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Polychrome Nets

Italian Lace from the Collection of The Metropolitan Museum of Art

Chiara Romano

Introduction

The collection of lace at The Metropolitan Museum of Art is one of the most outstanding collections of historical lace in the world, including approximately five thousand pieces. This study focuses on the technique, history, and material analysis of a selection of forty pieces of Italian polychrome lace belonging to one of the earliest forms of lacemaking.¹ These historic textiles, halfway between embroidery and lace, are generally defined as embroidered lace.² [Fig. 1] Their use seems to have expanded rapidly from the late fifteenth century;³ most of the Metropolitan's examples date from the sixteenth and seventeenth centuries. While the early lacemaking techniques used in creating these pieces produced considerable visual variety, structurally they all share the same basic net foundation. This makes them a particularly interesting subset to study, though very little information has been published on the subject. Early publications on the history of lace, illustrated with black and white photographs, could not adequately convey the attractive visual impact of polychrome silk.⁴ It was an incredible surprise to see how vivid the colors remain. [Fig. 2]



Figure 1 Polychrome embroidered lace from the collection of The Metropolitan Museum of Art. Clockwise from top left: MMA77.1.79, MMA 77.1.74, MMA 12.9.3, MMA 12.9.1. Author's photographs.

¹ The collection of early polychrome embroidered laces at The Metropolitan Museum of Art is made up of over one hundred pieces. The most representative in terms of techniques and materials belong to the group of forty pieces selected for this study.

² Pat Earnshaw, *The Identification of Lace* (Aylesbury: Shire Publication Ltd, 1980) 25–36.

³ Santina M. Levey, *Lace: A History* (London, Victoria & Albert Museum, 1983) 18–19.

⁴ Ibid., fig. 102. See also Caterina Binetti Vertua, *Trine e Donne Siciliane* (Milano, Ulrico Hoepli, 1911) Tav. 35–36.

Although some of this lace came to the Metropolitan Museum as part of larger groups such as the Nuttall, Blackborne, and Fishbach textile collections,⁵ many were purchased in the first decade of 1900 suggesting a contemporary curatorial interest in this type of lace.⁶ In that period a particular area in the Museum was already dedicated to textiles.⁷ The objects on exhibition were arranged in six galleries according to type of material.⁸ Of these six galleries, half were dedicated to the exhibition of lace, evidence of the attention given to this type of textile at that time.



Figure 2. Two images of a panel of 17th century Italian buratto lace in the Victoria & Albert Museum, London (Circ.958b-1907). (Left) Illustration [fig. 102] from S. M. Levey's 1983 book, *Lace: A History*. (Right) Author's photograph of the same piece in 2014.

⁵ In 1913 the Metropolitan Museum's lace collection included over three thousand pieces following the donation of three large collections: the Nuttall Collection, donated by Magdalena Nuttall of Tunbridge Wells, England; the Blackborne Collection, gathered by Thomas Blackborne from about 1850 and purchased for the Museum by sixty-two ladies and gentlemen; and the Seligman Collection, consisting of seventeenth and eighteenth century lace. The purchase of the Fischbach Collection's three thousand European, Coptic, and Persian textiles a few years later further expanded the Museum's range. The lace collection continues to grow today. For more information on the Museum's history of lace collection, see Winifred E. Howe, *A History of the Metropolitan Museum of Art* (New York, The Metropolitan Museum of Art, 1913) 312–313.

⁶ Several of the very early examples were bought via the Rogers Fund between 1907 and 1912. A number of individual pieces were gifts of separate individuals.

⁷ This second floor area corresponds to today's Asian Art Galleries.

⁸ According to the 1919 plan of the Museum's second floor, embroidered fabric were displayed in Gallery H15, woven fabric in Gallery H16, lace in Galleries H17, H18, H19, and costumes in Galleries H22 and H22A. Two galleries were dedicated to lace: H17 and H18. Special temporary exhibitions of textiles and related objects which were not ordinarily on display were shown from time to time in Gallery H19, but when it was not in use for such special exhibitions this gallery was also devoted to lace. See *Guide to Collection* (New York, The Metropolitan Museum of Art, 1919) 65. For more information, see also "Costume, Textiles and Laces" in *Guide to Collection* (New York, The Metropolitan Museum of Art, 1927) 106–107.

Technique

The group of polychrome lace which is the subject of this study is characterized by two of the many embroidered lacemaking techniques: *lacis* and *buratto*.

Both techniques produce a similar result. [Fig. 3] However there is a fundamental difference between them. In the *lacis* technique a single and continuous thread is worked. The lace's foundation is knotted in this working thread with the aid of a needle or shuttle and a mesh gauge.⁹

This technique was most likely developed in response to the needs of early fishermen and is still used to repair nets today.

The other technique, *buratto*, is woven rather than knotted. A special loom is used which enables the weaver to cross and re-cross warp threads between weft passes.¹⁰ This repeated crossing serves the same function as the knot does in *lacis*, anchoring the warp thread in place. [Fig. 4]

After the creation of the lace foundation, both *buratto* and *lacis* were embroidered under tension on a long frame.¹¹ Often both methods produced narrow bands of lace rather than large pieces.

Although polychrome *buratto* lace is very rare, this early Italian technique is richly represented in the Metropolitan. I will therefore now focus specifically on exploring this substantial body of material in order to investigate *buratto*'s history and material makeup.



**Figure 3. (Top) Early 17th century Italian buratto lace (MMA 22.115).
(Bottom) 16th century Italian lacis lace (MMA 79.1.76). Author's photographs.**

⁹ For more information about *lacis* technique see Carita, *Lacis. Filet Brodé* (London, Sampson Low, Marston & Co. Ltd., 1908). See also Heather Toomer, *Antique Lace: Identifying types and techniques* (Atglen, Schiffer, 2001) 104–107.

¹⁰ This type of loom was the same as an ordinary back-strap loom, complete with a supporting frame like that of the Lu loom except that one or two doup needles were added in front of the heddle. This enabled the weaver to twist two or more warp threads around each other while weaving. For more information about gauze weave, see Felix Guicherd, *Cours de Theorie de Tissage* (Lyon, Edition Sève, 1946) 303–312.

¹¹ For a visual reference see the title-page engraving of Sibmacher, *Schön Neues Modelbuch*, Nuremberg, 1597.



Figure 4. (Left) Detail of lacis net at 50x magnification, (MMA 79.1.76). (Right) Detail of buratto foundation in gauze weave at 50x magnification (MMA 22.115). Author's photographs.

The History of Buratto Lace

The term *buratto* appears in the first edition of the Italian *Vocabolario* in 1612.¹² It is defined there as “transparent cloth with an openwork textile structure” and derives from the Latin word *bura* which means coarse cloth.¹³

One of the earliest uses of *buratto*-cloth appears around 1490–96 in a drawing by Leonardo da Vinci, used as a sieve in a wheat-milling machine to separate flour from bran.¹⁴ This *buratto*-cloth was such an important part of the milling machine that the entire mechanism took its name from the textile and was also known as *buratto*.¹⁵

The importance of *buratto* lace is reflected in pattern books of the period.¹⁶ Although Italians turned increasingly to needle lace over time, *lacis* and *buratto* were never entirely banished from publication.¹⁷

¹² *Vocabolario degli Accademici della Crusca* (Venice, 1612). This was the first Italian dictionary. Florence's *Accademia della Crusca* remains a most important institution, officially responsible for regulating the Italian language. It is the oldest linguistic academy in the world, and still uses a *buratto* milling machine as its logo. See note 15.

¹³ *Ibid.* In this dictionary, under the word “buratto” information is listed regarding the material and color of the cloth. “Una sorta di drappo rado e trasparente. Dal basso lat. *bura*, grossa tela e questo dall'ant.lat. *burus*, di colore scuro. ... Ovvero d'un buratto di seta nera.” [Author's translation: “A sort of cloth openwork and transparent. From the latin word *bura*, large canvas and from the antic latin *burus*, dark in color. ... That is a cloth of black silk.”] *Buratto* is also referred to as a dark silk openwork cloth.

¹⁴ *Codex Madrid I*, c. 1490–96, Biblioteca Nacional, Madrid. Drawing, inv. 8936, f. 22r.

¹⁵ The *buratto* milling machine has become the editorial logo of the important *Accademia della Crusca* (see note 12). *Crusca* means “bran” in Italian. The *buratto* machine or cloth is intended to convey that the *Accademia*'s work is similar to that of a *buratto*-cloth, winnowing out corrupt words and structures from Italian as wheat is separated from bran.

¹⁶ During the decade between 1527 and 1537, Italian lace books focused entirely on embroidery upon net and linen. For more detailed information, see Margaret Harrington Daniels, “Early Pattern Book for Lace and Embroidery”, in *The Bulletin of the Needle and Bobbin Club*, Vol. 17, No. 2, 9–11.

¹⁷ Many of these sixteenth and seventeenth century patterns were published over and over again. The dating of the surviving pieces is made even more difficult because in the eighteenth and early nineteenth century the production of *lacis* and *buratto* continue to increase in the south of Italy. See Levey, p. 62.

Buratto was in fact the name of one of the earliest Italian design books, *Burato*, published around 1527.¹⁸ On its title page a woman is depicted weaving on the box loom commonly used for narrow textiles, the type which would be used in *buratto*.

Burato was also the first book to use a new method of graphic representation to explain the net embroidery patterns it included. Earlier books depicted net embroidery patterns via a grid of small squares (representing the net ground) in which entire squares were filled in (signifying a stitch filling in a spot in the weave or in the net foundation). In the pattern grids of *Burato*, this traditional way of representing a pattern is used, but there is also a new method exhibited: a small dot placed in the center of each square indicates the placement of a stitch. This kind of pattern is much more effective in depicting the feeling of translucency in the real finished product.¹⁹ The *Burato* book is also significant because the author includes illustrations for transferring an original design onto fabric using the technique of pouncing, *spolvero*.²⁰ This suggests that this was most likely one of the first book of patterns intended to help users transfer a design directly to the working fabric. The Cooper Hewitt National Design Museum has an example of a direct transfer that is most likely of this type in its collection of *buratto* lace. It retains the original pattern drawing on its reverse, suggesting that the work was probably done from that side. [Fig. 5]

As *buratto* lace utilizes a double-faced embroidery technique, the obverse and reverse of the finished product have a very similar appearance.



Figure 5. (Left) Fragment of 16th century Italian buratto lace in the Copper-Hewitt National Design Museum (1971-50-196). (Top, right) Detail of its under drawing at 20x magnification. (Bottom, right) Detail of its under drawing at 50x magnification. Author's photographs.

¹⁸ Alessandro Paganino, *Burato* (Toscolano c. 1527) ed. Ongania, Venice, 1880.

¹⁹ Translucency is one of the principal qualities valued in lace, and is not easy to appreciate in the fragments that survive today in museums. Lace is designed to be seen in contrast against the light, and this early method of representation makes that characteristic visually clear for the first time.

²⁰ This technique outlines a pattern directly onto a textile by pricking small holes along the main lines of the paper, laying the paper over a textile, and then shaking (pouncing) chalk mixed with charcoal through the holes. To make the design easier to follow, the dots can be blended into a line using a wet brush. For a full description of this method, see Paganino.

Material Analysis

The geometric designs with which embroidered lace was decorated in the sixteenth century transitions to more naturalistic designs by the late seventeenth century. Changes in the net ground also appear over time. The *buratto* technique is always characterized by a gauze weave foundation.²¹ In the earliest samples I reviewed the foundation is somewhat dense; the dimension of a single open square is sometimes less than 1 mm. Over the years it becomes increasingly more open. The basic material does not change; the majority of the foundation net I analyzed was silk. Just a small percentage of the net was linen and these pieces had an earlier attribution. [Figs. 6.1–6.2]

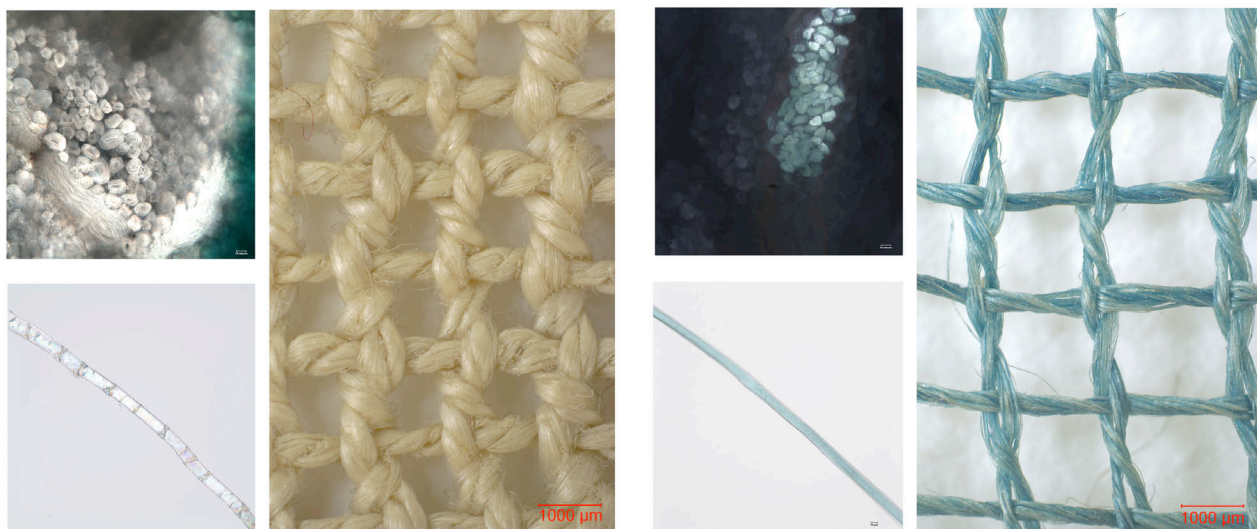


Figure 6. 1. (Top, left) Linen, cross section at 400x magnification. (Bottom, left) Linen, longitudinal view at 400x magnification. (Right) Buratto lace (MMA 07.62.61), detail of gauze foundation at 20x magnification. Author's photographs.
Figure 6.2. (Top, left) Silk, cross section at 400x magnification. (Bottom, left) Silk, longitudinal view at 400x magnification. (Right) Buratto lace (MMA 09.50.2561), detail of gauze foundation at 20x magnification. Author's photographs.

The beauty of the silk floss used in the embroidery of polychrome *buratto* lace is further enhanced by the variety of stitches employed. The foundation is commonly filled with darning stitches or satin stitches oriented horizontally, vertically, or diagonally. Stitches are executed with a single thread. Each thread uses one color or a combination of two colors. The lustrous effect of the silk floss is sometimes enriched with metal threads. [Fig. 7]

These threads have a yellow silk core wrapped with metal strip in an S-direction; SEM-EDS analysis revealed that the metal is an alloy of silver and copper.²²

²¹ Gauze weaves are those in which the warps are transposed (crossed or twisted). The weft passes through and holds the cross in place. Gauze can also be woven entirely by hand with a pick-up stick, sword-beater, and shuttle. For all-over gauze weave, as in *buratto* lace, it is best to prepare a heddle arrangement to pick up and cross a group of warps at a time. All samples analyzed here are plain gauze weave of the type also called “*gaze anglaise*” where every warp is composed of two threads: *fil droit* and *fil de tour*. Some of the samples analyzed also show a “*gaze double tour*” where a couple of warps are crossed and re-crossed two times between weft passes. See Guicherd, p. 315.

²² Three metal threads sampled from sixteenth and seventeenth century *buratto* lace strips (MMA 09.50.1160, MMA 09.50.2561, and MMA 12.9.1) were imaged and their composition and structure analyzed. SEM-EDS analyses were performed by Federico Carò, Associate Research Scientist in the MMA's Department of Scientific Research.

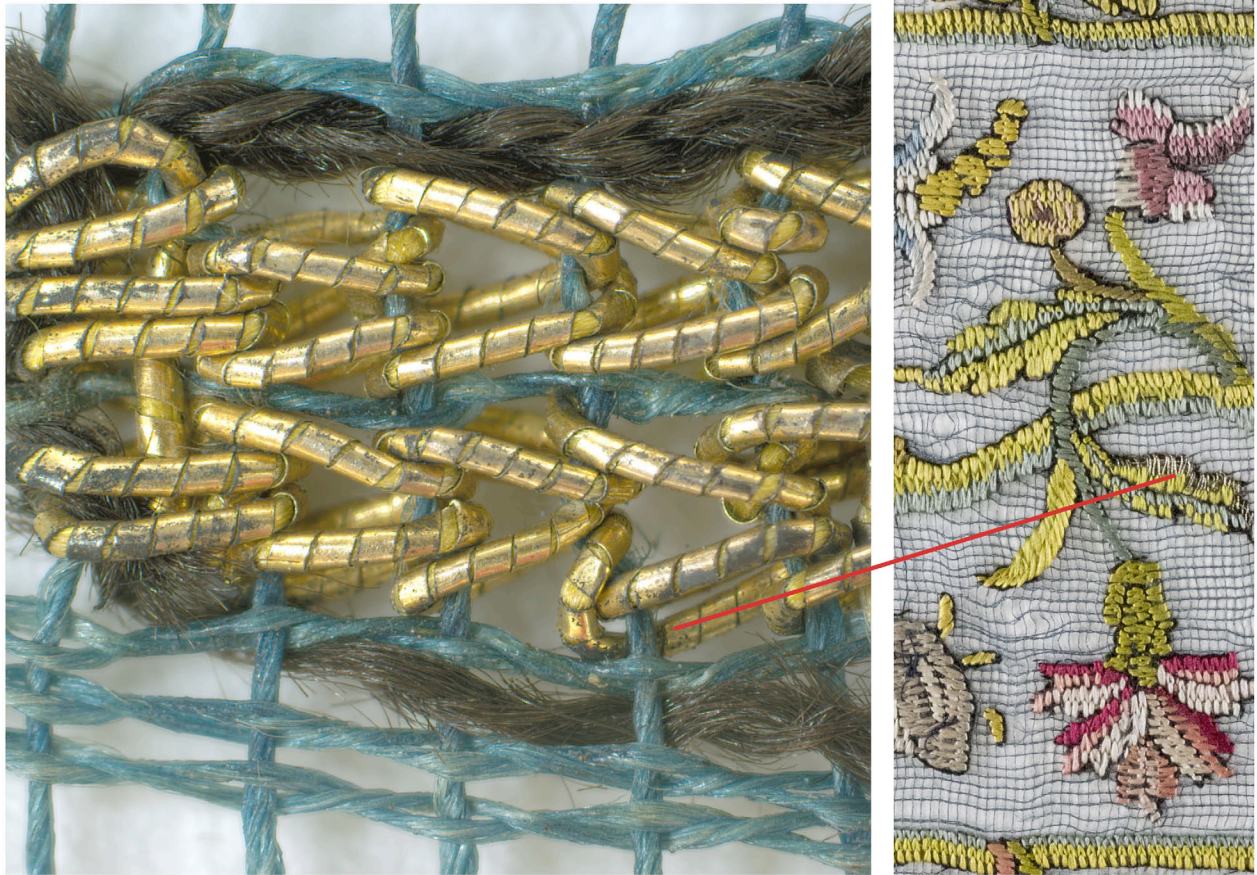


Figure 7. (Left) Detail of metal thread in MMA 09.50.2561 at 20x magnification. (Right) Location of metal thread in the object. Author's photographs.

The surface qualities and the structure of the metal strip suggest a beaten-and-cut method of fabrication.²³ The analyzed examples were also gilded on one side, though the gilding has detached from the metal strip and is now adhering to the corrosion product instead. This diffuse corrosion has caused material loss.

The metal threads are not the only elements that have suffered over the centuries. The foundation is by nature extremely fragile and many of the surviving polychrome *buratto* laces exhibit considerable damage. Warp and weft are distorted, resulting in an unstable structure. This damage is exacerbated by the coating that was usually applied to stiffen the net prior to embroidery. The overall appearance of the two coatings is noticeably different today. Visually, silk foundations appear to be coated with a uniform and transparent substance, while linen nets appear to have a rougher coating. [Fig. 8] To determine the nature of the different coatings an Iodine test was performed followed by FT-IR analysis.²⁴ The linen samples were primarily coated with rice starch. The starch coating on the silk had an additional polysaccharide gum added, most likely Gum Arabic. Over time, physical and chemical changes in the coating caused fractures and losses in the foundation, making the survival of these polychrome laces very rare.

²³ All the metal strips show a highly oriented microstructure of a copper-rich phase within a silver-rich phase, typical of a heavily worked two-phase alloy. See also A. Quye, Kathryn Hallett and Concha Herrero Carretero, *Wrought in gold and silk: preserving the art of historic tapestries* (Edinburgh, NMS Enterprises, 2009) 84–88.

²⁴ FT-IR analyses were conducted by Adriana Rizzo, Associate Research Scientist in the Metropolitan Museum of Art's Department of Scientific Research.

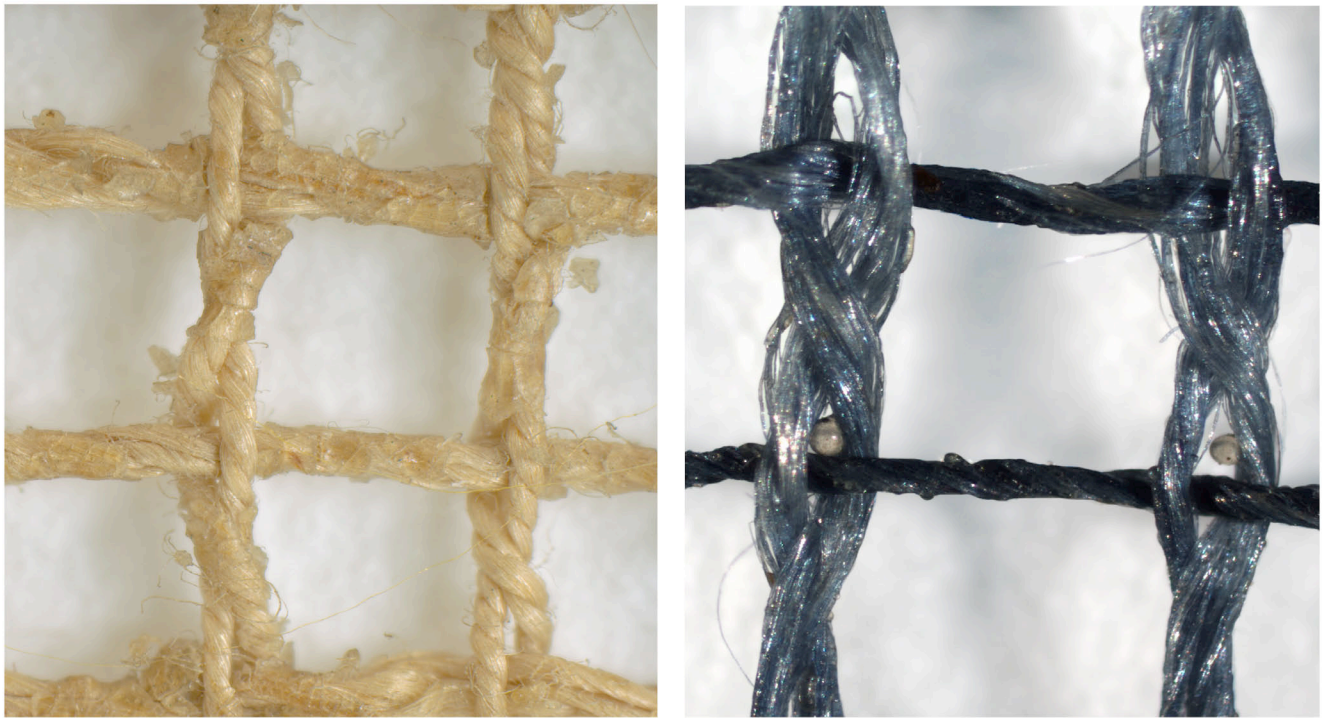


Figure 8. (Left) Detail of the linen coating on MMA 09.50.2484 at 20x magnification. (Right) Detail of the silk coating on MMA 09.50.2561 at 20x magnification. Author's photographs.

In comparing silk foundations, it was observed that this coating was used only on dyed silk. According to contemporary literature, for un-dyed gauze foundations raw silk was used.²⁵ Raw silk yarn naturally contains sericin. This provides the rigidity necessary for the weaving process and eliminates the need for an additional coating since the sericin acts as a natural sizing. A coating was applied onto dyed net foundations because the dyeing process completely removed the silk fiber's sericin in order for it to accept color. As the silk thread was dyed before the weaving process took place, in some pieces warp and weft were dyed visibly different colors. To enrich our understanding of these understudied pieces, dyes from a selection of lace from different periods were analyzed.²⁶ [Fig. 9]

Yellow and red dyes revealed the presence of weld, young fustic, archil, safflower, and cochineal. The dyes found in these laces were all representative of dyeing practices in Europe from the sixteenth to the nineteenth centuries and were probably derived from European sources with the exception of the last named. The cochineal in these samples could be either American or Armenian in origin. Their colorants are very similar and further study will be needed to differentiate them. Determining the dye's origin may be an important dating tool. By the middle of the sixteenth century

²⁵ Egidio Garuffa, *Tecnologia delle Industrie Meccaniche, Lavorazione delle Fibre Tessili*, Vol. IV (Milano, Hoepli, 1904) 272.

²⁶ Dye analyses were performed by Nobuko Shibayama, Associate Research Scientist in the Metropolitan Museum of Art's Department of Scientific Research, using high performance liquid chromatography with a photodiode array detector (HPLC-PDA). Five pieces of lace were analyzed: MMA 12.9.3, MMA 12.9.5, MMA 09.50.1160, MMA 22.115, and MMA 09.50.1989.

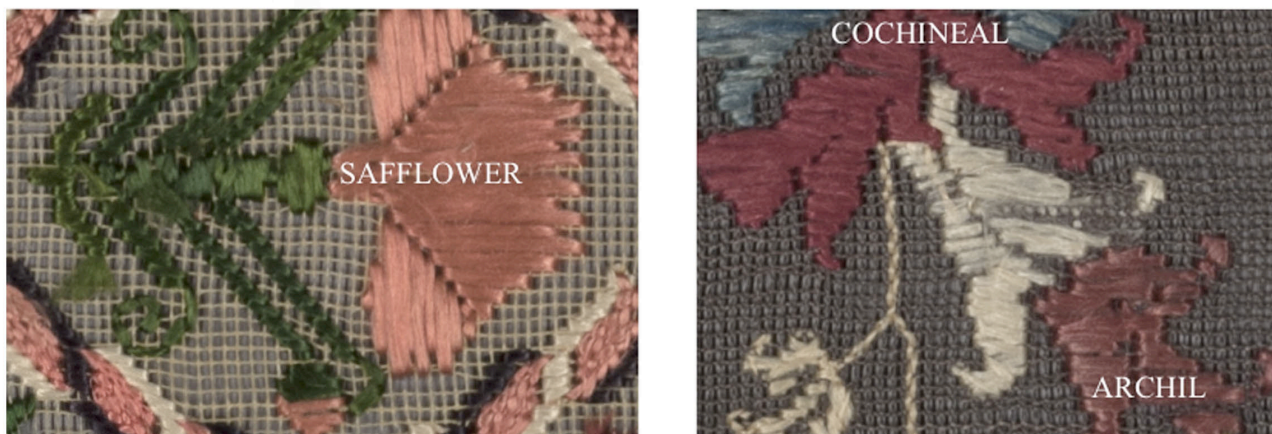


Figure 9. (Left) Detail of MMA 09.50.1989. (Right) Detail of MMA 12.9.3. Author's photographs.

American cochineal had slowly replaced *kermes* from Sicily and Spain and the Armenian cochineal brought by Venetians from the east.²⁷

Considering the popularity of American cochineal in Europe between the sixteenth and the nineteenth centuries, the cochineal of these examples of *buratto* lace *could* be of American origin. However, it is important to remember that New World cochineal found a particular resistance in Italy until the end of the sixteenth century. Venetian laws banned its use until the last quarter of the sixteenth century and punishment for infractions were very severe.²⁸ Although this is not conclusive evidence, the presence of American cochineal in these laces could mean that most of them, including those with an *early* sixteenth century attribution, should in reality be dated no earlier than the *end* of the sixteenth century.

Synthesizing the Fragments

The fragmentary nature of the lace collection in the Metropolitan is a reflection of the circumstances under which historic textiles came to be appreciated in the nineteenth century. Collectors acted as dealers for museums. To increase profits, they often cut antique lace and other textiles into several pieces for sale to more than one institution.²⁹ Part of the excitement of this research has consequently been finding lace fragments related to the Metropolitan's collection in other museums.³⁰ Examining different collections also gave me a better understanding of the original uses this lace was put to. Most of the pieces analyzed were bands with an average dimension of 2 to 40 centimeters in width

²⁷ Elena Phipps, *Cochineal Red: the art history of a color* (New York, The Metropolitan Museum of Art Bulletin, 67(3), 2010) 26.

²⁸ Italian laws of 1558, 1569, and 1574 banned the use of American cochineal for the dyeing of *scarlatti* and *pavonazzi*. Transgressors were threatened with the burning of their cloth as well as with corporal punishment. See Franco Brunello, *The Art of Dyeing in the history of mankind* (Neri Pozza, Vicenza, 1968) 200.

²⁹ For more information on the history of collectors and collecting in nineteenth century, see Birgitt Borkopp, "Collezionisti e Collezioni. Nascita e Sviluppo delle Collezioni di Merletti nell' Ottocento" in *La Collezione Gandini. Merletti, ricami e galloni dal XV al XIX secolo*, ed. Thessy Schoenholzer Nichols and Iolanda Silvestri, Modena, F. C. Panini, 2002) 19–26.

³⁰ During this research fragments of polychrome embroidered lace related to those held by the Metropolitan were found at several other museums. Among many other examples, MMA 22.115 is related to the Cooper Hewitt Museum's 1971-50-1 and the Musei Civici di Modena's 1881-153. The polychrome example MMA 08.180.442 is related to the Victoria and Albert Museum's 354-1891. MMA 20.186.30 connects with the Cleveland Museum of Art's 1920.1157.

and of 5 to 200 centimeters in length.³¹ Generally, the embroidered lace that has survived has done so as part of a large-scale furnishing piece. Bands of lace were frequently set as the decorative edges of linen or silk textiles, for example as bed or table coverings designed to be seen in contrast against the light or in movement. This original use is well shown in Italian paintings; in the *Birth of the Virgin* of Alessandro Allori in the Church of Santa Maria in Cortona a band of embroidered lace is used as a border for a bedcover. [Fig. 10]



Figure 10. Alessandro Allori, Birth of the Virgin, Santa Maria Nuova, Cortona, Italy, 1595. See detail of the embroidered lace used as a border for the bedcover. Image from Ed. F.lli Alinari, Florence, 1941.

In *The Supper of San Gregorio Magno* by Paolo Veronese, a lace piece worked on a net foundation appears as the decorative border for a tablecloth.³²

The collection of the Metropolitan Museum includes a similar tablecloth (MMA 09.178) that appears to completely retain its original *buratto* border. [Fig. 11] When I began my research there were no photographs of this piece in the Museum's catalogue, but I realized from the dimensions listed that it might be an intact *buratto* piece and indeed I had the great pleasure to discover that such was the case. It is a large *buratto* table-cover made in carnation-colored silk taffeta, decorated with borders of black silk *buratto* lace. This example of early lace is double-face embroidered with hunting scenes, double-headed eagles, and columns that divide the sections. [Fig. 12] It is further decorated in a

³¹ Although it is possible to evaluate the width of these fragments, their length remains uncertain as the majority were cut lengthwise.

³² Paolo Veronese, *The Supper of San Gregorio Magno*, Sanctuary of Monte Berico, Italy, 1572.

manner typical of polychrome *buratto* table-covers with abundant colored silk floss in long satin stitch, using the grid of the gauze as a guide. The result is a stylized and symmetric decoration with geometric edges.³³ This beautiful *buratto* tablecloth appears to be an early example of the type popular in Southern Italy during the seventeenth century,³⁴ and corresponds with another lovely intact *buratto* table-cover from the collection of the Victoria and Albert Museum (T.428-1950). [Fig.11]

Although my research began with a study of fragments of *buratto* lace, my subsequent discoveries of complete pieces provides a new, powerful contribution to the visual vocabulary of this polychrome lace, enabling this textile art to be understood in new ways. We can now appreciate both the individual components of these pieces and the pieces as a whole; as both singular examples of artistic technique, and as assembled art objects.



Figure 11. (Left) Buratto table cover in the collection of the The Metropolitan Museum of Art (MMA 09.178). (Right) Buratto table cover in the collection of the Victoria & Albert Museum (T. 428-1950). Author's photographs.

³³ Francine Besson, "Le rappresentazioni animali nella collezione di merletti del Museo delle Arti e della Storia di Ginevra" in *Arca di Filo. Gli Animali nel Merletto*, ed. Doretta Davanzo Poli (Milano, Centro Studi e Ricerche Arnaldo Caprai, 2002) 27–28.

³⁴ The production of *buratto* continued to rise though in the south of Italy during the eighteenth and early nineteenth centuries, especially via the production of peasant lace. Most of the lace was made in silk with a tickish thread that was most likely locally spun. Patterns show a wide range of styles. The largest illustrated group of Italian peasant lace can be found in Elisa Ricci's book *Antiche Trine Italiane* (Bergamo, Istituto Italiano d'Arti Grafiche, 1908) 3–4. See also the photographic material in Vertua's *Trine e Donne Siciliane*, fig. 34–36.



Figure 12. Details of embroidery in MMA 09.178. (Left) Double-headed eagle motif. (Right) Hunting scene. Author's photographs.

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References

- Besson, F. "Le rappresentazioni animali nella collezione di merletti del Museo delle Arti e della Storia di Ginevra" in *Arca di Filo. Gli Animali nel Merletto*, ed. Doretta Davanzo Poli. Milan: Centro Studi e Ricerche Arnaldo Caprai, 2002.
- Binetti Vertua, C. *Trine e Donne Siciliane*. Milan: Ulrico Hoepli, 1911.
- Borkopp, B. "Collezionisti e Collezioni. Nascita e Sviluppo delle Collezioni di Merletti nell'Ottocento" in *La Collezione Gandini. Merletti, ricami e galloni dal XV al XIX secolo*, ed. Thessy Schoenholzer Nichols and Iolanda Silvestri. Modena: F. C. Panini, 2002.
- Brunello, F. *The Art of Dyeing in the history of mankind*. Vicenza: Neri Pozza, 1968.
- Cardon, D. *Natural Dyes. Sources, Tradition, Technology and Science*. London: Archetype Publication, 2007.
- Carita. *Lacis. Filet Brode'*. London: Sampson Low, Marston & Co., 1908.
- Daniels, M. *Early Pattern Book for Lace and Embroidery*. New York: *The Bulletin of the Needle and Bobbin Club*, Vol. 17, No. 2, 9–11, 1933.
- Earnshaw, P. *The Identification of Lace*. Aylesbury: Shire Publication, 1980.
- Garuffa, E. *Tecnologia delle Industrie Meccaniche, Lavorazione delle Fibre Tessili*, Vol. IV. Milano: Hoepli, 1904.
- Guicherd, F. *Cours de Theorie de Tissage*. Lyon: Edition Sève, 1946.
- Jackson, N. and Jesurum E. *A History of Handmade Lace*. London: L. Upcott Gill, 1900.

Lamb, V. *Looms Past and Present. Around the Mediterranean and Elsewhere*. Hertfordshire: Roxford Books, 2005.

Levey, S. M. *Lace. A History*. London: Victoria & Albert Museum, 1983.

Paganino, A. *Burato*. Toscolano, c. 1532 and Venice: Ongania, 1880.

Phipps, E. *Cochineal Red: the art history of a color*. New York: The Metropolitan Museum of Art Bulletin 67(3), 2010.

Quye, A., Hallett K., Herrero Carretero C., *Wrought in gold and silk : preserving the art of historic tapestries*. Edinburgh: NMS Enterprises, 2009.

Ricci, E. *Antiche Trine Italiane, II*, Bergamo: Istituto D'Arti Grafiche, 1908.

——— *Il Burato. Libro de recami di P. Alex. Paganino*. Bergamo: Istituto D'Arti Grafiche, 1909.

Sibmacher. *Schön Neues Modelbuch*, Nuremberg, 1597.

Simeon, M. *The History of Lace*. London: Stainer & Bell, 1979.

Toomer, H. *Antique Lace: Identifying types and techniques*. Atglen: Schiffer, 2001.