

Ceramic Pharmacy Jars from Syria to Renaissance Europe, 1200–1600

A Comparative Study of Historical Production and Technique



The author's replica pharmacy jars, recreating six museum pieces from the 13th–16th centuries.

THL Gemma Evangelista Borgia

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Abstract

This paper examines the ceramic pharmacy jar known as the albarello. Drawing on research, archaeological evidence, and the sixteenth-century treatise of Cipriano Piccolpasso, it traces the migration of the albarello from the Middle East westward through trade networks to Spain and Italy. The author's own experience recreating six museum pieces provides a practitioner's perspective on the skills, difficulties, and rewards that would be encountered by our ancestors. A comparative analysis of Renaissance and contemporary maiolica methods—clay preparation, tin-glaze formulation, pigment chemistry, painting technique, and kiln design—reveals both how much has changed and how much, at the level of fundamental craft, endures.

I. Introduction: The Jar That Crossed a World

Somewhere in early thirteenth-century Syria, a potter turned a small vessel on a wheel, narrowing its waist slightly so that it could be easily held and the top collared in and ridged to accept a parchment lid which would seal in its contents. It would be decorated in black iron oxide and glazed in transparent turquoise. The Potter could not have imagined that this simple common storage jar would travel across the known world, be academically studied and celebrated four centuries later.

That jar, is now in the Ashmolean Museum in Oxford and is one of the earliest known ceramic examples of the albarello. As the albarello moved through time from the 12th to the 16th Century and to new countries (Spain, Italy and France), it became an example and expression of new ceramic technologies and taste. Potters utilized different and new materials, regional clays as apposed to fritware (stonepaste) of the Middle East. Tin glazed wares painted with vibrant oxides. New decorations that reflected the European tastes like elaborate Italian ornamentation. However, through it all, the bamboo-segment silhouette that inspired the original form in the Far East remained recognizable throughout. A testament to its practical, utilitarian and dare say “perfect” design.

This paper tells the Arbarello’s story in both historical and technical terms, from Syria in the 1200s to France in the 1500s. It also combines the authors direct experience in recreating six alberellos from museum examples. It will hopefully appeal to not only the scholar interested in the history and archaeology of medieval ceramics, but to any person curious to understand pottery knowledge/technology from surviving ceramic objects.

II. Origins: Syria and the Islamic World, 1200–1350

The Albarello Form and Its Far Eastern Roots



Fig. 1. Albarello, fritware with black under turquoise glaze, Syria, early 13th century. Ashmolean Museum, Oxford.

The word albarello, from the Arabic al-barrani, meaning “offering jar,” filtered through Spanish and Italian into the vocabulary of the apothecary’s trade. But the form’s genealogy is older and more distant. The characteristic silhouette, cylindrical, slightly waisted at the middle, was directly inspired by the sections of bamboo used as storage containers in the East and Southeast Asia. Persian potters, retained the functional form which was easy to grip, stack, and seal. Making them of earthenware or fritware made the jars durable for transport and long term storage.

The earliest surviving ceramic albarellos date from the thirteenth century. The Ashmolean jar (Fig. 1, early thirteenth century, Syria) is made of fritware an incredibly durable ceramic body rivaling porcelain. It is decorated/underpainted with black iron oxide under a turquoise leaded glaze, its proportions—height 21.3 cm, mouth diameter 12.5 cm.

Fritware: A Technical Innovation

The material from which the earliest albarellos, like the Ashmolean example (fig 1), were made of fritware (also called stonepaste). The recipe recorded by the fourteenth-century Persian writer Abu’l-Qasim Kashani describes a body of ten parts ground quartz, one part ground glass (an alkaline frit), and one part fine white clay. This formulation displaced the traditional iron-rich earthenware clays of the region. It produced wares harder, denser, and more translucent than earthenware, rivaling the whiteness of imported Chinese porcelain. The stimulus was at least partly competitive, the arrival of fine Chinese porcelain created demand for this domestic alternative.

For the modern, as well as the medieval potter, fritware presents challenges and difficulty. Its high quartz content makes it prone to cracking during drying and firing, and its low clay content reduces the plasticity that potters rely on for throwing. Most fritware was pressed into molds and then carved because of the plasticity issues. The author’s experience recreating fritware or stone paste confirms what the historical record suggests, that fritware is an unforgiving material and molded forms create the best results. The rewards of the material being a surface of exceptional whiteness, and durability that fires at the lower earthenware temperatures.

The Archaeology of Trade: Syrian Jars in London



Fig. 2a. Albarello, fritware, blue under clear glaze, Syria, 14th century. London Museum.

The second jar in this study comes from a specific archaeological find that exemplifies the trade networks through which albarellos traveled. A group of fritware jars were recovered from a chalk-lined cesspit excavated on Fenchurch Street, London (Fig. 2a–2b). These jars along with their contents, medicinal herbs and spices (possibly sumac or Aleppo pepper from Syria) were probably traded through Italian intermediaries to their final London destination. Once the contents were used the jars were unceremoniously discarded in the waste pits of London.

English physicians of the fourteenth century studied the works of Arabic, Persian, and Greek medical traditions that recognized the therapeutic properties of herbs and spices. Most of the ingredients obtainable only through long-distance trade. The Syrian fritware jar, arriving in London via Italian trade, was the material vehicle of this intellectual and commercial exchange.



Fig. 2b. Second London Museum Syrian albarello, 14th century. Note the panel decoration.

The thick-walled fritware of these trade jars was deliberately made to withstand the stresses of long-distance transport by road and sea, to be handled repeatedly in the apothecary's dispensary, and to maintain the integrity of its contents over months of storage. The decoration, floral designs and rhythmic lines, painted in cobalt blue under a clear glaze, was functional as well as aesthetic.

These particular Islamic albarellos bore no inscriptions specifying their contents. Identification was achieved through pattern and form rather than text, a convention that persisted throughout the Islamic albarello tradition. Middle Eastern potters were demonstrably capable of functional writing, as evidenced by the meaningful inscriptions on their domestic tableware. However, on albarellos there are only a handful of jars that have inscriptions. Most are unintelligible, pseudo-kufic scripts that have no meaning and are decorative in nature.

III. Spain and the Lusterware Tradition, 1350–1500

Valencia and The Luxury of Lusterware



Fig. 3. Pharmacy jar, tin-glazed earthenware with luster, Manises (Valencia), Spain, early 15th century. Metropolitan Museum of Art, New York.

By the early fifteenth century, the ceramic workshops of Manises, near the city of Valencia, had become the most celebrated producers of luxury ceramics in Europe. The Kingdom of Valencia had been under Christian rule since the thirteenth century, yet its workshops continued to be staffed by Muslim potters working under now Christian rule and patronage. The lusterware albarello now at the Metropolitan Museum of Art (Fig. 3) was produced for a clientele that included European nobility and catholic patrons.

The jar's decoration, geometric panels alternating with chevron or wave bands derives directly from Islamic ceramic patterns. The other patterns like the box and star patterns are those seen in European manuscripts. Potters were blending traditions to possibly appeal to their Christian patrons. In any case, European consumers saw lusterware as a mark of luxury rather than religious identity. The lusterware technique, developed in ninth century Iraq under the Abbasid Caliphate, involved applying metallic compounds over a fired tin-glazed surface and refiring in a reducing atmosphere. Pigment formulas and firing techniques were passed from master to apprentice and rarely written down or recorded.

The Secrecy of Luster

Among the most vivid passages in the history of ceramic technology is the story of luster's secrecy. For generations, the reduction firing technique that produced the iridescent metallic sheen was a closely guarded trade secret. The technical manuscript that eventually documented maiolica production (Piccolpasso's *Li Tre Libri dell'Arte del Vasaiò: The Three Books of the Potter's Art*) had no equivalent for lusterware. Again, its secrets were embedded in workshop practice rather than text. This is one reason why the technique disappeared from large-scale production in the seventeenth century. It wasn't until the twentieth century when practitioners such as Alan Caiger-Smith, would devote years to recovering the reduction luster process.

The author's replica of the Valencian jar confronted this secrecy directly. The lusterware sheen, being technically demanding and financially prohibitive to produce at the author's studio, was replaced in the replica with black line decoration that traces the same geometric and floral patterns as the original. This substitution is itself historical. Italian

potters of the early fifteenth century, who imported Valencian lusterware in large quantities, were in exactly the same position. Unable to produce the luster itself, they attempted to simulate the decorative qualities in available colorants. Italian potters would eventually discover how luster was created in the 1500's and incorporate it in their designs.

Islamic Decoration Blends with European

The shape of the Valencian albarello, too, retained the waisted cylindrical profile first developed in Syria: unchanged for three centuries, it had become the universal pharmaceutical container. The contrast between Islamic and European labeling conventions is striking on this jar. Pseudo-Kufic ornamental script still appeared on some jars of the period in decorative bands as pure ornament, carrying no meaningful text. European jars, by contrast, would increasingly carry functional inscriptions, names of contents, or apotropaic (magical or protective) messages directly on the body.

IV. Italy: Maiolica and the Renaissance Transformation, 1450–1550

The Innovation of Tin-Glazed Earthenware

Italy's engagement with the albarello tradition was shaped from the beginning by a productive inadequacy. Italian potters of the fourteenth and early fifteenth centuries admired Valencian lusterware and attempted to reproduce it. They could not. The technical requirements of luster production were beyond the capabilities of the workshops of Tuscany, Umbria, and Veneto. What they could do was formulate a tin-opacified, lead glaze that produced a brilliant white ground, a surface on which brightly colored oxide pigments would show with exceptional clarity. Maiolica, named after the island of Majorca through which Valencian wares were traded, was not an invention but a refinement that Italian potters transformed into an art form of the highest order.

The Montelupo Foliate Albarello, 1450–1470



Fig. 4. Pharmacy jar (albarello) with foliate decoration, tin-glazed earthenware (maiolica), Montelupo, Tuscany, Italy, 1450–1470. Metropolitan Museum of Art, New York.

The jar from Montelupo, Tuscany (Fig. 4, Metropolitan Museum, Object #16.154.4, 1450–1470) exemplifies the moment of transition in Italian ceramics. Its ivy leaf pattern is derived directly from Valencian lusterware imported into Tuscany in large quantities during the 1400s. Italian potters, who had not yet learned to produce luster, simulated its warm metallic quality with available oxides. The brownish leaves are applied in iron oxide attempting to simulate luster.

The overall decorations involves cobalt blue, copper green, manganese brown, and yellow iron oxide applied in a sequence that requires the painter to manage and understand the different pigment behaviors. The painter would have to be skilled and understand how to load the brush with the correct amount of pigment. There could be no error, every mark was immediate and irrevocable. Cipriano Piccolpasso, writing in his treatise of c.1556–59, describes this technique. The painter worked seated, ware balanced on the knee with the brush loaded with ground pigment and water. There was no correction, a stroke misplaced had to be scraped away with a knife-tip and reapplied. In rare cases, the ware had to be completely washed and redone. A time intensive and expensive mistake.

Clay, Glaze, and Pigment: Piccolpasso's Treatise

Piccolpasso's *Li Tre Libri dell'Arte del Vasaio* (The Three Books of the Potter's Art) is the foundational technical text for maiolica production. His account of clay preparation is deeply local: terra grassa (fat, plastic clay) was mixed with terra magra (lean, sandy clay) to achieve a workable balance. The clays of his region, the Apennine hinterland around Castel Durante in the Duchy of Urbino, were levigated through a series of pits: slaked in water, sieved through fine strainers, and allowed to settle.

His technical observation and documentation of the bianco, the white tin-opacified lead glaze is invaluable to today's pottery scholars. The bianco of that era's maiolica gave its defining visual character unmatched in today's wares. Piccolpasso's most frequently cited base recipe combines a pre-fused frit (marzacotto, made from sand and wine-lees potash), calcined tin, lead oxide, and additional sand. He explains in his treatise, a heavier tin content produced a brighter, more opaque white; a leaner mixture was more economical. The lead content is significant. Lead oxide served as a powerful flux, promoting brilliance and helping colorants develop their full hue and vividness. Without lead, the intense oranges and yellows of Renaissance maiolica were technically impossible.

The pigment palette was built from a small number of mineral and metallic sources. Cobalt (zaffre) provided blue, the most prized and expensive colorant. Manganese dioxide gave purple-brown for outlines and borders. Copper oxide produced green, though Piccolpasso notes its tendency to run. Iron oxide provided warm orange-yellow. Antimony combined with lead and iron gave a brighter yellow (Not used commercially today because of its toxicity). Each color was ground on porphyry or marble to an extremely fine consistency. Coarse particles cause uneven color or surface defects on the fired ware.

The Naples Storage Jar, c. 1500



Fig. 5. Storage jar (albarello), maiolica (tin-glazed earthenware), Italian (perhaps Naples or environs), ca. 1500. Metropolitan Museum of Art, New York.

The second Italian jar in this study (Fig. 5, Metropolitan Museum, Object #20.93.1, ca. 1500) is a storage vessel of the kind most frequently produced in late medieval and Renaissance Italy. Such jars, like their predecessors, were designed to fit with dozens of others on a shelf, often in a pharmacy or shop. The decoration was usually more elaborate on one side than the other, sometimes linking pieces to a known dispensary or workshop. Sometimes you would find inscriptions on the bottom of the jar identifying the pharmacy or amount/weight of the jar. Each time the pharmacist prepared a medicine, the jar would be reweighed. The new weight would be noted to keep track of contents used.

The bold interlocking scale pattern in cobalt blue, copper green, iron yellow, and manganese brown demonstrates the full Renaissance maiolica palette

deployed with excellent brushwork. The author's experience recreating this jar confirmed the importance of brush work. The successful replica, is clear in color and decisive in line. A steady brush and modern glaze knowledge is as important today as it was for the Renaissance potter.

Kiln Technology: From Wood-Fired to Electric Kiln

The kiln in which maiolica was fired, in Piccolpasso's world, a wood-fired updraft structure of considerable complexity—a domed, circular kiln with a central fire pit, a chamber above for wares placed in clay saggars, and a dome opening for loading. The fire was kindled with dry wood, raised gradually to full heat over many hours, maintained at peak temperature (1000 C), and cooled slowly. The kiln was essentially rebuilt or extensively repaired after every use. In contrast, contemporary technology could hardly be more different. The modern studio potter fires, generally in an electric kiln with digital temperature controller running on a pre-programmed computerized schedule. In Piccolpasso's day firing required the dedicated attention of an experienced person over twenty-four hours or more.

The elimination of wood firing from mainstream production has consequences beyond mere convenience and economy. Wood firing introduces variation—ash deposits, atmospheric shifts, temperature gradients which contribute to the visual complexity of the finished ware. Contemporary electric-kiln maiolica is more consistent but, in some respects, flatter. The warm depth of historically wood-fired maiolica is partly a product of kiln atmosphere that an electric kiln can not fully replicate.

V. France and the Sgraffito Tradition: The Beauvais Albarello, c. 1501–1550



Fig. 6. Beauvais sgraffito albarello, ceramic

The sixth jar in this study, is French, not Italian and unusual. Its decoration incorporates the sgraffito technique. Its text is not pseudo-Kufic ornamentation or the name of the medicinal contents. It is a direct warning: VA T'EN QUITTE, roughly “get out of here.” The jar (Fig. 6, London Museum, Object ID A4925) was made in Beauvais in central France in the early sixteenth century, and illustrates both the pan-European diffusion of the albarello form and the regional diversity of decorative responses to it.

Sgraffito decoration is technically distinct from the tin-glaze traditions of Spain and Italy. A layer of white slip is applied over the leather-hard vessel, then scratched with a sharp tool to expose the red clay body beneath.

*earthenware, Beauvais,
France, early 16th century
(1501–1550). London
Museum.*

Green and blue glaze are applied over the surface before the single firing. The Beauvais jar was sealed, as the Italian examples with a cap of parchment or pig's bladder.

The inscription is written in Gothic Textura Quadrata, a script style that helps date the piece to the early sixteenth century. This is characteristic of European pharmacy jars: while Middle Eastern albarellos deployed pseudo-Kufic script primarily as decoration, European jars increasingly used text as a functional and expressive tool. The Beauvais warning is simultaneously practical, a deterrent to unauthorized access, and at the same time expressive, a moment of whimsy.

VI. The Modern Practitioner: Recreation as Research

Why Replicate?

The decision to recreate six museum pharmacy jars rather than simply study them is itself a methodological statement. Physical recreation, working in the actual or similar materials, confronting the actual technical constraints, making the actual decisions that period potters made, generates a form of knowledge unavailable to purely documentary research.

From Museum to Workshop Bench: Six Jars Recreated Lessons Learned

The Syrian albarello from the Ashmolean Museum (Fig. 1) introduced the author to the particular difficulties of the turquoise-glazed fritware tradition. Achieving a turquoise with the depth and evenness of the original, without the lead content that helped the historic glaze flow and self-level. It is a reminder of how much technical knowledge is embedded in the choice of materials. Modern, Lead-free colorant glazes in the modern studio used produce a turquoise that is visually similar, definitely lacks depth and the characteristic surface quality of the original.

The London Museum Syrian jars (Fig 2a and 2b), with their blue cobalt underglaze decoration on white fritware, required confident linear brushwork on a porous surface that demanded speed. In the original as well in the reproduction, this evenness was achieved through practice and a trained eye.

The Valencian lusterware jar (Fig. 3) required the most significant technical substitution. The geometric decoration was traced in black line using brown, modern glaze pigment to approximate the warm, linear quality of the luster. The author's substitution is honest but not perfect. The Luster of the original has a golden sheen exuding luxury and a sense of depth. The author has a deep respect for the potters that produced lusterware in times that we see as primitive.

The Montelupo and Naples jars (Fig. 4 and 5) gave the author the most direct experience of the maiolica tradition. Both involve multi-color decoration on a modern white unglazed surface. This still demanded the management and knowledge of several different pigment behaviors.. The Naples jar, with its bold interlocking scale pattern, required a confidence of brushwork and mind that could only be developed through repeated practice. The successful replica is the product of exactly the kind of accumulated embodied knowledge that Piccolpasso was trying to document.

VII. From Period Workshop to Modern Studio

What Has Changed

Across all of the technical domains surveyed in this paper—clay, glaze, pigment, brush work, and kiln, a consistent pattern emerges. The modern practitioner inhabits a world of material abundance and technical predictability that period potters could not have imagined. Commercially prepared clay bodies deliver consistent plasticity and fired character. Synthetic metal-oxides and mason stains extend the palette far beyond the six or seven basic colors of the Renaissance workshop. Electric kilns follow pre-programmed firing schedules. Regulatory frameworks eliminate the chronic lead poisoning that must have been endemic among glaze workers and kiln operators in every period workshop.

Among the most significant changes is the near-complete abandonment of lead in studio and commercial practice. Lead-based fluxes, which were the foundation of Piccolpasso glazes, are now either prohibited or avoided on safety grounds. The vivid warm oranges and intense yellows achievable in lead-fluxed glazes cannot be faithfully reproduced in lead-free systems. Naples yellow (lead antimony), the standard bright yellow of the Renaissance palette, is no longer used. The modern replacement, vanadium-zirconium yellow, produces a clean, stable color, but lacks the distinctive buttery warmth of the original.

What Endures

Some aspects of the period workshop persists. Maiolica painting is still, at its heart, a matter of confident, irreversible painting on a porous, demanding surface. The immediacy of the wet-on-raw-glaze technique still demands exactly what it demanded in the sixteenth century: a sure hand, a trained eye, and an intimate understanding of how each colorant/oxide will behave in the kiln.

Traditional workshops in Faenza, Deruta, and Gubbio, where apprentices still learn regional ornamental vocabularies, represents the most direct institutional link to the world Piccolpasso documented. These workshops are custodial, maintaining a living tradition rather than reproducing historical artifacts. For the recreation practitioner, we engage with a living craft tradition. We recreate within our modern limits, meanwhile understanding the differences of the original production.

VIII. Conclusion: The Albarello as World-Traveler and Change Maker

The albarello is a small object, rarely more than thirty centimeters tall, but the world it traversed is enormous. In the space of three centuries, this pharmaceutical storage vessel traveled from the bamboo groves of East Asia to the ceramic workshops of medieval Syria; from the trade routes of the eastern Mediterranean to the cesspits of fourteenth-century London; from the luster kilns of Valencia to the maiolica workshops of Montelupo, Naples, and Urbino; and from the apothecaries of Renaissance Europe to the museum displays of Oxford, London, and New York. At each step, it acquired new materials, new decorations, and new social meanings, while retaining the essential logic of its form: a cylinder, a narrowed waist, a sealable opening, a grip for the human hand.

The technical story of the albarello's migration is the story of the medieval and early modern ceramic world: the diffusion of fritware technology from Iran across the Islamic world; the development of luster as a guarded trade secret in Abbasid Iraq; the Italian invention of a distinctive tin-glaze tradition that drew on Islamic and Spanish precedents while producing something unmistakably its own; the regional adaptations of northern Europe. At each node in this network, the encounter between local materials, local skills, and imported models produced something unique and new.

The scholarly apparatus of Piccolpasso's treatise, the archaeological evidence of the London cesspits, the museum collections of the Ashmolean and the Metropolitan, and the recreated replicas of the author's all speak, to the same reality: the ceramic pharmacy jar was a vehicle of knowledge as much as a container of medicine. To hold one, whether a fifteenth-century original or a twenty-first-century replica, is to touch all of that accumulated knowledge. Cipriano Piccolpasso wrote his *Three Books* in the belief that knowledge too long held secret was knowledge at risk of being lost. The same conviction animates this paper and the recreation project it describes.

Plates: Museum Examples and Author's Replicas

The following plates present the six museum pieces examined in this study, together with the author's group of replica jars. All museum photographs are reproduced from the author's original research documentation.



Plate 1. Jar No. 1: Albarello with tear-drop shapes. Fritware, black decoration under turquoise glaze. Syria, early 13th century (c. 1200). Height 21.3 cm. Ashmolean Museum, Oxford.



Plate 2a. Syrian fritware albarello (detail), 14th c. London Museum.



Plate 2b. Second Syrian fritware albarello, 14th c. London Museum.

Plates 2a–2b. Jar No. 2: Syrian albarelos found in a chalk-lined cesspit, Fenchurch Street, London. Fritware, blue under clear glaze, 14th century (1300–1400). London Museum.



Plate 3. Jar No. 3: Pharmacy jar (albarello). Tin-glazed earthenware with luster. Spain (Manises, Valencia), early 15th century. Height 31.4 cm. Metropolitan Museum of Art, New York.



Plate 4a. Montelupo albarello, front view.



Plate 4b. Montelupo albarello, rear view.

Plates 4a–4b. Jar No. 4: Pharmacy jar (albarello) with foliate decoration. Tin-glazed earthenware (maiolica). Montelupo, Tuscany, Italy, 1450–1470. Height 23.1 cm. Metropolitan Museum of Art, New York.



Plate 5. Jar No. 5: Storage jar (albarello). Maiolica (tin-glazed earthenware). Italian, perhaps Naples or environs, ca. 1500. Height 31.0 cm. Metropolitan Museum of Art, New York.



Plate 6. Jar No. 6: Beauvais sgraffito albarello. Ceramic earthenware. Beauvais, France, early 16th century (1501–1550). Height 165 mm. London Museum.



Plate 7. The author's six replica pharmacy jars, recreating museum pieces from the 13th–16th centuries using modern stoneware clay, commercial glazes, and electric kiln firing.

Expanded Glossary of Ceramic Terms

The following terms are drawn from both the historical record of medieval and Renaissance ceramic production and the vocabulary of contemporary studio ceramics practice.

Alkaline glaze: A glaze fluxed with alkali (soda or potash), producing brilliant colors in underglaze pigments. Common in Islamic ceramics, particularly fritware traditions.

Bianco: Italian: the white tin-opacified lead glaze forming the ground of maiolica. Formulated from marzacotto (potash-silica frit), calcined tin, lead oxide, and sand.

Biscuit (Bisque): Ware fired once at lower temperature to harden the clay body before glazing and decoration. The standard first firing in maiolica production.

Cobalt (Zaffre): Metal oxide colorant producing blue in maiolica and Islamic ceramics. Called zaffre or zaffra nera by Piccolpasso. Imported from central European mines; the most reliable and prized Renaissance colorant.

Earthenware: A ceramic body made from clay maturing at approximately 850–1200°C. The standard material for European maiolica production.

Faience: The French and English term for tin-glazed earthenware, derived from the city of Faenza. Synonymous with maiolica and delftware.

Flux: A substance that lowers the melting point of a glaze. In Renaissance maiolica, lead oxide was the primary flux. Modern alternatives include lithium carbonate, nepheline syenite, and boron frits.

Frit: A pulverized, insoluble glass formed by fusing raw glaze materials and quenching in water. Used as a glaze ingredient to render soluble materials insoluble.

Fritware (Stonepaste): Ceramic body of ten parts ground quartz, one part ground glass frit, and one part fine white clay (Abu'l-Qasim Kashani, 14th century). Developed in the Islamic world to rival Chinese porcelain; the material of the earliest albarellos.

Gothic Textura Quadrata: A medieval script style characterized by even vertical strokes and compressed, angular letterforms. Used on the Beauvais albarello; its style helps date the piece to the early 16th century.

Istoriato: Italian Renaissance maiolica painting style featuring narrative scenes (mythological, biblical, historical) covering the entire vessel surface. Developed primarily in Urbino workshops.

Kufic: Geometric form of Arabic script developed in Kufa, Iraq. Used decoratively and functionally on Islamic ceramics and architectural surfaces.

Lead glaze: A glaze fluxed with lead oxide, producing brilliant, smooth surfaces and vivid color. Standard in European maiolica through the 18th century; now largely prohibited for functional wares.

Levigation: The process of preparing clay by slaking, sieving, settling, and decanting in water to achieve a uniform, fine-grained consistency.

Luster (Lustre): A metallic iridescent sheen on a fired glaze surface, produced by applying metallic compounds (silver and copper) over a fired tin-glazed surface and refiring in a reducing atmosphere. Developed in 9th-century Iraq.

Maiolica: Tin-glazed earthenware produced in Italy from the 14th century, characterized by a white opaque tin-glaze ground decorated with metal-oxide pigments. Named via the island of Majorca.

Manganese: Metal oxide colorant (manganese dioxide) producing purple-brown in maiolica glazes. Used for outlines and decorative borders.

Marzacotto: Base frit material in Piccolpasso's bianco recipes: a pre-fused combination of sand and wine lees (potash), equivalent to a potash-silica frit.

Minai ware: Pottery decorated with multiple colors applied over the fired glaze surface (overglaze enamel painting), refired at low temperature. Produced primarily in 12th–13th century Iran.

Naples Yellow: Lead antimonate pigment, the standard bright yellow of Renaissance maiolica. No longer used in studio ceramics due to toxicity; replaced by vanadium-zirconium yellow.

Pseudo-Kufic: Script that mimics the appearance of Arabic Kufic writing without conveying meaningful text. Used decoratively on Islamic-influenced European ceramics, particularly on albarellos.

Reduction firing: A kiln firing in which oxygen supply is restricted, altering the color development of certain metal oxides. Required for luster production.

Sgraffito ware: Ceramics decorated by scratching through a topcoat of colored slip to expose a contrasting clay body beneath. The technique of the Beauvais albarello.

Slip: A semi-fluid colored clay used for coating a ceramic vessel or decorating it before glazing.

Stonepaste: See Fritware.

Terra grassa / Terra magra: Piccolpasso's terms for the two clay types mixed in maiolica production: fat clay (highly plastic) and lean clay (sandy). Mixed to achieve balance between plasticity and structural stability.

Tin glaze: A lead or alkaline glaze opacified with tin oxide (SnO_2), producing an opaque white surface. The defining characteristic of maiolica, faience, and delftware.

Underglaze painting: Pigments applied to the ceramic body before the final glaze is applied and fired. The standard decoration method for Islamic fritware and Italian maiolica.

Vanadium-zirconium yellow: Modern replacement for Naples yellow in lead-free ceramics. Produces a stable yellow but lacks the warm, buttery character of the lead-antimonate original.

Zircopax (Zirconium silicate): Modern substitute for tin oxide as a glaze opacifier. Produces a brighter, cooler white at lower cost than tin; used widely in commercial and studio maiolica.

Bibliography

Primary Sources and Museum Collections

- Ashmolean Museum, Beaumont Street, Oxford OX1 2PH. Jameel Centre for Islamic and Asian Art. Object EA1956.178 (Syrian albarello, early 13th century).
<https://jameelcentre.ashmolean.org/object/EA1956.178>
- London Museum, No. 1 Warehouse, West India Quay, London E14 4AL. Objects FER97[1074]<3926> & FER97[1074]<3925> (Syrian albarellos, 14th century); A4925 (Beauvais sgraffito albarello, early 16th century).
<https://www.londonmuseum.org.uk>
- Metropolitan Museum of Art, 1000 Fifth Avenue, New York, NY 10028. Objects: #46.85.9 (Spanish pharmacy jar, early 15th century); #16.154.4 (Italian albarello, Montelupo, 1450–1470); #20.93.1 (Italian storage jar, ca. 1500).
<https://www.metmuseum.org>
- Piccolpasso, Cipriano. *Li Tre Libri dell'Arte del Vasaio / The Three Books of the Potter's Art*. Translated by Ronald Lightbown and Alan Caiger-Smith. 2 vols. London: Scholar Press, 1980. Original manuscript c. 1556–59.
- Abu'l-Qasim Kashani. *Treatise on Ceramics* (14th century). Recipe for stonepaste body cited in Watson, Oliver. *Ceramics From Islamic Lands*. New York: Thames and Hudson, 2004.

Secondary Sources

- Allan, James W. *Islamic Ceramics*. Oxford: Ashmolean Museum, 1991.
- Caiger-Smith, Alan. *Lustre Pottery: Technique, Tradition, and Innovation in Islam and the Western World*. London: Faber and Faber, 1985.
- Caiger-Smith, Alan. *Tin-Glaze Pottery in Europe and the Islamic World*. London: Faber and Faber, 1973.
- Cooper, Emmanuel. *Ten Thousand Years of Pottery*. 4th ed. Philadelphia: University of Pennsylvania Press, 2000.
- Fehervari, Geza. *Pottery of the Islamic World in the Tareq Rajab Museum*. Kuwait: Tareq Rajab Museum, 1998.
- Hamer, Frank, and Janet Hamer. *The Potter's Dictionary of Materials and Techniques*. 5th ed. London: A & C Black, 2004.
- McNab, Jessie. "Maiolica in the Renaissance." In *Heilbrunn Timeline of Art History*. New York: The Metropolitan Museum of Art, 2000–.
http://www.metmuseum.org/toah/hd/maio/hd_maio.htm (October 2002).
- Poole, Julia E. *Italian Maiolica and Incised Slipware in the Fitzwilliam Museum Cambridge*. Cambridge: Cambridge University Press, 1995.
- Rackham, Bernard. *Italian Maiolica*. London: Faber and Faber, 1952.
- Tite, M. S. "Tin-Opacified Pottery Glazes: Past Use and Current Research." *Journal of Archaeological Science* 26, no. 7 (1999): 923–938.

Watson, Oliver. *Ceramics From Islamic Lands*. New York: Thames and Hudson, 2004.

Watson, Wendy M. *Italian Renaissance Maiolica from the William A. Clark Collection*. London: Scala / Corcoran Gallery of Art, 1986.