

*The Holy Family with Saint Elizabeth, the Child
Saint John the Baptist and Two Angels,*
a copy of Raphael

Technical report, restoration and new light on its history
and attribution



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**BILBOKO ARTE
EDERREN MUSEOA
MUSEO DE BELLAS
ARTES DE BILBAO**

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After undergoing a painstaking restoration process, which included the production of a detailed technical report, the *Holy Family with Saint Elizabeth, the Child Saint John the Baptist and Two Angels*¹ [fig. 1], is once again on display at the Bilbao Fine Arts Museum. A work of high quality, the painting, until recently attributed to Giulio Romano (Rome c.1499-1546), was kept for many years in storage at the Museum because of its precarious state of conservation [fig. 2].

During the restoration process, we ran a series of tests that included X rays, dendrochronology, infrared reflectography (IR), analysis of pigments, media, fillers and varnishes, and examination under ultraviolet light. A variety of specialists from public institutions and private business worked on the painting. Information gathered to aid with attribution and facilitating decisions on the most suitable conservation and restoration treatments also helped us to develop a multi-disciplinary work method defined and applied under scientific conditions².

To begin with, we studied the history of the work, the itinerary it might have followed in the nearly five centuries since it was painted and its relationship to the original by Raphael. Then we produced a report on the materials used and the major restoration work performed on the painting and, finally, its links with other old copies. The essay ends with a review of our conclusions.

1 Inv. no. 69/198.

2 SGS Tecnos took the X rays under the technical supervision of the Bilbao Fine Arts Museum. Responsible for the dendrochronology was Pascale Fraiture, a specialist from the Institut Royal du Patrimoine Artistique (IRPA) in Brussels, the study being completed in the IRPA laboratory after the data was collected *in situ*. Araceli Gabaldón and Tomás Antelo, from the Department of Physical Studies at the Institute for the Spanish Historic Heritage (IPHE) in Madrid, were entrusted with the infrared reflectography of the work as part of the VARIM project. The paint material was analyzed by ARTE-LAB, under the direction of Andrés Sánchez Ledesma and María Jesús Gómez García. Treatments were applied at the Bilbao Fine Arts Museum Conservation & Restoration Department, with José de la Fuente, restorer from the Prado Museum in Madrid being responsible for the treatment of the support. Rocío Salas Almela, from the IPHE in Madrid, and José Luis Merino Gorospe, from the Bilbao Fine Arts Museum, also worked on the support and applied the treatment on the paint material. Ana Sánchez-Lassa de los Santos was responsible for the historical study.



1. Anonymous Flemish
The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels, after 1518
Oil on oak panel, 197 x 143.7 cm
Bilbao Fine Arts Museum
Inv. no. 69/198
After restoration



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2. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Before restoration

1. An historical review. Original and copy

The painting is a copy, with a few variations (specified later), of the work by Raffaello Sanzio, Raphael, (Urbino, 1483-Rome, 1520) *The Holy Family with Saint Elizabeth, the Child Saint John the Baptist and Two Angels*, better known as *The Holy Family of Francis I*, now in the Louvre [fig. 3]³. Raphael had settled in Rome in 1508 in answer to a summons from Pope Julius II to take charge of the decoration of the rooms in the Papal apartments. Ten years later, in 1518, he received the commission to paint *The Holy Family* from Pope Leo X and his nephew, Lorenzo II de Medici, duke of Urbino, to be offered as a gift to Claude, the Queen Consort of France, wife of Francis I⁴. Painted in just two months, April and May, it was delivered at the end of May and, although signed and dated by Raphael⁵, his assistants, particularly Giulio Romano, mentioned by Vasari, are considered to have done a lot of work on it⁶. Raphael, despite his exceptional capacity for work, had a heavily manned workshop to deal with his rapidly increasing commitments. Together with this painting for the Queen of France, the Medici also commissioned a *Saint Michael, Archangel* (The Louvre) destined to be offered as a gift to Francis I. The importance of the commission, not to mention the sheer quality and beauty of both paintings, brought Raphael great fame. The letters exchanged on the subject of these paintings by Medici's agents, who visited the painter's workshop to check on progress, bear eloquent witness to this fact: "the figures shall be so beautiful and skilfully composed that they shall easily withstand criticism and bear comparison with any other figure"⁷.

As was customary practice at Raphael's Roman workshop, a number of sketches or preliminary drawings were made prior to the actual painting of the *Holy Family*. Four of these drawings survive, one held in the Louvre, *Young Woman with Her Arms out to a Child*, and two in the Uffizi, *Child* and *Study for a Virgin with the Child*⁸. Raphael's authorship of these three drawings is by no means wholly accepted, as some researchers believe them to be the work of Giulio Romano⁹. And, finally, the collection of the Bonnat Museum in Bayonne (France) includes the *Head of Saint Joseph* [fig. 4]¹⁰, a beautiful fragment of the preparatory card¹¹ for the figure of the saint. We know the painter retained the drawings and original cards he produced for his works and that, on his death, they were shared out amongst his disciples, Giulio Romano included¹². These drawings and cards were used to make many copies—also on paper—which a number of artists took with them on their travels round Europe. Engravings of the paintings also helped to popularize them, the first such engraving known to us being the one attributed to Italian engraver Gian Giacomo Caraglio (1500-1570)¹³.

3 Painted on poplar wood and transferred to the canvas support in 1777 by J. L. Hacquin, an operation that caused no little damage to the painting, as well as the loss of the original ground and, in consequence, of the preliminary or underlying drawing. Abundant retouches were lifted off when the work was restored in the 1980s. On this painting, Béguin 1984 and Paris 1993.

4 The occasion was the marriage of Lorenzo and Madeleine de La Tour d'Auvergne, Francis I's niece, the intention being to reinforce the diplomatic alliance between the Medici—the Pope and his nephew—with the French crown. Cordellier/Py 1992, p. 253.

5 "Raphael Urbinas Pingebat. MDXVIII Romae" is inscribed on the hem of the Virgin's robe. The inscription "Romae" is apocryphal.

6 G. Vasari. "Vita di Giulio Romano", *Le Vite de' più eccellenti architetti, pittori et scultori italiani*, Florence, 1550. Other members of his workshop, such as Raffaellino del Colle, Polidoro da Caravaggio, Gian Francesco Penni and Giovanne da Udine, may also have worked on the painting. The latter may have done the flowers and the luxurious marble paving.

7 "Saranno sì belle e tanto bene adorne che reggeranno al martello e al paragone con qualunche altra figura si sia". Letter of 27 March 1518 from Baldassare Turini in Rome to Goro Gheri in Florence. Shearman 2003, vol. 1, p. 343.

8 Registered respectively under the following inventory numbers: Louvre, 3832 and Uffizi, 534E and 535E. Madrid 2005, pp. 116-125.

9 Madrid 2005, p. 124.

10 Measuring 49.5 x 35.6 cm, the drawing is in black stone and wash on greyish brown-ochre paper. Bonnat Museum, inv. no. 1705.

11 The term *cartone* referred to a drawing made on large sheets of paper and which could be transferred directly to the support: wall, panel or canvas.

12 Some excellent copies survive by Giulio Romano of originals by Raphael, including the *Madonna with the Child*, in Wellington Museum, Apsley House, London, copy of *The Madonna of the Chair*. Young/Joannides 1995.

13 Rome 1985, pp. 202-203.



3. Rafael Sanzio (1483-1520) and workshop
The Holy Family of Francis I, 1518
Oil on panel transferred to canvas, 207 x 140 cm
Musée du Louvre, Paris
Inv. no. 604



4. Rafael Sanzio (1483-1520)
Head of Saint Joseph
Blackstone and wash on paper, 49.5 x 35.6 cm
Musée Bonnat, Bayonne, France
Inv. no. 1705

The Bilbao Fine Arts Museum acquired the panel on the 10th of October 1913. Recorded as number 25 in the register book as the work of an anonymous artist, it came from the Santa Casa de Misericordia in Bilbao¹⁴, and in 1914 appears as a contribution from the City Council¹⁵. From a document dated 15th of February 1844, we know the painting was previously in the old convent of San Francisco in Bilbao, built in 1501, being abandoned by the Franciscans when the convent was destroyed in 1837 during the First Carlist War¹⁶. The document in question is a "List of paintings in the Museum of Paintings of the Province of Vizcaya", and the reference to the work goes as follows: "Another on Panel, good copy of Roman School, badly restored, seven feet long, and five and one inch wide, which shows the holy family from the convent of San Francisco"¹⁷. The measurements in feet and inches are roughly equivalent to 196 x 142 cm, so they fit our panel, which measures 197 x 143.7 cm. What we don't know, unfortunately, is how long the panel had been in the convent.

Before proceeding, one other possibility needs to be mentioned here. This painting may have been part of the important collection of the Marquis of Leganés¹⁸, as the inventory made on his death on the 6th of April 1655 includes the following description of a work: "a Md^a with the child who holds him with her left hand, and Saint Elizabeth, Saint John and Saint Joseph and an angel who crowns him with a garland of flowers,

14 Built as a provincial poorhouse by Antonio de Goicoechea, it was inaugurated in 1872 in the presence of the King, Amadeus I of Savoy.

15 In the *Libro registro de obras y objetos de arte*. Museo de Bellas Artes de Bilbao-Bilboko Arte Eder Museoa, S.A., 1908-1990.

16 P. Gil. *La Santa Casa de Misericordia de Bilbao*, p. 3 (unpublished document, courtesy of Antonio Barandiarán).

17 The document is in Madrid's Royal Academy of Fine Arts of San Fernando, 54-5/2. It is signed by Antonio de la Escosura y Hevia, political chief of Vizcaya. Zugaza 1992, pp. 16, 28-30.

18 Don Diego Mesía de Guzmán was named Marquis of Leganés by Philip IV in 1624. Nephew of the Conde-Duque de Olivares, he invested his huge fortune in the acquisition of works of art, eventually creating one of the most important collections of the 17th century, exceeding the monarch's own. López Navío 1962, pp. 264-265.

ht. 2 and $\frac{2}{3}$ b. and of width a *vara* and $\frac{2}{3}$, copy of *Raphael*, with its m., 1,200”¹⁹. Besides the description, the measures also correspond to this panel, as the Castilian *vara* was equivalent to 83.5 cm, which would make the measurements 208.5 x 144.5 cm, very close to those of the Museum panel. Further, it should be remembered that measurements included in the inventories of the time were approximate.

Of the published references to the painting in the 20th century, we may quote Antonio Plasencia, who in 1931 referred to it as “Copy with variations of Raffaello Sanzio”²⁰, or Gaya Nuño, who in 1955 titled it *Holy Conversation* and attributes the painting to “Julio Romano”, this being the first time, to our knowledge, Romano figures as the author²¹. In his 1969 catalogue of the Museum, Crisanto Lasterra describes it as a copy of Raphael, “probably by his disciple Giulio Romano”²². With certain reservations, in 1978 Javier de Bengoechea also acknowledged the “authorship of Giulio Romano” as “possible”²³.

The innovative composition Raphael came up with for the original, with the three members of the Holy Family forming a sharp diagonal, shows the Child about to leap from the cot to embrace His Mother, a position interpreted as a symbolic image of the Resurrection of Christ as he leaves the sepulchre²⁴. To the left, Saint Elizabeth holds her son Saint John by the arms, while he joins his hands in a gesture of veneration directed towards his cousin. Behind is the vigorous figure of Saint Joseph, wrapped in an extraordinarily executed, brightly coloured red robe. Over the Madonna’s head, an angel holds a white rose, while another, in the centre, crosses his hands on his chest.

A comparative study of the two works, the Louvre painting and the one in Bilbao, highlights the fidelity to the original of the museum copy. Both have similar measurements: Raphael’s original measures 207 x 140 cm and the Bilbao painting 197 x 143.7 cm. Particularly striking is the almost exact coincidence of the drawing for the two works, a fact confirmed by superimposing them using transparencies made on a sheet of acetate.

Although the differences in execution and colouring are evident some differential elements deserve special mention. In both works, the scene takes place indoors, with the light entering from the left, and while in the Louvre version there is a window in the wall at the back, through which a mountainous landscape can be seen, the one in Bilbao takes place in a closed interior, giving the work a somewhat claustrophobic atmosphere. Dominating the scene is a large pilaster, possibly an allusion to the painter’s knowledge of Serlio’s architecture²⁵. A sober wooden floor here replaces the luxurious marble paving of the original in the Louvre. In the work by Raphael, the angel on the left²⁶ holds a garland of flowers over the Madonna’s head, in allusion to her virtues and the Passion²⁷, while in the Bilbao work this has been substituted by a single white rose, a symbol of purity and, at the same time, of suffering. In the Bilbao panel, this angel’s one visible wing is strikingly coloured, no doubt inspired by the plumage of some exotic bird. A pensive-looking Saint Joseph²⁸ looks older in the work in the Louvre, while the Bilbao panel shows him as a younger man in his prime, with abundant, uncombed locks;

19 López Navío 1962, p. 315, no. 1108; Ruiz Manero 1996, vol. 1 (*Rafael y su escuela*), pp. 81-82.

20 Plasencia 1932, p. 27, no. 84.

21 Gaya Nuño 1955, p. 162.

22 Lasterra 1969, p. 92.

23 Bengoechea 1978, pp. 194-195.

24 Firestone 1943, pp. 43-62.

25 Sebastian Serlio (Bologna, 1475-Fontainebleau, c. 1554), architect, disciple of Peruzzi, studied the writings of Vitruvius and the monuments of the ancient world. His work, *Regole generali di Architettura*, published from 1537 on, was a major influence on contemporary artists.

26 Raphael’s drawing for this figure is in the Museum of the Condé de Chantilly and he repeated the figure in the *Banquet of the Gods at the Wedding of Love and Psyche*, in the loggia of the Villa Farnesina in Rome, for which he finished the decoration in 1519.

27 Paris 1993, p. 47, notes that the crown is in fact an authentic Marian garland: jasmine, roses, a carnation and a daisy. The marigold, the wild rose and the cornflower allude to the Passion.

28 Raphael’s inspiration was the Heraclitus he painted in the *School of Athens* for the Vatican apartments (1509-1510).

curiously, this representation is more closely related to the drawing by Raphael in the Bonnat Museum than with the figure we see in the painting in the Louvre. At one point in our research, we were able to compare the two figures, Bonnat and Bilbao, superimposing a transparency with the drawing of the Saint —tracing directly on our panel on a sheet of acetate— on Raphael's preparatory drawing²⁹.

In the Louvre painting, the cot from which the Child jumps is a simple wood affair, with just a carved cane for decoration. But the cot in the Bilbao panel is in fact what really distinguishes the painting, being absent from all the other known copies. The cot in the copy is richly decorated and makes a vivid contrast with the general sobriety of the rest of the scene [fig. 5]. The Child's cot is a delicate work of craftsmanship framed by two leg-type pieces that simulate bastons of authority. In the centre is a medallion-cameo with the image in profile of someone dressed as a Roman emperor, in a possible allusion to the supreme status of the work's principal character³⁰; on either side are two barely perceptible figures that are hard to interpret. Besides the vegetable and plant features, pearls and precious and semi-precious stones decorate the cot: rubies, sapphires, aquamarine, amethysts, emeralds, rock crystal and, finally, what appear to be two poppies —symbol of Christ's Passion— carved in red and black coral on either side of the upper part. All of this is captured with a delicacy that contrasts sharply with the way the rest of the painting is executed.



5. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Detail of cot

One question inevitably comes to mind when considering the painter's moves as he set about copying the original painting: what system did the artists of the time use to make such accurate copies? From a number of methods available, the author of the panel chose a system involving tracing with a stencil, which gave remarkable accuracy and was very popular during the Renaissance. Using a paper or card on which the lines of the composition were drawn, the artist made a series of perforations with a sharp object or a needle³¹. The tracing was placed on the support after the ground had been applied, and carbon dust from burnt bones or wood contained in a small cloth bag was passed through the perforated holes. Although the dust might have been a reddish colour, in most cases it was black. The result was a succession of more or less neigh-

29 Our grateful thanks to the Bonnat Museum for enabling us to study the drawing and superimpose the tracing.

30 Isabel Mateo suggests this figure may possibly refer to the majesty of the Child God, who eventually wear a crown of thorns instead of a crown of laurel.

31 On tracing methods, see Bambach 1999 and Hiller von Gærtringen 1999.



6. *The Holy Family with Saint Elizabeth, the child Saint John and two angels*, after 1518
Bilbao Fine Arts Museum
Detail of cleaning process, with the stencil clearly visible in the Child's hand. Some old retouches are appreciable to the naked eye because their colours have changed; after they were eliminated, a huge number of gaps came to light, as can be appreciated to the right of the image



7. *The Holy Family with Saint Elizabeth, the child Saint John and two angels*, after 1518
Bilbao Fine Arts Museum
Detail of the hand of the Child in infrared reflectography clearly showing stencil dotting (Institute of Spanish Historical Heritage, Madrid)

bouring dots that marked the outlines of the drawing on the ground³². As we shall see in more detail later on, the analyses showed that charcoal was used to make the underlying stencil drawing on the Bilbao panel. In some zones, the small stencil dots are evident to the naked eye, as in Saint Elizabeth's headwear or the Child's right hand, owing to an effect of transparency in the paint layers [fig. 6]. But it was the spectacular result of the infrared reflectography³³ [fig. 10] that revealed the entire sequence of dots that made this extraordinarily accurate copy possible [fig. 7]. Some areas of the drawing, like the face of the Madonna, were reinforced afterwards with fine lines using some dry tool. The final result does not adapt to the projected preliminary drawing in all cases, as occurs with the cot, which was originally stencil drawn with bars; finally the artist painted the cot with remarkable virtuosity in an entirely different manner.

2. Description and studies on the painting technique

To begin with, special mention should be made of the high quality of the support [fig. 8], which was made with six panels joined vertically. The wood, even to the naked eye, is clearly oak, more usual in northern European schools; in Italy, where oak was very scarce and consequently very expensive, the poplar was used almost exclusively³⁴. The dendrochronological study indicates that this oak came from the Baltic region, the wood from here being the most highly sought after for panel paintings³⁵, as the poverty of the soils and the long, cold winters interspersed with short summers meant the trees developed slowly and uniformly, giving close, parallel growth rings with minimum sapwood and plenty of heart³⁶. The choice of this type of wood,

32 A fine layer of translucent oily primer was applied to the drawing to fix it, also acting as insulation to prevent the ground from absorbing too much medium from the paint layers.

33 London 2002 and Madrid 2006.

34 Uzielli/Casazza 1994, p. 85, quote percentages of the use of wood for paintings in a range of countries, with the poplar (*Populus*) being used in 90% of paintings in Italy and oak (*Quercia*) in 1.5%. Bomford... [et al.] 1995, p. 11, goes into some detail, noting that "... Italian paintings on panel, from the earliest surviving examples to the 17th century, almost always use poplar wood; either white poplar (*Populus alba* L.) or the poorer quality black poplar (*Populus nigra* L.)". Giulio Romano used poplar, for example, for his copy of Raphael's *Madonna* in Apsley House. Young/Joannides 1995, p. 734.



8. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Back of painting before restoration



9. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
X-ray

the care with which it was treated and the size of the whole, which must have entailed a substantial increase in the cost of the raw material, suggests the work was a major commission. The study of the growth rings and their comparison with the known patterns, which is the method on which dendrochronology is based³⁷, enabled us to determine the date the wood used in the panels was cut. According to our results, the wood of the panels comes from different trees, only two of the six panels being from the same one; the trees involved were felled in 1427, 1425, 1420 and 1407³⁸ (see the schema of the constituent elements of the support, fig. 12).

The X-ray study of the work was particularly useful in understanding the way the actual support was made [fig. 9]. It follows the construction techniques for Flemish supports at all times³⁹. The six panels used in the support were glued side by side, the joints being reinforced by seventeen pins inserted perpendicularly to the grain of the wood in special purpose-made holes. Also made from oak, the pins are between 6.5 and 7 cm long. Rather than performing a structural function, the pins provided a guide for joining the panels together, keeping them steady while they were glued. One unusual feature showing up clearly in the X ray are the

35 The list of famous paintings on Baltic oak is almost endless and includes *The Garden of Earthly Delights* by Hieronymous Bosch, *The Three Graces* by Rubens and *Crossing the Styx* by Patinir to mention just three.

36 Klein 1984.

37 Deriving from classical Greek, the term is a compound of three words: *dendro* (tree), *krono* (time) and *logia* (treatise or study). So its translation would be: the study of the age of the tree.

38 The sixth panel is very small and does not provide a sufficiently large sequence of rings to permit dating.

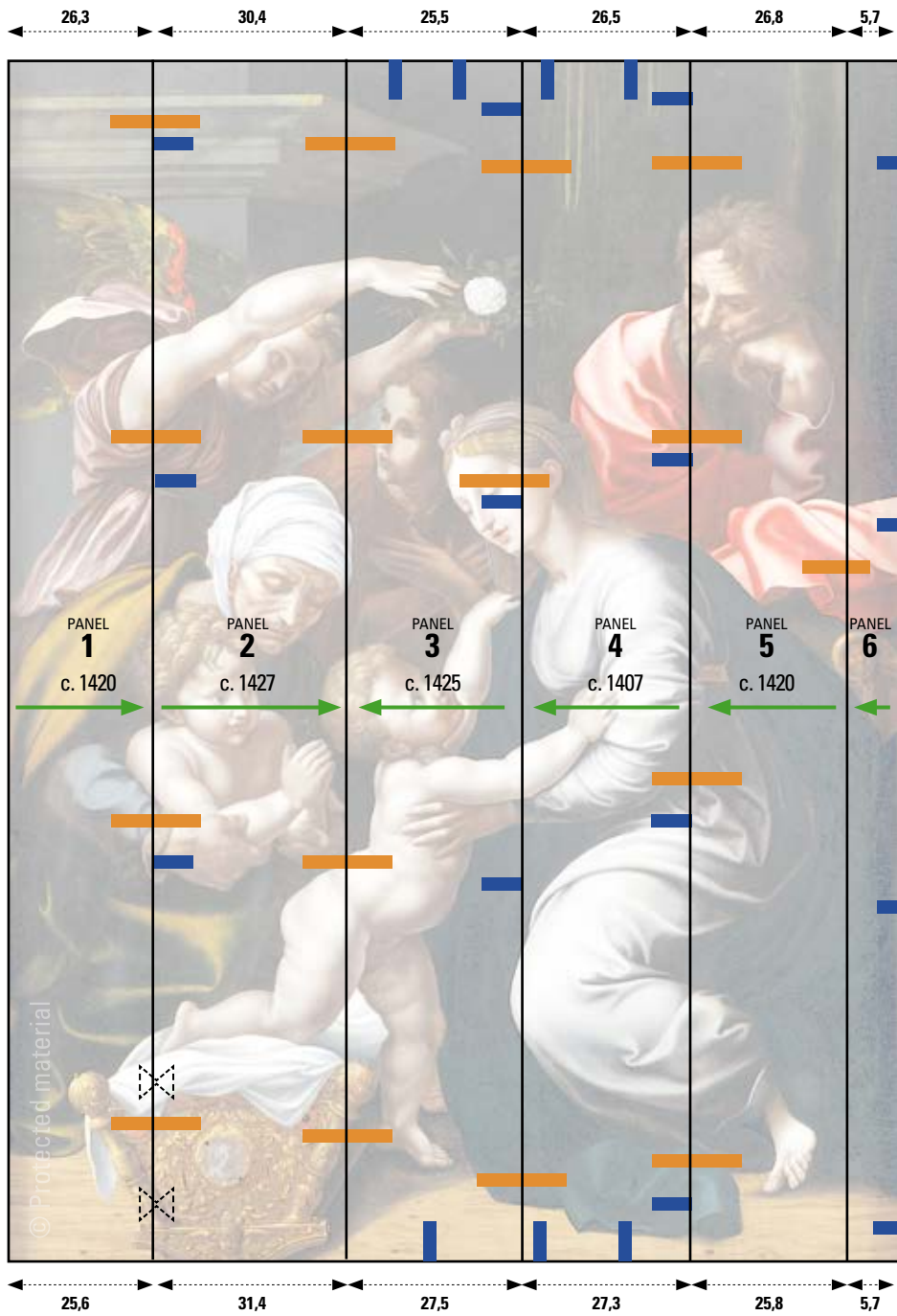
39 Fletcher 1984.



10. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Infrared reflectography revealing the stencil preliminary drawing (Institute of Spanish Historical Heritage, Madrid)



11. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Work seen under ultraviolet light. The yellow veil covering the painting marks the layers of aged varnishes, while non-original repainting and retouches can be distinguished by the dark colouring



12. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels, after 1518*

Bilbao Fine Arts Museum

Diagram of parts used in support (measurements in cm). In orange, location of pins inserted in panel joints, and in blue, empty pin holes. Green arrows indicate the direction of wood growth (Institut Royal du Patrimoine Artistique, Bruxelles)

holes for the pins, some still containing small fragments, that were not used in the actual construction of the support. Some are located on the support perimeter, on the upper, lower and right hand edges. Others are distinguishable, however, in the panel joint areas, and, odder still, the holes in each panel do not coincide with the analogous holes in the neighbouring panel. With no apparent use, it is difficult to see exactly what they are doing there, unless there was a change in arrangements when the panels were put together. It is also possible that the wood was being reused⁴⁰.

Another feature of the Flemish construction technique also found in this support is the wedge form each panel displays in cross section [fig. 19]. A number of experts attribute the phenomenon to an efficient longitudinal cutting system used to cut the tree trunk into radial-like segments, as a means of obtaining the largest possible number of high quality, radial-cut panels⁴¹. At some point in the distant past the backs of the uppermost parts of each “wedge” must have been planed down, this being clear to the naked eye in the lighter tones of the planed areas in comparison to the intact zones.

Stylistic considerations aside, the paint material was also treated according to the Flemish method⁴², Colours were applied in thin, translucent layers on a fine white homogeneous ground. Calcium carbonate was decisive in the ground in all samples⁴³, which also contained coccoliths, minute calcareous bodies found in deep-sea ooze that only ever appear in grounds of Flemish origin. Glazes were also detected in the superimposed layers constructing some colours, such as the green of the curtain, or the red of Saint Joseph’s robe⁴⁴. These glazes were produced with clean, clear colours, feeding off the luminosity of the backgrounds, the shadier areas being reinforced with more colour-charged touches. Analysis⁴⁵ extended appreciations reached with the naked eye [figs. 13, 14 and 15]. Pigments identified were lead white and calcium carbonate⁴⁶ for the whites, azurite for the blue, lead-tin yellow, red and orangey earths comprising iron oxides, vermilion and madder lake, a lake based on copper and charcoal black pigments⁴⁷. A drying oil was used as medium, this being linseed oil, the most popular in oil painting. As we shall see later, the varnish analyzed, a triterpene resin, was from a much earlier restoration; the resin is the sort known as “soft”, like mastic and dammar, in a mixture with beeswax.

As noted above, reflectography revealed the excellent preliminary drawing done in stencil, and which is appreciable to the naked eye thanks to the transparency of the paint layers in some zones. Analysis revealed that charcoal black had been used. With the drawing finished, an insulation layer of lead-white and charcoal primer (present in all the samples analyzed) was applied generally.

40 The new restructuring may have been due to deterioration caused by the wood-eating insects that weakened some of the panels.

41 Murette 1961 and Wadum 1997.

42 References to Flemish painting techniques. See Gómez González 2003.

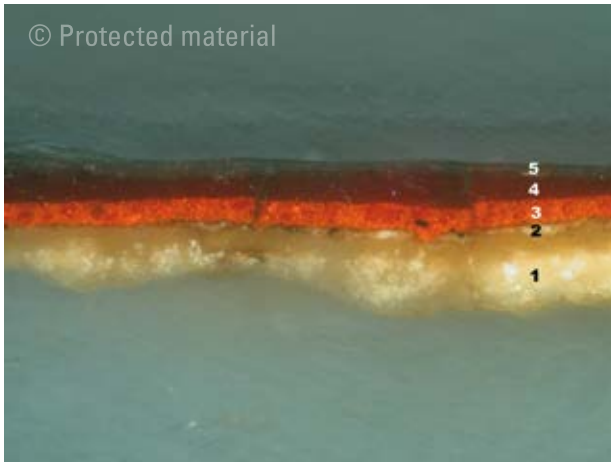
43 Dried calcium sulfate, i.e. gypsum, appears in the grounds—normally thick layers—used for Spanish and Italian panels of this period. There is virtually no limit to the number of references on the subject. For Spanish grounds, Gómez González 1998, p. 27; for Italian grounds, Bomford... [et al.] 1995, p. 17.

44 Madder lake was used for the glaze in Saint Joseph’s robe and copper-pigment green lake for the curtain.

45 For the materials study Arte-Lab used micro-sample studies by optical microscope under incident and transmitted light, selective staining and micro-chemical tests, optical fluorescence microscopy, Fourier transform infrared spectroscopy (FTIR), gas chromatography–mass spectrometry (GC-MS) and scanning electron microscopy–energy-dispersive X-ray micro-analysis (EDXS-SEM).

46 In a very low proportion. Possibly an impurity contained in the lead white.

47 A number of manuals on the chemistry and behaviour of these pigments are available. See, for example, Gómez González 1998, pp. 51 and ff.



13. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518

Bilbao Fine Arts Museum

Cross-section of the red of Saint Joseph's robe

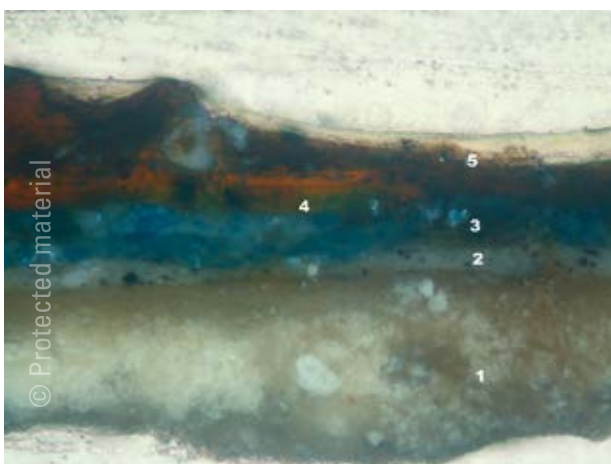
1. Ground of calcium carbonate and animal glue
2. Lead white and low-proportion charcoal primer
3. Layer of red paint comprising vermilion, red earth, calcium carbonate and lead white
4. Glaze of red lake with lead white and calcium carbonate in low proportion
5. Varnish of triterpene resin and beeswax in low proportion



14. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518

Bilbao Fine Arts Museum

Cross-section of the red of Saint Joseph's robe under ultraviolet light. The layer between the red lake glaze and the varnish corresponds to an animal glue applied in an early restoration



15. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518

Bilbao Fine Arts Museum

Cross-section of the curtain green

1. Ground of calcium carbonate and animal glue
2. Lead white and low-proportion charcoal primer
3. Paint layer of azurite, lead white and calcium carbonate
4. Copper pigment-based green lake
5. Varnish of triterpene resin and beeswax in low proportion

3. State of conservation

In the first place, this work underwent earlier restorations or repairs that account for some of the elements or additions we encountered. Records exist of one previous intervention, by Gonzalo Perales in 1968, restorer at the Prado in Madrid, although there is no record of the extent of the work he did.

To the naked eye, the painting had five clean vertical sections coinciding with the panel joins, separated by a distance of up to 2 mm. On the back [figs. 8 and 12] and perpendicular to the panel joints, it had four wooden crosspieces that had been glued and screwed in position, plus another piece of wood reinforcing the joint of the narrowest panel. Some small nails were also crossed from the head of each panel towards the opposing one. The crosspiece surfaces were machine-made or -finished, the nails and screws clearly industrial and were fixed from the back, all of which pointed up the fact that they were modern additions. Two of the crosspieces were also inlaid in the support in incisions made for the purpose. We quickly discarded the possibility that these incisions had held earlier, original crosspieces, as they are not in the shape of the dovetail, i.e. they didn't widen towards the interior of the support, and are roughly done, which doesn't fit well with the care taken over the construction of the support in general. In any case, Flemish supports, even ones of this size, were never reinforced with crosspieces, the frame being responsible for giving the support stability. The frame was fixed by a perimeter groove into which it was inlaid, giving it sufficient rigidity in the plane for correct handling and subsequent work. Other undoubted additions were two wooden bows or double dovetails inlaid against the grain in the joint in the lower zones between the first and second panels. Although this type of reinforcement for wooden structures has been used since ancient times, it often did more harm than it prevented, as against-the-grain wood impedes the natural movement of the support in adjacent areas, which, over time, provokes cracks in the zones of contact between the support and the end of the bow⁴⁸.

With all these pieces fixed on the original panel, the dilation and contraction of the panel had generated internal pressures that, ultimately, were released by causing cracks in the weakest areas of the support, i.e. in the panel joints. As the panels were "freed" and with the passing of time, they continued moving independently, causing irregularities and bends that eventually gave the surface of the work a wavy look. Apart from the structural damage, these cracks, irregularities, and warpings of the support had a substantial effect on the aesthetic aspect of the work.

Except at isolated points, basically in the robe of the angel on the left of the composition, the paint was correctly fixed to the support, with only tiny, unimportant gaps. The biggest problem was caused by some patchy, over-energetic cleaning done in the earlier restorations, which affected the surface glazes and finishes. This was particularly appreciable in the darker areas of the neck and face of the main characters, where the depth of the shadows and volume of modelling had been to a certain extent lost, above all, in the angel with his hands crossed on his chest.

Under ultraviolet light [fig. 11] we were able to locate and identify quite clearly many retouches and repaintings of different sizes, some appreciable to the naked eye through having changed the colour [fig. 6]. By combining this inspection with X rays and even with infrared reflectography, techniques that reveal the structure of the deep layers of the paint material, we were able to distinguish between retouches designed to reconstruct complete losses of paint layer and the ones performed to cover more superficial wear and tear. At the joint of the two panels on the right, a wax filler was applied and a large area was repainted to cover up the panel irregularities, which had for a long time hidden part of the original painting.

⁴⁸ There are many examples, including *La Anunciación* by Lorenzo de Mónaco in the Church of the Holy Trinity in Florence, Sánchez Coello's *Saint Sebastian between Saint Francis and Saint Bernard* and Roger Van der Weyden's *The Descent from the Cross*.

Ultraviolet light also revealed the state of conservation of the layer of varnish. As noted above, the varnish consisted of a triterpene resin mixed with beeswax, and was the result of a previous restoration, since, as the stratigraphic inspection shows [fig. 14], there were remains of animal glue between that layer and the painting, usually the effect of a colour fixing process. The thickness of the varnish varied, the layer being thicker in the backgrounds and zones of shadow, and very fine in the whites, flesh tones and the lighter cloths, owing to earlier cleaning processes⁴⁹. High fluorescence under ultraviolet light indicated advanced oxidization, which, to the naked eye, resulted in a generally yellowish, slightly opaque look. Finally, we found dust deposits and particles adhering to the fresh varnish all over the surface, different types of stains, insect droppings and a layer of dirt and environmental pollution accumulated over the years. The layers of decaying varnish and dirt hid the colouring, and impoverished the modelling by attenuating the effects of the chiaroscuro and three-dimensionality, all of which substantially tarnished the experience of viewing the work.

4. Treatments

Before beginning our work, we took general and detailed photographs of the work in its current state, front and back, under direct and raking light. During conservation and restoration work, all stages of each process were photographed, with every effort being made to get the settings to match.

As we said at the beginning, besides revealing the structure of the work and the painting techniques used, these technical studies also guided us in the choice and implementation of each treatment. For example, the X rays, taken prior to any work on the support, broadened our knowledge of the internal structure of the wood, of its joints and pins, and the degree of cohesion between each element. They also helped us to pinpoint the size and location of faults in the paint before beginning cleaning and retouch elimination procedures, the scope of which we controlled with the aid of ultraviolet light. Fillers, pigments, media and varnishes were also analyzed and identified prior to cleaning, as accurate knowledge of the composition of the layers needing treatment is vital for selecting the most suitable solvents and cleaning procedures.

Let's look now at the phases of the treatment.

a) Separating the frame

Joined only by four points fixed to the panel, the frame was so weakly attached that removing it brought no change in the stability of the work's structure. The superimposed lower crosspiece was removed as its ends also helped to hold the frame.

b) Local colour fixing

Lifted colour had to be fixed in a few small areas. Rabbit skin glue in a 10% dilution was used as adhesive; the surface, protected with Japan paper, was treated with a thermal spatula⁵⁰.

c) Cleaning

Tri-ammonium citrate⁵¹ in a 5% dilution was applied to remove the surface layer of dust, dirt and environmental contamination. Next the old stucco wax, which hid the level between the two right-side panels and

49 These were more intense in the clearer colours, this being standard practice in early restorations as a way of "bringing out the lights."

50 This device consists of a tiny plate enabling the controlled application of heat and pressure on the paint layer.

51 Tribasic citrate of ammonium (C₆H₁₇N₃O₇) is an ammonium salt totally soluble in water. In solvents in 5% or less distilled water it has pH 7, i.e. neutral, which means the drying oils in the paint layers do not hydrolyze, their level of action being 5.5 and 8.5. It is used for surface cleaning and the elimination of certain salts (chelating agent) and is rinsed after application with distilled water. For a basic survey providing further information on this and other solvents discussed below, see Torraca 1981.

some of the original painting, was eliminated. This was easily removed with a scalpel after being softened by a mixture of ethanol at 25% in *White Spirit*⁵².

A standard protocol was used to work on the layer of varnish and eliminate retouches, the solubility trials beginning with weak, highly volatile blends of solvents. For instance, the 25% mix of ethanol in *White Spirit*, used to remove the stucco wax, was too weak and only managed to eliminate surface dirt in the same degree as with the citrate solution. By increasing the proportion of ethanol to 50%, we removed the varnish, but it was held to be too high a proportion for some lakes in the paint layer. It also acted very slowly, meaning the cleaner had to continue with the solvent for too long. Finally we chose a mixture of Cellosolve⁵³ at 25% in xylene⁵⁴, a controllable medium that dissolved the varnish layer clearly and quickly without acting on the underlying layer of oil paint, and without “blanched” after the solvents had evaporated. Some accumulations of darkened varnish in the crackling were removed with the help of a scalpel after being softened up by the solvent [fig. 6].

After the varnish had been cleaned off, retouches and repaints stood out more clearly, as their colours had changed tone with respect to the original. There were in fact two different types, one of which was easily eliminated with the same mix used for the varnish, the other being tougher, being only slightly softened. Although several stronger solvents applied with small sprinklers were tested to get the tougher retouches and repaints off, no satisfactory mix was found. Removal was only possible with a scalpel when dry, with magnifying lenses to facilitate what was a very delicate operation. The same technique was used to remove insect droppings and a range of other stains.

d) Treating the support

Our aim was to stabilize the support and correct the vertical cracks dividing the painting. First, we took off the bars fixed to the back. Once the screws were loosened, we found the bars were stuck hard to the support, which meant using gouges to work them down to the support. The bows set against the grain at the joint of the first and second panels were removed in the same way. We also extracted the nails crossed from the head of each panel towards its opposite. With that done, the support's six panels separated easily as they were still joined by remnants of glue at only a few points [fig. 16]. The glue deposits at the panel edges were removed with *Laponite*⁵⁵. Mixed with water, Laponite forms a gel that softens animal-based glues without affecting the original support, leaving the joints clean for correct joining.

Next we had to consolidate and stabilize the actual support itself, for which we had first to choose the right adhesive. Uniting two totally separate but perfectly matching panels is no problem, as the amounts of adhesive remaining between the pieces will be too small to affect the mobility and stability of the support. Unfortunately, this happens very rarely. In the present work, the joints were separated because shrinkage with time, or possibly successive re-glueings, had caused the wood to withdraw. In this case water-based, natural or synthetic glues (e.g. an animal glue, PVA and the like) are not suitable, as they don't have fill-in capacity and saturate the wood cells in the joint zones, accelerating the process of separation. This also means that joints have to be united very quickly, which makes it difficult, not to say impossible, to level up

52 Ethanol (CH₃-CH₂-OH) and *White Spirit* (a commercial blend of saturated aliphatic hydrocarbons) are solvents. Ethanol is classified as volatile and highly polar and the other two as volatile and non-polar. The mixture is widely used for its moderate polarity and volatility, being very low-retention solvents.

53 *Cellosolve* is the trade name of ethylene glycol monodethyl ether, which belongs to the ether group and is obtained by an industrial alcohol dehydration process. It is used in mixes with aromatic hydrocarbons as a solvent for relatively young natural resins.

54 Xylene is an aromatic hydrocarbon (C₈H₄(CH₃)₂), used as a solvent for industrial lakes, resins and enamels.

55 Inorganic, synthetic colloid forming a thixotropic gel when dispersed in water. It is used in particular to eliminate organic glues, as it does not leave residues and is totally innocuous for the painting. About this material, Napper 1983.



16. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
The work after the support panels had been separated

the different pieces of a such a large support as this. So we opted to use Araldite AW 1253 with HV 1253 hardener⁵⁶, a synthetic adhesive with high fill-in capability and a relatively slow setting time, which enabled us to level up the joints perfectly.

We joined the panels one by one, starting with the two on the right. Pressure was applied in two directions: in the same plane, perpendicularly to the joint, to bring the panels together and minimize the gap between them; and perpendicularly to the plane to ensure the joints were flush and achieve a uniform surface (figs. 17 and 18). We have already noted the slightly convex form of each panel, which gave the support a wavy look. To minimize this phenomenon and obtain an optimum aesthetic result we followed the curvature of each panel so that the sum of all of them gave us a uniform curve.

The last step in the treatment of the support involved reconstructing the volumes of wood lost in the grooves into which the crosspieces and dovetails fitted. Pieces of perfectly cured, radially cut oak of similar characteristics were grafted on, and fixed with the grain of the support. Using small pieces we

56 Araldite 1253 and Araldite AW 103 and HV 953 by Ciba Geigy Corporation are heat-stable epoxy resins. Tested by the aerospace industry from the 1950s, they are the only adhesives capable of withstanding thermal oscillations of more than one hundred degrees in short periods, and the vibrations of aircraft engines. Castelli/Santacesaria 1999.



17-18. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Reconstruction of support during adhesion of panels

achieved a perfect fit and a form very close to the original, thus minimizing the amount of adhesive [fig. 19]. In this case, we used *Lee Vally* codfish glue, which, unlike other animal adhesives, stays liquid at room temperature with adherence that is ideal for this kind of work⁵⁷.

e) Colour reintegration

First we applied a white calcium sulphate stucco bound with animal glue, to level the gaps in the paint. Panel joint areas needed only a thin line of this material, as the consolidation of the support reduced the old separations to a minimum. Colour reintegration of the gaps began with watercolour using the *rigatino* technique, which involves applying colour in vertical lines that help to differentiate these areas from the original painting⁵⁸. Some of the small patches dotted over the paint surface that were not eliminated during cleaning were reintegrated with small touches of colour not appreciable to the naked eye.

f) Varnishes

During reintegration with watercolour, a first “retouch coat of varnish” was applied, enabling us to distinguish the original colouring better and continue the reintegration process, adjusting the colours more precisely. A second coat of varnish was then applied, prior to the reintegration with varnished pigments, a third coat being applied once the colour reintegration was complete. In all cases dammar resin varnish in 12% *White Spirit* was applied with a brush, with 2% *Tinuvin 292* added in line with the calculation of the dry weight of the resin. The latter is a stabilizer that delays the dammar resin ageing process quite markedly⁵⁹.

57 A glue obtained from the cartilages of cod, and its properties, which have a lot to do with the cold waters cod inhabit, are extremely useful in comparison with other animal glues, as the glue doesn't need to be heated and so does not lose its physical qualities.

58 The Italians were the first to define these pictorial reintegration techniques. See Brandi 1963, Baldini 1997 y Calvo 1997, p. 186.

59 According to research by René de la Rie (Rie/McGlinchey 1990), *Tinuvin 292*, produced by Civa SC, delays the ageing and yellowing of dammar resin to around 100 years, the normal time for such ageing, without additions, being just 25 years.



19. *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels*, after 1518
Bilbao Fine Arts Museum
Reconstruction of volume in crosspiece grooves

For a discreet, level gloss finish, the final varnishing was sprayed on in two coats, using *Lefranc* retouch varnish in *White Spirit* at 50%.

g) Re-framing

For re-framing, small screws were used to fix metal strips to the frame, which was then adapted to the definitively convex shape of the support by means of fillets added all over the inner frame perimeter. The ones on the upper and lower edges were cut to coincide with the curve of the support; the straight side fillets act as a sort of box to fill the gap between panel and frame. Besides improving the look of the whole, the assembly actually fulfils a structural function, as it helps to stabilize its parts without blocking their plasticity.

Conclusions

Given the fidelity of this copy to Raphael's original, it would seem reasonable to suggest it is the work of an Italian artist, the obvious candidate being Giulio Romano, Raphael's most brilliant disciple. Giulio Romano worked with the master on many paintings, including the original in the Louvre on which this one is based. But, having discarded him largely for reasons of style, the results of the inspections and studies performed provide solid arguments in favour of the painter of the copy being a member of the Flemish school. The in-depth knowledge of the technique and the materials used provided by analysis was also essential to these conclusions.

Apart from the differences in composition between the work in the Louvre and the painting in Bilbao, there are also differences in style, which, taken together with the analysis, go a long way to explaining the attribution of our painting to the Flemish school. Raphael's style in the Louvre painting is still within the Quattrocento current of the Italian Renaissance, despite the innovative composition evidencing his concern with the representation of chiaroscuro, movement and anatomy in the figure of the Child. Delicate shading models the subtly profiled figures and the background opening on to a landscape gives a measured tone to

the composition. There is a gentleness about the figures and a melancholy in their faces that only the *maestro* of Urbino was capable of conveying.

The atmosphere is radically different in the Bilbao painting. Its hermetic quality makes the scene colder and unreal. Taken as a whole, the marked linear drawing delimiting the character profiles imbues the composition with a hardness wholly lacking in the original. Everything, the general tone of the painting, tends to point to Flemish Mannerism: the precise line, the coldness and the way the flesh tones are worked, even the paint layer transparencies. As we noted above, the exquisite work on the cot suggests another artist's hand, which would actually be a natural development given the traditional specialization of painters in the Flemish school and their tendency to help out on each other's works.

Furthermore, Flemish painters of the 16th century were well acquainted with Italian art. After Jan Gossart set the example in 1508, painters crossed the Alps to discover and study Italian art throughout the century. One particularly interesting painter, in view of the influence Raphael exerted on his art, was Michel Coxcie (1499-1592) from Malines⁶⁰. Coxcie's admiration for the Italian painter was so great that it earned him the nickname of "the Flemish Raphael."

As this essay deals with a Flemish copy of *The Holy Family of Francis I*, we will refer to two other 16th-century copies from the same school also based faithfully on Raphael's painting now in the Louvre. One is *The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels* [fig. 20], attributed to Bernard van Orley⁶¹, and dated between 1530 and 1540, now in the Church of St. James in Antwerp. The similarity between this work and the one in Bilbao is surprising, as it even repeats the Madonna's hairstyle and veil, which in turn differ from the ones found in the Louvre painting. But what is most striking is the perfect coincidence of the transparencies with the images of both works, despite the Antwerp panel being of a smaller size. That Van Orley was also seduced by Raphael's painting is clear from a work now in the Prado entitled *Holy Family* [fig. 22], dated 1522. The compositional schema of this oil painting on panel—fundamentally the figure of the Child—is based on Raphael's painting; in it Van Orley transfers Raphael's models to his own characteristic style based on the more traditional tenets of Flemish painting. The three figures of the Holy Family form the same sharp diagonal and one of the angels, caught in a similar pose to the one in Raphael's picture, reaches over to place a crown on the Madonna's head⁶².

The other work based faithfully on the painting by Raphael in the Louvre is a *Madonna with Child* [fig. 22] by Jan Sanders van Hemessen, in the Groeninge Museum in Bruges in which the Flemish artist, as the title suggests, makes more accurate copies of the Madonna and Child.

It is interesting to note that in the two paintings the cots have bars, clearly appreciable in the underlying drawing for the Bilbao painting, although not actually shown in the finished painting.

Besides the paintings already seen, we can gain a good idea of the success of this painting by Raphael from the existence of other copies on panel, some attributed to Giulio Romano, another executed in fresco by another disciple of Raphael, Raffaellino dal Colle, in Casteldurante⁶³ and other later ones painted

60 He lived in Rome, where he saw the work of Raphael, from 1531 to 1539. He worked for María of Hungary and later for Philip II.

61 Van Orley, Brussels's most influential painter in the first half of the 16th century, worked for the Regents of the Low Countries Margaret of Austria and, subsequently, María of Hungary, who succeeded the former in 1532. Although there is no record of any journey to Italy, he saw the work of Raphael in engravings and boards for tapestries and was called "the Raphael of the Low Countries", to distinguish him from Coxcie.

62 Silva 2001, pp. 122-124, mentions a journey to Brussels made by Tommaso Vincidor, one of the disciples of Raphael through whom Van Orley might have become familiar with the *maestro* of Urbino's models, apart of course from the the ones he saw in drawings and engravings.

63 Dussler 1971, p. 48. Besides the copy by Raffaellino dal Colle, Dussler mentions another copy he had seen only in a photograph and which in 1797 belonged to Benjamin West



20. Attributed to Bernard van Orley (c. 1488-1541)
The Holy Family with Saint Elizabeth, the Child Saint John and Two Angels, 1530-1540
Oil on panel, 127 x 113 cm (approx.)
Church of St. James, Antwerp (Institut Royal du Patrimoine Artistique, Bruxelles)

on canvas in the 17th century. A brief mention here for three of these, all faithful copies of Raphael's original: one is a painting on canvas measuring 195 x 128 cm, attributed to Giulio Romano and sold at auction in 2001⁶⁴; the one held at the National Museum of Fontainebleau Chateau, a 17th century painting on canvas measuring 212 x 145.5 cm and attributed to Jean Michelin (c. 1616-1670)⁶⁵; and a smaller 17th-century oil on canvas painting measuring 58 x 40 cm in the Bordeaux Fine Arts Museum⁶⁶. An oil-on-panel *Madonna with the Child*, attributed to Giulio Romano, measuring 134 x 98 cm and featuring Madonna and Child on their own, as the title suggests, was sold at auction in 1992⁶⁷. As far as we know, none of them belong to the Flemish school.

To return now to the painting in the Bilbao Fine Arts Museum: the dendrochronological report, which revealed the age of the wood, dating the support to the first half of the 15th century and showing that it was

64 *Pintura, muebles y objetos de colección*, Finarte, Madrid, auction PM-84, 29 November 2001, p. 16, no. 7.

65 Chateau de Fontainebleau, inv. no. 643; MR 448.

66 The painting is not in good condition.

67 *Alte und moderne Kunst*, Rief Kunstauktionen, Munich, lot 1515, 12 November 1992.



21. Jan Sanders van Hemessen (c. 1500-c. 1556)
Madonna with Child
Oil on oak panel
Groeninge Museum, Brugge
Inv. no. 0000GR00232.I

made to the norms and practices of the 15th- and 16th-century Flemish school, was of particular interest. Some materials, such as the oak of the support and the ground components, also relate it to this school. The X rays also provided data essential to the study of the support, and revealed that it had been reused, as the panels were separated and then reunited. It is possible that this old 15th century support may have been made and left —unpainted— in some carpenter's workshop and, in view of its extraordinary quality, the painter may have decided to have it overhauled for reuse in a major commission, which would explain the restructuring and adaptation to the dimensions required for the panels. The absence of any remains of a previously applied polychrome, as revealed by the analysis of the paint material and the X rays, supports this hypothesis.

As for the manner of painting itself, the artist follows the purest Flemish tradition in the application of glazes, or transparent layers of colour, as can be gleaned from a simple visual inspection, as well as the cross-sections.

The fact that the measurements of the two works studied here and the scale of the figures are so similar (as demonstrated by the fact that, when superimposed, the transparencies of the drawings of both coincide



22. Bernard van Orley (c. 1488-1541)
Holy Family, 1522
Oil on oak panel, 90 x 74 cm
Museo Nacional del Prado, Madrid
Inv. no. 2692

almost to perfection, as do the folds of the robes) suggests that the painter of the copy used a tracing based on the original by Raphael. Elaborating on this hypothesis, he might well have seen the painting by Raphael on a visit to Rome, returning home to his own country with the tracing used for this copy.

How the work came to Spain, and possibly came to form part of the Marquis of Leganés's collection, as suggested by the abovementioned reference to it in the 1655 inventory of his goods, can also be explained fairly coherently. It is possible that the Marquis acquired it for his collection (particularly in view of its quality) during one of his sojourns in the Low Countries, of which Philip IV had named him Governor in 1627. However, there is as yet no way of knowing how the work came to be in the convent of San Francisco in Bilbao.

In short, we have tried to trace the likely, although incomplete, trajectory of this painting in a number of periods of its long history. Despite some highly distinctive features in the painting, such as the execution of the flesh tones or the hair of the characters, we cannot put a name to the artist who painted it. However, we can situate the probable date of execution, some years after Raphael's original in 1518, and place the artist responsible in a particular school and a particular style. The way the characters are painted, the coldness of the flesh tones, imbued with an almost metallic sheen, the painting technique using glazes and the thorough-going treatment of the cot, are all features of the Flemish Mannerist aesthetic with Italian roots that was so successful in the Low Countries in the first half of the 16th century.

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