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The Half-Life of Blue

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From the vantage point of the Renaissance, blue was the color of the future. Infrequent in Ancient and early Medieval art, blue, between the eleventh and fourteenth centuries, slowly became more prominent in European material culture, eventually emerging as Europe's favorite color by the eighteenth century, according to French historian Michel Pastoureau.[1] During this transition, and particularly between the fourteenth and seventeenth centuries, blue's semiotic value was in flux. In the late Middle Ages, for example, theologians associated blue with the Virgin Mary. By the seventeenth century, "chromophobic" Protestants, who connected rich and vibrant colors to Catholicism's excesses, accepted blue as a sober and moral hue, in line with black, gray, brown, and white.[2] Pastoureau supports his thesis with significant material, textual, and documentary evidence. For example, by the eighteenth century, the number of words for "blue" increased markedly in European languages.[3] Most extant eighteenth-century dyers' manuals demonstrate a preoccupation with blues, as evidenced by numerous recipes for creating it, in contrast to Medieval dyers' interest in reds.[4] Between 1704 and 1707 in Berlin, German chemist Heinrich Diesbach invented Prussian blue, and the natural dye indigo, derived from a plant native to Central America, became more widely available, giving artists and artisans easier access to blue hues. Westerners' taste for blue intensified in the nineteenth and twentieth centuries. By the 1900s, blue was the favorite color overall in the West, and the preferred color of most clothing.[5]

During the Renaissance, in the middle of the cultural shift described by Pastoureau and the focus of this essay, painters and patrons alike prized blue pigments, in their various forms—ultramarine, azurite, indigo, smalt, and "Santo Domingo blue," a New World pigment described in archival documents.[6] Blue pigments, though, were notorious among artists because of their expense, rarity, and instability. An early study of blues in the Renaissance suggested that artists

and treatise writers viewed the color as "feminine," thanks to its difficulty of use and capriciousness.[7] In addition to being difficult to use, many blue pigments were known to degrade, turning a muddy brown or green, gray, or even black, usually within decades of their use. Why would artists and patrons choose pigments with such a short half-life? Was it only cost that affected their decisions? How did notions of temporality, fame, and ingenuity influence their artistic choices?

I center my investigations of blue pigments in the Spanish Empire, because of the importance of its vast trade networks and Spain's unique history. In the fifteenth through eighteenth centuries, Spain was the heart of a global empire and the center of worldwide commerce. Spanish conquerors, explorers, and traders traversed the globe in search of new lands and natural resources, including new artists' materials.[8] Additionally, Spain's unique past as *al-Andalus,* with parts of the Peninsula under Islamic control from 711 to 1492, produced a distinctive material history, one conditioned by advanced developments in technology and science, legacies of Arabic culture. These, in turn, influenced attitudes toward, and the creation of, blue colorants in the Early Modern era. How did Spain's "Moorish" background affect the semiotics of blues at this cultural moment? How did its position as center of the largest global empire in the world influence the creation and acquisition of blue pigments in Europe and beyond?

THE HUNT FOR BLUES IN THE SPANISH EMPIRE

Documents from Spanish archives reveal tales of eager adventurers searching out new sources of blue pigments and dyes. Rocío Bruquetas, Spanish conservator, curator, and art historian, has uncovered a document dating from 1417 referring to mining "blue stones" in Talavera, Arenas de San Pedro, and San Martín de Valdeiglesias, all in Castile, in which King Juan II ordered inspections of these mines. In 1498 three inhabitants of the Spanish city of Córdoba were granted a license to search the nearby mountains (*sierra*) for mines of "*cobre y azul,*" copper and blue, presumably copper and azurite, the two minerals often found together.[9] A bit earlier, in 1476, other Spanish entrepreneurs received licenses to hunt in Sigüenza and Cuenca. In 1498, explorers received a license to search for "*piedra azul muy fino para pintores*" ("blue stone very fine for painters") in Cabrales (Asturias); another license dated 1627 authorized exploration along "*las riberas del río Óribo,*" the banks of the Oribo River, in León.[10] Other kinds of records in the Spanish archives point to the preciousness of blue pigments and colorants—such as court cases involving vendors trying to sell "fake blues" and artisans meeting to establish quality control of blue and green pigments.[11]

The quest for coveted blue stones, or "*piedra azul,*" can also be documented in the Americas. Bruquetas was the first to signal the importance of trade in "Santo Domingo blue," a form of azurite, mined in the Dominican Republic, transported

via galleon back to Spain, and sold throughout Europe.[12] As she has noted, Christopher Columbus, during his second voyage (1493–96), recorded the existence of blue minerals on the island of Hispaniola in his second letter of 1495, written to the Catholic monarchs Ferdinand and Isabella. One of the most productive mines for copper blue minerals was in Cotuy, in what is now the Dominican Republic.

Such cargo was frequent on the galleons returning to Seville in the sixteenth and seventeenth centuries.[13] A royal order of 1609 asks the governor and captain general of Hispaniola to report on the quality of a certain mine containing blue stone and demands that the royal fifth, or "*quinto,*" be paid to the Crown.[14] Other records, including one from 1579, record shipments of this "blue mineral" (*mineral azul*) to officials in Seville's House of Trade, on one of the first boats to return to Spain with cargo.[15] It transported "two loads of blue mineral of the best quality that is to be found on the island" ("*dos cargas de mineral azul de la mejor calidad que se encuentre en la isla*"). Another document from 1563 speaks of the discovery of silver on the island of Hispaniola, but also mentions "*cobre azul,*" or blue copper, possibly copper sulphate, also used as a pigment.[16]

Other blue pigments used in Spain were acquired in Europe. During the reign of King Philip II, copious amounts of pigments were purchased for decorating his ambitious building projects, such as El Escorial, as well as the palaces in Madrid, Toledo, El Pardo, and Valsaín. Archival documents record purchases of smalt and ultramarine, in addition to azurite, previously discussed. Because most of the artists at El Escorial were Italian painters working in fresco, they purchased pigments from Italy.[17] Sixteenth-century documents reveal that much of the smalt acquired by Spanish painters came from Venice, despite the fact that most smalt was produced in Germany, the Low Countries, and Bohemia, from cobalt mined in nearby Saxony. Other pigments were acquired from Antwerp.[18]

The archival record reveals the global nature of the trade in blue pigments. Artists in the Americas often employed pigments manufactured in Europe instead of local ones. A study of 106 colonial Andean paintings, dating from 1610 to 1780, employed chemical and art historical analysis to reveal the use of a number of European blue pigments, including azurite, smalt, and ultramarine.[19] In the sixteenth and seventeenth centuries, artists working in New Spain requested pigments and other artist supplies from Europe. Similar shipments were sent to Panama and Honduras from Spain.[20] Smalt, for example, appears on the registries of ships arriving in the Americas from Spain, not surprising since smalt was not manufactured in the Americas until the second half of the nineteenth century, according to some scholars.[21]

As these documents indicate, the hunt was on in Spain and the Americas for new mineral blues. The best known of these blues is, of course, ultramarine, derived from *lapis lazuli.* The precious stone was mined in Afghanistan and imported to Europe via the Silk Road in the Middle Ages and Renaissance. Ultramarine, or powdered *lapis,* had been used for millennia by the ancient Egyptians

and Babylonians and in ancient Asia. Recipes for its use in the West date back to late Antiquity, as revealed by the Stockholm and Leiden Papyri, probably dating from the late fourth century, and the *Mappae Clavicula,* dated to the eighth to twelfth centuries, with parts probably based on earlier texts.[22] During the Early Modern era, *lapis lazuli* was mined in northeastern Afghanistan, in remote areas, including the Sar-e-Sang Valley and Badakhshan Mountains. It is a stable pigment. Europeans' reverence of it has been clearly documented, most notably by social art historian Michael Baxandall, whose groundbreaking 1972 study, *Painting and Experience in Fifteenth-Century Italy,* carefully analyzed its use in Domenico Ghirlandaio's *Adoration of the Magi* of 1488, a panel painted for the *Spedale degli Innocenti* in Florence. In the painting's contract, the artist and Fra Bernardo, the Hospital's prior, agree that the finished panel will conform to a preliminary drawing and be completed within the stipulated time frame. Most significantly, Ghirlandaio was directed to use certain blue pigments and gold. The blue is explicitly specified: "and the blue must be ultramarine of the value about four florins the ounce."[23] More precious than gold, ultramarine set the standard for blues in the Early Modern period.

The precious ultramarine was rarely used in Spain, however, as artists and treatise writers of the period testify. This has been confirmed by art historians and conservators in technical examination of Spanish paintings.[24] These writers include the painters Francisco Pacheco, author of *El arte de la pintura,* written in the first third of the seventeenth century and published in 1649, and Antonio Palomino, author of *El museo pictórico y escala óptica,* written in 1723. The pigment has been identified, though, in the painting of *The Coronation of the Virgin* (Madrid, Museo del Prado, 1641–44) by Diego Velázquez, student and son-in-law of Pacheco, and in several of Bartolomé Esteban Murillo's Immaculate Conception paintings, as well as his *Virgin of the Rosary* (Dulwich, ca. 1675–80), in which ultramarine was applied over smalt, a pigment to be discussed shortly.[25] In Spain, preliminary research seems to indicate that ultramarine was specially reserved for depictions of the Virgin Mary, as similarly noted by some art historians about Italy.[26]

Spanish artists more commonly used "Santo Domingo blue," discussed earlier, and European azurite, mined in Spain, a copper mineral or copper carbonate that was much more readily available. The former was more common in the sixteenth century, and the latter in the seventeenth. Azurite is not as stable as ultramarine, but it is much cheaper. Unfortunately, however, with time it can turn greenish, or even brown or black. It had been used for centuries in fresco and tempera painting. Sometime after the early 1400s, artists began to add the ground-up ore to linseed oil. Both Pacheco and Palomino discuss the use of Santo Domingo blue and azurite, using varied terminology.[27] Their terms for these mineral-based pigments include "Santo Domingo blue," fine blue, as well as "fine, thin blues of ashes" ("*azules de cenizas finas y delgadas*"). Vicente Carducho, a third painter

and treatise writer, mentions azurite in his 1633 text, *Dialogues of Painting*, calling it "Seville blue ashes" or simply "blue ashes" ("*cenizas azules*"). Both Pacheco and Palomino indicate that Spanish painters used azurite instead of ultramarine.[28] Whether Santo Domingo blue or azurite, the color is not the same as ultramarine, as can be seen in *Holy Family,* a painting from around 1604–06 by Antonio de Mohedano (1561–1625) that hangs in the Museo de Bellas Artes in Seville. The azurite employed for Mary's garment is quite well preserved, giving us an idea of its original greenish-blue color.[29]

The most common blue used by Spanish painters was smalt, the most unstable blue of all.[30] "*Esmalte*" or smalt was a pigment made by human hands and ingenuity, not by nature. It derived from potassium glass, made blue through the addition of small, varying amounts of cobalt ore. Cobalt was mined in the mountains of Saxony, in what is now eastern Germany, the major European source of the ore. The process of creating smalt was difficult and labor intensive. The mined ore was heated repeatedly to create cobalt oxide, called zaffer or zaffre, then ground, and poured into molten glass, turning it blue. The glass was quickly cooled by plunging it into cold water, causing the glass to fragment into granules, which were then ground finely to make smalt. The ground smalt was added to linseed oil, a process that Pacheco described in detail. To offset this complicated description of the technique, I offer this simpler explanation from Stuart Fleming, former archaeologist at the University of Pennsylvania: "The artists' pigment—smalt—is simply powdered blue glass."[31] A team of conservators, chemists, and art historians studying blues offers this description: "Smalt is an inorganic pigment of complex manufacture."[32] Venetian glassmaker Antonio Neri, author of the first known treatise on colored glass in Europe, *L'arte vetraria* (*The Art of Glass*), published in Venice in 1612, expressed bewilderment at how smalt was created. In chapter 72, on blue smalt, he wrote: "I cannot find the composition hereof in any writer, but I have been informed by an honest workman in Glass, that 'tis made of Zaffer, and Pot-ashes calcin'd together in a furnace, made like that for Glass."[33] Pacheco offered an even simpler account: Smalt was, in his estimation, "created by God," a bold statement of admiration for how difficult it was to manufacture.[34]

In addition to being challenging to make, smalt was also problematic to use in painting, if one is to believe artists' treatises of the times. Smalt was lumpy, since the intensity of the shade of blue depended on the amount of cobalt in the glass as well as the size of the glass particles; larger particles created a more intense hue. Large cobalt particles settled in the oil; smalt also dripped from canvases, prompting artists to devise various tricks to prevent it from sliding off. They attempted to drain off the excess linseed oil to make the cobalt particles more visible and to prevent them from sinking, sometimes pricking small holes in the canvas to eliminate some of the oil, according to Fleming.[35] On the other hand, the presence of cobalt in smalt sped up the slow drying process of oils, and Pacheco and others recommended using smalt to speed drying time.[36] The glass particles also gave

the pigment sparkle and made it appear rather transparent. The sparkle of glass particles combined with the transparency would have been particularly delightful when seen by candlelight. Both Pacheco and Palomino recommended that painters mix smalt with other colors,[37] probably to add luminescence and radiance to other hues.

On the downside, cobalt can fade or even turn gray over time, particularly in damp environments; moisture causes the cobalt suspended in linseed oil to oxidize. To complicate matters, potassium also attracts moisture, hastening the oxidation and fading. Pacheco and others documented such changes in treatises of the time.[38] A recent scientific study of sixteenth-century paintings employing smalt provides new information on the conditions under which smalt loses its blue color.[39] This research team demonstrated that the ratio of potassium to cobalt plays an important role. When the ratio was 1:1, the smalt preserved its intense blue hue.

The loss of color in smalt can be clearly detected in Spanish paintings from the sixteenth and seventeenth centuries, including a work attributed to Pedro Campaña (1503–1586), a Flemish painter working in Spain. His *Conversion of the Magdalen,* closely studied by Marika Spring and others,[40] provides an insightful case study for two reasons: (1) A copy of the painting exists, with its blues intact; and (2) Spring and her researchers created a digital version of the painting, restoring the discolored passages. Color loss can also be detected in a later work by Sevillian master Bartolomé Esteban Murillo, his *St. Justa* from 1665 (Dallas, The Meadows Museum). Note the passage in the middle of the canvas, in the center and to the right, where the saint holds drab gray draperies in her arms. Formerly a beautiful blue, they originally provided a vivid complement to the saint's yellow dress.[41]

Why would painters employ a pigment that oxidized and became dull in color, often within decades of its use? Was it only because it was less expensive?[42] If low cost was the only reason that artists in Spain used smalt, why would Pacheco describe smalt as "created by God"? Why would court artist Diego Velázquez, or highly successful and wealthy painters such as Murillo or El Greco, use a seemingly inferior pigment? They and their wealthy patrons could surely afford something more expensive and long-lasting.

BLUES IN *AL-ANDALUS*

As we ponder these questions, the history of smalt in the Iberian Peninsula is also important to consider. While cobalt was used in the ancient world, by the Egyptians, Babylonians, and others, it does not seem to have been used in Europe until the late Middle Ages, the thirteenth century, to be exact, when the technology arrived from the Middle East. Cobalt blue can be documented as being manufactured and used in ninth-century Iraq. By the thirteenth century, it had spread from the east to North Africa, southern Spain (Málaga), and eastern Spain (Valencia), as documented by its presence in Hispano-Moresque pottery.[43] The use of cobalt blue

can be seen in pottery produced in southeast Spain, *al-Andalus,* under Muslim control at that time. Cobalt-colored blue and white wares then spread throughout the Iberian Peninsula via *mudéjar,* or Muslim, craftsmen, working in the various Christian kingdoms.[44] In the fourteenth century, ceramic craftsmen began to move north to other parts of the peninsula, including Valencia and Barcelona, from the Nasrid kingdom in Granada, as the Nasrid dynasty began to weaken, eventually falling to Spanish control in 1492.[45]

Numerous extant ceramics from various areas of Spain, done in Hispano-Moresque style and dating from the thirteenth, fourteenth, and fifteenth centuries, use cobalt. The use of cobalt-derived blue in these ceramics was the basis of the creation of smalt for painting. Two examples, a deep dish and a basin, both in museum collections, exemplify these ceramics.[46] Both were produced in Valencia during the fifteenth century (figures 7.1 and 7.2) and are examples of tin-glazed lusterware that uses cobalt-derived blues. The first example, dating from about 1430, features cobalt blue in a bold design of Arabic script, contrasting with fine decorative patterns in yellow against a white background. The second basin, while employing the same color pattern of cobalt blue with golden accents against a white background, is a vessel used by Christians, given its central prominent "IHS," the abbreviation for "Jesus." Similar ceramics can be found in collections throughout Europe, Latin America, and the United States.[47]

In addition to their use in ceramic containers and tiles, cobalt-derived blues also appeared in Islamic architectural decoration and manuscripts in Medieval Iberia. For example, a recent technical analysis by a team of Spanish scientists of the fourteenth-century Madrasah palace in Granada, the first Islamic university in Spain, revealed the presence of cobalt in the blues employed in the stucco decoration in the Oratory, which dates from the Nasrid period (1232–1492).[48] Tiles produced in Seville in the sixteenth century also reveal the presence of cobalt blue. Spain was home to major tile-making centers in the Islamic world, in addition to Syria and North Africa. Islamic-influenced tile making later spread to Venice from Spain by about 1500.[49]

What is significant here is that the technology to create blue pigments from cobalt, the basis of smalt, was introduced into Spain by Muslim craftsmen from the Middle East and was associated with objects created in Hispano-Moresque style in the fifteenth through seventeenth centuries. The production of cobalt ceramics, in fact, continued to be closely linked to populations descended from former Muslims into the seventeenth century. After the expulsion of the "*moriscos,*" or Spanish-Muslims, in 1609 under Philip III, the production of this type of ceramic declined dramatically.

My hypothesis is that cobalt blue retained an association with the splendor, luxury, sophistication, and advanced technology of Arabic culture well into the Early Modern period. To put it another way, blue smalt, derived from cobalt, produced a number of associations for period viewers in Early Modern Spain. Color is

FIGURE 7.1. Hispano-Moresque Deep Dish, ca. 1430, tin-glazed earthenware, 45.72 cm (17 ⅞"), Accession 56.171.162. The Cloisters, Metropolitan Museum of Art, New York.

FIGURE 7.2. Hispano-Moresque Basin, mid-15th century, tin-glazed earthenware with copper luster, 49.5 cm (19 ½"). The J. Paul Getty Museum, Los Angeles, CA.

semiotic. Its meaning is not fixed but rather depends on signification in a specific time and place. Let's further explore the semiotic value of cobalt blue in Spain.

We begin with the etymology of the word "*azul*" in the Spanish language, which scholars have suggested originated in Arabic and Persian. It derived from the Arabic word "*lazaward,*" or perhaps the Latin "*lazurium,*" based on the Persian "*lajoard.*"[50] All three of these possible source words designated the same object, the precious blue stone *lapis lazuli.* (Today the word for blue in Arabic is "*azraq.*") "*Azul*" was not in use in Spain until the High Middle Ages.[51] Interestingly, the color blue rarely appears in early Medieval Spanish manuscript illuminations, which favored reds, yellows, browns, and blacks.[52] Sebastián Covarrubias's important early Spanish dictionary of 1611, the first to employ only Spanish in the definitions (as opposed to Latin), *Tesoro de la lengua castellana o española,* defines "*AZVL*" as the color of the sky and notes that "the name is Arabic," or possibly derived from the Latin "*ceruleus,*" based on the stone called "*lapis lazuli*" by the "barbarians." He concluded: "It has said color of the sky, and even of the starry sky, because it is seeded with little points of gold, in the manner of stars."[53] No more perfect description for the look of ultramarine or blue smalt could be found.

Not only was "*azul,*" the word for blue, etymologically related to Arabic, but the color blue also seems to have been associated with the culture of *al-Andalus,* as evidenced by the ceramics discussed previously. An early account of the sixteenth-century Morisco Revolt against the Spanish monarchy and the detailed inventories dating from 1550 to 1580 of the confiscated belongings of participants in the Granada uprisings give a thorough picture of Muslim material life in mid-sixteenth-century Spain. The inventories are particularly useful, documenting the possessions of the forcibly converted *moriscos,* which were seized and publicly auctioned off when their owners were found guilty of rebellion.[54] The first revolts against Spanish rule ran from 1499 to 1501, soon after the fall of the Nasrid kingdom in 1492. A series of other revolts occurred throughout the century, culminating in the Alpujarras Rebellion of 1568–71. During this time, numerous inhabitants of Granada were forcibly resettled in other parts of Spain.[55] The inventories, housed in the *Archivo de la Alhambra,* reveal numerous references to blue fabrics, livery, and articles of fine clothing, including tunics and silk shirts. The presence of blue clothing and textiles is striking, since research on other areas of Europe has suggested that blue was not a common color for fine clothing during the Renaissance, but rather was worn mainly by the peasantry.[56] Additional evidence associating blue with the Arabic world comes from Italy. Once Italian artisans began using cobalt blue in the early fifteenth century, the cobalt, processed in the form of zaffer or zaffre imported from Syria, became known as "*colore damaschino,*"[57] "damask color," or "color of/from Damascus."

Material and textual evidence thus suggests that the color of cobalt blue was associated with the culture of *al-Andalus* in Early Modern Spain. The real consequences of the uprising in the Alpujarras notwithstanding, significant evidence

points to the valorization of Moorish culture in sixteenth-century Spain. A recent study of references to Islamic culture in literature, architecture, fashion, and equestrianship in Spain demonstrated that Early Modern Spaniards regarded "Moorishness" as princely, refined, luxurious, and sophisticated.[58] Art historians Cynthia Robinson, María Judith Feliciano, and Pamela Patton, among others, have teased out the various meanings associated with what has been called "*mudéjar*" style, the label given Islamic-style objects produced under Christian rule in the Iberian Peninsula, especially their aura of luxury and technological sophistication.[59]

While the Spanish monarchs and the Catholic Church might reject and fight back against Muslim "heretics" in their midst, the great scientific and technological advancements of the Arabic world were greatly appreciated, indeed, coveted by European scholars. It was because of Arabic culture that the knowledge of the ancient Greeks had been preserved, to be translated later to Latin and made available to Europeans. *Al-Andalus* was, in fact, the most important center for translation to Latin from Arabic in the eleventh and twelfth centuries, the height of Arabic culture, with important sites at Santa María de Ripoll Monastery in Girona, Barcelona, Toledo, Salamanca, and other cities.[60] Texts and treatises on science and technology, of particular interest, were tirelessly translated, preserving the Arabic world's knowledge of mathematics, medicine, astronomy, physics, chemistry, alchemy, and astrology, as well as architecture, mining, hydraulics, irrigation, agriculture, and commerce.[61] In 1085, after the fall of Toledo to Christian forces, that city became a magnet for European scholars, who traveled there to consult and translate the numerous Arabic manuscripts housed in its libraries.[62] Arguably, Western science had its origins in the Arabic world, a line of argumentation that could potentially lead to a new sense of what the Renaissance means.[63]

This scientific knowledge was central to the creation of Spain's future empire. Indeed, it was the Arabic world's advanced knowledge of mathematics, astronomy, and navigation, as well as its preservation of Greek achievements, that led to the creation of the astrolabe, sextant, and quadrant, critical tools that enabled Spanish galleons to sail to the Americas. Without the scientific and technological knowledge preserved by scholars in *al-Andalus,* later translated into Latin and made available to the West, there would have been no future Spanish Empire.

And there would have been no cobalt blue or smalt, either, since it was Arabic technology that created the prized blue color.[64] A treatise on ceramics by historian Abu'l-Qasim, dating from 1304 to 1316, describes the use of cobalt for ceramics and mentions Kashan, in central Iran, as its source.[65] Qamsar, outside of Kashan in central Iran, was the site of a major cobalt mine, in use from ancient times until the early 1900s. Recent scientific analysis of cobalt in thirteenth- and fourteenth-century blue and white ceramic pieces from Teruel revealed that they were colored with cobalt from the Middle East.[66] From where did Early Modern Spanish artists obtain smalt? Did they get it from the cobalt mines in Iran? Art historians have long assumed that as elsewhere in Europe, smalt in Spain came from Saxony,

which had large cobalt mines and factories to manufacture smalt for export.[67] The source of the cobalt used in Renaissance Spain merits further investigation, however, as the intriguing clues presented above suggest.

A document from 1613 indicates the possibility that Syria exported cobalt to Spain, although further study and corroboration are needed.[68] This document, the record of a lawsuit brought by dyers in Barcelona, describes "Damascus Blue" (*Damasco azul*), reminiscent of the Italian "*colore damaschino*" referenced earlier. Damascus, Syria, had been home to the illustrious Umayyad dynasty, the group that conquered the Iberian Peninsula in the seventh century and built the Great Mosque at Córdoba. Is it possible that this document refers to the import of zaffer made from cobalt in the Middle East? The current word "*cobalto,*" or cobalt, derived from the German word "*Kobald,*" meaning "sprite" or "spirit," did not enter the Spanish language until much later, well after the Early Modern era. Great care must be taken not to read too much into this document, since "*Damasco azul*" could also refer to damask, a fabric. Additional corroborating evidence is necessary.

THE TEMPORALITY OF BLUES

In conclusion, the goal of this essay was to rethink blue pigments in Spain and its empire and to reconsider our notions of temporality. I was intrigued by why Spanish artists knowingly used pigments that degraded and, furthermore, by Pacheco's estimation of one of these pigments, smalt, as "created by God." Were there reasons beside low cost to employ smalt? How did concepts of temporality and ingenuity influence artists' and patrons' artistic choices?

My investigation was also deeply concerned with constructs of temporality. The Renaissance is typically thought of as a period concerned with the future, with legacies, with posterity and fame. The use of smalt by Spanish artists, however, unsettles this assumption. Documents and other primary sources, combined with scientific analysis of ceramics made with cobalt blue, suggested another path—that during Spain's Renaissance blue was associated with the splendor and innovation of Iberia's illustrious Arabic past—and that the scientific achievements of *al-Andalus* were critical for the development of Spain's future empire. This led me to consider temporality and the possibility of multiple European histories,[69] an idea with particular importance for Spain, with its unique Islamic past. To quote art historian Keith Moxey, in his recent book *Visual Time:* "[H]istorical time is heterochronous rather than monochronous."[70] Alexander Nagel and Christopher S. Wood, authors of *Anachronic Renaissance,* have even suggested that Renaissance artworks were expected to encode references to Europe's multiple pasts, an example of what they call time "folding" over on itself.[71] Such artworks, which reflect temporal instability, are "anachronic." Paintings that use smalt perfectly embody this notion of anachronic works, since they refer back to the illustrious history

of *al-Andalus,* as they simultaneously predicted Europe's future taste for blue. In fact, fading smalt is a literal witness to, a performative mechanism for, such temporal instability.

Finally, my reconsideration of blues in the Spanish Empire was conditioned by discourses drawn from ethnic and decolonial studies, especially recent theorizing of Afro and Chicanx futurisms.[72] Futurist scholars, writers, activists, and artists in ethnic studies posit new, more just futures for people of color, alternative futurisms inspired by non-Western notions of temporality, as they simultaneously question Eurocentric constructions of history. This has taken off in the realm of speculative fiction, what was once called "science fiction," in response to the fact that people of color were never expected to be part of the history of science or technology. My interest in ethnic studies led me to question Western histories of science and art, both marred by assumptions of European superiority. Similarly, decolonial theorists, including Walter Mignolo and Nelson Maldonado-Torres, have questioned the discursive formation of history in ways that resonate with Chicanx futurism.[73] Which histories are authorized, and who is empowered to narrate them?

Encouraged by these theorists' reconsiderations of Eurocentric strategies in the humanities, I ventured that Spain's interest in blue during the Renaissance was a prediction of what would transpire in the rest of Europe. From the vantage point of the Renaissance, blue was the color of the future, and Spain was ahead of other European countries in its use of and taste for blues, both conditioned by Spain's unique Islamic past, including and especially its technological advances. In the Renaissance mind, these scientific developments became associated with futurity, a futurity built on the sophisticated culture and advanced learning of *al-Andalus.*

Allow me to conclude with contemporary New Mexico, where many homes have front doors painted cobalt blue, described as "a requisite for doors and windows"[74] in New Mexican villages, a carryover from Spanish colonial practice, according to common wisdom, and a distant echo of the cobalt blue of Islamic Iberia. The blue doors still visible in New Mexico today act as a fulcrum between past and present. They suggest why knowledge of the past matters, and they materialize its power to carry over into the future.