).

[118]*Ibid.*, p. 144 (Doc. 754).

[119]Marchini, *ISGW*, p. 249, note 57. For a stylistic examination of "The Resurrection" and "The Nativity," see Marchini, *ISGW*, pp. 51-52. Also, see *Catalogo della mostra di quattro maestri del primo Rinascimento*, Florence (Palazzo Strozzi), 1954, nos. 8,9, and Hildegard Van Straelen, *Studien zur Florentiner Glasgemälde* [sic], 1938, pp. 86-88, both cited in Pope-Hennessy, *Paolo Uccello*, p. 145.

[120]Poggi, *Documenti*, p. 146 (Doc. 768).

[121]Marchini, *ISGW*, p. 249 (note 57), and Pope-Hennessy, *Paolo Uccello*, p. 145.

[122]The definitive study on this window can be found in Enzo Carli, *Dipinti senesi del contado e della maremma* (Milano: Electa, [1955]), pp. 35-38. Also, see Marchini, *ISGW*, pp. 29 and 242 (note 31).

[123] *Ibid.*

[124] Concerning the window's possible origin, see Carli, *Dipinti*, p. 35.

[125] For a stylistic examination of the window, see Carli, *Dipinti*, pp. 62-63; and Marchini, *ISGW*, pp. 29 and 242 (note 31).

[126] For a definitive examination of this window, see Enzo Carli, *Vetrata Duccesca* (Milano: Electa Editrice, 1956).

[127] The apse window has also been assigned to Giacomo di Castello di Mino Martinello and dated 1369 based on documentary evidence. Toesca, *Il trecento*, pp. 868-69; and John Pope-Hennessy, "An Exhibition of Sienese Stained Glass," *The Burlington Magazine*, LXXXVIII (December, 1946), 306. For documents, see Milanesi, *Documenti*, I, 311-12.

Francesco Formica, attributed author of the short treatise on stained glass entitled *De la practica di comporre finestra a vetri colorati* (*supra*, p. 48), is also cited as having worked on this window in 1379 and 1380. Lisini, "De la practica di comporre finestra a vetri," p. 265. For documents, see S. Borghesi and L. Banchi, *Nuovi documenti per la storia dell'arte senese* (1898; rpt. Soest, Holland: Davaco, 1970), p. 398.

[128] The window portrays in nine compartments from top to bottom and left to right - first row: "John the Evangelist," the "Coronation of the Virgin" and "Matthew the Evangelist;" second row: "St. Ansanus" with "St. Crescentius," the "Assumption of the Virgin" and "St. Savinus" with "St. Bartholomew;" third row: "Luke the Evangelist," the "Dormito Virginis" and "Mark the Evangelist." Ansanus, Crescentius and Savinus represent the three oldest patron saints of Siena. For their identification, see Marchini, *ISGW*, p. 242 (note 32).

[129] Marchini, *ISGW*, pp. 32 and 243 (note 36).

[130] *Ibid.* No documents are cited in support of this assertion.

[131] Milanesi, *Documenti*, I, 39.

[132] *Ibid.*, I, 311-12; and *supra*, pp. 56 and 78, note 127.

[133] *Ibid.*, I, 45; and Sherwood A. Fehm, Jr., "Notes on the Statutes of the Sienese Painters Guild," *Art Bulletin*, LIV, No. 2 (June, 1972), 198-200.

[134]Milanesi, *Documenti*, I, 45 (note 3) and II, 22. For a brief biography and bibliography on Benedetto di Bindo Zoppo, see Thieme-Becker, *Künstler Lexicon*, III (1909), 308-9.

[135]Marchini, *ISGW*, p. 14.

[136]P. E. Giusto, *Le vetrate di S. Francesco in Assisi*, Milan, [1911], p. 25, as cited in Lane, "Florentine Painted Glass," p. 44, note 4.

[137]For an annotated bibliography on the literature concerning the glass in the Basilica of San Francesco, see Marchini, *ISGW*, pp. 236-37 (note 13). The most recent examination of the windows can be found in Giuseppe Marchini, *Le vetrate dell'Umbria*, Corpus Vitrearum Medii Aevi, Italia I (Rome: De Luca Editore, 1973), pp. 15-165.

[138]Marchini, *ISGW*, p. 238 (note 14). Also, see Ida J. Burgess, "Cimabue's Cartoons for Stained Glass Windows," *International Studio*, LXXXVIII (Sept., 1927), 33-38.

For the German influence on stained glass in Northern Italy, see Caterina Gilli Pirina, "The Sixteenth-Century Windows in the Rear Choir of the Duomo in Milan and Dürer's Engravings," *Burlington Magazine*, CXIV (July, 1972), 452-58; E. Tietze-Conrat, "Dürer's Shop - Three Studies," *Art in America*, XXXIII, No. 1 (January, 1945), 13-17 (on the glass in San Nazaro, Milan); *Supra*, p. 70, note 37 (on glass at Sta. Maria Gloriosa dei Frari, Venice); *Supra*, p. 53 (on the Cornaro chapel in the Fratri Minori, Venice).

[139]Lane, "Florentine Painted Glass," p. 44; and Marchini, *ISGW*, p. 238 (note 14).

[140]See Marchini, *Le vetrate dell'Umbria*, pp. 118-29.

[141]On the dating of the frescoes, see Giovanni Paccagnini, *Simone Martini* (Milan: A. Martello, [1955]), pp. 137-59.

[142]Marchini, *ISGW*, p. 242 (note 27).

[143]Giustino Cristofani, "Le vetrate di Giovanni di Bonino nella Basilica d'Assisi," *Rassegna d'arte umbria*, I (1910), 3-13.

[144]Marchini, *ISGW*, p. 30. Also, see Marchini, *Le vetrate dell'Umbria*, pp. 169-90.

[145]Luigi Fumi, *Il santuario del S.S. Corporale nel Duomo di Orvieto* (Roma: Danesi, 1896), p. 197, as cited in Marchini, *ISGW*, pp. 30 and 242-43 (note 33).

[146]Marchini, *Le vetrate dell'Umbria*, pp. 193-95.

[147]Marchini, *ISGW*, p. 243 (note 34).

CONCLUSION

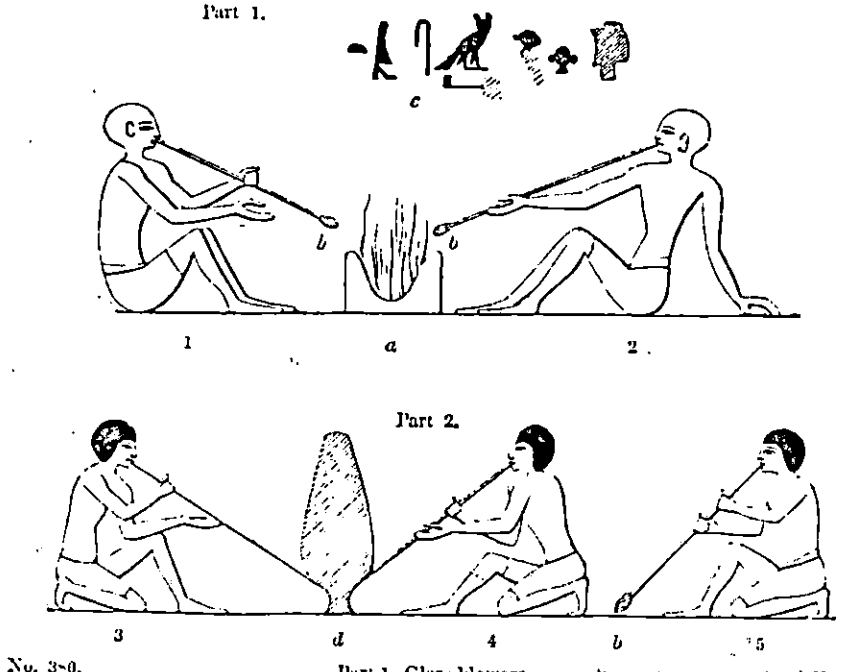
The literary, physical and documentary evidence presented in this thesis has revealed a number of interesting facts concerning the glass industry in Italy. First we have seen that there existed in Italy an old and well established literary tradition concerned with the transmission of technical information related to the manufacture of glass. Secondly, it was shown that in Italy the earliest surviving evidence of glass use as a window-fill can be dated to the first century A.D. We have also seen that in Italian ecclesiastical settings, the use of figurative windows dates back to the sixth century while the general employment of glass in windows is well established by the ninth century. Thirdly, while literary evidence places an actual glass-producing industry in Italy in the eleventh century, archaeological evidence dates the industry earlier to the seventh-eighth century. It would appear, based on this evidence, that Italy had a firmly established and developed native glass industry during the Middle Ages.

Evidence in this thesis has also revealed a number of facts concerning Italy's stained glass heritage. We have seen that while the employment of some stained glass in

Italy is reported quite early, the widespread use of stained glass dates quite late - some two hundred years after Northern Europe's greatest achievements in the medium. This is indeed a curious situation in light of Italy's precocious artistic nature, making apparent the need for further exploration into the conditions surrounding the development of Italy's stained glass tradition. As the scope of this investigation was limited to examining only one of the possible theories explaining Italy's late stained glass development it will be the responsibility of future scholarship to pursue the others. In closing, it is my sincere hope that this work has aided in opening the way to a better understanding of, and appreciation for, Italian stained and painted glass windows.

PLATES

Plate I. Egypt, New Kingdom, "Goblet of Tuthmosis III," Late Dynasty XVIII, c. 1450 B.C.



No. 3-0.

Part 1. Glass-blowers.
2. The same.

Beni-Hassan Thebes.

The glass at the end of the blowpipe, *b b*, is coloured green.
a is the fire. *d*, a glass bottle.

Plate II. Thebes, Beni-Hassan-el-Gadim, tomb paintings, "Glass-blowers," c. 1600-1500 B.C.

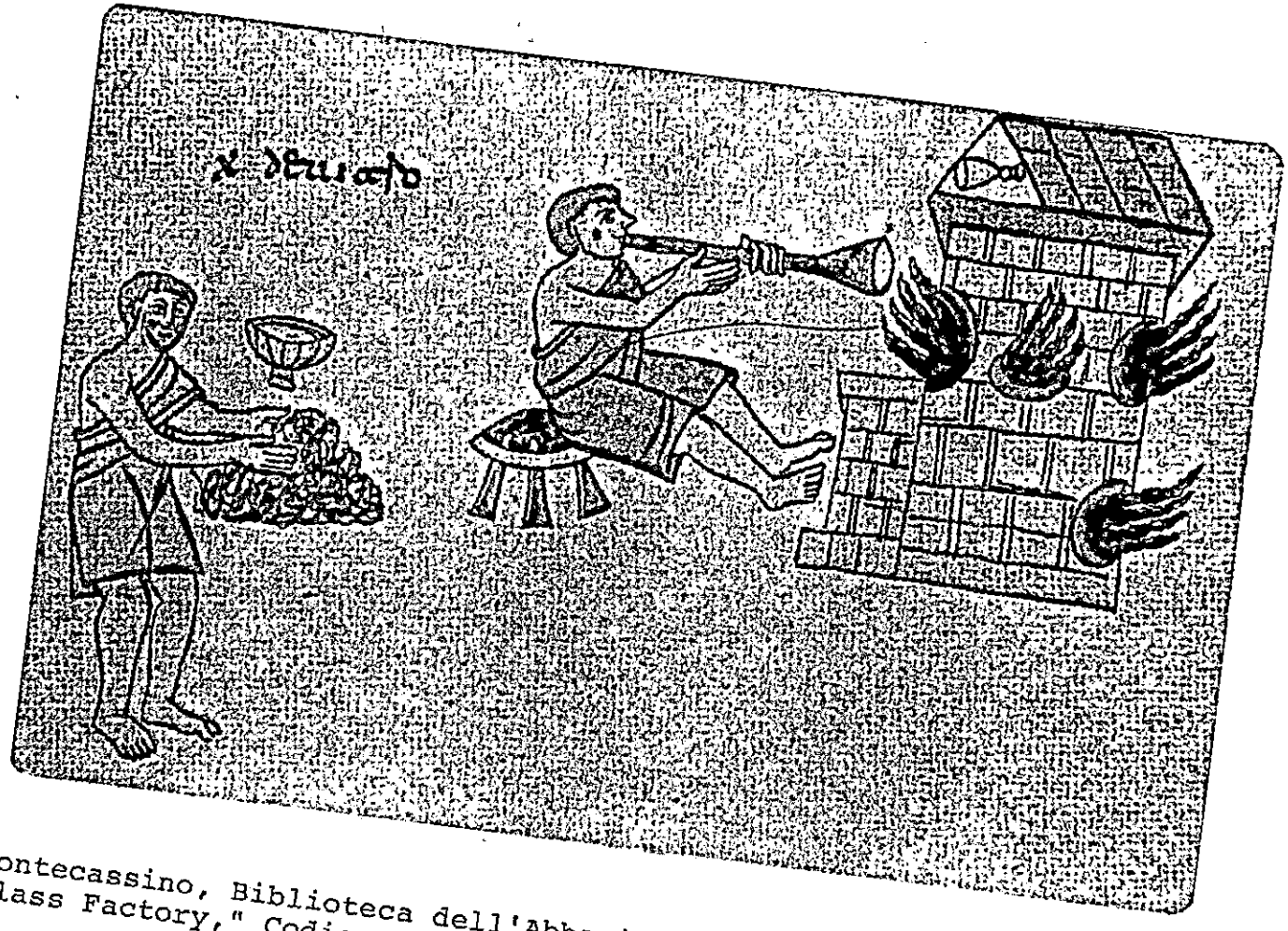


Plate III. Montecassino, Biblioteca dell'Abbazia, Manuscript illumination, "A Medieval Glass Factory," Codice 132 ("De Universo" of Rabanus Maurus), 1023.

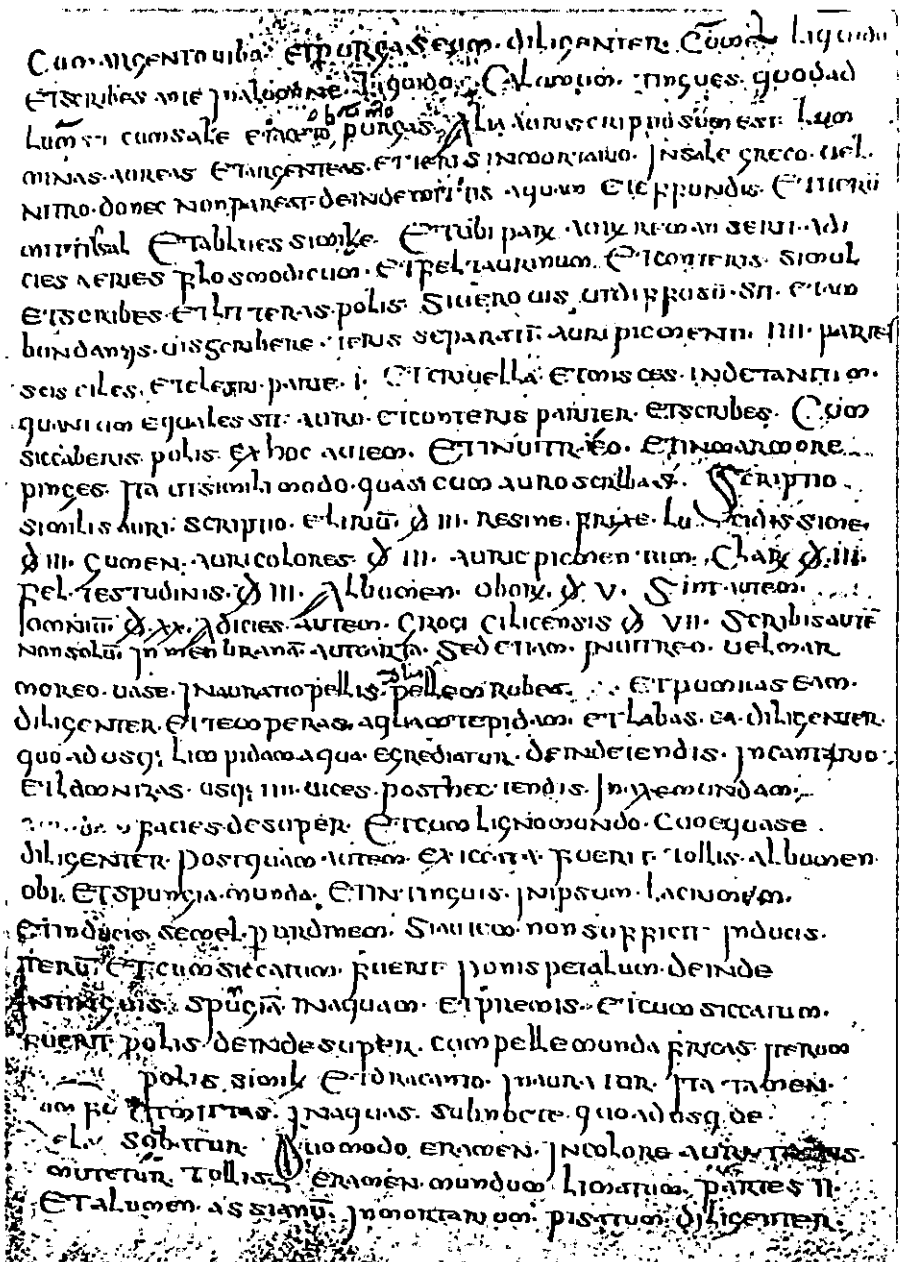


Plate IV. Lucca, Biblioteca Capitolare, "A page from the *Compositiones variae*," Lucca 490, folio 223r, lines 390-424, c. 787-816.

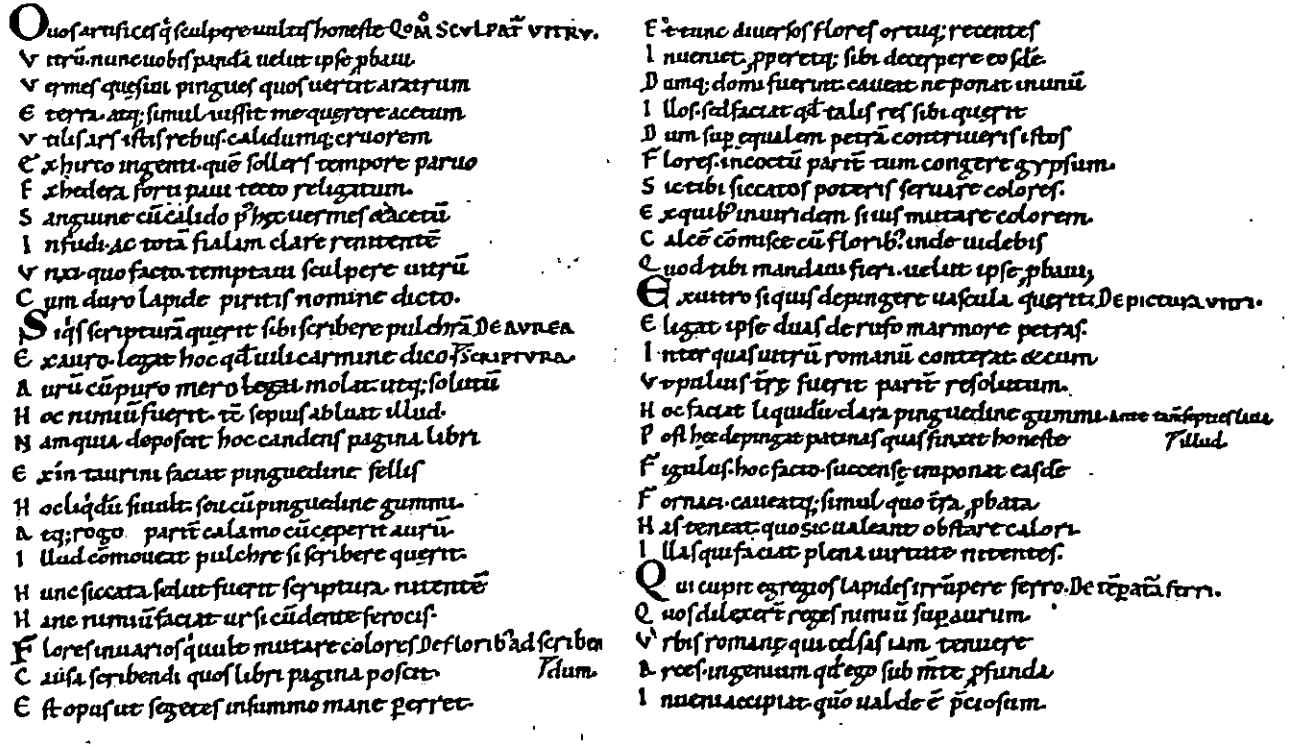


Plate V. New York, Eastman School of Music, Sibley Music Library, "A page from *De coloribus et artibus Romanorum*," No. 1, Acc. 149667, first five chapters, 11th C.

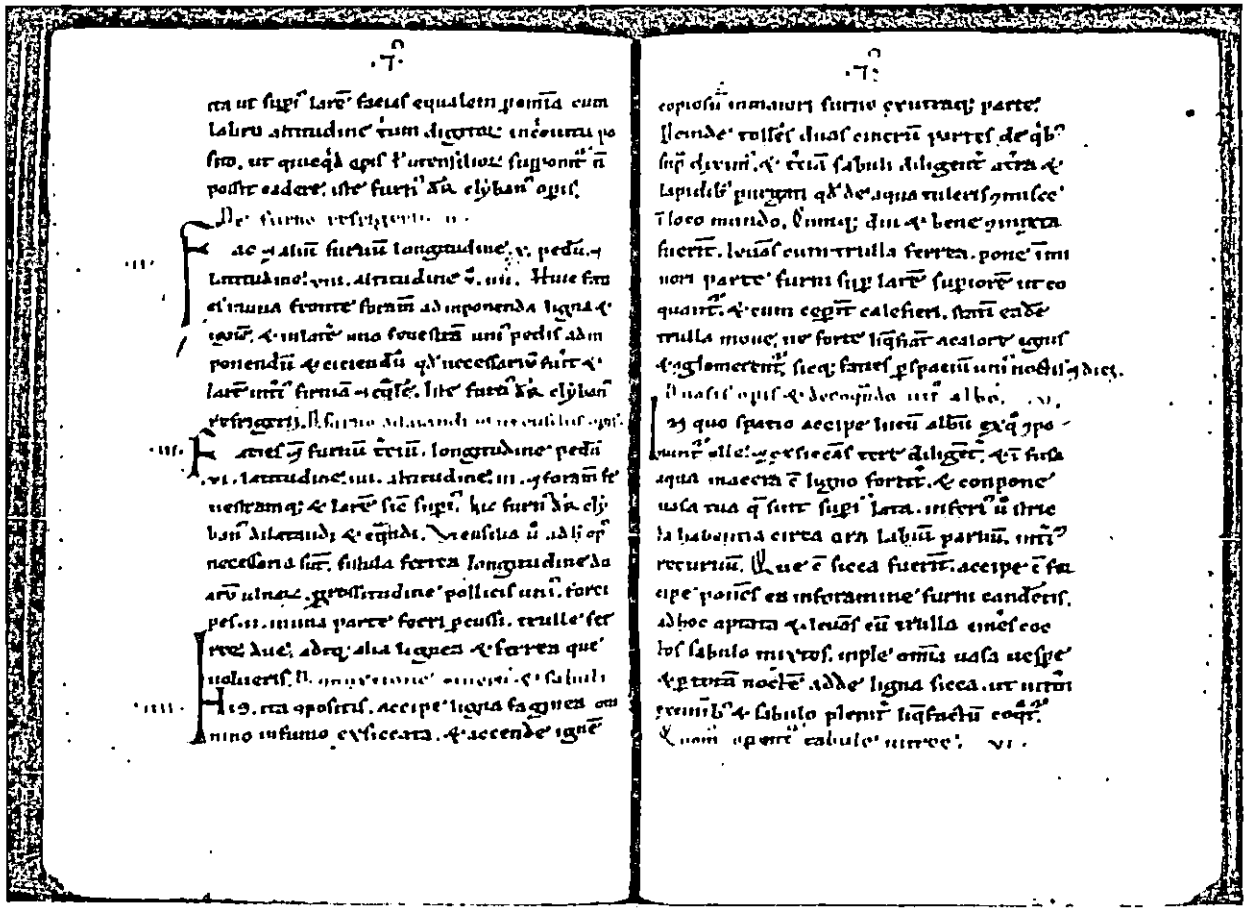


Plate VI. London, British Museum, "A page from *Diversarum artium schedula*," Harley 3915, 13th C.

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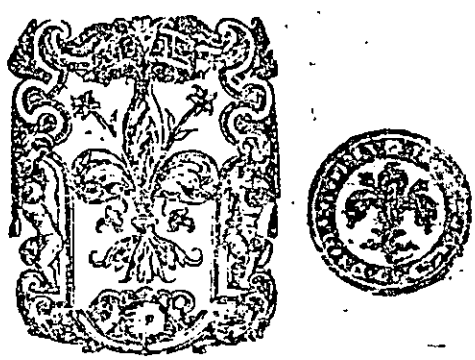

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Plate VII. Florence, Biblioteca Nazionale, "Title page from the first edition of *L'Arte Vetraria* by Antonio Neri," Ed. Guinti, 1612 (Firenze).

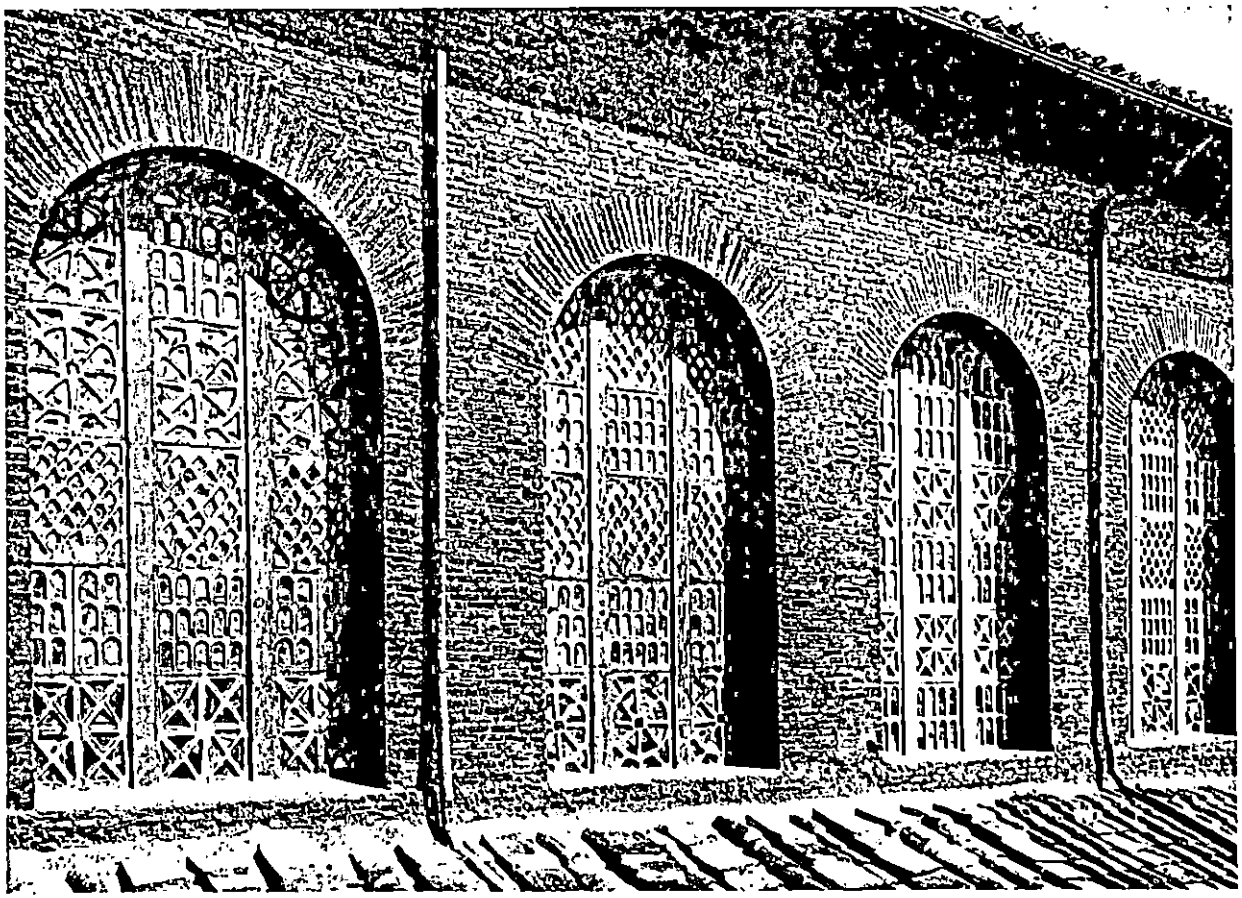


Plate VIII. Rome, Santa Sabina, Clerestory transenna (exterior view), 9th C.

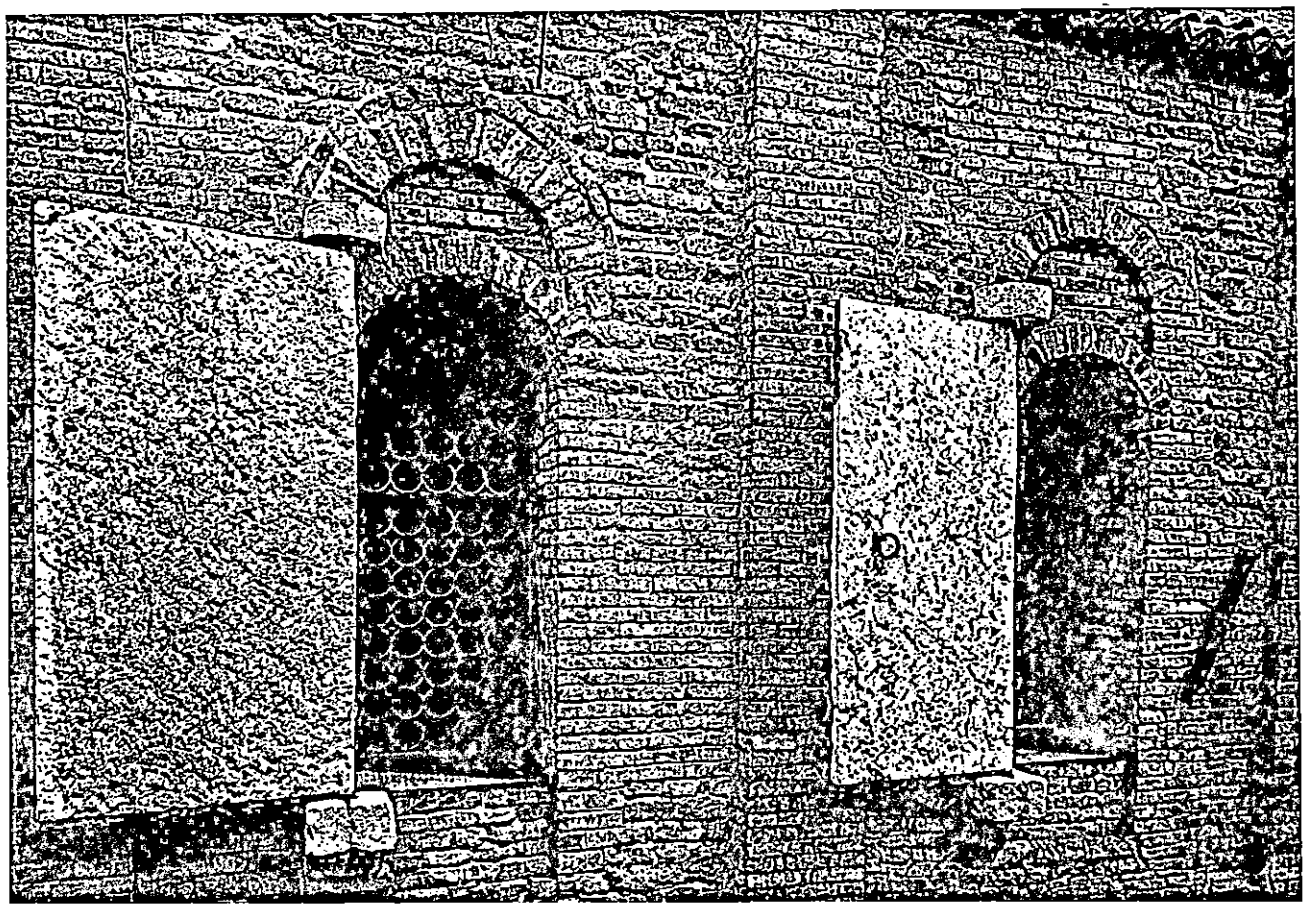


Plate IX. Torcello, Basilica, Istrian marble shutters, c. 11th C (?).

Plate X. (A). "Manufacturing Crown Glass," engraving, Denis Diderot, 18th C.

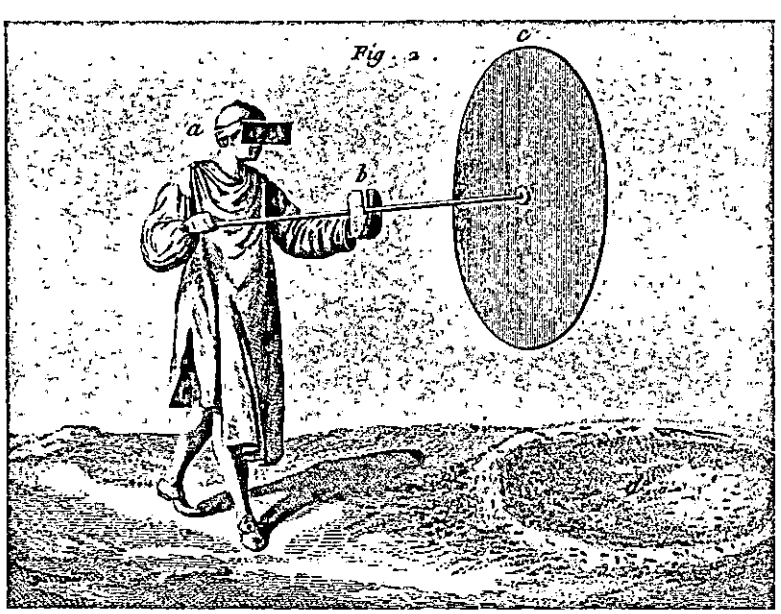


Plate X. (B). "Manufacturing Crown Glass," engraving, Denis Diderot, 18th C.

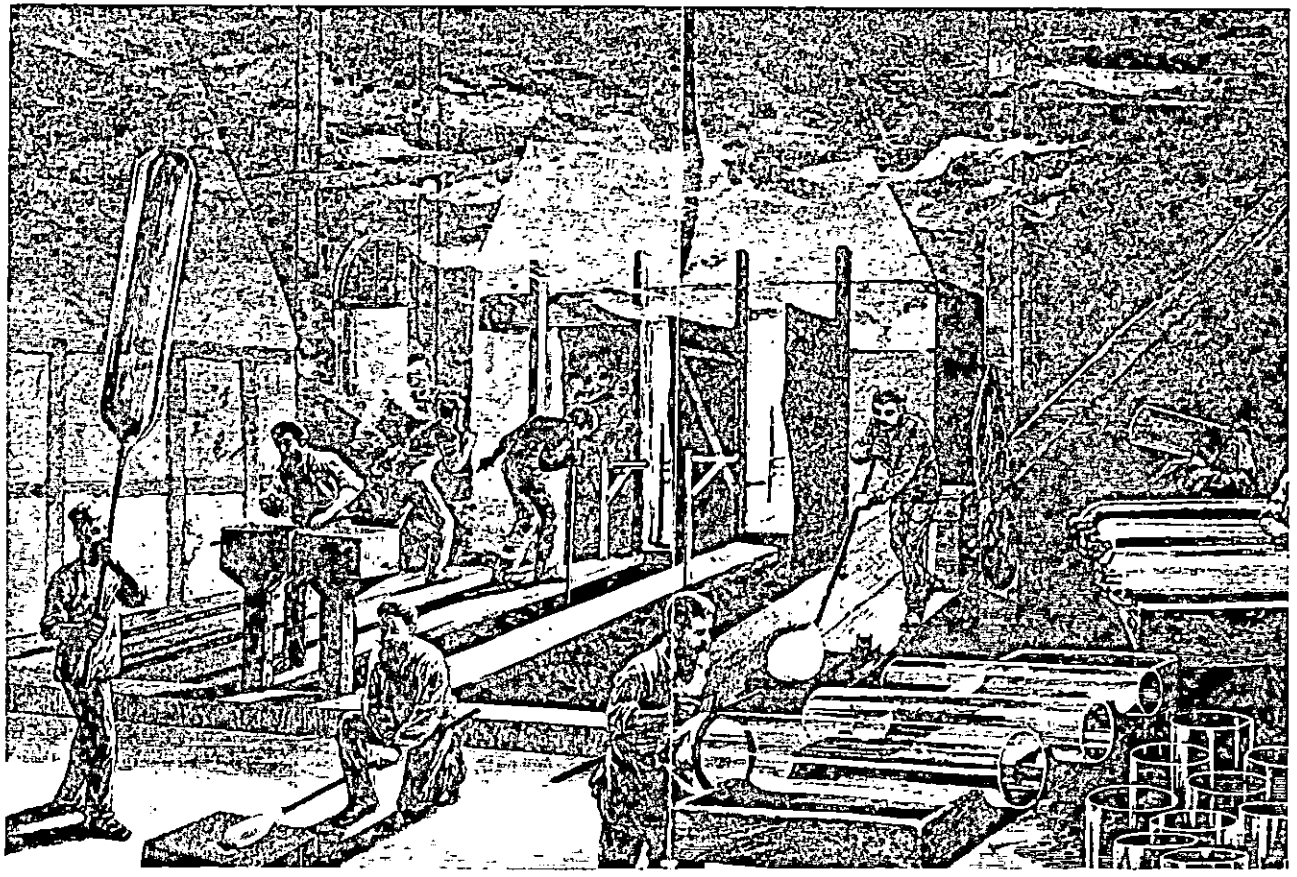


Plate XI. "Cylinder Glassmaking, Pittsburgh, 1884."

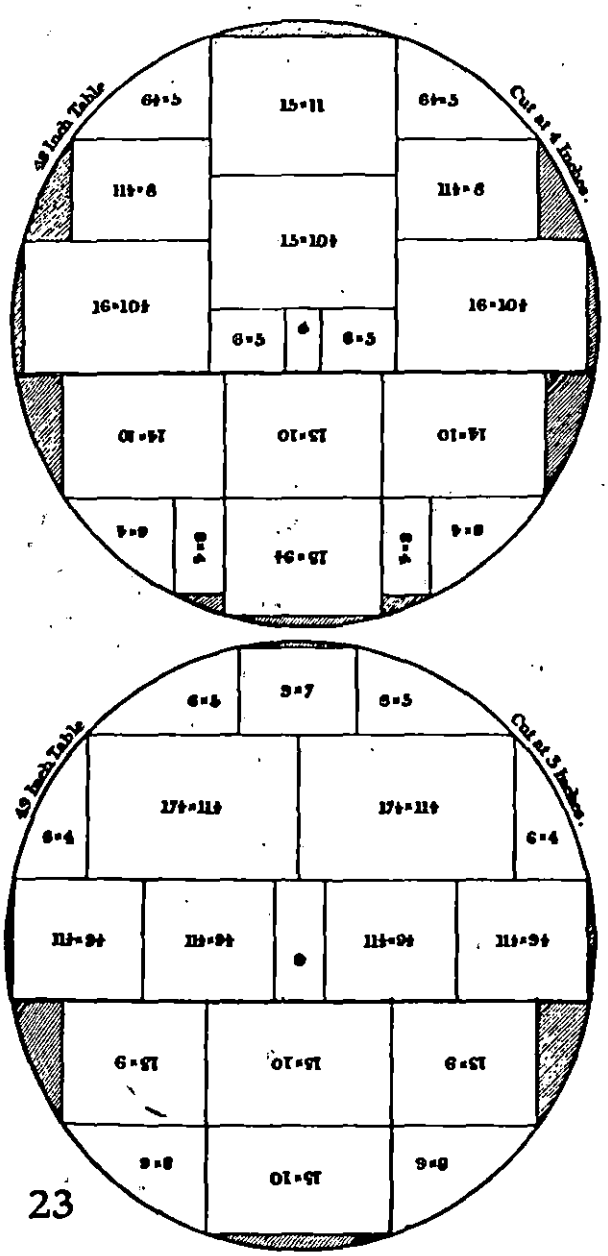


Plate XII. "Pattern from a Glazier's Manual for Cutting a Pane of Crown Glass," 1835.

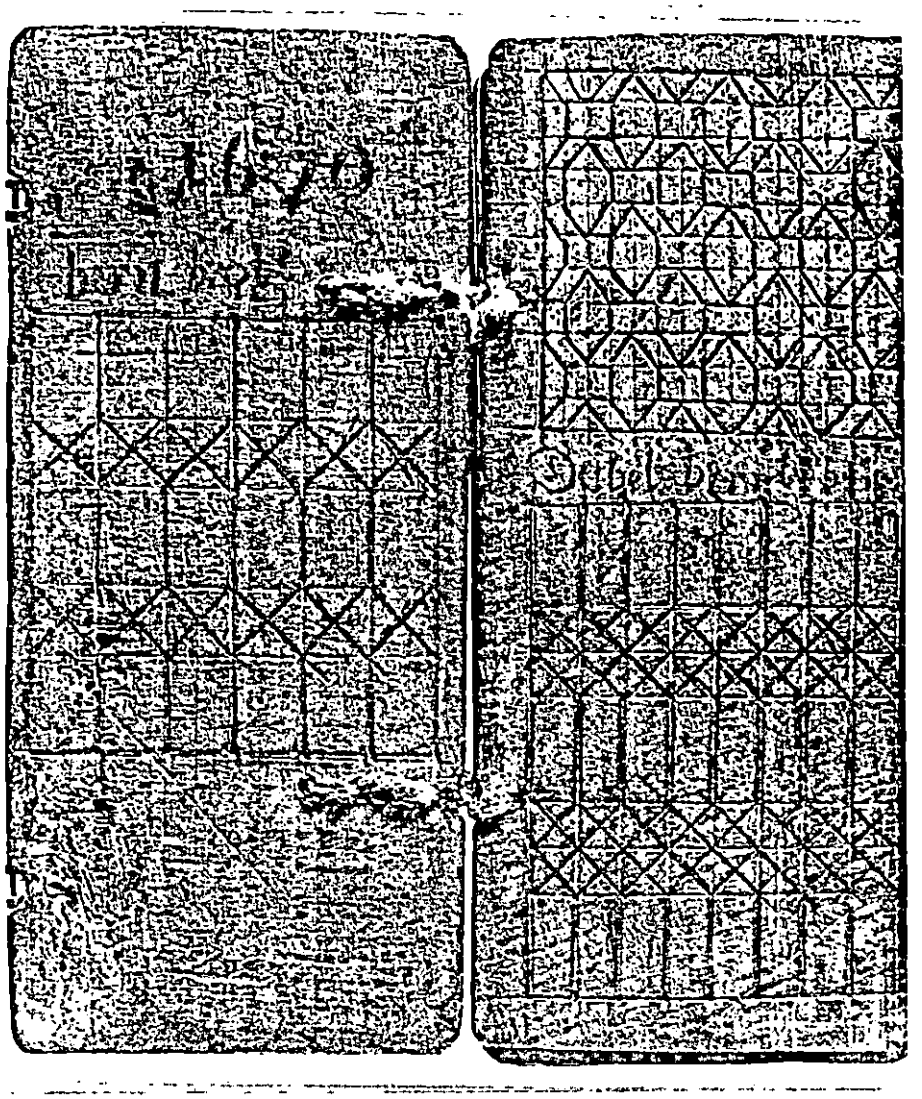


Plate XIII. Copenhagen, Nationalmuseum, "Glazier's Pattern Book" (with leaves of thin beech wood), 1670 or before.

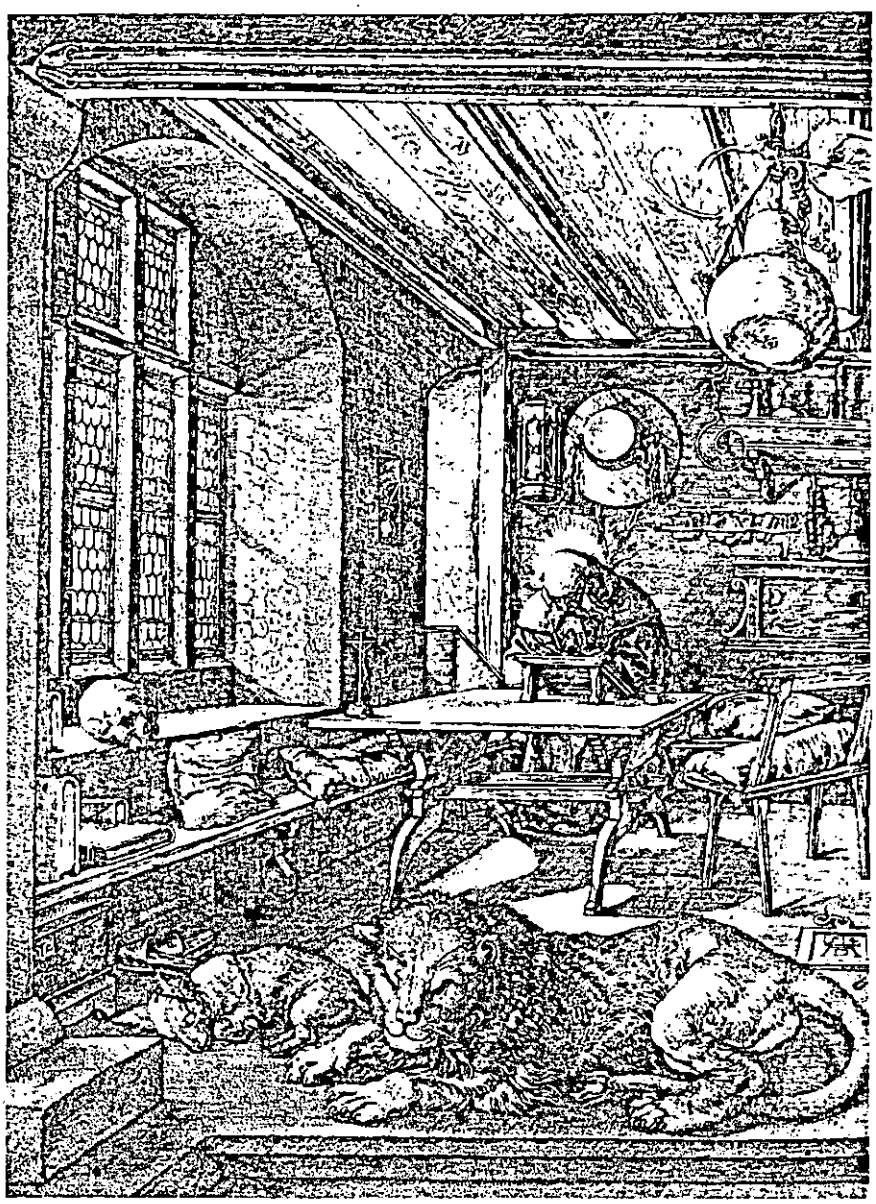


Plate XIV. "St. Jerome in His Study" (Bull's-eye window), engraving, Albrecht Dürer, 1514.

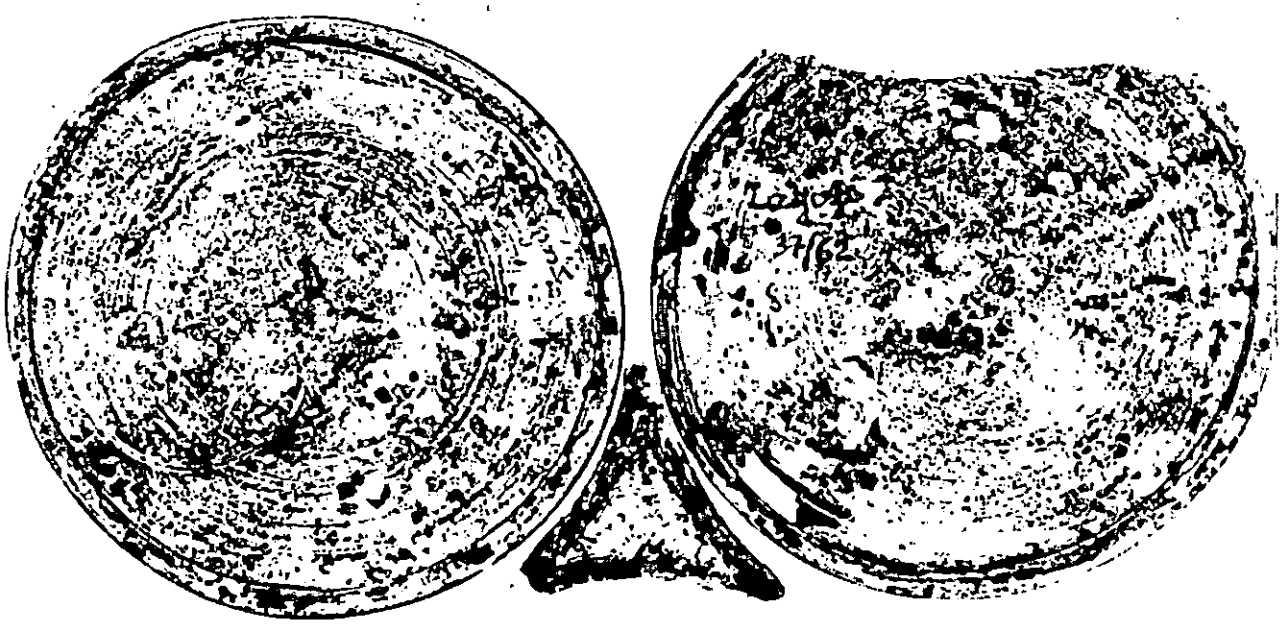


Plate XV. Poland, Zagosé (near Cracow), Roundels from a window with matching "coin," (Diam. 9 cm.), 14th-15th C.

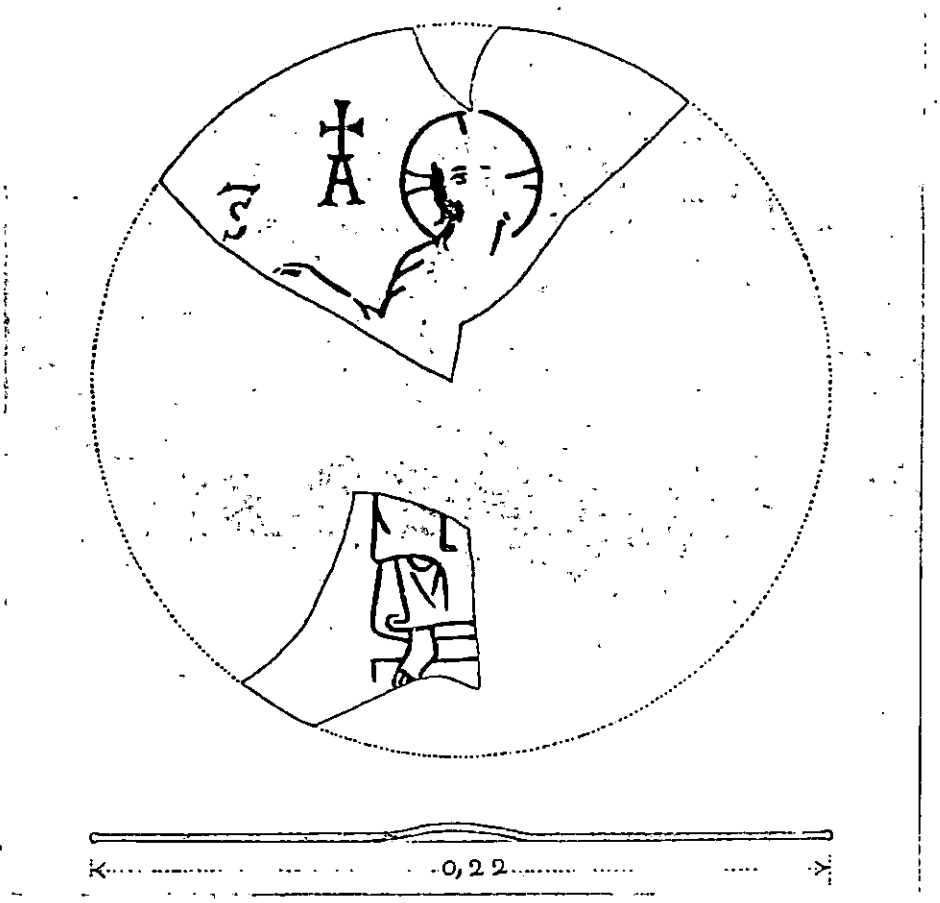


Plate XVI. Ravenna, S. Vitale, window fragment, "Christ in Benediction," 6th C.

Plate XVII. Germany, Lorsch Abbey, window fragment, "Nimbused Christ or Apostle or Saint," 9th C.

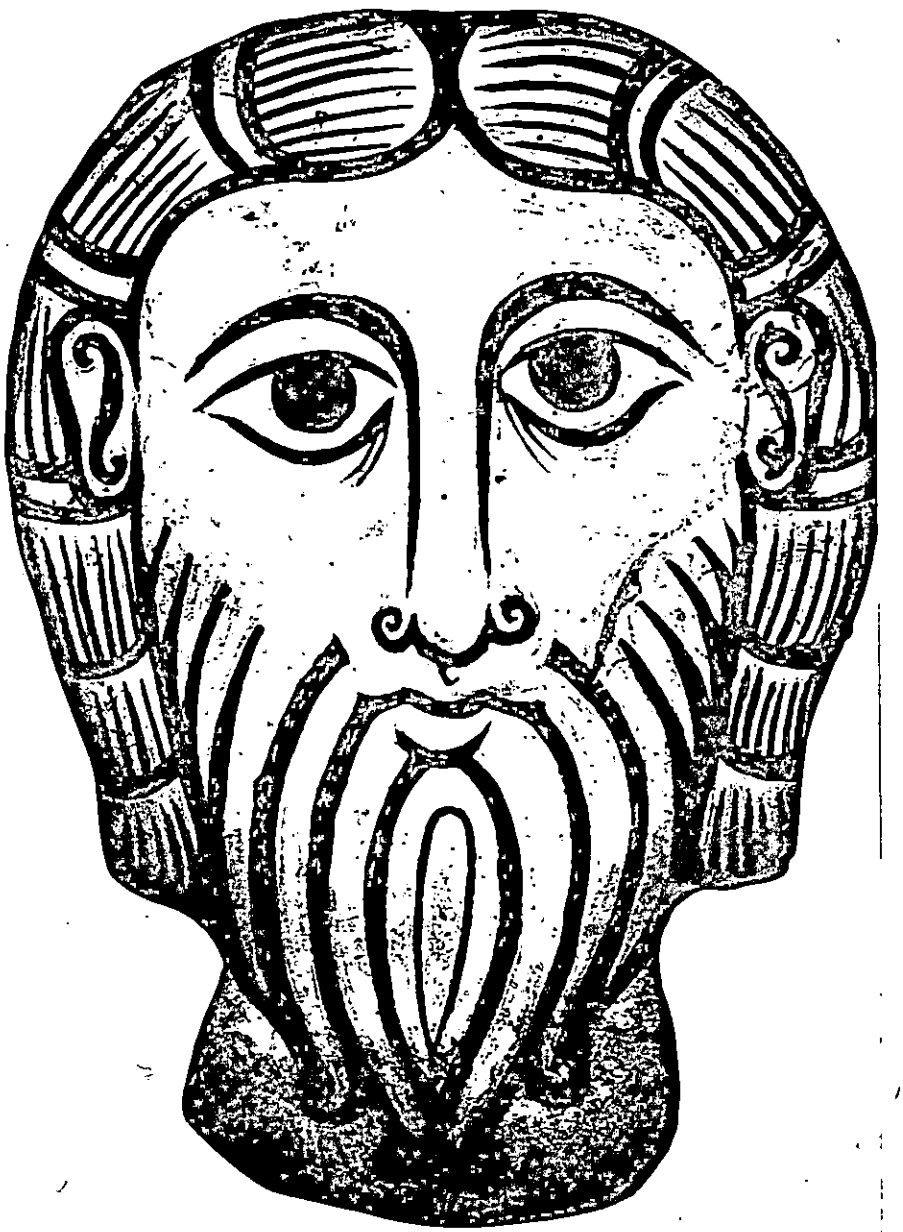


Plate XVIII. Alsace, Abbey Church of Wissembourg (now Darmstadt, Hessisches Landesmuseum), window fragment, "Christ," 11th C.

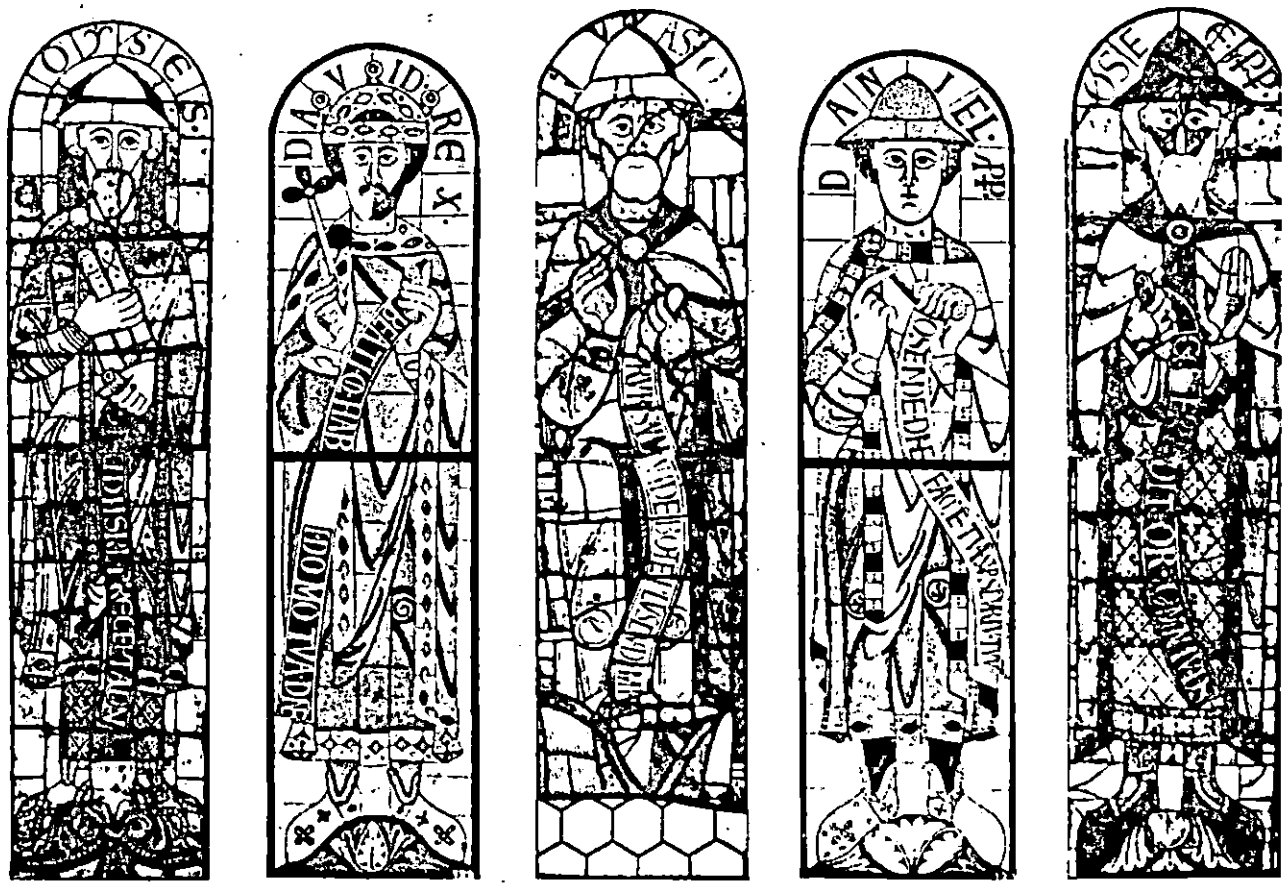


Plate XIX. Germany (Bavaria), Augsburg Cathedral, Nave clerestory windows, "Moses," "King David," "Jonah," "Daniel" and "Hosea," attributed to the monks of Tergernsee, c. 1065.

Plate XX. Germany (Bavaria), Augsburg Cathedral, Nave clerestory windows, "Hosea," "King David" and "Daniel," attributed to the monks of Tergernsee, c. 1065.

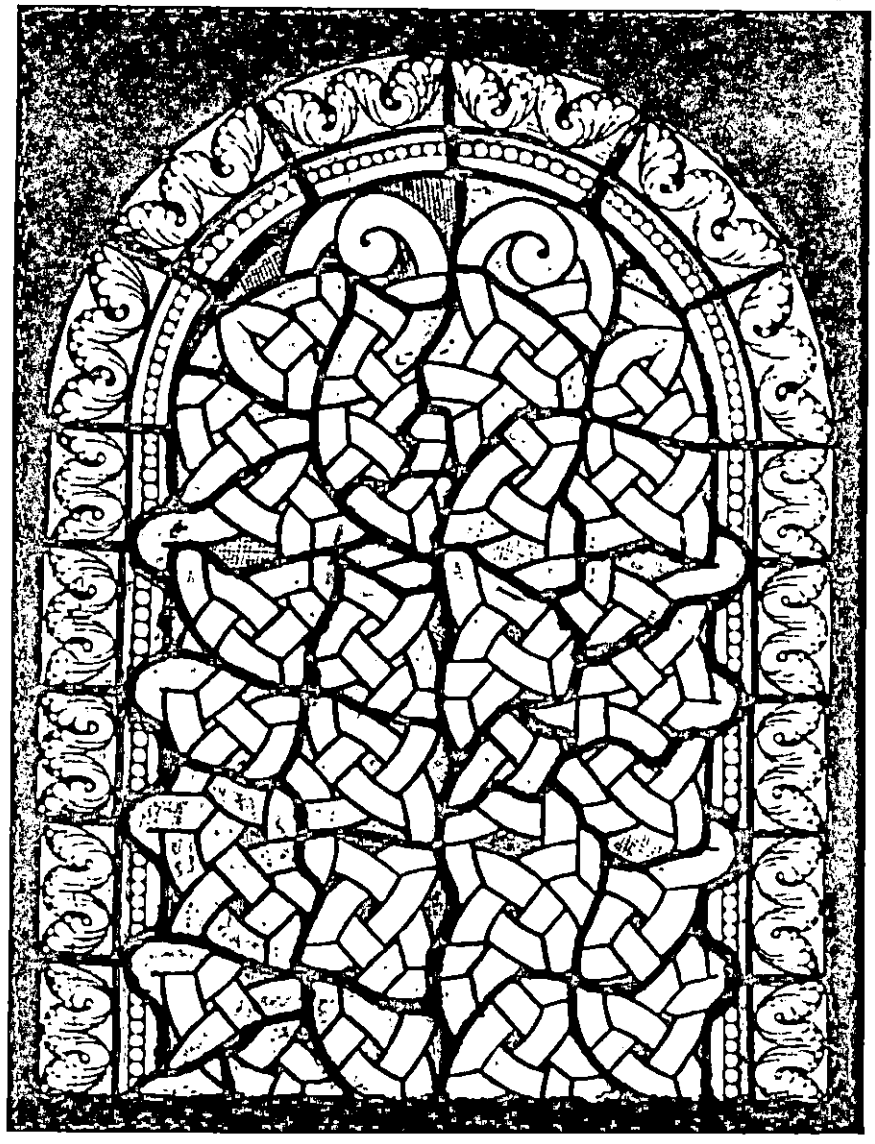


Plate XXI. Lower Austria, Heiligenkreuz, Cistercian monastery, cloisters, north wing, "Ornamental window," 1st half of the 13th C.

Plate XXII. Milan, Pinacoteca Ambrosiana, Cartoon for the "Four Crowned Martyrs" window (Milan Cathedral), Pellegrino Tibaldi, c. 1568-70.

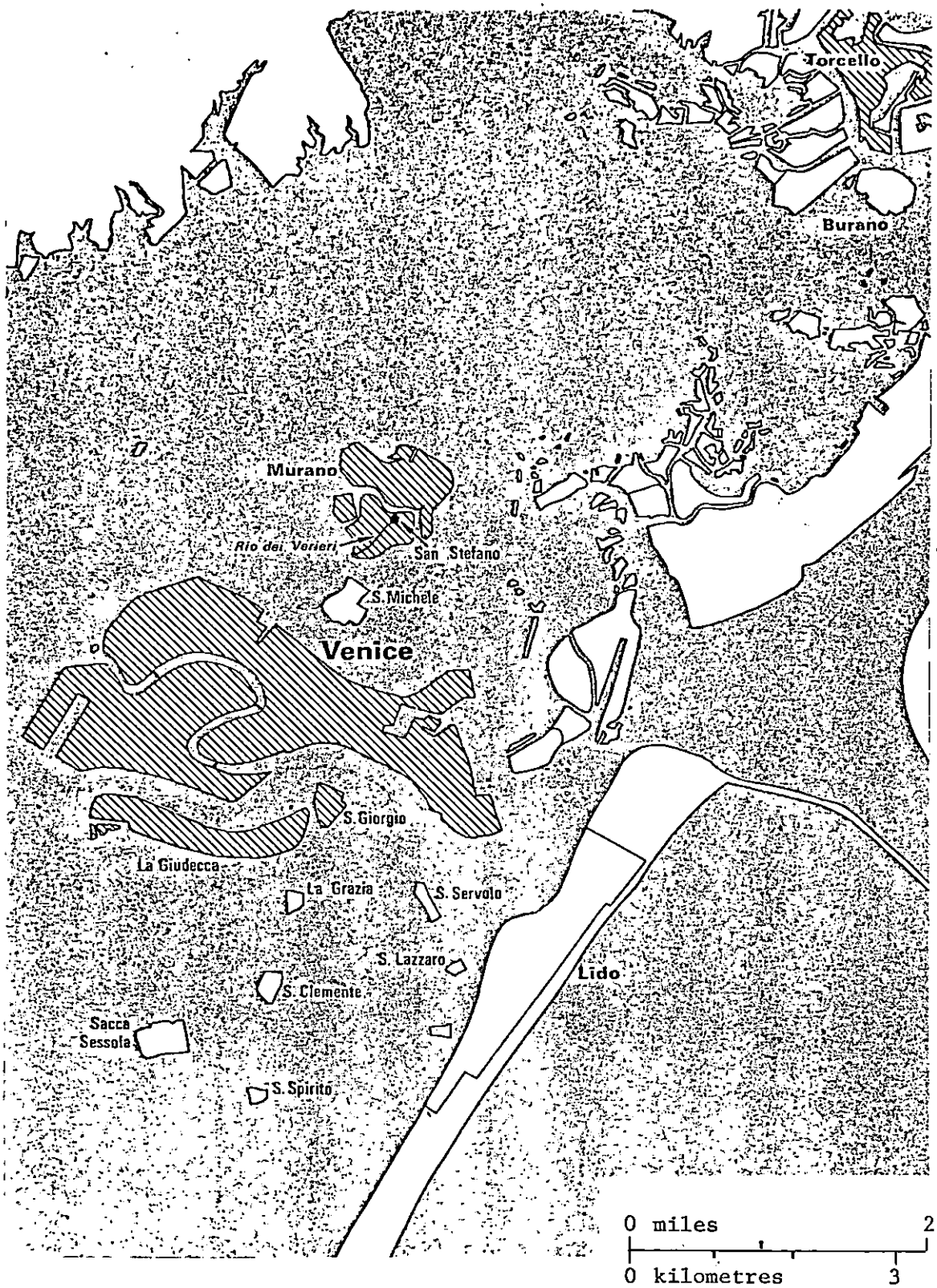


Plate XXIII. Map. "Venetian Lagoon."

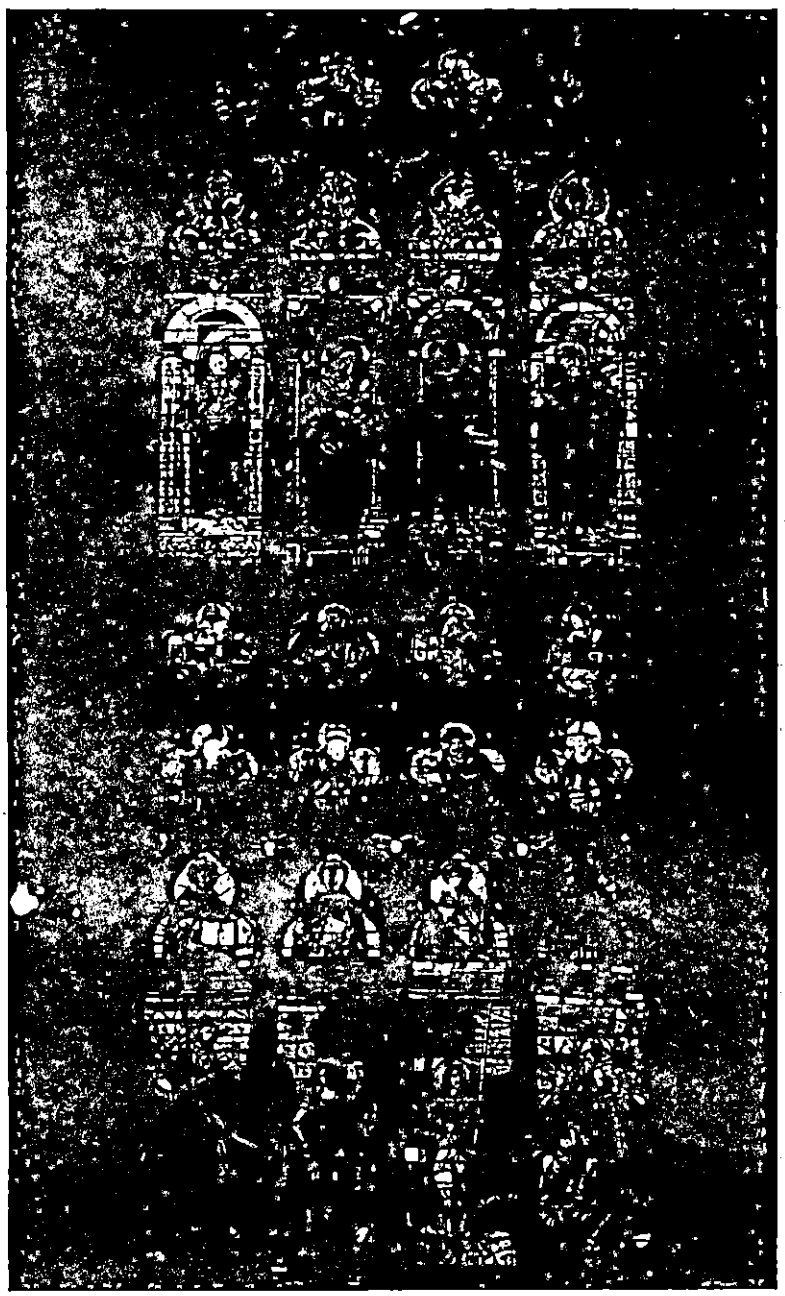


Plate XXIV. Venice, Ss. Giovanni e Paolo, Southern transept window, executed by Gian' Antonio Licinio da Lodi, c. 1470.

Plate XXV. Venice, Ss. Giovanni e Paolo, Southern transept window (detail upper portion), "Old and New Testament Figures," executed by Gian' Antonio Licinio da Lodi, c. 1470.

Plate XXVI. Venice, Ss. Giovanni e Paolo, Southern transept window (detail central portion), "Symbols of the Four Evangelists," the "Four Doctors of the Church" and "Dominican Saints," executed by Gian' Antonio Licinio da Lodi, c. 1470.

Plate XXVII. Venice, Ss. Giovanni e Paolo, Southern transept window (detail lower portion), "Dominican Saints" and the "Four Warrior Saints," executed by Gian' Antonio Licinio da Lodi, c. 1470.

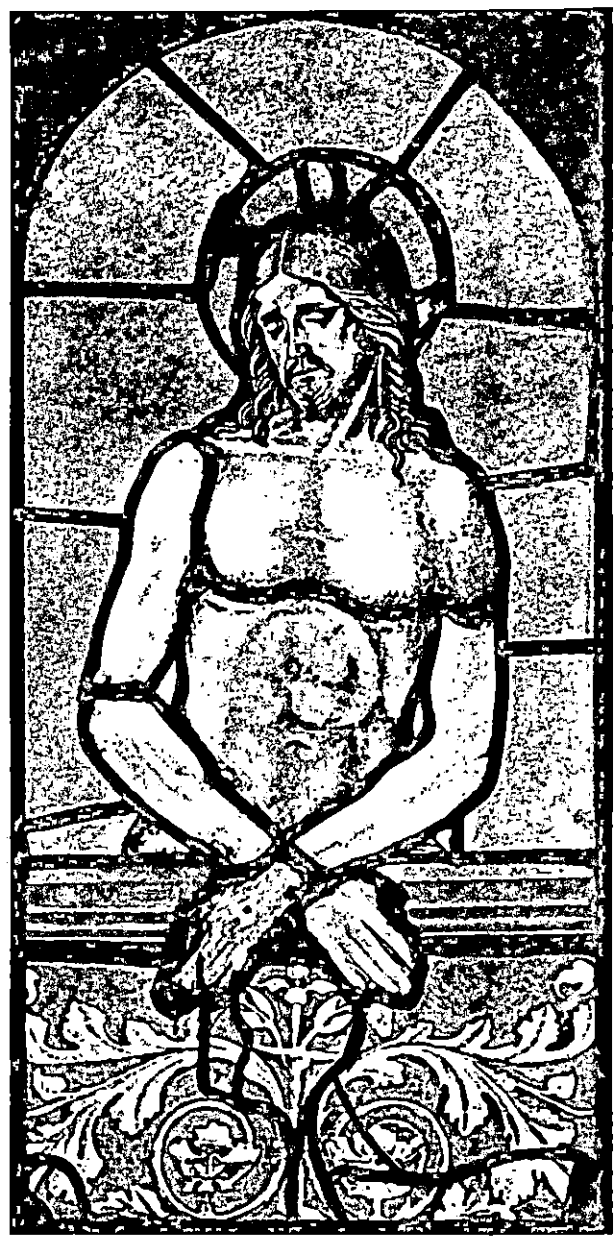


Plate XXVIII. Venice, Santa Maria dei Miracoli, Apse window, "Christ," School of Bellini, 15th-16th C.

Plate XXIX. (A). Florence, Convent of Ognissanti, Refectory, fresco, "Last Supper," Domenico del Ghirlandaio, 1480.

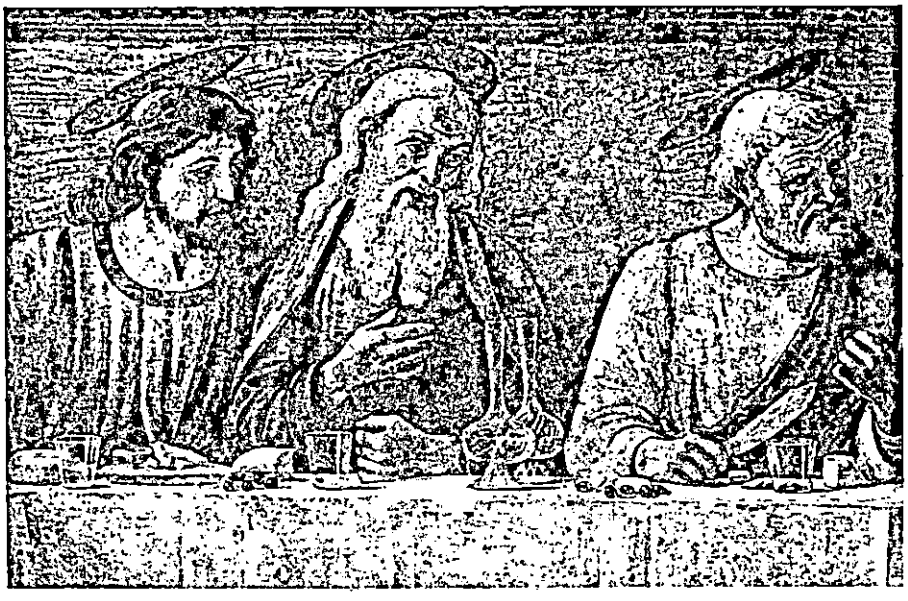


Plate XXIX. (B). Florence, Convent of Ognissanti, Refectory, fresco, "Last Supper" (detail showing "bicchieri"), D. Ghirlandaio, 1480.

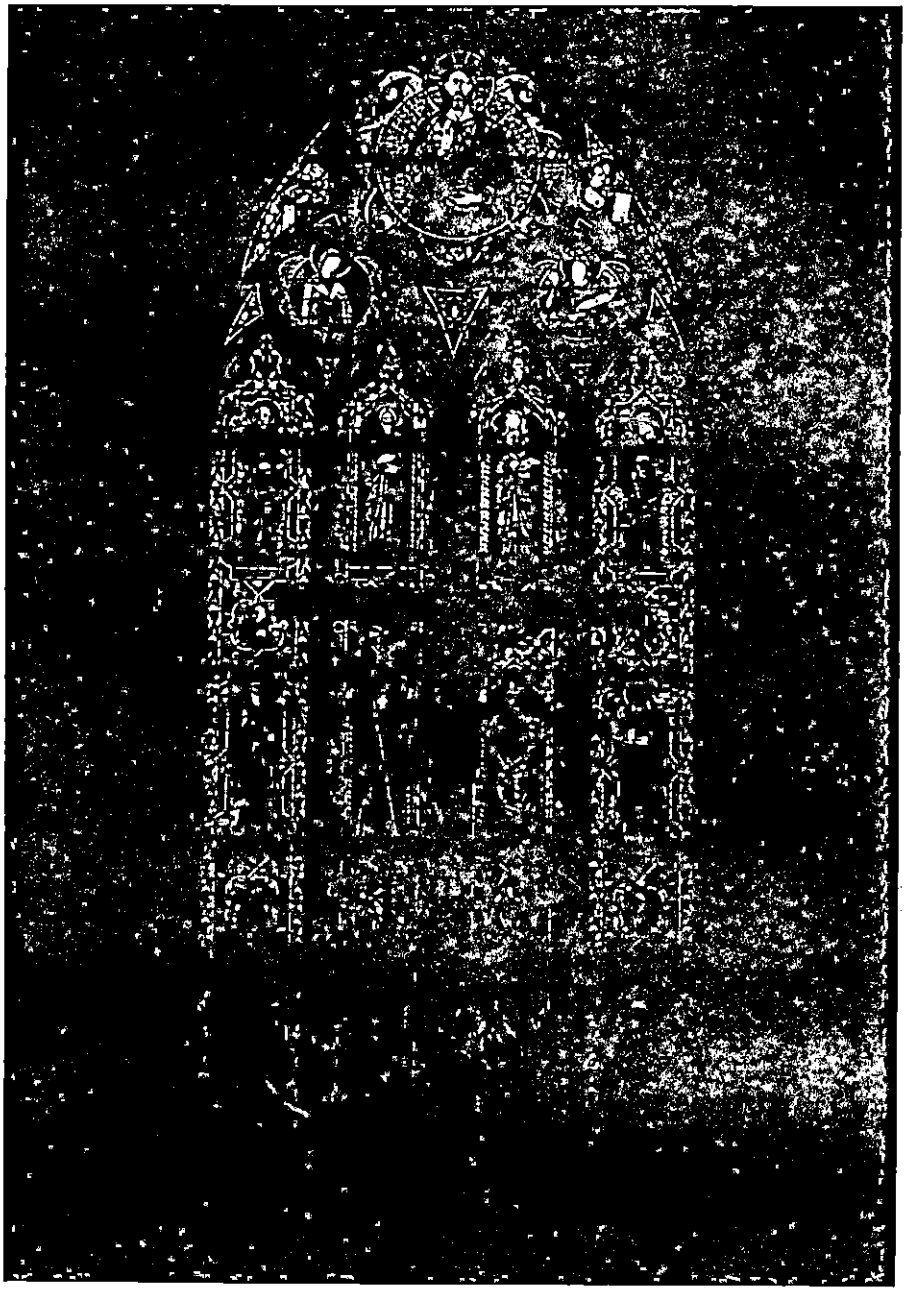


Plate XXX. Pisa, S. Francesco, Apse window, (upper portion) Circle of Traini, 1342, (lower portion) modern, 1926.

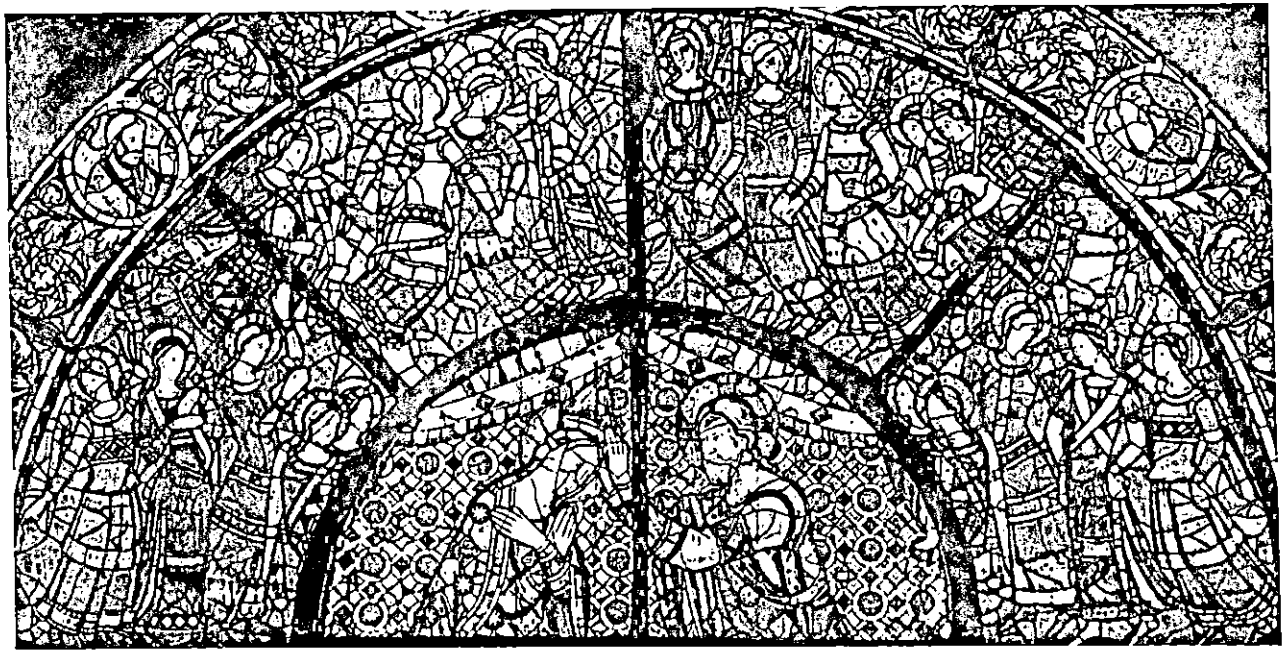


Plate XXXI. Florence, Santa Maria Novella, Rose window (detail), "Coronation of the Virgin," designed by Andrea da Firenze, c. 1365.

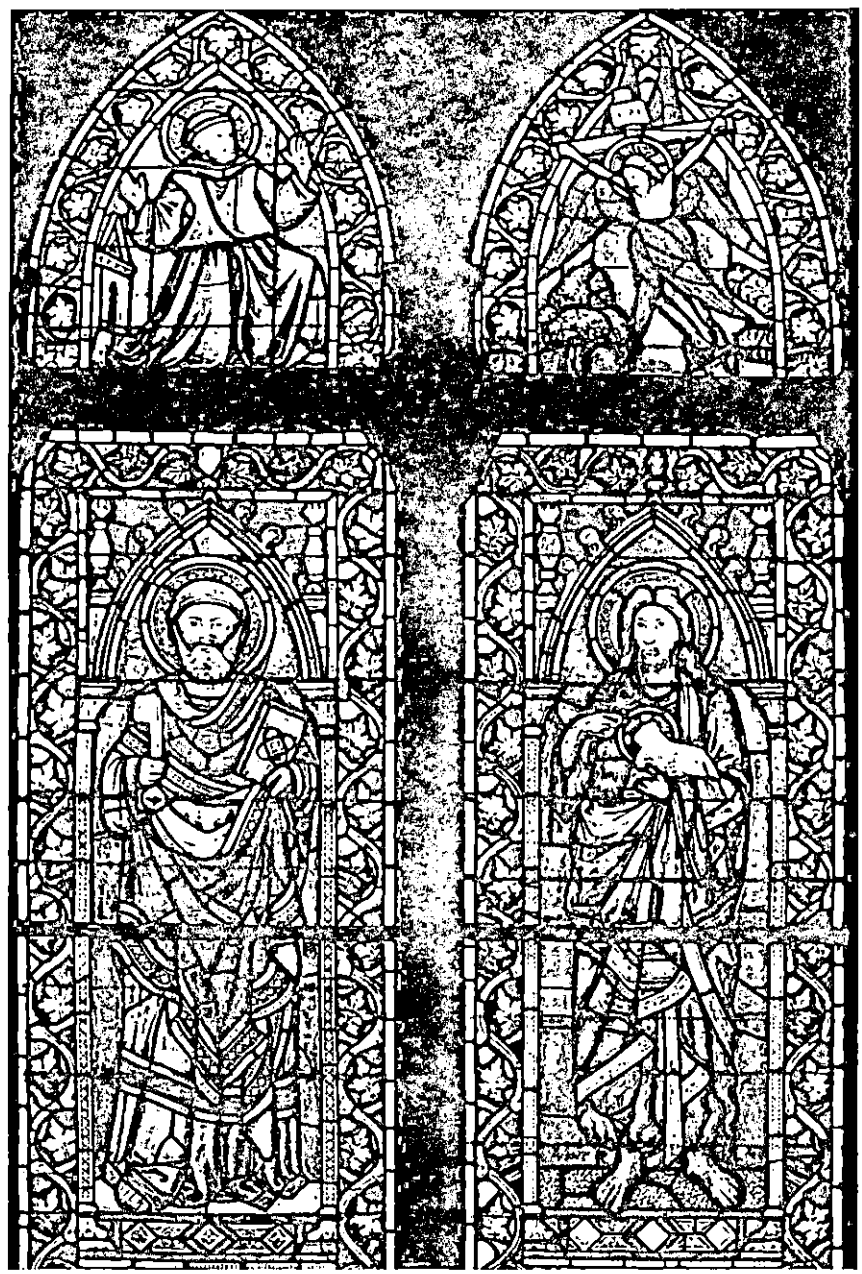


Plate XXXII. Florence, Santa Croce, Baroncelli Chapel window (detail), "The Stigmata of St. Francis," "St. Peter" and "St. John the Baptist," Taddeo Gaddi, c. 4th decade of the 14th C.

Plate XXXIII. Florence, S. Croce, Apse window occhio, "Apparition of St. Francis in Arles," Pacino di Bonaguida, 14th C.

Plate XXXIV. Florence, S. Croce, Apse window occhio, "The Transfiguration of Elijah," Taddeo Gaddi, 14th C.

Plate XXXV. Florence, Or San Michele, "The Virgin Appearing to A Dying Abbess," Late Gothic Florentine Master, early 15th C.

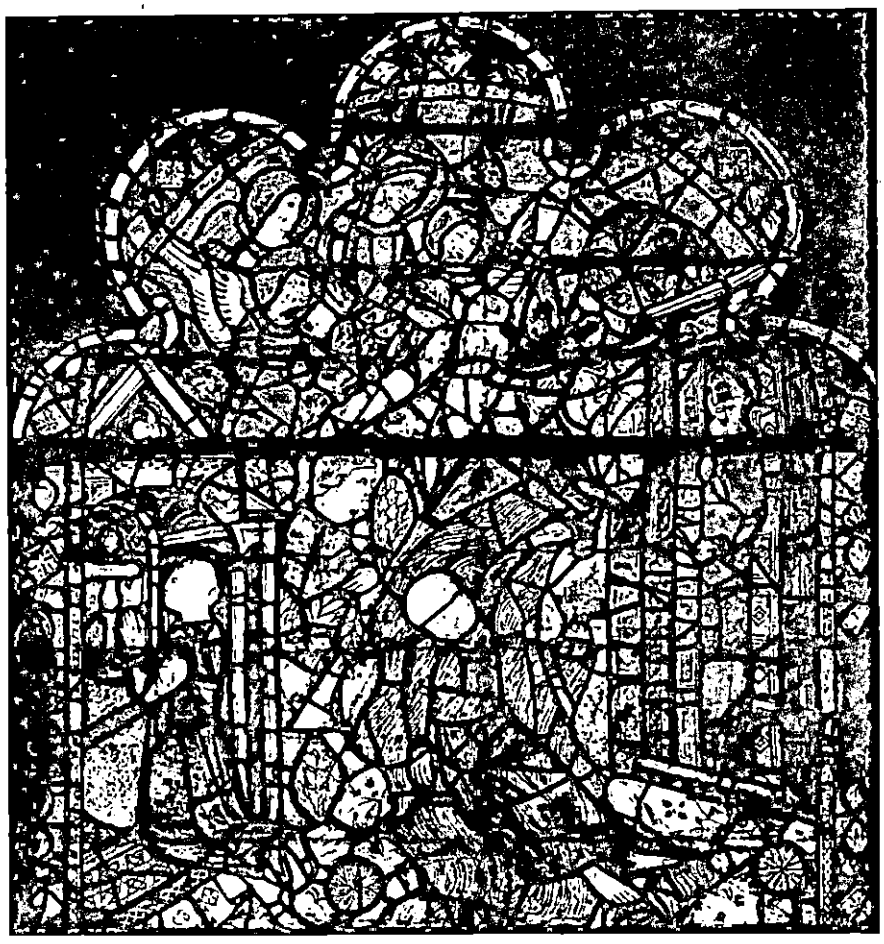


Plate XXXVI. Florence, Or San Michele, "The Story of the Sinful Monk," Late Gothic Florentine Master, early 15th C.

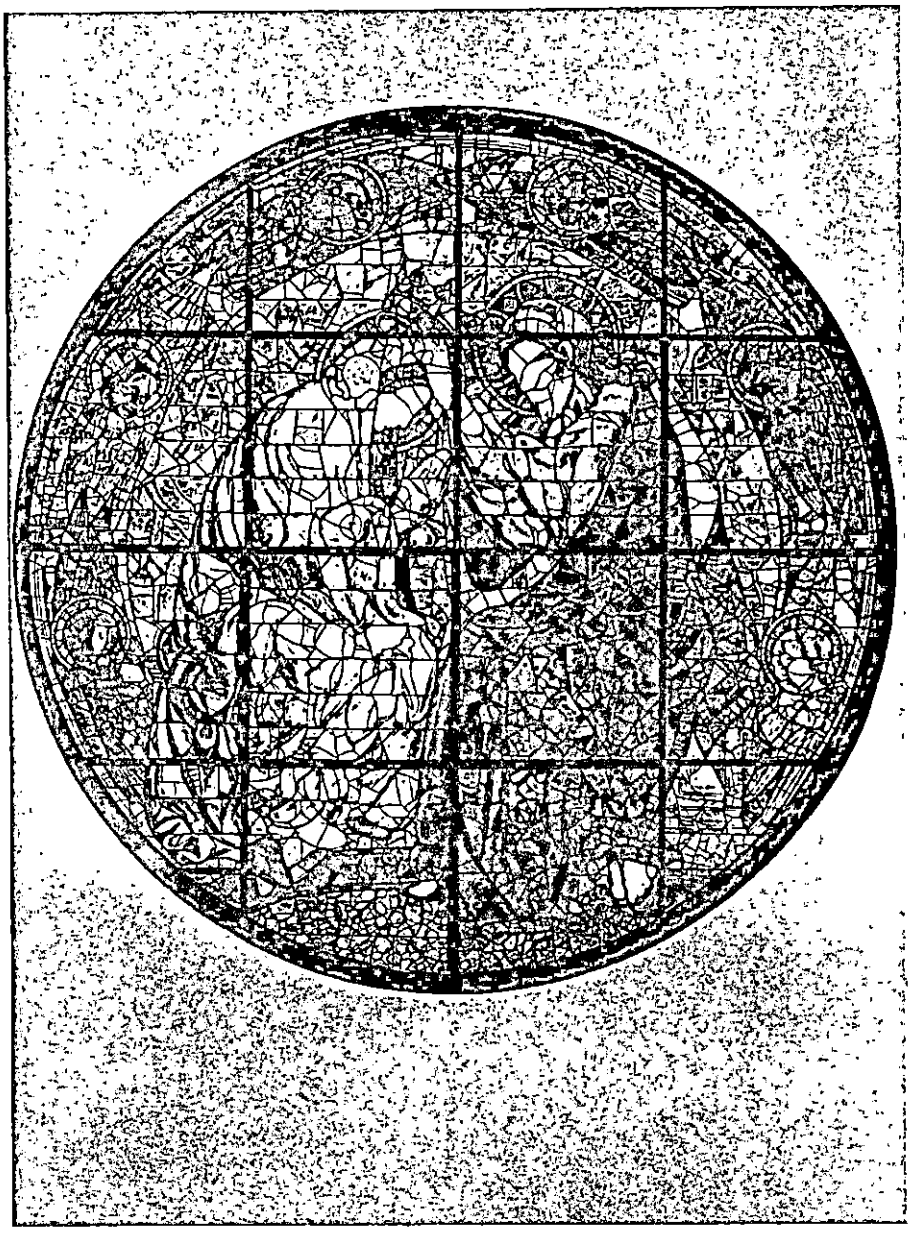


Plate XXXVII. Florence, Santa Maria del Fiore, Cupola window, "The Coronation of the Virgin," designed by Donatello (1434) and executed by Domenico di Piero da Pisa and Angelo di Lippo (1438).

Plate XXXVIII. Florence, Santa Maria del Fiore, Cupola window, "The Ascension," designed by Lorenzo Ghiberti (1443) and executed by Bernardo di Francesco (1444).

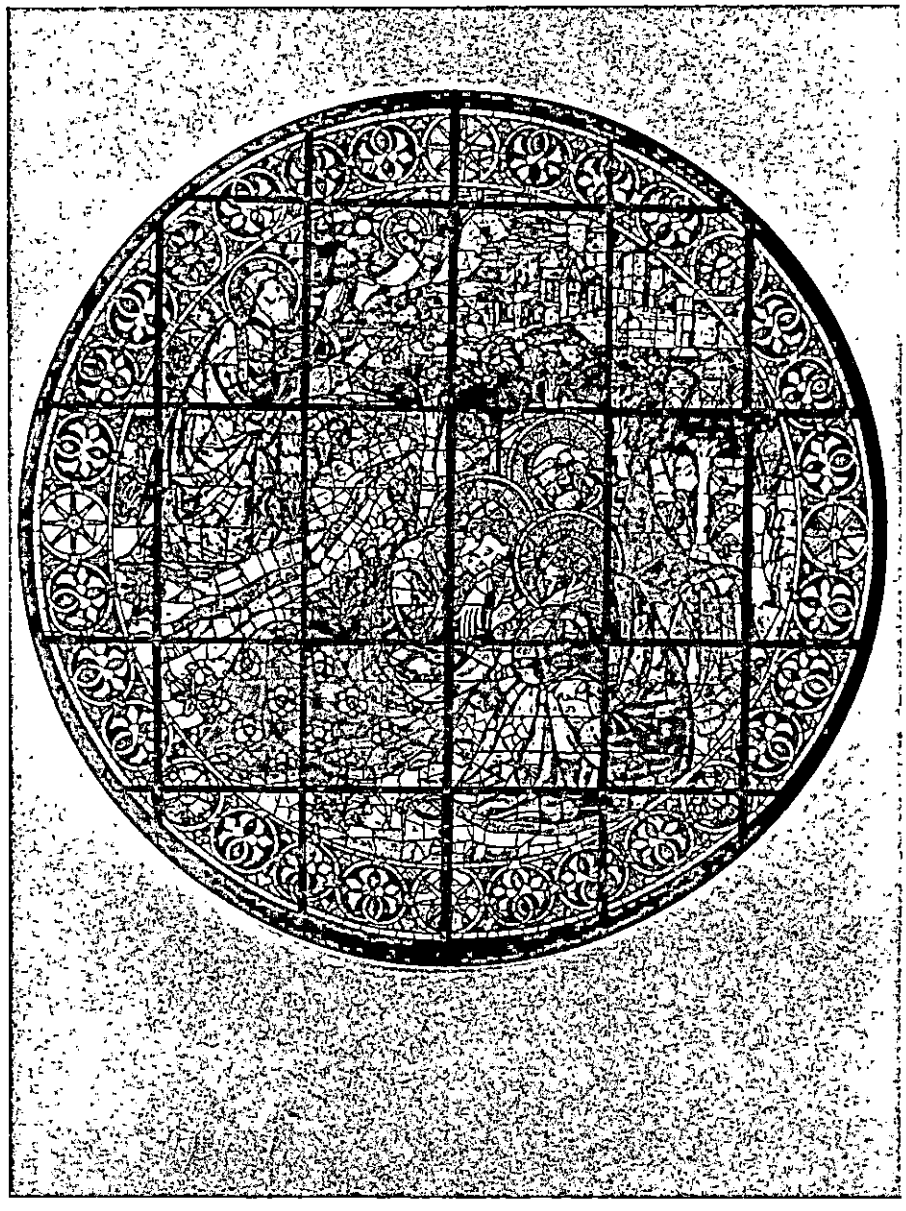


Plate XXXIX. Florence, Santa Maria del Fiore, Cupola window, "The Agony in the Garden," designed by Lorenzo Ghiberti (1443) and executed by Bernardo di Francesco (1444).

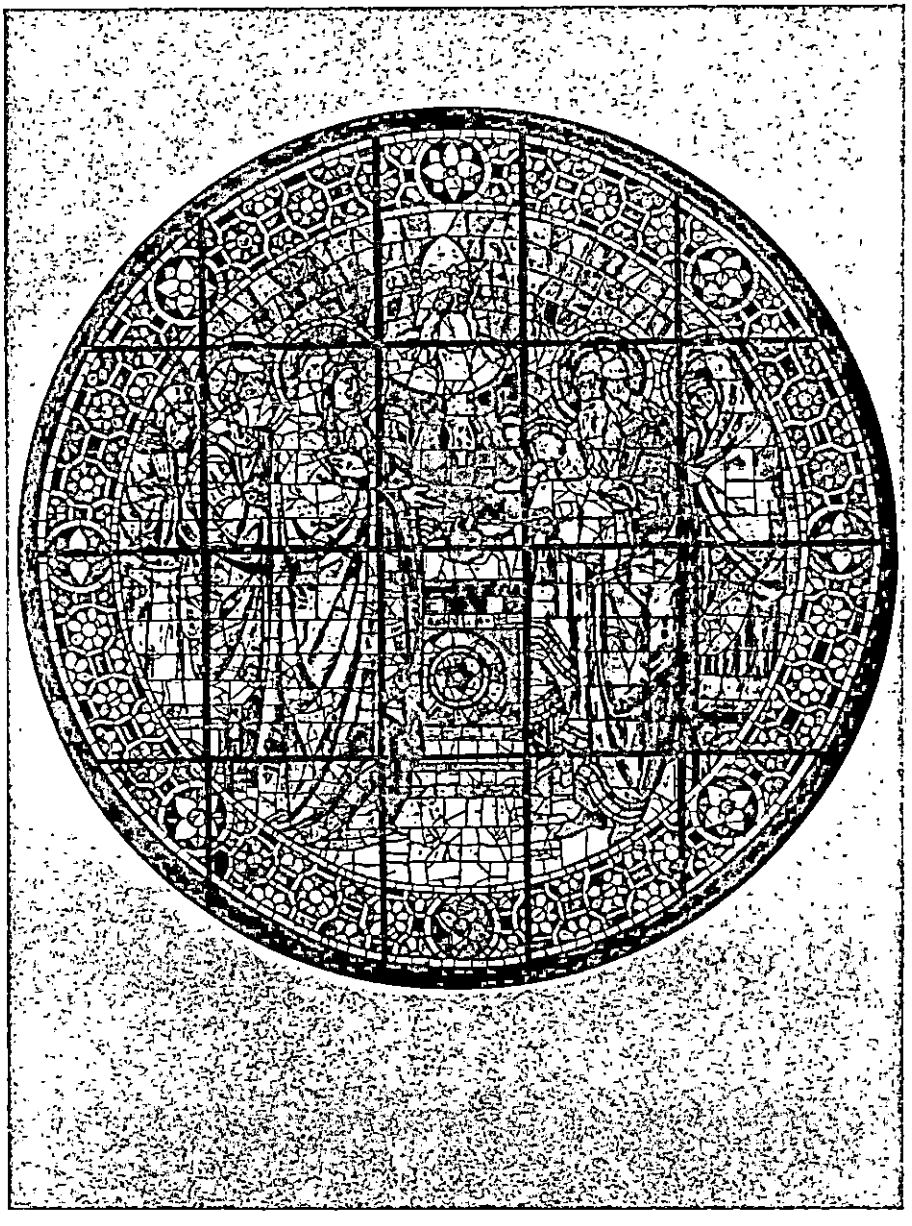


Plate XL. Florence, Santa Maria del Fiore, Cupola window, "The Presentation in the Temple," designed by Lorenzo Ghiberti (1443) and executed by Bernardo di Francesco (1444).

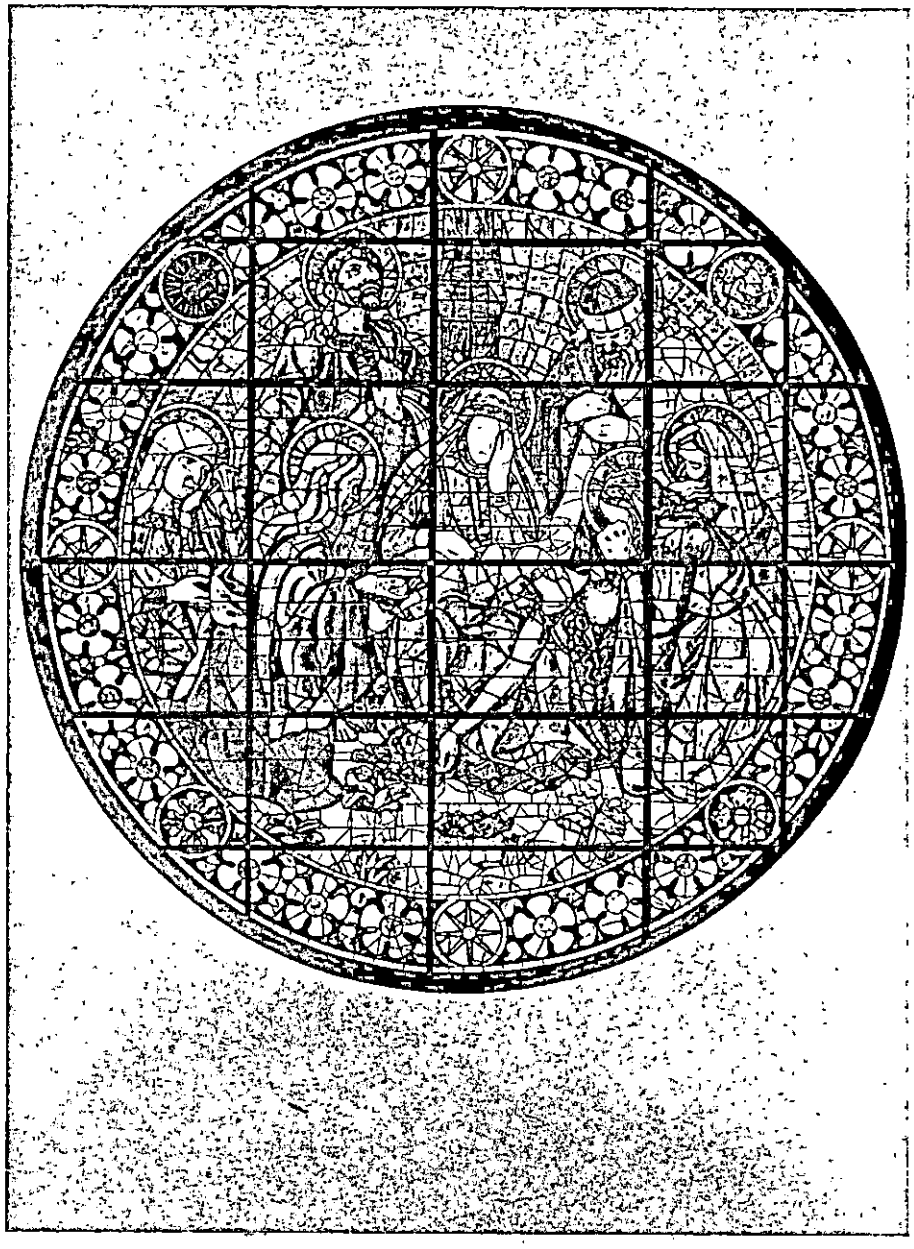


Plate XLI. Florence, Santa Maria del Fiore, Cupola window, "The Deposition," designed by Andrea del Castagno (1444).

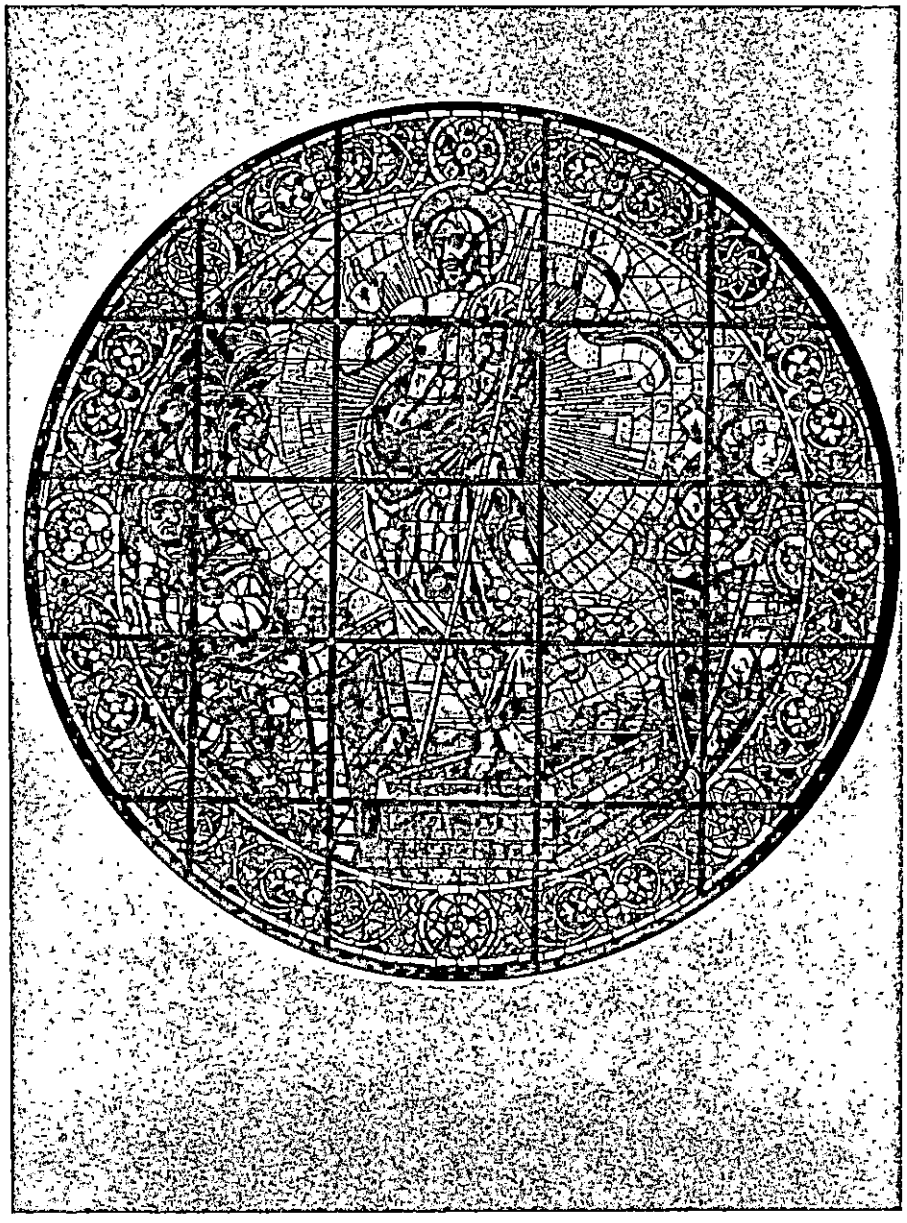


Plate XLII. Florence, Santa Maria del Fiore, Cupola window, "The Resurrection," designed by Paolo Uccello (1443) and executed by Bernardo di Francesco (1444).

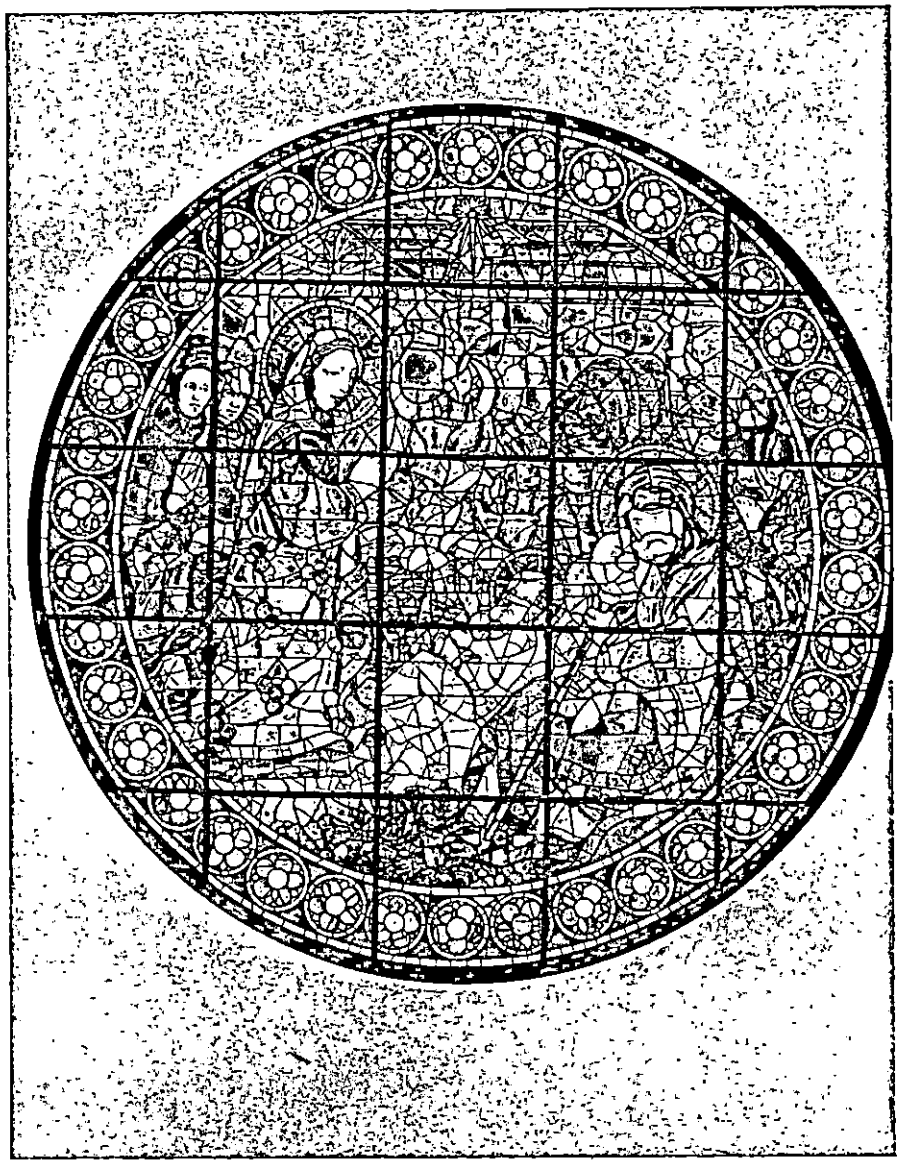
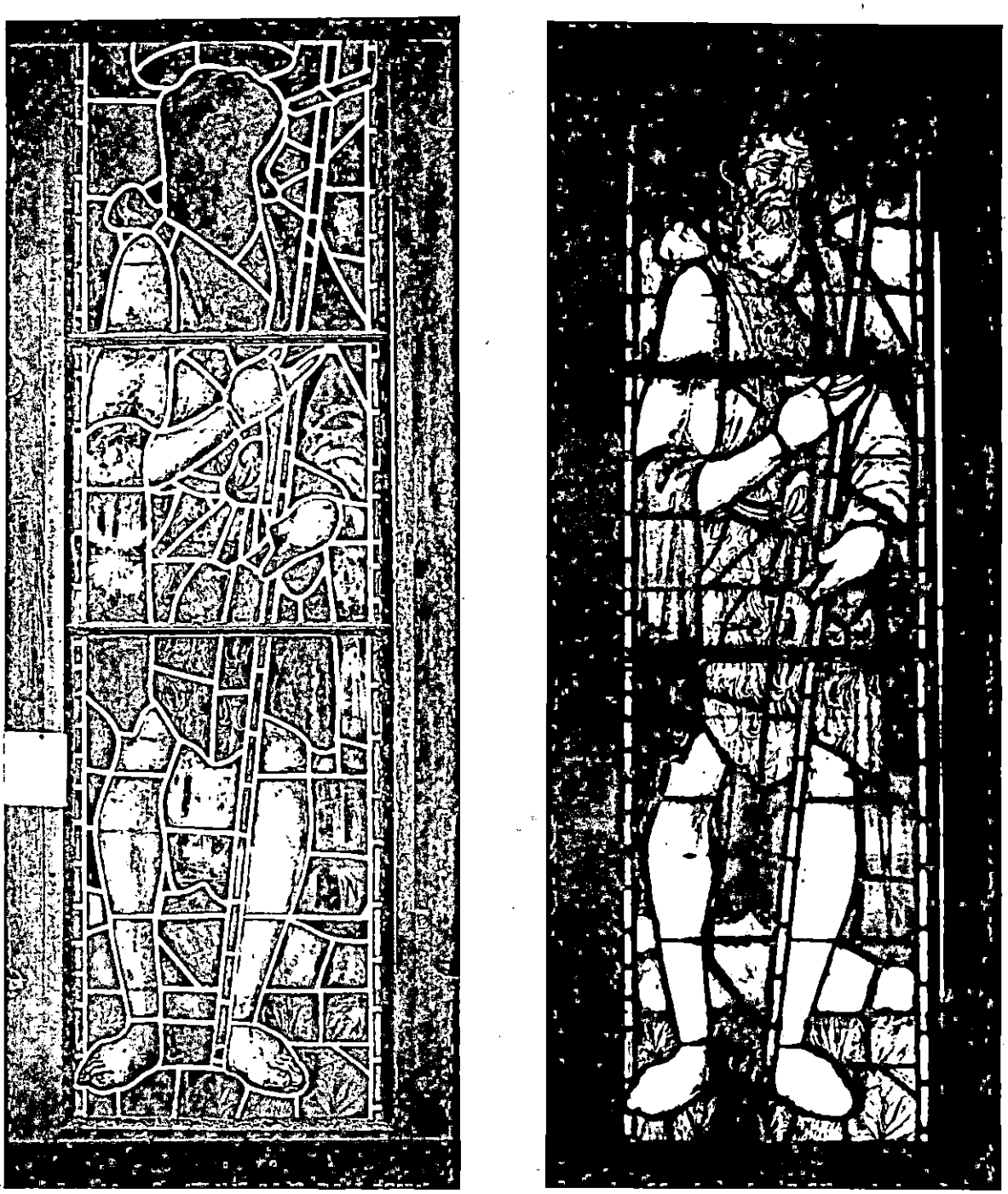


Plate XLIII. Florence, Santa Maria del Fiore, Cupola window, "The Nativity," designed by Paolo Uccello (1443) and executed by Angelo di Lippi (1444).



(A) (B)

Plate XLIV. Chianciano, Museum of Sacred Art, window, "St. John the Baptist," (A) Showing leading, Florentine Master, 15th C.

Plate XLV. Siena, Santuario della Madonna della Grotta, window, "The Virgin and Child," Sienese Master, c. 1275.

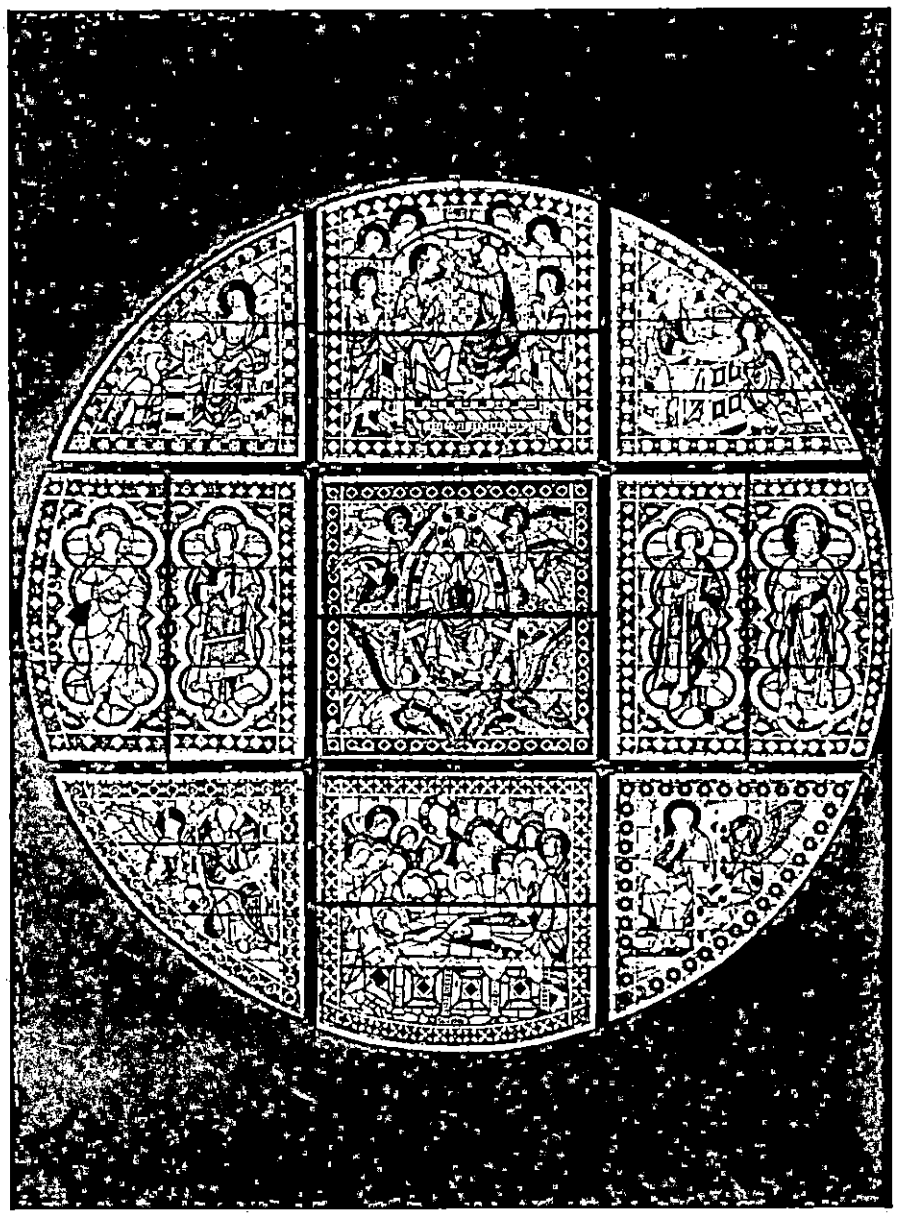
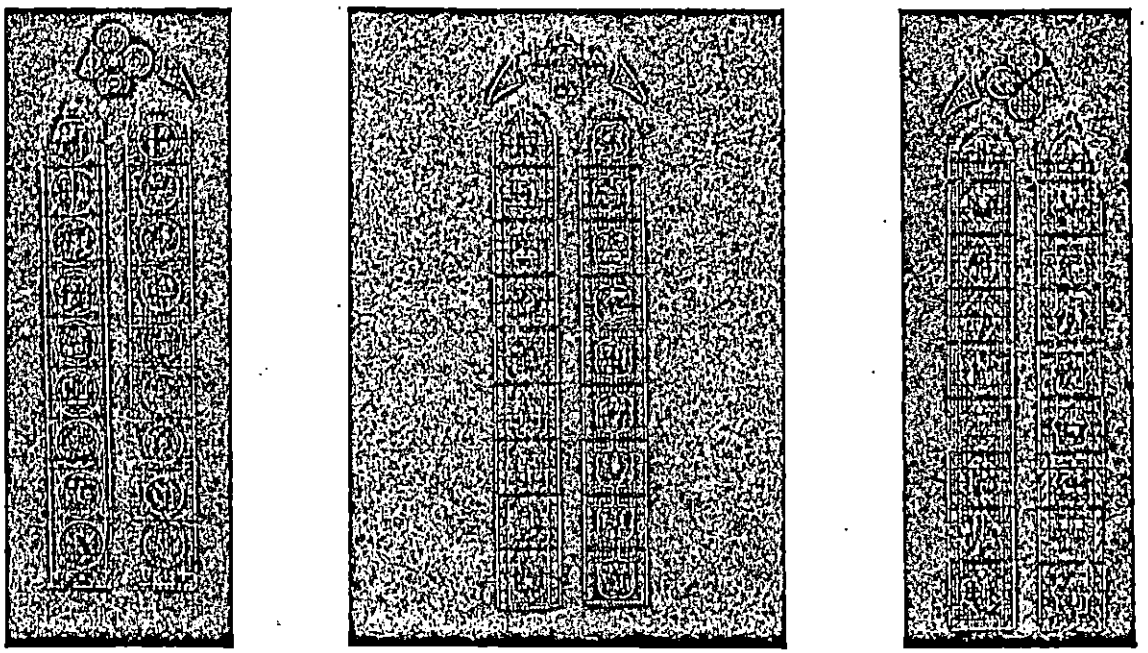


Plate XLVI. Siena, Cathedral, Apse window, Duccio di Buoninsegna, c. 1287-88.

Plate XLVII. Siena, Palazzo Pubblico, Window over doorway of the Sala della Guinta (detail), "St. Michael the Archangel Slaying the Dragon," Ambrogio Lorenzetti, c. 1330.



VIII VII VI

Le tre finestre dell'abside: VIII, VII, VI.

Plate XLVIII. Assisi, San Francesco, Upper church, Apse windows, mid 13th C. or earlier.

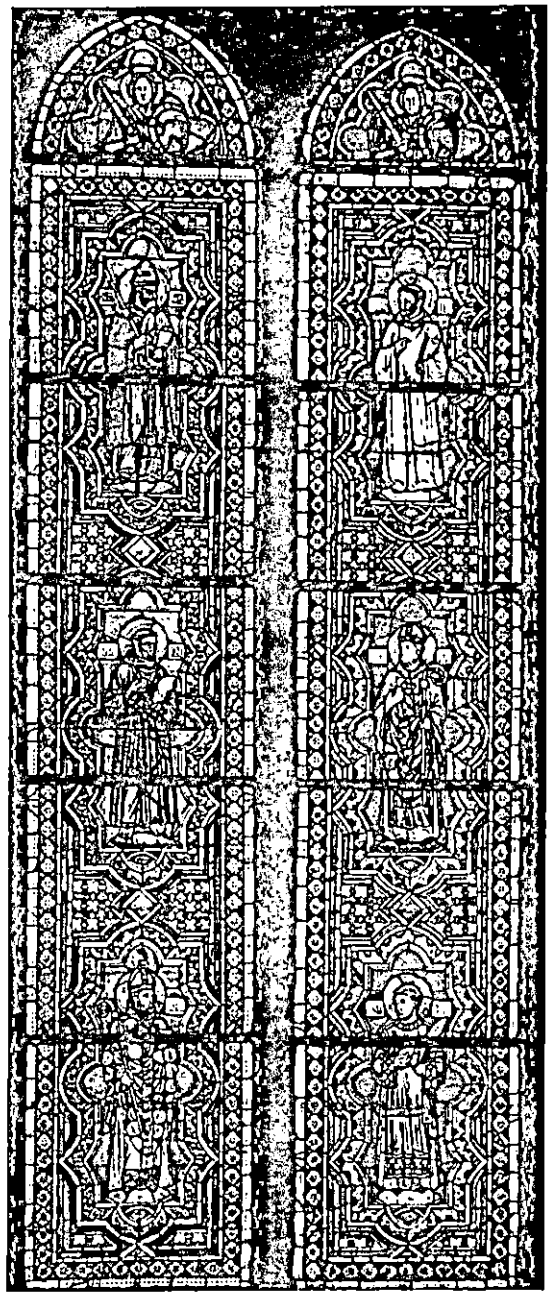


Plate XLIX. Assisi, San Francesco, Lower Church, Chapel of St. Martin windows (left double lancet), designed by Simone Martini and executed by Giovanni di Bonino da Assisi, c. 4th decade of the 14th C.

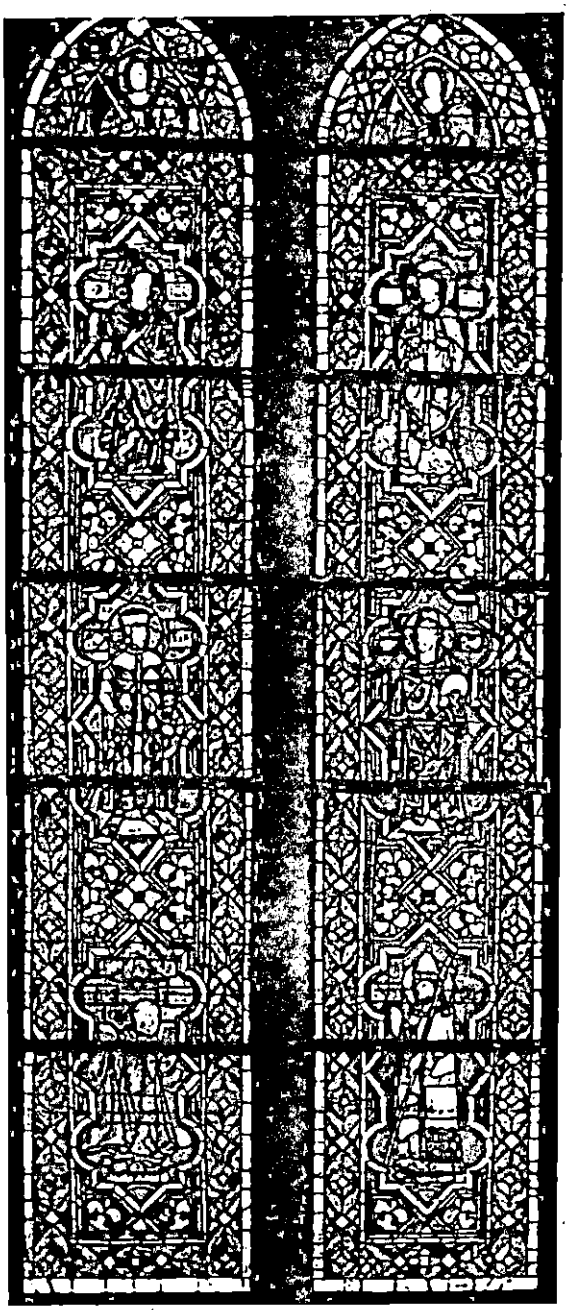


Plate L. Assisi, San Francesco, Lower Church, Chapel of St. Martin windows (central double lancet), designed by Simone Martini and executed by Giovanni di Bonino da Assisi, c. 4th decade of the 14th C.

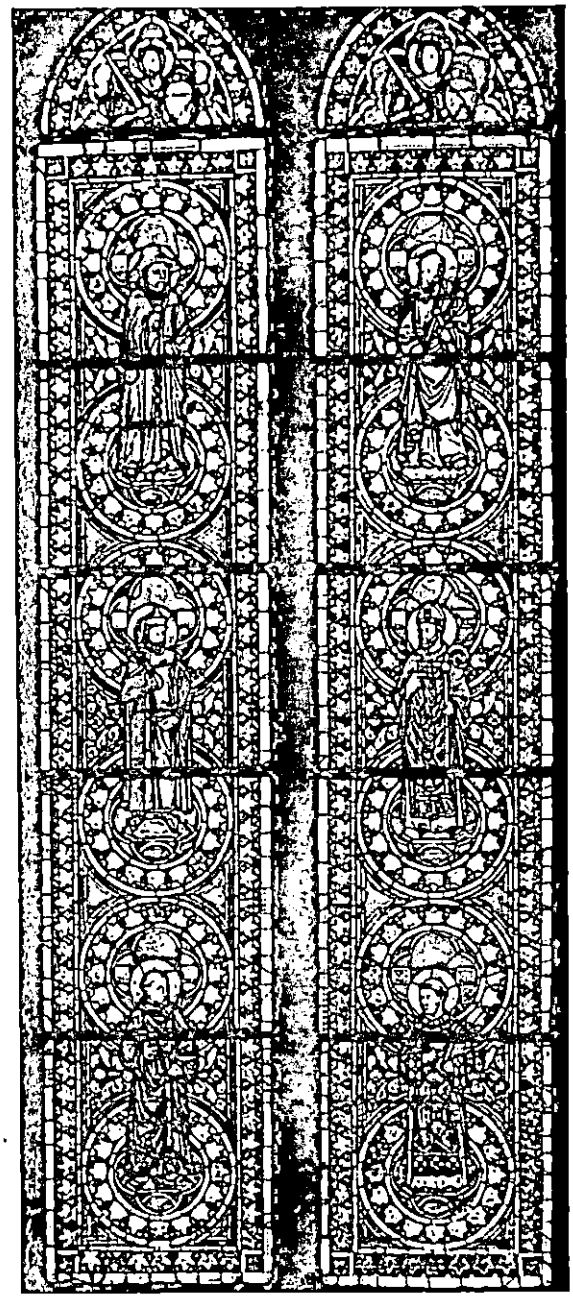


Plate LI. Assisi, San Francesco, Lower Church, Chapel of St. Martin windows (right double lancet), designed by Simone Martini and executed by Giovanni di Bonino da Assisi, c. 4th decade of the 14th C.

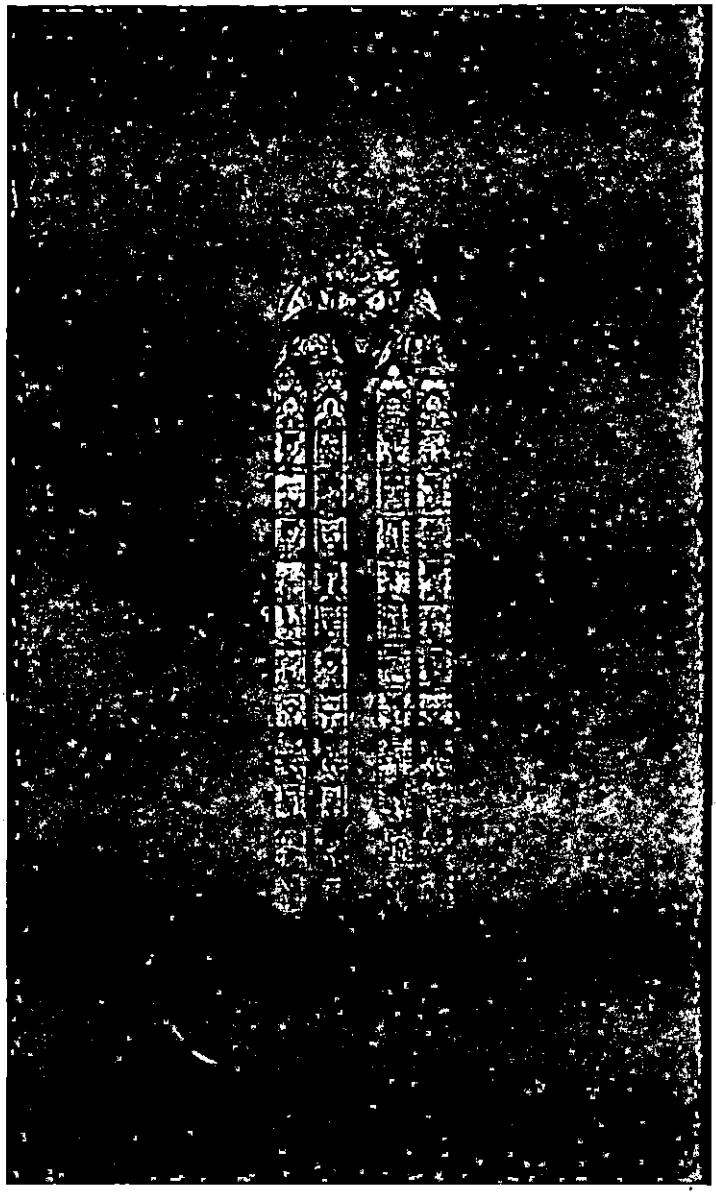


Plate LII. Orvieto, Cathedral, Apse window, designed by Lorenzo Maitani and executed by Giovanni di Bonini da Assisi, 1334.

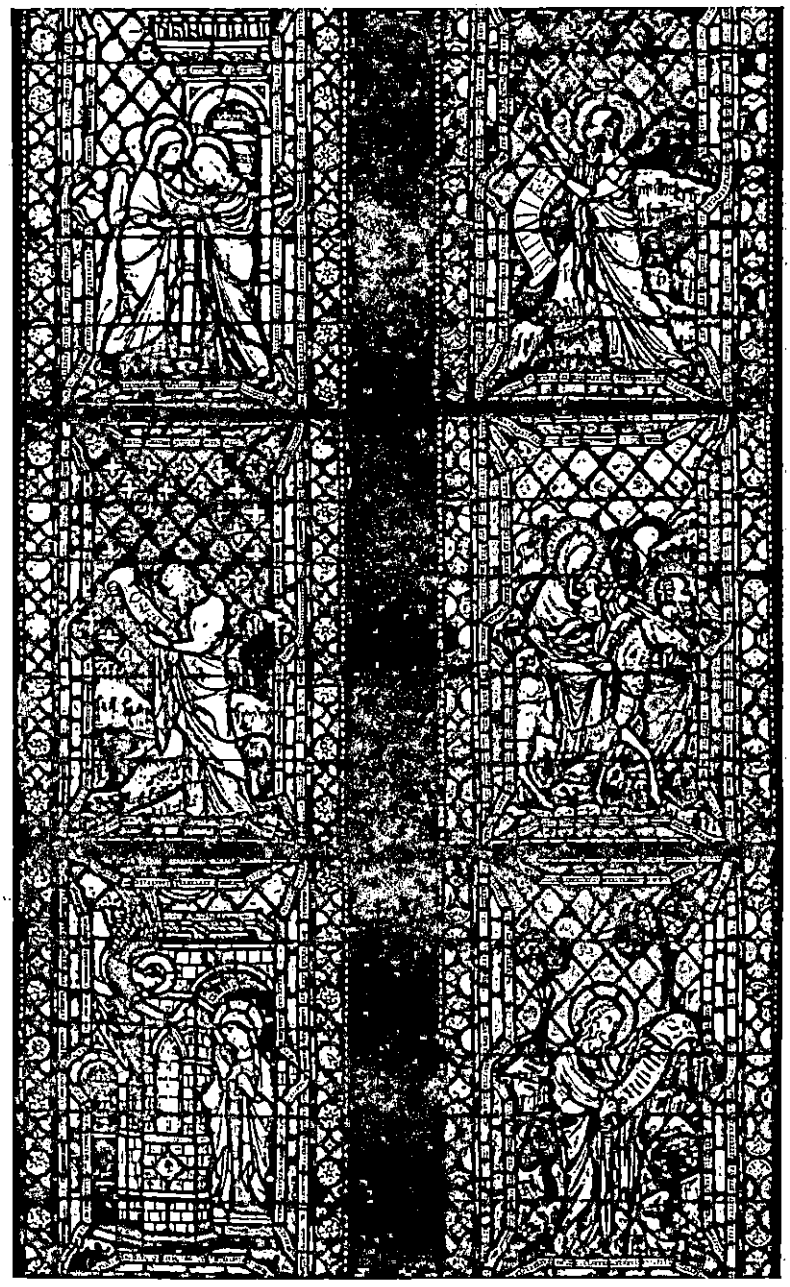


Plate LIII. Orvieto, Cathedral, Apse window (detail), "Stories of the Virgin and of Christ and Prophets," designed by Lorenzo Maitani and executed by Giovanni di Bonino da Assisi, 1334.

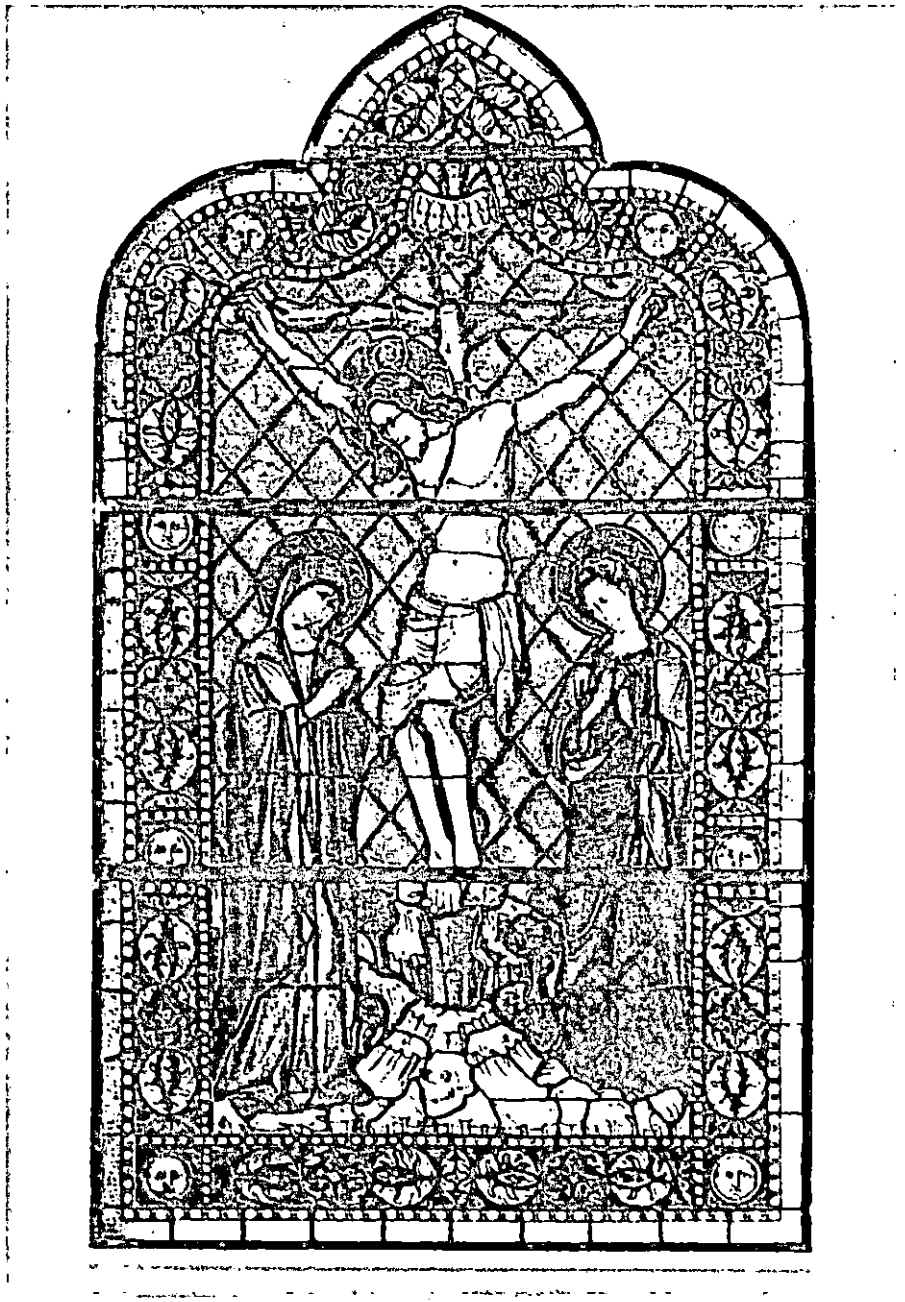


Plate LIV. Perugia, Galleria Nazionale dell'Umbria, Window panel, "Crucifixion," executed by Giovanni di Bonino da Assisi, 1st half of the 14th C.

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AN EXAMINATION OF THE ITALIAN GLASS INDUSTRY AND ITS INFLUENCE ON NATIVE STAINED AND PAINTED GLASS

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5 JULY 1977

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