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**Form and Function of Central Italian Medieval Glass
in the Light of Finds from the Benedictine Abbey of Farfa
and the Palazzo Vitelleschi at Tarquinia**

Volume I (of II)

Martine Sarah Newby

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MPhil. Thesis
Submitted to the University of Durham
Department of Archaeology

March 1999



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ABSTRACT

Form and Function of Central Italian Medieval Glass in the Light of Finds from the Benedictine Abbey of Farfa and the Palazzo Vitelleschi at Tarquinia

Martine Sarah Newby

MPhil. Thesis Submitted to the University of Durham, Department of Archaeology,
1999

The study of medieval vessel glass in Italy is a relatively new discipline. Very few intact pieces survive but archaeological excavations have begun to produce a considerable volume of fragments. Two such excavations in central Italy, at the Abbey of Farfa and the Palazzo Vitelleschi, Tarquinia, have provided the opportunity to examine broadly contemporary assemblages from high status ecclesiastic and secular contexts. Evidence from the medieval Italian iconographical record has also been considered.

The wealth and variety of the glass from Tarquinia is unprecedented with *circa* 600 vessels present. From these pieces it has been possible to identify a much wider range of vessels than previously recognized and to suggest divisions between tablewares and utilitarian pieces used for storage, distillation and medical purposes. They also show, for the first time, that glass was used in large quantities during the later Middle Ages in central Italy and provide archaeological confirmation of the surviving inventories of glass-makers' stock.

The finds from Farfa and Tarquinia, together with pieces found in churches in Rome and now preserved in the Museo Sacro of the Vatican, show that the same types of glass vessel were being used in high status domestic households and religious communities with the exception of hanging lamps which are found exclusively on ecclesiastical sites of whatever status. They also suggest a change in the pattern of glass production and consumption by demonstrating the move away from heavier and more elaborately-decorated pieces at the end of the 13th century, to mass-produced thin-walled mould-blown vessels by the end of the 14th century.

This thesis is important because it has extended and amended the corpus of medieval glass known and will provide a firm foundation for future studies both in Italian medieval material culture and in the history of glass.

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DECLARATION

The material in this thesis has not previously been submitted for a degree in this or in any other university

**Martine Newby
29 March 1999**

1: INTRODUCTION

INTRODUCTION

The aim of this work is to examine central Italian medieval glass from the later 13th until the beginning of the 15th century. It will not look at glass beyond 1450, which marks the discovery of '*crystallo*' by Antonio Barovier in Venice and thereafter the rise and dominance of the Venetian glass industry. This study will not attempt to discuss all excavated pieces in order to create a relative chronology and typology, as this has partly been achieved by Stiaffini (1985 and 1991). Rather, through the sources discussed below, it will examine the uses to which the glasses might have been put while appreciating that one form could have fulfilled several different functions. It is hoped that temporal distinctions in the use of glass among different levels of society will be revealed. The finds from the Farfa Abbey and the Palazzo Vitelleschi, Tarquinia, which provide evidence from comparatively affluent ecclesiastical and domestic sites respectively, shall be compared with material from less affluent dwellings.

This introductory chapter will describe the sites and sources used in this thesis. The glass, discussed here and catalogued in Appendices A and B (in vol. II), comes principally from the two sites mentioned in the title: the Benedictine Abbey of Farfa and the Palazzo Vitelleschi at Tarquinia. There are also a few pieces from excavations at Tuscania (nos 75 and 256) and one each from Santo Stefano, Anguillara (no. 76) and the Palazzo Altemps in Rome (no. 47). Some intact vessels preserved in the Museo Sacro of the Vatican (nos 227, 236 and 245-52) and the Museo del Palazzo Venezia, Rome (nos 236 and 252) are also included. Throughout this thesis these pieces will be compared and contrasted with published finds from other sites in Italy (Fig. 1), especially from the environs of Rome and from Tuscany. Further comparisons will be made with glasses listed in the inventories of contemporary glass-makers (Appendices E and F) and other published documents.

Another important source is the depiction of glass vessels in 14th- and early 15th-century manuscripts and frescoes. A selection of these have been included for consultation (Plates 1-49) from which it has been possible to identify many forms known from the archaeological record and to suggest multiple functions for them. This introduction will also include a short discussion on the history of the study of Italian medieval glass and the importance of the present study of the glass from Farfa and Tarquinia.



THE ABBEY OF FARFA

History of the Abbey

The Benedictine Abbey of Farfa (Fig. 2) is located in the Sabine Hills, 40 km northeast of Rome. It is situated on a natural hillside ledge enlarged by a terrace in Roman times. The abbey was one of the most important monasteries of central Italy in the Middle Ages and has been well-known to historians for a long time because of the survival of a number of early documents. These include the *Libellus constructionis farfensis*, an anonymous history of the abbey written in the second half of the 9th century, the *Destructio monasterii farfensis* written by Abbot Hugo (998-1039) that continues on from the former and covers the period of abandonment and reconstruction in the late 9th and 10th centuries, and the *Registrum farfensis* compiled by Gregory of Catino at the end of the 10th century (Balzoni 1903). The following short history of the abbey has been drawn mainly from the following publications: Schuster 1921, McClendon 1987 and Leggio 1992.

Farfa was founded between 560 and 570 by Lawrence, Bishop of Forum Novum, but this community was destroyed in the Lombardic invasion of 592 and subsequently refounded at the end of the following century by Thomas of Maurienne. Throughout the 8th century Farfa acquired vast estates in central Italy and when Charlemagne conquered the Lombardic kingdom in 774, the abbey passed into Frankish hands. Charlemagne granted the monastery temporal and ecclesiastical immunity, on a par with the royal abbeys of northern Europe. Around 840 under Abbot Sichardus (830-842) the structure of the monastery reached its greatest splendour, but in 897 the abbey was occupied by the Saracens and burned by locals. Abbot Hugo (998-1039) wrote that before its partial destruction and desertion, 'with the single exception of Nonantula ... there was not a monastery of comparable wealth in the entire kingdom of Italy' (Balzoni 1903, vol. 1, 31). It was an imposing complex protected by a wall with towers, giving the impression of a fortified city and included, besides the claustral buildings and six basilicas, a '*palatium*' for the emperor.

At the beginning of the 12th century Farfa had, in addition to the great estates in the Sabina, possessions in Rome and property in Viterbo, Tarquinia, Orte, Narni, Terni, Spoleto, Assisi, Senigallia, Orsino, Chieti, Tivoli and the port of Civitavecchia. However, in 1122 at the Concordat of Worms, when the abbey finally passed under the authority of the papacy, its fortunes began to decline. The tenure of Abbot Adenolfus (1125-44) was interrupted by the papal schism of 1130 when he was forced into exile after siding with

Innocent II. Afterwards Farfa was apparently in a ruinous state and by the middle of the 14th century, the economic situation had become so precarious that it could not pay the *Camera Apostolica* or tithe: an interdict was placed on the abbey and the abbot was excommunicated. Indeed, during the 14th century most of the abbots appear not to have resided at Farfa but in nearby *castelli*. By the end of the century it had been reduced to a more minor establishment that no longer played a role in international affairs between the emperor and the papacy.

In 1400 Pope Boniface IX introduced the commendatory system and placed his nephew, Cardinal Tomacelli, as the first papal overseer of the monastery. Biannual fairs were introduced shortly afterwards and these developed into an important source of income for the abbey and financed the construction of the present abbey church, consecrated in 1496. From 1477 the abbey was divided internally so that the palace complex with its stables and servants' quarters was relegated to the commendatore and his court, while the cloisters and adjacent buildings were given over exclusively to the monks. The palace complex was demolished by Cardinal Lambruschini (1833-1841) thus creating the open area that has been excavated.

The Excavations

The first serious attempt to discover the remains of medieval buildings at Farfa was made by Cardinal Schuster who recognized that the campanile (Fig. 2,III) was one of the few structures to have survived (Schuster 1921). However, he misidentified the crypt of Abbot Sichardus as the ground floor of this tower. The first excavations (Markthaler in 1927 and Croquison in 1936) continued this misidentification despite the former finding a crypt at the west end of the transept of the present church, which they correctly believed to be the nave of the medieval one (cf. Markthaler 1928 and Croquison 1938).

In 1959 further excavations were carried out during restoration work by the Soprintendenza ai Monumenti di Lazio (unpublished). These revealed the elaborate *opus sectile* floor of the medieval church (cf. McClendon 1980) and to the south a massive wall and a tower-like structure with a spiral staircase, which might have been part of the early medieval defenses, as described by Abbot Hugo, or part of a two-storeyed monumental guesthouse or gateway (McClendon 1987, 107).

Excavations were undertaken between 1978 and 1986 by the British School at Rome under the direction of David Whitehouse, and Charles McClendon of Yale

University, in collaboration with the Soprintendenza Archeologia del Lazio. Three preliminary excavation reports have been published (Donaldson *et al.* 1979; Whitehouse 1981b; McClendon and Whitehouse 1982) as well as several studies on the structural history and interpretation of the early medieval abbey (McClendon 1983 and 1987; Whitehouse 1984a and 1984b; Gilkes and Mitchell 1995). Two preliminary reports on the glass finds have already been produced (Newby 1987 and 1991). At the time of writing this thesis, the final excavation report is still in preparation, although it will be published in the near future. Figure 2, taken from an aerial photograph of the Abbey and village, shows the area of excavation, bounded on the east of the present abbey church (I), to the north by the standing cloister (II) and to the west by the standing tower (IV). The apse and crypt of Abbot Sichardus' oratory (V) may be seen protruding into the excavations.

The excavations were divided into three main areas: A, B, and C, of which both areas A and B were subdivided into three sectors: A1, A2 etc. Area A1 is situated at the western end of the medieval church and to the south of the standing cloister. The annular crypt built by Abbot Sichardus was incompletely excavated as it was much disturbed by earlier excavations. This sector was originally separated from Area A2 by a baulk that contained the 'Farfa Bowl' (no. 229; Figs 59-60). Area A3 was formed by the long rectangular corridor of a portico directly to the south of A1 and A2, in which the early medieval deposits were destroyed by the insertion of later medieval graves and the lowering of the floor level on at least two occasions. Area B1 is located to the south of A3 and to the north of area C. It was formed by the central stables of the commendatory palace in which reductions in the floor levels destroyed most of the medieval horizons, but revealed Roman and late antique structures underneath. Area B2 was located between the western end of the stables and the standing tower. It contained a medieval room subdivided into three smaller ones in the post-medieval period, but only a few medieval finds were found in the northernmost room. Area B3 consisted of a small, long trench excavated between the eastern wall of the stables (B2) and the nave of the present abbey church. Area C was formed by an early medieval chapel that was not excavated below the level of the post-medieval cobbled floor.

The excavators recognized fifteen periods: 1 to 4 - Roman; 5 to 7 - early medieval; 8 - the fire of 897; 9 to 11 - medieval, and 12 to 15 - post-medieval. Period 9 represents repairs made to the abbey in the 10th century after the fire of 897 including the ambulatory of Abbot Sichardus in Area A1, although there appears to have been no attempt to clear

away fire debris from Area A2. Area A3 continued to be used for burials in both this and in Period 10. In Period 10 the west portico in A2 was demolished, the colonnade dismantled and the cistern backfilled which, from the dating evidence of the coins found, occurred in the mid-11th century. During Period 11 a deep spread of loam containing a high proportion of organic material and a lot of domestic rubbish sealed the rubble deposits of Period 10. It is thought that these deposits, excavated in arbitrary spits, represent garden soils, which were probably spaded over periodically and enriched with the deliberate incorporation of kitchen waste over a period of time, up into the 14th century. This would explain how fragments from the same vessel (eg. nos 222 and 261) were found scattered across up to ten different contexts. During this period Area A3 was modified. It was no longer used for burials and the floor was lowered on at least two occasions. It is the glass finds from Period 11, especially from Area A1 and A2, which shall be discussed in this thesis.

During Periods 12-14, Areas A3, B1, B2 and C were incorporated into a *palazzo* for the commendatory abbot in the early 15th century. In the late 16th century (Period 14) the lower floor, including the chapel in Area C, was converted into a series of stables. The upper levels of the *palazzo* were finally demolished in the mid-19th century (Period 15) and the ground floor stables infilled with rubble.

PALAZZO VITELLESCHI, TARQUINIA

History of Tarquinia

Tarquinia is situated on a hill, 5 km from the sea and 70 km northwest of Rome. During the Middle Ages it was known as 'Corneto' (the name first appearing in an 8th-century document in Farfa Abbey), changing its name to 'Corneto-Tarquinia' in 1872 and finally just to 'Tarquinia' in 1922. The ancient Etruscan city (*Tarxuna* or *Tarxna*), located on a neighbouring hill, Pian della Cività, is commonly supposed to have been evacuated during the 9th or 10th century AD because of Saracen raids. The following short history of the city has been taken from Supino 1968, Abulafia 1974 and Cicerchia 1992.

According to archival documents only a single tower-house existed in 939, followed by a castle in 976, located on the promontory now occupied by the Romanesque church of S. Maria di Castello. At the beginning of the 11th century Tarquinia acquired the status of *civitas* through a bull of Pope Sergius IV (1009-1012), became a free commune in the first half of the 12th century and reached its greatest political and

economic power between the 13th and 15th centuries. In 1190 Tarquinia was visited by Richard the Lion Heart and by Crusaders in 1217. The church of San Giovanni Gerosolimitano was built at the turn of the 12th century by the Knights of Malta, who also ran a small hospice for sick pilgrims located in the neighbourhood. In 1204 Peter of Aragon was crowned by Pope Innocent III (1198-1216) on which occasion he extended to the citizens of Tarquinia the right to trade unhindered in Catalonia and Aragon. The city received further important privileges from James II of Aragon in 1298. Abulafia wrote that the main proof for links with Spain would have to come from archaeology (Abulafia 1974, 225), and pieces of Hispano-Moresque dishes have since been found at the Palazzo Vitelleschi. Fragments from a 12th-century imported Byzantine blue glass bottle with gilt and enamelled decoration (see below pp. 105-6) of a type made famous by discoveries at the glass-house of Corinth and from Cyprus were also found during the restoration of a medieval tower-house (no. 260; Whitehouse 1982).

Abulafia has published late 12th- and 13th-century commercial treaties from Genoa and other Italian mercantile republics whose destinations included the ports of north Africa, Syria and Sicily, that contain mention of 'Corneto' or medieval Tarquinia (Abulafia 1974). It is regrettable that the city archives of Tarquinia were destroyed by fire earlier this century. During the Middle Ages, Tarquinia was a commercial centre *par excellence*, frequented by Ligurian, Tuscan and south Italian merchants. In 1173 the city entered a treaty with the commune of Pisa and four years later with Genoa. These emphasized the rights of the citizens of the various towns in disputes, reduced tolls by half and guaranteed the right to purchase specified commodities. For example, Genoa, trapped between the mountains and the sea, desperately needed foodstuffs especially grain and was permitted to buy wheat as long as no reserve had been placed on it by the commune to prevent famine. Tarquinia, therefore, acted as an outlet for south Etrurian grain as well as a conveniently safe port *en route* to Africa and the eastern Mediterranean.

Tarquinia in the later Middle Ages was one of the most important centres of the Patrimonio, a province of the Papal States and a principal port for Rome that was a good purchaser of its abundant wheat and salt. In 1245 the city resisted a siege by the army of Frederick II, who took a bloody revenge by executing a group of hostages after a summary trial. In 1316 the Guelfs were driven out of the town by the Ghibellines but returned shortly afterwards with the support of Pannello Orsini, Commander-in-Chief of the Papal army. Later, in 1328, Matteo Vitelleschi seized power through a conspiracy, but

was killed two years later during an insurrection. During the 15th and 16th centuries the city underwent a steady decline when the influence of the Church grew and the Vitelleschi family, who had strong links with the Papal State, ruled the town. Between the end of the 15th and the beginning of the 16th century the city suffered two devastating plagues that reduced the population by two-thirds and in 1656 the town only had 2350 inhabitants.

Palazzo Vitelleschi and the Excavations

In 1982-1983, the British School at Rome and the Soprintendenza Archeologia dell'Etruria Meridionale carried out a programme of architectural survey and excavation inside the Palazzo Vitelleschi. It is the finest 15th-century building in the city and the home of the Museo Nazionale Tarquiniense (Fig. 3). It overlooks what has probably always been the principal entrance to the town. The palace was begun in 1436 by Cardinal Giovanni Vitelleschi (1395-1440), who was then archbishop of Florence (cf. Law 1998a and 1998b for further career details). The Vitelleschi were one of the leading families of Tarquinia. Between 1376 and 1378, Ludovico di Puzio di Bonifacio Vitelleschi appears as 'defender' of Corneto, and as prior of the Council of the Nine, and a Vittucio Vitelleschi was castellan of the Castel San Angelo between 1407 and 1411 (Law 1998b, 69). Law also suggests 'that at least some of the buildings on the site [of Palazzo Vitelleschi] had previously been in Vitelleschi ownership' (Law 1998a, 52). When Cardinal Vitelleschi died, while imprisoned in Castel San Angelo, the palace passed to the Apostolic Chamber and was used by some popes as a temporary residence: Alexander VI in 1492, Julius II in 1505 and 1509, and Leo X several times between 1514 and 1520.

An earlier study of the Palazzo by Giuseppe Cultrera (1921) revealed that the palace had been constructed by incorporating existing late medieval structures hidden behind new Renaissance porticos, doors and windows (Fig. 4). In Area D (Fig. 3), the 'proto-palace' complex, three phases were detected dating to between the 12th and the 15th century. Firstly, the tower-house (XIII), once owned by Earl Fani, was constructed in the 12th century. During the second phase rooms XII, XIV, XV and XVI were added in a three-storey structure, while room XI was built later in phase three. The proto-palace looked onto the present Via Mazzini as demonstrated by the entrance to the tower-house (XIII) and the arches of the second and third phase. Originally the walls facing the courtyard and zone A3 were probably without doors, but had large windows at ground-floor level with smaller windows above. The courtyard of the present Palazzo Vitelleschi

occupies a space between the 12th-century city walls, part of which still exist in rooms III and IV.

Area A3 is formed by a long three-storeyed rectangular house or row of houses built after the proto-palace at the end of the 14th or the beginning of the 15th century. The construction of the house/s created an alley between zones D and A3, parallel to Via Mazzini and Vicolo Soderini. In this area a group of twelve pits or *pozzi* were found cut into the tufa bedrock. Four of the pits (196, 212, 444 and 481) contained no datable material and are believed to have belonged to a pre-Etruscan or an Etruscan timber phase. They could also be related to the construction of the 12th-century tower-house. The remaining eight pits (4, 9, 27, 72, 179, 180, 181 and 410) provided a rich sample of artefacts and biological remains. These pits, especially nos 4, 9 and 181, 'had been filled with domestic refuse in the last twenty years of the 14th century' (Whitehouse in Clark, G. *et al.* 1989, 201-2).

The original site plans or sections have not been located, and the following discussion of the pits has been taken from site books and a draft summary held in the archives of the British School at Rome. They are all (with the exception of pit 181) typical medieval *pozzi* that are bell-shaped or flask-shaped in profile (cf. Andrews 1982 for a discussion of these pits in Lazio). Pit 4 has a sub-rectangular mouth, 1.06x1.2 m, part of which underlies wall 152, becoming circular in plan below and with a flat bottom. Its upper surface may have been truncated as it varies in depth from 1.8 to 2.25 m under the wall. There is a single late 12th-century coin from the bottom context (Appendix C, no. 1). Pit 9 is circular in plan with a diameter of 1.7 m and would appear to cut through the foundation trench of another wall, so that a third of the pit underlies it. Pit 27 is also circular in plan with a top diameter of 1.2 m and a depth of 1.2 m. The bottom layer may represent a cess deposit capped by clean layers above it when it was reused as a rubbish pit. This pit contained twenty-two coins most of which date to the second half of the 14th century (Appendix C, nos 2-21). Pit 72 is sub-rectangular while pits 179 and 180 are circular in plan, with diameters of 1.6 m and 1.3 m and depths of 1.55 m and 1.4 m respectively. There is some dispute as to which period pit 179 belongs to as it contained a single coin dating from the second half of the 12th century (Appendix C, no. 22). This could be residual, but the material it contains is neither comparable in quantity nor quality to the main fills of pits 4, 9, 181 and 410. This pit, together with nos 27, 72 and 180 contained very little glass.

Pit 181 is exceptional in that it is the only pit to maintain a rectangular or square section. The opening and first 1.3 m forms a rectangular shaft, 1.3x1.5 m, when it flares out to a rough square of 1.9 m and it is also deep (6.2 m). It also has constructional features cut into its sides: a number of plugholes down each side that might represent scaffolding supports and two thin slots cut horizontally around the sides at 2.3 m and 3 m deep that could represent the settings for floors or platforms. This pit contained fifty-five coins (Appendix C, nos 24-68) and twelve lead seals (see below).

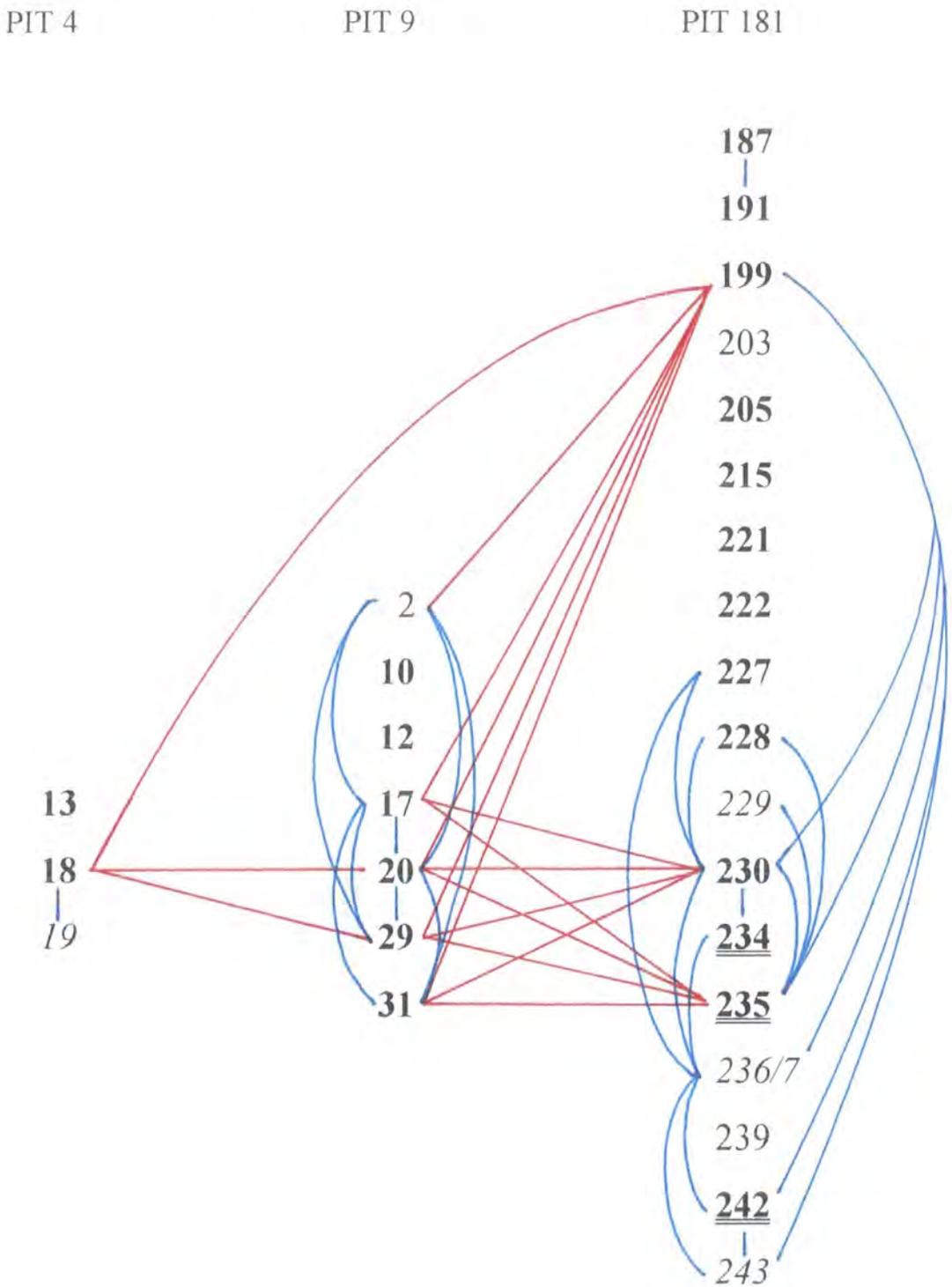
The Finds

On working through the huge quantity of glass finds from the Palazzo Vitelleschi for this thesis, the importance of the site has become increasingly apparent. Over 500 individual vessels were found whereas only 1250 medieval pieces from over 200 sites dating between 1200 and 1500 have been recorded in England (Tyson 1996). Nearly 400 of the vessels at the Palazzo Vitelleschi comprise the bases of plain and mould-blown truncated-conical beakers (Appendix B). This study has also shown that the pits were emptied and refilled over a number of decades and not infilled at one time as originally thought, leaving residual material at their bottoms. This is especially the case with pit 181 and may be demonstrated in Table 1 on p. 10 showing the distribution of late 13th- or early 14th-century pruned beakers confined to the lower levels and later 14th-century plain and mould-blown truncated-conical beakers in the upper. This change in the form of the same vessel type is also reflected in the glass bottles and jugs found. Table 1 also shows the fragment joins both within and across pits 4, 9 and 181 that proves that their last fills were contemporaneous.

The last filling of the pits contained not only household objects that had become obsolete over a long period of time, but also entire tablewares and many other household items of the 'proto-palace'. This could have been deposited for reasons of plague or, more probably, of politics, as an act of conspicuous contempt for some conquered enemy (pers. comm. John Law). Pits 4, 9 and 181 contained large amounts of ceramics ranging from fine imported Hispano-Moresque dishes to simple cooking pots and containers, alongside copper utensils, objects of ivory and even a gilded diadem embellished with pearls.

Over 130 coins were found and Appendix C lists the seventy identified by Angelo Finetti from pits 4, 9, 179, 180 and 181. The coins from pit 410 have still to be studied. This reveals that there is a strong correlation in the dates of the coins and the different

TABLE 1: Links between pits 4, 9 and 181 at the Palazzo Vitelleschi, Tarquinia



Key: **18** contexts with mould-blown beakers only
 229 contexts with pruned beakers only
234 contexts with both mould-blown and pruned beakers
 — joins between pits
 — joins within pits

types of beakers (cf. Table 1). Coins dating from the second half of the 14th century are only found in those layers that contain plain and mould-blown truncated-conical beakers. There were also fourteen lead seals, twelve of which come from contexts 221 and 227 of pit 181. These belong to Urban VI (1378-1389) and Antonio Venier, Doge of Venice (1382-1400), which according to a letter (in the archive) of 17 October, 1984, from John Law to David Whitehouse,

'... is an extraordinary haul ... A superficial skim through the published documents from the fire-depleted Tarquinia archive failed to reveal the name of the owners of our 'proto-palace' in the late 14th century, the date (1382+) at which the seals (with documents attached?) were buried. More than a dozen documents issued by the Pope and Doge of Venice. He must have been important. Was he, I wonder, a Vitelleschi or one of their relatives?'

Taken together the coins and lead seals suggest that the earliest date for the ultimate filling of the pits is 1382, but probably not later than 1400 as there are no coins minted after this date.

The pottery from the site has still to be studied in detail. It includes both locally-produced and imported wares: archaic maiolica from Pisa, *graffita arcaica tirrenica* from Liguria, spiral ware from central Italy, Spanish lustre ware, bowls with stamped decoration from the Maghreb and alkaline glaze from the Near East. These imported wares are a reminder that Tarquinia was an important commercial port with trading links throughout the Mediterranean from the second half of the 12th century. 'The scale of the proto-palace and the wide range of imports indicate that its owners belonged to a privileged stratum of urban society' (Whitehouse in Clark, G. *et al.* 1989, 203). The glass finds, too, as shall be discussed, reflect this position.

A selection of forty-two, but unrepresentative, examples of the glass from pits 4, 9 and 181, believed to have been discarded within a decade of 1390, have been published (Whitehouse 1987). These included a wide range of the pruned beakers and four plain beakers but only three with mould-blown vertical ribbing. No examples from the large quantity of mould-blown beakers with circular bosses, hexagons, squares, pointed ovals or diamonds were included. A more comprehensive sample was included in the exhibition, *Phönix aus Glas und Asche* (Baumgartner and Krüger 1988, 44-8). Baumgartner realized that the glass found spanned a period of time and thought that the pruned beakers were

old-fashioned (*ibid.* 48). Table 1 shows that the pruned beakers belong to an earlier phase, although some may still have been in use at the time of discarding. It is impossible to say whether they were regarded as antiques or whether they were used in the more modest parts of the household. However, it is worth noting here that glass vessels could last for a long time despite their inherent fragility as noted by St Augustine of Hippo,

'We men are more fragile than if we were made of glass. Glass is fragile, yet if it is cared for, how it lasts! You may come upon goblets generations old, with the first owner's great grandchildren drinking from them today. Such fragility preserved for so long!' (Sermon 17).

HISTORY OF THE STUDY OF ITALIAN MEDIEVAL GLASS

Introduction

In 1983 Harden presented a paper, 'Study and research on ancient glass: past and future' at The Corning Museum of Glass in which he outlined the development of the study of ancient glass from the late 19th century to the present day (Harden 1984). When considering possible avenues for future research he wrote that,

'Western glass of the high medieval period, until recently scarcely recognized at all, is now well enough known, notably in Italy and the Balkans, for a full account to be written about its development and about its connections, so far as they can be evaluated, with contemporary glass in Islamic lands.' (*ibid.* 21).

To date no 'full account' has been written for Italy, but this thesis will discuss the developments and connections for central Italian glass during the 13th and 14th centuries. Although known mainly for his work on ancient glass, Harden did write several articles on European medieval glass, including general overviews (1969, 1972 and 1975a) and more regional studies of glass in Apulia, Lombardic Italy and Britain (1966, 1975b and 1978 respectively).

Italian medieval glass, apart from the 6th- and 7th-century Lombardic pieces, like those from the necropoli of Castel Trosino and Nocera Umbra (Mengarelli 1902 and Pasqui and Paribeni 1918), rarely survives intact. Most of the pieces that have withstood the trials of time may be found preserved in cathedral treasuries, like that of San Marco in Venice (*Treasury of San Marco* 1984, eg nos 21, 24 and 26). This Treasury includes pieces believed to have been looted from Constantinople during the Fourth Crusade of

1204 that were later included in the inventory of 1325. In addition to Byzantine glass vessels there are also pieces of glass and rock crystal of Islamic origin (*ibid.* no. 29). Gilt and enamelled 13th- and 14th-century Islamic glasses imported into western Europe were held in great esteem (cf. Rogers 1998 and Tait 1998). These were often enhanced with contemporary precious metal mounts like the two beakers in the Grünes Gewölbe, Dresden (Lamm 1929/1930, pl. 129.2-3). The 'Luck of Edenhall', formerly in the possession of the Musgrave family of Edenhall, Cumbria, was kept in a tooled, 14th-century French leather case (Charleston 1959). Other medieval glasses in Italian cathedrals include a pruned beaker in Orvieto (Mentasti *et al.* 1982, 69, no. 49).

Medieval glasses, containing precious relics, were sometimes sealed in altars during their consecration. This practise is well-attested to in Rome where a number of such pieces were found during 19th- and early 20th-century restorations of churches like S. Nicolà dei Cesarini and S. Giorgio in Velabro. These are now preserved in the Museo Sacro of the Vatican (cf. nos 227 and 247-51). A further dozen were found together in the altar-sepulcrum in the church of S. Croce in Gerusalemme (Fremersdorf 1975, pls 68-70). The examples in the Museo Sacro, as shall be discussed in this thesis (pp. 89-96 *passim*), are probably of local rather than of Venetian origin as suggested by Fremersdorf (1975, 104-5). However an imported gilt and enamelled Islamic flaring glass beaker decorated with a horseman was found under the altar of the now destroyed church of S. Margherita, Orvieto (cf. p. 99; Lamm 1929/1930, pl. 127.1 and Charleston 1976, 335, no. G2). It was found at the end of the 19th century and entered the Louvre, Paris, in 1908 (inv. no. A.O. 6131; Fig. 73).

The Corning Museum of Glass, Corning, New York, was established in 1951 and launched the *Journal of Glass Studies* in 1959

'to meet the need for recording those discoveries, interpretations, acquisitions and publications which affect the art and history of glass-making. It is hoped that articles will include scholarly contributions of a scientific-technical nature as well as archaeological and art historical accounts ...' (notice in first volume)

An article on Byzantine gilt and enamelled bottles from Cyprus, which are similar to an example from Tarquinia (no. 280), appeared in the first volume (Megaw 1959). The first article devoted to an aspect of Italian medieval glass, by Gasparetto in 1967, was a discussion of the glass-house on the island of Torcello, followed in 1979 by an overview

of the glass produced in Venice (Gasparetto 1979). These have been followed by a number of other articles relevant to this thesis, including a discussion on recent finds from Italy (Whitehouse 1983b) and a preliminary report on the glass finds from Farfa Abbey (Newby 1991) as part of the annual Leonard S. and Juliette K. Rakow Award, established in 1983. The first was awarded to Harden and the second jointly to David Grose and to Danièle Foy for research into French medieval glass.

Another important source of articles containing information on Italian medieval glass is *Archeologia Medievale*. This journal was first published in 1973 whereas *Medieval Archaeology*, published by the Society of Medieval Archaeology in England, was started almost twenty years earlier in 1956. These articles include glass reports within excavation reports (cf. Andrews 1977; Gelichi 1986; Roffia 1988 and Testori 1992) and even the excavation report of a medieval glass-house at Monte Lecco (Fossati and Mannoni 1975). This journal has also contained short articles on glass typologies (cf. Stiaffini 1985), regional studies (cf. d'Angelo 1976 on Sicily) and documentary evidence for the consumption of glass (cf. Piccini 1981 on the ceramics and glass bought by the monks at Monte Oliveto).

There have been only a few studies devoted to specific types of medieval glass such as lamps (Crowfoot and Harden 1931 and Stevenson 1988), window glass (Harden 1961, Cramp 1970 and 1975, and dell'Acqua 1997 and 1998), and industrial glass especially distilling equipment (Moorhouse 1972, 1987 and 1993). However, most of the information on Italian medieval glass compiled for this thesis comes from excavation reports, exhibition catalogues and conference proceedings.

Excavation Reports and Regional Studies

Early studies of glass from medieval Italian excavations include the report on the Convent of San Silvestro at Genoa (Andrews 1977), the area surrounding the Torre Civico, Pavia (Nepoti 1978a) and on Lucera Castle, Apulia (Whitehouse 1966). Glass-houses from the Early Middle Ages have been found at Torcello (Gasparetto 1967 and Leciejewicz *et al.* 1977) and San Vincenzo al Volturno (Hodges *et al.* 1990 and Hodges 1991), and medieval glass factories at Monte Lecco in Altare (Mannoni 1972 and Fossati and Mannoni 1975) and more recently at Germagnana in Valdelsa (Mendera 1989, 1990a, 1991 and 1993).

The excavations of glass-houses, although rare occurrences, have provided a wealth of information. The first major medieval site to be discussed in depth was found at Corinth in Greece (Davidson Weinberg 1940, 1952 and 1975). Davidson Weinberg believed that this was a Byzantine glass-house, destroyed by Roger of Sicily when he conquered Corinth in 1147, and that the glass-workers were brought with other artisans to work in Sicily. However, since the examination of glass from other Byzantine and Italian sites, this dating has been questioned and a 13th-century date for both glass-houses at Corinth now seems more appropriate (Whitehouse 1991a and 1993). Some very distinctive styles of decoration were recognized at Corinth, including pruned beakers and gilt and enamelled bottles, so there has been a tendency for subsequent excavation reports to include parallels for these pieces to the exclusion of more ordinary ones. Megaw has examined similar gilt and enamelled bottles from Cyprus (1959 and 1968) while another example from Tarquinia was published by Whitehouse (1982).

More general regional studies have been undertaken in Sicily (d'Angelo 1976) and in Apulia (Harden 1966). While Whitehouse, in his articles on recent developments in Italian medieval glass (1981a and 1983b), concentrated again on pruned beakers and vessels with applied blue trailing to the exclusion of other more ordinary pieces.

In 1995, *Il vetro in Toscana, strutture, prodotti, immagini, (sec. XIII-XX)* was published. This book, which examines the glass produced in Tuscany from the 13th century to the present day, includes two sections on the production of medieval glass in Tuscany (Mendera 1995a and 1995b; Stiaffini 1995a-d) and its products from the 13th to 15th century (Stiaffini 1995e). The second section is composed of previously published glass vessels, including some pieces from the Palazzo Vitelleschi, Tarquinia (cf. Whitehouse 1987). These pieces are also compared with contemporary iconographical representations (cf. Ciappi 1995a and 1995b), but this thesis will show that the range of glass used in central Italy during the Middle Ages was much more diverse than previously thought.

However, Venice is predominant and it is often seen by scholars as the production source for most medieval Italian glass, although the excavation of several glass-making sites in other regions, like that of Germagnana mentioned above, shows that this was not the case. This thesis will show that the glass found at Tarquinia and Farfa has more parallels with the products of Tuscan rather than Venetian glass-houses.

Venetian glass has been studied in depth by Astone Gasparetto. His book, *Il vetro di Murano dalle origini ad oggi* (Gasparetto 1958) was followed by many articles (cf. *idem* 1967, 1975, 1975/1976, 1977, 1978 and 1979). While Gasparetto was working on the glass finds, Luigi Zecchin worked on contemporary documents relating to glass-making in the State Archives of Venice. Over thirty-five years from 1949 he wrote about 200 articles on the history of Italian medieval and Renaissance glass, especially Venetian, in specialized and obscure journals. Since his death in 1984, these have been collated and published in thematic groups in three volumes (Zecchin 1987-1990) thus making them more accessible to glass scholars.

Most of the glass preserved in the Treasury of San Marco is of Byzantine origin. Byzantine glass was the subject of a study (Philippe 1970) based on surviving vessels and fragments, mosaics, historical texts including the glass-making treatise by Theophilus (cf. Dodwell 1986 for a translation, and pp. 31-2 below for a discussion) and depictions, while placing the major find spots in their historical setting. The glass was divided into two main historical periods divided by Crusades, firstly, from the 4th to the 11th century and secondly, from the 12th to the second half of the 14th century when the Byzantine Empire fell to the Turks. However, glass from this second period, excluding that produced at Corinth possibly by Italian glass-workers, is still largely unknown although current excavations at sites like Butrint on the Albanian coast might help to clarify how much glass was imported from Venice and how much was locally-produced.

Robert Charleston's report on the medieval glass from Southampton (Charleston 1975a) included a discussion on imported vessels then thought to have come from Italy and probably from Venice. However, in the light of more recent work in Italy and France (see below) many of these pieces may have originated from France. Charleston also wrote about the development of glass furnaces (Charleston 1978) and on 12th- to 15th-century medieval glass (Charleston 1980b).

In France, Danièle Foy is in the unique position of examining all the medieval glass found on French excavations. She has produced a typology of French medieval glass from Provence and the Languedoc (Foy 1985) and a book, *Le verre médiéval et son artisanat en France méditerranéenne* which examined glass-making sites, the glass-workers and their products (*idem* 1989a).

In 1929 Lamm published a survey of medieval Islamic glass, *Mittelalterliche Gläser und Steinschnittarbeiten aus dem Nahen Osten* (Lamm 1929/1930). He

constructed a typology of the glass, dividing them into four styles which he attributed to the following four centres that were known to have produced glass: Aleppo, Damascus and Raqqa in Syria and Fustat (medieval Cairo) in Egypt (*ibid.* vol. 1, 27-8). However, these glasses were grouped together for historical reasons rather than from archaeological conclusions. An international conference to re-examine the status of Islamic glass studies was held in the British Museum in 1995 and the resulting proceedings have been published recently (Ward 1998).

In 1941 Lamm discussed the history of lustre painting and the group of enamelled 'Syro-Frankish' glass (now known as 'Aldrevandin'). He thought that the latter group might have been produced by Europeans in Syria, probably for export, as no examples have been found in Syria (Lamm 1941, 77). A few examples have been found in Italy at Lucera Castle, Apulia, together with pieces of imported Islamic glass (Whitehouse 1966) and Palermo, Sicily (Falsone 1976, fig. 29 and Whitehouse 1981a, fig. 5). Further examples of 'Aldrevandin' glass are known from England (cf. Clark, J. 1983 for the remarkable find at Foster Lane, London) and northern Europe (cf. Krüger 1998) although they were probably produced at several centres, including Murano (Carboni 1998).

Exhibitions

In 1982 an exhibition of Venetian glass, *Mille anni del arte del vetro a Venezia* (Mentasti *et al.* 1982) included fifty-one pieces of early medieval and medieval glass among the 665 exhibits. Twenty-three fragments came from excavations on the island of Torcello (cf. Gasparetto 1967 and Leciejewicz *et al.* 1977) and a further thirteen were found at Cividale dei Friuli. The exhibition also included a restored, conical pruned beaker with a 'toed' base-ring, now in The Corning Museum of Glass (Mentasti *et al.* 1982, 68-9, no. 48), and an intact cylindrical pruned beaker preserved in the Museo dell' Opera del Duomo, Orvieto (*ibid.* 69, no. 49).

In 1987 Baumgartner wrote the catalogue for the first major exhibition of medieval glass from the collection of Karl Amendt in Dusseldorf. This contained over 130 vessels, mostly German or Rhineland *Waldglas* but including three 'Aldrevandin' enamelled pieces and several glasses with blue trailed decoration of possible Italian manufacture but found in Germany (Baumgartner 1987, nos 1-3 and 5-7 respectively). The catalogue included a form table with scaled drawings of every piece, grouped according to type and set within its chronological framework.

This exhibition was closely followed by the superb *Phönix aus Sand und Asche* (Baumgartner and Krüger 1988) with over 560 exhibits including pieces from the Amendt Collection and glasses from over 130 other lenders. This was the greatest collection of medieval glass ever assembled, but it concentrated on locally-produced glass found on sites north of the Alps that are markedly different to those produced in Italy and countries under Byzantine influence. The exhibition only included a few pieces from Italy such as the Hedwig beaker from Pistoia (*ibid.* no. 43), the 'Farfa Bowl' (no. 229; *ibid.* no. 323) and a small group of thirty fragments excavated from the Palazzo Vitelleschi, Tarquinia (*ibid.* 44-8; cf. for example nos 51, 147, 189, 203 and 253). However, among the large number of glasses found in Germany are a number of pieces of then unknown manufacture, which now may be assigned to an Italian place of production, including the area under study in this thesis.

The exhibition in Rouen, *À travers le verre du moyen âge à la Renaissance* (Foy and Sennequier 1989) complemented the exhibition curated by Baumgartner and Krüger (1988) by concentrating on medieval French glass, some of which has similarities with vessels found at Farfa and Tarquinia. The 1992 exhibition in Toulouse, *Plaisirs et manières de table aux XIV^e et XV^e siècles*, which was devoted to medieval table manners, included glass amongst objects made in other media (Rey-Deliqué 1992). Most of the glass exhibited came from the recent excavations in the forecourt of the Louvre and displays strong influences of contemporary 15th-century Italian glass (Barrera 1990 and 1991). The catalogue of pre-industrial utensils in the Museum Boymans-van Beuningen, Rotterdam, discusses objects of different media (ceramic, wood, glass and metal) from the Low Countries arranged according to period and function (Ruempol and van Dongen 1991).

Conferences

In 1958 Joseph Philippe organized the Journées Internationales du Verre, largely funded by the city of Liège. In 1967 this became the Association Internationale pour l'Histoire du Verre (A.I.H.V.) with triennial conferences. The publication of these conference papers in the *Annales* of the Association and the national surveys of extant glass in the *Bulletins* are an important source of articles on ancient and medieval glass, with the proportion devoted to the latter increasing steadily. Indeed, the 9th *Bulletin* was devoted to Italian glass and includes several articles on medieval glass (cf. Mannoni 1983). The first paper

devoted to Italian medieval glass appeared in 1981 (Whitehouse 1981a), followed six years later by preliminary reports on the medieval glass from Farfa and Tarquinia (Newby 1987 and Whitehouse 1987 respectively). Mendera published two articles on the glass-houses at Gambassi in 1990a and 1993 while the last two editions of the *Annales* contained three articles devoted to central Italian medieval glass and the depictions thereof (cf. Ciappi 1993, Mendera 1996 and Stiaffini 1996).

The first conference devoted solely to medieval glass was held in Belgrade in April 1974, '*Verre médiéval aux Balkans (Ve-XVe siècle)*' (1975) at which twenty-five papers were presented by international scholars. It included, besides reports on glass from the Balkans, discussions on Lombardic glass (Harden 1975b), and the trade and influence of Venetian and Italian glass on Balkan pieces (Gasparetto 1975 and Stancheva 1975). Further studies by Andjelić and Valov for example have shown how glass produced in the Balkans differs from that produced in Italy (Andjelić 1975 and Valov 1975).

The proceedings of a small conference on Italian and European medieval glass, *L'attività vetraria medievale in Valdelsa ed il problema della produzione pre-industriale del vetro: esperienze a confronto* (Mendera ed. 1991) contains six papers relevant to this thesis: Mendera on the glass-house at Germagnana (Gambassi); d'Angelo on the Tuscan connection in glass production at Palermo, Sicily; Nepoti on medieval glass production in the environs of Padua; Muzzi on social and economic conditions for late medieval glass-making; Stiaffini's typology of medieval Italian glass and Silvia Ciappi on medieval depictions of glass beakers and bottles.

The 14th congress of the A.I.H.V. took place in Venice and Milan in October 1998 at which new research relevant to this thesis was presented. This included papers on 13th- to 15th-century glass lamps from north-eastern Italy (Martina Minini); a glass lamp of 'Islamic' type from the *castrum* of Ragona (Silvia Lusuardi and Roberta Zeuch); the use and production of glass vessels on northern Italian domestic sites of the 9th to 12th centuries (Mariamaddalena Negro Ponzi); late medieval Venetian glass (Carl Pause) and medieval glass from an urban excavation in Ferrara (Anna Maria Visser). At this conference I presented a paper based on the results of the present thesis entitled, 'Some comparisons in the form and function of glass from medieval ecclesiastical and domestic sites in Italy' (Newby in preparation). These papers will not be published until later in 1999, but short references will be made to them from my notes where applicable. For the

first time the number of papers presented on medieval glass was equal to that of those on ancient glass, which further illustrates how this area of study is increasing in popularity.

CONCLUSION

Preliminary reports of the glass finds from Farfa and Tarquinia have been included in the publications of medieval Italian glass mentioned above. However, the full range and enormous quantities, especially from the Palazzo Vitelleschi, have not been presented previously. This material is of great significance as it is possible for the first time to demonstrate the dramatic change which occurred in vessel types over the course of the 14th century, a change which had already been suggested by contemporary documents and glass-making sites. As shall be discussed in this thesis, this entailed a move away from the heavier and more elaborate vessels with applied decoration of the late 13th and early 14th century (like pruned beakers), to thin-walled, mould-blown pieces. These were mass-produced and were consequently less expensive and therefore available to a much wider section of society by the end of the 14th century. What also emerges is that the same forms were used in both domestic and ecclesiastical contexts with one notable exception - that of glass hanging lamps which only occur in the latter.

2: GLASS MANUFACTURE IN CENTRAL ITALY

INTRODUCTION

This chapter will outline the evidence (archaeological, archival and iconographical) for the manufacture of medieval glass in central Italy. It will concentrate especially on Tuscany where extensive work in the Elsa valley has been undertaken recently by the Department of Medieval Archaeology of Sienna University (Mendera 1989, 1990a, 1990b, 1991, 1993, 1995a and 1995b). However, while evidence for the use and consumption of glass is plentiful, especially for the two main sites included in this thesis, that for the production of glass is scarce. To compile a more detailed picture, evidence from elsewhere in peninsular Italy and in Greece will be considered.

Archaeological and historical studies have showed that by the early 14th century glass factories were widespread in northern and central Italy, as well as in Sicily (Whitehouse 1981a and Mendera 1991). However, the study and dating of medieval Italian glass have, for a long time, been influenced by two major assumptions that are only now being questioned. The first is that Venice dominated European glass production in the Middle Ages and that any glasses of a noticeably high quality had to derive from the city. The high value placed on Venetian Renaissance *crystallo* glass throughout Europe, both then and now, has further strengthened this assertion of her predominance in the production of medieval glass. Certainly the Venetian trading system allowed for a wide distribution of her finished products in northern Europe. As Jacoby has noted (1993, 65-6), it has been 'customary to examine the evolution of the Venetian glass industry in isolation, without taking into account that the particular problems it faced were tightly interconnected with developments within a much wider context.' The second assumption is that it was Greek glass-makers who introduced new forms of glass, like the pruned beaker, into Italy in the mid-12th century, based on the discovery in 1937 of two glass workshops at Corinth (see below pp. 27-8).

Manufacture of Glass

This section will discuss briefly the technical processes by which glass is produced from its raw materials. Glass is an artificial, non-crystalline material, categorized as a super-cooled liquid rather than a solid. It is a mixture of three basic raw materials that form the 'batch' in the following approximate proportions: silica (75%), soda or another alkali

(15%) and lime or calcium oxide (10%). Glass can be produced from the fusion of pure silica, but this can only be achieved at very high temperatures, much higher than the approximate 1200°C achieved in medieval furnaces (Charleston 1978, 11). To lower the melting point, speed up the fusion process and produce a more stable glass, a soda-lime flux is added. Lime, which can occur naturally in sand, acts as a stabilizer that prevents glass from being water soluble. A quantity of broken glass or 'cullet' is also added to the batch to further aid fusion and to reduce costs of fuel and raw materials. This re-melting of broken glass collected from outside or of reject vessels from the glass-house itself explains the paucity of fragments found on glass-making sites. Glass vessel typologies are not easily discerned as they can be from the waste dumps found near pottery kilns.

The raw materials were fused together in crucibles made of refractive clay in fritting furnaces that reached temperatures of 1200°C. The fused materials were then immersed in cold water to remove the excess flux and to increase the transparency and brilliancy of the glass (Jacoby 1993, 78). The resulting material or 'frit' was then transferred to other crucibles and placed in the melting furnace until the glass could be worked by the glass-blower. The Verona glass-house of Ottaviano del fu Venturino in 1409 had two furnaces for these processes, '*formax et calchara ubi laborantur vitrea*' (Appendix F; Nepoti 1991, 133). However, they could take place in separate locations with frit being bought in by glass-workers.

After manufacture all glass has to be annealed, a very gradual uniform cooling process that strengthens the glass by removing internal strains caused during manufacture. Annealing can take place in an upper chamber of the main furnace where the vessels are left to cool down over night or in a separate construction. The former may be seen in an illuminated miniature of a three-storeyed glass furnace from Hrabanus Marus, *De Universo* (Plate 1a) where a goblet is being annealed in the upper chamber below the pitched roof of the furnace. It is also similar to a 9th-century description of a glass furnace in a Syrian manuscript in the British Museum (Charleston 1978, 10-11),

'The furnace of the glass-makers should have six compartments, of which three are disposed in stories, one above the other ... the lower compartment should be deep, in it is the fire; that of the middle storey has an opening in front of the central chambers - these last should be equal, disposed on the sides and not in the centre, so that the fire from below may rise towards the central region where the glass is and heat and melt the materials. The

upper compartment, which is vaulted, is arranged so as uniformly to roof over the middle storey; it is used to cool vessels after their manufacture.'

In medieval Italy, silica was obtained from two primary sources: sand or quartz pebbles, especially from the Ticinio and Arno rivers. '*Rena da bichieri*' (beaker sand) is mentioned in an early 14th-century Florentine custom list which also includes '*sale archale*' (alkali salt) and '*soda da fare vetro*' (Ciasca 1927, 763, 772 and Jacoby 1993, 73-4). The 1409 inventory from a Verona glass-house includes an unspecified quantity of both pebbles and sand, '*lumen cogolum et sablonum (et alia)*' (Appendix F; Nepoti 1991, 133). The preparation of the pebbles appears to have occurred outside the glass-house, although some workshops stored whole pebbles and may have ground them to powder *in situ* (Jacoby 1993, 74). This could be achieved in two different ways. The pebbles were either heated until they became incandescent, at which point they were thrown into cold water where they disintegrated, or they were ground by mechanical processes, usually water-powered mills that could process large quantities and so reduce costs.

Broken glass tended not to be thrown away but was collected, probably by workmen from glass-houses as practised in antiquity (Leon 1941), to be re-used as cullet. In the mid-14th century, during the decorating of the facade of Orvieto Cathedral, Andrea nelli Zampino was paid 1½ florins per hundredweight of 'old glass', ie cullet. Broken glass is recorded in comparatively large amounts in two early 15th-century glass-makers' inventories (Appendix E and F respectively). In the first, some '*2746 libbre rotaminis*' (cullet) and '*255 libbre fritta veteri*' (frit) are recorded among the raw materials, while the second includes, '*4,000 libbre vitrum fractum*'. This recycling of broken glass makes the large assemblage discarded at the Palazzo Vitelleschi, Tarquinia, all the more unusual.

There was also a Mediterranean trade in cullet as attested to in a treaty of 1277 made by Jacopo Contarini, Doge of Venice, with Bohemund III, Prince of Antioch. In it special reference is made to the importation to Venice of broken glass from the Middle East to be used as cullet (Tait 1979, 10). Cullet also served as ballast in ships as demonstrated in an 11th-century wreck at Serçe Limani off the Turkish coast that contained Islamic cullet intended, supposedly, for a Byzantine glass-house (Bass 1979, 1984 and van Doorninck 1990). A 15th-century shipwreck outside the port of Malamocco in the Venetian Lido produced a large quantity of irregular greenish glass blocks weighing from a few hundred grams up to fifty kilos (Molino *et al.* 1986). Broken glass was also collected to make pottery. During the 14th century ceramists from Imola are recorded as using pieces

of broken glass combined with bone, lead or tin to make the opaque white glaze for maiolica (Biavati 1982).

Levantine ashes derived from plants growing in coastal or arid and saline areas were the preferred source of soda (Ashtor and Cevidalli 1983). During the 13th and 14th centuries Venice imported large quantities of Levantine soda ashes but maintained a monopoly on them, prohibiting their export to rival glass-making areas (cf. Jacoby 1993 for two Milanese documents of 1394 and 1408 asking the Venetian Senate to lift their export ban on these ashes). In other parts of Italy ashes were imported from Egypt, Spain and France while local plant ashes were also utilized. An anonymous Florentine recipe book of *circa* 1400 mentions ashes derived from ferns, wine lees, types of oak and borage (Zecchin 1987-1990, vol. 3, 213-17) while calcined wine lees and oak ashes appear in Bolognese custom tariffs in 1317, 1351 and 1388 (Frati 1903, 369-70).

Metallic oxides can be added to the batch to colour the glass. Cobalt oxide or copper oxide, for example, will produce blue glass, while green can be achieved through the addition of iron oxide. Glass in its natural state has greenish tints due to the presence of naturally-occurring metal oxides in the batch. However, small quantities of manganese oxide will neutralize these tinges and render the glass colourless. Manganese oxide was also used to make pink or purple glass both by increasing the amount added to the batch and by increasing the length of time the batch remained in the furnace (cf. Theophilus, chapter VIII in Dodwell 1986).

Blue was by far the preferred colour in southern Europe for applied decoration and may be found on a variety of tablewares like the Farfa Bowl with zigzag trailing (no. 229) and on bottle necks from Tarquinia (eg. nos 147 and 158). The Verona inventory of 1409 includes '28 libbre azuro' and '200 libbre manganexo' (Appendix E; Nepoti 1991, 133-4), while the 1424 inventory of the goods of a Gambassi glass-maker includes '600 libbre manganesis' (Appendix F; Nepoti 1991, 134-5). Yet, despite the large quantities of manganese mentioned, very few examples of purple vessels or ones with purple trailing have survived. These include the famous Byzantine dark purple gilt and enamelled bowl in the Treasury of San Marco, Venice, believed to be part of the booty following the sack of Constantinople in 1204 (*Treasury of San Marco* 1984, 180-8, no. 21). There is also a group of cylindrical Byzantine bottles with gilt decoration made in both purple, cf. an example in the British Museum (Tait 1979, 21, no. G and Megaw 1980) and blue glass, cf. a group found in Cyprus (*idem* 1959 and 1968). Fragments from blue examples have

been found in Italy at Tarquinia (no. 260; Whitehouse 1982), Rome (Mendera and Cini 1990, 500-1, fig. 70 and Sagui 1998, 35, fig. 47) and Otranto (Whitehouse 1983b, 120, fig. 9). A spherical sprinkler flask with purple and turquoise trailing from the Palazzo Vitelleschi (no. 255) may be an Islamic import. However there is an intact hanging lamp in the Museo Sacro of the Vatican Museums with alternate purple and colourless handles (no. 363) and fragments from another from Farfa decorated with blue handles and trailing (no. 364). As the latter two are ecclesiastical vessels (cf. pp. 124-5 and 129) it raises the possibility that they were made by window glass makers who had access to pots of coloured glass.

EVIDENCE FROM THE MUSEO SACRO, TARQUINIA AND FARFA

Museo Sacro, Vatican Museums

No evidence for glass production is present among the medieval pieces in the Museo Sacro. As a collection formed mostly from intact pieces discovered during 19th- and early 20th-century restorations of church buildings, rather than from systematic excavations, it is unlikely that glass-making debris or furnace remains would have been found, let alone preserved in it. Yet it was during late 19th-century restoration of Orvieto Cathedral that Fumi found in the archives much valuable information about the glass-workers who made the mosaics of the façade (see below p. 33; Fumi 1891; Harding 1988 and 1989).

Palazzo Vitelleschi, Tarquinia

Like the Vatican collections, no evidence for glass manufacture was found among the finds from the Palazzo Vitelleschi. As mentioned in the Introduction (p. 9), fragments from over 500 different vessels were found. This large number attests to the high, if not indeed conspicuous, consumption of the finished product, at a level not previously recorded from any European archaeological site of this period. Most notable among these vessels was the presence of almost 400 thin-walled truncated-conical beakers made in pale tinted colourless glass (cf. Appendix B). Mendera has calculated that these truncated-conical beakers, known as 'Gambassini', comprised more than seventy per cent of Italian production (Mendera 1990a, 308). These beakers form almost 80 per cent of the vessels found at Tarquinia, while the earlier finds contain mostly free-blown vessels decorated with applied prunts and trailing (cf. Table 1 on p. 10).

Farfa Abbey

At Farfa some glass-working debris, almost identical to that from San Vincenzo (see below p. 28), was found in 9th-century deposits. This evidence took the form of pieces of slag, melted drops and a single sherd from a thick-walled crucible with a rilled exterior, with a thin layer of greenish-colourless glass still adhering to the interior (Newby in press). The small quantity found of such material suggests that there was some form of glass production on the site, although probably not in the area excavated.

There is no evidence for glass production on the site from the 12th to 15th century. This could be due to the difference in the abbey's status in these two periods. As discussed in the Introduction (p. 2), Farfa in the Early Middle Ages was an imperial abbey and one of the most prestigious monasteries in Europe. It was also undergoing a period of construction and renovation as documented in the *Libellus constructionis farfensis* (cf. McClendon 1987, 7-8). From the excavations we know that the windows from the crypt and/or the apsidal end of the Abbey church in Area A1 were glazed with deliberately-shaped coloured glass quarries including some of the earliest-known painted examples (Newby 1987, 257-62, figs 2-5 and in press). However, by the 13th century the Abbey reverted to the jurisdiction of the Holy See and its previously vast possessions and numerous inhabitants were much reduced. During this period there were no great building projects that would have required a glass furnace on the site to produce window glass. In 1402 the former tradition of holding biannual fairs was reintroduced to increase the revenues of the Abbey. It is possible that glass vessels were sold at these fairs, but unfortunately no records survive (as at Monte Oliveto, see below p. 34) which shed light on the origin and cost of the glasses acquired by the monks. Nor is there any mention of glass objects in either the inventory of precious objects left by Abbot Berardus III at his death in 1119 or in the inventory of objects taken from the monastery by the schismatic Abbot Guido III two years later (cf. *Regestum Farfense* V, 310-11 and 321-2; transcribed in McClendon 1987, 137-8, documents XII and XIII respectively).

Monasteries have had a long tradition of glass-making or at least of importing glass-makers during periods of major construction and renovation. The earliest and most famous documented account for this was included by Bede in his *Historia Abbatum auctore Anonymo*. He recorded that when the construction of the monastery at Monkwearmouth, founded by Bishop Benedict in 674/675, was nearing completion, Benedict sent to Gaul for glass artisans to make windows and to teach the art of making glass lamps and

vessels for liturgical use (Cramp 1969, 22; 1970, 16). However, by 764 this art had been lost, for Monkwearmouth's current abbot, Cuthbert, wrote to Bishop Lull at Mainz asking for glass-makers rather than glaziers, 'who can make glass well ... because we are ignorant and destitute of that art' (Cramp 1969, 24). This request from the Abbot of Monkwearmouth raises several questions. Firstly, was there a greater demand for the replacement of glass vessels rather than for glass windows and, secondly, was the manufacture of vessel and window glass practised by different craftsmen? As Biddle pointed out in his study of medieval Winchester (Biddle 1990, 351-2), a glass window tended to remain *in situ* until the building was altered, damaged, or demolished. Vessel glass, on the other hand, through frequent use, was more likely to be broken and so require replacing.

ARCHAEOLOGICAL EVIDENCE

Corinth Glass-Houses

In 1937 two glass workshops were discovered at Corinth although the actual form of the furnaces was not ascertained. They were supposed by Davidson Weinberg (1940, 1952 and 1975) and Harden (1972, 101) to be contemporary and to date from the late 11th and early 12th centuries. Furthermore, the factories were believed to have ceased operating when the city was sacked by Roger of Sicily in 1147 at which point the glass-makers from Corinth were included among other artisans brought from the Peloponnese to establish new industries in Sicily. Glass-houses have since been recorded at Palermo, Cefalà Diana and Catania (Bonanno and d'Angelo 1971-1974, 341-2).

The glass produced at Corinth included mould-blown beakers (of the 'Gambassini' type) decorated with herringbone and diamond patterns as well as heavily ribbed or pruned beakers and bottles with neck swellings or internal hollow-tubular rings. It was assumed that these new glass forms spread northwards from Sicily through the Italian peninsula so that whenever similar glasses were found, especially fragments from pruned beakers, they too were assigned a 12th-century date despite occurring in later contexts. In his study of Byzantine gilt bottles from Cyprus, Megaw first questioned these suppositions about the glass produced in Corinth workshops (Megaw 1959, 61). When the discovery of the large glass assemblage from the Palazzo Vitelleschi was made, this early attribution for the Corinth material had to be seriously re-examined (Whitehouse 1991a and 1993). These two assemblages are far too similar for them not to be very close in date and not to come from the same tradition of glass-making. Recent excavations in Corinth

appear to confirm this as Williams and Zervos (1992, 15) have identified similar glass vessels from contexts that immediately predate the Catalan invasion of 1312. Whitehouse would appear to be correct in suggesting that 'the Agora South Centre workshop may have been an offshoot of Italian glass-making of the 13th or early 14th century, and not its antecedent' (Whitehouse 1993, 662).

Italian Glass-Houses

The first evidence for early medieval glass production in Italy came in 1961 when a team of Polish archaeologists found the remains of a 7th- to 8th-century glass factory on the island of Torcello in the Venetian lagoon (Leciejewicz *et al.* 1977). This included the foundations of a circular glass furnace located in the 'Piazza' between the Church of S. Fosca and the Palazzo del Consiglio. The glass produced included short-stemmed goblets, formed from a single paraison of glass with a hollow-tubular base-ring, and mosaic tesserae, presumably for the decoration of the adjacent church.

More recently, the excavations at the monastery of San Vincenzo al Volturno, in the Molise, have revealed evidence for several glass workshops within the monastic complex. The monastery was founded in the early 8th century by three monks from Farfa. In the 9th century it became a very grand establishment with workshops producing utilitarian and luxury items, including glass and enamels, until its destruction during a Saracen raid on 10 October, 881 (cf. Hodges *et al.* 1990 and Hodges 1991). Although several glass workshops were found on the site, what form these furnaces took is not clear. It is also uncertain whether they included a fritting furnace for the fusing of the raw materials or whether refined glass had to be imported to the site (*pers. comm.* Ian Free-stone). Whichever was the case, there was evidence for the production of both cast and crown window panes (dell' Acqua 1997 and 1998) and vessel glass, mainly stemmed goblets and three-handled lamps (Stevenson 1988 and in preparation). The glass-makers also appear to have been re-using Roman coloured glass tesserae for cullet as suggested in Theophilus' 12th-century treatise (see below p. 32) for making window panes and *reticelli* rods with opaque white or yellow spiral trails. These rods would have been used to decorate vessels as on a fragment from Farfa with turquoise and white *reticelli* trailing (Newby 1991, 35 and in press) and two intact examples excavated in Sweden that were probably imported (cf. Baumgartner and Krüger 1988, 70, 72-3, nos 13 and 15.6).

Other furnaces which have come to light since those of Torcello include a circular furnace dating to the last decades of the 13th and beginning of the 14th century at Monte Lecco (Mannoni 1972; Fossati and Mannoni 1975). Situated in the Appenines outside the great port of Genoa with its large market and trading routes, it was located close to rich quartzite sediments and wood to fire the furnaces. Interestingly, among the very few glass fragments found, there was a fragment from an Islamic enamelled beaker that has been interpreted either an import for inspiration, a part of cullet or denoting the presence of glass-workers from the Islamic world.

From a slightly earlier period artisan activity at Pavia was connected with the restoration of the Torre Civica, adjacent to the cathedral, dated to around 1100. This site produced *circa* 500 fragments connected with the making of coloured windows, some which included painted decoration. More importantly there were '*panni*', circular blocks of glass which give testimony to the trade of cullet (Nepoti 1978a, 219).

Glass-Making in Tuscany

The glass research currently undertaken by the Department of Medieval Archaeology at Sienna University in the valley of the River Elsa, Tuscany, is helping to change our perception of medieval glass production (Mendera 1990a, 1990b, 1991, 1993, 1995a and 1995b). This project, initiated in the early 1980s, has concentrated on three main areas of study: archival, field survey and lastly the excavation of two glass-making sites. In 1986 excavations were undertaken at Germagnana, near Gambassi, one of sixteen glass production sites identified through the field survey (*idem* 1993). A complete glass factory was uncovered revealing a rectangular fritting furnace in Area I that was abandoned at the beginning of the 14th century, while the circular furnaces in Area II, where the glass was blown and annealed, remained in use throughout that century (Fig. 5). Mendera (1990a, 304) sees this as evidence for a change in the process of glass production during the first half of the 14th century with the preparation of the raw glass mass being undertaken in separate specialized glass workshops. A manuscript dated 26 December, 1345, in the Archivio di Stato of Florence documents this trade in '*marzacotto*' or '*fritta*' from nearby Certaldo to Gambassi and Montaione (*ibid.*).

Historical documents have shown that this area of central Tuscany was one of the most active areas of medieval glass production in Italy. Glass-making is known at San Gimignano from the first quarter of the 13th century, while Figs 6a and b (after Mendera

1990a) show how widely dispersed glass-makers from this region were, especially from the small towns of Gambassi and Montaione, in the 14th and 15th centuries. The new form of mould-blown beaker with raised patterns of circles, diamonds and ribs were known in contemporary Venetian documents as 'Gambassini' (Zecchin 1973c, 121-2) suggesting that they were either first developed in this region or by its glass-makers working in Venice. They also appear later in the 14th century at Bologna (Nepoti 1978b, 326), Imola (Biavati 1981, 630-1) and most importantly at Gambassi, near Florence (Mendera 1990a, 1990b, 1991 and 1993). Mendera believes that the name for this type of beaker, as identified by Zecchin, confirms her hypothesis that glass-makers from Gambassi were working for some time in Murano before returning to Tuscany. This would appear to be in conflict with the glass-makers' *Capitolare* drawn up in Venice in 1271. Two of the strict rules it laid down for its guild members prohibited the import of finished glassware into Venice and the making of glass there by any foreign glass-house master (Tait 1979, 10).

From the 15th century there were concentrations of glass furnaces in all the principal Tuscan cities like Florence, Siena and Pisa, as well as in every part of Italy, including Rome. These furnaces tended to be constructed outside the town or city walls not only because of the fire hazard, but also because of the storage space needed for fuel and raw materials and the finished product. At Venice glass-makers were moved to the island of Murano in 1291 allegedly to protect the city from risk of fire, but also to prevent its trade secrets from leaking out. On the other hand, the evidence from Orvieto shows that during the 14th century glass-makers from Montaione were working immediately adjacent to the Cathedral in the city centre.

The Sienese study in Valdelsa has also shown that the Gambassi furnaces, like that excavated at Germagna (Mendera 1991), were run by a few people, mainly members of the same family. The glass-makers had to invest in the running of the furnace and supply their own tools while the contractor, as at Orvieto (Harding 1989), Palermo (d'Angelo 1976, 383) and Bologna (Nepoti 1978b, 327) provided the capital for construction of the furnace and purchase of certain expensive raw materials, like gold leaf for gold-glass tesserae.

The re-introduction of the process of mould-blowing, presumably in the early 14th century, allowed for the simple and fast production of multiple copies, that consequently made these beakers less expensive to produce and more accessible to a wider stratum of

society. The moulds in which these vessels were originally blown were probably made of metal, although other materials include wood and terracotta. Whichever, they were highly portable and could be carried with the glass-maker wherever he worked. No moulds survive at Germangana but in a document of 15 December, 1344, in which two Tuscan artisans contracted themselves to work at a Palermo glass furnace, one was employed to mend the metal moulds that otherwise would become spoiled (d'Angelo 1989, 288).

ARCHIVAL EVIDENCE

Medieval Treatises

No archaeological evidence for the production of glass appears to have survived on any Italian monastic site after the 9th century. From the 13th century, documents record that Italian glass-houses were in the charge of lay individuals (see below p. 33). Yet it was during the early 12th century that the best-known medieval treatise on glass-making and other arts, *De diversis artibus*, was written by a Benedictine monk using the pseudonym of 'Theophilus' (Dodwell 1986). There is some debate as to who Theophilus was and where and when he wrote his treatise, although he described himself at the beginning of the preface to the first book as, 'Theophilus - humble priest, servant of the servants of God, unworthy of the name and profession of monk ...'. The oldest surviving copy of the treatise, a 12th- or early 13th-century manuscript in Vienna (Nationalbibliothek MS 2527), names him in the title as '*Theophilus qui est Rugerus*'. This has led scholars to further identify him with Roger of Helmarshausen, a noted metal-worker of the early 12th century (cf. Dodwell 1986, xxxix).

The treatise by Theophilus is important because of its emphasis on techniques and their practical application. It is divided into three books, the first of which deals with the materials and arts of painting, while the third, and longest, discusses metal-working. It also appears to have been written from the author's personal experience as may be seen from the preface to the second book, which is devoted to the manufacture of glass,

'Having applied myself to this task, I understand the nature of glass, and I consider that this object can be obtained simply by the correct use of the glass and its variety. This art, as I have learned from what I have seen and heard, I have endeavoured to unravel for your use.'

The second book is divided into thirty-five chapters, of which thirty-one have survived. The first five are concerned with the building of three types of rectangular furnace: for

making the glass, annealing the finished product and a muffle furnace for the spreading and flattening of glass, presumably for windows and mosaics. He also describes a fourth furnace in which to make glass frit. These chapters also include information on the tools needed and how to make ceramic crucibles.

This treatise appears to be devoted mainly to the production of window glass with instructions on the making and spreading of sheet glass, the making of coloured (yellow and purple) glass as well as a chapter on how to utilize mosaic tesserae from 'the ancient buildings of pagans' as a source of coloured cullet. There are thirteen more chapters devoted to the construction of windows, the cutting of shaped quarries and their decoration with paint, the making of wooden or the casting of lead comes, and their fixing into window openings.

Of the thirteen remaining chapters, two are devoted to the making of glass vessels and long-necked flasks. One of these also includes a section on how to attach handles to a vessel so that it could be suspended and how to decorate it with applied glass threads. These vessels with handles could have been very similar to the 'mosque'-type lamps from Farfa (cf. nos 364-8) and the intact example in the Vatican (cf. no. 363). The long-necked flasks, on the other hand, may be related to those found at Tarquinia (cf. nos 147-50 and 170-2) or those seen in depictions of dining scenes (cf. Plates 9 and 17-19). There are two further chapters on decorating glass in the Greek manner with gold and silver foil, a third on the decorating of earthenware vessels with various coloured glazes. There is also a chapter on making glass rings, but it is not clear whether all of these were finger rings, as there is mention of adding drops of glass of another kind to the ring like a gem, or whether they had some other function, possibly connected with the textile industry.

The penultimate chapter intriguingly tells how to mend a broken or cracked glass vessel. This was achieved, allegedly, by filling the damaged vessel with damp ashes which were left to dry so that they would form a shaped mould. Then, glass with a low melting point was painted over the crack or break and the whole was reheated so that the new glass would fuse with the original vessel. This phenomenon has not been recognized on any of the glasses examined during the course of this study. If this technique was employed during the Middle Ages it presumably was restricted to the repair of valuable, highly-prized glass in an area with ready access to a furnace.

There are two other treatises of which copies must have been available in the Middle Ages. These are Eraclius' *De Coloribus et Artibus Romanorum* (Merrifield 1849)

and the *Mappae Clavicula*. Eraclius, probably also a monk though not a humble one, described himself as 'a very wise man'. His treatise concentrates on the preparation of colours and on the arts of the ancient Romans and includes a chapter on the chance discovery of glass by merchants on the banks of the River Belus as described by Pliny in his *Natural History*. The *Mappae Clavicula*, for the most part a treatise on the preparation of pigments, also includes instructions on how to colour and stain glass. According to Sir Thomas Phillipps (1847) this treatise was compiled in Italy but written in an English or Flemish hand in the 12th century.

Evidence from Accounts

From Orvieto there is detailed documentary evidence for virtually every phase in the production between 1321 and 1390 of the mosaics on the facade of the cathedral (Fumi 1891; Harding 1988 and 1989). These cathedral accounts emphasize that mosaic production was an expensive, labour-intensive process that could cost about four times that of a fresco (Harding 1989, 73) and were consequently regarded as 'status symbols' in the Middle Ages (Andreescu 1977, 17). The specialists needed included one or two mosaicists, several glass-makers and a team of glass-cutters who made the various sizes and shapes of tesserae. In 1321 two glass-makers, Consilio of Monteleone and Ghine Petri, were recorded as working 'at the glass furnaces situated opposite the door of the bishop's palace'. Monteleone was employed by the Opera del Duomo for over forty years and eventually his workshop was taken over by his nephew Nucciarello in the 1360s. He was instructed to make 'new and clean' glass tesserae at his own expense, together with the window glass for the Cappella del Corporale. This glass was then bought from him and in 1347 the rates were as follows: 2 soldi for each piece of gold glass, 4 soldi for a pound of coloured glass and 2 soldi 6 denarii for a pound of re-cut glass.

The men required to cut and set up the tesserae, known as *incisores vitri*, were taken on for a year and paid on a daily basis. In a document of 6 June, 1360, Giovanni Noritudinelli and Giovanni Petrucciolo were each paid 6 soldi a day and Bartolomeo der Dominici 2 soldi and 6 denarii. It was however, the mosaicists who received the most money. Pietro Pucci, the *magister mosaici*, was paid 5½ florins a month in 1386. He first worked as Ugolino di Prete Ilario's assistant on the frescoes in the Cappella del Corporale. Ilario was primarily a painter but he also worked with mosaics (Vollmer 1939, 542) and

maybe this is why in his cycle of the Miracles of the Holy Sacrament he included three scenes from the story of the Hebrew boy (Plate 4; see below p. 37).

An intriguing glimpse as to how frequently and in what quantities glass vessels were purchased may be found in Piccini's 1981 study of the early 15th-century accounts of the monastery of Monte Oliveto, near Sienna. No purchase made included less than 100 pieces with the figure rising to 228 on 14 June, 1409 (Piccini 1981, n. 71). In total, some 2,935 beakers were bought in the twenty year period between 1409 and 1429 (*ibid.* n. 72), although only thirty-seven monks were documented as living in the monastery in January 1407 (*ibid.* n. 70). Some of the entries also recorded the prices, for example, on 30 March, 1422, 150 beakers were bought for 2 lire 8 soldi while the 160 beakers acquired on 21 April, 1428, cost 2 lire 10 soldi (*ibid.* n. 69). This high level of consumption is now also known from the late 14th century at Tarquinia and from the late 15th century at the Palazzo Altemps, in Rome (*pers. comm.* Stefano Coccia).

The monks at Monte Oliveto also bought other glass objects from the 'bicchieraio' Francesco in Sienna, including eight 'ampolle d'altare' on 4 April, 1413 and four 'ampolle da messa' on April 25th of the following year (Piccini 1981, n. 76). These ampolle or cruets would have been liturgical vessels used to hold the wine and water before their consecration in chalices made of gold or silver during the mass (cf. pp. 85-7). On 21 June, 1421, the monks bought six 'fiaschi di vetro ... di mezzo quarto' and four 'fiaschi di vetro grande di quarto' (*ibid.* n. 73). These flasks would have had the modern capacities of 2.85 and 5.7 litres and possibly represent flasks made for the table and for storage respectively. At Tarquinia there are fragments belonging to several wide-necked bottles which could have had such large capacities (cf. nos 267, 271 and 280) and flasks for the table with capacities between 1.3 and 2 litres (cf. pp. 75 and 77).

Inventories

That glass was produced in great quantities is also borne out by two inventories of glass-makers' stock from the north of Italy that have already been referred to above (cf. Appendices E-F and Nepoti 1991). The detailed inventory in Appendix E is taken from a contract drafted in Verona in March 1409 (Nepoti 1991, 133-4). It records a four-year contract between Ottaviano del fu Ventuino, who had just inherited his father's glass-works, and an entrepreneur Antonio Carletti who was investing 250 ducats in its operation. A total of 43,654 glasses are listed of which 38,010 or 87 per cent are beakers

including 18,500 '*mioli gambasini*', which are also the cheapest at '*soldi 15 il centinaio*', while the most expensive are 400 '*mioli cristalini*' at 30 *soldi*. Jacoby (1993, 83) believes that Ottaviano entered into the partnership with Antonio Carletti because the workshop was burdened with a huge amount of unsold glass which had produced a severe cash-flow problem and that the money provided by the latter was primarily for raw materials. This might be correct, but this high level of stock, which by itself provides an insight into the production capability of a single workshop, is also borne out by other contemporary inventories like Appendix F (see below). In Florence there are further documents which record the very high level of stock belonging to some glass-makers, one of which includes 100,000 beakers, 14,000 jugs, 2500 flasks and 1500 cruets (Vannini 1981, 46, n. 39; Mendera 1990a, 304).

Appendix F is a 1424 inventory of the glass workshop in Manuta of a *moiolaro* or beaker-maker, Bernardo de Carpensis, from Gambassi (Casali 1987, 165, n. 11 and Nepoti 1991, 134-5). It includes a list of raw materials and over 100,000 products ranging from fifty '*ingrestarias ad coquendam aquam*' (water bottles) to 50,000 '*moiellorum ad filios*' (ribbed beakers). As with the inventory of 1409 the nine forms of beakers comprise 88 per cent of the total.

Nepoti, while working on documents in the Archivio di Stato in Bologna, has calculated the selling prices of the various types and qualities of glassware produced in that city in 1389 (Nepoti 1978b and 1987, cf. Appendix D). In this table it is possible to see how the cost of the various forms increases according to their weight and the quality of the glass used. Two types of glass are mentioned: '*verde*' that presumably had natural greenish tinges and '*bianco cristallino*' that was intentionally decolourized with the addition of manganese oxide to the batch. In a wealthy household there might be a distinction between glass used with tablewares in '*bianco cristallino*' and utilitarian vessels in '*verde*'. At the Palazzo Vitelleschi there is a noticeable variation in the quality between tablewares and utilitarian glasses. However, in more modest households and taverns, where breakages were probably high, the cheaper vessels in *verde* were presumably preferred.

That glass was so plentiful is not reflected in the few known inventories of private individuals. This raises the question as to whether these mass-produced glasses, at least from the mid-14th century, were no longer conceived as luxuries and worth listing individually. If so, it would imply that those glasses itemised were luxury pieces, possibly

imported from Venice or the Near East as seen in the inventory of Gastone Moncada of 13 December, 1455. This inventory includes mention of glasses from Damascus which would have already been over fifty, if not over 100 years old by the mid-15th century (Bonnano and d'Angelo 1971-1974, 347-8). For further discussion on the importance of Islamic glass in medieval Europe see below, p. 103.

ICONOGRAPHICAL REPRESENTATIONS OF GLASS-MAKING

None of the three treatises discussed above actually contains a depiction of a glass furnace. The earliest known (and only Roman depiction) that includes two glass-blowers occurs on at least two pottery lamps made from the same mould (cf. Abramic 1959, pl. 27, for the example found in 1930 now in the Split Museum). The earliest medieval illustration of a furnace comes from a manuscript datable to 1023 in the library of the Abbey of Monte Cassino (Codex 132; Plate 1a). It is a copy of the *De Universo* attributed to Hrabanus Maurus (d. 856), Bishop of Mainz and adviser to Charlemagne. This illumination depicts a three-storeyed furnace. There is, however, debate as to whether it shows a rectangular furnace with a vaulted roof which would follow Theophilus' design (Gasparetto 1967, 55-6) or a circular furnace (Charleston 1978, 11). Charleston (*ibid.*) argues that it was circular because the glory holes are depicted elliptically. However, Plate 1b, which comes from a 1425 copy of the same manuscript in the Vatican Library (Pal. Lat. MS 291, f. 211v) clearly shows a two-tiered circular furnace with two finished beakers and a bi-conical bottle on the floor beside the furnace.

The most famous medieval depiction of a furnace is that included in a Bohemian manuscript of *circa* 1425 of 'Sir John Mandeville's Travels' (Plate 3; British Library, Add MS 24.189, f. 16). It depicts a two-tiered furnace with an annealing oven behind, in which a pruned beaker may be seen slowly cooling. Above the furnace and its wooden superstructure (as at Germagnana, cf. Fig. 5 and above p. 29), is a vignette showing the collection of the raw materials and fuel needed to make glass (Charleston 1978, 22-3).

A three-tiered circular glass furnace (Plate 2) is depicted in a 15th-century medical manuscript, *Liber de Herbis et Plantis*, in the Vatican Library (MS 6823). Crushed glass was a basic ingredient in medical recipes (Foy and Sennequier 1989, 107) while glass bottles, or phials are often specifically mentioned in recipes to store medicines (Moorhouse 1993, 140, appendix 1, nos 3, 5 and 6). This circular furnace is very similar to the three-tiered 'second glass furnace' illustrated in Agricola's *De Re Metallica*, published in

Basel in 1556. It also corresponds closely to those seen by Peder Månsson, a Swedish priest who lived in Rome between 1508 to 1524 and who was very interested in the glass industry as it was then unknown in Scandinavia. He published an account of these furnaces in his *Glaskunst* (Charleston 1978, 12-13).

In the Corporale Chapel, Orvieto Cathedral, Ugolino di Prete Ilario painted three scenes from 'The Miracle of the Jewish Boy' (Plate 4). Mrs Merrifield in a note on Jewish glass (1849, 92-3) includes an account of this miracle as related in volume III of the 'History of the Jews',

'It was the custom of the Church (certainly at the time while Menas was Bishop of Constantinople) to distribute the crumbs of the consecrated host which might remain to children summoned for that purpose from their schools. On this occasion the son of a Jewish glass-blower joined the other children and partook. When his father found out he locked his son in his furnace while his mother went around the city weeping for three days. On the third day while crying outside the locked furnace door, she heard the boy answer from inside the furnace. He said he had not been burnt because a lady in purple robes (the Virgin) had poured water on the coals. The father was consequently put to death and the mother and son were baptised'.

As an artist with a glass connection (see above pp. 33-4) it would only have been natural for Ilario to include in his cycle the story of a miracle from his own vernacular, especially when there was a fully operational glass furnace adjacent to the cathedral in which he was working. Indeed, the only other depiction of this story that I have found is in a stained glass window in Le Mans Cathedral, France. Here the story is known as the 'Miracle of the Jewish Child of Bourges', in which the father was specifically a glazier rather than a more general glass-blower (Lillich 1985, 73, fig. 1).

CONCLUSION

What we have seen in this chapter is a change in the method of glass-working: the preparation of glass from its raw materials (soda, lime, silica and de-/colourant) in separate furnaces and the adoption of mould-blowing. The latter led to the mass-production of glasses, especially the 'Gambassini' beakers, as demonstrated by both in the large quantities mentioned in the stores and inventories of glass-makers and by the huge number found at

Tarquiniā. The few treatises known, written by monks for monks, deal mainly with producing coloured glass for church windows while the depictions of the furnaces themselves often occur in medical manuscripts. Unfortunately very few of the excavated furnaces have survived above their foundations so as to allow reconstructions to be made. At the beginning all evidence for the production of glass is connected with the church, however, by the 14th century it was in the hands of lay families who supplied glass for both ecclesiastical and domestic use. The various inventories and account books at Orvieto and Monte Oliveto show how glasses were valued and in the following chapters I shall discuss using both archaeological and iconographical evidence how the various types of glass became more plentiful and available to a wider section of society.

3: FINEWARES: DRINKING VESSELS

INTRODUCTION

Finewares and Utilitarian Vessels

Examination of the very large and varied glass assemblage from the Palazzo Vitelleschi in Tarquinia has allowed for provisional interpretations of their functions. To achieve this, the glass has been tentatively divided into 'finewares' and 'utilitarian' vessels through simple considerations of size, portability, quality of the glass metal, style, decoration and the age of the object at the time it was deposited. The assigning of a basic function also acts as a tool for dividing the glass into smaller, more manageable groups for discussion. The finewares include the tablewares (beakers, bottles, jugs and bowls etc.) discussed in this and the following two chapters and imported, luxury wares (Islamic and Byzantine etc.) in Chapter 6. Utilitarian vessels have also been subdivided into four groups: storage, distilling, medical and lighting in Chapter 7.

The attribution of any vessel to these 'fineware' or 'utilitarian' categories cannot be 100 per cent secure as medieval utensils of whatever medium were more multi-functional than their modern counterparts, with a few basic shapes serving a wide range of purposes (Ruempol and van Dongen 1991, 11). Therefore, those vessels that might have had ecclesiastical uses, like liturgical cruets, have been discussed according to their form (cf. pp. 85-7), rather than being regrouped into a separate chapter. It must also be remembered that lower quality vessels, probably used purely for the more utilitarian purposes at the Palazzo Vitelleschi, could have been the only glass vessels present in more humble households, where they would have been viewed as a luxury, i.e. a 'fineware' that might have taken pride of place on the table during special occasions.

Drinking Vessels

This chapter, the first devoted to the glass found at Farfa Abbey and the Palazzo Vitelleschi, Tarquinia, concentrates on those vessels used principally for drinking wine, water, beer or other liquids. The varieties and evolution of each type will first be outlined and then followed by short discussions on how they relate to glass found on other central Italian sites. Contemporary iconographical and documentary sources, invaluable for establishing the form and functions of these and other vessels, shall also be considered.

When I embarked on this thesis, I assumed that I would be dividing this chapter into two sections, one discussing goblets and beakers, i.e. stemmed vessels with feet and footless vessels suitable for drinking. However, no goblets were found in the 13th- or early 14th-century deposits at Farfa and only five small fragments were recognized among the glass finds from the Palazzo Vitelleschi (nos 1-5). It would appear that goblets were not common in medieval Italy despite a tradition for stemmed vessels continuing from the late antique into the Early Middle Ages. Simple goblets with folded conical feet are known, for example, from Rome (Isings 1965, 2-3, fig. 2) and from the early medieval glass-houses at Torcello and San Vincenzo al Volturno (Leciejewicz *et al.* 1977, 112 and Stevenson in preparation). Base fragments are also present in the early medieval deposits at Farfa (Newby in press).

This chapter, therefore, will concentrate on footless vessels that are often called 'cups' in the literature (cf. Davidson Weinberg 1952 and Lamarque 1973), but which I prefer to call 'beakers' to avoid confusion with handled vessels. Beakers are the most numerous and diverse group of glass vessel in medieval Italy. The examples, which come principally from the Palazzo Vitelleschi and the Abbey of Farfa, will be divided into two main groups according to their technique of decoration (applied or mould-blown), undertaken while the vessel was still hot and being worked at the furnace. These two types of beaker are strikingly different although retaining a few similar features that will be discussed in the conclusion to this chapter. There are also several beaker fragments from Farfa that have wheel-cut decoration (nos 257-9), carried out on the finished, cold vessel, but these are of Islamic manufacture and shall be discussed in Chapter 6.

As mentioned in the Introduction (pp. 9 and 11), when I first started working on the Tarquinia finds, I followed the excavation director's view that the glass found in pits 4, 9 and 181 was the result of a single deposition of the palace's contents due to some disaster, probably plague (Whitehouse 1987, 320-1). However, an examination of the distribution of pruned and mould-blown beakers in pit 181 revealed a distinct pattern that questioned this assumption (cf. Table 1 on p. 10). Pruned beakers occur in the lower levels while in the upper only mould-blown beakers are found, with mixed layers in the middle. Not surprisingly there were joins between fragments from different contexts within the same pit, especially as some layers were arbitrary divisions. However, joins across pits only occur among fragments found in contexts that contained exclusively mould-blown pieces except context 235 in pit 181 that contained both. It would appear,

therefore, that pit 181, although originally used to store grain, was subsequently reused as a rubbish pit over several decades and emptied at regular intervals. It is regrettable that the ceramics from the site have not been studied so that they cannot be used to confirm this hypothesis. However, an examination of the coins (listed in Appendix C) shows that pruned beakers are associated with coins dating from the second half of the 12th to the early 14th century. The latest coins, minted at the end of the 14th century, are found towards the top of pit 181, in the same contexts as the lead seals of Pope Urban VI (1378-1389) and Doge Antonio Venier (1382-1400), and the mould-blown truncated-conical beakers.

GOBLETS

In this thesis the term 'goblet' shall be used morphologically to denote a stemmed vessel. Care must be taken in distinguishing goblets from beakers when reading the literature on medieval glass. In French, for example, the word '*gobelet*' may denote a tumbler or beaker, while '*calice*' in French and Italian can refer to both goblets and chalices. However, in English 'chalice' has a religious connotation as the vessel used for the consecration of the wine and water during the Mass. Because of the inherent fragility of glass, combined with the apprehension that some portion of the sacred wine might be accidentally spilled, chalices made of glass were forbidden periodically by ecclesiastical synods (Way 1846, 132-3 and Braun 1932, 33-4, 45-9). The fact that they were banned suggests that there had been chalices made of glass and a few rare medieval survivals show that they were used occasionally, at least in France. A 14th-century glass chalice and paten, for example, were found in the stone tomb of a bishop of Nevers (Foy and Sennequier 1989, 359, no. 401, pl. 8) and another, without provenance, was formerly in the Constable-Maxwell Collection (Sotheby's 1979, 202-3, lot 355). To date no examples have been found from a liturgical context in Italy. Indeed goblets were exceedingly rare in Italy during the later Middle Ages with only a few pieces known from central Italy and Apulia.

Goblets of the 12th to early 14th century typically have small bowls on tall, usually solid stems, sometimes with an applied and pincer-trail around the centre, and set on a wide conical foot (Stiaffini 1991, 212, form I2a). There are five fragments from Palazzo Vitelleschi, Tarquinia, that probably come from five individual goblets (Fig. 7). These fragments include the lower part of a slender bowl decorated with three thick vertical

trails (no. 1; Whitehouse 1987, 326, no. 19), a hollow tall stem with a solid knob at the base of the bowl (no. 2) and a fragment from a wide conical foot with a diameter of 122 mm (no. 5). It is possible that some fragments attributed to the flaring mouths of large utilitarian bottles could come from the conical feet of goblets. There are also two small fragments from solid stems. The first, from the middle of a solid stem has a twisted and a plain section separated by an applied trail in the centre (no. 3) and the other comes from the lower part of a stem with a basal swelling just above the junction with the foot (no. 4; Fig. 7.4; Baumgartner and Krüger 1988, 46, fig. 45).

The domed lid decorated with three rows of applied prunts (no. 253; Figs 68.253 and 69a) was originally interpreted as the bowl and stem from a goblet (Whitehouse 1987, 326, no. 18, fig. 4.18) because of similarities to an example found at Southampton (Charleston 1975a, 218-19, no. 1513, fig. 222). This interpretation was first questioned by Baumgartner when this piece was included in the exhibition, *Phönix aus Sand und Asche* (Baumgartner and Krüger 1988, 45) but see p. 95 below for a further discussion.

Goblets are very rare in medieval Italian glass assemblages and do not occur among contemporary depictions, although the reverse is the case north of the Alps, especially in France and England (cf. Foy 1989a, 202-9 and Tyson 1996, 47-51 respectively). In an exhibition of French medieval glass, twenty-eight goblets were displayed including the intact, late 14th-century 'Augustine' goblet that was found in a wall niche of the Augustinian church, Rouen (Foy and Sennequier 1989, 211-12, no. 158, pl. 16). This form of vessel with tall, slender stems and wide domed feet is easily identifiable in the French iconographical record. An early 14th-century manuscript, '*Cy commence bible hystorians*' by Pierre de Comestor includes a dining scene where guests may be seen sharing glass goblets (Montpellier, Bibliothèque de la Faculté de Médecine, MS H. 49, f. 239v.; Foy and Sennequier 1989, no. 165, pl. 9). This miniature was used as the cover illustration for an exhibition on medieval table manners: *Plaisirs et manières de table aux XIVè et XVè siècles* (Rey-Deliqué 1992).

The rarity of stemmed vessels in Italy would suggest that they were the preserve of the most affluent levels of society. Their presence at Tarquinia, together with other exceedingly rare forms like jugs (see below p. 83), seems to confirm the inhabitants as belonging to the highest level of society. This is suggested further by other luxury finds such as the pearl-studded diadem and the presence of game amongst the faunal remains (Clark, G. *et al.* 1989, 242).

Stiaffini believes that goblets were made in more specialized glass-houses that produced wares for merchants and the élite (Stiaffini 1991, 211). The mid 13th-century goblets from Lucera Castle (Whitehouse 1966, 177, fig. 31.4) were found with other rare luxury forms including a handled bottle, ribbed footed bowl and imported Islamic enamelled beakers. Other stem fragments from Apulia have been found at Petrulla (Harden 1966, 74, no. 6, fig. 9). However, the only finds from central Italy are two fragments from the garden of S. Caterina della Rosa in Rome (Cini 1985, 540-1, nos 939-40, fig. 87 and Mendera and Cini 1990, 498, nos 546-7) and another, unpublished, solid stem fragment from Cosa (pers. comm. David Grose).

It has long been held that stemmed drinking glasses were a Renaissance invention, originating from Venice (Charleston 1984, 19). This is reflected in the iconographical record when goblets only start to appear in late 16th-century paintings. However, this ignores the evidence for medieval glass goblets north of the Alps, especially in France, which also shows that the glass industry in western Europe was not dependent on Venetian or Italian fashions. Goblets of glass do not become common at either Farfa or Tuscania until the later 16th century (Lamarque 1973, 126).

BEAKERS WITH APPLIED DECORATION

Introduction

This section on beakers with applied decoration is dominated by pruned beakers, i.e. vessels with applied blobs of glass left in relief on the body (nos 6-61). They form over 80 per cent of the beakers with applied decoration from Tarquinia and Farfa. The remaining vessels with applied decoration have either vertical ribs (nos 62-8), or thin trailing arranged in simple spirals (nos 69 and 70) or in more abstract designs (nos 71-6). Some of these forms have parallels with glasses from elsewhere in Italy and southern France. The glasses described below have been divided into three main groups: pruned beakers, beakers with vertical ribbing and beakers with thin trailing.

Pruned Beakers

The pruned beaker is the most distinctive form of beaker found in central Italy during the late 12th to early 14th century (cf. Stiaffini 1991, 202-11, 231-4). They may be subdivided into two main forms, distinguishable principally by the treatment of their applied base-rings. The first group have squat, mostly cylindrical bodies with gently flaring or upright

rims and bases edged with an applied coil trailed once around the bottom and left smooth, known as a 'solid base-ring' (Figs 8-13). The second type have wide flaring mouths on slender bodies that taper inwards towards the bottom, which is decorated on the outside with an coil trailed once around the body and then pincerd out to form a series of protuberances or 'toes' on which the vessel stands (Figs 14-17). Both types also share the following features: they are free-blown and have pushed-in bases with conical kicks and pontil-marks underneath. They all have fire-rounded rims on upright or flaring mouths separated from the body by an applied coil, trailed horizontally once around the body. Below this horizontal trail is a zone of applied 'prunts' arranged in staggered horizontal rows or 'quincunx'. With the exception of two small fragments from Farfa (nos 59 and 60) all the applied decoration is formed from the same colourless metal with greenish and yellowish hues as the rest of the vessel.

PRUNTED BEAKERS WITH SOLID BASE-RINGS

At the Palazzo Vitelleschi, Tarquinia, there are at least three squat pruned beakers with straight, gently tapering sides, reworked rounded rims, pushed-in bottoms with gentle kicks and applied solid base-rings (nos 6-8; Figs 8.6 and 9; Whitehouse 1987, 325, no. 6, fig. 3.6 and *idem* 1991a, 76-7, fig. 7.5). Their heights range from 69 to 71 mm and they have rim diameters of *circa* 70 mm. They are decorated 25 to 30 mm below the rim with a horizontal trail above three rows of rounded conical prunts arranged in quincunx. These three beakers are almost identical to an intact example that is 70 mm high preserved in the Museo dell'Opera del Duomo, Orvieto (Mentasti *et al.* 1982, 69, no. 49). This piece does not display the same level of craftsmanship - the glass has a brownish tinge and is very bubbly, the horizontal trail is not of a uniform thickness and overlaps, while the kick of the base is lop-sided. However, their similarities are so great that they are presumably contemporary and might have been produced in the same workshop although the Orvieto example might have been made by an apprentice rather than a skilled artisan.

All three beakers come from context 19 of pit 4. No examples with complete profiles, that can securely be attributed to this form, have been identified in pit 181, although there are several upper and lower body fragments that might belong to this group (nos 9-14). Only one other fragment, part of a large 'toed' base-ring (no. 54), probably from a pruned beaker, was found in pit 4. Eighty-eight per cent of the remaining pruned vessels of both groups come from three contexts in pit 181 (nos 236/7, 242 and 243).

Table 1 (p. 10) show that the other contexts containing pruned fragments include nos 199, 229 and 235. However, all the fragments in context 199 join with other fragments from lower levels of pit 181 as with the upper part of a pruned beaker (no. 26), a beaker with five rows of prunts and a 'toed' base-ring (no. 35) and the lower part of a large pruned beaker with a 'toed' base-ring (no. 53). No distinction can be discerned in the distribution of fragments from the two main groups of pruned beakers.

This first type of pruned beaker from Tarquinia is similar to another group with a fourth row of prunts that are predominant among the finds from Farfa (nos 17-18; Figs 8.17-18; Newby 1987, 263, figs 6-7 and *idem* 1991, 39, figs 5d-8). These beakers are also *circa* 70 mm high and have a smaller rim diameter of *circa* 60 mm with a horizontal trail only *circa* 20 mm below. A minimum number of eighteen different pruned beakers have been identified among the fragments from Farfa (Fig. 11) of which at least a third may be assigned to this form (nos 17-22). Except for fragments from a larger example (no. 30; Figs 11.30 and 18.30), the remainder are body fragments that are not large enough to determine their original form. There are also several solid base-rings that probably came from pruned beakers (nos 23 and 24).

Some of these pruned body fragments from Farfa are similar to a second type of pruned beaker from the Palazzo Vitelleschi that has three rows of large applied prunts (no. 15; Figs 8.15 and 12a; Whitehouse 1987, 325, no. 7, fig. 3.7 and *idem* 1991a, 76-7, fig. 7.6). Only one example of this type has been found at the Palazzo Vitelleschi. It differs from the previous two forms in that it has a cup-shaped mouth with a diameter of 74 mm and although there are three staggered rows of prunts below a horizontal trail they are much larger, flattened and have pointed pulled centres. There is also the lower body from a slightly larger beaker with a base diameter of 70 mm (no. 16; Fig. 8.16). Related body fragments with large and flattened prunts are present at Lucca (Stiaffini 1991, 232) and Palermo (Falsone 1976, 122). The glass metal of no. 15 is also different from the other pruned fragments at the Palazzo Vitelleschi. It is transparent pale pinkish-yellow in colour and contains purple streaks caused by the manganese oxide, added as a counter balance to greenish tints caused by impurities in the sand, not being mixed evenly with the raw materials. This beaker also came from the same layer (context 229 in pit 181) as two other types of beaker, decorated with triangular clusters of very small prunts (nos 57-8; Figs 8.57-58 and 13), which are also only represented by single examples at Tarquinia.

Among the pruned fragments associated with applied solid base-rings from the Palazzo Vitelleschi are two reconstructible examples and one upper body fragment of a much larger form of beaker. This type has a flaring mouth and a barrel-shaped body decorated with proportionally larger prunts arranged in six staggered rows (nos 25-7; Figs 8.25 and 12b; Whitehouse 1987, 325, no. 8). These beakers are *circa* 107 mm high with rim diameters ranging from 88-100 mm. As mentioned above (p. 45), there are ten body fragments from Farfa that belong to a similarly large pruned beaker with a body diameter of *circa* 90 mm (no. 30; Figs 11.30 and 18.30). There are two lower body fragments from solid base-rings with diameters ranging between 75-82 mm (nos 28-9) from the Palazzo Vitelleschi and a further two from Farfa with diameters of 90 and 100 mm respectively (nos 31-2; Fig. 18.32). All these larger vessels are possibly related in type to an upper body fragment from Corinth mentioned, but unillustrated, by Davidson Weinberg (1952, 88, no. 745). This beaker had a cylindrical body decorated with prunts applied in 'checker-board' and an upright rim with a diameter of 90 mm.

In Italy this group of pruned beakers with applied solid base-rings is always compared to a single example with a flaring rim from Corinth (Davidson Weinberg 1952, 88, no. 744). This beaker is 77 mm high and has a flaring mouth with a rim diameter of 75 mm on a cylindrical body decorated with five rows of staggered prunts below a horizontal trail. Its rarity led Davidson Weinberg to suggest that this type was not made at the Agora South Centre factory (*idem* 1975, 136). However, this point is generally ignored in later writings when other examples of this form are ascribed to glass-workers from Corinth working in Norman Sicily or Apulia after 1147 (cf. pp. 27-8 above).

The Corinth beaker is similar to another from Aidone, Sicily, which has tentatively been associated with the Norman foundation of the city in the 12th century (Davidson Weinberg 1975, 136). This piece is larger with a rim diameter of 81 mm and a base diameter 70 mm. Except for the beaker from Orvieto mentioned above (p. 44) that is so closely related to pieces from the Palazzo Vitelleschi, the only other intact example known also comes from Sicily. This beaker was found during excavation of the Steri and is now in the Museo Archeologico Regionale, Palermo (d'Angelo 1976, fig. 1; Falsone 1976, fig. 28 and Mentasti *et al.* 1982, 67, no. 45). It is 75 mm high and, like the examples from Corinth and Aidone, it has a flaring mouth with a rim diameter of 73 mm and a cylindrical body decorated with five rows of prunts arranged in quincunx. It is possible that these vessels from Sicily and Greece are related although at this stage of research one cannot

be certain that they were made by the same artisans in one or several glass-making centres. They are similar in profile to the larger examples from the Palazzo Vitelleschi (nos 25-6) while the smaller beakers with vertical walls (eg. nos 6-8 and 17-18) were presumably made in more local glass-houses. Unfortunately other pieces from central Italy, such as the base fragment with a single row of prunts extant from the Crypta Balbi, Rome (Mendera and Cini 1990, 500, no. 557) are too small to assign them to a particular type within this group. With the recognition of the wide range of beakers from Tarquinia and Farfa future attributions may be made easier.

PRUNTED BEAKERS WITH 'TOED' BASE-RINGS

The second type of prunted beaker with conical bodies and 'toed' base-rings appears to have been produced in a defined series (nos 33-56; Figs 14-17). At the Palazzo Vitelleschi the heights of these beakers range from 83 to 155 mm and their rim diameters from 60 to over 80 mm. At the base of the flaring mouths there is an applied horizontal trail and below, a varying number of staggered rows of prunts. One of the examples with five rows of pulled prunts (no. 34) is similar to an example with four rows of large pulled prunts, formerly in the Biemann Collection, Zurich, now in The Corning Museum of Glass (inv. no. 87.3.33; Mentasti *et al.* 1982, 68-9, no. 48 and Whitehouse 1991a, 79, fig. 1). This example, made in colourless glass, is 121 mm high with a rim diameter of 85 mm and a base diameter of 52 mm. Further fragments have been found at Lucera Castle (Whitehouse 1966, 177) and Petrulla (Harden 1966, 73-4). It is interesting to note that fragments from glass goblets have been found on both sites and that at Lucera Castle both groups of prunted beaker are present. Other examples are known from Ripafratta (Stiaffini 1989, 488, no. 10, pl. 23.10) and Monte d'Irsi, Basilicata (Cotton 1971, 154, nos 2-3, fig. 3.2-3).

From the documentary record it is known that *mojoli de girlanda et imperlati* or beakers with 'toed' base-rings and decorated with prunts, were made at the end of 1276 in Venice (Mentasti *et al.* 1982, 68). Examples from the Venetian region are known from Cividale del Friuli (Gasparetto 1975, 145, pl. 1a-c; *idem* 1979, 85, fig. 14 and Mentasti *et al.* 1982, 66-7, no. 40), but the only local depiction of a prunted beaker comes from the façade of the Doge's Palace, Venice (Pause 1996, pl. 37.2). However, this carving is of a squat prunted beaker with three rows of prunts and an applied solid base-ring like the examples from the Palazzo Vitelleschi (nos 6-8) discussed in the previous section.

The only depiction of a pruned beaker with a 'toed' base-ring from central Italy is in a fresco of 'The Wedding at Cana' in the north transept of the Upper Basilica at Assisi (Plate 5a). It is believed to have been painted by the Roman artist and mosaicist Jacopo Torriti (fl. 1270-1300) or one of his followers in the early 1290s. It shows a servant holding an empty beaker with a flaring mouth and four staggered rows of prunts below a double horizontal trail in her right hand and a spouted maiolica jug in her left. This double horizontal trail has not been identified on any surviving glass fragments. In 1981 Whitehouse listed five pictures that contain representations of pruned beakers including the above example (Whitehouse 1981a, 173), but two of these can now be shown to depict mould-blown beakers (p. 65).

Another pruned beaker is depicted in a late 13th-century allegorical fresco of January and February in the Sala dei Notari, Palazzo dei Priori, Perugia (Plate 5b). This beaker has a wide flaring mouth separated from the cylindrical body decorated with three rows of distinctive pulled large prunts by a horizontal trail and set on a gently flaring base. The form of this beaker is similar to two published examples from Corinth although the prunts on these pieces are much smaller, snail-like, and arranged in five rows (Davidson Weinberg 1952, 114, nos 742-3). The first beaker is 94 mm high, with a rim diameter of 75 mm and a base diameter of 41 mm, while the second has a larger rim diameter of 115 mm. These are similar to the lower body of a pruned beaker from the Palazzo Altemps, Rome (no. 47; Fig. 18.47). It too has a cylindrical body decorated with four extant rows of snail-like prunts on a 'toed' base-ring with a base diameter of 48 mm.

Apart from the two published pieces from Corinth, Davidson Weinberg mentioned a further seventeen 'toed' base fragments with diameters ranging from 35 to 60 mm (Davidson Weinberg 1940, 308). There are also fragments from a further five 'toed' bases with diameters ranging from 40-55 mm from Farfa and the Palazzo Vitelleschi (nos 44-6 and 48-9; Fig. 17) and an additional three from larger beakers with diameters ranging from 80-90 mm (nos 54-6; Fig. 18.55-6). However, as shall be shown in the next section 'toed' base-rings are not exclusive to pruned beakers, occurring on both ribbed and trailed beakers (cf. nos 62, 64, 69 and 71) and also on bowls (cf. nos 228-9).

Although fragments from 'toed' pruned beakers were found in the same contexts at the Palazzo Vitelleschi, one cannot be certain that they were used together at the same time or that they were used together with the pruned beakers of the first type, i.e. those with applied solid base-rings. The definite progression in their capacities suggests strongly

that they were used for different beverages, i.e. spirits, versus wine or even beer. However, this assumes that each beaker fulfilled a single function, but this could change not only over time but in which part of the house, shop or monastery they were used. Some beakers, for example, are known from the iconographical record to also have been used as flower vases as may be seen in the 'Adoration of the Shepherds' from the Portinari Altarpiece painted by Hugo van der Goes in 1476-1487.

The capacities of the pruned beakers have been calculated up to the level of the applied horizontal trail. This is a feature common to all types and a natural level up to which to fill a beaker if spillage was to be avoided when lifting and tilting it to drink from. The capacity of no. 34 (Figs 14.34 and 16a), for example, is comparable to that of the three- and four-tiered beakers of the first group (eg nos 6 and 17; Figs 8.6 and 8.17) at *circa* 10 cl. The smallest pruned beaker with a 'toed' base (no. 33; Fig. 14.33) has the smallest capacity at 4.2 cl, while the two largest (nos 50 and 53; Figs 14.50 and 14.53) have 12.5 and 46.5 cl respectively if the reconstructions are correct. The capacities of each major vessel type shall be considered again in the Conclusion.

OTHER FORMS OF PRUNTED BEAKERS

There are several pruned beakers that do not fall easily within the two groups outlined above. These include a unique example of a squat, cylindrical beaker from the Palazzo Vitelleschi decorated with three triangular clusters of small snail-like prunts below an applied horizontal trail (no. 57; Figs 8.57 and 13a; Whitehouse 1987, 325, no. 5 and Baumgartner and Krüger 1988, 45, fig. 43). It is 44 mm high and has a rim diameter of 78 mm. There is also an upper body fragment from same deposits at Tarquinia that has a single triangular cluster of prunts extant, but there is no evidence of the usual horizontal trail (no. 58; Figs 8.58 and 13b). This geometric arrangement of small prunts has not been recognized on other Italian fragments. However, a beaker from Prato has a band of small prunts applied just below the rim and underlined by two trail left in relief (Francovich *et al.* 1978, 64, no. 704, pl. 16.704) and body fragments from Cefalà Diana are decorated with small raised prunts (Bonanno and d'Angelo 1971-1974, 339, fig. 1). These examples have led Stiaffini to suggest that they are a later reworking of the decorative theme of applied prunts which were combined with other decorative elements and applied in geometric figures on other beaker forms according to the imagination and the ability of the glass-worker (Stiaffini 1991, 232).

All the prunts discussed above were made in the same coloured glass as for the main body of the vessel. However, at Farfa there are two examples with blue decoration (nos 59-60; Fig. 18.59-60). The first is a yellowish-colourless body fragment decorated with a single dark blue rounded prunt (no. 59; Fig. 18.59; Newby 1991, 39). It is similar to a body fragment from Salpi in Apulia that bears one blue and two self-coloured prunts (Harden 1966, 75. no. 11, fig. 13). This combination of blue and self-coloured prunts may also be seen on a restored 13th-century example with an applied solid base-ring from Würzburg (Baumgartner and Krüger 1988, 204-6, no. 184).

The second coloured prunted fragment from Farfa is small, but clearly has a blue tip on a colourless prunt and body (no. 60; Fig. 18.60; Newby 1991, 39). Four fragments from two different beakers with blue-tipped prunts have been found in contexts dating from the late 13th to early 14th century at Koblenz (Baumgartner and Krüger 1988, 208-9, nos 189-90). These fragments include an upper body fragment with a flaring mouth (diameter 116 mm) and a 'toed'-base fragment (diameter *circa* 92 mm) where the tips of the 'toe' is also in blue glass. This type of blue-tipped prunt is also found on contemporary Islamic glass (Lamm 1929/1930, vol. 2, pl. 26.17-18).

The last type of prunt to be discussed, the double prunt, is very unusual and apart from the four examples from Farfa (no. 61; Fig. 18.61) is not recorded elsewhere in Italy. These prunts have protrusions on both the exterior and interior of the vessel. A large prunt was applied on the outside wall while a second prunt with an elongated bubble inside was formed by pulling on the inside of the vessel (pers. comm. Bill Gudenrath). The nearest parallel to this type of prunt is an early 16th-century German *Stangenglas* in the British Museum (inv. no. MLA S875; *Masterpieces of Glass* 1968, 136, no. 175) and a fragmentary late 15th- or early 16th-century *Krautstrunk* from the Lückger Collection, now in the Kunstmuseum Düsseldorf (inv. no. P 1936-89; Baumgartner and Krüger 1988, 345-6, no. 316). The function of these double prunts remains obscure.

Beakers with Vertical Ribbing

This small group comprises fragments belonging to four beakers from the Palazzo Vitelleschi, Tarquinia, decorated with vertical ribs that start *circa* 19-25 mm below the rim (nos 62-5; Figs 18.62-3 and 19b). Made in transparent pale green or yellowish bubbly glass, these beakers have plain reworked rounded rims and straight-sided walls that taper inwards towards the pushed-in bottoms with low conical kicks and pontil marks

underneath. They stand on applied solid 'toed' base-rings, ranging in diameter from 44 to 58 mm. The ribs on the first example (no. 62; Baumgartner and Krüger 1988, 46, fig. 45) are more prominent than those on nos 63-4 (Whitehouse 1987, 326, no. 12, fig. 3.12; Baumgartner and Krüger 1988, 45, fig. 45). It is possible, however, that the latter beakers were 'optic-blown' (see below p. 55). Indeed, the beaker no. 62 and the lower body fragment no. 65 come from the same earlier deposits in pit 181 (contexts 242 and 243) that contained the pruned beakers, while the beakers nos 63 and 64 come from pit 9 which produced mould-blown vessels exclusively (cf. Table 1 on p. 10).

The combination of mould-blown and applied decoration may also be seen on two small fragments from ribbed beakers with 'toed' base-rings from Farfa (nos 66-7; Fig. 18.66-7). A similar fragment was found in an embankment in the Venetian lagoon, dated by Zecchin to the early 14th century (Zecchin 1987-1990, vol. 1, fig. on p. 11). These vessels probably were made during the transition from free-blown vessels with applied decoration to mould-blown pieces, that occurred in central Italy during the second quarter of the 14th century.

Beakers with Thin Trailing

This section is also small but includes, in addition to some fragments from the Palazzo Vitelleschi, Tarquinia, two sherds from Tuscania and Anguillara (nos 75-6; Fig. 20.75-6 respectively). Like the pruned beakers with 'toed' bases discussed above, these two upper body fragments come from beakers where the junction between the flaring mouths and vertical bodies is marked by a horizontal trail, which is blue on the Anguillara fragment (no. 76; Fig. 20.76). Below this is a zone of applied trailing that curves in an indeterminate pattern. A noticeable feature among these beakers, except for the latter and the two pruned fragments from Farfa (nos 59 and 60), is the absence of blue decoration, so long associated with Italian glass-making (Charleston 1972, 46). However, as shall be shown later, blue trailing was used occasionally on bottle necks (nos 147 and 151), jugs (no. 203), bowls (nos 229 and 232) and lamps with blue handles (no. 364).

From the Palazzo Vitelleschi, Tarquinia, are six fragments from the lower body of a vertically-walled beaker set on a 'toed' base-ring and decorated with a thin, spiral trail wound at least six times around the body (no. 69; Figs 19a and 20.69). There are fragments from another squat beaker with a cylindrical body and flaring mouth, the walls decorated with abstract curved trailing (no. 71; Figs 20.71 and 21a) The metal and the

delicate trailing on this beaker are similar to the example with spiral trailing (no. 69), fragments from which were found in the same context in pit 410, suggesting that they are probably contemporary and could possibly originate from the same glass-house. The glass is noticeably thinner than in the other beakers with applied decoration and is similar to the mould-blown ribbed flask (no. 192; Figs 46.192 and 47b), also from pit 410, which suggests that all probably date to the second half of the 14th century.

UNDECORATED BEAKERS

The beakers in this section may be divided into three groups: beakers with applied solid base-rings, beakers with hollow-tubular base-rings and truncated-conical beakers.

Beakers with Applied Solid Base-Rings

The seven beaker bases discussed briefly in this section all come from the Palazzo Vitelleschi, Tarquinia (nos 77-83; Figs 22 and 24a). They were made in light yellowish or greenish glass and vary in base diameter from 55 to 75 mm. They were manufactured in the same way as the bases with applied solid base-rings from pruned beakers discussed above (pp. 44-7). However, they only differ from these because the trail applied around the bottom of the beaker is much thinner, although they come from the same contexts in pit 181 (nos 229, 236/7 and 243). It has not been possible to identify securely any body or rim fragments from these or the following undecorated beakers due to the large number of undecorated sherds from the site.

Beakers with Hollow-Tubular Base-Rings

As with the undecorated beakers above there are seven examples of this form from the Palazzo Vitelleschi (nos 84-90; Fig. 22; Whitehouse 1987, 326, no. 20, fig. 4.20). Instead of having an applied coil around the bottom of the beaker to strengthen it and prevent breakage, the bottom was pushed-in and then outwards to create a hollow-tubular ring before forming a conical kick. As glass is technically a liquid, the surface tension of a hollow-tubular ring is rendered very strong. Larger versions of this hollow-tubular base with diameters up to 110 mm are associated with bottles (cf. nos 176-85, Figs 42 and 43) while similarly tooled rings were also used around the middle of flasks (cf. nos 173-5; Fig. 42a) that were all found in the same contexts in pit 181, especially 236/7.

Truncated-Conical Beakers

This type of plain undecorated beaker is both a common form at the Palazzo Vitelleschi and throughout the rest of Italy from the mid-14th century (Whitehouse 1987, 325, nos 1-4, fig. 3.1-4; Stiaffini 1991, 229-30). In form, these beakers with straight walls tapering inwards to the bottom, pushed-in to form conical kicks (cf. nos 91-6; Figs 23 and 24b), are identical to the mould-blown truncated-conical beakers discussed in the next section (pp. 53-65) and for the most part they shall be discussed there. Of the 393 individual beaker bases listed in Appendix B a minimum of sixty-seven come from plain beakers. Two similar intact examples were found together with a bulbous bottle in a wall niche in Florence (Barrelet 1959, fig. 143) while another, possibly slightly later example, was also found in a wall niche during restoration work of the Palazzo Pretorio, Pistoia, in 1981 (Mazzi 1982, 229-30, no. 4). This beaker, made in thin transparent glass with a faint yellowish tinge, is 60 mm high with a rim diameter of 75 mm and a base diameter of 50 mm.

MOULD-BLOWN BEAKERS

Introduction

The following section on beakers concentrates on truncated-conical mould-blown pieces with straight walls and pushed-in bases with prominent, conical kicks and pontil marks underneath (nos 97-146). It would appear from excavations in Italy that most 14th-century beakers, and especially those from the second half of the century, belong to this form. The iconographical record also confirms that these beakers were the predominant type of drinking vessel used during the 14th and 15th centuries (see below p. 65).

The vast number retrieved from the Palazzo Vitelleschi, Tarquinia, are known principally from their bases, which constitute the thicker and, therefore, the more durable part of the vessel. All these bases, 393 in total, have been grouped together in Appendix B. Of these, 269 (68%) come from mould-blown beakers and seventy-four (19%) come from plain beakers. However, for the remaining 13 per cent (fifty bases) it has been impossible to determine whether the rest of the beaker was decorated as the pattern does not always continue to the underside of the base.

It is possible to make some general observations on the various forms of beaker and the types of decoration present in the large sample from Tarquinia. Due to the limitation of time and resources as well as to the nature of the glass itself (its fragility and

similarity of metal), it has not been possible to try to reconstruct all the truncated-conical beakers found on the site. The vessel walls are very thin, often less than 0.5 mm thick, so they have tended to break into small fragments that are difficult to match. Yet, from their uniformity it is possible to reconstruct a type series for these medieval Italian mould-blown glasses and descriptions of reconstructible examples are included in Appendix A.

An examination of the finds from Tarquinia shows that the range of mould-blown geometric designs is much wider than previously thought (cf. Figs 26, 28, 31-2 and 34). When Whitehouse published a preliminary account of the glass, he included four examples of plain truncated-conical beakers (nos 91-2 and 95-6; Whitehouse 1987, 325, nos 1-4, fig. 3.1-4), but only three with mould-blown decoration, all of which had vertical ribbing (*ibid.* 326, nos 13-15, fig. 3.13-15). He neither mentioned the vast number of mould-blown beakers present, with nearly 300 individual beaker bases surviving, nor the diversity in their decoration that includes circular bosses, hexagons, pointed ovals, diamonds and rectangles besides vertical ribbing. Instead, Whitehouse concentrated his study on the well-documented pruned beaker, and on bottles and other more luxurious pieces, often decorated with applied trailing, which can now be identified with an earlier phase of occupation in the 'proto-palace'.

Through comparisons with the large sample from the Palazzo Vitelleschi, it has also been possible to identify tentatively some examples that occur in post-medieval deposits at Farfa (nos 108-11, 126-7 and 146-7; Fig. 34). Many of the deposits from Farfa have been disturbed by later building phases and contexts from all periods contain residual material. It is also possible that some pieces might have survived for a length of time before being discarded. The designs recorded consist mostly of circular bosses with varying diameters and vertical ribbing. There is also a single body fragment with rounded squares (no. 144; Fig. 34.144) and another with a geometric pattern not recorded among the finds from the Palazzo Vitelleschi with concentric raised diamonds with a central raised point (no. 146; Fig. 34.146).

Manufacture

Although these glass beakers were mould-blown there are no mould-marks on them (usually visible in the form of raised vertical or horizontal seams), indicating that they must have been blown into one-piece moulds. There are also no marks on the finished glass vessel to indicate the material of the mould but they could have been made of

terracotta, wood, metal or stone. No ceramic or stone moulds were found among the finds from glass-house at Germagnana although the finds included large pieces of ceramic crucibles (Mendera 1995b, 40, fig. 36, pl. 40.1). Wooden moulds, on the other hand, would not have survived buried in the ground and when worn out probably would have ended up in the furnace itself as fuel. Metal moulds, although not found on medieval glass-making sites, were recorded in a contract of 1344 between two Tuscan glass-makers and a Palermo glass-house (see above p. 31; d'Angelo 1989, 288). Further metal moulds are mentioned in a document drawn up in *circa* 1480 by a glass-maker originally from Gambassi, Guaspere di Simone Porrigini, for the equipment of a glass-house in Mugello (Spallanzani 1982, 573; Mendera 1989, 74 and *idem* 1991, 23-4). Metal or stone moulds would have been more durable than those of terracotta and therefore better suited to multiple reuse, as suggested in the vast numbers of beakers recorded in glassmakers' inventories (Appendices E and F). Once these moulds were worn out the metal could have been recycled which would explain their absence in the archaeological record.

These beakers were 'optic' blown - a process by which a small paraison or gather of glass was blown into a patterned mould, removed and then further inflated or 'free-blown'. This further inflation causes the pattern to expand and soften. It is not possible to determine whether these pieces were subsequently blown into a plain mould to reduce the prominence of the earlier design. The bottom was pushed-in to form a kick after which the pontil attached to the underneath and the paraison was separated from the blow-pipe. Then the beaker walls could be opened outwards and the rim reworked and rendered smooth at the furnace mouth. The finished vessel would then have been placed in the annealing oven to cool down slowly and to remove tensions within the glass.

This type of 'optic-blowing' may be distinguished from normal mould-blowing in that the design is not hollow, i.e. the glass does not have a uniform thickness. Instead the design occurs in low relief on both the internal and external surfaces of the vessel. The thickness of the vessel wall may vary from 0.4 to 1.2 mm, which is considerably thinner than that found on vessels with applied decoration where there are positive bulges on the interior wall caused by pressure during the application of the prunts or ribs etc. By blowing into a mould these beakers would have been quick to produce, requiring less skill than the beakers with prunts and applied decoration discussed above as well as using less glass to make lighter vessels.

The glass used to make all the plain and mould-blown pieces is very similar. All the glass contains some very small bubbles and occasional blowing spirals and pieces of grit. The glass is always transparent, almost colourless with varying light tinges of green and yellow due to natural impurities in the sand and other raw ingredients. There are also a few beaker bases made in bluish-green glass which may also be distinguished by their severe weathering with surface pitting (Fig. 27b). The rest of the glass has little or no iridescence, sometimes appearing like new. This would indicate that these bluish-green beakers were made of a different composition as all the pieces were subjected to the same soil conditions during burial. For a discussion in the relationship between the colour of the glass and type of decoration see below p. 60.

Form

Using the largely reconstructible examples from the Palazzo Vitelleschi, catalogued in Appendix A (nos 97-141), it has been possible to identify three basic profiles for plain and mould-blown truncated-conical beakers. The first (A) is of a squat vessel with widely flaring walls, *c.* 15-20° from the vertical, where the rim diameter is much greater than the height (cf. Figs 23.93-4, 26.105-7, 28.114, 118 and 32.134, 137). These have capacities ranging from 8.5-14 cl. up to the top of the decoration. The second (B) is slightly taller with less flaring walls, *c.* 10-15° from the vertical (cf. Figs 26.98, 28.124 and 31.128-9) with capacities of *c.* 9-10 cl. and lastly the tallest (C) with more vertical walls, only *c.* 10° from the vertical (cf. Figs 23.96, 26.101, 31.141 and 32.138) and the largest capacities ranging from 12-15.6 cl.. There also appears to be a correlation between the degree of flaring and the height of the beaker - the greater the angle the shorter the beaker.

The cut-off rim of the beakers was rounded at the furnace mouth and consequently thickened slightly. They vary in diameter from 55 to 100 mm, with the largest diameters occurring on the shorter, squat beakers with widely flaring walls of type A. The walls are always straight-sided, but on some a slight bulge above the bottom may be detected (cf. Figs 26.101 and 28.118). This might have been caused by pressure when the base was pushed-in to form the conical kick. All the beakers have pushed-in bases with conical kicks, that tend to be more prominent in beakers with smaller diameters. The conical kick is the feature most often delineated in contemporary depictions (cf. Plates 6a, 11a and 18). On some beakers the pontil, in the form of a small disk, is still intact (eg. no. 106), while

on others it has been partly broken to leave a slight ledge (eg. nos 115 and 134) or a faint raised ring or scar (nos 105 and 114).

Decoration

The decorative patterns on the mould-blown beakers include raised circular bosses, vertical ribbing, hexagons or honeycomb, diamonds and squares or rectangles. These designs occur on all three basic forms described above. Table 2 on p. 58 shows the distribution of the various types among the contexts of pits 4, 9, 180, 181 and 410. As mentioned above (p. 53), the decoration does not always continue on the underside of the base which makes the distinction between mould-blown and plain beakers difficult. Therefore, the number of 'plain/unknown' beakers included in Tables 2 and 3b (pp. 58-9) is artificially high. From Table 2 and 3a it is possible to see that most bases (61.9%) came from pit 181, which was also the largest and deepest pit on site (see above pp. 8-9). Table 2 also shows that the different types of mould-blown decoration are evenly distributed among the contexts in which they are found. Table 3b on p. 59 shows the relative proportion of each type, where circular bosses are the most common type with 137 examples (34.8%), followed by ribbing (91 bases or 23.1%), hexagons (27 bases or 6.9%), diamonds or ovals (12 or 3.1%) and lastly three examples with rounded squares (0.8%). Plain or unknown beakers form 31.5%.

The decoration generally starts between 15 and 20 mm below the rim, leaving a smooth undecorated band at the top. This undecorated band distinguishes these beakers from later 15th-century pieces where the decoration continues up to the edge of the rim as on several examples from the Palazzo d'Arnolfo at San Giovanni Valdarno, Florence (Boldrini and de Luca 1988, 143-4, nos 7-8, fig. 7.7-8). However, on some ribbed beakers from Tarquinia, the decoration does continue right up to the rim (eg. nos 122-4; Fig. 28.122 and 124). One example has an additional mark, similar to a rosette, applied on the underside of the base (no. 125; Fig. 28.125 and 29b). Whitehouse thought that this might be a maker's mark (Whitehouse 1987, 326, no. 15), but no other beaker base, decorated or not, has this mark to confirm his hypothesis. The glossy yellowish-green metal of this piece is also atypical. In addition, fragments from this beaker were found in the two uppermost contexts of pit 181 leaving the possibility that it might be intrusive.

Towards the top of the beaker the mould-blown decoration is often distorted, becoming squashed and elongated near the undecorated band below the rim. This

TABLE 2: Distribution of truncated-conical plain and mould-blown beakers from the Palazzo Vitelleschi, Tarquinia

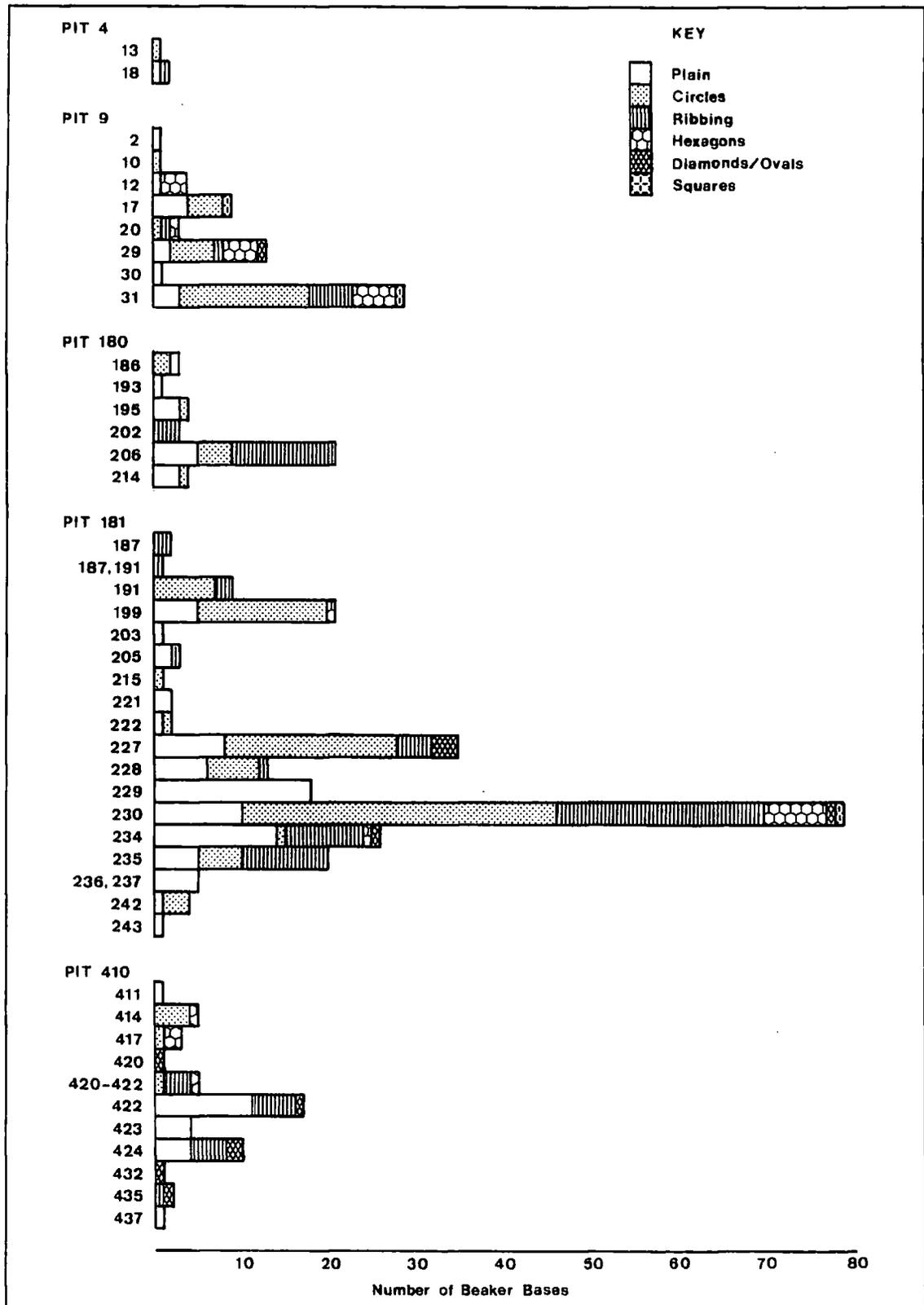
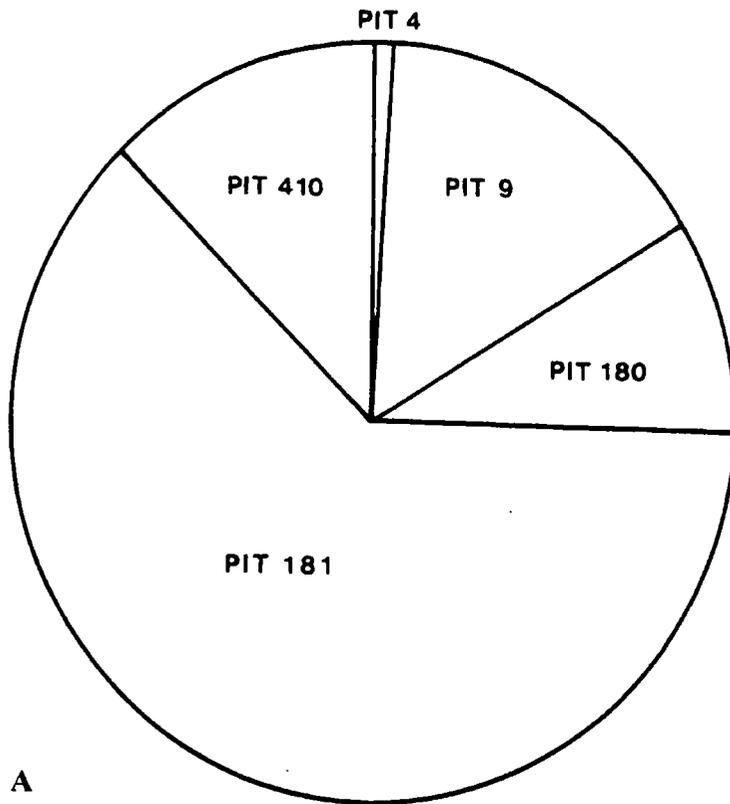
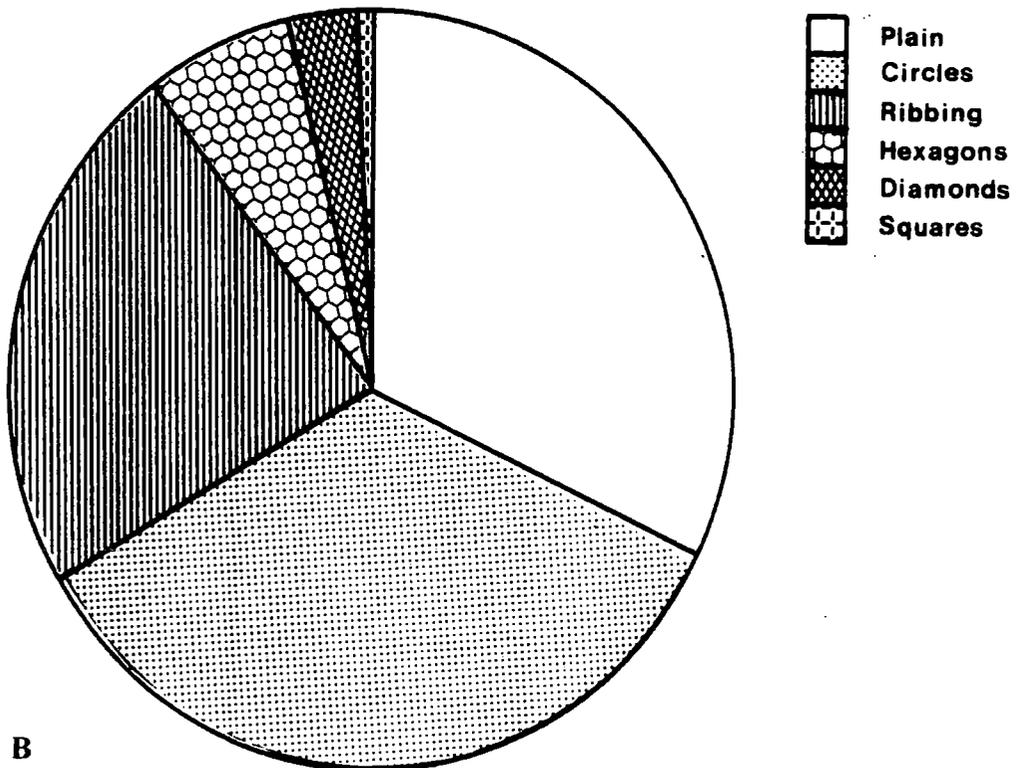


TABLE 3: Relative proportion of truncated-conical plain and mould-blown beakers from the Palazzo Vitelleschi, Tarquinia: A. according to pit; B. according to decoration



A



B

distortion increases with the rim diameter and may be seen especially in squat beakers with flaring walls. It is the change in appearance of the circular bosses or hexagons etc from rim to base that makes the reconstruction of individual beakers difficult. This is not only due to the large number present but also because fragments from the same piece can occur in several different contexts within a pit. Indeed, joining fragments from one beaker with rounded square or rectangular bosses were recognized from pits 9 and 181 (no. 141; Figs 31.141 and 33b; Appendix B, no. 65).

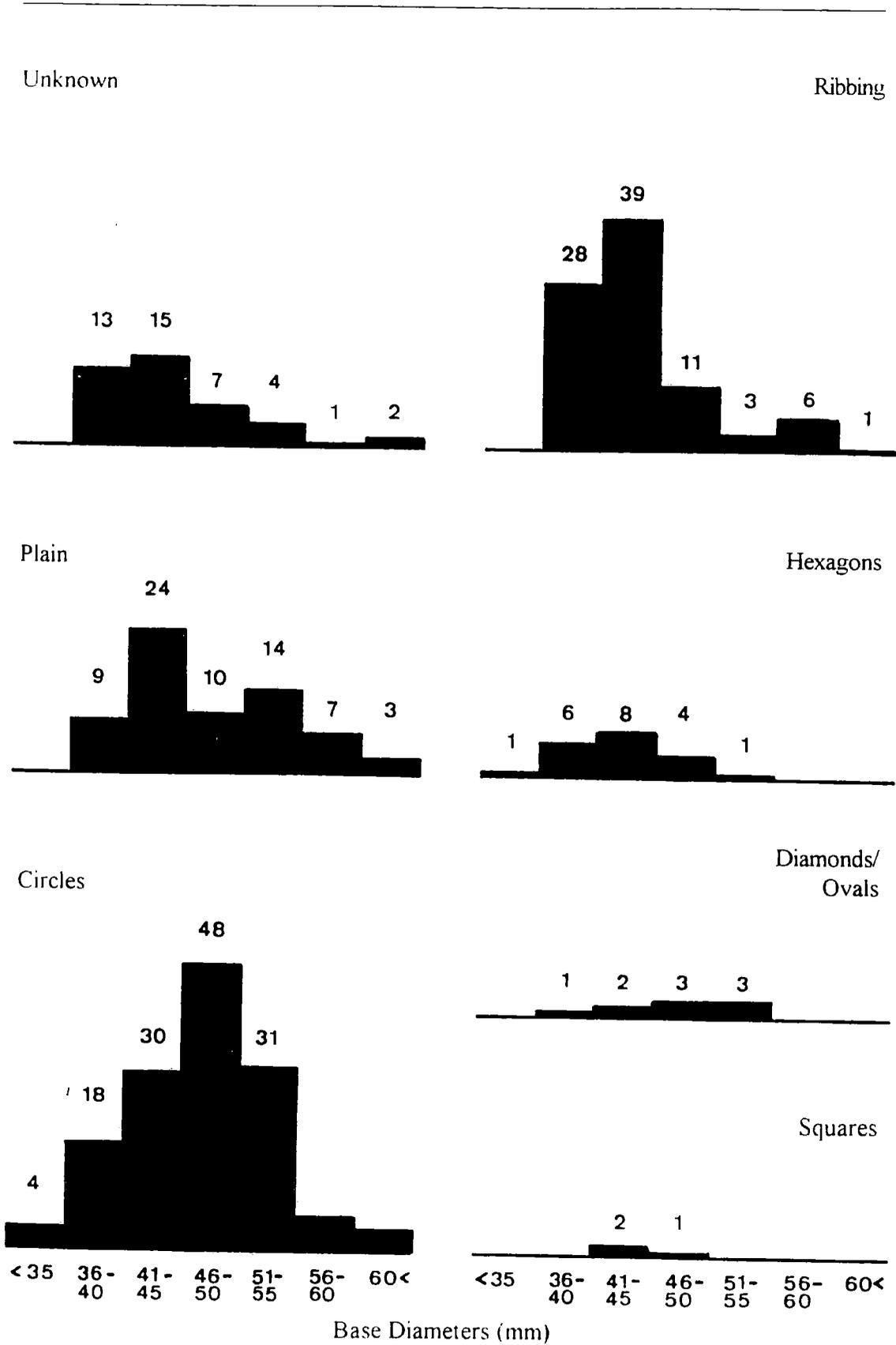
Table 4 (on p. 61) shows the four major types of truncated-conical beaker: plain and those decorated with circular bosses, vertical ribbing and hexagons grouped according to the colour of the glass metal and their base diameter. Beakers with diamonds or squares were not included because their numbers are so small (cf. Table 3 on p. 59 for their relative proportions) and nor those of unknown decoration or diameter. The two most common colours are yellowish at 25.3 per cent and yellowish-green at 26.9 per cent, closely followed by yellowish-brown or sepia at 21.2 per cent and greenish at 19.3 per cent. The most striking feature is the small percentage (7.3%) of beakers made in bluish-green glass. There is no discernible pattern between the colours and the base diameters.

In Table 5 (p. 62) all truncated-conical beaker bases with known diameters have been arranged in 5 mm groups according to their type of decoration. It also includes those beaker bases for which it has been impossible to determine if the original beaker was decorated (i.e. 'unknown'). Table 5 shows that three-quarters of the ribbed bases have diameters ranging between 36-45 mm and especially between 41-5 mm. This size distribution is also mirrored by beakers decorated with hexagons and beakers of 'unknown' decoration where two-thirds (twenty-eight bases) range in diameter between 36-45 mm. Beakers decorated with circular bosses have larger diameters: three-quarters have diameters between 41-55 mm, peaking with forty-eight examples (34%) with diameters between 46-50 mm. This raises the possibility that beakers with vertical ribbing were blown into moulds decorated all over with ribs, while those with circular bosses were only decorated on the sides. This would leave an undecorated area on the bottom of the latter's parison, which, depending on how much they were further inflated and tooled, might result in part of the pattern continuing on the underside of the finished beaker. Therefore, it is possible that some of those beaker bases of 'unknown' decoration come from smaller beakers decorated with circular bosses (cf. Fig. 26.99-100 and 105).

TABLE 4: Relationship between the colour and the base diameter of the four main groups of truncated-conical beaker from the Palazzo Vitelleschi, Tarquinia

Dimensions (mm)	< 35	36 -40	41 -45	46 -50	51 -55	56 -60	60 +	Total
PLAIN BEAKERS								
Yellowish glass	-	5	10	5	3	3	1	27
Yellowish-brown/sepia glass	-	-	1	1	-	-	1	3
Yellowish-green glass	-	-	5	2	6	4	1	18
Greenish glass	-	2	2	1	5	-	-	10
Bluish-green glass	-	2	6	1	-	-	-	9
Total	0	9	24	10	14	7	3	67
CIRCLES								
Yellowish glass	-	2	7	8	9	1	1	28
Yellowish-brown/sepia glass	2	4	10	18	8	1	-	43
Yellowish-green glass	3	7	7	13	12	2	-	44
Greenish glass	-	4	5	5	-	2	1	17
Bluish-green glass	-	1	1	4	2	-	1	9
Total	5	18	30	48	31	6	3	141
RIBBING								
Yellowish glass	-	7	12	2	-	1	-	22
Yellowish-brown/sepia glass	-	2	9	4	-	-	-	15
Yellowish-green glass	-	9	10	-	1	2	-	22
Greenish glass	-	9	6	5	2	3	1	26
Bluish-green glass	-	1	2	-	-	-	-	3
Total	0	28	39	11	3	6	1	88
HEXAGONS								
Yellowish glass	-	-	2	1	-	-	-	3
Yellowish-brown/sepia glass	-	5	-	-	1	-	-	6
Yellowish-green glass	1	-	-	-	-	-	-	1
Greenish glass	-	-	6	2	-	-	-	8
Bluish-green glass	-	1	-	1	-	-	-	2
Total	1	6	8	4	1	0	0	20
TOTAL	6	61	101	73	49	19	7	316

TABLE 5: Number of truncated-conical beakers sorted according to base diameter (mm) and decoration, including unknown, from the Palazzo Vitelleschi, Tarquinia



The possibility that the same mould was used to form different shaped beakers may be seen in the similarity of the number of tiers of raised bosses on the three forms of beakers. In beakers with vertical ribbing where it has been possible to count the number of ribs present, almost all have thirty-two ribs. This is the case for whatever form of beaker suggesting that the same mould was used and that the final form was achieved by subsequently inflation and tooling. This use of the same mould may be seen in later Venetian Renaissance glass where a number of small bowls, footed salvers and goblets were formed from moulds with forty ribs (cf. Baumgartner 1995, 90-3, nos 170, 172 and 173 for a further discussion).

Discussion

Stiaffini in her discussion of medieval Italian glass identified four main types of beaker present during the 14th century: plain truncated-conical beakers (form H3a), a few examples of the latter on which the rim is decorated by a thin blue spiral trail (form H3b), pruned beakers (form H3c), and beakers with mould-blown geometric designs (form H3d; Stiaffini 1991, 229-34). However, she did not recognise a connection between forms H3a and H3d, both of which occur together in contemporary deposits from many sites in Italy, including the Palazzo Vitelleschi. They were probably made in the same glass-houses.

The excavations of a mid-14th to 15th-century glass-house at Germagnana, near Gambassi, produced 1350 fragments of glass and demonstrates the early production of mould-blown glass in central Italy (Mendera 1989, 73-8). Of these fragments, 71.5 per cent belong to mould-blown truncated-conical beakers with thin walls, never more than 1 mm thick, while the thickness of the undecorated part of the wall is generally less than 0.5 mm. The sample was not large enough to allow for the full reconstruction of forms and only the following general observations could be noted, which have similarities with those outlined above for the finds from the Palazzo Vitelleschi. Rims are always smooth with diameters varying between 70-80 mm while the mould-blown decoration starts generally between 15-20 mm below the rim. The pushed-in bases with conical kicks and traces of the pontil have diameters of *circa* 50 mm, however, the decoration does not always continue to the underside of the base. From these fragments, five types of decoration were identified but in different proportions to those found at the Palazzo Vitelleschi (cf. Table 3 on p. 59): 45 per cent with lozenges or diamonds, 4 per cent with

circular bosses, 1.5 per cent with vertical fluting or ribbing, 0.85 per cent with spirals and 0.15 per cent with zigzags. The remaining 48.5 per cent were undecorated or with no trace of decoration. It is also worth noting at this point that only two wall fragments decorated with applied prunts were found at Germagnana, leading the excavator to suggest that these came from older broken vessels to be reused as cullet rather than representing another type of beaker produced on the site (Mendera 1989, 74).

At Corinth 120 beaker bases with conical kicks from shallow, straight-walled truncated-conical beakers, made in thin glass, usually with bluish or greenish tinge were found (Davidson Weinberg 1940, 311, fig. 13). The base diameters of these beakers range from 40-75 mm while the walls are decorated with the following motifs: circular bosses, ellipses, diamonds, herring-bones and ribbing.

Truncated-conical beakers, both plain and those with mould-blown decoration have been found on many sites, both domestic and ecclesiastic, throughout Italy, although in small numbers and often too fragmentary to allow for the reconstruction of the whole form. 14th- and 15th-century Italian sites where mould-blown beakers have been found include: Bologna (Sogliana 1987, 46, fig. 5.17); Cividale del Friuli (Gasparetto 1975, 148-9, pl. 7.23); Ferrara (*Il Museo Civico in Ferrara* 216, 217); Finale Emilia (Curina 1987, 61-4, no. 9, pl. 16.9); Florence (Buerger 1975, 202, nos 43-4); Genoa (Andrews 1977, 174-5, nos 45, 51, 71, pl. 33.47,51,74); Grosseto (Gottlieb 1980, 32, nos 32, 34); Murano (Gasparetto 1977, 92, fig. 65); Palermo (Falsone 1976, 122, fig. 30); Pisa (Stiaffini 1987, 336-7, no. 34); Pistoia (Vannini 1987a, 619-42 *passim*); Porciano (*idem* 1987b, 80); Prato (Francovich *et al.* 1978, 140, nos 427, 430, 432-3); Rimini (Gelichi 1986, pl. 24.1-4,8); Ripafratta (Stiaffini 1990, 162, no. 109); Rocca San Silvestro (Mendera 1989, 75) and Tuscania (Lamarque 1973, 117, 118, fig. 32.1,1,4,6). The designs on the examples from the Crypta Balbi, Rome, start *circa* 12 mm below the rim and also comprise circular bosses, hexagons, diamonds, vertical ribbing and squares (Cini 1985, 539-40, nos 922-5, 927-8, pl. 86.922-5, 927-8 and Mendera and Cini 1990, 449, 503-4, nos 560-9)

The high concentration of beakers in Tuscany has persuaded Mendera (1989, 74-5) to believe that medieval mould-blown beakers originated from this region (Mendera 1989, 74-5; see also above, p. 30). This is further borne out by references to beakers called '*fiorentini*', '*lucchesi*', '*pisani*', '*pistoiese*' and '*gambassini*' in 14th- and 15th-century Muranese documents (Zecchin 1973, 121-2 and *idem* 1979, 221). These documents, according to Zecchin, show that Tuscan glass artisans were working in Murano and that

their products were being named after their home towns. Indeed, I believe that the region around Gambassi is the most likely source for the beakers found at Tarquinia, especially considering the distribution of glass-workers from this region compiled by Mendera (1990, 305, fig. 1 and 1995a, 32, fig. 24) and reproduced here in Fig. 6b. From the archival work of Abulafia it is known that Tarquinia had mercantile contacts in Tuscany and Genoa as well as with southern Mediterranean ports like Naples (Abulafia 1974) and although glass is not specifically mentioned in these legal contracts it could easily have been included on board ships.

Two basic forms of beakers may be identified from the iconographical record, the first with gently flaring walls is probably a combination of types B and C, while the squat, truncated-conical beakers of type A are also recognisable, as in Giotto's 'Death of the Knight of Celano' in the Basilica of St Francis in Assisi. In these depictions the straight flaring walls and high kicks are clearly delineated (cf. Plates 11a, 18, 24-5 and 39), although decoration is seldom shown, presumably for artistic reasons, especially for frescoes painted when designs and details were simplified. These plain, undecorated truncated-conical beakers are most commonly depicted in Italian pictures and miniatures accompanied by footed glass flasks with long neck and/or maiolica jugs (cf. Plates 7-9).

In Whitehouse's short survey of late medieval glass in Italy he listed five depictions of pruned forms (Whitehouse 1981, 167-8 and 173) and illustrated one that included several beakers with straight walls, plain rims and clearly delineated basal kicks from a fresco of 'The Wedding at Cana' in the Collegiata, San Gimignano, painted by Barna di Siena between 1350-1365 (Plate 6a). This detail shows five identical beakers displaying two types of decoration: staggered horizontal rows of circles on four beakers and vertical ribs on the remaining one. Rather than representing pruned beakers, they are more probably mould-blown vessels with circular bosses or vertical ribbing. If correct, then this would be the earliest depiction of mould-blown beakers. Other beakers with circular bosses as well as an example with diamonds are included in Giusto de' Menabuoi's fresco of 'The Wedding at Cana' in the Baptistery of Padua Cathedral, painted in 1378 (Plate 6b for a detail of the examples with circular bosses only and cf. Ciappi 1991, fig. 20 for the beaker with diamonds). This picture was also included in Whitehouse's list of pictures of pruned beakers (Whitehouse 1981, 173), but at this stage neither the presence, let alone the range, of mould-blown beakers among late medieval Italian glass assemblages had been recognized.

CONCLUSION

Differences Between Applied and Mould-Blown Beakers

When comparing the two main types of beaker discussed in this chapter, the pruned beakers and the truncated-conical beakers with or without mould-blown decoration, it is possible to see a number of developments in the consumption of glass at the Palazzo Vitelleschi and by implication in the rest of central Italy during the 14th century. With the pruned beakers there is a well-defined series of sizes of different capacities, presumably for the consumption of different drinks: liqueurs in the smallest beakers with 'toed' bases (possibly produced within the household - see below p. 116) red or white wine in the medium-sized vessels and beer in the largest. For a short discussion on the practice of adding water to wine cf. below p. 84). This wide range of sizes is absent among the plain or mould-blown truncated-conical beakers. Is this, therefore, a possible indication of a change in drinking habits? The capacities of the plain or mould-blown beakers correspond closely with that of the three-tiers pruned beakers with solid base-rings (Fig. 8.6) and the medium-sized conical pruned beakers from Tarquinia (Fig. 14.34) and with the four-tiers pruned beakers with solid base-rings from Farfa (Fig. 8.17). Together with the evidence from the iconographical record it would seem safe to identify these vessels with the consumption of wine.

The second, major difference between the two groups is the weight of each type: mould-blown truncated-conical beakers are considerably lighter than pruned beakers, not because the type of glass used in their manufacture changed radically, but that more glass was needed for beakers with applied decoration. Not only are the walls of the plain or mould-blown beakers considerably thinner, by at least 200-300 per cent, but they have simple pushed-in bases without the addition of applied solid base-ring whether left smooth or manipulated into a series of 'toes'. The pruned beakers are also decorated with thick blobs of glass that would also add considerable weight and stability to the piece. The pruned, ribbed and trailed beakers also required more time to make as well as greater skill and these factors would have made them more expensive to produce. Goblets, made from at least three separate paraisons, would have been the most complicated to make and consequently, the most expensive. Mould-blown beakers on the other hand appear to have been mass-produced in a semi-industrial process that would have required less skill and less time to produce. Consequently they would have been much cheaper and thereby are likely to have been available in much larger quantities to a much wider market.

There is, however, one feature common to all the decorated beakers - they have decoration in relief which probably had a practical function is preventing the glass slipping through greasy fingers. The majority (68.5%) of the bases from truncated-conical beakers from the Palazzo Vitelleschi have decoration in relief and this percentage may in fact be greater as the decoration does not always continue to the underside of the base (see above p. 57).

The 14th century in central Italy, as so clearly demonstrated at the Palazzo Vitelleschi, saw a huge shift away from the use of pruned beakers and beakers with applied decoration with the introduction of new, mould-blown vessels around the middle of the century. This was not an over night change. At Farfa, for example, there are several beakers with mould-blown vertical ribbing combined with applied 'toed' base-rings (nos 66-7; Fig. 18.66-7). Pruned and truncated-conical beakers were probably used at the same time at the Palazzo Vitelleschi, although one cannot tell whether they were used together on the same table or whether the older pruned beakers were demoted to other parts of the household. However, by the time of the disposal of the proto-palace's contents in the last two decades of the 14th century, truncated-conical beakers, and especially those with mould-blown decoration, were predominant.

Documentary Evidence

The large production of cheap, multiple copies of beakers, presumably mould-blown, is well-known from documents, such as the glass-makers' inventories and bills, discussed in the previous chapter (pp. 34-6). However, until the excavations at the Palazzo Vitelleschi there was no physical evidence for such large assemblages dating to before the 15th century. A study of the early 15th-century accounts of the monastery of Monte Oliveto has shown that beakers were ordered frequently and in large quantities (Piccini 1991). No purchase made included less than 100 beakers with 2935 beakers bought in the twenty-year period between 1409 and 1429 (*ibid.* n. 72), although only thirty-seven monks were documented as living in the monastery at this time. An inventory of a Veronese glass-house of Ottaviano del fu Venturino in 1409 lists a total of 43,654 glasses of which 38,000 (87%) are beakers, including 18,500 *mioli gambasini* that were also the cheapest at 15 soldi per *centinaio* (Appendix E; Nepoti 1991, 133-4). 100,000 beakers together with a large number of jugs and flasks are listed in the inventory of a Florentine glass-maker (Vannini 1981, 46, n. 39 and Mendera 1990, 304). This large-scale consumption

and production can also be seen in the late 15th-century finds from the Palazzo Altemps, Rome (pers. comm. Stefano Coccia).

Iconographical Evidence

Depictions which contain beakers are mostly of dining scenes, especially two New Testament scenes from the Life of Christ: the 'Wedding at Cana' and 'The Last Supper'. These scenes show that each guest had their own beaker and knife with central glass flasks and/or maiolica jugs from which they would be served red wine and white wine or water. Beer does not appear to be depicted, but this is not unexpected as the central theme to both scenes is the transformation of water into wine.

These scenes all show the meal in progress but when the table is shown before the meal has started, the beakers are depicted turned upside down. This was presumably a means of keeping them clean from soot and dust particles in the air, in a manner still practised in some country restaurants in France and Italy. This practice can be seen in a mid-13th century manuscript in the Vatican where Christ is waited on by Martha, a beaker of red wine already poured from a flask on the table, while Mary crouched beside his feet has not yet filled her upturned cup (Plate 10). This custom continued into the 14th and 15th centuries as attested to in two frescoes. The first, is of the same scene as the Vatican manuscript, and was painted by Giovanni da Milano in the Rinuccini Chapel in the Church of S. Croce, Florence, in around 1365 (Plate 11a). This fresco shows four up-turned truncated-conical beakers, their conical kicks clearly delineated, set immediately behind four wooden trenches or loaves of bread, on a table covered with a white table-cloth with patterned borders. The second fresco, 'The History of St Peter', painted a century later by Simoni Lamberti, shows a trestle table in the background, on which have been set empty ribbed footed flasks, each beside a pair of up-turned truncated-conical beakers with two settings of two bread rolls in front (Plate 11b).

When beakers are depicted in other rooms of the house, such as the bedroom or study, they are often shown placed upside down over the mouth of a flask (cf. Plates 20-1). This would have served two functions to keep flies, dust etc out of the flask while also keeping the beaker clean, and will be discussed in more detail in the chapter on flasks, see below p. 76. Where a beaker is shown full, then it may be covered by a simple piece of cloth as in a fresco of 'The Resurrection of the Rabbi's Daughter' in the Abbey Church of Pomposa (Plate 14).

A fresco by Domenico Ghirlandaio in San Martino dei Buoniuomini, Florence, shows five beakers of probable truncated-conical form standing in a low ceramic basin, which may have been filled with water to keep them cool (Plate 15b). A similar basin or *rinfrescatoio* made in late archaic maiolica was photographed together with a mould-blown truncated-conical beaker with circular bosses, both of which were found in the Palazzo dei Vescovi, Pistoia, to recreate the scene in Ghirlandaio's fresco (Plate 15a; Vannini 1985, pl. 10.1).

This glimpse of 14th-century household waste from the Palazzo Vitelleschi prompts some important observations. Firstly, this extremely wealthy household was not recycling glass, either because this was not a financial necessity or because there was no system within the city for doing so. The latter possibility could further indicate the lack of a local glass-house during this period. Secondly, it provides evidence for a revolution in the consumption of glass in medieval central Italy that occurred with the introduction of the mass-produced and consequently less expensive mould-blown vessels in the mid-14th century. From the finds from Farfa and Tarquinia it is possible to trace the development of beakers throughout the 14th century. The more simple pruned forms from Farfa from the end of the 13th to the beginning of the 14th century, followed by the wider range and possible services from the Palazzo Vitelleschi, Tarquinia from the first half of the 14th century, which were replaced by the end of the century with plain or mould-blown truncated-conical beakers.

4: FINEWARES: BOTTLES

INTRODUCTION

Bottles can be used for serving and/or storage and this chapter will concentrate on those used primarily for the former. No attempt shall be made to distinguish between the terms 'bottle', 'flask' or 'carafe' as all can describe tablewares used for holding and serving wine and other portable liquids. Bottles with special uses such as cruets and toilet bottles will each be discussed separately in Chapter 5 (pp. 82-3, 85-7 and 96). The fragments that will be discussed here come mostly from the mouths, necks or bases of bottles, i.e. from the thicker and more durable parts of the vessel. The thinner body walls either have not survived or remain among other undiagnostic body sherds.

At the Palazzo Vitelleschi, Tarquinia, there are fragments from at least two dozen bottles of several different forms that might be described as 'finewares' (nos 147-202; Figs 35-46), including three hypothetical reconstructions (Figs 44 and 46). They belong to a variety of forms characteristic of the later 13th to early 15th century, but the various elements (mouths, necks, bases etc.) were not necessarily used in the same combinations as found elsewhere in Italy. The number of fragments from the abbey of Farfa identified as possibly coming from fineware bottles is considerably smaller than those from Tarquinia. They include a bottle mouth decorated with an applied blue spiral trail (no. 158) and neck fragments from a *Kuttrolf* (no. 188; Fig. 45.188), a form not found at Tarquinia. There are no bottles preserved in the Museo Sacro of the Vatican.

As with the beakers discussed in the previous chapter, flasks from the later 13th and early 14th century were free-blown and sometimes embellished with applied decorative trailing. Mould-blown examples with either vertical or spiral ribbing were introduced in the mid-14th century. The bottles discussed in this chapter, therefore, have tentatively been divided into two groups: free-blown and mould-blown and then further sub-divided according to form, decoration or other diagnostic features although each of these elements might have occurred in several different combinations. All these bottles tend to have cylindrical necks with either flaring mouths or upright rims. Some examples have neck swellings and/or decorative applied trailing left in relief. Below rounded or angular shoulders the bulbous, squat bodies sometimes had internal hollow-tubular rings around their maximum diameter. Other bottle bodies were decorated with pincer or mould-blown vertical ribbing.

FREE-BLOWN BOTTLES

Bottles with Neck Bulges or Swellings

Bottles with neck bulges have been found on most medieval Italian excavations, although not necessarily as pronounced as on the four examples from the Palazzo Vitelleschi, Tarquinia (nos 147-50; Figs 35 and 36). The first three fragments have rounded rims on either vertical (cf. no. 147 with a diameter of 36 mm) or gently flaring mouths as on nos 148-9 with diameters ranging from 43-8 mm. Then, *circa* 50-60 mm below the rims are horizontal bulges or 'neck swellings' 35-40 mm in diameter tooled out of the long cylindrical necks that splay gently outwards towards the rounded shoulders. These examples are very closely-related and probably represent the products of the same glass workshop.

The first example is also decorated at the bottom of the neck with an applied and pincerd self-coloured coil sandwiched between two horizontal blue trails (no. 147; Fig. 36a). There are a further two cylindrical neck fragments with the same decorative combination (nos 151-2; fig. 37.151) as well as several smaller fragments with either the applied and pincerd colourless trail (no. 165) or with a single blue trail (nos 153-7). It is also possible that the jug with a neck bulge, blue rim trail and handle with blue looped trailing discussed in the following chapter (no. 203; Figs 48.203 and 49) could have come from the same service (cf. Fig. 49b where the two fragments have been photographed together).

This decorative band of blue and colourless manipulated trailing has also been found on the neck fragments of two bottles and a small phial at the ruined Castello di Zuccola, Apulia (Testori 1992, 275, fig. 9.14-16). It has also been found on two flasks from Nuremberg, dated to the late 13th or early 14th century (Baumgartner and Krüger 1988, 276-7, nos 308-9) where the rest of the vessel resembles the more typical flask with flaring mouth and vertically-ribbed body discussed below (p. 77). They also have a small angular neck swelling. Indeed, this smaller angular neck swelling in the upper neck is a typical feature of Italian medieval glass and has been found at Genoa associated with a hollow-tubular pushed-in base (Andrews 1977, 168, nos 1 and 8, fig. 31.1 and 8) and at the glasshouses of Monte Lecco (Fossati and Mannoni 1975, 57, no. 2) and Corinth (Davidson-Weinberg 1940, 321, fig. 22.63; *ibid.* 1952, 119, no. 780). The last two examples have reconstructed heights of 250 and 190 mm respectively. A bottle with a double bulge was found during the excavations of the cloister in the abbey of S. Francesco d'Assisi, Palermo (d'Angelo 1976, 383, fig. 8).

Bottles with Applied Decoration

Some of the bottles in the above section from the Palazzo Vitelleschi have applied decoration comprising an applied and pincerd self-coloured trail sandwiched between blue horizontal trails (no. 147; Figs 35.147 and 36a). Blue trailing also occurs on a neck fragment where a deep translucent blue spiral trail was wound at least three times around the lower neck (no. 159; Figs 37.159 and 38b). It is unclear, however, whether this example had a ribbed body like a bottle from San Lorenzo di Ammiana (Pause 1996, fig. 7.3) or a flask from Corinth that also has a hollow-tubular internal tube and hollow-tubular base-ring (Davidson-Weinberg 1952, no. 781). Blue spiral trailing also occurs on a smaller neck fragment (no. 160) while a deep translucent blue zigzag trail may be found on a small slender neck fragment (no. 161). There is also a single fragment from Farfa Abbey from the flaring mouth of a small flask decorated from the rim (diameter 30 mm) with a close-set blue spiral trail (no. 158; Fig. 37.158). It is similar to a collection of fourteen bottle mouths with blue spiral trailing from Regensburg, dated to the second or third quarter of the 14th century (Baumgartner and Krüger 1988, 277-8, no. 311).

Applied spiral trailing in the same metal as the rest of the vessel was employed on four further bottles from the Palazzo Vitelleschi, three times on the neck and once on the upper body (nos 162-4 and 166; Figs 37.162 and 164, 38a, 39a and 40.166). The first (no. 162, Figs 37.162 and 38a) comes from a long slender cylindrical neck with a gently flaring mouth and decorated with a trail wound five times anti-clockwise around the lower part. This fragment is covered with black, enamel-like weathering, that has not been recorded on other glass sherds from the site suggesting that this bottle was made in a different type of glass, possible in a different glass-house. There are also two adjoining fragments from the lower part of a tall flaring neck with a trail wound around clockwise four times (no. 164; Figs 37.164 and 39a).

There is also an unusual fragment from the pushed-in bottom of a small bottle made in transparent deep cobalt-blue seeded glass that has been decorated with an applied and marvered opaque white spiral trail (no. 187; Figs 38c and 45.187; Whitehouse 1987, 325, no. 22, fig. 4.22). This combination of dark blue glass with opaque white decoration has not been recorded elsewhere in central or southern Italy but fragments of blue rims with white trailing have been found at the glass-making site of Monte Lecco, near Genoa (Fossati and Mannoni 1975, 62, nos 46 and 72).

Bottles with Pincered Ribbed Bodies

There are fragments from at least three bottles made in transparent pale green glass where the comparatively narrower, globular bodies are decorated on the shoulders with short vertical ribs pincered out of the body wall (nos 167-9; Figs 39b and 40.167-9). These ribs appear on the body only and do not continue beyond the shoulders. It has not been possible to identify neck or base fragments, although one can probably assume that they had cylindrical necks.

Kuttrolf

Among the fragments of flasks from Farfa there are four which would appear to come from the neck of a *Kuttrolf* (no. 188; Fig. 45.188). Blown in light green glass, presumably originally with a bulbous body and pushed-in base, this example had at least three slightly twisted tubes tooled out of the neck. *Kuttrolfs* often had a cup-shaped mouth that made it possible to drink from these multi-necked bottles. It remains unclear whether this type of bottle was simply a novelty although the tubes have one practical aspect in that a liquid, presumably wine, could be poured from the bottle without glugging because one of the tubes could admit air (Ruempol and van Dongen 1991, 88). Yet the name has been said to derive from the German *Kuttering* (gurgling) or from the Latin *gutta* (drop) or *gutturium* (a slow-pouring dropper for perfume; Newman 1977, 176, v. *Kuttrolf*). This type of flask is very unusual in Italy and I have not been able to find another example from a 14th-century context or depiction, so this piece could represent an import from north of the Alps. Farfa's connection with the Holy Roman Empire and the fact that many of her abbots were of Germanic origin makes this very probable.

Bottles with Internal Rings

There are three examples of hollow tubular horizontal rings tooled out from the middle of thin-walled bottles from the Palazzo Vitelleschi (nos 173-5; Figs 41 and 42a). Made in pale green glass, the largest and only complete ring (no. 174) has a diameter of 150 mm (Whitehouse 1987, 329, no. 39, fig. 5.39), while the other two (nos 173 and 175) have diameters of 140 and 150mm respectively. Although very little of the vessel wall survives on these fragments, their dimensions and quality of glass indicate that they might belong to the group of bottles with neck bulges (nos 147-50; Figs 35 and 36) that could also have had hollow-tubular base-rings (nos 176-85; Figs 42b and 43).

Similar hollow-tubular rings or tubes may be found on 7th-century Lombardic bottles (cf. Gasparetto 1979, fig. 2 for an example from Cividale del Friuli) and from medieval excavations elsewhere in Italy: at the Castello di Zuccola, Castello di Salerno, San Lorenzo di Ammiana and the convent of San Silvestro, Genoa (Testori 1992, 275, fig. 9; Marino 1992, no. 7, fig. 27.7; Pause 1996, fig. 9.15 and Andrews 1977, 186, no. 160, fig. 37.160 respectively). Further fragments dating to before the middle of the 14th century were found during excavations at Frohburg, Canton Solothurn, in contexts that also produced fragments from pruned beakers (Baumgartner 1985, 162, no. 12, fig. 3.12). There is also an example from the Agora South Centre glass workshop at Corinth that comes from a reconstructed bulbous bottle with a flaring mouth, cylindrical neck with an applied blue spiral trail and bottom pushed-in to form a hollow-tubular base-ring (Davidson-Weinberg 1952, no. 781). The position of the blue spiral trailing on the bottle from Corinth is also paralleled by a fragment from Tarquinia with a self-coloured trail (no. 162; Figs 37.162 and 38a). These 'tubes' are also found on later bi-conical bottles from northern Europe that date from the 15th to 17th centuries (Baumgartner and Krüger 1988, 317-18, nos 374-7).

The vessel wall out of which these 'tubes' are formed is very thin indeed - less than 1mm thick. It would appear logical, therefore, to suggest that these 'tubes' or rings were employed by glass-workers to strengthen the vessel around its widest and weakest point thus preventing them from breaking when full and heavy. I do not feel that these were used for purely decorative purposes, although they mirror the horizontal join at shoulder level between the two halves of contemporary closed metal vessels. A 14th-century mosaic in the archway above the door to the Baptistery of San Marco, Venice (Plate 16), shows three bottles with a horizontal band around the centre of their bulbous bodies, but it is unclear whether they were made of glass or metal.

Hollow-Tubular Base-Rings

Hollow-tubular base-rings are the only type of base discussed in this section on free-blown bottles that were formed in the same way as those from undecorated beakers discussed above (p. 52). There are a large number of base fragments from pushed-in and rounded bottoms from both Farfa and Tarquinia. As the former are generally of cruder manufacture and the latter would have been incapable of standing without external support, they have been discussed under utilitarian wares (see below p. 113).

There are fragments from ten individual hollow-tubular bases from the Palazzo Vitelleschi (nos 176-85; Figs 42b and 43) with diameters ranging from 70-110 mm. They are all made from the same transparent yellowish or greenish glass and come from the same contexts of pit 181 (especially 236/7, 242 and 243) as the hollow-tubular strengthening rings and bottle necks with bulges discussed above. An eleventh example comes from a flask with vertical ribbing on the body (no. 192; Figs 46.192 and 47b).

Two of these bases (nos 184-5; Fig. 43.184-5), however, have smaller and more delicate rings, but larger diameters of 110 mm. The low angle of the vessel wall extending above these bases suggests that they might come from bowls or dishes rather than from bottles. A similar fragment with a diameter of 115 mm was found at the Castello di Zuccola, Apulia (Testori 1992, 275, fig. 9.11), for which it is impossible to determine whether it comes from a bottle or a bowl.

Discussion

Figure 44 shows a tentative reconstruction of a flask using a combination of four elements: no. 147 the long cylindrical neck with a neck bulge and decorative blue and self-coloured trailing on the lower part, the rounded shoulder and upper body of no. 170 that follows the curves of no. 147; the largest of the internal hollow-tubular rings (no. 174) and a hollow-tubular base-ring (no. 179). This flask would have had a capacity of 1.7 litres up to the level of the neck bulge.

It has been suggested that these neck bulges could mark a legal measure (Fossati and Mannoni 1975, 58-9 and Andrews 1977, 168). But how this level could have been determined in a still semi-molten vessel is unclear, especially as the examples from Tarquinia show variations in capacities (cf. p. 79). Surely if an exact measure was to be indicated, a line engraved or scratched around the neck when the vessel was cold would serve that purpose better. Glass was used for weights (cf. Plate 40) and measures of capacity according to the *Capitolare dei Fioleri* of 1296, because it could not be tampered with at a later date and, because of its transparency, the level of the liquid inside was visible (Minini 1998, 211). Contemporary Venetian documents record that blue trails *circulo laçuro supremo* were applied to act as measures to the necks of flasks (Fossati and Mannoni 1975, 65 and Gasparetto 1986, 104) while the same *metodo veneziano* was used at Parma in the late 13th century where statutes prescribed that a *quartina* had to have a *circulum de vitro endigo* or a blue trail (Galimberti *et al.* 1995, 194, n. 13).

The neck swellings and the applied trailing could also have served another function. During the Middle Ages, before the introduction of the fork, diners would have had greasy fingers so that handling glass, whether beakers or bottles, would have been difficult. Could these features, therefore, have afforded a means of preventing the bottle from slipping through greasy fingers? On the other hand, they may also be seen as the forerunners of the post-medieval 'string-rim', i.e. a means of securing a cover over the bottle rims. A piece of cloth, possibly waxed, could have been held securely in place with a piece of string tied immediately below the bulge, as may still be seen on some 17th-century pharmaceutical *albarelli* in the Hospital of S. Fina, San Gimignano (Morozzi 1981, figs 7-8). Depictions also show that flasks, when being used in private chambers, were sometimes covered by an upturned beaker as in Domenico Ghirlandaio's fresco of 'St Gregory Announcing her Death to S. Fina' in the Chapel of S. Fina, San Gimignano (Plate 20 and cf. Plate 21 for two other examples). None of the bottles shown in these depictions, however, have neck bulges.

Corks were not used at this period to close the mouths of bottles, but bottles could have been plugged with a variety of other materials. Two bottles with plugs made from a paste of resin and wax were discovered in a small brick niche under the right pillar of the façade of the Church of S. Sigismund, near Cremona (Mariacher 1964). These two bottles, typical of Venetian 15th-century production, appear to contain wine or oil (although the contents have not been analysed). According to records, Duchess Bianca Maria Visconti, began building the present day church twenty years after she had married Francesco Sforza, Duke of Milan, in a chapel on the site. Three bottles containing water, wine and oil were placed in the foundations on 23 June, 1463. The two surviving bottles stand c. 270 mm high, excluding the stopper, with a maximum diameter of 115 mm and a separate pedestal base of 90 mm diameter.

A bottle with a single swelling is depicted in a fresco of 'The Last Supper' (c. 1360-70) by Jaime Sena in a Palermo church (now in the Galleria Nazionale della Sicilia, Palermo; d'Angelo 1976, 383, fig. 7). Other medieval depictions of bottles show this neck bulge very clearly and that these flasks stood on base-rings, possibly hollow-tubular base-rings like the examples from the Palazzo Vitelleschi, Tarquinia (nos 176-85). These depictions occur as early as the mid-13th century, as in a scene of 'Christ at the House of Martha and Mary' from a Veronese manuscript of the New Testament, now in the Vatican Library (Plate 10). Two frescos by Giusto de'Menabuoi (1376-1378) in the Baptistery of

Padua Cathedral (Plates 18-19) each show a flask with a flaring mouth, a neck bulge in the upper third of a long neck, over a wide, squat body, on a base with a kick protruding into the bottom of the bottle. These bottles with low squat bodies would have been very stable with a low centre of gravity, as would the flask with a pear-shaped body on a similar base shown in a scene of 'Gluttony' from Taddeo di Bartolo's fresco of 'Hell' in the Cathedral of San Gimignano (Plate 24b).

MOULD-BLOWN BOTTLES

The mould-blown bottles that shall be described briefly in this section fall into three groups. The first are formed from fragments (nos 189-91, 193-6 and 200-2) belonging to a minimum number of five flasks epitomized by the reconstructible example in Fig. 46.189 (Whitehouse 1987, 330, no. 41, fig. 6.41 and Baumgartner and Krüger 1988, 48, fig. 46). This shows a long-neck bottle with a flaring mouth, bulbous spherical body and a pushed-in base with a conical kick and pontil mark underneath (cf. also Fig. 47a for the two largest fragments). It was decorated with sixteen or eighteen vertical ribs that continue on the underside of the base (no. 201) and extend up to 12 mm below the rim. This bottle stands *circa* 272 mm high with rim and base diameters of 74 and 110 mm respectively. It would also have had a capacity of 1.3 litres up to a level *circa* 40 mm below the rim.

Among the mould-blown neck fragments are three small pieces (nos 197-9) belonging to a second group that have spiral ribbing. They probably come from a similar type of bottle but the fragments are too small to ascertain whether the whole vessel had spiral ribbing or whether this was confined to the neck.

The third group is represented by a single example (no. 192; Figs 46.192 and 47b) that was found in pit 410, while the flask described above was reconstructed with adjoining fragments from pits 9 and 181 (cf. Table 1 on p. 10). This flask is larger with a reconstructible height of 257 mm and an estimated capacity of 2 litres. It has a thickened everted mouth on a cylindrical neck and bulbous body with a carinated profile. The body is decorated with *circa* sixteen vertical ribs that do not extend downwards to the bottom pushed-in and tooled to form a hollow-tubular base ring and a conical kick. This flask is made in thin colourless glass covered with a silvery iridescence that is almost identical to the squat cylindrical beakers on 'toed' bases decorated with thin spiral and abstract trailing also from pit 410 (nos 69 and 71, see above pp. 51-2).

CONCLUSION

Glass bottles or *fiola* with bulbous bodies and long necks have always been important products for medieval glass-houses. Indeed, Zecchin has shown that the name *fiolari* given to the early glass-workers in Venice came from the word *fiola* (or *fiala* in Italian; Zecchin 1987-1990, vol. 2, 324). The earliest document records a donation made by a *Domenico fiolario* to the Church of S. Giorgio in 982 while another of 30 May 1288 is a notice of 'promise to deliver' from the *fiolarius*, Leonardo Fugazza, owner of a Muranese glass-house (*ibid.* vol. 1, 8). Fugazza swore in front of the Podestà that he would make 4000 bells for Nicola Marano of S. Maria, half with threads and half without; 600 footed cups, half *schiette* [colourless?] and half *a reticello*; and 600 footed goblets with trails to the feet and mouths. The bells were valued at 30 lire and the cups at 15. Leonardo had to consign all the work to Nicola Marano in the following days of June, under a penalty of 10 lire, but if the caravan did not go overseas, Marano would not keep the pieces. To date no glass bells have been recognized from the archaeological record either in Italy or in the Near or Far East. By beginning of the 14th century, however, the terms *vetrario* or *bichierio* are used to denote a glass-maker, replacing *fiolario*.

In the chapter on glass production mention was made of the large quantities of glass produced, as is borne out in inventories of glassmakers' stocks (Appendices D-F, pp. 34-5). These documents each include several types of bottles, but because of the mixture of medieval Italian, Latin and dialect used it is not always possible to identify exact forms. Nepoti has calculated the selling price and weight of the various types of glasswares described in a document of 1389 in the Archivio di Stato in Bologna (Appendix D; Nepoti 1978b, 326; *idem* 1987, table on p. 140). He identified three types of bottles either made in *verde* (presumably naturally-coloured greenish glass) or *bianco cristallino* (i.e. decolourized glass although probably still with a slight yellowish or faint greenish tinge as with the glass from Tarquinia). The three types of bottles are called *inghistaria*, *bocalitus de meza* and *bocalitus de piçola et terçarola* with weights of 7, 5½ and 3 *once* (ounces?) respectively. Those made in *bianco cristallino* were more expensive, costing up to a third more for the *inghistaria* and a quarter more for the *bocalitus de meza*. According to Zecchin, the word *inghistere* (or *inghestare*, *inghistaria*, *enghestare* and *angastere*) denoted a footed flask with a long neck, often with the kick extending into the body of the flask, that was used for either wine or water on the table or on the sideboard (Zecchin 1970, 27). From this it might be possible, therefore, to identify the *inghistaria*

as tablewares, with those made in *bianco cristallino* being superior and more desirable. The *bocalitus de meza* could have been used more for storage while the smaller *bocalitus de piçola et terçarola* could have had more personal uses, possibly as toilet bottles.

In a document of 1409 from Verona (Appendix E; after Avena 1911 and Nepoti 1991, 131-4) the bottles were divided into four categories: *bochali compensatis 100 bochaletis*, *bocchale a cembola*, *bochali de meça* and *bochaleti tridentini*. The first two types cost 4 lire 10 soldi per hundred while the last two were cheaper at 40 soldi. However, when one compares the totals for each main form, the ratio of beakers to bottles varies from 8:1 to 12:1 with bottles representing between 6 to 11 per cent of the total production. This corresponds with the calculations by Mendera that mould-blown 'Gambassi' beakers comprised more than 70 per cent of Italian production (Mendera 1990a, 308). Five types of glass bottle (*bochaletarum* or *bochaleti*), were included in the 1424 inventory from the workshop of the glass-maker Bernardo de Carpensis (cf. Appendix F; Archivio de Stato di Mantova, *Estenioni notarili*, 1424, cc. 15v-16r; Nepoti 1991, 134-5). There was a total of 2900 bottles that comprise *circa* 6 per cent of the total number of vessels listed.

Further information as to the sizes and capacities of medieval bottles is contained within the orders made by the monks from Monte Oliveto to the glass-maker Francesco in Siena between 1409 and 1429 (Piccini 1981). These records are currently being researched but Piccini has shown that it is possible to distinguish three types of bottles according to their size: *fiasco grande* or *di quarto* that held 5.7 litres, *fiasco di mezzo quarto* that held 2.8 litres and *fiaschetto* or *fiasco di metadella* that held 1.4 litres. In one order made on 21 June 1421 the monks ordered 6 *fiaschi di vetri ... di mezzo quarto* and 4 *fiaschi di vetro grande di quarto*. The former would have been suitable for serving wine or water at table while the latter four flasks would have been very large and better used for storage. The capacities of the three bottles from the Palazzo Vitelleschi, 1.7 litres (Fig. 44), 2 litres (Fig. 46.192) and 1.3 litres (Fig. 46.189/201), would fall, therefore, between the *fiasco di mezzo quarto* and the *fiaschetto* or *fiasco di metadella* mentioned above.

5: JUGS, BOWLS AND OTHER DOMESTIC FINEWARES

INTRODUCTION

This chapter will concentrate on those finewares (excluding beakers and bottles) presumed to be of local or Italian manufacture, while the following chapter (no. 6) will consider imported pieces, primarily from the Islamic world. The glasses described below have been divided into four main groups: handled and/or spouted vessels (i.e. jugs and cruets); wide-mouthed open vessels (i.e. bowls, plates and dishes); covered vessels (i.e. covered bowls and jars) and toilet bottles. These include examples from the Abbey of Farfa and the Palazzo Vitelleschi, Tarquinia, although not in the huge quantities as seen in the previous two chapters, neither are all forms represented at both sites. It is also in this chapter that the pieces examined in the Museo Sacro of the Vatican Museums become more important as these include intact examples that are generally overlooked in writings on medieval Italian glass. It has also been possible to include two previously unpublished medieval vessels from the Church of Santa Maria, Tivoli (nos 236 and 252), now preserved in the Museo del Palazzo di Venezia, Rome. Study of the iconographical record also reveals further information as to the possible, multiple functions of several forms, like cruets, which could have domestic, liturgical and even medical uses.

HANDLED AND/OR SPOUTED VESSELS

Introduction

All the pieces described in this section come from the Palazzo Vitelleschi, Tarquinia, and, like the bottles and beakers described above, fall into two main groups - free- and mould-blown. These vessels, like bottles and flasks were suitable for the holding and pouring of liquids, but may be distinguished from the latter by their handles and sometimes the presence of a trefoil mouth or pouring lip. There is also a correlation between the contexts from which these two types were found, with the mould-blown fragments coming from the contexts (nos 230 and 234) that include almost 27 per cent of truncated-conical beakers (cf. Table 2 on p. 58).

Free-Blown Jugs

There are two main fragments that come from a large jug made in greenish-colourless glass (nos 203-4). The first (no. 203; Figs 48.203 and 49) forms the entire neck, part of

the sloping shoulder and the upper part of the handle. The neck is wide and cylindrical, flaring gently at the top and decorated below the fire-rounded rim (diameter 64 mm) with an applied blue trail. At the bottom of the neck there is a tooled hollow bulge (diameter 70 mm) that is similar to those found on bottles from the same contexts (cf. nos 147 and 149-50). The narrow strap handle is attached to the neck below the rim and curves gently outwards and downwards. It is further decorated on the outside with an applied blue vertical trail and a second trail on top, manipulated into a series of loops. The lower body and cylindrical pedestal base fragment (no. 204; Figs 49a and 50.204) was originally published as the lower part of a tazza or a bowl (Whitehouse 1987, 326, no. 21). However, it probably comes from the same vessel as no. 203 and has been included in the reconstruction in Fig. 51. This reconstruction has a restored height of 260 mm and a maximum body diameter of 170 mm, which would have had a capacity of *circa* 2 litres up to the level of the neck bulge, increasing to *circa* 2.2 litres at the lowest level of the rim.

The quality of the glass and the presence of the neck bulge and blue trailing suggest that this jug and the bottle with neck bulges and blue trailing (no. 147) were made in the same glass-house. It is even possible that they come from part of the same service. Fig. 49b, an inverted photograph of nos 147 and 203, illustrates these similarities, while Figs 44 and 51 show tentative reconstructions of both forms, that have respective capacities of 1.7 and 2 litres.

There are also three small fragments from trefoil mouths, presumably from jugs, which are also decorated with applied blue trailing on top of the rim (nos 205-7; Fig. 50.205). It has not been possible to identify other pieces from these vessels but there are a number of fragments from plain, solid strap handles (nos 213-16; Figs 52.213 and 54.214-16). Other handle fragments include part of an upright thumb-rest (no. 217; Fig. 54.217) and the lower part of a handle with a curled terminal (no. 218; Fig. 54.218).

All the handle fragments mentioned above are made in various shades of glass with light greenish or yellowish tinges. However, there is an unusual handle fragment made in opaque streaky brick-red glass with part of the thin vessel wall still attached (no. 219; Fig. 54.219). This fragment forms the lower two-thirds of a handle dropped onto the body, drawn outwards at an angle of *circa* 25°, then more or less vertically before curving back to the body. The shape of the handle suggests that it comes from a small vessel, possibly a cup or even a hanging lamp, although this type of handle is not typical of those associated with the latter (see below p. 124). There is also a small curved fragment from

a thin-walled vessel that was found in pit 9, context 39. Opaque red glass is known from medieval Europe but is rarely found in Italy either as the main body of a vessel or as decorative trailing. There are a few fragments known, those collected as surface finds at Salpi, Apulia (Harden 1966, 76 nos 16 and 18a,b) and a fragment from the neck of a jug with part of a handle attachment from Porciano (pers. comm. David Whitehouse). Further fragments were found at the Agora South Centre factory at Corinth including the lower body of a pendant lamp (Davidson Weinberg 1940, 316, fig. 19.48 and 1952, 121, no. 802, pl. 60). Samples from Salpi and Corinth have been examined by Robert Brill and shown to owe their colour to the presence of reduced copper in the batch (Brill in Harden 1966, 79 and table 1 on p. 78).

Mould-Blown Jugs

There are five groups of fragments that come from a least two mould-blown jugs decorated with vertical ribbing (nos 208-12; Fig. 52). They are made in thin (< 1 mm), almost colourless glass that has a yellowish-green or greyish-green tinge in the thicker fragments. These have been combined, together with two handle fragments (nos 213-14) to create the tentative reconstruction in Fig. 53. This shows a jug with a trefoil mouth with a maximum diameter of 75 mm on a wide cylindrical neck and bulbous body with a base pushed-in to form a low domed kick. From the curve of the upper shoulder and that of the base, the jug probably had a bulbous body. The reconstruction has a restored height of 200 mm and a maximum body diameter of 140 mm. This vessel would have had a capacity of *circa* 1.1 litres to just below the trefoil mouth and a maximum capacity of *circa* 1.2 litres to the lowest point of the rim. As for the jug with decorative blue trailing discussed above, this mould-blown jug may have come from the same service as the mould-blown flask with a pushed-in base (no. 189; Figs 46.189 and 47a) that would have had a capacity of *circa* 1.3 litres. It would appear, therefore, that mould-blown pieces, whether beakers, flasks or jugs, had noticeably smaller capacities. This might suggest a change in drinking habits over the course of the 14th century with either a decrease in the quantities drunk or a more frequent refilling of the vessels.

Spouted Vessels

There are two main types of spouted vessels among medieval glass assemblages: cruets or *ampolle* and alembics. The former will be discussed in this section while the latter will

be included in Chapter 7 under distilling apparatus (pp. 115). The identification of spouted vessels is difficult for two reasons. Firstly, their bodies are similar to those of small bottles and flasks, and secondly, it can be difficult to distinguish between a fragment of a spout or a handle. The main distinction is that a spout is hollow and a handle is generally solid. This problem can be seen in a unique 13th-century handled bottle or decanter jug with a narrow cylindrical neck and a bulbous ribbed body from Lucera Castle in Apulia (Whitehouse 1966, 173, fig. 31.3). On this vessel the handle is solid for the upper two-thirds, but the lower part is hollow. Therefore, if only the lower part was found, it might appear to be part of a spout from either a cruet or an alembic. There are only two fragments of drawn hollow spouts with oval sections from the Palazzo Vitelleschi that I believe to come from spouts rather than handles (nos 220-1), but there are no fragments from Farfa. The first fragment (no. 220; Fig. 54.220) is made of pale yellowish-green glass. The lower part of the wall of the spout is thicker than the upper part, while, simultaneously, the glass becomes thinner towards the tip. This is a small fragment, only 28 mm long and it is possible that it comes from an alembic, like no. 356, adjoining fragments of which were found in pits 9 and 181. The other spout fragment (no. 221; Fig. 54.221), made in colourless glass, is longer (42 mm) and has a diameter of 6 mm at its broken end.

Discussion

Jugs are one of the rarest forms of glass to be identified from medieval Italian assemblages although they were common in Roman times and also in the Early Middle Ages (Stiaffini 1991, 217). The vessels described above from the Palazzo Vitelleschi, including the two tentative reconstructions (Figs 51 and 53), would appear to be the only recorded examples from central Italy. It has not been possible to find parallels for these examples from elsewhere in peninsular Italy. This again demonstrates the wealth and importance of the finds from Tarquinia, as this form appears to be otherwise absent from the overall archaeological record. Of course it is possible that without the main diagnostic features of trefoil mouths, pouring lips and handles, the body and base fragments could be classified as coming from bottles and flasks.

No jugs are recorded among the glasses ordered by the monks from Monte Oliveto, near Siena, in the early 15th century (Piccini 1981) or are identifiable from the inventories listed in Appendices D-F. North of the Alps, however, a different picture emerges. In England, for example, glass jugs are more common. Rachel Tyson has listed

1250 glasses dating from 1200 to 1500 found in England, including thirty-four handled jugs or vessels with pouring mouths (Tyson 1996, vol. 2, 116-22).

A possible reason for glass jugs not being common may be detected in the iconographical record. In most medieval Italian dining scenes glass flasks are shown filled with red wine (cf. Plates 7-9). However, when jugs are also depicted, these tend to be made of maiolica. This can clearly be seen, for example, in Jacopo Torriti's late 13th-century fresco of 'The Wedding at Cana' in the Upper Basilica, at Assisi (Plate 5a). It would seem to suggest that ceramic jugs, especially of maiolica, were preferred. Occasionally jugs are depicted in precious metals, as in a 15th-century fresco the '*Ultimo colloquio di San Benedetto e Santa Scolastica*' in the Upper Church of Santo Speco, Subiaco (Plate 25). The ceramic finds from the Palazzo Vitelleschi have still to be studied in depth, but early sorting of the finds shows there to be a large number of reconstructible maiolica vessels, including jugs, as well as more general coarse and cooking wares.

Depictions of glass jugs are just as rare as the vessels themselves. The best-known example is in a fresco of the '*Cena di San Guido*' painted by Pietro da Rimini in c. 1318 in the Refectory of Pomposa Abbey (Plate 22). In this fresco there are two plain, flaring glass beakers and two jugs, one made of painted maiolica and the other a vertically ribbed pear-shaped glass jug with an angular handle. The table has been set for two people and the glass jug is shown containing red wine. What was contained in the ceramic jug? In medieval Italy and France, as in ancient times, it was customary for wine to be drunk mixed with varying quantities of water according to taste and vintage. Jean de Joinville (1224-1317), who accompanied Louis IX of France on the 7th Crusade that started in 1249, described life in Caesarea in his chronicle, including his manner of dining,

'I had wine mixed with water issued to my servants, and gave the same to my squires, but with lesser proportions of water. At my own table a large flask of wine and a bottle containing water were placed before each of the knights, so that he might mix his drink as he wished' (Engle 1991, 93).

I have suggested above that the range in sizes and capacities of both types of pruned beakers (cf. Figs 8 and 14) reflected the different types of beverages drunk, like wine and beer, and further that the bottles and the jug with neck bulges could have come from the same service. A further corollary could be that jugs were also used to serve beer rather than water, while the bottles were used for wine. The wide mouth of the jug would also have been more suitable for the containing of beer. In general, the contents of casks

were decanted into pottery jugs or amphorae which in turn were decanted into tablewares. This process may be seen in a 14th-century fresco of 'The Wedding at Cana' in the Abbey of Pomposa (Plate 13).

A further pair of footed glass jugs are depicted in a mid-14th century fresco of a kitchen in the Cathedral of Spilimbergo (Plate 28a). These are shown on a wooden shelf beside a pair of glass cruets and a maiolica jug as if these vessels were destined to be used at the table. Below, suspended from the shelf, are two coarse ware jugs and a cooking cauldron, presumably of bronze.

The forms of glass cruets are remarkably similar, with slight variations in the curve of the spout and the detail of the handles, and follow those made in precious materials. Examples of spouts and handles have been found across Italy, at Murano in the Basilica of SS Maria and Donato (Gasparetto 1977, 86-90), at Genoa in the Convent of San Silvestro (Andrews 1977, 180, no. 160, fig. 35.160), in Altare at the glass-house in Monte Lecco (Fossati and Mannoni 1975, 59, nos 63-4), in the Benedictine abbey of Sant' Eufemia, Lamezia Terme (Ruga 1994, 342, fig. 8) and at Lucca in the Church of SS Giovanni and Reparata (Stiaffini 1993, 249-50, fig. 3.1). Those from the latter were all found grouped together in a 15th-century maiolica basin below the present 19th-century baptistry. Stiaffini (*ibid.*) suggests that as they were used during religious services they were not thrown away with other refuse but preserved inside the church.

The examples of cruets, both archaeological and iconographical, mentioned above all come from ecclesiastical sites, except for the two fragments from Tarquinia and the fragments from the glass-making site at Monte Lecco. However, an account book from 1426-1429 shows that, contrary to what has been found in the archaeological record, this type must have been used widely on domestic sites. Drawn up between the glass-maker, Francesco di Bartolomeo from Gambassi, and the notary, Lodovico di Giovanni Massufero, this manuscript lists 827 cruets for oil but only nine for the altar (Antoni 1982, 302). This distinction between cruets for domestic and liturgical use may also be seen in the inventory of the Gambassi glass-maker Bernardo de Carpensis, compiled in Mantua in 1424 (Appendix F; Nepoti 1991, 134-5). In this inventory 4000 *ampoletarum retondarum ac longarum ac ballas* are listed compared to only 400 *ampoletas ab altare* (*ibid.*). Cruets are also listed in an inventory, dated 15 May 1409, of the glass-maker Ottaviano di Verona, who was the nephew of a glass-maker from Padua called Cardino. Among the various listed tablewares, mostly beakers, are 100 *ampolete ab altare cum*

ventosis simul (Appendix E; Nepoti 1991, 133-4 and Stiaffini 1993, 249). Liturgical cruets were also ordered frequently by the monks of Monte Oliveto, from the *bicchierario* Francesco in Siena, although not in such huge quantities as the beakers discussed above. On 4 April, 1413, they ordered eight *ampolle d'altare*, while the following year on 25 April, they ordered a further four *ampolle da messa* (Piccini 1981, 595). Two years later on 11 April an order was placed for one *ampolle per la sacrestia*, while the sacristan at Asciano was bought an hour-glass or *vetro d'orologio fece fare el sagrestano ad Sciano* on 9 April, 1418, for 1 lire, 18 soldi, 6 denari.

According to the rules laid down at the Councils of Orléans in 541 and Braga in 675, the Eucharistic chalice had to be filled exclusively with red wine mixed with a little water. Until they were to be consecrated together in the chalice, they were kept in other receptacles made of precious metal or hard stone (Gasparetto 1977, 86). To avoid confusion these bore distinguishing marks, such as 'A' for *acqua* and 'V' for *vino*, or a fish and bunch of grapes respectively. This, however, would not have been necessary for glass or rock crystal as the contents would have been clearly visible. Later, the Synod of Würzburg in 1298 established (at least in Germany) that liturgical cruets could be made in any of the following materials: glass, pewter, gold, silver and rock crystal (Vasco Rocca 1988, 138; Stiaffini 1993, 269).

The best-known depiction of a cruet is in a fresco by Taddeo Gaddi in the Baroncelli Chapel in the Church of Santa Croce, Florence (Plate 26). It shows a *trompe l'oeil* niche filled with a cruet containing red wine that has a long cylindrical neck, elongated S-shaped handle and a thin curved spout. Behind the cruet is a small glass flask filled with water and next to it, a metal pyx. The flask is closed with a hooded cap that illustrates the practical, domestic custom of covering bottles with oil-paper folded down at the edges. It also proves how similar in form cruets are to small flasks so that without the presence of handles or spouts they cannot be distinguished from medium-sized bottles in the archaeological record.

Not all cruets have handles. There is, for example, an intact cruet with only a spout preserved in the Museo A. Sanarelli at Forlì (Plate 28b). A still-life fresco of a kitchen in the Cathedral of Spilimbergo (Plate 28a; Prati 1981-83, 135, fig. 10), painted in the mid-14th century, shows a similar pair of handleless cruets. These pear-shaped footed cruets are depicted on a wooden shelf sandwiched between a pair of larger footed glass jugs that are similar in form to the maiolica jug with a trefoil mouth on the other side. This fresco

is also important in that it shows the types of vessels a contemporary artist would expect to find in a kitchen. It is possible that the presence of handles distinguishes those cruets used in the church from those, without handles, that were used in domestic contexts.

Taddeo Gaddi included another cruet in a fresco of 'The Virgin with St John the Baptist and St John the Evangelist', painted between 1325-1330 in the castle chapel at Poppi, owned by Count Guidi. About a century later in date is a fresco by Masolini on the back wall of a niche in the Chapel of St Helena in the Church of Santo Stefano at Empoli (Plate 27). This pair of cruets is very similar in form to that depicted by Gaddi, but they have more elaborate looped handles, which are not known from the archaeological record. Both these frescoes also show the practice of placing liturgical objects after use in a special niche sunk into the walls of chapels and churches. This would suggest that each chapel in a church would have had its own set of vessels.

Cruets could also have been used as dropper flasks in the preparation of medicines. They may be seen as the precursors to those used later with closed high domed tops, handles and spouts, like 16th- and 17th-century examples in the hospital of Santa Fina, San Gimignano (Morozzi 1981, figs 4-6). The applied thick coils at the tip of the spouts were used to secure covers tied by string or thread below the coil.

WIDE-MOUTHED VESSELS

Introduction

The fragments discussed in this section come from wide-mouthed vessels, such as bowls or dishes with shallow bodies and jars or containers with deep bodies. There are many problems of classification within this group as the vessels are often only identified by their large rim diameters. Some pieces, for example, may be confused with the mouths from lamps or urinals, while base fragments from large vessels may be also confused with those from bottles and flasks. This section includes examples from both Farfa and Tarquinia, as well as some intact bowls from the Museo Sacro of the Vatican Museums. To aid discussion these pieces have been divided into groups according to their form, technique of manufacture or decoration, although these are not mutually exclusive.

Bowls with Pedestal Feet

The first piece to be discussed in this section comes from the Abbey of Farfa. It is a free-blown footed bowl made in an 'emerald'-green glass containing bluish-green swirls and

inclusions (no. 222; Figs 55.222 and 56). The glass also contains many small bubbles that become larger and more elongated towards the everted, fire-rounded rim. It has been reconstructed from eleven fragments retrieved from ten different medieval contexts belonging to period 11. It has a restored height of 63 mm and a rim diameter of *circa* 200 mm. The flaring curved body becomes thicker towards the bottom (from 2 to 5.5 mm) and is set on a pedestal foot with a folded edge. The colour of this glass is very distinctive and to date no medieval parallels have been found. It is also not a colour utilized by 13th- or 14th-century Islamic glass-makers. In 9th- or 10th-century relief-cut Islamic pieces, like the bowl in the Treasury of San Marco, Venice (Pasini 1885, pl. 45) and a fragmentary lobed bowl in The Corning Museum of Glass (*Glass From the Ancient World* 1957, no. 532; Oliver 1961, 25-6, fig. 30), the 'emerald'-green glass is very pure and virtually free of bubbles. However, the colour and intensity of this bowl show similarities to some early medieval window glass quarries found at Farfa (Newby in press). It is possible, therefore, that this bowl is a rare survival from the 8th or 9th century. During this period, deep rich colours were achieved by the remelting of Roman glass, especially tesserae, as demonstrated at San Vincenzo al Volturno (Hodges *et al.* 1990) and suggested by Theophilus (chapter 12 in Dodwell 1986). The large size and the number of fragments (cf. Fig. 56) could further suggest that this was not broken and discarded until sometime during the late 13th or early 14th century rather than being residual. There are a number of residual fragments throughout all the contexts at Farfa, but these tend to be much smaller and weathered. When these pieces come from the same vessel, as with an ancient Roman footed mosaic bowl (Newby 1991, 33-4, fig. 1), they are not contiguous.

There is a more typical medieval pedestal base made from two paraisons, presumably from a footed bowl, found at Farfa (no. 223; Fig. 50.223). This fragment in light green, seeded glass comes from the lower part of a shallow, flaring bowl with a maximum diameter of 74 mm and the upper part of a gently spreading foot. Also from Farfa are three examples of coiled bases, made in pale yellowish-green glass with base diameters ranging from 40 to 50 mm (nos 224-6; Fig. 57.224-5). The lower walls of the bodies and the pushed-in bottoms are decorated with ribs and set on applied coiled pedestal bases that bear traces of vertical tooling marks. All four pieces come from contexts belonging to phase wc-222 of period 11, which contained most of the printed beakers discussed above on p. 45.

The latter three pedestal bases are very similar to that from an intact bowl preserved in the Museo Sacro of the Vatican Museums (no. 227; Fig. 57.227; Fremersdorf 1975 105, no. 949, pl. 67). This hemispherical footed bowl (height 90 mm) with an upright, fire-rounded rim (diameter 113 mm) has a mould-blown body with a faint design of raised hexagons and lozenges. It was found in a 12th-century altar of the Church of San Nicolà dei Cesarini built over Temple A in the *Area Sacra di Largo Argentina*, Rome, in the 8th century. During excavations, carried out between 1926 and 1929, the church was destroyed (although the apses may still be seen) and this bowl was transferred to the Museo Sacro. It was found with an inscribed lead cover, folded down at the edges, which lists the relics of the holy martyrs it contained (cf. vol. II, p. 41 for a full transcription). These bones were wrapped individually in pieces of 8th- or 9th-century cloth, each printed with the martyr's name, that are probably contemporary with the consecration of the church. Both Volbach (1936, 346) and Fremersdorf (1975, 103, no. 105) considered this piece to be of Islamic origin, but in light of the fragments found at Farfa, a more local origin of production would seem more appropriate.

Bowls with Pincer'd 'Toed' Base-Rings

The first bowl to be discussed in this section was found at the Palazzo Vitelleschi, Tarquinia (no. 228; Fig. 58). At first only the lower, decorated part of the vessel was recognized (Whitehouse 1987, 327, fig. 4.24; Baumgartner and Krüger 1988, fig. 45 on p. 46), but subsequent study of the Tarquinia material yielded adjoining fragments from the upper body. This revealed that the bowl had a cup-shaped mouth with a fire-rounded rim (diameter 140 mm), tapering body and pushed-in base with a high kick and a restored height of 55 mm. It is made in greenish-colourless glass and decorated with applied, self-coloured trailing arranged in a random pattern of zigzags, before the pincer'd, 'toed' base-ring was added.

One of the largest pieces of medieval glass to have been found is the so-called 'Farfa Bowl' (no. 229; Figs 59-60) that was restored for the exhibition, *Phoenix aus Sand und Asche* (Baumgartner and Krüger 1988, 285, no. 323; cf. also Whitehouse 1983b, 116-17, figs 2-3 and Newby 1991, 40, fig. 9). The 'Farfa Bowl' is 114 mm high and made in greenish-colourless glass. The reworked, everted rim folded downwards at the lip, which has a diameter of *circa* 390 mm, is decorated with an applied dark blue trail. The curving walls are further decorated below a horizontal blue trail, with an applied, dark blue

continuous zigzag trail that forms a band of fifteen continuous lozenges. The bowl stands on an applied, pincer'd 'toed' base-ring, but the bottom of the bowl is missing. Unfortunately, this piece was found in a pit contained within a large baulk that divided areas A1 and A2 of the excavations. The pit cut into the garden soil deposits of period 11, but its exact relationship with this and the post-medieval stable-yard of period 13 remains obscure. The bowl probably dates from the 14th or early 15th century and is presumably a fruit bowl, or *fruttiera*. If so, then it may be a fore-runner to the large Renaissance ribbed footed bowls with blue trailing that date from the end of the 15th to the first half of the 16th century (cf. Mentasti *et al.* 1982, 112-13, no. 133 and Rückert 1982, 51, no. 35 with numerous parallels). It is not certain where this piece was produced, but its closest parallels from Italy are two fragmentary small bowls with decorative blue trailing from Faenza that were found with coins of Lodovico Gonzaga (1369-1382; Mentasti *et al.* 1982, 70, nos 51a and b and Whitehouse 1983b, 117, fig. 4). These bowls have cup-shaped mouths with upright rounded rims, that are similar to fragments of a small pale green glass bowl, also found at Farfa, with a rim diameter of 110 mm (no. 240) and the bowl from Tarquinia described above (no. 228). The bowls from Faenza are closely related to a variety of vessels from France decorated with applied blue trailing (Foy and Sennequier 1989, 229-30, 232-7, nos 198-9, 204-14), believed to have been made in the south of the country from the late 13th century (Foy 1989a, 229-39). Indeed, simple applied blue trailing arranged in spiral and lozenge designs on colourless or almost colourless glass is a recognisable feature of 14th-century Mediterranean glassware appearing on bottle necks (cf. nos 147, 151-2 and 159), bowls, beakers and, in France, on stemmed goblets (Foy and Sennequier 1989, col. pls 17-19).

Bowls with Applied Decoration

The first group of bowls with applied decoration to be discussed here are those decorated with prunts (no. 232; Figs. 61.232 and 69b). The three fragments from the Palazzo Vitelleschi, come from a shallow bowl, made in pale green glass, with an upright, fire-rounded rim (diameter 127 mm). The curved sides are decorated with three staggered rows of applied, rounded conical prunts between two blue horizontal trails. The lower part of the vessel is missing. This type, although uncommon, has a wide distribution. A hemispherical bowl with applied prunts and horizontal trails in blue and colourless glass, for example, was found in a late 13th-century context in the Dominican Friary at Boston,

Lincolnshire (Charleston 1972, 45, no. 1, fig. 9). This bowl also has an external flange below the rim that a diameter of 160 mm and a base diameter of 72 mm. The example from the Palazzo Vitelleschi was published originally as coming from the bowl of a goblet (Whitehouse 1987, 326, no. 17, fig. 4.17), together with another large fragment thought to comprise the bowl and upper stem of a second goblet (no. 253; Figs 68.253 and 69a; *ibid.*, 326, no. 18, fig. 4.18). However, both Erwin Baumgartner and I believe that this latter piece is an elaborately-decorated cover (Baumgartner and Krüger 1988, 45, fig. 43). This problem of identification can also be seen in a large fragment from Fustat, preserved in the Islamic Museum, Cairo (Fig. 61). This large fragment is made in light yellowish-green glass and, as in the bowl fragments from Tarquinia (no. 232), the lower curved walls are decorated with staggered rows of applied prunts above a horizontal self-coloured trail. However, this piece also has the beginnings of a drawn hollow stem (or finial, if it comes from a cover).

Bowls were also decorated with applied vertical ribbing and there are from Farfa six sherds from a heavily ribbed vessel with a bulbous body (maximum diameter 118 mm) made in thick brownish-yellow glass (no. 235; Figs 63.235 and 64b). The large ribs become more pronounced towards the bottom while on the underside of the tip of each rib is a scratched 'X' of unknown function but which could be tooling marks. Although these fragments possibly come from a flask, like the example found in a 12th- to 14th-century grave at St. Pierre-Les Eglises, Chauvigny (Foy and Sennequier 1989, 183-4, no. 114), they are more likely to belong to an early 13th-century bowl, like a reconstructed example with a pedestal foot, from Saint Denis (*ibid.* 162, no. 85). The very thick glass of this bowl might suggest another function, that of a mortar, as it is similar in form to a 15th-century bronze example with heavy ribbing preserved in the hospital of Santa Maria della Scala in Siena (Cavallero 1985, 251, fig. 237 on p. 252).

A more typical ribbed footed bowl, related to the example from Saint Denis, is a restored example in the Museo del Palazzo Venezia, Rome (no. 236; Fig. 63.236). Like the trailed covered jar (no. 252), discussed below on pp. 94-5, this bowl was found in the Romanesque Church of Santa Maria Maggiore in Tivoli and could possibly date back to the 13th century. It is made in colourless glass with a straw-coloured tinge and has a gently flaring curved mouth with a fire-rounded rim with a diameter of 85 mm. The bulbous body is decorated with thirteen applied ribs and set on an applied pedestal foot with a hollow-tubular foot.

Bowls with Mould-Blown Decoration

There are four large fragments (three adjoining) from a large shallow dish from the Abbey of Farfa decorated with a faint pattern of depressed ovals (no. 244; Figs 55.244 and 64a). This dish is made in pale yellowish-green glass, which is very similar to that of the prunted beakers from both Farfa and Tarquinia. It has an everted, fire-rounded rim folded downwards and the shallow curving walls are decorated below two scratched lines with faint depressed ovals, up to 17 mm across, arranged in a quincunx pattern. These ovals appear to have been formed while the vessel was hot, either by pressing or blowing the paraison into a mould. There are no cutting or polishing marks visible. It has not been possible to find a parallel for this piece, but the form of the rim and its size (diameter of 260 mm), are comparable to the 'Farfa Bowl' (no. 229; Figs 59-60).

Deep Containers

The last piece to be discussed in this section on wide-mouthed vessels is a rare, intact deep glass container (no. 239; Fig. 55.239). It was found together with five covered glass jars hidden in an altar in the Church of San Giorgio in Velabro, Rome, all of which are preserved in the Museo Sacro of the Vatican Museums (nos 247-51). This free-blown container made in light green glass containing a lot of bubbles has uneven flaring walls that range in height from 156 to 175 mm and a pushed-in base with a high kick. The wide mouth has an everted, thickened and fire-rounded rim with a rim diameter of *circa* 200 mm. The only comparable vessel is a cylindrical covered jar, with an everted mouth, from the Church of Santa Croce in Gerusalemme, Rome, where it was used as a reliquary (Volbach 1936, 347 and Fremersdorf 1975, pl. 68). It is possible that no. 239 also originally had some form of cover, although not necessarily of glass, like the moulded bowl from San Nicolà dei Cesarini that has an inscribed lead cover (no. 227).

Discussion

Most of the pieces described above probably come from bowls that were used as tableware. As such they probably served as containers for condiments, such as salt and spices, for sauces, or for fruit. Rachel Tyson considered that the larger examples might also have been used as basins for washing hands and small ones as finger bowls, but concluded that they were not large enough while also being too fragile and unstable (Tyson 1996, 63). Spices were expensive, but then those who could afford the luxury of

glass bowls would surely have been able to afford the spices to fill them. This must have been especially so in Italy with her direct trading routes to the East, in particular those associated with the maritime states of Genoa and Venice.

In medieval Italian depictions there is often a single central coloured, presumably ceramic, bowl, from which the diners help themselves, while this is often surrounded by several smaller bowls (cf. Plate 8, a detail of 'The Last Supper' by Pietro da Rimini in the Refectory of the Abbey of Pomposa, 1316-1328). The large bowls are usually depicted as containing meat, sometimes whole carcasses (cf. Plates 6 and 24) or fish (cf. Plate 22a). The smaller bowls, shared by two or three diners, probably contained the sauce in which they dipped the meat (cf. Plate 9). The shape of some surviving glass bowls (eg. no. 228) would lend themselves to this function, with deeper central wells that could have contained the sauce and wide flaring upper bodies that could have been used to wipe off some of the excess before eating the sauce-covered meat. The same scenes show that each guest had their own glass beaker from which to drink, but there are no bowls recognisably made of glass included in these depictions. They have also not been identified in the three glass-makers' inventories included in Appendices D-F.

COVERED VESSELS

Introduction

The examples discussed in this section come from the Palazzo Vitelleschi, Tarquinia, and the Museo Sacro of the Vatican Museums. The former examples are decorated with applied prunts although they come from two different forms, while the latter included examples, which without the preservation of their lids would have been classified under cups or footed bowls. There is also an unusual example of a covered vessel from the Church of Santa Maria Maggiore, Tivoli.

Undecorated Covered Beakers

Five covered small bowls (nos 247-51; Fig. 66) were found, together with the deep container discussed above (no. 239), concealed in the altar in the Church of San Giorgio in Velabro, Rome. The church is believed to have been constructed in the 9th century while the campanile was built in the 12th. The interior of the church was redecorated in the 13th century at which point the altar and canopy were built and embellished with cosmatesque decoration. There are three small and two larger glass beakers, plus another

body without a lid from a possible sixth example, which are so similar as to suggest that they were made at the same time and in the same glass-house. They are all made in light green glass and have domed covers with spherical finials and applied coils around the maximum diameter of the cover that rest on the rim of the container below. The heights of the jars/containers range from 36 to 60 mm and rim diameters range from 47 to 72 mm. Without the presence of these covers, these would appear to be drinking beakers with convex walls and thickened, fire-rounded rims.

Undecorated Covered Footed Bowls

There are two examples of hemispherical, footed bowls with covers in the Museo Sacro of the Vatican Museums (nos 245-6; Fig. 65.246; Fremersdorf 1975, 105, nos 950-1, pls 66 and 67). The first was found by Volbach in 1939 in the depot of the museum, while the second comes from the Treasury of the Sancta Sanctorum in the old Lateran Palace. Both are made in light greenish glass. Fremersdorf (1975, 105) considered the pieces in the Vatican to date from the 10th to 12th century and to be of either Venetian or oriental manufacture. However, Fremersdorf was writing from the perspective of an ancient glass historian while comparing pieces to intact examples preserved in the Rhineland that belong to the *Waldglas* tradition of glass-making which is confined to countries north of the Alps. He was also writing at a time before any detailed study of medieval glass, especially in Italy had been undertaken. The foot formation of these two bowls in the Museo Sacro is similar to fragments from Farfa (nos 230-1; Fig. 65.230-1) made in thick light greenish glass. However, with the Farfa examples one cannot determine whether they originally had covers. The shape of these bowls is also similar to the footed bowl with moulded decoration from San Nicolà dei Cesarini (no. 227; Fig. 57.227) although the foot was formed by an applied spiral and tooled coil. These too were probably produced locally in the 12th or 13th century.

Covered Vessels with Applied Decoration

There are two types of applied decoration on covered vessels. The first is represented by a restored covered jar with self-coloured and purple trailing from the Church of Santa Maria Maggiore, Tivoli (no. 252) and the second by two lid fragments decorated with prunts from Palazzo Vitelleschi, Tarquinia (nos 253-4). The restored covered jar from Tivoli (no. 252, now in the Museo del Palazzo Venezia, Rome), is in a very fragile state

so that illustration (Fig. 67) can only be an approximation. It shows a covered jar (total height 164 mm) with a tapering body and pushed-in base with a hollow-tubular base-ring. It is made in colourless glass with a straw-coloured tinge, like the footed ribbed bowl from the same church discussed above (no. 236; Fig. 63.236). It is decorated with crude applied trailing comprising purple horizontal trailing and self-coloured spiral, zigzag trails and chain decoration. The domed cover, surmounted by a hollow knob with a hollow-tubular edge tooled out of the body, is decorated in the same manner as the body with horizontal and zigzag self-coloured trailing.

The two prunted fragments from Tarquinia are very different. There is an almost intact domed cover (no. 253; Figs 68.253 and 69a) made in pale green glass with a tooled, hollow-tubular flange that would have rested on the rim of the vessel below. The body of the cover is decorated above the flange with three staggered rows of rounded conical prunts between two horizontal trails. Above this is a hollow stem drawn out of the body with a swelling finial decorated with a further eight applied prunts and surmounted by a pontil. Whitehouse (1987, 326, no. 18, fig. 4.18) published this piece as the bowl and upper part of the stem from a prunted goblet, but this interpretation has been questioned by Baumgartner who thought it could come from a lid (Baumgartner and Krüger 1988, 45). On examples of similar goblets from Southampton (Charleston 1975a, 218-19, no. 1513, fig. 222, *idem* 1975b, 105, pl. 2.1 and Tyson 1996, vol. 2, no. GA49, fig. 9) and from Fustat (Fig. 61) the stem, although hollow, is formed from a second paraison of glass that is added to the solid bottom of the bowl. In the piece from Tarquinia there is no such barrier so that any liquid would have entered the hollow stem and knob. This would have been almost impossible to clean afterwards, however, it could possibly be the cover for such a grand goblet or even for a bowl like no. 232.

The second lid from Palazzo Vitelleschi (no. 254; Fig. 68.254) is composed of a small fragment with a flat upper surface decorated with a large, flattened prunt and with a horizontal trail at the edge with the almost vertical wall. However, this fragment is too small for a secure attribution and it is possible that it comes from an angular bowl with a foot as there is no trace of wear on the top of the surviving prunt.

Discussion

The covered vessels preserved in the Museo Sacro of the Vatican Museums probably all contained relics of saints and martyrs. There are two other examples that still contain their

relics in the Church of Santa Croce in Gerusalemme, Rome (Fremersdorf 1975, pls 68-70). Santa Croce in Gerusalemme is one of the 'Seven Churches' of Rome, which according to tradition was founded by the emperor Constantine's mother, St Helena, in the 4th century. It was rebuilt in 1144 by Pope Lucius II, at which point these glass vessels may have been concealed in the altar filled with their holy relics. The first is a covered ribbed bowl, similar in form to nos 227 and 245 but without a foot, that contains a variety of smaller glass phials, some of which appear from the reproduction in Fremersdorf (1975, pl. 69) to be late Roman or early medieval in date. The second covered glass reliquary takes the form of a wide, deep cylindrical container with an everted mouth that still contains fragments of two tibia or fibia. It is unlikely that any of these vessels were made specifically for religious or liturgical purposes. Indeed, they are more likely to have been produced, both with and without lids, for domestic households to contain a wide variety of items.

TOILET BOTTLES

There is only one example from Tarquinia that might be interpreted as a toilet bottle or sprinkler, used to contain rose-water or some kind of perfume (no. 255; Figs 70-1). Fragments from it were found in pits 4, 9 and 181 and help to prove that the latest fillings of these pits was contemporaneous (cf. Table 1 on p. 10). They join to form two halves of a very pale green spherical vessel with a short narrow neck and very small opening of *circa* 5 mm. It is decorated first with opaque turquoise spiral trailing wound all the way round the vessel and overlaid by haphazard trailing in opaque turquoise streaked with purple. This is the only example I have found with this colour combination in Italy although there is a flaring Islamic beaker preserved in the National Museum, Damascus, which has similarly-coloured trailing. Therefore, it is possible that this piece has an eastern origin. Its nearest parallel, however, is an example from Tuscania that also has a spherical body but which has a more conventionally Mediterranean decoration of dark blue, spiral trailing (no. 256; Fig. 72). Originally this piece was thought to have come from a footed goblet (Lamarque 1973, 128, fig. 35.147), but the foot of this vessel would better be interpreted as the shoulder and the base of the bowl as the bottom, as shown in Fig. 72.

6: IMPORTED FINEWARES

INTRODUCTION

This chapter will concentrate on the glass vessels imported into central Italy during the 13th and 14th century. Again, as throughout this thesis, it must be stressed that until the later 14th century glass of any form was generally only available to the upper strata of society. These imported pieces were regarded as luxuries by Italians, but as totally exotic by the rest of Europe that already considered Italian or Venetian glass a luxury. While Italian glass was imported into the rest of Europe, that produced north of the Alps was not of a sufficient quality to merit exportation to the south into Italy, except for stained glass, lenses and mirrors (cf. Krüger 1993).

The glass imported into central Italy, therefore, had to have come either from the Islamic world or the Byzantine Empire. From the former it is possible to identify two main types of glassware: 13th- to 14th-century gilt and enamelled Mamluk glass (pp. 99-100) and wheel-cut vessels (pp. 103-4). Despite the problems of identifying 'Byzantine' glass (cf. p. 16), there is one recognized type: gilded and enamelled bottles. A rare example was found at Tarquinia, not from the Palazzo Vitelleschi, but from another medieval tower-house in the town (no. 260; Fig. 75; Whitehouse 1982). There is also a possibly related wheel-engraved piece from Farfa, decorated with fish and palm trees (no. 261; Figs 77 and 78b).

Luxury glass, especially the 'Aldrevandin' glasses with enamelled figurative or foliate decoration, produced in Venice should also be regarded as an 'import' to central Italy and especially the Papal States. The reasons for this are both political and logistical. During the 13th and 14th century Venice and her citizens had been sporadically excommunicated by the Pope, although considerations of trade and profit possibly overrode the resulting ban on relationships with the city-state. In 1309 Clement V instigated a papal crusade against Venice in order to regain papal rights over Ferrara (cf. Abulafia 1980, 186-8). A second reason could have been the difficulty in transporting such a fragile and expensive commodity over the Apennines. This would have suggested trade by sea, but trade along the Mediterranean coast of Italy at this time was dominated by Genoa, a rival of Venice. Further more, although glasses of the 'Aldrevandin' type have a wide distribution in northern Europe they have not been recorded in central Italy or Tuscany. Indeed, the few fragments known from Italy come from Palermo, Sicily (Falsone

1976, fig. 29 and Mentasti *et al.* 1982, 67-8, no. 46) and Lucera Castle, Apulia (Whitehouse 1966, 177, fig. 31.4), i.e. from regions with strong Venetian links. For longer discussions on this distinctive group of vessels cf. Baumgartner and Krüger 1988, 126-60, nos 72-119; Carboni 1998 and Krüger 1998.

The discovery of several shipwrecks containing glass shows that both in earlier and later periods long distance sea-trade in glass vessels, raw materials and cullet for recycling existed. An early 11th-century shipwreck transporting Islamic glass was found at Serçe Limanı, a natural harbour on the southern Turkish coast. The ship contained three tons of cullet in the hold that also acted as ballast, and about eighty Islamic glass vessels from the living quarters, possibly both for personal use and trading (Bass and van Doorninck 1978; Steffy 1982; Bass 1984 and van Doorninck 1990). It has been estimated conservatively that two-thirds of a ton of cullet represents somewhere between 10,000 and 20,000 vessels belonging to over 200 different vessel forms (*ibid.* 1990, 59).

From the 15th century onwards it was Venice that was exporting glass to the east, after Timur had destroyed the glass industry in Damascus in 1401. Brascha of Milan, who visited the Holy Land in 1480, recorded that the captain of his ship 'sent from Jaffa to Damascus glass vessels from Murano' (Whitehouse 1991b, 45). Indeed, there are still Venetian mosque lamps preserved in the Topkapi Palace, Istanbul, some of which are made in *vetro a filigrano* (cf. Rückert 1957 for an example in Istanbul and Drier 1988b for a lamp now in a Swiss museum). A shipwreck of *circa* 1583 was found at Gnalić, off the Dalmatian coast, filled with Venetian glass (Gasparetto 1973, *idem* 1975/1976 and Petricioli 1973).

There are two principal sources of information for the presence of Islamic and Byzantine glass imported into Europe and specifically into central Italy during the Middle Ages: the glasses themselves (cf. Charleston 1976 and Tait 1998) and documentary sources, mainly inventories (cf. Rogers 1998). Surviving custom records, for example, concentrate on the duties levied for the importation of staple goods, such as wheat and oil, and do not appear to mention glassware (*ibid.* 69). This could indicate that glass was not imported in bulk as otherwise it surely would have been taxed or at least merited some sort of official attention. It must also be remembered that some imported glass could have been brought back as souvenirs from the Near East by crusaders and pilgrims, possibly like the 'Luck of Edenhall' (Charleston 1959) or represent diplomatic gifts as with an Islamic flask from the royal Pyx Chapel at Westminster (Tyson 1996, vol. 1, 121). They

could also have been the personal possessions of foreign nationals living in Italy, as is thought to be the case at Lucera Castle, in Apulia (see below p. 100; Whitehouse 1966, 176-7). It has not been possible to identify any imported glass from the iconographical record.

GILT AND ENAMELLED MAMLUK GLASS

Gilt and Enamelled Mamluk Glass in Central Italy

No pieces of Islamic gilt and enamelled glass have been recovered from either the Abbey of Farfa or the Palazzo Vitelleschi, Tarquinia. An intact beaker (Fig. 73), however, was found at the end of the 19th century under the altar of the now destroyed church of Santa Margherita, Orvieto (Louvre, inv. no. A.O. 6131; Lamm 1929/1930, vol. 1, 329, vol. 2, pl. 127.1; Charleston 1976, 335, no. G2 and Wenzel 1984, 11, fig. 9). This cylindrical beaker has a flaring mouth and is decorated in gilt and polychrome enamel with a horseman between bands of eulogistic *naskh* inscriptions. The deposition of glasses, possibly as reliquaries, within or under altars also occurs in Rome and elsewhere (cf. pp. 93-6). However, this is the only Islamic example known from central Italy that was deposited in this manner. Usually these highly prized pieces were embellished with gem encrusted mounts and placed on display in cathedral treasuries, like two beakers in the Grünes Gewölbe, Dresden (Lamm 1929/1930, vol. 1, 332, vol. 2, pl. 129.2-3 and Charleston 1976, 331, nos B5 and B6).

There are two further Islamic gilt and enamelled vessels from Italy that have never been buried, which might suggest that they survived as heirlooms or collectors' pieces. However, neither of these vessels have provenances that date back beyond the mid-19th century so they could have arrived in Italy after the Middle Ages. The first is a cobalt-blue cylindrical bottle with an enamelled *naskh* inscription around the shoulder and a design of polychrome hexagons infilled with gilt stars on the body, in the Museo Civico di Arte Medievale, Bologna (Carboni 1993 and Newby 1998, 38, no. 5, figs 10.5-6).

The second intact vessel is the 'Cavour Vase', a large blue gilt and enamelled vase decorated with green parrots, arabesques and both Kufic and *naskh* eulogistic inscriptions, that was recently acquired by the National Museum of Qatar (Lamm 1929/1930, vol. 1, 293-4, vol. 2, pl. 110 and frontispiece to both volumes; Newby and Sheppard 1991, and Newby 1998.. The names and titles contained within the *naskh* inscriptions are those of Sultan Salāh al-Dīn Muhammad (1361-3), although they do not mention him by name

(Newby 1998, 37). The vase was first recorded in 1861 when it passed on the death of the Italian statesman, the Count of Cavour, to the husband of his niece, the Marchese Alfieri di Sostegno. Lamm, however, recorded an unsubstantiated story that this vase had been brought back from the Crusades by a member of the d'Allinges family (Lamm 1929/1930, vol. 1, 293). This would give it a provenance similar to that of the celebrated 'Luck of Edenhall' that was formerly in the possession of the Musgrave family of Edenhall, Cumbria, before it entered the Victoria and Albert Museum, London (inv. no. C.1-1959; Charleston 1959 and 1976, 33-4, no. D1).

A fragment from a 13th-century Islamic enamelled beaker was found among the evidence for glass production at Monte Lecco (Fossati and Mannoni 1975, 62, 64, pl. 2). This sherd is decorated with an interlaced geometric design outlined in red against a blue enamelled background. It raises three interesting but presently unanswerable questions as to why an imported fragment might be found on a glass-making site. Firstly, was this an example to be learnt from, as has been suggested for the presence of a Byzantine bottle at Corinth (Megaw 1980, 25), or could it be evidence of an Islamic glass-worker or of a glass-worker who had travelled to the Near East working on the site? Lastly, could this be evidence for a trade in Islamic glass from a Spanish source rather than direct from Syria or Egypt, as Genoa had good trading relations with Spain at this time (Abulafia 1974, 225)?

Fragments from eight different Islamic gilt and enamelled glass have been found at Lucera Castle in Apulia together with a fragment from an 'Aldrevandin' beaker (Whitehouse 1966, 176-7 and Charleston 1976, 335, no. G3). Lucera was the nucleus of a colony of Saracens, founded in 1223, who had been transferred from Sicily and which had mosques, an imperial harem and a menagerie (Whitehouse 1966, 171-2). From documents it is known that in 1236 a third of the colony converted to Christianity and that the whole community had become Christian by 1269. However, this might have been for reasons of expediency and would not have negated the importation of objects from their homeland for their personal use. Further fragments have been found during excavations of the Castello di Salerno (Marino 1992, 64, no. C28, fig. 25.1).

Pseudo Islamic Glass

Among the finds from the Palazzo Vitelleschi, Tarquinia, is a fragment from a cylindrical bottle neck that was originally decorated with a gilt decorative band, possibly a pseudo-

Kufic inscription (no. 186; Figs 45.186 and 78a). This fragment is made in transparent yellowish glass and while the gilt decoration has rubbed off, the pattern survives as a shadow which indicates that it was originally fired onto the vessel rather than cold-painted. The position of the inscription on the neck is similar to that found on 13th- or early 14th-century Islamic bottles and vases, for example, a bottle inscribed with the titles of the Rasulid Sultan al-Mujāhid 'Ali (1321-63) in the Freer Gallery, Washington D.C. (inv. no. 34.20; Porter 1998, fig. 21.3). This flask has a long neck with a tooled hollow-tubular flange about a third of the way down, that is similar to the neck bulges found on Italian medieval bottles. The fragment from the Palazzo Vitelleschi, is made in a similar glass metal as the bottles with neck bulges and applied blue trailing (e.g. no. 147; Fig. 36a) and could have been made in the same glass-houses. If so, it would be the first piece of local Italian production to be identified as having pseudo-Islamic decoration.

Pseudo-Kufic inscriptions may also be found around the interior of the rim and on the exterior of the base of the famous purple Byzantine bowl with enamelled medallions in the Treasury of San Marco, Venice, that was looted from Constantinople in 1204 (*Treasury of San Marco* 1984, 180-3, no. 20). Pseudo-Islamic inscriptions were used also as a decorative motif in southern Italian church frescoes. They occur in bands, for example, on the triumphal arches in the Abbey Church of Santa Maria di Cerrate, Squinzano, and in early 13th-century frescoes in the Church of San Pietro Barisano, Matera. Pseudo Kufic letters may also found in a mosaic of 1322 in the Baptistery of San Gennario, Naples, while real Kufic inscriptions occur in mosaics in Brindisi and Taranto.

Islamic Glass in Europe

Islamic glass has always been prized and admired in Europe as may be seen in the accounts of contemporary western travellers who praised the glass produced at Damascus. Symon Simeonis, for example, wrote in the account of his pilgrimage in 1325-1326,

'Concerning the wealth of this city, however, which shows forth particularly in gold and silver, cloth of gold and silks ... in glasses most pleasingly decorated, which are commonly made in Damascus ... we forbear to write: for they cannot be captured on paper, nor set forth in words.' (Lamm 1929/1930, vol. 1, 493, excerpt 59).

The Italian pilgrim, Gucci, who was in Damascus in 1384 also reported that luxury glass was sold there (Irwin 1998, 25). Earlier, in *circa* 1168, Benjamin of Tudela wrote that at



Tyre there were 400 Jews who were making money from glass-making and ship-owning. He also referred to Jews involved in glass production at Antioch (Irwin 1998, 24). This is another reference to glass-makers being Jewish as noted above (p. 37) and illustrated in the fresco of 'The Miracle of the Hebrew Boy' in Orvieto Cathedral (Plate 4). However, it is not possible in this thesis to expand this point further.

Examples of Islamic glass have been found distributed widely across Europe both from archaeological excavations and preserved intact in cathedral treasuries and private houses since the Middle Ages. Of the thirty-four listed by Charleston three came from Italy (Charleston 1976, 335, nos G1-3). A striking feature to emerge from these pieces is the predominance of figured decoration rather than arabesques and palmettes. The most popular theme appears to be that of horsemen as on the beaker from Orvieto discussed above (p. 99) and on two pilgrim flasks. The first, reputedly from an old Würzburg collection, is now in the British Museum (inv. no. S 334; *Masterpieces of Glass* 1968, 114-15, no. 153 and Charleston 1976, 332, no. B7) and the second in St Stephen's Cathedral, Vienna, was used as a reliquary to contain Bethlehem earth allegedly soaked with the blood of the Holy Innocents (*ibid.* 332-3, no. C1). A frieze of polo-players occurs on a beaker in the Grünes Gewölbe, Dresden, with later 14th- to early 16th-century German silver-gilt mounts (*ibid.* 331, no. B5), while another mounted in early 15th-century parcel-gilt mounts is decorated with fowlers and a frieze of flying birds (*ibid.* no. B6). Other figured designs include musicians as on a beaker in the Landesmuseum, Kassel, that is believed to have been part of the Kasseler Kunstkammer (*ibid.* no. B3) and revellers were found on fragments from a basin or large bottle recovered from a context post-dating 1481 at Häisingborg Castle, Sweden (*ibid.* 330, no. A2).

All the subjects mentioned above would have appealed to western tastes rather than the iconoclastic arabesques and palmettes. This has raised the question as to whether these figured glasses were made specifically for the western European market as argued recently by Carswell when discussing a pair of beakers now in the Walters Art Gallery, Baltimore (Carswell 1998). The first of these is decorated with an octagonal building and a hexagonal arcade filled with hanging lamps, that have been identified as the Dome of the Rock and the Holy Sepulchre respectively, i.e. the two most important pilgrimage sites in Jerusalem, itself the most important place of pilgrimage in the Christian world. The second beaker has a figure riding a donkey with a minaret in the background, that has been interpreted as depicting Christ entering Jerusalem, the minaret probably being that

which still overlooks the Via del Dolorsa (*ibid.* 62).

Syrian glass, specifically, *vidre de Damas* or *vidre domesqui* is mentioned in several 14th- and 15th-century Spanish inventories (Frothingham 1941, 20; *idem* 1956, 2-3). King Martin I of Aragon (1395-1410), for example, had a serving dish of 'Damascus' glass set on a chased silver-gilt pedestal and further embellished with a gilt and enamel eagle (*ibid.* 2). The presence of this type of glass among inventories, which include other valued possessions, demonstrates the high value placed on these objects. In Spain not only kings but also merchants and officials aspired to own pieces of Islamic glass. In 1373 after the death of an apothecary in Cervera a *brocal* (decanter) of Damascus glass was included in the sale of the shop contents, fetching 5 *sueldos* and 1 *dinero* (y Brasés 1911). Pere Beçet (1365? -1430), the bailiff of Cataluña, kept a serving dish of Damascus glass in a luxuriously furnished room overlooking his flower garden (Trabalund Tuberner 1911/1912, 602).

Elsewhere in Europe Islamic glass was equally prized. In France, for example, the inventory of Charles V's possessions in 1379-1380, contained a large quantity of Islamic works of art including textiles, inlaid metal-work and glass *ouvré en la façon de Damas* (Lamm 1929/30, vol. 1, 495, excerpt 68; Charleston 1976, 329). In England Henry IV had in 1389 a '*petit triacler d'arg ennuovrez ovesqu'un glas d'Alisandre [et] autre verre de glass depeynte en dehors*' (Hartshorne 1897, 139).

Most of these glasses would have arrived in Europe in the later 13th and first half of the 14th century, but appear as antiques or heirlooms in inventories a century later like that of Gastone Moncada, dated 13 December 1455 (Bonanno and d'Angelo 1971-1974, 347). Moncada, possibly a Spanish merchant residing in Palermo, owned a number of glass vessels (*vitru*) including four which are labelled *damaskina* or *damaskinu*. These were listed together with some of the latest fashionable and expensive pieces of *crystallo* from Venice (*vitru cristaudimu*). The 1456 inventory of Piero Cosimo de'Medici also includes a *vetro domaschino*, that presumably refers to an antique glass (Lamm 1929/1930, vol. 1, 495, excerpt 71).

WHEEL-CUT ISLAMIC GLASS

There are examples of at three imported Islamic glass beakers with wheel-cut decoration from the Abbey of Farfa (nos 257-9: Fig. 74). These fragments comprise the complete thick base and lower body of a straight-walled beaker with a wheel-engraved pattern of

semi-circles (no. 257; diameter 40 mm and 16 mm thick); body fragments from the lower part of a thin walled beaker with shallow wheel-cut grooves (no. 258) and ten similar straight walled fragments, possibly from several different vessels, decorated with a combination of wheel-cut grooves and incised lines of diamonds within circles or ovals (no. 259; Newby 1991, fig. 5b).

There is another distinctive group of wheel-cut beakers that might have been produced in the Near East, as their style of cutting comes from a long eastern tradition of glass and hardstone engraving. These 'Hedwig' beakers are so-called because of the legendary association of one example with St Hedwig (1174-1243), the patron saint of Silesia (cf. Allen 1987 for a survey of the twenty-four known examples). They are made in very thick colourless or almost colourless glass, often with a smoky topaz tinge and decorated when cold by a series of irregular wheel-cut facets, leaving the design element (lions, griffins, eagles and/or palmettes) in high relief with vertically cut or bevelled profiles. No examples have been found in the Near East. Instead, their distribution is concentrated in central and eastern Europe. Two examples, however, are known from Italy. Three fragments from the lower part of a beaker with a base diameter of 50 mm were found in 13th-century deposits during excavations of the Palazzo dei Vescovi, at Pistoia (Vannini 1987a, 633-4, no. 3563, fig. on p. 643).

The second beaker was recorded in the mid-17th century at Loreto, near Ancona, when Bishop Anthony Crosin presented '... a crystal beaker in a gold mounting inscribed "Cup of St Hedwig"' to the treasury of the church of the Holy House in Loreto in 1659 (Allen 1987, 20, no. 21). It was last mentioned in an inventory of the Holy Chapel dated 1660-1690, but during the French occupation of 1796-1799, the Napoleonic Commissioner seized all the gold and silver '... including a mounting for a rock crystal beaker'. No mention is made as to what happened or had happened to the beaker, but it highlights the danger in assigning pieces to contemporary distribution maps without fully investigating their full provenances as this beaker only arrived in Italy some three and a half centuries after it was made.

BYZANTINE GILT AND ENAMELLED GLASS

Introduction

For a long time there have been problems in securely identifying Byzantine glass production (Philippe 1970). This has not been helped by the misinterpretation of the

dating of the only known glass-making site at Corinth, which rather than being destroyed by Roger of Sicily in 1147 was in fact operating during the later 13th and early 14th century (cf. pp. 27-8). Whitehouse suggested that the Corinth glass-house may have been manned by Italian glass-workers (Whitehouse 1993, 662), possibly in a similar manner as the Tuscan glass artisans documented as working in Sicily in the mid-14th century (cf. pp. 31 and 55).

Byzantine Gilt and Enamelled Glass

To date only one type of glass has been recognized as being produced within the Byzantine Empire, although the actual production site remains uncertain. These vessels, made in either blue or purple glass, are mostly composed of tall cylindrical bottles with gilt and enamelled decoration arranged in horizontal zones, including animals within roundels. They are well known from Cyprus where excavations at the Castle of Saranda Kolones, at Paphos, produced six examples (Megaw 1959 and 1968). The castle passed from Byzantine to Crusader hands in 1191, but was destroyed by an earthquake in 1222, thus providing a good *terminus ante quem* for these vessels. Further examples have come to light in Russia at Novogradok, near Minsk (Gurewitch *et al.* 1968, pl. 1) and Dvin, Armenia (Megaw 1959, 60) and at the Agora South Centre glass-house at Corinth (Davidson-Weinberg 1940, 316, fig. 20 and *idem* 1952, 115, no. 750, fig. 14, pls 58 and 146). It has been proposed by Megaw (1980, 25) that the latter piece rather than being made at the glass-house was an import or sample.

Several examples have been found more recently in Italy at Otranto (Giannetta 1992, 230, no. 78) and Tarquinia (Whitehouse 1982). The bottle from Tarquinia (no. 260) was found by chance during the restoration of a medieval tower-house in the Via delle Torri in 1982. The find comprised five fragments from a blue cylindrical bottle decorated in opaque white enamel and gilt with a restored height of 205 mm. The reconstructible design (cf. Fig. 75) shows three zones divided by double horizontal gilt bands. In the upper zone are three roundels containing collared hares, then there is a wide band with small gilt crosses and the bottom zone has three roundels containing turtle doves. The design on this bottle is similar to that on fragments identified recently in the Gorga Collection that were probably found in Rome as with the other antiquities from the collection (Fig. 76; Sagui 1998, fig. 47 on p. 35).

Two chapters of Theophilus' *De diversis artibus*, written in the early 12th century,

are devoted to how the Greeks embellished their glass goblets with gold and silver (Dodwell 1986, chapters 13 and 14). However, it is not clear whether these 'Greeks' were practising their art in Greece or elsewhere in Europe. The second method described involves the application of gold and enamels in figurative designs not dissimilar to that found on the bottles mentioned above (*ibid*, chapter 14),

'They [the Greeks] take the gold, ground in a mill, which is used in books and mix it with water - the same with silver. With it they make circles and, in them, figures of animals or birds in varied work, and coat these with the very clear glass of which we have spoken above. Then they take the white, red and green glass, which are used for enamels ... with them, they painted small flowers and scrolls and other small things they want, in varied work, between the circles and scrolls, and a border around the rim....'

Byzantine Wheel-Cut Glass

The medieval glass from Farfa also includes several luxury vessels from the eastern Mediterranean, which were either imported or donated. The most important of these are twelve fragments from a tall cylindrical vessel made in high quality yellowish glass (no. 261; Figs 77 and 78b; Newby 1987, 265-8; *idem* 1991, 36, 38, figs 6-7). The walls were wheel-cut and engraved with a reconstructible design of two date palms with five branches and opposing fishes on either side of the trunks on the upper part and with a double guilloche also containing fish on the lower part below two horizontal grooves (Fig. 77). The knock-off rim, that has a diameter of 65 mm, has been left rough and unsuitable to drink from, suggesting that it might originally have had a metal mount or that it was cut down from a bottle at a later date, possibly after some form of accident. If the former, then it would have parallels with a mid-14th century Syrian beaker with a chipped rim from a medieval metal reliquary now in the Rheinisches Landesmuseum, Bonn (inv. no. 203; Baumgartner and Krüger 1988, 124-5, no. 71). The Christian symbolism of the engraving on the Farfa beaker further suggests that it could have been used as some kind of reliquary. However, would a broken reliquary have been carelessly discarded among other rubbish? It could have equally started out as a bottle especially if one considers the close parallels in its form and style of decoration with the Byzantine gilt and enamelled bottles discussed above (cf. Figs 75-6).

CONCLUSION

Most of the imported vessels discussed above come from cathedral treasuries, like that of San Marco, Venice, which contains pieces of Islamic or Byzantine craftsmanship, looted from Constantinople in 1204 during the Fourth Crusade. If these pieces are typical of luxury imports to medieval Europe it might, at first, seem surprising that nothing comparable survives in Rome, a pilgrimage centre second only to Jerusalem, teeming with pilgrims and merchants from all over the known world. The Vatican must have received many rich diplomatic gifts and valuable donations for the basilica, even during the Schism, similar to the 'Goblet of the Eight Priests' at Douai, France (Lamm 1929/1930, vol. 1, 274, vol. 2, pl. 96.1). This was an enamelled Islamic goblet bequeathed to Douai Cathedral in 1329 by Marguerite Mullet (or Mallet) together with an endowment for the maintenance of eight chantry priests, who met annually and drank to the memory of their benefactress (Tait 1998, 53).

There is no mention of glass in the inventories of old St Peter's as listed by Müntz and Frothingham (1883). In the *Liber Anniversorum* of the Vatican Basilica for 9 May, 1350, reference is made to a Venetian who came to Rome with some friends to make an offering to the basilica to protect the *sudarium* - a *pulcheriman et mirabilem tabulam de cristallo, pulcris lacrimis argenti deaurati in quodam ligno quadrato* (a very beautiful and amazing glass container, with beautiful tears of gilded silver, on a square [?] wooden frame; pers. comm. Mandy Collins). This was to be placed before the *Dei Vultum* (divine face, presumably the 'Veronica'; Egidi 1908, 210-11). This must have been a major donation for it to be included in this necrology, especially in a Jubilee year, albeit only the second. Although it is not clear whether the Venetian visitors or pilgrims were the makers of the casket, it demonstrates that by the mid-14th century Venice was associated with the production of luxury glass.

During the Schism, the inventory of Clement VI (1342-3) at Avignon included two possible pieces of imported glass: *vas vitreum laboratum pro aqua rosea* (a decorated glass vessel for rose-water), possibly a *qumqum* (Rogers 1998, 69), and an *amphora di vitro cum modico de balsamo* (glass amphora containing some balsam; Hoberg 1944, 60), which might refer to a Mamluk enamelled glass amphora or pilgrim flask like the examples in the Cathedral of St Stephen, Vienna (Charleston 1976, 333, nos C1 and C2). Later, the inventory of Innocent VI (1352-1362) includes a *pinta de vitro picturato cum supercupo de i aspide rubro, memrato argento deaurato cum i serpente in ansa* (enamelled glass

with a figural scene mounted as a small glass ewer or jug) that formerly belonged to the Abbot of Dijon (Hoberg 1944, 289, 241). However, this entry does not make it clear whether it was of eastern, especially Damascene manufacture.

Two major historical events, however, could explain this scarcity of pieces surviving pieces in Rome. The first was the Sack of Rome in 1527 by imperial troops, the second was the Treaty of Tolentino in 1797 which Pius VI was forced to conclude with Napoleon, further impoverishing not only the treasury of the Vatican, but removing art treasures from the whole of Italy. The 'Hedwig' glass recorded at Loreto, near Ancona, in the 17th century is believed to have been one of those pieces that disappeared during the French occupation (Allen 1987, 20). The glass now in the Museo Sacro of the Vatican was found predominantly during explorations and excavations of the catacombs and restorations of the many churches in the Eternal City.

7: UTILITARIAN GLASS

INTRODUCTION

The medieval utilitarian glass discussed in this chapter includes those vessels made for everyday use in domestic, ecclesiastical, commercial and industrial contexts. These are not the fine tablewares discussed in the preceding chapters, but more humble and mundane glasses whose forms were dictated by practical and functional considerations, rather than by transient fashion. As such their basic forms remained substantially unchanged for centuries and are more closely related to glass vessels from other regions, so that in the case of urinals and lamps, for example, it is possible to discern wider European trends.

During the Middle Ages, even the most expensive and prestigious tablewares, including imported Islamic pieces, contain some bubbles and, occasionally, tiny pieces of grit. Utilitarian glasses were usually made of poorer quality glass, with thicker and uneven walls and were only rarely embellished with any form of decoration. Glass urinals, however, are an exception as their body walls had to be thin and transparent to allow for a proper examination of their contents. This comparison between table and utilitarian glass can only be tentative. The identification of forms within either group is difficult at a period when glass was still considered a luxury and when some forms could serve several different functions. The attention to detail in utilitarian pieces was not always as high, as may be seen in the careless finishing of rims and the less regular wall profiles of the vessels described below. While the quality of the glass metal (i.e. its clarity and presence of bubbles and impurities etc.) used for utilitarian pieces may be lower than that for the finewares, medieval Italian glass, with its pale yellow and/or greenish tints is generally of a higher quality than the darker green or amber-coloured potash *Waldglas* of northern Europe.

From the inventories of glass-makers' stock (cf. Appendices D-F) it would appear that tablewares and utilitarian vessels were made in the same glass workshops. The difference in the quality of glass metal, was recognized in medieval Italy as may be seen at Bologna where late 14th-century documents relating to the manufacture of glass in the city mention two types of glass: '*verde*' (greenish) and '*bianco cristallino*' (white crystal, i.e. almost colourless). Vessels made of the former were less expensive although the weight of the finished article made of either type was the same (cf. Appendix D; Nepoti 1987b, table on p. 140).

The utilitarian glass discussed in this chapter has been divided into four main sections, although the same form may have been used for several different purposes: glass for storage, distilling apparatus (for medicines, alcohol and metal assaying), medical glass, and lighting. Comparisons made between surviving examples and depictions in illuminated manuscripts and frescoes help to place these vessels in their correct historical perspective. It must also be remembered that some practices, especially in the field of medicine, which are no longer in use may have required a range of glass forms not readily identifiable.

GLASS FOR STORAGE

Introduction

Many of the vessels discussed below could have been used for both commercial and domestic purposes. This section will concentrate on two major types of glass vessels that would have been used for storage of liquids, semi-liquids and solids, i.e. bottles and covered vessels. Contemporary medieval depictions of kitchens are rare, but from those that do exist the absence of utensils, whether pottery, metal or glass is noticeable. Cooking utensils were simple and usually take the form of metal cauldrons that were suspended over the fire, and ceramic pots, dishes and jugs. The chain from which cauldrons were suspended and other utensils may be seen being used in two depictions. The first, is in a manuscript illumination from a mid-13th century 'New Testament' in the Vatican Library of 'Christ at the House of Martha and Mary' (Plate 10) and the second is a fresco painted by Ugolino de Prete Ilario (1357-1364) in the same chapel in Orvieto Cathedral as the 'Miracle of the Hebrew Boy' (Riccetti 1988, pl. 8). Plate 28a, which shows a detail of a mid-14th century still-life of a kitchen in the cathedral of Spilimbergo, includes a pair of glass cruets and glass jugs, the former presumably used for oil and vinegar (see p. 86).

Bottles

The bottles included in this section have been selected for a variety of considerations: metal, size, absence of decoration and representations in the iconographical record. They all come (with the exception of four pieces from Farfa) from the Palazzo Vitelleschi, Tarquinia, where the recognition of utilitarian pieces was made easier because the large assemblage allowed for the secure identification of tablewares. Figs 44 and 46 show tentative reconstructions of the three major fineware flask types from Tarquinia.

FLATTENED BOTTLES

The bottles discussed in this first section are distinguished by their flattened bodies (nos 262-6; Fig. 79). First is the rim, neck and upper body of a large bottle (no. 262; Figs 79.262 and 80a) made in thick semi-transparent bubbly bluish-green glass that contains a lot of bubbles and blowing spirals. This piece has a short everted mouth with a bevelled rim (diameter 42 mm) on a strong cylindrical neck that splays towards the bottom. When first published by Whitehouse (1987, 330, no. 42, fig. 6.42) no body fragments had been identified. It is now shown to have had rounded shoulders and a flattened body. No base fragments have been identified but they were probably similar to a second, thinner example also made in very bubbly bluish-green glass that has a rounded bottom that thickens gently towards the middle and which still has part of the pontil attached (no. 263; Fig. 79.263). There are also two fragments from two smaller bottles with thick rounded bottoms and flattened sides that are of similar metal to the group of small round-bottomed spherical bottles discussed below (pp. 113-14)

These bottles would have required external support for them to remain upright. In a mid-14th century fresco by Tommaso da Modena of 'St Jerome' in the Church of S. Niccolò, Treviso, a clearly delineated flattened flask within a wicker casing is suspended from the wall by a nail (Plate 17b). Only the mouth and neck of the flask is visible above the level of the wicker and it is similar to a bottle in a fresco by Taddeo Gaddi (1332-1338) from the Church of S. Croce, Florence (Plate 17a).

WIDE-MOUTHED BOTTLES

The bottles are grouped in this section because of their large mouths, that range in diameter from 68 to 110 mm, fall into three groups. The first is represented by fragments from four large bottles with funnel mouths (nos 267-70). The largest piece (Figs 80b and 81.267) forms most of the neck and the top of the wide rounded shoulders from a huge bottle made in transparent pale greenish glass containing tiny bubbles and pieces of sand. This fragment is 180 mm high which suggests that the original height could have been between 450 and 500 mm. It is very similar to two very large bottles supposedly filled with *aqua ordey* depicted in an illustration of the *Tacuinum Sanitatis* (Plate 39a). These bottles have funnel mouths (in this instance each stoppered by an apple) and bulbous bodies on pushed-in bases with kicks and hollow tubular base-rings similar to smaller bottles from Tarquinia (nos 176-85; Figs 42b and 43).

The next five bottles have wide flaring mouths above a tooled neck bulge and wide cylindrical necks (nos 274-8; Fig. 81.274-8). This distinctive horizontal neck bulge or swelling that occurs *circa* 15-21 mm below the rim, has already been noted on fineware bottles from the Palazzo Vitelleschi (nos 147-50; Fig. 35). Bottle mouths would have been covered with pieces of waxed cloth tied with a piece of string secured below such a bulge as may be seen in a 15th-century miniature from an Italian medical manuscript showing a glass urinal covered with a piece of white cloth, possibly waxed, and tied with string (Plate 38). In large households, cooking stores would have been kept in a separate room or as far away as possible from the dirt, dust and soot of the fire. Probably for the same reason, glass beakers are often depicted laid upside down on a table before the meal has started (cf. Plate 11 and p. 68). The slight swelling would also have afforded a better grip. Sometimes these vessels have been identified as coming from the mouths of urinals (cf. Whitehouse 1987, 327, no. 37, fig. 5.37) but there is no firm evidence for this (see below p. 118).

The last group are formed by fragments from six bottles or flasks with wide flaring mouth on broad roughly cylindrical necks (nos 279-84; Fig. 83). These include many fragments making up half the rim and neck of one large bottle made in pale brown seeded glass with a surviving height of 174 mm and a rim diameter of 95 mm (no. 280; Fig. 84).

LARGE AND MEDIUM-SIZED BOTTLES

There are a further five large or medium-sized bottle types that could have been used for storage at the Palazzo Vitelleschi, Tarquinia. Figs 81.271 and 82a show the reconstructed upper body and tapering neck from another very large bottle probably originally about 400 mm high, made in greenish-colourless glass containing tiny bubbles (no. 271). The body appears to have a carination with a maximum diameter is 204 mm which would make it a much larger albeit undecorated version of no. 192 (cf. Fig. 46.192).

The second type is represented by the rims and necks of four medium-sized bottles with unevenly flaring mouths (diameters 42-60 mm) on cylindrical or gently splaying necks (nos 288-91; Fig. 85.288-90). There are two examples of the third type, a variation on the second in that the flaring mouths have been manipulated to form a pouring lip with maximum rim diameters of 55 and 66 mm respectively (nos 286-7; Fig. 85.286-7).

The last two forms are represented by single examples only. Fig. 85.295 shows the upper part of a container with an upright rounded rim and short cylindrical neck on

sloping shoulders (no. 295), while Fig. 86.296 illustrates the short neck and inturned rim of a flask or closed vessel made in greenish colourless glass from Farfa that has an internal rim diameter of 16 mm (no. 296).

BOTTLES BASES

The bottle bases discussed in this section belong to two main forms: those with pushed-in bottoms and others with rounded bottoms. Two further sub-divisions may be seen within examples of the former. The first is the bottom of a small flask, presumably with a cylindrical body, that was pushed-in to create a very high and prominent kick that extends 63 mm into the lower part of the bottle although the base diameter is only 48 mm (no. 297; Fig. 87.297). This fragment from the Palazzo Vitelleschi was one of the few diagnostic sherds from pit 72, but a fragment from the tip of a similar high kick (no. 298; Fig. 87.298) from context 187 of pit 181 suggests that these together with another base with a high domed kick from context 182 (no. 299; Fig. 87.299) might date to the 15th century. There are fifteen examples of the second type at the Palazzo Vitelleschi and an additional two from Farfa (nos 300-16; Figs 87.304, 309 and 310). The base diameters of these bottles, where discernible, ranges from 64 to over 100 mm. The examples from Tarquinia tend to come from the lower deposits of pit 181 that are associated with pruned beakers and finewares bottles with neck bulges.

There are thickening rounded bottoms both with cut-off pontils and others left in relief from at least another sixteen different bottles or urinals from the Palazzo Vitelleschi, Tarquinia (nos 317-32). These come from a range of contexts spread across pits 9 and 181. It is not possible to determine what their upper bodies looked like but there is a reconstructible cylindrical bottle with a rounded bottom from Farfa (no. 285; Fig. 83.285). It is made in transparent greenish-colourless glass containing small bubbles and has a reconstructed height of 240 mm and a maximum mouth diameter of 33 mm. The flaring mouth is very uneven and the cut-off rim was turned inwards to create a small aperture at the top. The cylindrical body is tall but also uneven and the rounded bottom has part of the pontil still adhering to it.

SMALL ROUND-BOTTOMED FLASKS

The last bottle type to be discussed here is represented by ten upper body fragments and seventeen bases from the Palazzo Vitelleschi, Tarquinia (nos 333-55; fig. 86; Whitehouse 1987, 329, no. 32, fig. 5.32). These are small bottles or phials with small flaring mouths

(diameters 16-22 mm) on cylindrical necks of varying lengths, spherical bodies with thicker rounded bottoms, often with part of the pontil still protruding. Like the flattened flasks with rounded bottoms (cf. no. 263) and the bottles bases discussed above these small flasks would have had to have some form of additional support. These small bottles are the most widely diffused form found at the Palazzo Vitelleschi with examples being found in all four pits (nos 4, 9, 181 and 410). This, together with adjoining fragments of other vessels found in several different pits (cf. especially nos 255 and 356), further indicates that it is not possible to associate the finds from any one pit as containing objects from one specific part of the 'proto-palace'.

Covered Vessels

The above-mentioned bottles would have been suitable for the storage of liquid and semi-liquid products, but solid goods would have had to be stored in sealable containers. Stiaffini in her tentative typology of Italian medieval glass only identified a single lid from a glass jar from a 15th-century context in Viterbo (Luzi 1988, 105, no. 4; Stiaffini 1991, 247, fig. 8.2). However, re-examination of the material in the Museo Sacro of the Vatican Museums revealed seven undecorated covered jars (nos 245-51; Figs 65.246 and 66) and a deep container (no. 239; Fig. 55.239). These were all used as reliquaries and when compared to further covered vessels from the Church of Santa Croce in Gerusalemme, Rome (Fremersdorf 1975, pl. 68), demonstrate a wide range of forms previously unrecognized. Without their lids, the jars in Figs 65 and 66 could be simply classified as bowls or beakers respectively. The latter two covered jars, together with five other jars from the same workshop, were found in an altar in San Giorgio in Velabro (nos 247-51; cf. pp. 93-4) originally placed there as reliquaries like the gilt and enamelled Islamic beaker from Santa Margherita, Orvieto (cf. p. 99).

DISTILLING APPARATUS

Introduction

Basic distilling apparatus is composed of three units: the cucurbit, the alembic and the retort (Fig. 88 after Moorhouse 1972, fig. 25 on p. 88). Although processes were refined over the centuries, these vessels retained their original shapes as may be seen when comparing 8th- or 9th-century Islamic and medieval European manuscripts (cf. Plates 29-32). The first vessel, the 'cucurbit', so-called on account of its gourd-like shape, would

have contained the liquid to be distilled and been supported over a flame, sometimes in a water bath. It is used with an 'alembic', in the shape of an inverted bowl with an internal gutter along the rim which collected the condensed vapour that had trickled down the inside of the dome before passing out through a spout into a receiver. A third distinctive part was the retort, usually with a globular or ovoid body and characterised by a long thin attenuated spout extending obliquely from the upper part to the receptacle for the distilled liquid. Sometimes there is an orifice for filling the retort. The rounded bottom of the retort rests on a stand over a flame. Sublimation, the conversion of solids into vapour, did not require such complicated equipment.

Evidence from Central Italy

Fragments from an alembic found at the Palazzo Vitelleschi, Tarquinia (no. 356; Fig. 89; Whitehouse 1987, 327, no. 27 and Stiaffini 1991, 226, fig. 4.2), must be among the earliest surviving European examples. Made in transparent pale green colourless glass containing a lot of tiny bubbles, adjoining fragments were found in four different contexts from pit 9 and a fifth in pit 181 to form about half the rim, with a diameter of 84 mm. The domed part of the alembic is missing or remains unrecognized among base fragments from rounded-bottomed bottles like nos 317-32 described in the previous section (p. 113 above). A small, thick spout fragment (no. 221; Fig. 54.221), made in transparent pale yellowish-green glass might also come from an alembic rather than a cruet (cf. p. 83). It was found in context 18 of pit 4 which from Table 1 on p. 10 can be seen have produced other adjoining fragments from contexts in pit 9 that contained pieces of the alembic rim (no. 356).

Fragments from spouts are also known from Monte Lecco (Fossati and Mannoni 1975, 59-60, no. 67b), Pistoia (Vannini 1987a, 632, no. 3551) and Germagnana (Mendera 1989, 74). The form of the alembic remained basically unchanged for centuries as can be seen from two 16th-century examples from Strasbourg (Baumgartner and Krüger 1988, 434, nos 547-8, Foy and Sennequier 1989, 336-7, nos 381-2) and also from illustrations in a variety of manuscripts, woodcuts and paintings (cf. Plates 29-32).

Such medieval apparatus is usually found in religious, specifically monastic contexts (there is a post-medieval spout from Farfa) but the 'proto-palace' at Tarquinia has always been considered a domestic site. Alembic fragments were also found in an early 16th-century midden associated with the manor house of More, Hertfordshire (Biddle *et*

al. 1959, 180, fig. 18,17). Moorhouse in his article on English medieval distilling apparatus wrote that the occurrence of fragments of glass alembics on a site could suggest four possibilities (1972, 85-6): the site could be a glass factory, making distilling apparatus among other vessels, the alembic could have been used in a kitchen for distilling wines and liqueurs, with and without herbs, it could have formed part of alchemical equipment, or it could have been used for making nitric acids for use in assaying. There is the possibility that the lower floor of the palace held some sort of apothecary or wine shop. If the latter, this might also explain the presence of a large number of mould-blown beakers, small bottles and large storage vessels. However, there is no other supporting evidence for this hypothesis and the presence of distilling equipment on the site is more probably indicative of the home production of liqueurs etc. as mentioned in the *De materia medica*. The owners of the 'proto-palace' were certainly wealthy and belonged to a level of society that could both read and have access to such books.

Discussion

Archaeological material from Taxila in the Indus Valley, dated 150 BC to AD 350, indicates that the Indian people may have been the first to use distillation and it is most probable that the Chinese learnt the art from India (Anderson 1983, 822). The distillation of alcoholic liquids was first introduced in the eastern Mediterranean at about the same time as that of acids in the 3rd or 4th century. As with the medical texts the first alchemical Greek texts were copied first by Arabs and then at a later date in Europe, cf. a 10th- to 11th-century compilation manuscript in Venice (MS Marcianus 299). Plate 29 shows a Greek manuscript with a *tribikos*, or three-spouted *ambix* or alembic, copied in the 15th century from an 8th- or 9th-century original (Anderson 1983, fig. 1). The earliest mention of alembics as *arabicum* or *arabachi* is testament to their origin in Islamic writings and often appear as such in medieval Genoese inventories. The term 'alembic' itself is an Arabic word derived from the Greek, *ambix* (*ibid.* 823). Islamic texts that were probably known in Europe include the 9th-century treatise by al-Kindi (801-866), 'Book of Perfume, Chemistry and Distillation', which deals mainly with the preparations of essential oils and the work of al-Razi (865-925) an influential physician and alchemist who made frequent mention of the distillation processes while describing the apparatus in detail (*ibid.*).

The distillation of alcohol was probably first practised in Italy *circa* 1100 in the form of liqueurs sweetened and flavoured by infusing leaves (Moorhouse 1972, 84). In circa 1280 the Florentine Thaddeo Alderotti (1223-1303) described how he used wine that had been distilled for medicinal purposes. Roger Bacon (1214-1294) writing on alchemy in the 13th century shows how well the process and products of distillation were known across Europe,

'Alchemy ... it hath taught us how to sublime, distil, and resolve the medicines of the physician, and by many other methods also according to the operations of that science; as is clear in our health giving waters, oils and many other useful things.'

Distillation was used for the working of metal, the making of pigments, medicines and pharmacy. It was widely used wherever metallurgy, especially assaying, was an essential feature of the use of a regulated coinage and of the payment of taxes in coin or in precious metal. It follows that distillation was likely to have been known and understood in many technical centres (Moorhouse 1972, 80). Distillation applied to vegetal ingredients gave rise to a number of aromatic substances, essential oils and medicinal waters, while tinctures were made from ground herbs put into alcohol for a determined length of time (possibly for several weeks) and then strained and stored. It is possible that the liquid produced from the still at the Palazzo Vitelleschi, Tarquinia, were stored in some of the small round bottomed flasks discussed above (nos 333-55; pp. 113-14 above).

MEDICAL GLASS

Medieval glass utensils used in medical practice, both for diagnosis and for treatment were very similar across Europe and showed very few developments in individual forms from the 11th to the 16th centuries. The reasons for this are several fold and are connected with the study of medicine in a few centres like the great universities of Bologna, Paris and Oxford and the famous medical school at Salerno. Medicine was practised by Benedictines and, after the 13th century, by the new mendicant orders of Franciscans and Dominicans.

Urinals and Uroscopy

The urinal is the best-known medical instrument of the Middle Ages and became the symbol of physicians. In a practical sense, examination of urine and stools was the only way of seeing what was happening within the body. Charleston (1984, 33) identified two

main forms of urinal, both of which had rounded bases and thin walls to allow for the examination of the contents. The first was essentially a spherical bottle with a cylindrical neck and wide, almost horizontal rim. The second had a pear-shaped body and flaring mouth. For an early 13th-century urinal from St. Denis and a late 15th to 16th-century example from Strasbourg, cf. Foy and Sennequier 1989, 350-1, nos 370-1 respectively.

A complete profile of a medieval urinal, which corresponds to Charleston's first form, survives from Tuscania dated to the 14th century by Stiaffini (Lamarque 1973, 122, no. 15, fig. 133; Stiaffini 1991, 227, fig. 4.1). It is made in bubbly light green colourless metal with blowing spirals and sandy impurities. The thickened rim (diameter 110 mm) is outplayed over almost vertical walls and a rounded base. Fragments from four similar urinal mouths have been identified from the Palazzo Vitelleschi, Tarquinia (nos 357-60; Fig. 90.357-8 and 360). Other later examples from Italy include a 15th-century urinal from the Palazzo Paradiso, Ferrara (Visser Trouvagli 1985, 217, fig. 61,47) and fragments from the upper body of another were found in a post-medieval cess-pit at Farfa (Newby 1991, 41, fig. 10b).

Another urinal from the same cess-pit at Farfa (*ibid.* fig. 10c) had a infolded hollow-tubular rim over a body flaring towards a thicker rounded base. This is paralleled by two upper body fragments with rim diameters of 110 and 130 mm from the Palazzo Vitelleschi, Tarquinia (nos 361-2; Fig. 90.361; Whitehouse 1987, 327, no. 25, fig. 4.25). The former example comes from the latest fill of pit 181 and is possibly intrusive like other fragments from contexts 181 and 182 (cf. no. 299, the bottle base with a high domed kick discussed on p. 113). This type is also known from contemporary depictions (cf. Plates 36 and 38), as are examples belonging to Charleston's second form (cf. Plates 35 and 37) although no fragments belonging to it have yet been identified from central Italian assemblages. This, of course may be simply due to misidentification, upper body fragments being classified under bottles, jars or even lamps.

The most common medieval representations show the doctor holding an urinal at arm's length in order to examine the urine against the light (Plates 33 and 35), sometimes with patients or servants holding empty wicker baskets designed to ensure the safety of the urinal (Plate 37). One of the things that made uroscopy so popular was the fact that the distinctions it depended upon could be made visible in the shape of coloured diagrams (cf. Plates 34 and 36) that could be consulted by the physician. Plate 34 shows the reverse side of a folding calendar that would also give the relative astrological information needed

by the physician. These diagrams survive in large numbers and usually show about twenty distinctions, usually presented in separate glass urinals with an abbreviated list of common illnesses with which that colour and type of sediment were associated and suitable medicines for their treatment. The following translation of a 14th-century manuscript describes the significance of the different colours of urine,

'Reds, ranging from crocus-colour to that of intense fire, signify excesses of the digestion. Colours resembling those of liver, white leave or cabbage stalks indicate overheating. Black and leaden colours show bad digestion. The colours of spring water, light filtering through horn, milk, or camel hair show indigestion. Pallid colours like cooked fat indicate the beginnings of digestion. Cider colours show medium digestion. Golden colours alone are the sign of a perfect digestion.'

Both the depictions of doctors holding urinals and urine charts show a range of glass vessels, that generally tend to have wide mouths and bodies with rounded bases. However, the question must be asked as to whether these depictions are after vessels contemporary to the scribe, direct copies from earlier manuscripts or due to the copyist's fantasy.

Blood-Letting

Cupping involved the withdrawal of blood from the body by the application of an exhausting vessel or cup. This technique dates back to the *Hippocratic Corpus* where the skin is cut or scarified and a warmed cupping vessel placed over the cut creating a vacuum to draw out the blood. Using a transparent medium for the cup allowed the amount of blood to be assessed. The Science Museum possesses an Islamic example in glass which they have tentatively dated to the 11th to 14th century. It is a thick-walled vessel with a slightly flaring mouth, wide short neck with neck bulge on a hemispherical body. This again would be a difficult vessel to identify from single body fragments and although there are similar rim fragments from Tarquinia they cannot be assigned to this form with any certainty.

Spectacles

Although not a 'medical' implement in the usual sense, the convex lens, either mounted singly or in pairs was used in the Middle Ages by long-sighted people who had lost their ability to focus. Spectacles, according to Zecchin (1956 and 1962) seem to have first appeared during the 13th century in Venice rather than in Florence or Pisa, but instead of

glass, lenses were originally made of rock crystal. Their discovery has also been attributed to both an Italian, Salvino d'Armati (died 1317) and to an Englishman, Roger Bacon (died 1294). By the 14th century specialist ateliers and shops, *cristallers* or *mestres d'ulleres* are known in Italy and from the beginning of the 15th century in Barcelona (Foy 1989c). However, it was not until the 16th century that glass lenses were developed to correct shortsightedness and in 1600 Galileo began using glass lenses in his telescopes or 'spectacles for distant viewing' which had been developed several years earlier in Holland.

To date no recognized lens, whether of rock crystal or of glass, has come from an Italian excavation, let alone within the area covered by this thesis. The earliest depictions occur in two frescoes of 1352 by Tommaso da Modena (1325-1379) in the Dominican convent in Treviso. The first, Plate 42 shows Fra Ugone da Provenza wearing spectacles clipped on his nose while writing at his desk. This form of spectacles, like the handle part of a pair of scissors, is also known from later French carved misericordes (Foy 1989c). The second of da Modena's frescoes shows Cardinal Ugo de Billon reading, using a single lens mounted like a modern magnifying glass (Plate 43). All these depictions are of monks, presumably either scholars or copyists who would have damaged their eyes by reading or writing in ill-lit rooms. In fact, scenes depicting the studies of early church fathers like St. Jerome often include a pair of spectacles suspended from a nail to the side of the wooden desk together with ink pots, knives, pens and other tools of the scholar (Plate 48). It is not until the 15th century that wealthy individuals are portrayed wearing spectacles, like the moneylenders in a picture by Marinus de Reymersvale (1493-1570, Museo Stibbert, Florence) for whom good sight would have been a requisite of his trade.

Apothecary Glasses

The study of Italian pharmaceutical glass is still far from being complete, especially as the bottles, phials and jars used to contain the liquid, semi-liquid and dry preparations would not have differed greatly, if at all, from those used for food storage, cosmetic preparations and even those covered vessels used as reliquaries. An inventory of 1424 for the hospital in Porta Rossa, Florence, includes, '*albarelli da unghuento, bosoli di legno da polvere e da pillole*', while later 16th- and 17th-century inventories include references to several hundred small bottles, '*ampolloni per il nuovo stillo, vasetti, albarelli, imburri, trombe da fiaschi, un capello di vetro*' (Morozzi 1981, 109-10). What is evident from manuscripts (cf. Plate 41 for an apothecary dispensing the famous pannacea *theriac* made up of over

sixty-four ingredients) is that baskets, scales, bowls, cups, boxes, mortars and pestles would have been standard equipment for an apothecary.

It is more than probable that medieval pharmacies utilized glass as well as ceramic containers. These would mostly have been bottles and phials to contain liquid and semi-liquid preparations and covered jars or albarelli for dried produce. The natural properties of glass, transparent, inert and non-absorbent would have made it an ideal medium for such storage. These vessels did not differ greatly, if at all, from those used for storage in domestic households and need not have been of local manufacture as demonstrated by the record of a late 13th-century merchant from London who had glass vessels for sale to apothecaries in Salerno (Stafski 1956 and Spiers 1961, 1).

Saladino d'Ascoli in his *Compendium Aromataricorum*, published in 1484, describes the jars in which the apothecary should keep his materials. These could be made of glass, lead, tin, iron, silver, gold or horn according to the nature of the product and they should have straight necks, closed over the mouth with a piece of parchment and sealed with pitch or wax. Some bottles (cf. Fig. 81) have neck bulges below which a string could securely fasten cloth tied over the top as seen in the depiction of an urinal (Plate 38). Dioscorides had used this method earlier in the mid-1st century AD, but did not mention glass as it had not yet become a widely available commodity although core-formed, cast and mosaic glass phials had been used as expensive containers for luxury perfumed oils.

Stiaffini (1991, 193-4, 225-6) identifies the phials used for medicines and unguents as those bottles with a rim diameter of less than 20 mm. She identified four different forms from contexts datable from the 11th to the 13th century as well as two 14th-century forms. However, these tend to be single finds from widely dispersed sites from northern Italy to Sicily and without any complete profiles it is not possible to trace a development of forms either regionally or chronologically.

The Museo Sacro in the Vatican possesses some very small early medieval glass phials or '*chrismaria*', many of which were found in the Chapel of the Sancta Sanctorum and were believed to have contained oil from the lamps in the Edicule in the Church of the Holy Sepulchre (Fremersdorf 1975, 103-5, pls. 64, 71). They were crudely made in greenish glass, but although their provenance suggests they were used as reliquaries their form was probably the same as phials for small quantities of medical preparations or unguents.

Pestles and Mortars

Pestles and mortars were used for grinding medicinal ingredients and also for the preparation of food and pigments for painting. Fragments from what is possibly a mortar, made in thick light sepia glass, with thick heavy ribs has been found at Farfa (no. 235; Figs 63.236 and 64b). Whereas heavy ribbed vessels are known from the 13th century, such as the footed cups from Saint Denis and Paris (Foy and Sennequier 1989, 161-3, nos 83-5), this vessel is also closely akin to a small 15th-century globular bronze mortar with ten thick ribs from the hospital of Santa Maria della Scala, Sienna (Cavallero 1985, 251-2, fig. 237). Some similarly decorated pieces have been dated to the 14th century, while another 15th-century bronze mortar was found in the Castello at Sienna (Lese 1975, pl. 7). The Farfa glass example also retains a so far inexplicable feature in the form of scratched Xs at the bottom of each rib. These are unlikely to be tooling marks and must have been made when the vessel was cold. A 15th-century manuscript in the British Library (Sloane MS 6, f. 175 v.) shows two more typical and large metal ringed mortars being used in the preparation of medicines under the instruction of Aesculapius and Asclepius (Murray-Jones 1984, 93, fig. 41).

Discussion

Medieval medicine had its roots firmly in the ancient and Islamic worlds with medical authors working within the framework of the ancient physician Galen (AD 129-199), supplemented by western translations of Islamic authors, who themselves had previously translated ancient texts. The theory of illness in the Middle Ages continued to be based on the humoral theory of the *Hippocratic Corpus* albeit with some modifications and refinements over the centuries. The purpose of medical treatment was the restoration of this balance. The physician could detect changes in the balance of the humours by examining the urine and pulse of the patient. Galen also made use of the work of a Roman army physician, Dioscorides (fl. AD 50-70) who wrote an authoritative encyclopedia on medicines, *De materia medica*.

The Arabs in the 9th century translated ancient Greek texts and Islamic pharmacy was also a continuation and development of the Greek tradition. It was not only Arabic medical texts but also astrological works that were later translated. Astrology became increasingly more important in medieval western medicine. Folding calendars, which consisted of a simple calendar of dates, tables of eclipses and information allowing for the

calculation of when the moon would be in a particular astrological 'house', became popular in the 14th century. These together with the tables of urine glasses and rules for blood-letting became important portable references for the physician (cf. Plate 34 for a 15th-century urine chart on the back of a folding calender).

Relics and reliquaries were important during the Middle Ages. Shrines in the great cathedrals and churches were visited and pilgrimages were undertaken to Compostella, Rome and Jerusalem, where personal relics could be bought, sometimes in the form of holy water or oil in small glass phials. The holy water or oil was believed to be capable of protecting against the plague that was not just a disease of the lower classes, but could affect anyone of whatever status. It has been postulated that the dramatic discarding of the contents of the 'proto-palace' of Palazzo Vitelleschi at Tarquinia was an attempt to get rid of the contents of a plague infested household. However, it is also possible that this represents a deliberate action in order to punish the losing side in a political argument. Such disputes were common and whereas previously in Rome the house and all its contents were destroyed a ban had been imposed on the destruction of the houses themselves (pers. comm. Many Collins). This was also the time of the Great Schism and Cardinal Vitelleschi who subsequently owned the site was on the 'winning' side.

LIGHTING

Introduction

To date the only study devoted solely to glass lamps is that by Crowfoot and Harden in 1931 which examined early Byzantine and later lamps in light of finds from Karanis, Egypt (dated to 4th to 5th centuries AD) and from several Byzantine churches in Jerash, Syria, that were utilized from the 5th to 8th century AD. These were combined with contemporary depictions of lamps taken from mosaics in Jerash and Salonika, to produce a type series of lamps for the 4th to the 7th century. Crowfoot and Harden believed that vessels of various shapes were used for different types of lights: true lamps burning a wick, candlesticks, single lights and elements in a polycandelon or chandelier. Stevenson in 1988 also discussed a particular type of lamp that was produced at the monastery of San Vincenzo at the end of the 9th century and that is found in central and southern Italy during this period, but which does not seem to continue beyond the 10th century. A fragment of one handle was found among early medieval deposits at Farfa (Newby 1991, 36, fig. 3c).

From the 11th century there appears to have been two major forms of lamps used in Italy as a whole: stemmed pendant lamps and lamps with bulbous bodies with a minimum of three small handles. Nearly all of these have been found on or in the immediate vicinity of churches and monasteries. There are early medieval examples of the former type in the Museo Sacro of the Vatican Museums (Fremersdorf 1975, nos 874-8) and two base fragments from Farfa (Newby 1991, 36, fig. 3b). However, none were recovered from later 13th- or 14th-century contexts at Farfa so the lamps discussed below shall concentrate on those with bulbous bodies and small handles.

Hanging Lamps with Bulbous Bodies

This section is dominated by an intact lamp allegedly found in the catacombs and now in the Museo Sacro of the Vatican Museums (no. 363, Fig. 91.363). This lamp, made in transparent pale greenish glass has a wide flaring mouth with a rounded rim (diameter 102 mm) on a bulbous body with a pushed-in bottom that rests on an applied coiled base. Around the middle of the body are six small applied looped handles in alternate self-coloured and dark purple glass and there is an applied purple trail wound at least three times around the middle of the neck. This lamp is 120 mm high and served as a model for the reconstruction of a lamp from Farfa with a reconstructed height of 115 mm (no. 364; Figs 91.364 and 92). This lamp is made in bubbly light green glass and is decorated with an applied blue horizontal trail 20 mm below the fire-rounded rim (diameter 110 mm) and with six blue handles, four of which are extant. The base is also formed from an applied spiral base. There are a further four fragments from another lamp with a transparent greenish-colourless body with handles made in contrasting turquoise glass streaked with red trails (no. 366) and another self-coloured handle that was applied over thin spiral trailing (no. 367). All the handles mentioned above were applied on the middle of the body, then drawn outwards and inwards to create a small loop before being reapplied to the upper body. On the two further examples from Farfa and the Palazzo Vitelleschi, Tarquinia (nos 368-9; Fig. 93.368-9) the top of the handle is curled back towards the bottom to create a complete ring.

There are also eight fragments from a slightly later lamp from Farfa made in an unusual greyish-blue glass (no. 365; Figs 93.365 and 94). Like the examples above it has a wide flaring mouth with a rounded rim (diameter 88 mm) that is decorated with an applied self-coloured trail 14 mm below. Only the lower part of one handle survives and

the pushed-in base with a hollow-tubular base-ring (diameter 38 mm) is similar to two others from Farfa (nos 230-1; Fig. 65.230-1) that were discussed above (p. 94) together with a covered bowl with the same foot formation from the Treasury of the Sancta Sanctorum, in the Old Lateran Palace (no. 246; Fig. 65.246).

Discussion

It is generally believed in Italy (cf. Stiaffini 1991, 198-9 for further references) that these handled lamps derive from Islamic models, which from the 12th century in the Near East were often lavishly decorated in gilt and enamel, usually with a particular verse from the Koran (Dura 24, verse 35, section 5) that itself mentions glass lamps, 'God is the Light / Of the heavens and the earth / The parable of His Light / Is as if there were a Niche / And within it a Lamp: / The Lamp enclosed in Glass: / The glass as it were / A brilliant star...'

Theophilus, writing in the 12th century, had already urged the glass-maker to make 'as many handles as you wish' (Dodwell 1986, chapter 10). This probably refers to the making of lamps with three or more loop handles for suspension. It seems, therefore, most probable that both the Islamic mosque lamps and the Italian examples under discussion derived from an earlier, perhaps Byzantine, prototype, that was possibly already in use in Constantinople in the 6th century (see below). Fremersdorf (1975, 97) discussing the intact lamp from a catacomb in Rome (no. 363) believed it to be an Islamic import. I feel, however, that it is so closely related to the examples from Farfa (nos 364 and 366-8) and those seen in depictions (cf. below p. 126 for the example in San Clemente, Rome) that they were produced locally. These lamps would appear to be too common to be restricted solely to imports, although possible exceptions include an angular example from the garden of the Convent of Santa Caterina della Rosa, Rome (Cini 1985, 552, no. 1019, fig. 90.1019), and the large handle from Farfa (no. 370; Fig. 93.370).

Lethaby and Swainson in discussing the Byzantine building of Santa Sophia, Constantinople include a translation of a 6th-century poem about the Basilica, known as 'The Silentiary's Poem' (Lethaby and Swainson 1894). In it is a long description of the lights and candelabra that illuminated the Great Church. These included a mixture of polycandela in the larger domed areas and single lights along the narrower aisles. This arrangement would have been repeated on a smaller, more modest scale in most contemporary churches. An example of this may be seen at the Church at Nahariya in East Galilee that was destroyed by fire and later abandoned. As the building collapsed the glass lamps fell

to the ground, preserving their position for posterity. The plan of their location on the floor of the church (Duval 1994, fig. 27 on p. 200) shows a strong correlation between the position of the single lamps and the columns or piers of the nave to which they were presumably attached and possible evidence for wooden beams between the piers across the nave from which further lamps were suspended.

This general arrangement of single lamps between piers and polycandela over altars appears to have continued well into the 11th and 12th centuries in central Italy as may be seen in Plates 44-7. Plate 44 shows a painting of *circa* 1080 in the lower church of the Basilica of San Clemente in Rome which depicts the legendary story of the interruption of St Clement's Mass by Sisinnius. Above the altar is a polycandelon suspended by three chains from the ceiling into which are inserted seven, presumably pendant stemmed glass lamps. Also depicted to the sides, presumably in the arches of the piers dividing the nave and aisles, are single hanging lamps with flaring mouths, bulbous bodies and three handles. These latter lamps must correspond to the surviving lamp in the Vatican and the reconstructible example from Farfa (nos 363-4; Fig. 91).

Plate 45 shows a fresco of the Roman school, dateable to 1295, in the Church of S. Maria Maggiore, Tivoli, where five single hanging lamps of stemmed form are depicted suspended from arches, which are similar to two lamps of unknown provenance also preserved in the Vatican (Fremersdorf 1975, nos 877-8) and to the 11th-13th century lamp excavated in Pisa (Stiaffini 1989, 448). Below there appears to be a crown, similar to those described above in Santa Sophia, Constantinople, from which one would expect to find further hanging lamps.

By the beginning of the 14th century, another form of polycandelon or chandelier seems to have been certainly in use in Tuscany as can be seen in a number of frescoes by Giotto. In the Arena Chapel, Padua, painted between 1305-1306, on either side of the altar are depicted *trompe l'oeil* chapels in which are metal cages, consisting of three circular bands tied together by three vertical bands that are joined at the top and are in turn suspended from the centre of the vaulted ceiling by a chain (Plate 47). From each horizontal metal band are suspended three glass lamps, the top and bottom rows are lamps with stemmed bodies while the middle row has lamps with globular bodies. Further chandeliers, this time with two rather than three rows of lamps were painted ten years earlier by Giotto in the Upper Church in the Basilica of St. Francis in Assisi.

An insight into the use of lighting may be obtained from the Rule of St Benedict which became the basic rule for the organisation of life in all medieval religious communities. St Benedict, who lived and worked in around Subiaco in central Italy during the first half of the 6th century, compiled his Rule to regiment community life, defining the horarium for the Divine Office, for study and for manual work. In it he outlined the eight different offices which were to be said during the course of the twenty-four hour day. These include: Matins, Lauds (at dawn), Prime (first hour of the day, ie 6am), Terce or Tierce (third hour, 9am), Sext (sixth hour, noon), None (ninth hour, 3pm), Vespers and Compline. Matins or the Night Office was thought to be the eighth hour of the night which, at the equinoxes would be at 2am, and would vary daily. The hours of Matins changed according to the season to ensure that the monks would receive enough sleep. Because monks had to get up in the middle of the night Chapter 22 on how the monks are to sleep stipulates: '*candela jugiter in eadem cella ardeat usque mane*' (there shall be a light burning in the dormitory throughout the night). This light could have taken the form of a candle or possibly a glass oil-lamp. The church and the passages leading to it would also have had to be lit.

Chapter 41 of St. Benedict's Rule deals with the hours of meals: '*Ipsa tamen Vespera sic agatur, ut lumen lucernae non indigeant refientes, sed luce adhuc diei omnia consummentur. Sed et omni tempore sive cena sive refectionis hora sic temperetur, ut luce fiant omnia*' (Vespers, however should be so timed that the brethren may not need lamplight at the meal, but all may be accomplished by daylight. And at all times let the hour of the late meal or supper be so arranged that everything may be done by daylight). This orchestrating of working hours and times for eating during daylight hours was a practical arrangement probably also observed among normal lay households.

As noted above, glass lamps of all varieties have been found almost exclusively on or in the immediate vicinity of ecclesiastical sites, especially monasteries, even the most humble rural sites. In south Etruria, for example, a pale green handle fragment was found at Santa Rufina (Christie 1991, 255, no. 5, fig. 65) and at Santa Cornelia there are fragments from a multi-handled lamp in streaky blue glass with two blue and one opaque white handle as well as further fragments of colourless and purple handles (*ibid.* 82-3), which have parallels with the lamps from the Vatican and Farfa.

Evidence for the use of glass lamps on secular sites, on the other hand is virtually lacking. The huge assemblage from the Palazzo Vitelleschi only produced a single

fragment of a handle (no. 369; Fig. 93.369). The absence of identifiable glass lamps does not mean that they were not used in secular households. Certainly by the middle of the 15th century they are mentioned in documents. For example, an inventory of the possessions of Gastone Moncada (possibly a Spaniard), preserved in the Archivio di Stato of Palermo, Sicily, from session 3 on December 13th, 1455, lists among other glass vessels which also include pieces imported from Catalonia and Damascus, *virtu cristaudin*, presumably '*cristallo*' from Venice: '*item tri calamari seu lampi di vitru*' and '*item una lampa*' (Bonanno and d'Angelo 1971-1974, 347-8).

The problems associated with the identification of objects, like lamps, from contemporary documents may be illustrated by the following two examples extracted from Venetian archives, of 1289 and 1305 respectively. In Murano a glass-worker's working year was prescribed by the Council to extend from mid-January to mid-August. To work outside this period required a special permit. Such an ordinance, granted on 29 August 1289, allowed a glass-worker from Murano to continue work after mid-August in order to complete a lamp ordered by the Nuncio of Ancona. In 1305, all the glass factories were closed on 28 August for the annual holiday, but a permit was granted to the furnace of Murano to remain open to complete a *feralem vitreum* (lighthouse lamp) for the Ancona pier, possibly a replacement for the earlier lamp of 1289. This affords us a tantalising glimpse as to the use of glass outside secular or ecclesiastical surroundings, in much larger civil engineering projects and for which traces are unlikely to be found in the archaeological record. Plate 49 from a Flemish manuscript of *circa* 1340 shows a fanciful piece of glass engineering - a diving bell from which Alexander the Great surveyed the ocean floor (Lane-Fox 1980, fig. on p. 41).

The reasons for the lack of glass oil-lamps from domestic sites are manifold. One major factor is probably the daily routine of medieval man (and woman) rising with the dawn and going to bed at dusk, thus making the need for lighting in the home less important. Among the numerous depictions of feasting scenes, especially of the 'Last Supper' and 'The Wedding at Cana' no form of lighting is represented. This is probably another indication that meals were consumed during daylight hours, as in monasteries (see above). On the other hand the architecture of the day did not favour large windows, except in palaces and churches, so that some light would have been required for internal work. Most of this was probably obtained from fires (which were then constructed in the centre of the room), especially in the kitchen or cooking area or, depending on the wealth

of the household, from candles (beeswax and tallow for the less affluent), pottery oil-lamps, cresset stones and torches. In dwellings not built of stone an open flame would have been a fire-risk, and even more so an oil-lamp. Oil-spills did occur as demonstrated in the Old Church at Old Dongola in Nubia where four oil-spills were found against walls and in one case at the north corner of an altar (Kjolbye-Biddle 1994, 22).

The almost exclusive use of glass oil-lamps on religious sites is quite dramatic. From depictions and the description of the sumptuous interior of S. Sophia in Constantinople it is possible to identify how the two principal forms: stemmed pendant lamps and lamps with small handles, possibly influenced by Islamic models, were placed and utilized within churches. This distinction between secular and ecclesiastical use may also be reflected in the products of glass-houses. For example, only two identifiable lamp fragments were recognized at Corinth (Davidson Weiniberg 1940, 321, nos 67-8, fig. 19) which are similar to examples from the Church of SS. Maria and Donato, Murano (Gasparetto 1977, 78-9, fig. 51). At the glass-house at Monte Lecco, only three of the thousands of fragments retrieved have been identified as small handles coming from hanging lamps (Fossati and Mannoni 1975, 60, nos 59-61).

Could it be possible, as witnessed earlier for the 9th-century glass-houses at Torcello and San Vincenzo, that glass lamps were specialities of monastic glass-houses? Some glass-workers were itinerant as demonstrated in Bede's famous account in his *Historia Abbatum* of the abbot of Monkwearmouth, Benedict Biscop importing workmen from Gaul to glaze the windows of the church, porticos, and refectories in AD 675 (Cramp 1969, 22). The range of colours found on the lamp fragments from Farfa is not found on drinking vessels from site which might suggest that these lamps were made by window glass makers, rather than vessel glass-makers, who would have access to more colours, while making the windows for the churches in which the lamps would ultimately hang.

8: CONCLUSION

Conclusion

The main purpose of this work was to compare and contrast roughly contemporary glass assemblages from two high status ecclesiastic and secular sites: the Benedictine Abbey of Farfa and the Palazzo Vitelleschi at Tarquinia respectively. A third collection comprising rare intact medieval glass vessels found in churches in Rome, now preserved in the Museo Sacro in the Vatican, was also considered. Together these pieces show that the range of vessels used in central Italy during the Middle Ages was much more diverse than has previously been recognized. Throughout this work comparisons were made with published glass finds from across Italy to ascertain whether the glass consumed in central Italy during the later Middle Ages belonged to a wider geographical distribution.

The pieces discussed come principally from the Palazzo Vitelleschi, Tarquinia, a remarkable site that produced evidence for *circa* 600 individual glass vessels, two-thirds of which are truncated-conical beakers. This total from one site is almost half of that discussed by Tyson in her survey of the medieval vessel glass in England between 1200-1500 (Tyson 1996). Although the reasons for the discarding of the household contents of the 'proto-palace' at Tarquinia remain unclear, such a large sample has enabled tentative divisions between finewares and utilitarian pieces to be established, i.e. those vessels used at table and in the private chambers (cf. Chapters 3-6) and those used for storage, distillation, medical purposes and lighting (Chapter 7).

Detailed study of the finds from the Palazzo Vitelleschi, revealed that of the four main grain storage pits that yielded glass finds (nos 4, 9, 181 and 410), pit 181 at least had previously been re-used as a rubbish pit and not infilled in one go as originally thought by the excavators. This left residual material at the bottom but showed that the latest infilling of the pit occurred between 1382-1400. Adjoining fragments across pits 4, 9 and 181 show that all these pits were filled at the same time, but it was not possible to discern a pattern within these that might indicate that they were each filled with material from specific parts of the 'proto-palace'. However, they do demonstrate very clearly the move away from heavier vessels with applied decoration to lighter, mass-produced mould-blown pieces by the end of the 14th century. At Palazzo Vitelleschi there are *circa* 300 individual mould-blown glass beakers that may come from several large services possibly acquired in similarly large quantities as those ordered by the monks from Monte Oliveto where no

purchase made included less than 100 beakers, rising to 228 on 14 June, 1409 (Piccini 1981, n. 71). This change in the principal production technique from free- to mould-blowing was a gradual development and some fragments like the beakers with mould-blown ribs and applied 'toed' base-rings (nos 63-4) possibly belong to a transitional phase.

All the glasses discussed in this work have come from comparatively affluent sites. Some pieces were intended more for display than use. It has been recognized for a long time that ostentatious displays of plate and other valuable materials played an important role in the demonstration of wealth and power. This may be seen, for example, at the Palazzo Altemps, Rome, where a late 15th-century fresco of a side board laden with silver plate in the Cupboard Room was uncovered during recent restoration work (Plate 12). Excavations elsewhere within the Palazzo Altemps produced later 15th-century glassware in similar large quantities to that from the Palazzo Vitelleschi (pers. com. Stefano Coccia).

Very little glass has been published from less affluent sites. It is not clear, however whether this reflects the absence of glass finds from such sites or whether the fragments found are disregarded because they are considered of no consequence as the study of medieval Italian glass is still in its infancy. It is hoped that parts of this work will be published and provide a basis for further research to aid the identification and attribution of new assemblages.

Interpretations from Depictions

This diversity of glass forms found at Farfa, Tarquinia, and among the vessels preserved in the Museo Sacro is not reflected in the contemporary iconographical record. This is probably due to the limitations in fresco painting where the design and details are simplified, so that glass is usually shown in its generic form. The iconographic representations of vessel glass used in this work come from all over Italy and not just from central Italy. Artists during the later Middle Ages and Renaissance were itinerant. Giotto, for example, although born in Florence, also worked on commissions in Milan, Padua, Assisi, Rome and Naples. Sources from north of the Alps have not generally been used as they often include vessel types not found either from Italian excavations or in Italian depictions. This is best exemplified by those tall-stemmed goblets, typical of French later 13th- and 14th-century production (cf. Foy and Sennequier 1989, 199-200, nos 140-76), that occur frequently in contemporary manuscripts etc, but as a form are exceedingly rare in Italy (cf. pp. 41-3).

Great similarities occur in the scenes depicted in both manuscripts and frescoes as may be seen in contemporary depictions of 'The Last Supper' from a Gospel by Petrus Cemeraccenis (1322; Plate 7) and a fresco of the same scene by Pietro da Rimini in the Refectory of the Abbey of Pomposa (1316-1328; Plate 8). In manuscripts, where slight variations might be made to miniatures by the copyist, it is not always possible to discern whether the glass depicted is contemporary with the original manuscript or the copy. These variations may be seen for example when comparing the two versions of the glass furnace in copies of Hrabanus Maurus, *De Universo* (Plate 1).

These depictions are nearly always of religious subjects coming from church frescoes, mosaics and miniatures from illuminated manuscripts. They mostly portray 'The Last Supper' and 'The Wedding at Cana' (cf. Plates 5, 8-9, 12, 15 and 21-2), the two most important feasts in the New Testament in which the artists tend to depict luxurious vessels rather than everyday, ordinary vessels. The vessels depicted include truncated-conical beakers, sometimes with clearly delineated kicks, but seldom with the range of mould-blown designs found at the Palazzo Vitelleschi. Bottles are shown with neck bulges, kicks and foot-rings but are rarely with decorative trailing or mould-blown ribbing.

It was not possible in this work to study in detail medieval Italian table manners and how they relate to the use of glass, but from a simple examination of the iconography of dining scenes the following general observations can be made. The dining table, whether trestle or fixed, is always covered with a white cloth sometimes with elaborate woven or embroidered patterns (cf. Plates 6-7, 16 and 19-20). In the centre of the table there was a communal bowl of food, or in larger gatherings several bowls, from which the diners would have helped themselves (cf. Plates 9, 18 and 21). Sometimes there were a few smaller bowls that might have contained sauces, spices or salt (cf. Plate 5), while other food was placed directly onto the tablecloth (cf. Plate 22 of the fresco of 'The Last Supper' in S. Zeno Maggiore, Verona, showing cherries and crayfish). It is unlikely that large dishes to hold meat were made of glass, but small bowls containing the sauces and spices could have been similar to pieces like nos 228 and 240 from the Palazzo Vitelleschi and Farfa Abbey respectively. The 'Farfa Bowl' (no. 229) was probably more suitable for holding fruit and may be a fore-runner to the Renaissance *fruitteria* (p. 89-90).

As the 14th century developed, the depictions tend to indicate a move towards more individual table settings and away from shared drinking vessels to one flask shared between two diners, each with their own glass beaker (cf. Plate 11b). Each diner used

their own knife (cf. Plates 8-9 and 12). Occasionally spoons were present, but forks were not introduced until the later 15th century suggesting that everyone had greasy fingers from handling the meat which would have made holding smooth glass surfaces difficult. This, as discussed above (pp. 67 and 76) might explain the various forms of raised decoration (i.e. prunts, trails, mould-blown bosses and neck bulges) employed in order to secure a better grip. At least one piece of bread or a roll shown by each diner would have served as a platter (cf. Plates 12, 18, 20 and 22), although in some depictions from the second half of the 14th century it appears that wooden or earthenware plates were being used (cf. Plate 15).

Before the start of the meal, glass beakers were shown upturned, thereby preventing the entry of dust, soot and other particles (cf. Plate 11). In another example a wad of cloth covered a full beaker at the bedside of Jairius' daughter (Plate 14). Flasks were sometimes covered by an upturned beaker when used in private chambers and studies (cf. Plates 24-5) or else they were kept in cupboards (cf. Plate 17). Otherwise the standard method of stoppering a bottle, before the introduction of cork, was wax with leather, parchment, cloth or bombase, a crude type of cotton wool (Lamarque 1973, 130).

The wine, usually depicted as red wine (possibly for artistic reasons or to show the transformation of water into wine), was served in bottles although majolica jugs and occasionally glass jugs were also used (cf. Plate 7 for examples of both). Scenes of 'The Wedding at Cana' show servants pouring liquids into large ceramic containers or amphorae, while glass bottles or smaller jugs were used on the table itself (cf. Plates 8, 15 and 19). The latter plate also shows that when there were many diners the women and men were seated separately.

Comparisons of the Glass Found on Ecclesiastic and Domestic Sites

Medieval glass vessels that have survived intact are known mostly from treasuries, such as San Marco in Venice and the Grünes Gewölbe, Dresden, where they were often luxury items preserved in precious metal mounts. Others have been found sealed in altars where they were seemingly used as reliquaries. The Islamic enamelled beaker from S. Margherita, Orvieto (Fig. 73) is similar to two examples preserved at Dresden. Some simple covered vessels have been found in at least three churches in Rome: S. Croce in Gerusalemme (Fremersdorf 1975, pls 68-70), S. Giorgio in Velabro (nos 247-51) and S. Nicolà dei Cesarini (no. 227). These vessels appear similar to those used on domestic sites

and do not appear to have been made specifically as reliquaries. These examples raise the question as to how common and widespread this practice was and how many might still be undetected within churches. Glass vessels have also sometimes been recovered from wall niches like a plain beaker from the Palazzo Pretorio, Pistoia (Mazzi 1982, 229-30, no. 4), and a further two beakers together with a bottle in Florence (Stiaffini 1995e, 47, fig. 43). Two footed flasks for wine or oil were found in a niche in the facade of the Church of S. Sigismundo, near Cremona, built in 1463 (Mariacher 1964).

Such pieces show that there does not appear to have been a distinction between religious and domestic wares. The same forms, like bowls, cruets and even alembics, were used on both types of site, although one cannot be certain that they were used for the same function or functions. However, when cruets were mentioned in glass-makers' inventories or in accounts a distinction was sometimes made between *ampoletarum retondarum ac longarum ac ballas* and *ampoletas ab altare* as in an inventory of 1424 (Appendix F).

The only vessel that is found exclusively on one type of site is the hanging lamp, which occurs on religious sites of whatever status. The small fragment from the Palazzo Vitelleschi, Tarquinia (no. 369) could possibly come from a sanctuary lamp from a private chapel on the site or be intrusive from another source. In contemporary depictions no form of lighting, whether candles or oil-lamps, is shown in dining scenes, private chambers or studies suggesting that the various activities depicted took place in daylight hours although lamps are always shown in church interiors (cf. Plates 44-7). A feature of the lamp fragments from Farfa is that they are often made in deliberately-coloured glass, whether blue, purple, dark green or turquoise, on naturally-coloured bodies. The range of colours found on these fragments is not echoed among the vessel glass discussed in this thesis which could suggest that these lamps were made by window glass makers, rather than vessel glass-makers, who would have access to more colours, while making windows for the churches in which the lamps would ultimately hang.

Measurement of Capacities

Throughout this thesis an attempt was made to calculate the volumes of reconstructible pieces to see whether their capacities might match those listed in the documentary record. This is a new area of research for both glass and ceramic vessels. Hugo Blake has recently studied the sizes and measures of late medieval pottery in north-central Italy to see if the

pottery could be grouped into sizes and then to ascertain whether these were regular multiples and whether they correspond with known units that might vary from place to place (Blake 1997). He concluded that there was a marked difference in sizes according to time, place and function (*ibid.* 249).

From the rough calculations made for the reconstructible vessels from the Palazzo Vitelleschi there would also appear to be a change in size over time. The bottle (Fig 44) and jug (Fig. 51) with blue decorative trailing have larger capacities (1.7 and 2 litres respectively) than the mould-blown ribbed flask (Fig. 46) and jug (Fig 53) that have the respective capacities of 1.3 and 1.1 litres. There also appears to be a distinct range of sizes with the pruned beakers (cf. Fig. 14 for the full range of beakers with applied 'toed' base-rings). The capacities of these beakers range from 4.2: 10- 12.5: 46.5 cl, while most of the mould-blown beakers fall between 9-14cl. It is also possible to see from the large size of some of the utilitarian bottle neck fragments that their capacities must have been large and could be similar to those mentioned in the accounts of the monks of Monte Oliveto (cf. p. 79; Piccini 1981) and the sizes of bottles in the glass-makers' inventories included in Appendice D-F. In Venice it is known from documentary sources that glass was used for weights that took the form of circular or semi-circular rings stamped in relief with the symbol of the city to confirm its validity (cf. Plate 40b; Minini 1998, 214). In a miniature of the *Tacuimum Santitatis* conserved in Paris, there is evidence for such weights being used in the weighing of sugar (Plate 40a). At the same time, Minini's recent study has shown, that bottles with fixed capacities marked by an applied blue trail were also produced (cf. p. 75; *idem*).

Implications of the Thesis and Further Suggestions for Future Research

The importance of this thesis lies in its having extended the corpus of central Italian medieval glass to show a wealth and diversity of form that will hopefully prove useful and provide inspiration for futures studies of glass both in Italy and the rest of Europe. The wide range of forms presented, together with tentative assignations of function, allow for a greater appreciation of the position of glass in medieval Italian society. It is now possible to distinguish between tablewares and utilitarian pieces and to identify, in central Italy at least, which pieces might be considered to have been produced locally from those that might have been imported from elsewhere in Italy, like Venice, or from the Islamic or Byzantine worlds.

Glass should not be examined in isolation. The use of contemporary iconographical representations in this work, for example, has revealed further insights into how and by whom these vessels were used. It has also shown the links between glass beakers and bottles and ceramic jugs (cf. pp. 83-5). It would be very rewarding to compare the range of ceramic and glass vessels used from the same sites. At Tarquinia, for example, there are almost 300 mould-blown beakers but under ten mould-blown flasks. In glass-makers' inventories the ratio of beakers to bottles varies from 8:1 to 12:1 (cf. p. 79) so that for 300 beakers one might expect to find between two and three dozen bottles which suggests that at the Palazzo Vitelleschi, at least, some other form of vessel was being used to serve water and wine at table. The final ceramic report from the site will be very revealing.

This thesis is not the definitive study of medieval glass in central Italy but it is hoped that the vessel glass presented here will also be studied by scholars of other disciplines and media, especially ceramics, so that a better understanding of the material culture of Italy at the end of the Middle Ages and the beginning of the Renaissance may be achieved.

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ABBREVIATIONS

- Ass. Int. Hist. Verre* *Association Internationale pour l'Histoire du Verre*
Amer. J. Archaeol. *American Journal of Archaeology*
Archaeol. J. *The Archaeological Journal*
Archeol. Med. *Archeologia Medievale*
Il vetro dall'antichità 1998 *Il vetro dall'antichità all'età contemporanea: aspetti tecnologici, funzionali e commerciali*, Atti 2e giornate nazionali di studio *Association Internationale pour l'Histoire du Verre* - comitato nazionale italiano (December 1996), Milan 1998
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- J. Glass Stud.* *Journal of Glass Studies*, The Corning Museum of Glass
Med. Archaeol. *Medieval Archaeology*
Riv. Staz. Sper. Vetro *Rivista della Stazione Sperimentale del Vetro*, Murano
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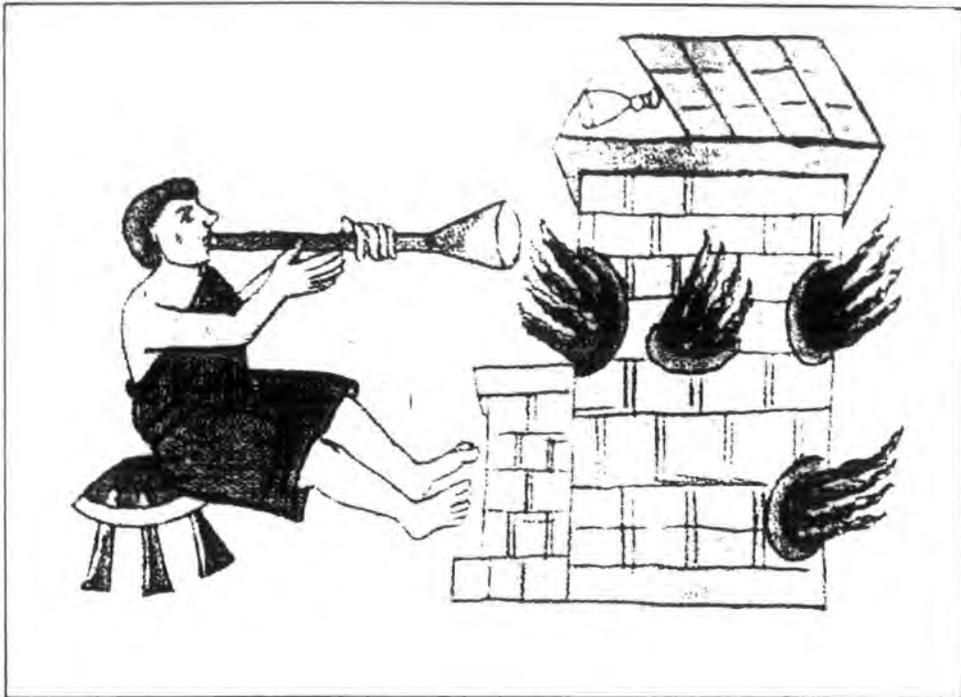
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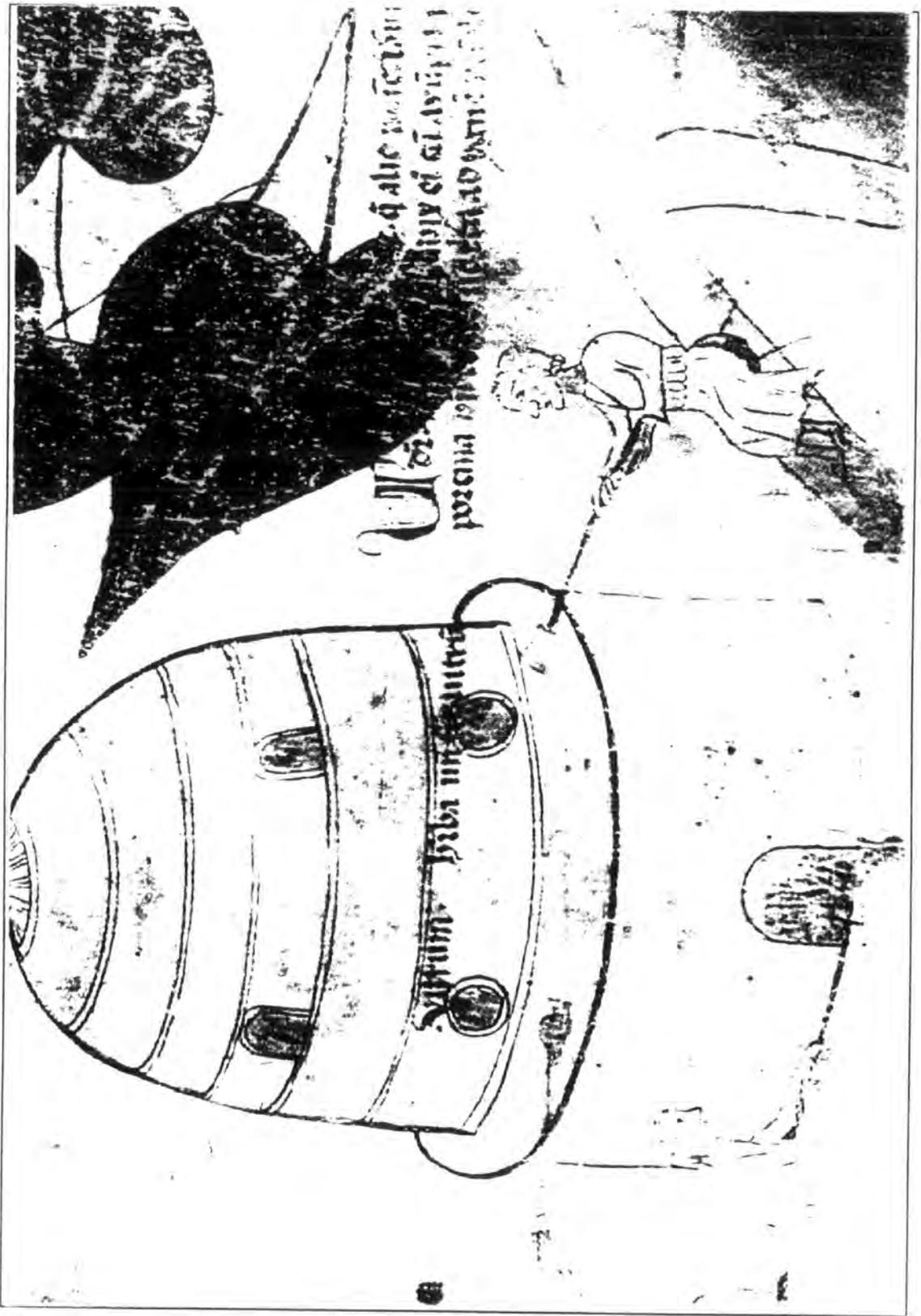
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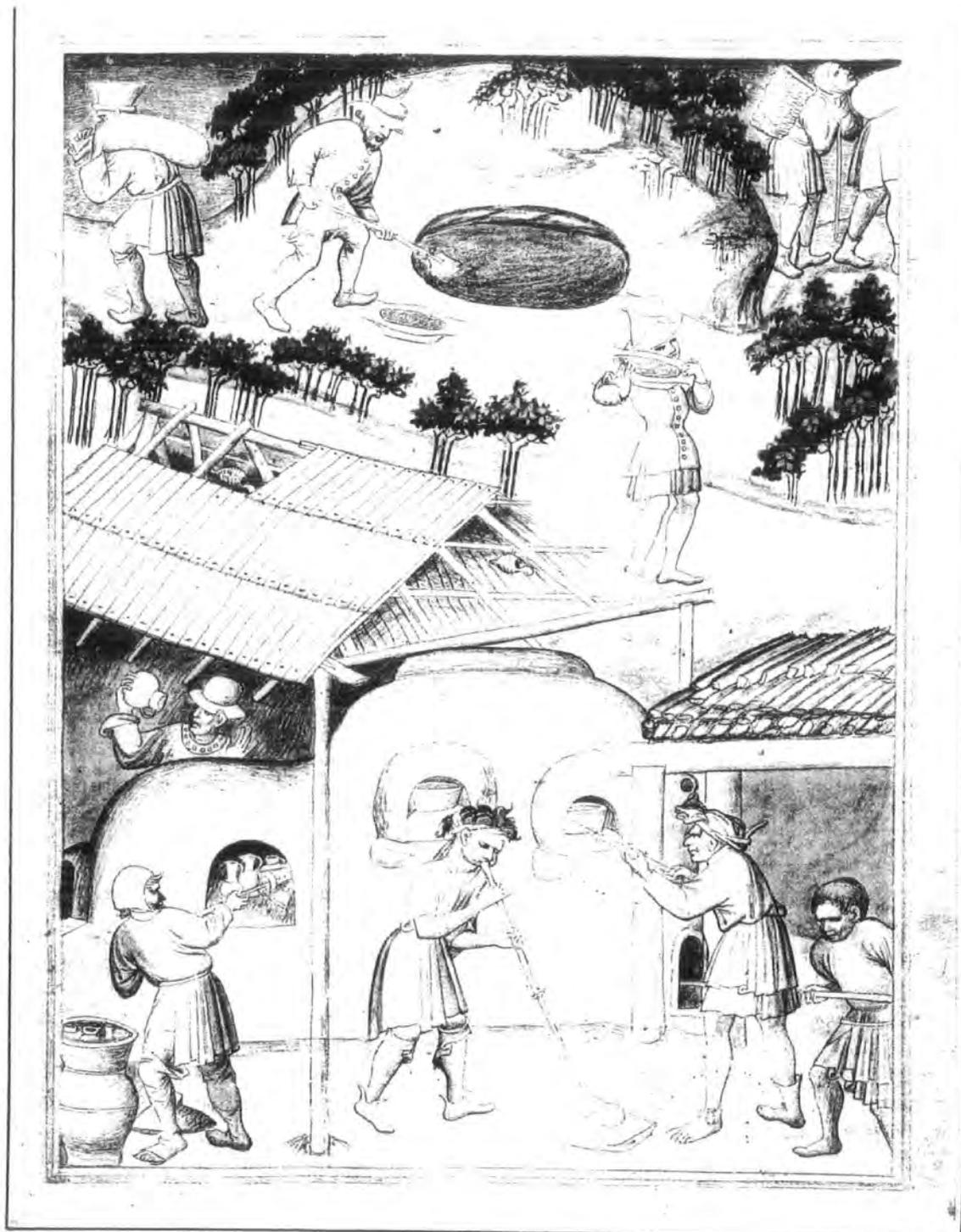
A. Illuminated miniature of a three-storey glass furnace from Hrabanus Maurus, *De Universo*, datable to AD 1023. *Abbey of Monte Cassino, Codex 132*



B. Illuminated miniature of the same scene from a 1425 copy of Hrabanus Maurus, *De Universo*. *Vatican Library, Pal. Lat. MS 291, f. 211 v.*



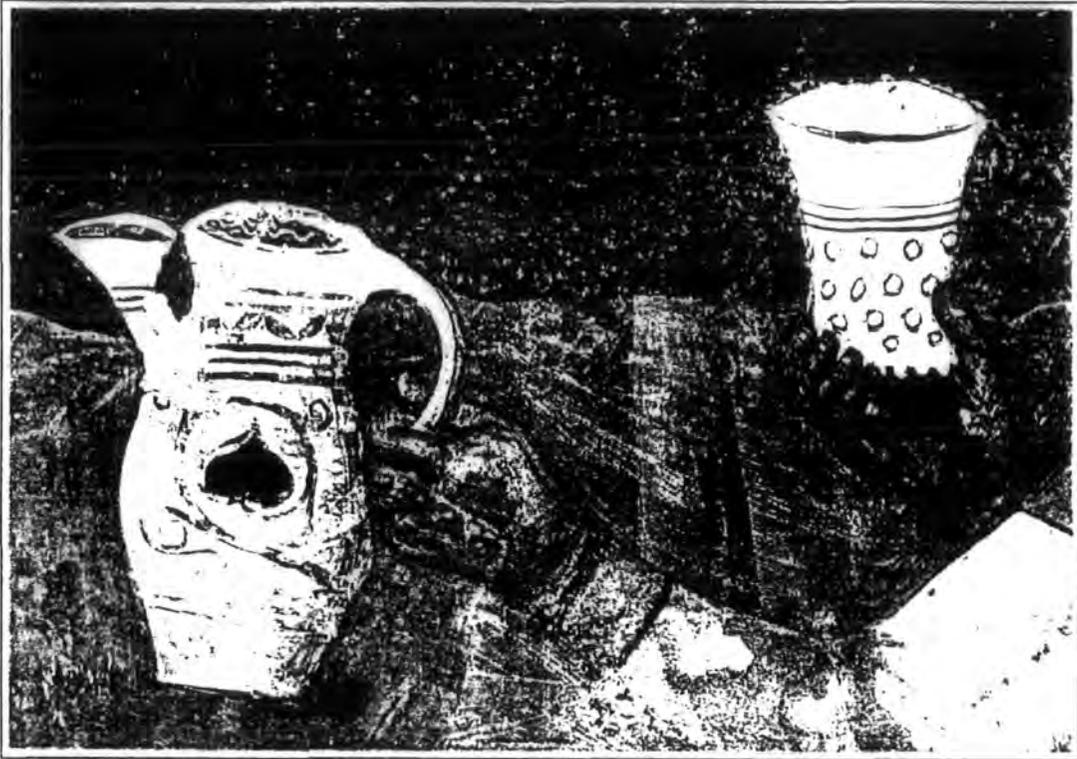
15th-century illustration of a three-storey glass furnace with two glass-blowers and a *tiseur* attending the stoke-hole. From the *Liber de Herbis et Plantis*. Vatican Library, MS 6823



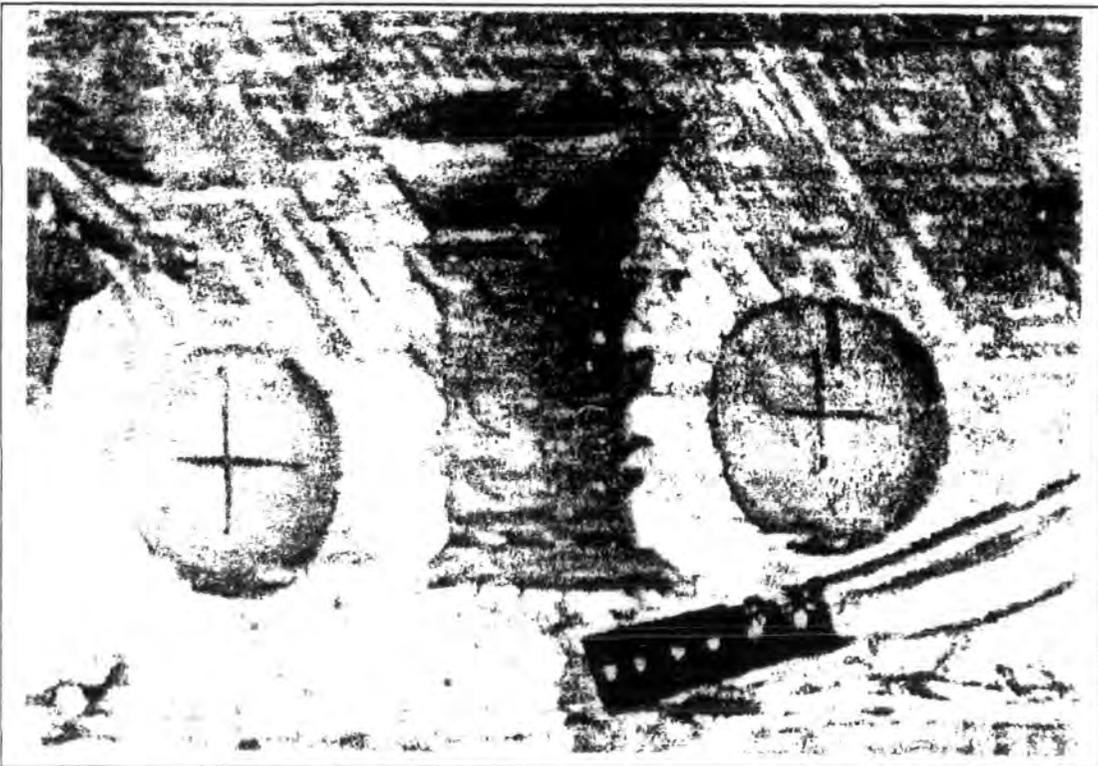
Miniature showing the processes involved in glass-making from a Bohemian manuscript of *Sir John Mandeville's Travels* (c. 1420). London, British Library, Add MS 24.189, f. 16



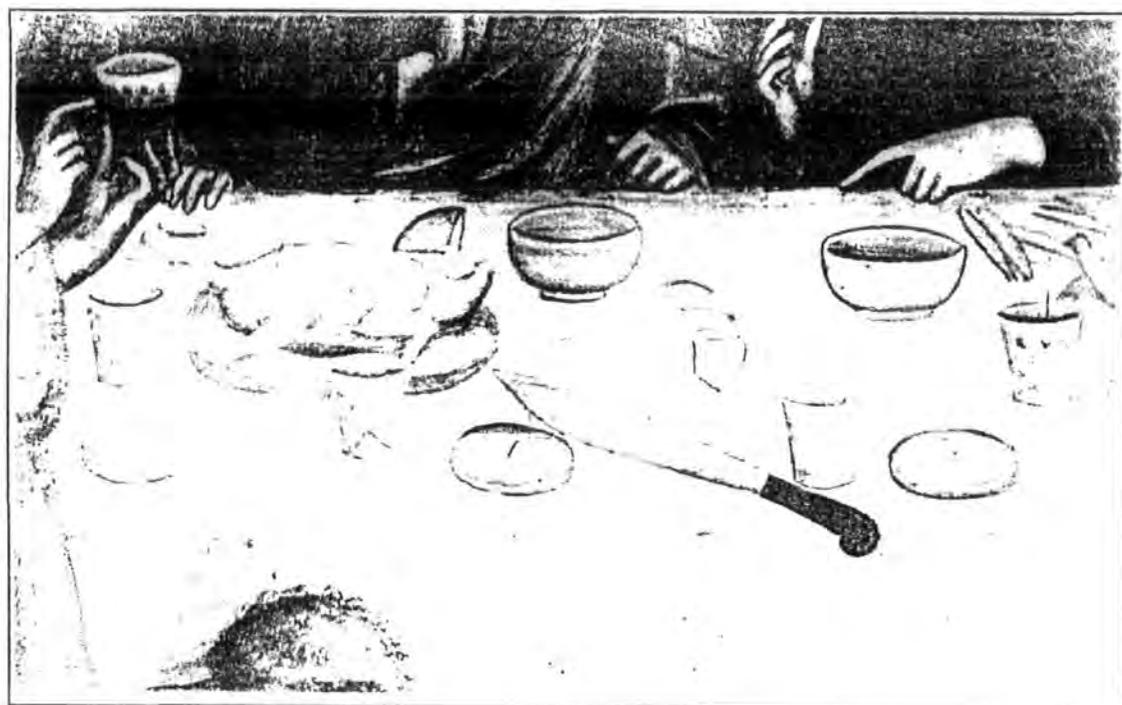
Detail from Ugolino di Prete Ilario's fresco (1357-1364) of *The Miracle of the Jewish Boy*, shown here being thrown into a glass furnace by his father. Corporale Chapel, Orvieto Cathedral. *After Il vetro in Toscana 1995, pl. 2*



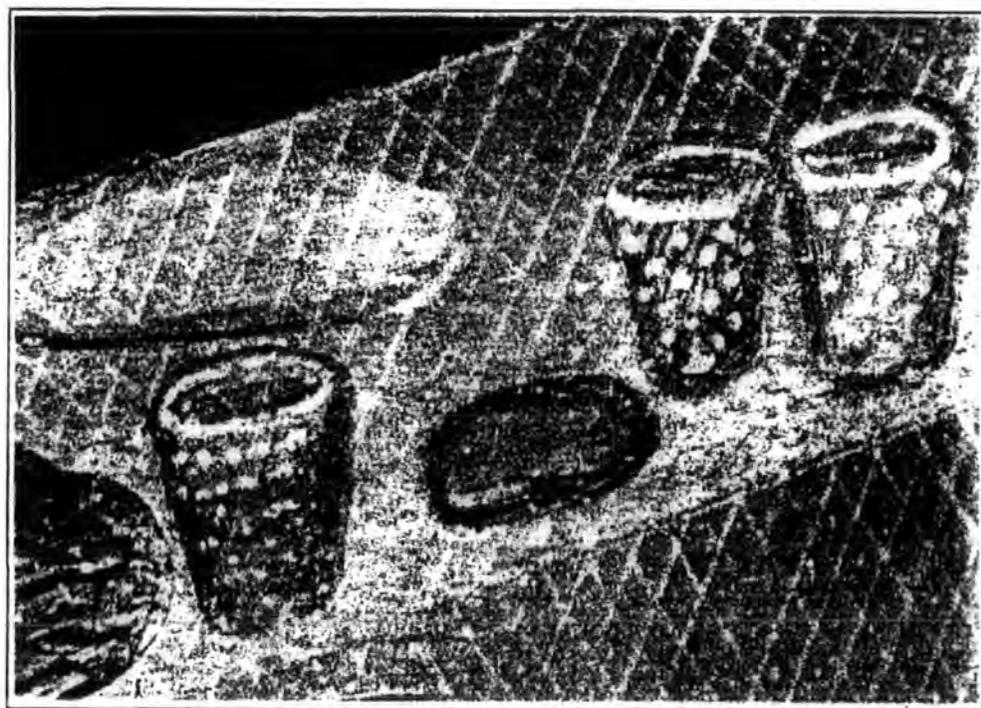
A. Detail from Jacopo Torriti's fresco of *The Wedding at Cana* (1292) in the Upper Basilica, Assisi, with a maiolica jug and a pruned beaker with a toed base. *After Ciappi 1991, fig. 2*



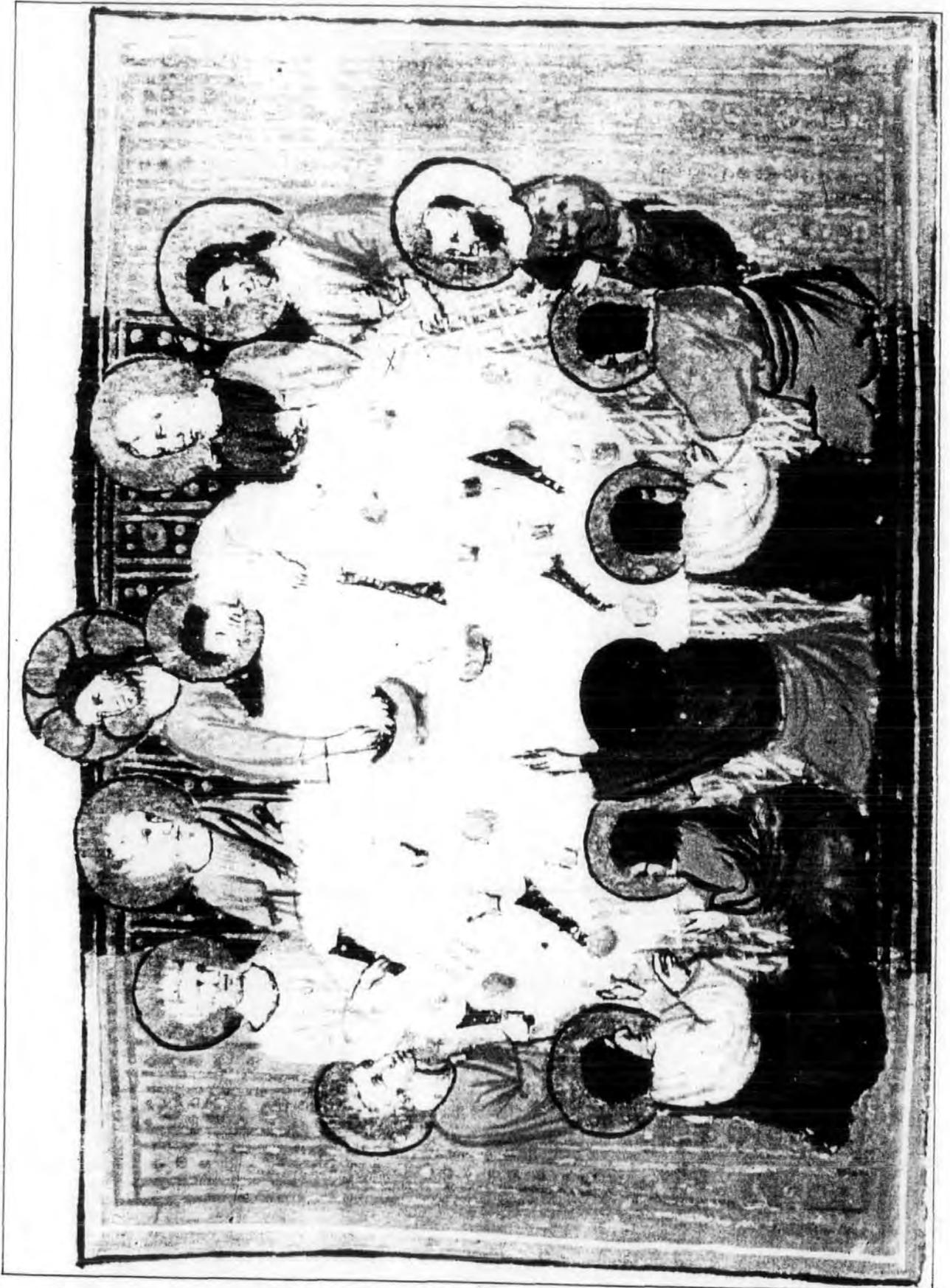
B. Detail of a pruned beaker from a late 13th-century fresco, *Allegoria di gennaio e febbraio*, in the Sala dei Notari, Palazzo dei Priori, Perugia. *After Ciappi 1991, fig. 3*



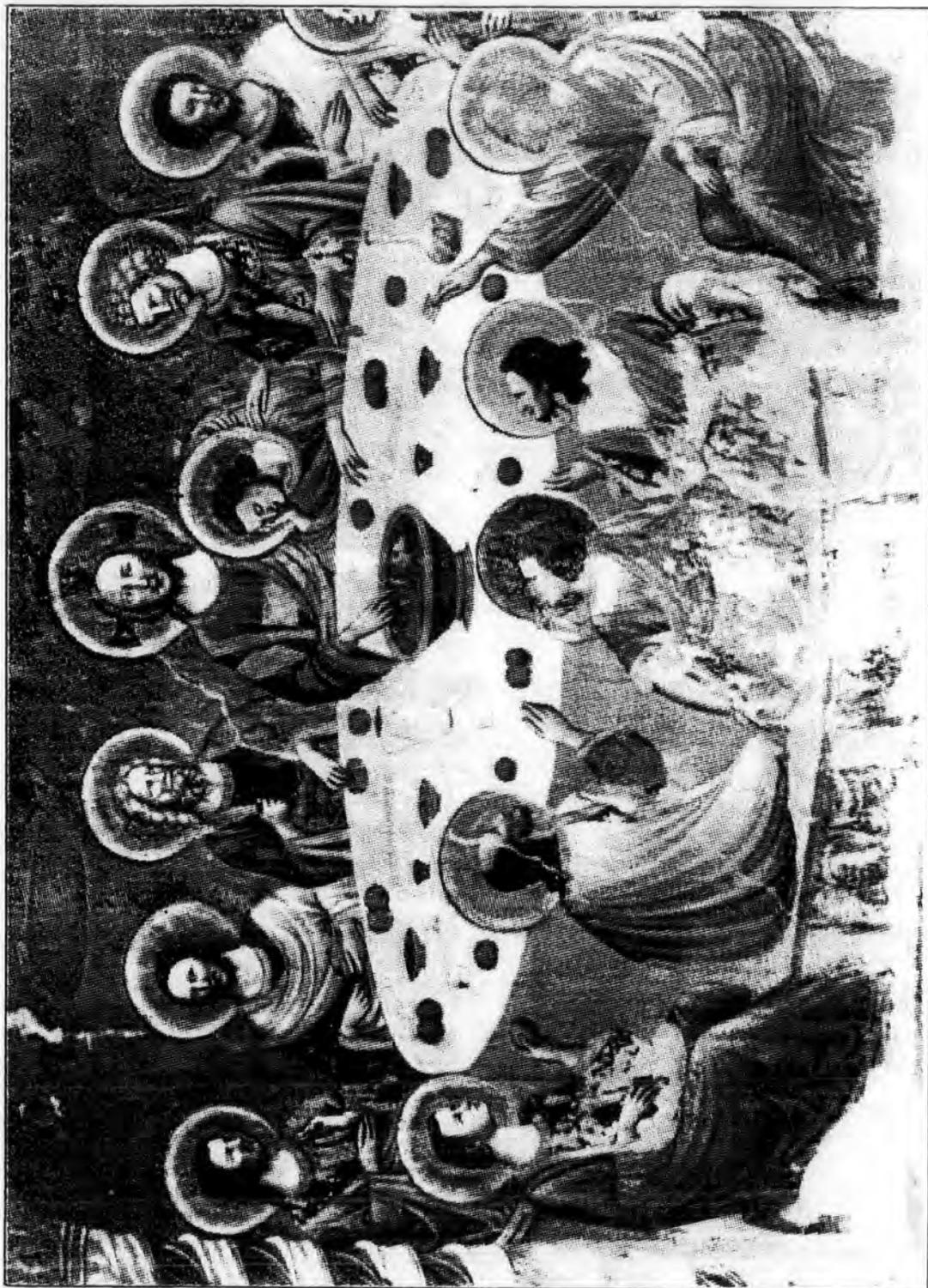
A. Detail from a fresco (1350-65) of *The Wedding at Cana* by Barna di Siena, showing five mould-blown glass beakers, in the Collegiata, San Gimignano. After Ciappi 1995a, fig. 54



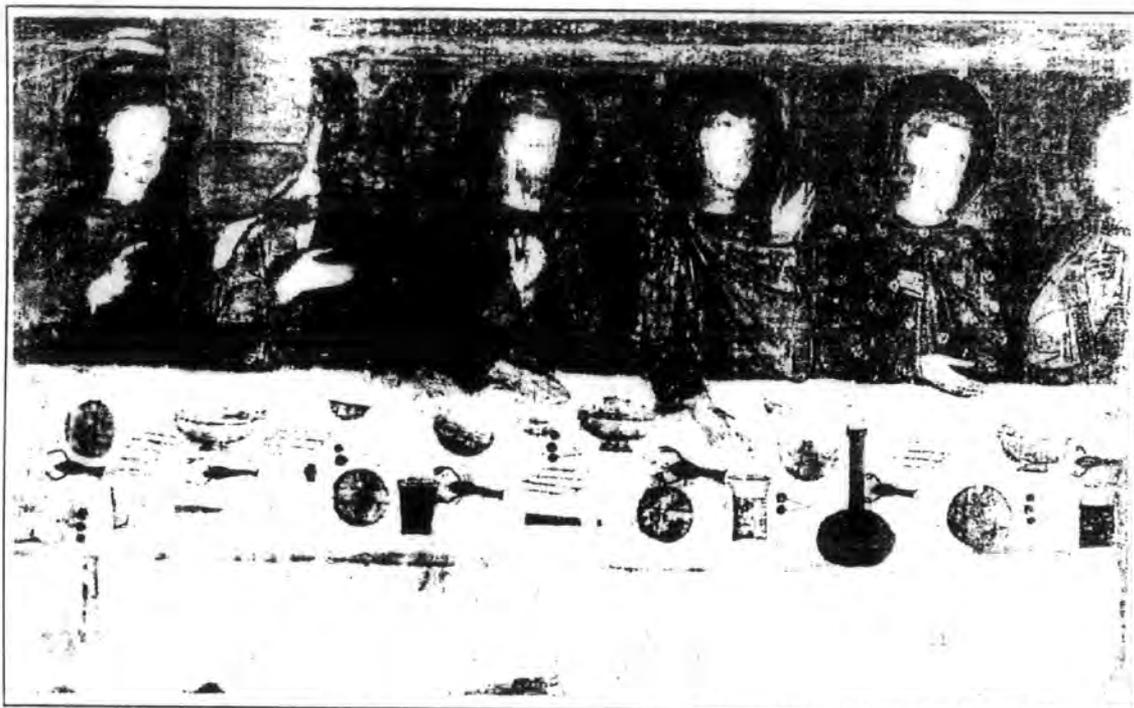
B. Detail from Giusto de' Menabuoi's fresco of *The Wedding at Cana* (1378) with three mould-blown beakers, in the Baptistery of Padua Cathedral. After Ciappi 1991, fig. 19



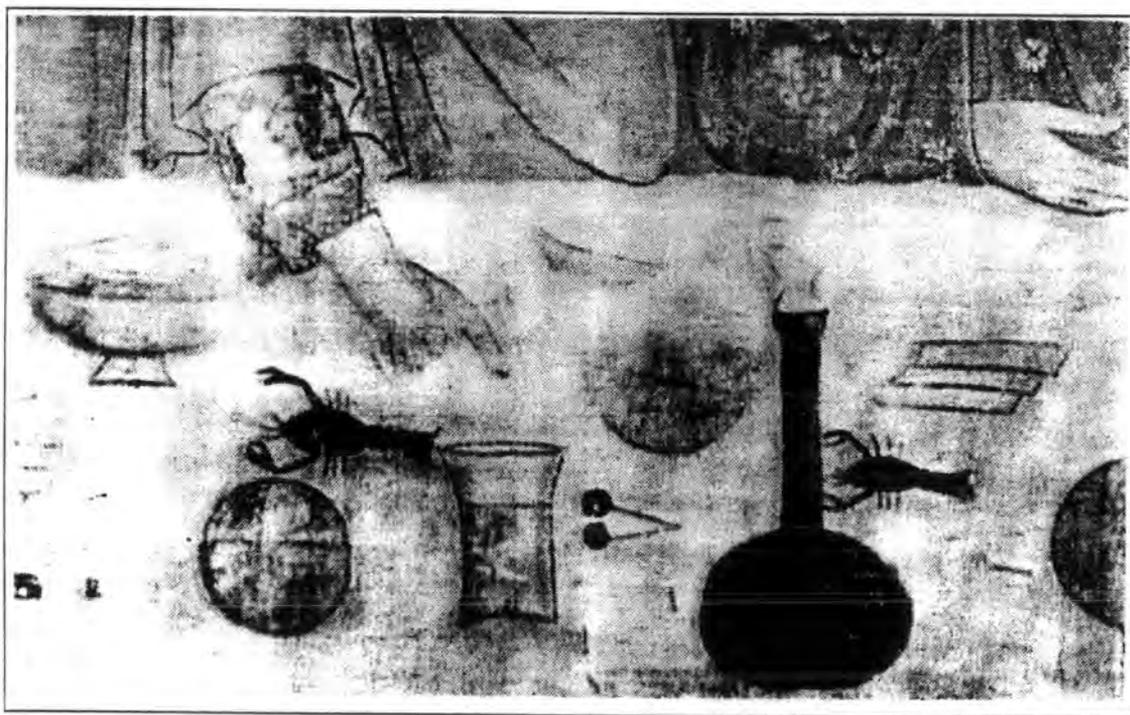
Illuminated miniature of *The Last Supper* from a Gospel by Petrus Cameracensis, Bologna, 1322. *Vatican Library, Urb. Lat. MS 11, f. 328 v.*



Detail of a fresco of *The Last Supper* by Pietro da Rimini in the Refectory of the Abbey of Pomposa (1316-1328). After di Francesco 1998, fig. on p. 82



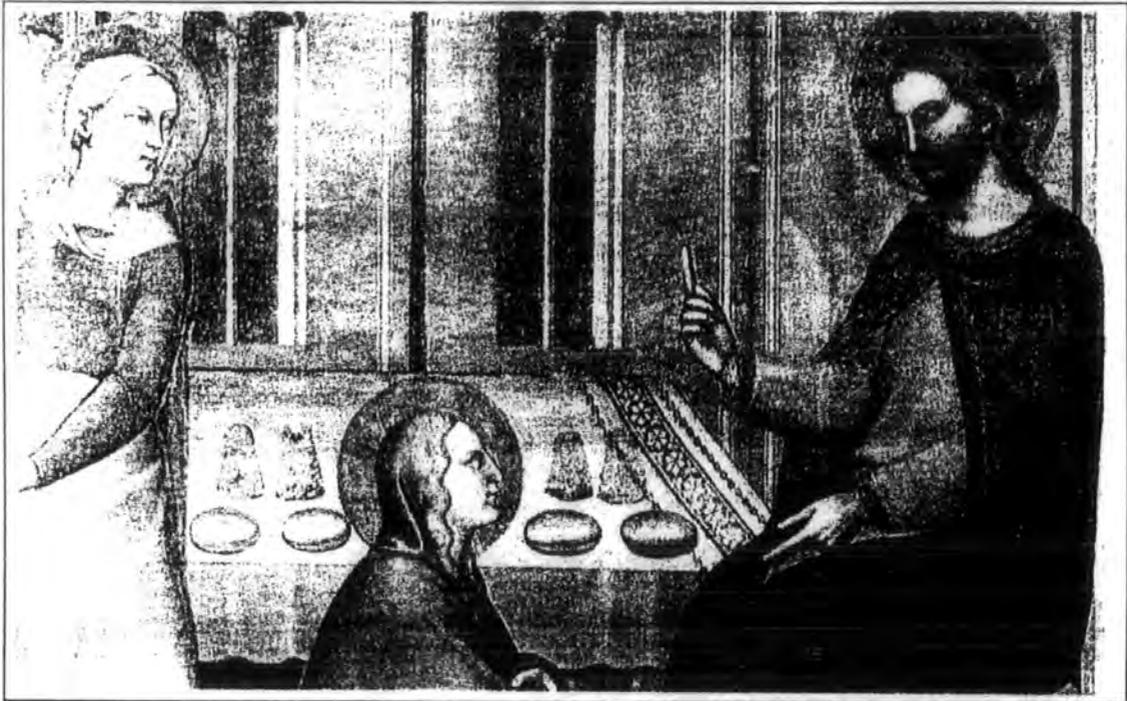
A. Detail from a 14th-century fresco of *The Last Supper* in the Church of S. Zeno Maggiore, Verona. After Zecchin 1987-1990, II, fig. on p. 21



B. Another detail from *The Last Supper* showing the glass bottle and beaker, as well as two crayfish and cherries scattered on the table-cloth. After Zecchin 1987-1990, II, fig. on p. 21



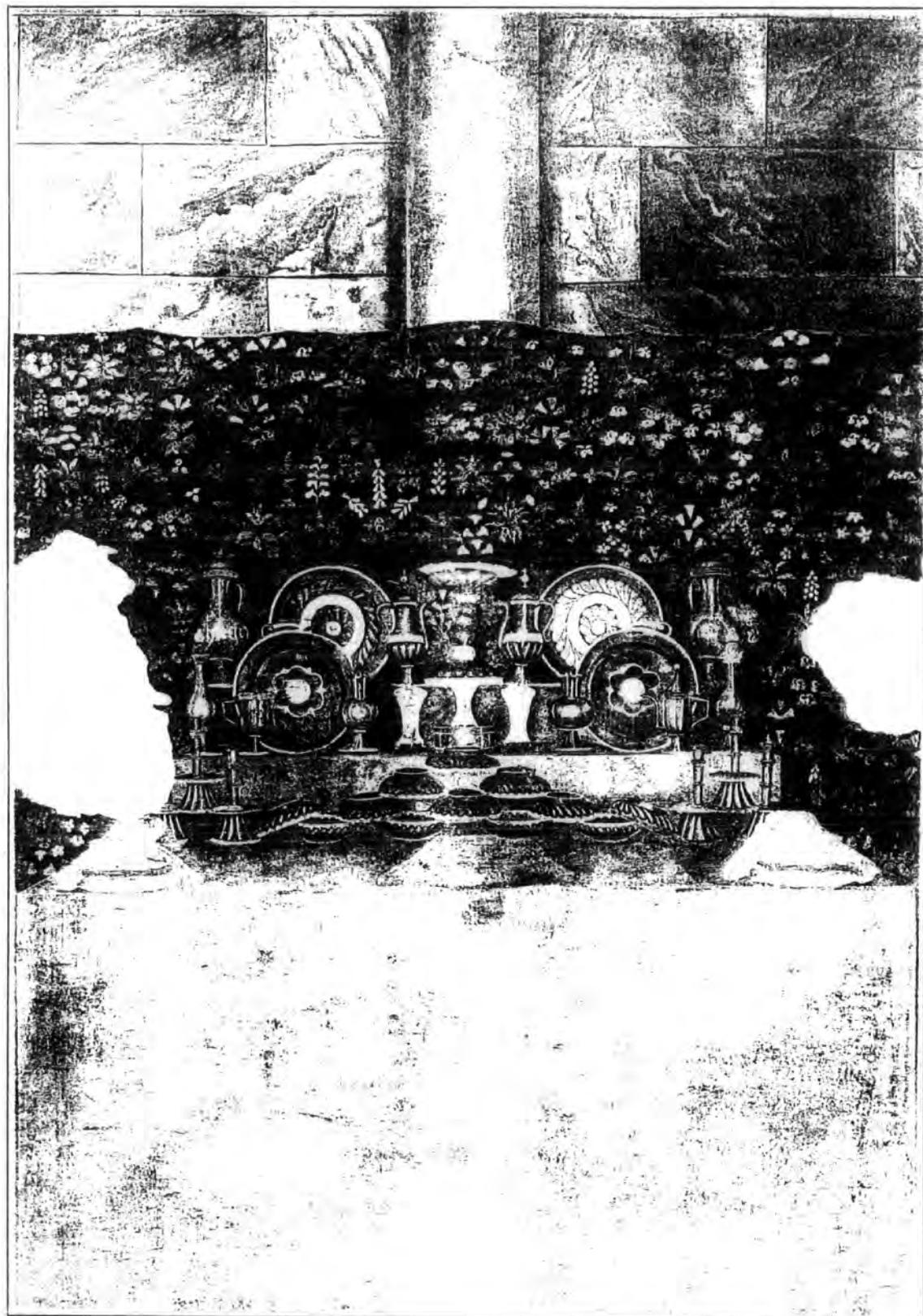
Detail of an illustration of *Christ at the House of Martha and Mary* from a Veronese manuscript of *The New Testament*, c. 1250. Vatican Library, Vat. Lat. MS 39, f. 52 v.



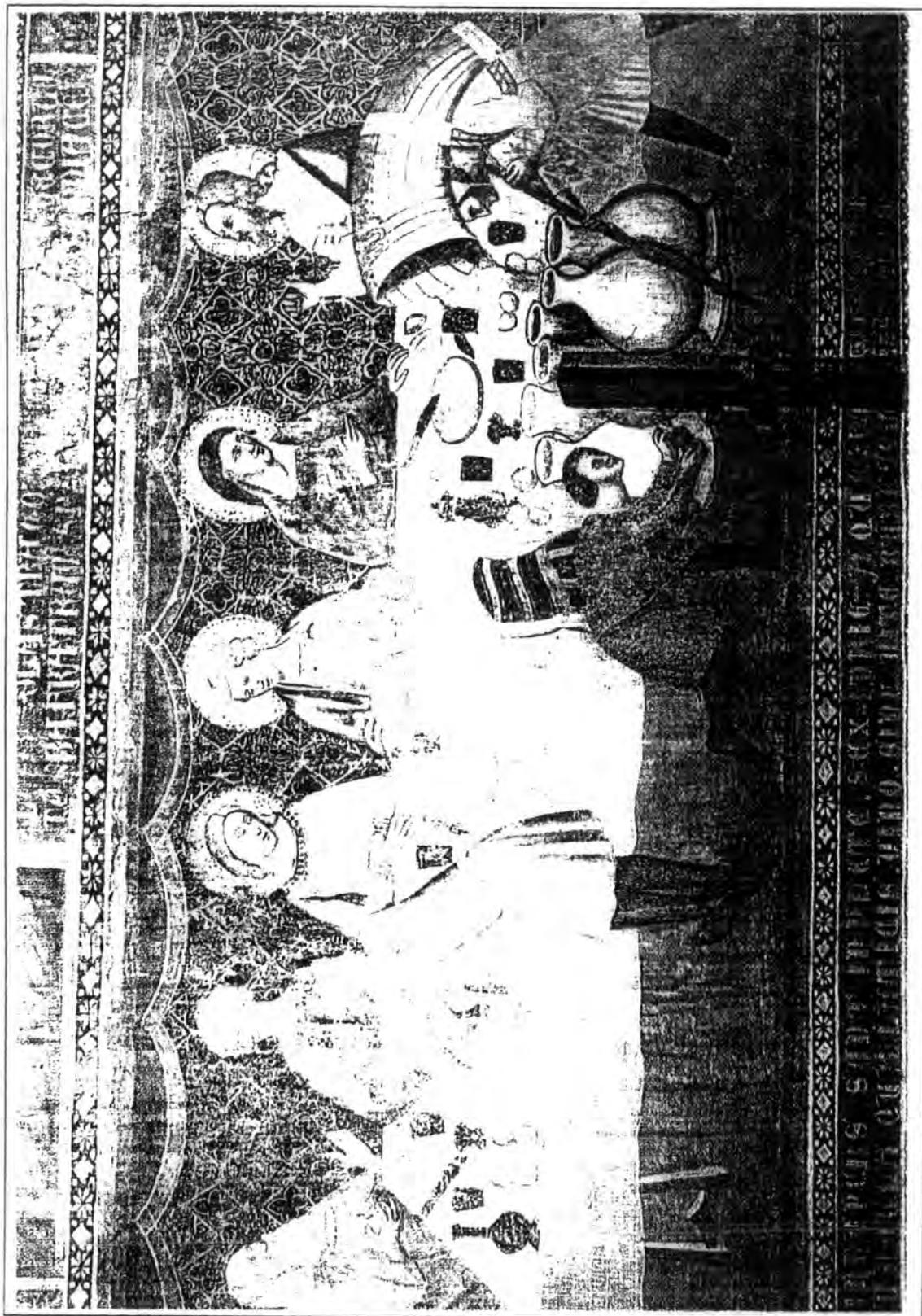
A. Detail of Giovanni da Milano's fresco, *Christ at the House of Martha and Mary* (c. 1365) that shows four up-turned beakers on the table waiting to be used, in the Rinuccini Chapel, Church of S. Croce, Florence. *After Il vetro in Toscana 1995, pl. 18.1*



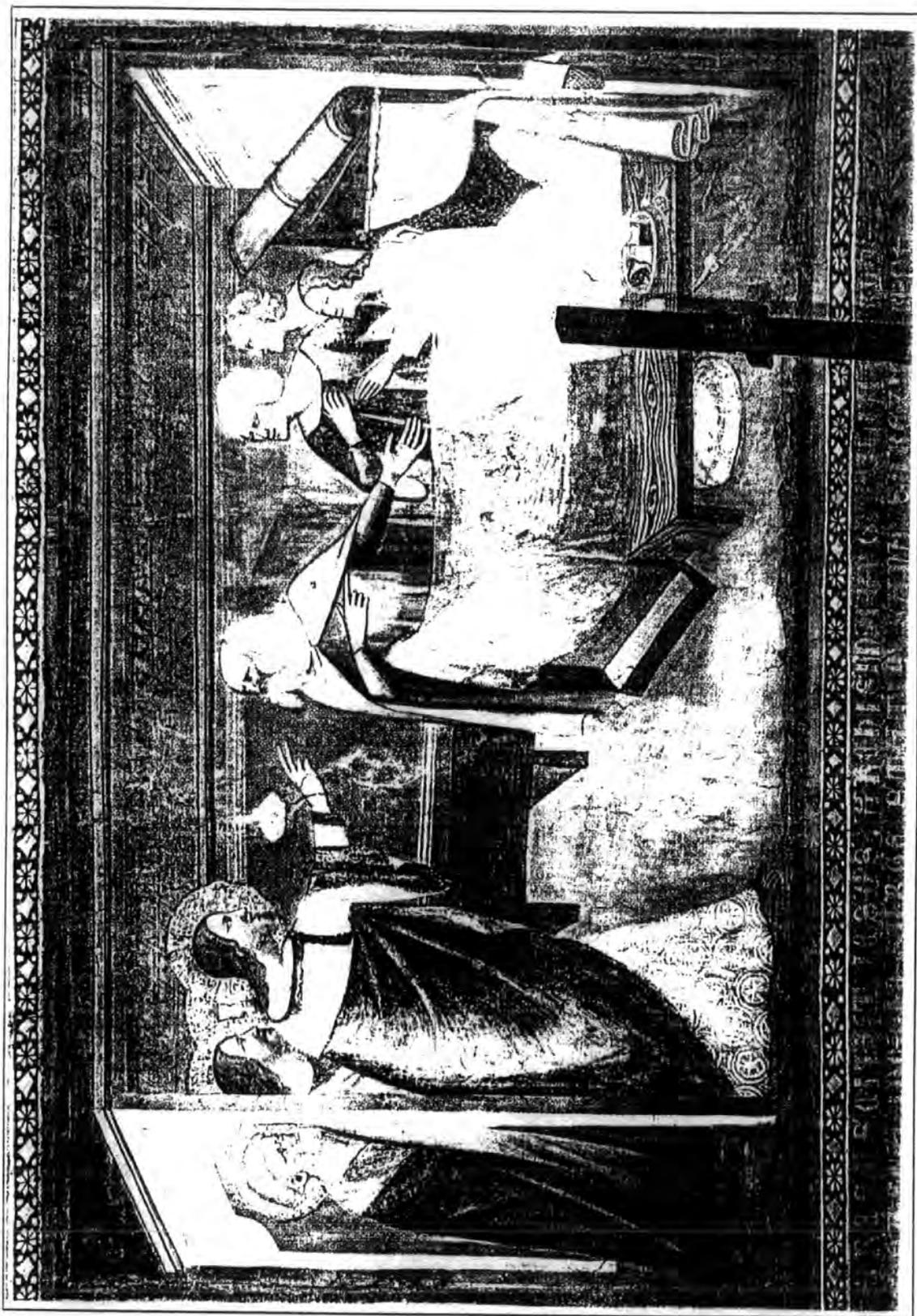
B. Detail of Simone Lamberti's fresco, *The Story of St Peter Martyr* that also shows four up-turned beakers set on a laid table in the background. Galleria Nazionale, Parma. *After Zecchin 1987-1990, III, fig. on p. 147*



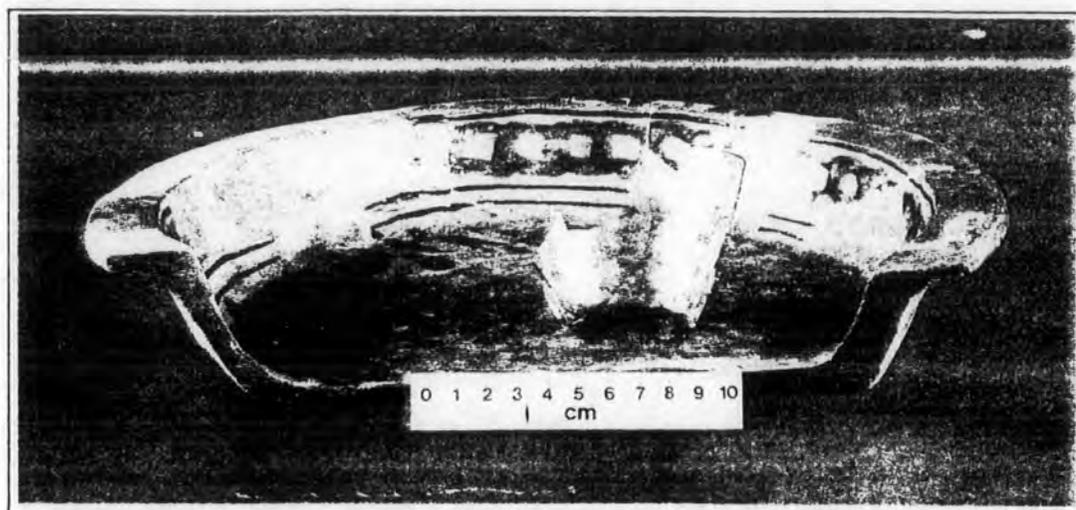
Detail of a fresco (c. 1477) in the Cupboard Room, Palazzo Altemps, Rome, with a silver-laden sideboard against a floral tapestry. After Scoppola and Vordemann 1997, fig. 23



Detail of *The Wedding at Cana*, possibly by Vitale da Bologna or one of his followers in the second half of the 14th century. Pomposa Abbey Church. *After di Francesco 1988, fig. 2*



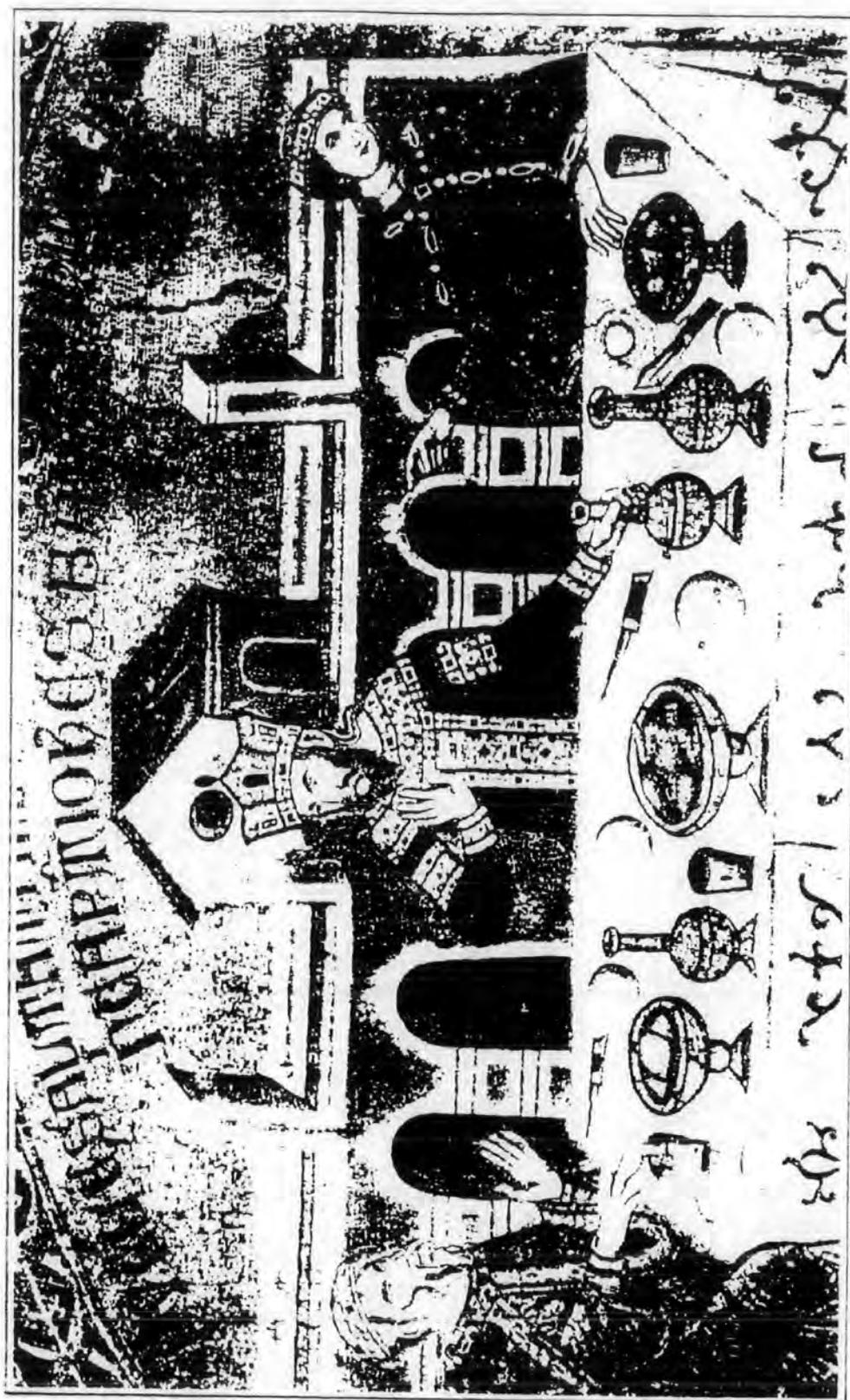
Fresco of *The Resurrection of the Rabbi's Daughter*, possibly by Vitale da Bologna, in the second half of the 14th century. Abbey Church, Pomposa. *After di Francesco 1988, fig. 1*



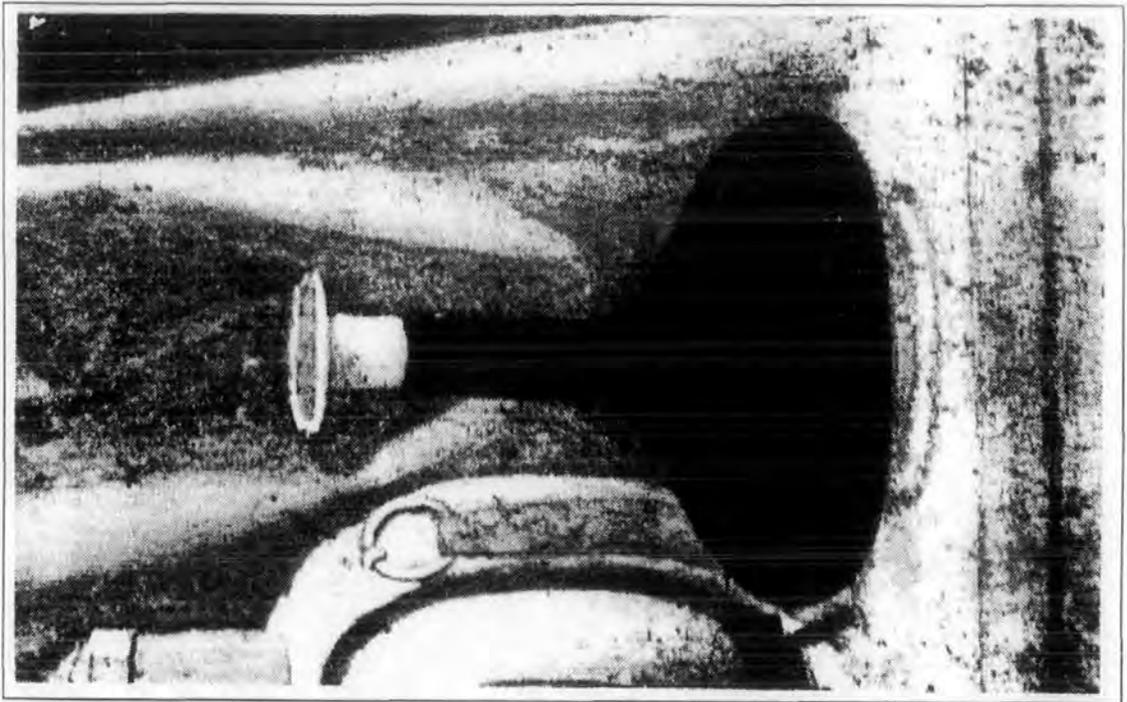
A. Late 14th-century maiolica *rinfrescatorio* with a mould-blown glass beaker standing inside it, both found in the Bishop's Palace, Pistoia. *After Vannini 1985, pl. 10.1*



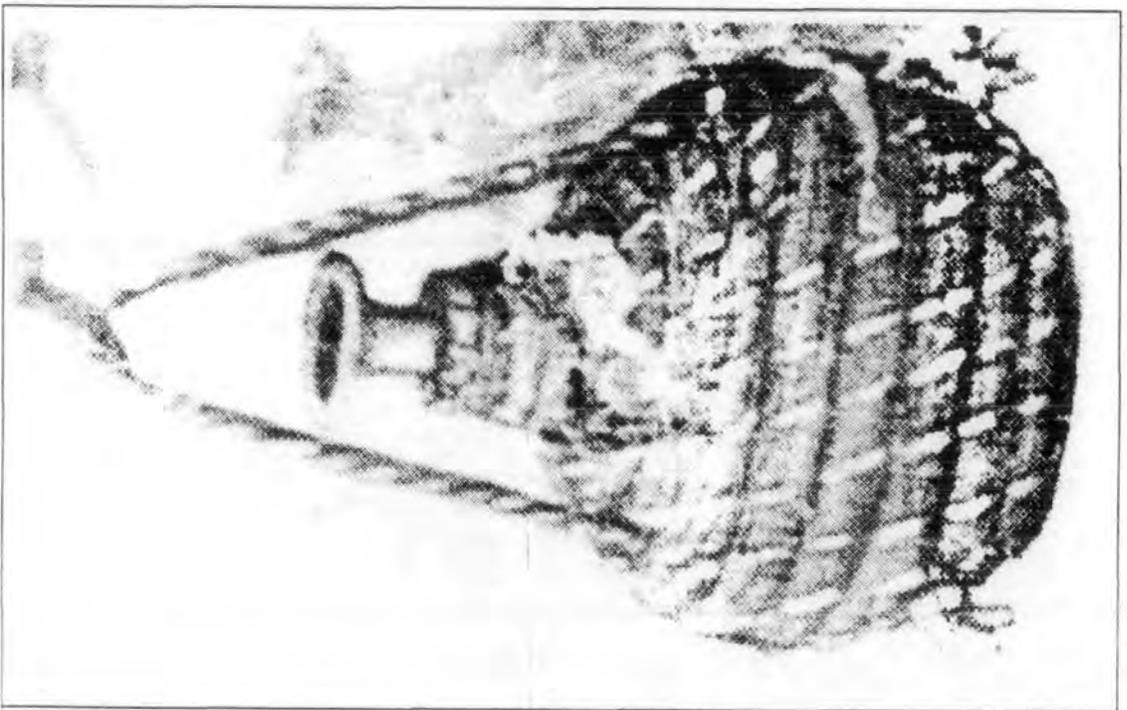
B. Detail of a fresco by Domenico Ghirlandaio, *Opere di misericordia*, in the Church of S. Martino dei Buoniuomini, Florence, that shows five glass beakers cooling inside a ceramic basin or *rinfrescatorio*. *After Vannini 1985, pl. 10.2*



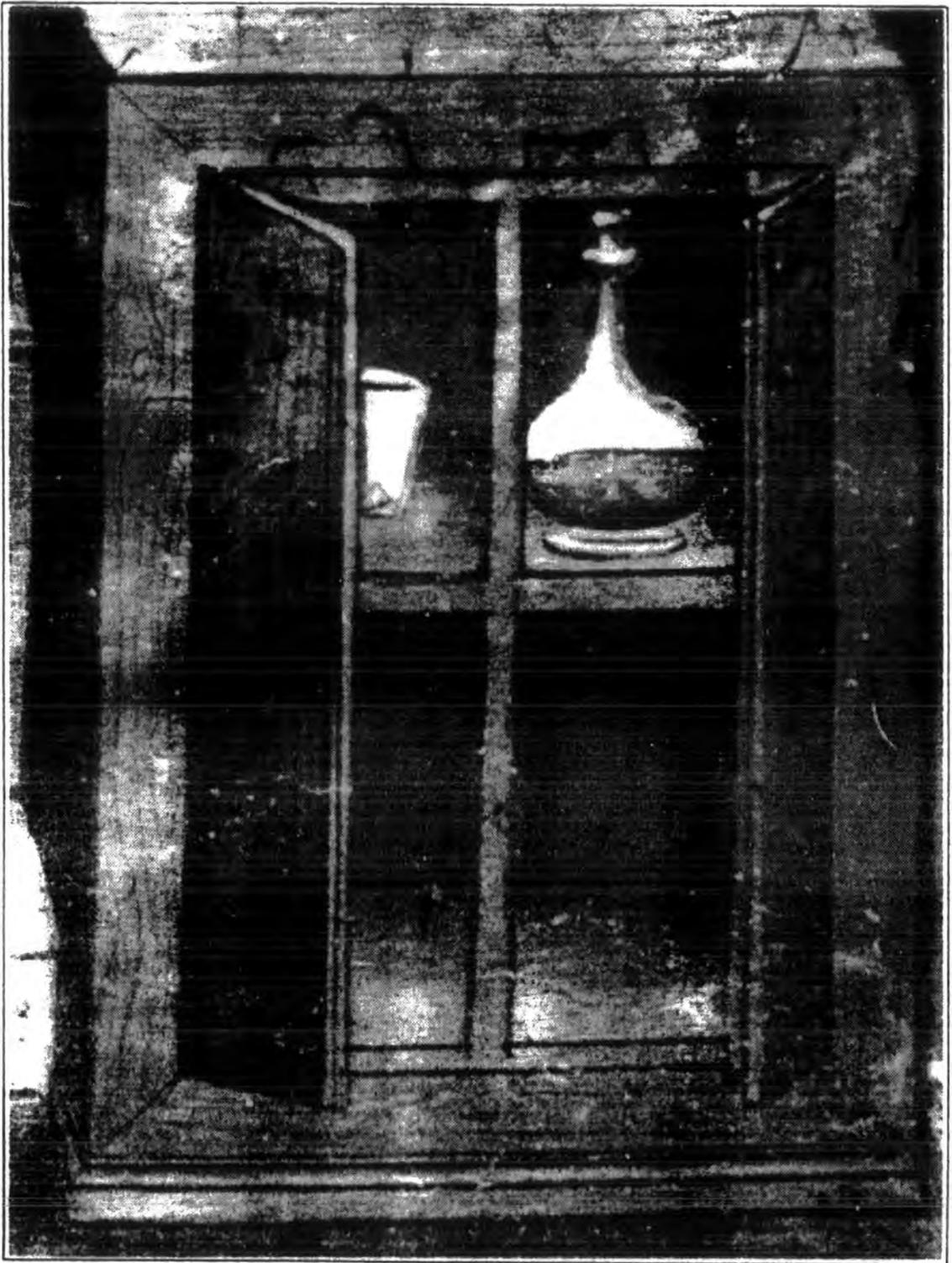
Detail from a mid 14th-century mosaic of *Herod's Feast* in the archway above the Baptistry door of S. Marco, Venice. After Zecchin 1987-1990, III, fig. on p. 13



A. Detail of a footed glass flask filled with red wine from a fresco by Taddeo Gaddi (1332-1338). Museo dell'Opera di S. Croce, Florence. *After Zecchin 1987-1990, I, fig. on p. 26*



B. Detail of a glass flask in a wicker case and suspended from a nail in a wall from a mid 14th-century fresco of *St Jerome* by Tommaso da Modena in the Church of S. Niccolò, Treviso. *After Ciappi 1995b, fig. 80*



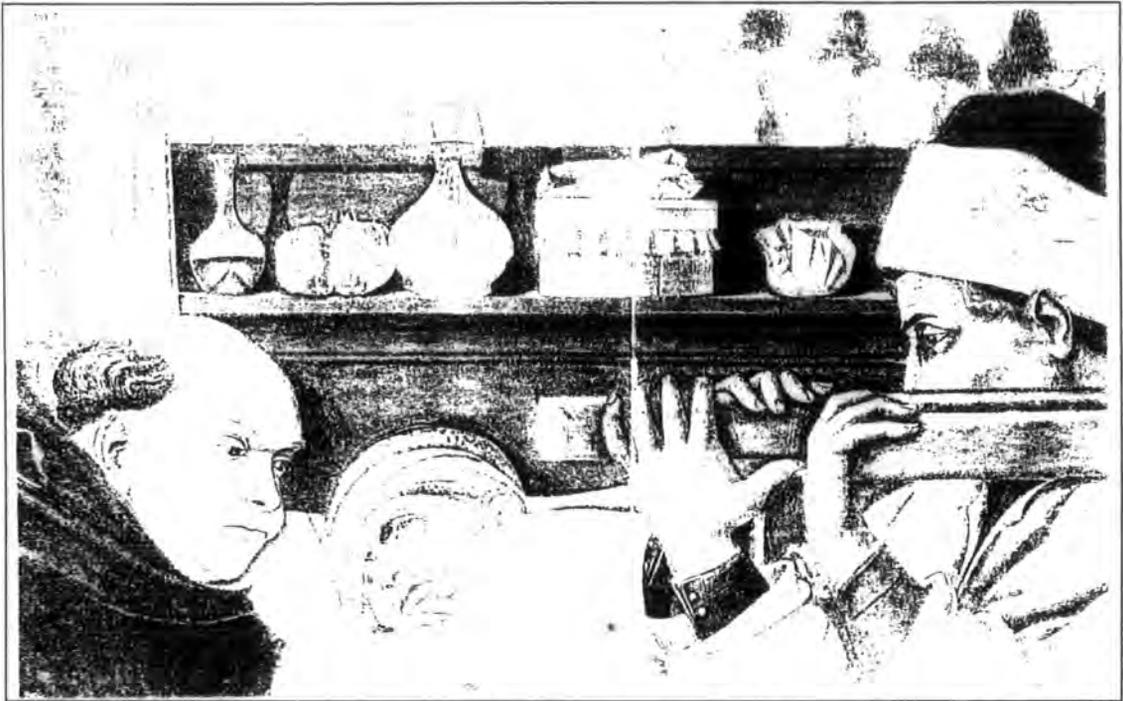
Detail of a fresco by Giusto de' Menabuoi (1376-1378) in the Baptistery of Padua Cathedral with a wooden cupboard containing a footed glass flask with a neck bulge and a glass beaker. *After Zecchin 1987-1990, I, fig. on p. 27*



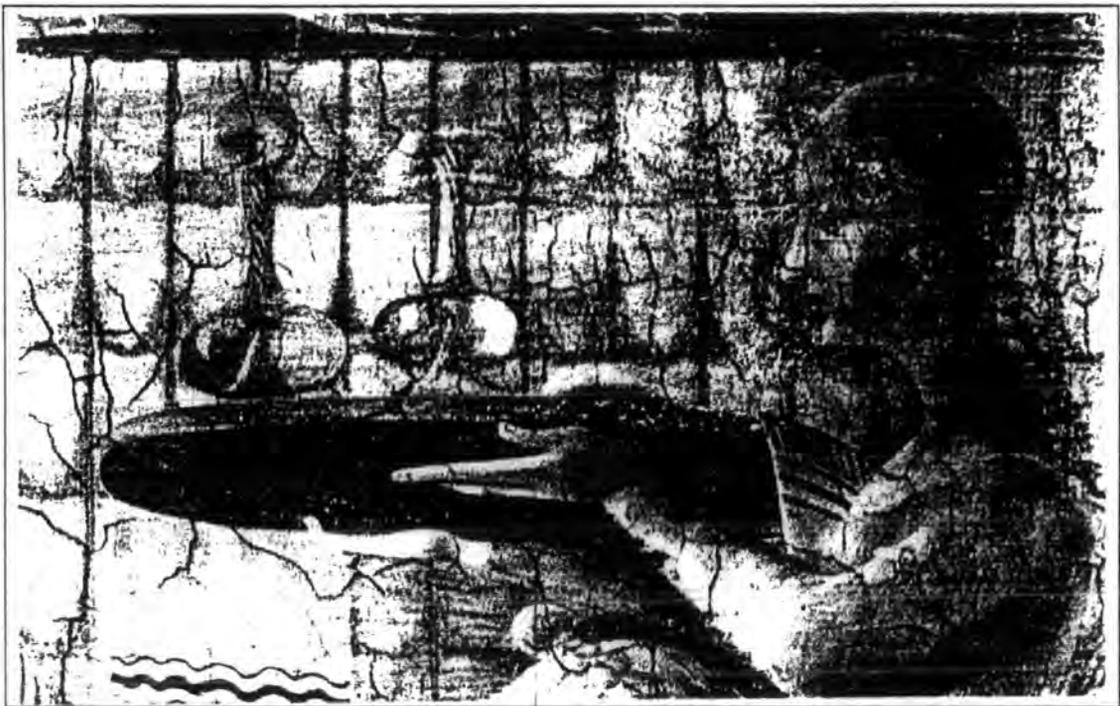
Detail of a fresco by Giusto de' Menabuoi (1376-1378) also with a footed glass flask with a neck bulge in the Baptistry of Padua Cathedral. *After Zecchin 1987-1990, III, fig. on p. 139*



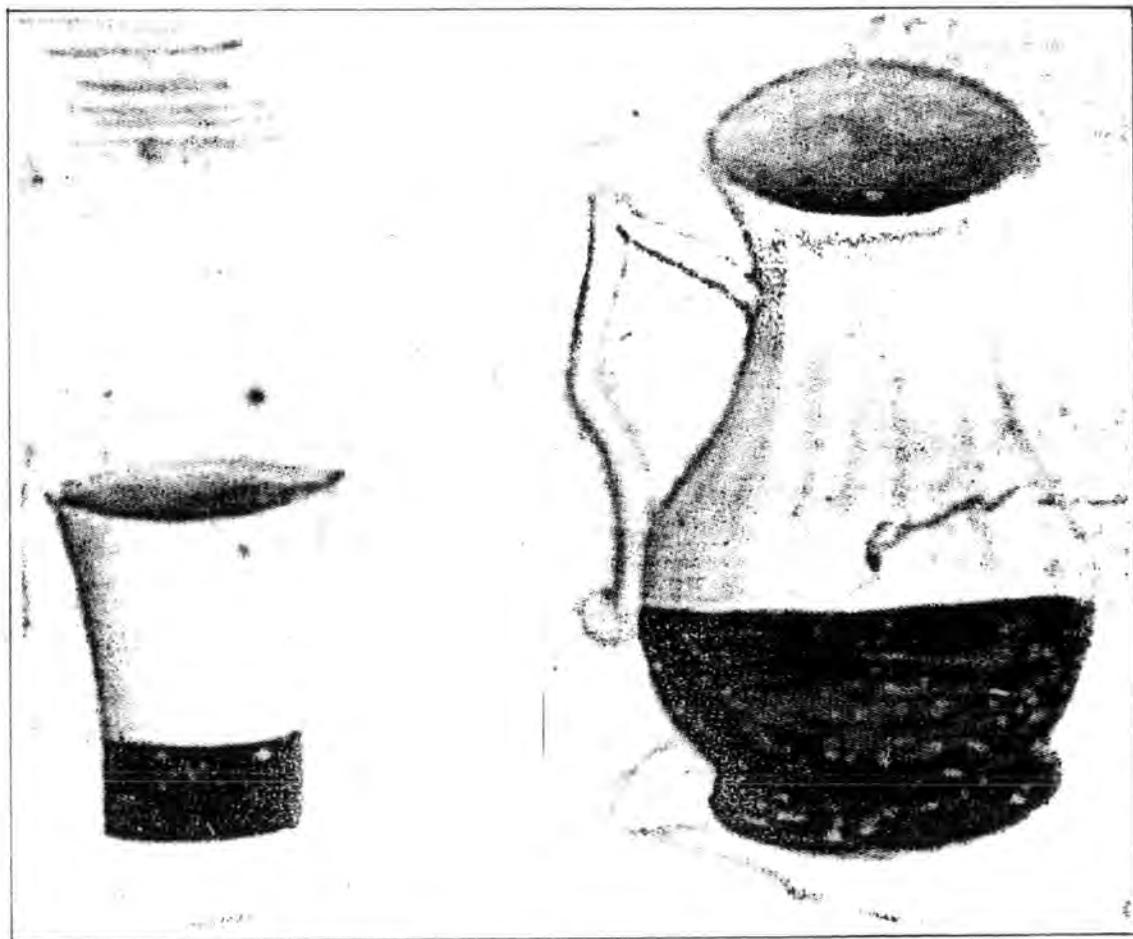
Detail of a late 15th-century fresco by Domenico Ghirlandaio (1449-1494), *St Gregory Announcing Her Death to S. Fina*, in the Chapel of S. Fina, Cathedral of San Gimignano. After Zecchin 1987-1990, I, fig. on p. 118



A. Detail from a fresco by Domenico di Bartolo (1440-1443), *Cura e governo degli infermi*, in the Hospital of S. Maria nella Scala, Siena. After *Il vetro in Toscana 1995*, pl. 40



B. Detail of a servant carrying two ribbed glass flasks on a tray from a mid 15th-century fresco by Paolo Ucello, *The Nativity of the Virgin*. Assunta Chapel, Cathedral of S. Stefano, Prato. After *Il vetro in Toscana 1995*, pl. 18.2



Two details from a fresco by Pietro da Rimini, *Cena di San Guido* (c. 1318), in the Refectory of the Abbey of Pomposa. These include a very early depiction of a ribbed glass jug with an angular handle. *After Zecchin 1987-1990, I, fig. on p. 14*



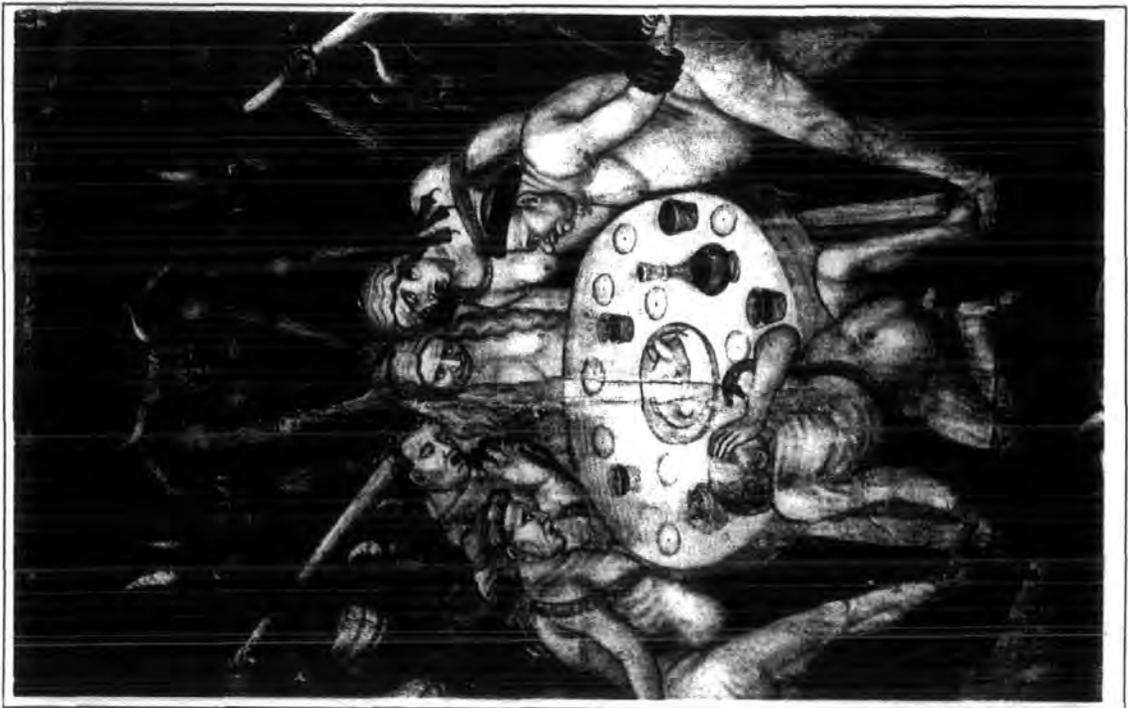
A. Frescoes by Pacino da Nova (1375-1390), *The Last Supper* and *The Story of St Eligio*, in the Basilica of S. Maria Maggiore, Bergamo. Photograph: David Lyall



B. Detail of Pacino da Nova's fresco of *The Last Supper* in the Basilica of S. Maria Maggiore, Bergamo. After Zizzo 1984, fig. on p. 47



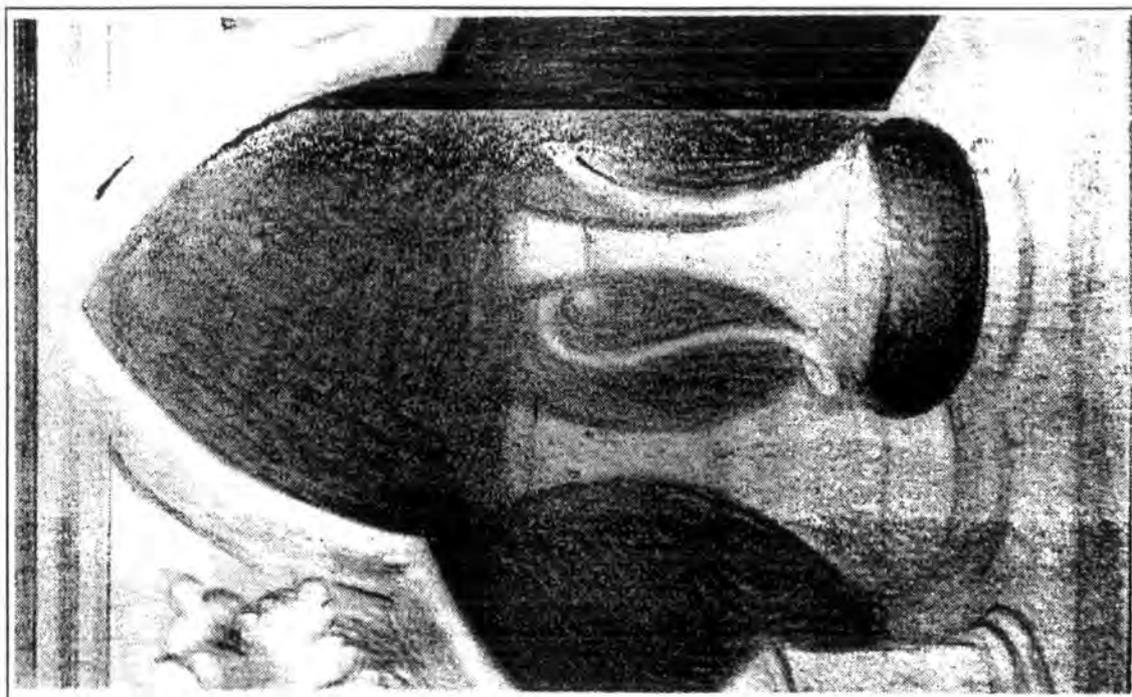
A. Detail of *The Last Supper* by Barna da Siena (1380) in the Church of the Collegiata, San Gimignano. Photograph: Edizioni Boldrini



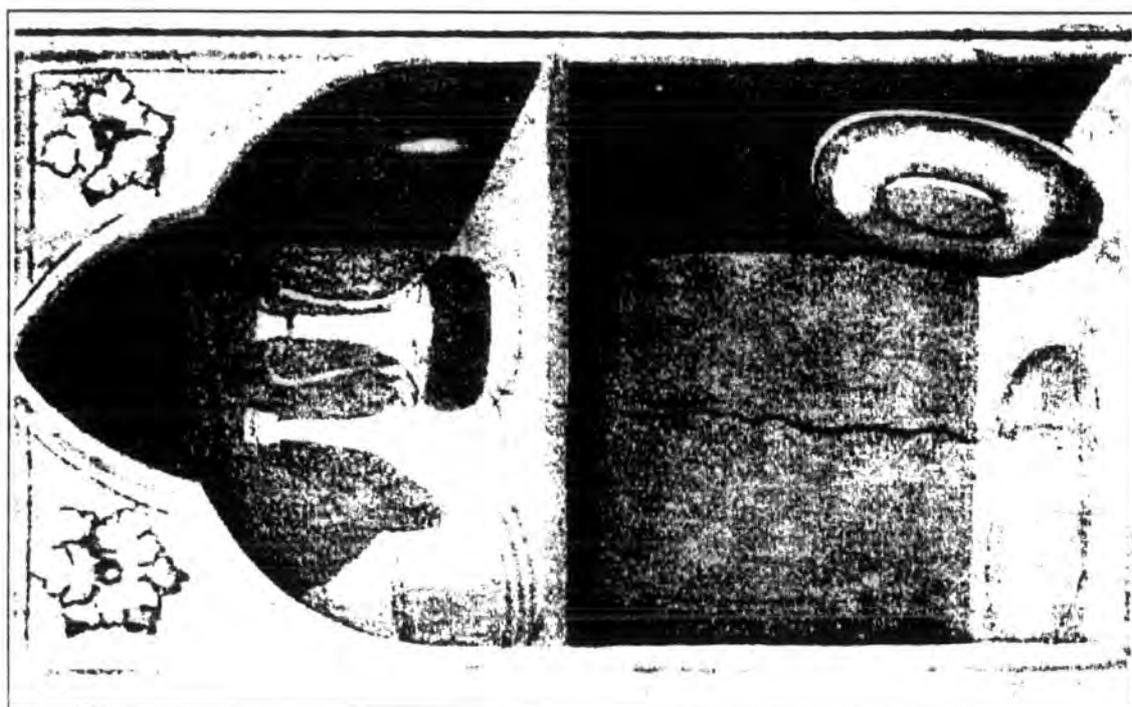
B. Detail of *The Gluttons* from a fresco of *Hell* by Taddeo di Bartolo (1396) in the Cathedral, San Gimignano. Photograph: Fontanelli



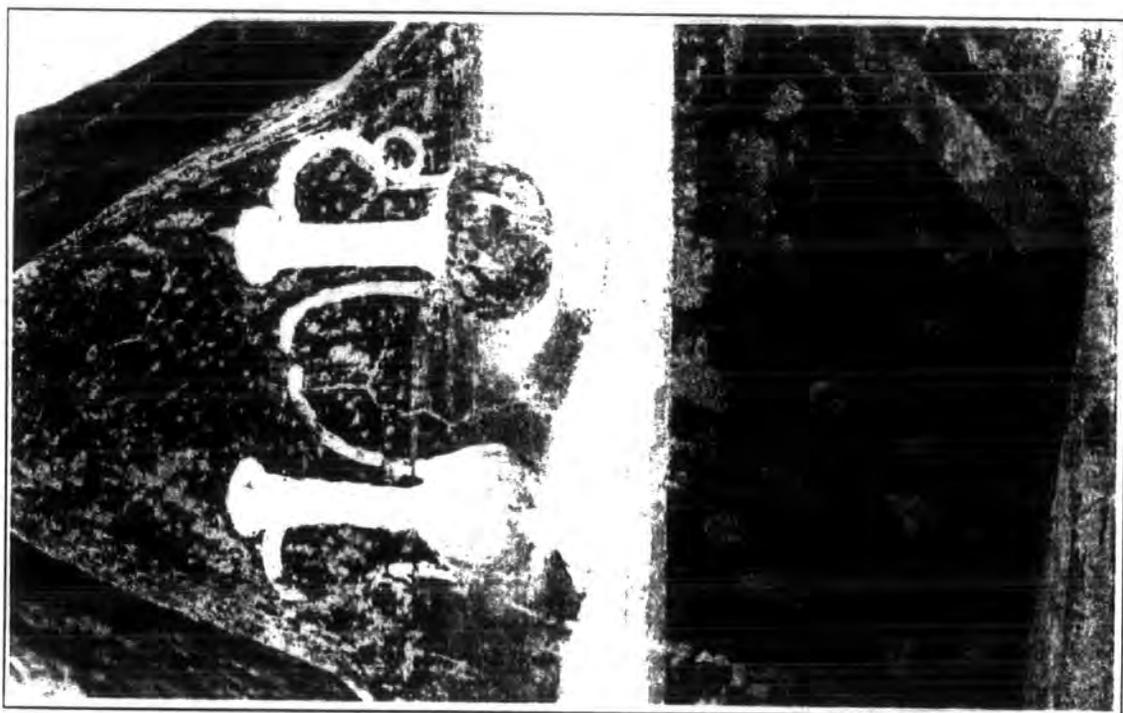
Detail of a 15th-century fresco of the *Ultimo colloquio di San Benedetto e Santa Scolastica* in the Upper Church of Sacro Speco, Subiaco. After Barone 1987, fig. on p. 16



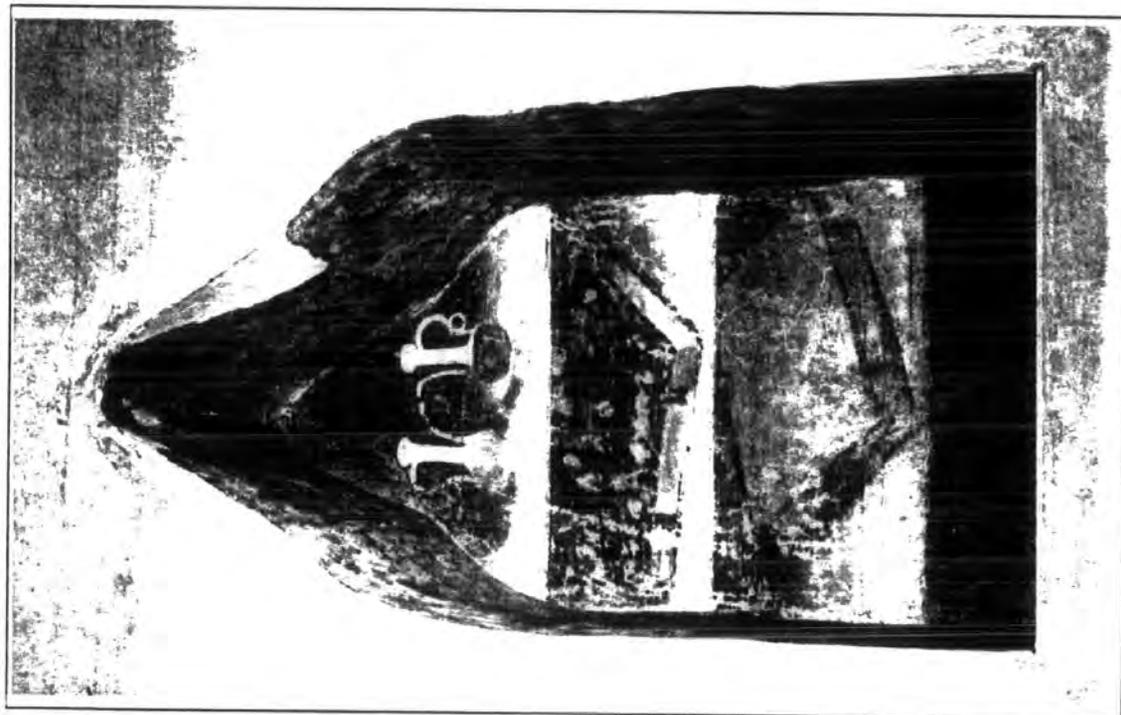
A. Detail of a glass cruet and a small glass flask from a fresco by Taddeo Gaddi (1332-1338).
Baroncelli Chapel, Santa Croce, Florence. *After Zecchin 1987-1990, I, fig. on p. 18*



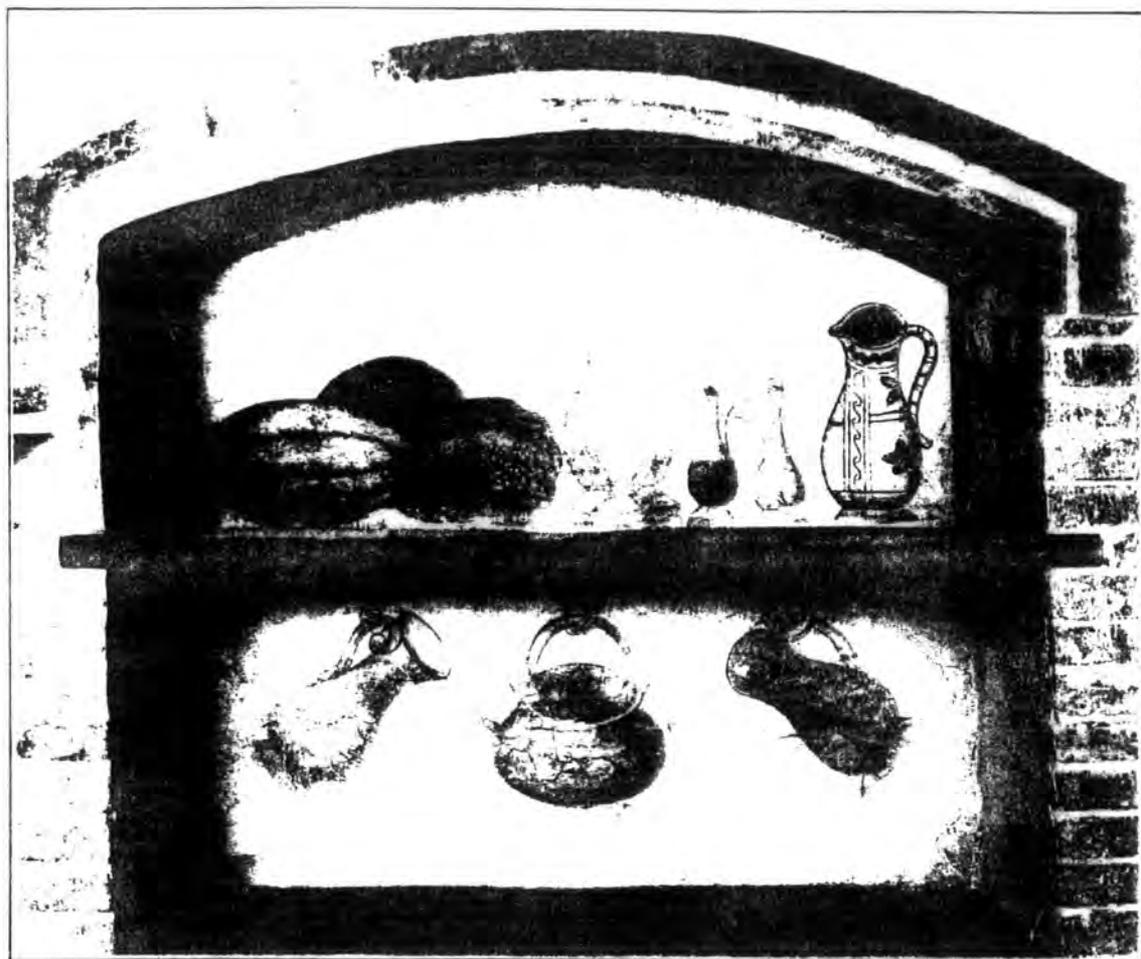
B. Fresco of a false niche with liturgical objects painted by Taddeo Gaddi (1332-1338) in the
Baroncelli Chapel, Santa Croce, Florence. *After Staffini 1993, fig. on p. 250*



A. Detail of two glass cruets with looped handles from a fresco by Masolini (1424) in the Chapel of Sta Helena, S. Stefano, Empoli. *Photograph: M. Newby*



B. Still-life fresco painted by Masolini (1424) on the back wall of a niche in the Chapel of Sta Helena, S. Stefano, Empoli. *Photograph: M. Newby*



A. Mid 14th-century fresco of a kitchen with glass and maiolica jugs and a pair of glass cruets, in the Cathedral of Spilimbergo. *After Siena 1994, front cover*



B. Glass cruet in the Museo A. Santarelli, Forli. *After Ciappi 1995a, fig. 60*

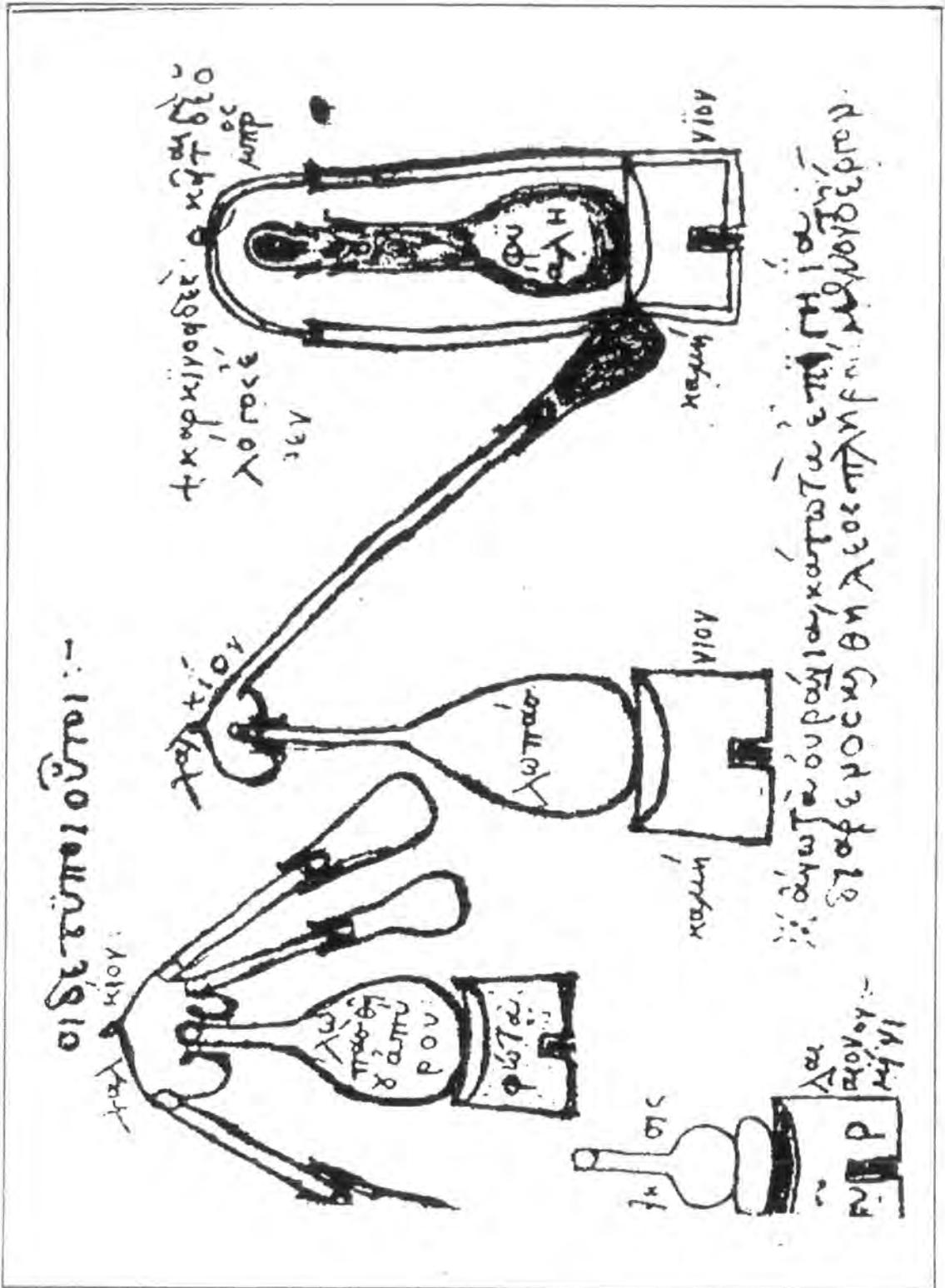


Diagram from a 15th-century copy of an earlier 8th- or 9th-century Greek manuscript. On the left is a *tribikos* or three-spouted alembic and a more usual single-spouted alembic in the centre. Paris, Bibliothèque Nationale, GR 2327. After Anderson 1983, fig. 1

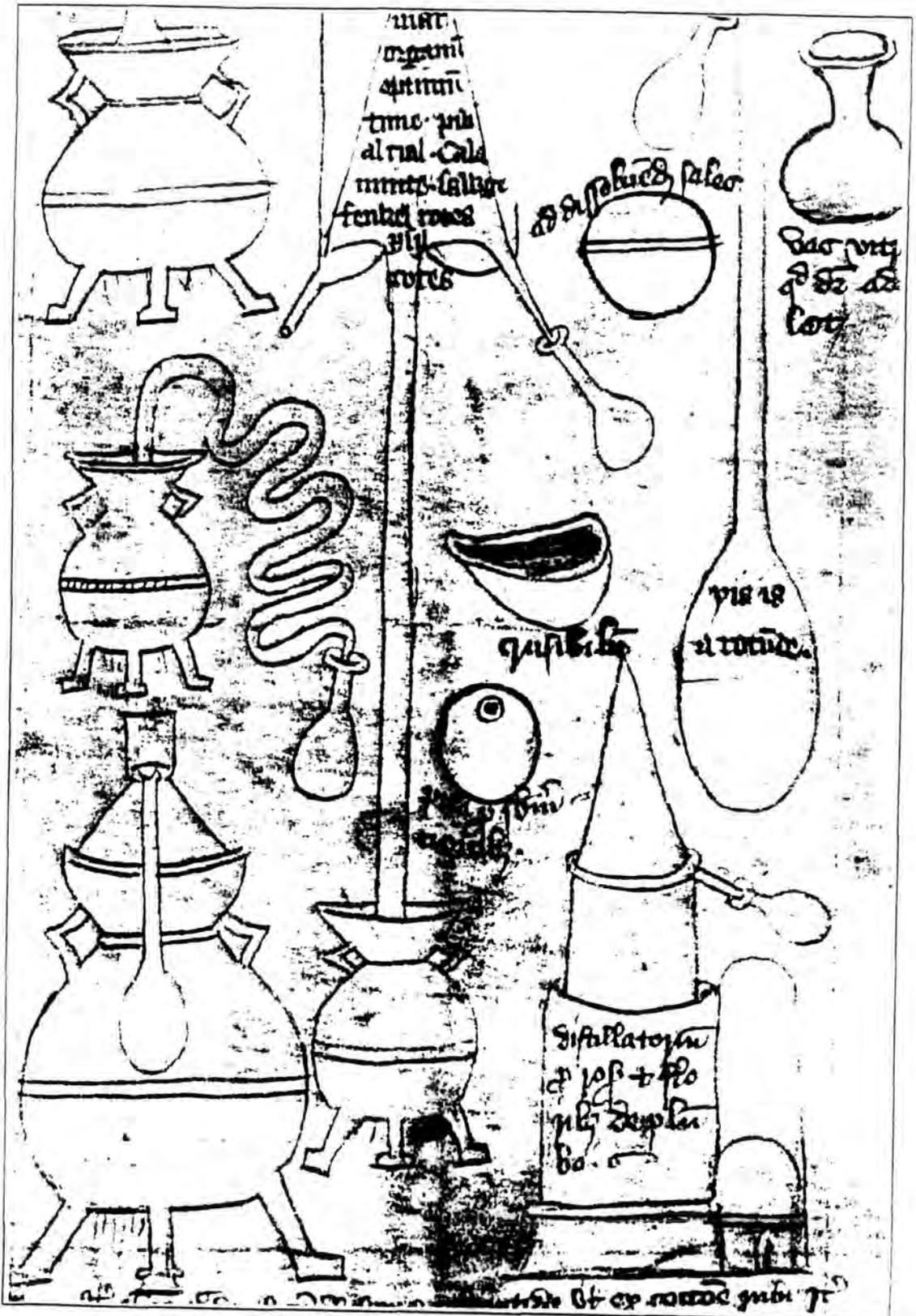
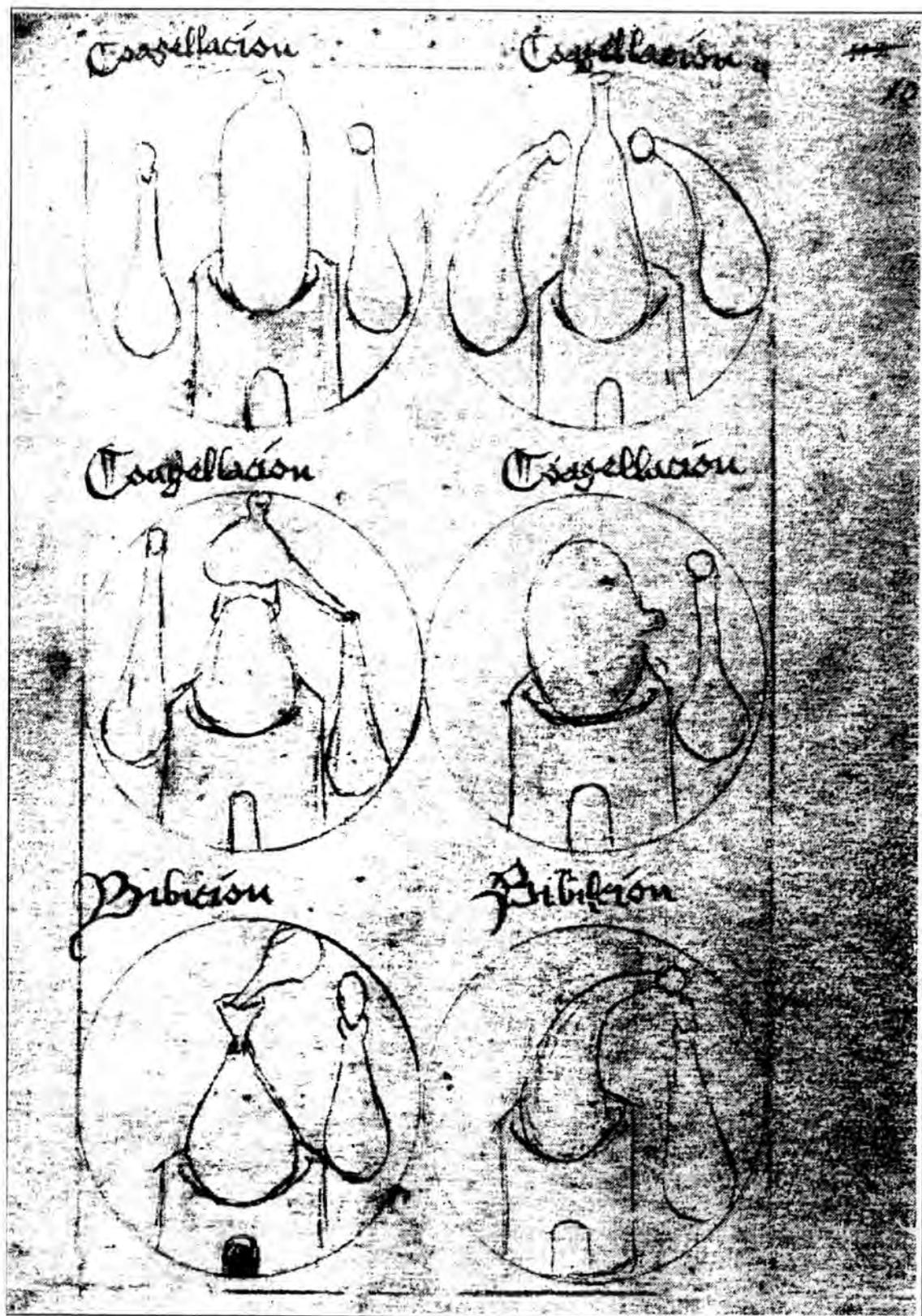


Illustration from an English 15th-century manuscript showing furnaces, stills and other apparatus used in the preparation of medicines and the transmutation of metals. London, British Library, Sloane MS 3548, f. 25



Detail of an illustration from a late medieval chemical treatise showing many glass shapes and how they were used together in various sublimation processes. *London, British Library, Harley MS 2407, f. 108*

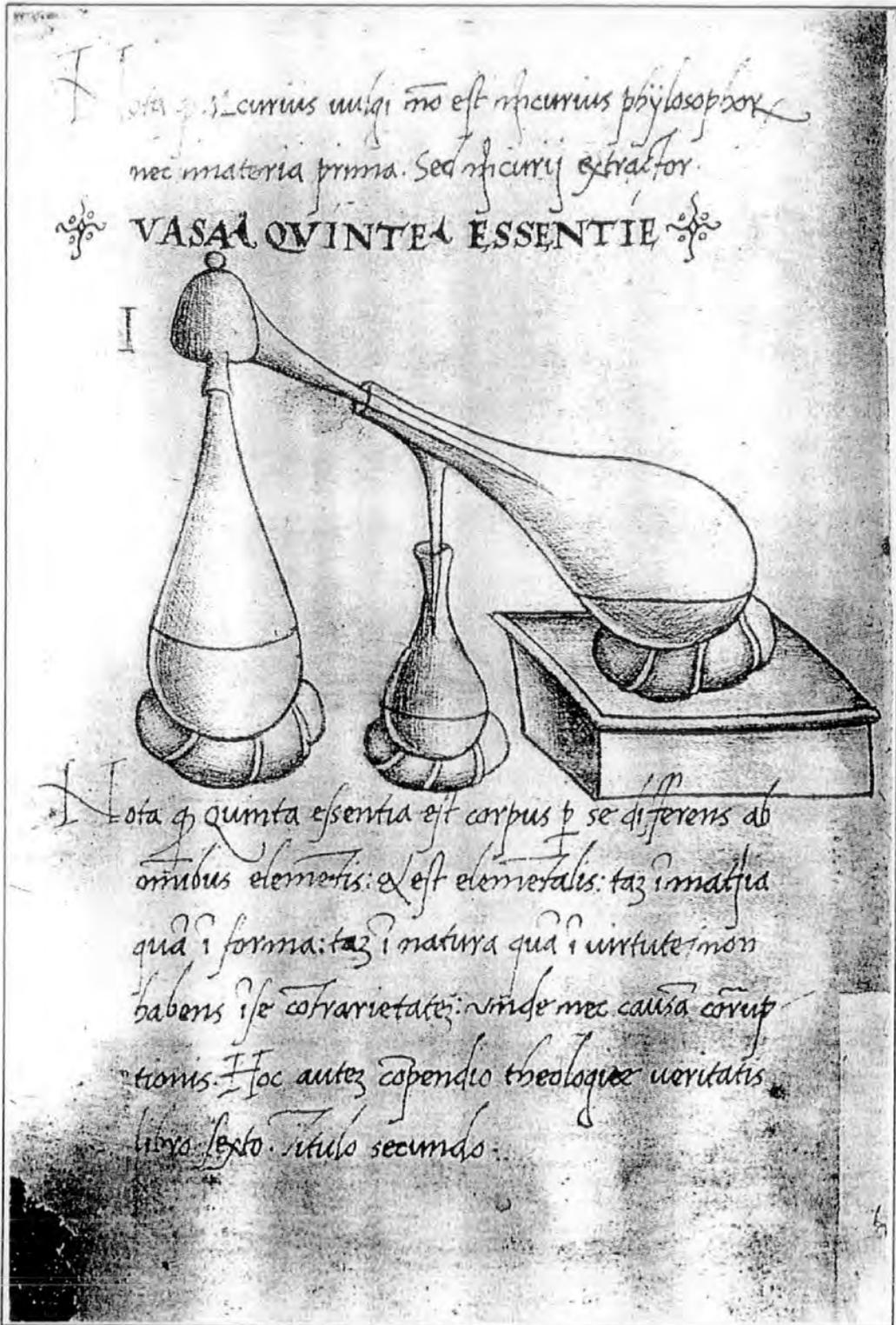
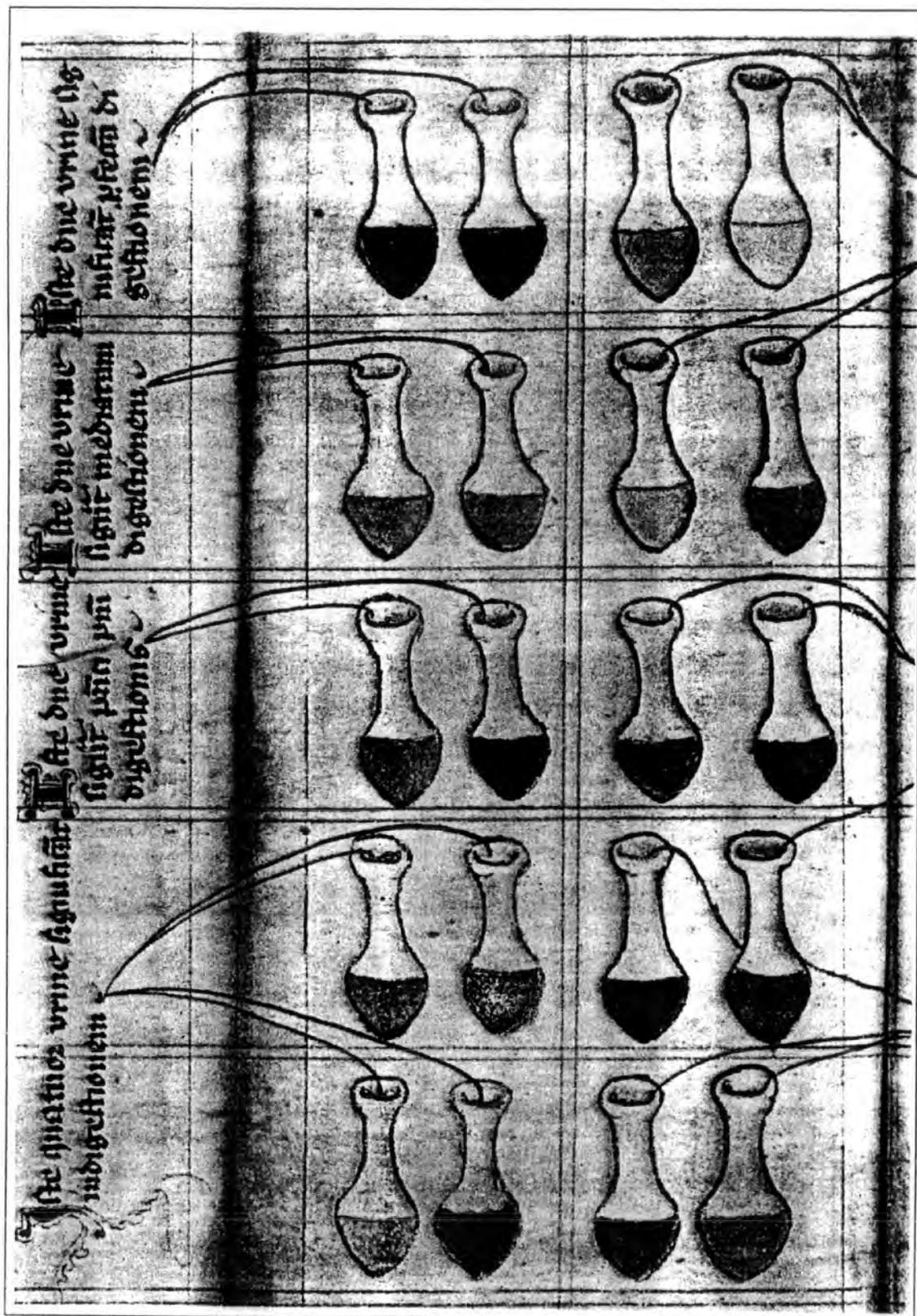


Illustration from a 15th-century discourse on alchemy in the University Library of Padua showing distilling apparatus. After Foy and Sennequier 1989, 337, no. 383



Miniature from Mauro's *Tractatus de urinis*, showing a red-robed doctor examining the contents of a slender glass urinal. Paris, *Bibliothèque Nationale*, *Cod. Lat. MS 18499, f. 144v*.



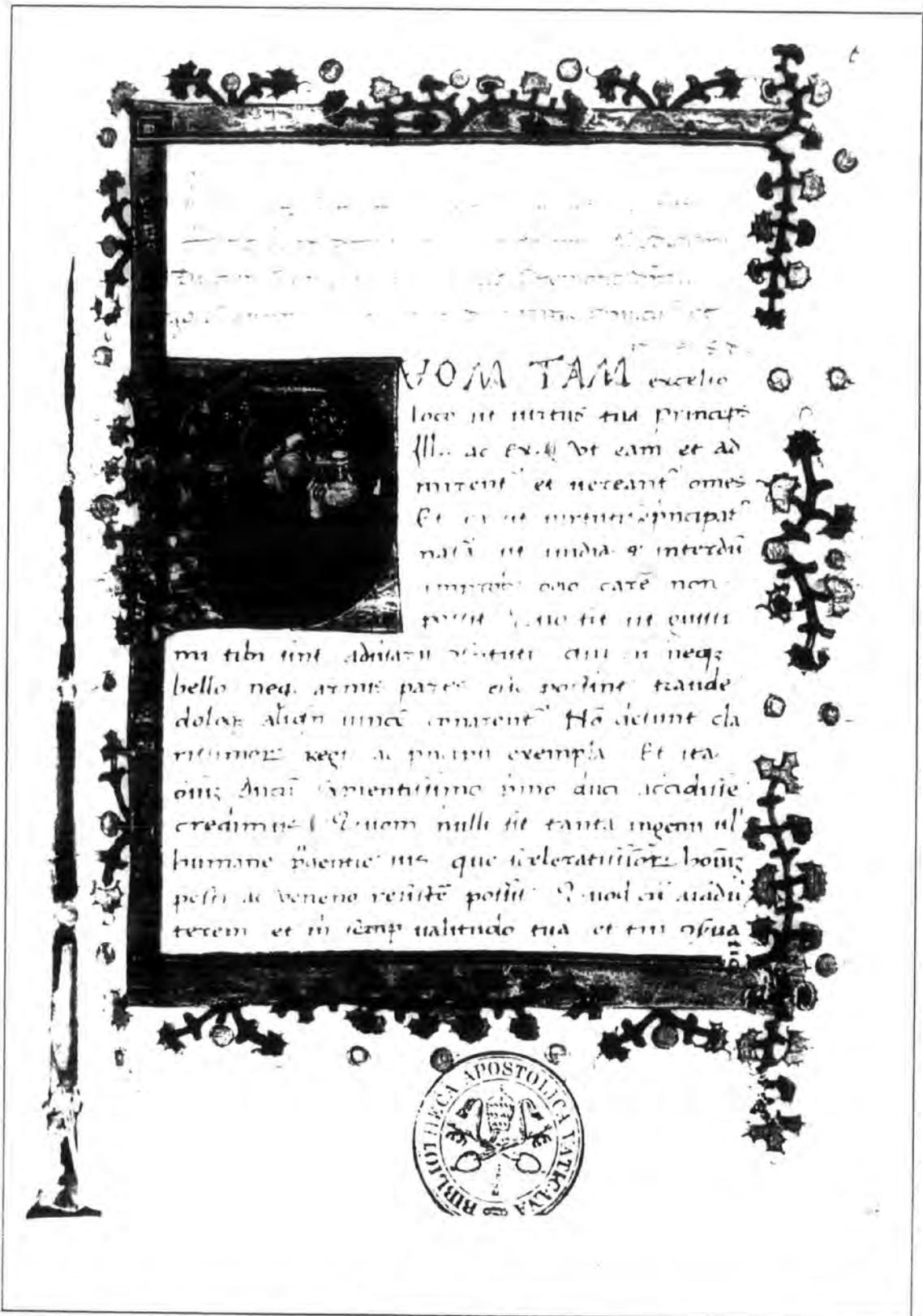
Detail of a physician's folding calendar, opened to reveal a coloured table of urinals
 London, British Museum, Harley MS 5311, section J



Detail of a 14th-century Bolognese manuscript, *Decretum Gratiani*, showing a physician examining an urinal at the bedside of a dying bishop, who is in the act of naming his successor. *Vatican Library, Urb. Lat. MS 161, f.166*



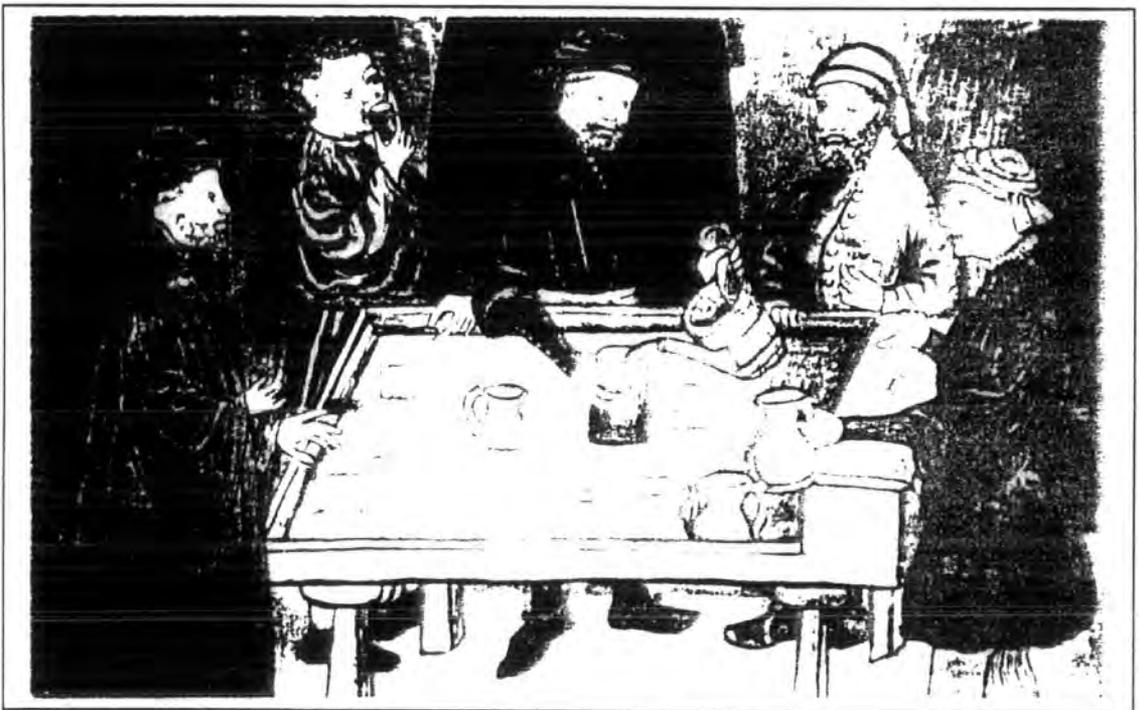
Detail from a 15th-century miniature of a red-robed doctor holding a glass urinal to the light which was brought to him by the patient in a woven handled basket of the same shape. *Turin, Biblioteca Nazionale, MS D I 14, f. 1*



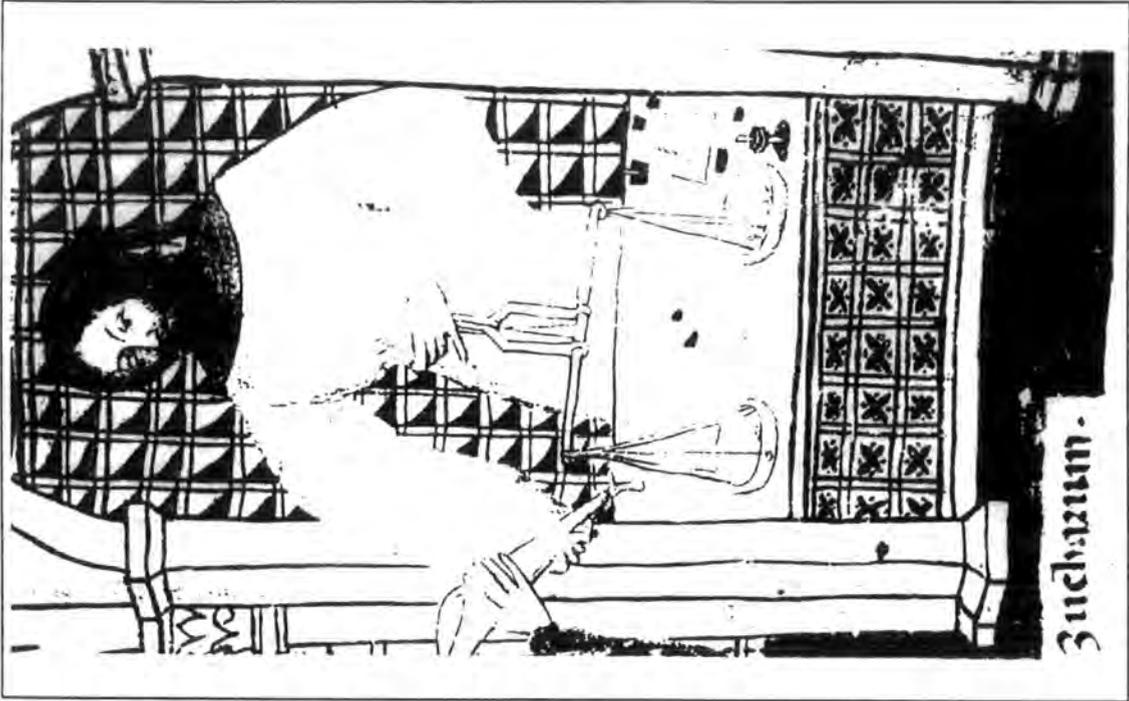
Folio from an Italian 15th-century manuscript with a miniature in which a doctor is holding an urinal covered by a white tied cloth. *Vatican Library, Urb. Lat. MS 1434, f. 6*



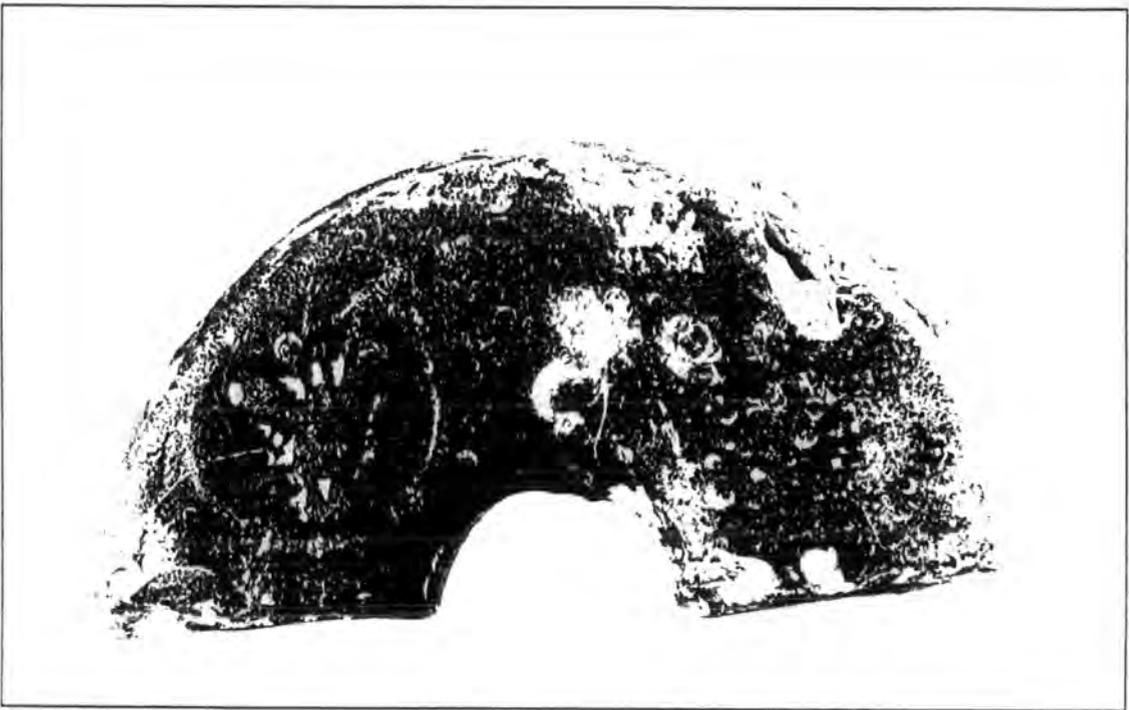
A. Detail of the illustration for *Acqua Ordey* with two very large glass flasks, from the Rome manuscript of the *Tacuinum Sanitatis*. After Ciappi 1991, fig. 21



B. Detail from a tavern scene, *vinum rubeum grossum*, with the inn-keeper measuring out wine, from the Vienna manuscript of the *Tacuinum Sanitatis*. After Minini 1998, fig. 2



A. Detail from the Paris manuscript of the *Tacuinum Sanitatis* showing a shop-keeper selling sugar. After Minini 1998, fig. 4



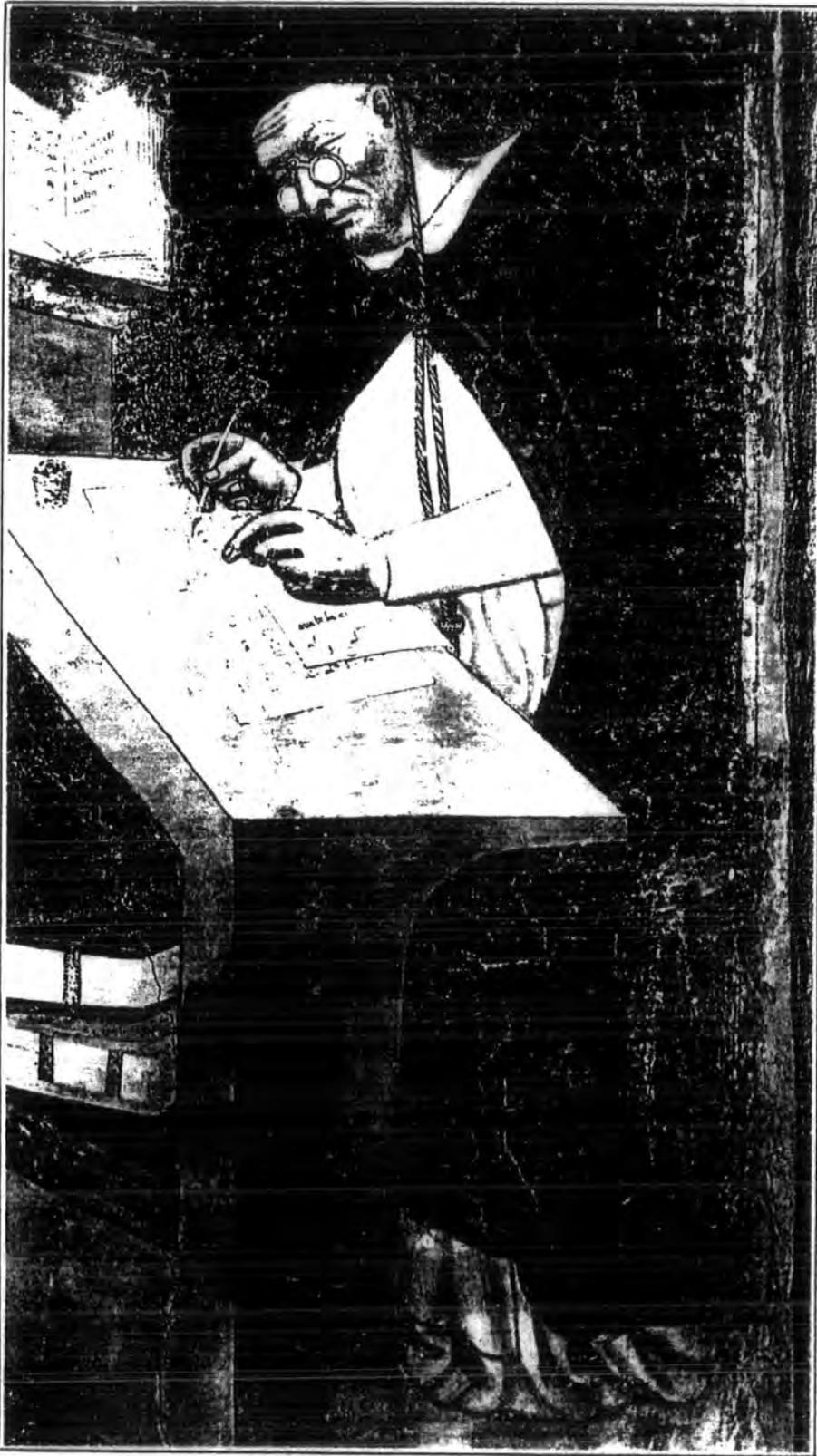
B. Half-pound glass weight, cut down from a circular pound weight with a hole in the centre, and stamped with a seal. Galleria Franchetti, Venice. After Minini 1998, fig. 3



A. Detail from the Vienna manuscript of the *Tacuinum Sanitatis* showing an apothecary dispensing *Theriaca*, a panacea containing over 64 ingredients. After Arano 1976, pl. 41



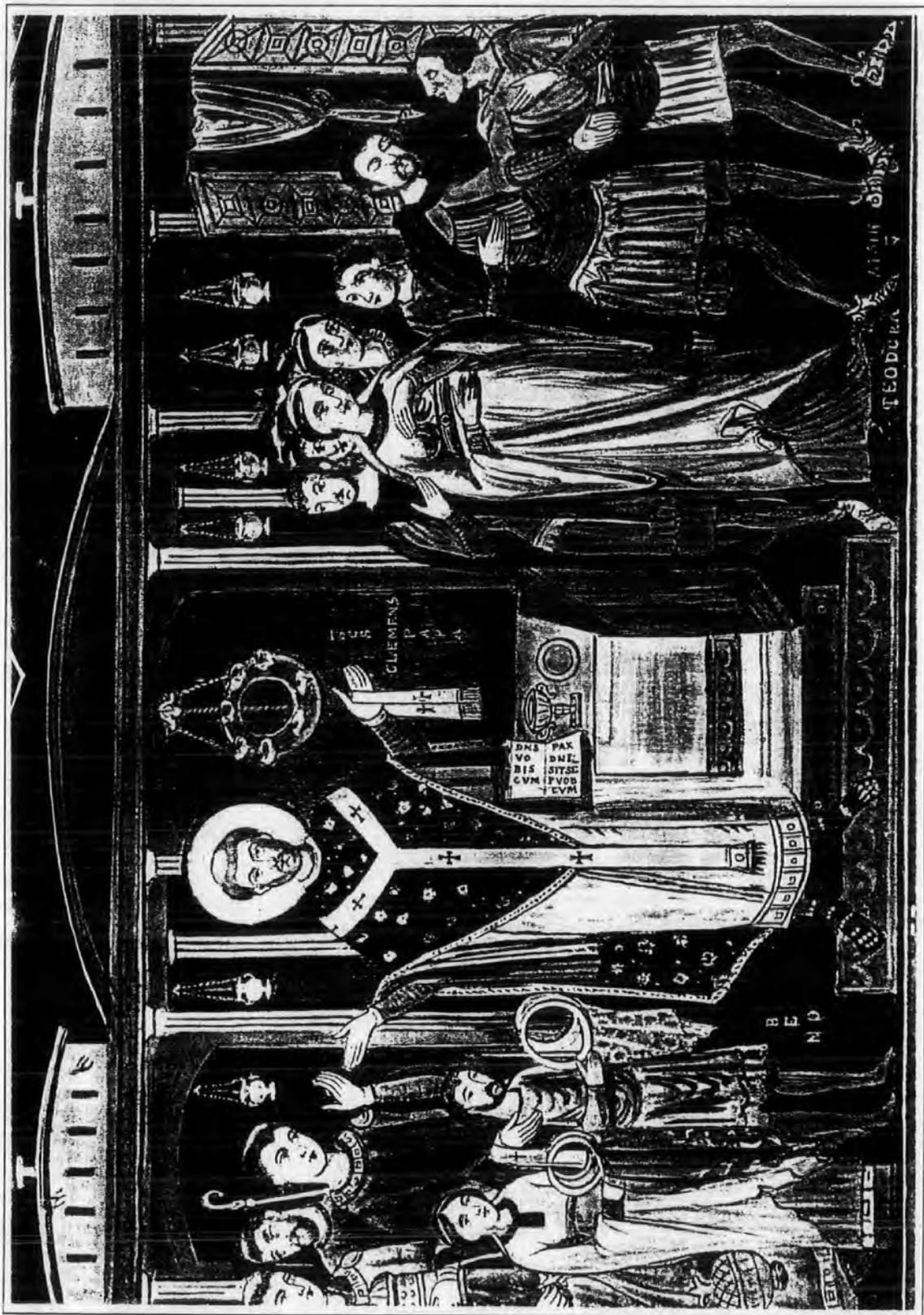
B. Detail from the miniature illustrating *Oleum Amigdalorum* (oil of almonds) from the Vienna manuscript of the *Tacuinum Sanitatis*. After Arano 1976, pl. 24



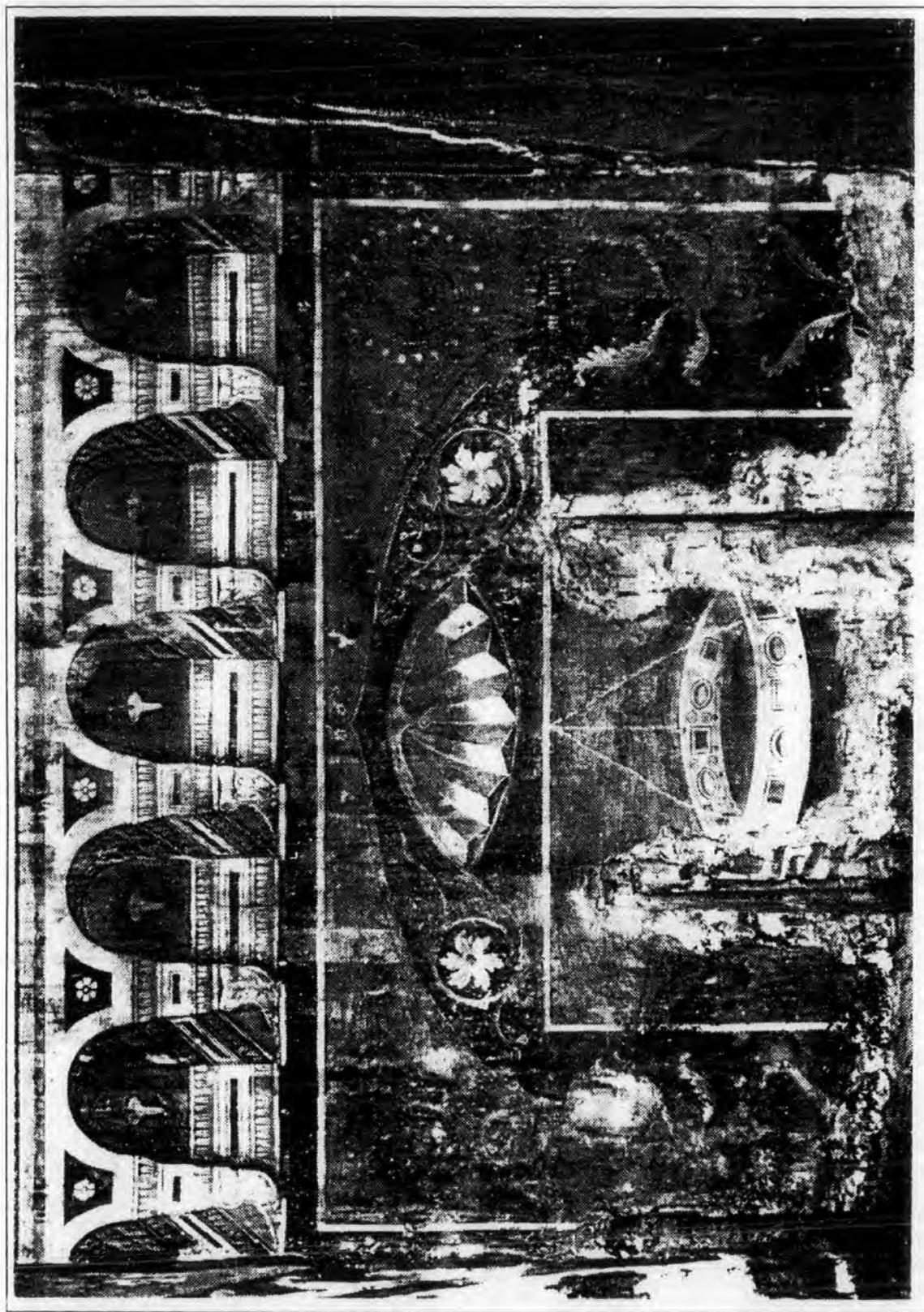
Detail from a fresco by Tommaso da Modena (1352) in S. Nicolo, Treviso, showing Fra Ugone da Provenca wearing a pair of spectacles. *After Zecchin 1987-1990, vol. 2, fig. on p. 245*



Detail from a fresco by Tommaso da Modena (1352) in S. Nicolò, Treviso, showing Cardinal Ugo da Billon reading from a book with the aid of a magnifying glass or monocle. *After Zecchin 1987-1990, II, fig. on p. 245*



Detail from a fresco (c. 1080) of *Sisinnius Interrupting St Clement while Celebrating Mass* in S. Clemente, Rome. Above the altar is a polycandelon with seven pendant lamps and a further six hanging lamps are suspended from the arches of the nave.



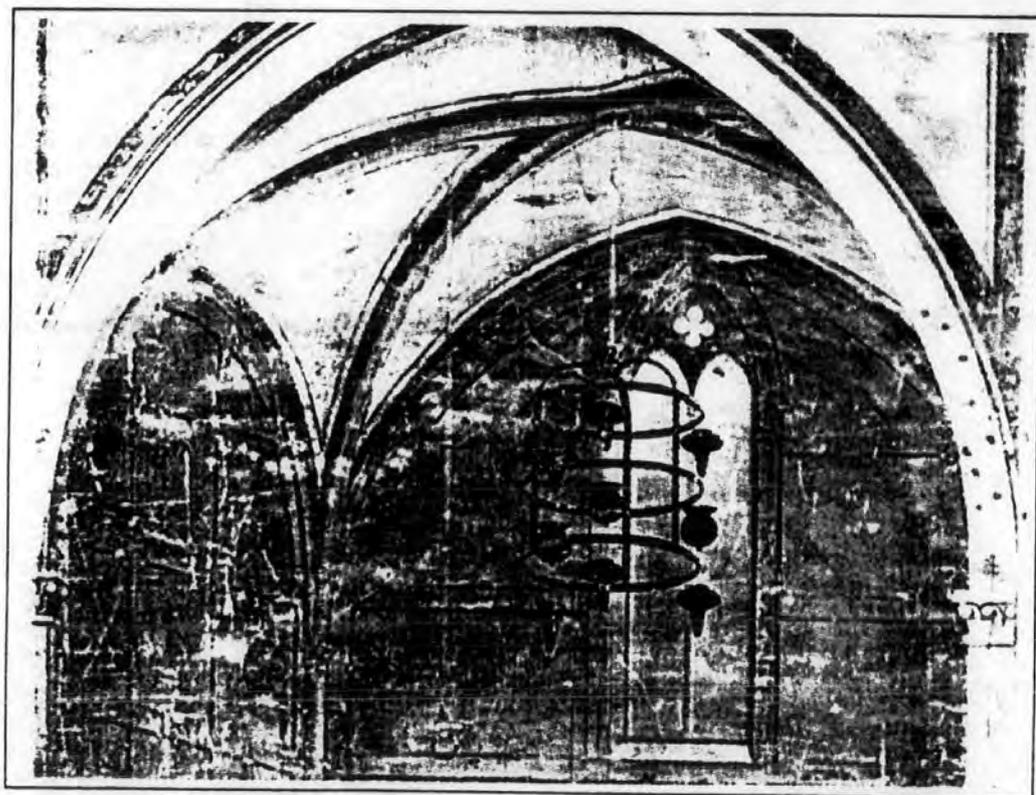
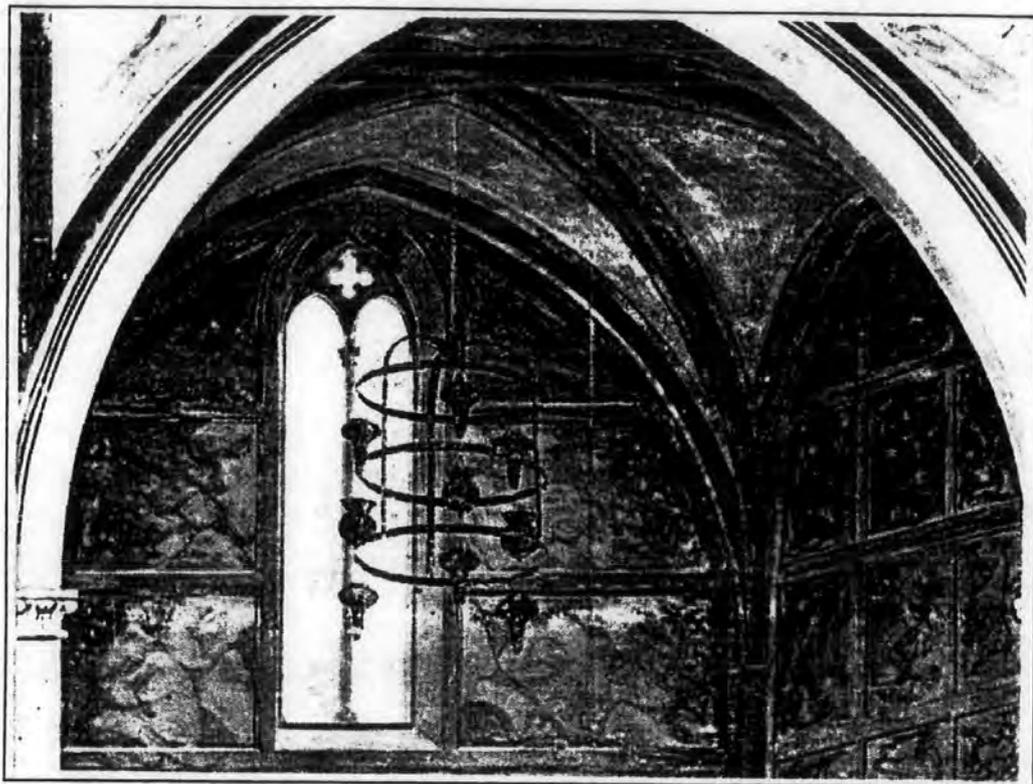
Detail from a late 13th-century fresco in the Choir of S. Maria Maggiore, Tivoli, in which are depicted five stemmed glass hanging lamps and a metal corona.



A. Detail of *San Silvestro consacra la Nuova Basilica di San Pietro*, by Deodato Orlandi (1288-1315) in the Church of S. Pietro, S. Pietro a Grado. After *Stiaffini 1995b*, fig. 45



B. Detail of a late 15th-century painted wooden panel with *The Miracle of the Lamp of St Bartholomew*, attributed to Niccolo Rondinelli, from the Church of S. Domenico, Ravenna. After *Foy and Sennequier 1989*, 355, no. 400



Detail of two *trompe l'oeil* chapels painted by Giotto (1303-1306) with polycandela from which are suspended two types of glass lamps, in the Chapel of the Scrovegni, Padua



15th-century Italian illumination of *St Cyprien of Carthage in his Study*. The wooden sloping writing desk has two glass inkwells attached to the side while there is a glass flask and an hour-glass on the upper shelf. *Vatican Library, Urb. Lat. MS 63, f. 8 v.*



Detail from a Flemish manuscript, datable to 1340, of Alexander the Great surveying the oceans from a glass diving bell. *After Lane Fox 1980, fig. on p. 41*

