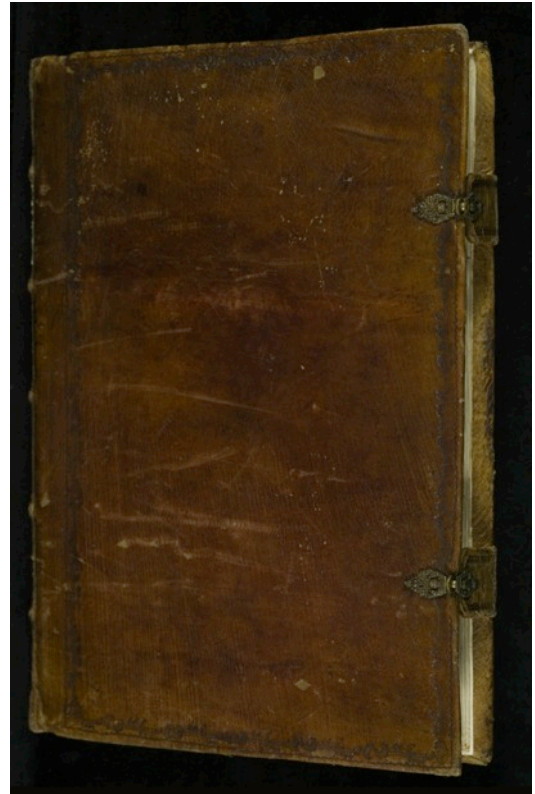


La Bella Principessa and the Warsaw Sforziad

Pascal Cotte¹ and Martin Kemp²



Introduction

In 2010, we published a book on an exceptional portrait on vellum executed in inks and coloured chalks.³ The portrait had been sold as a German early 19th-century *Head of a Young Girl in Profile to the Left in Renaissance Dress* at a Christie's sale in New York on 30 January 1998. Estimated as worth \$12,000 – 16,000, it sold to the dealer Kate Ganz for \$21,850, which is a high price for an anonymous 19th-century German drawing in an archaic mode. This compares to a price of \$6,755 for a signed and dated Overbeck drawing of the *Virgin and Child* at Christie's on 21 November 1996.

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³ Kemp M., Cotte P., *La Bella Principessa. The Story of the New Masterpiece by Leonardo da Vinci*, London, 2010 (with a Preface by Nicholas Turner), which contains a review of the evidence available at that time.

The current owner, who purchased it from Ganz for the price she had paid for it, intuited that it was an original Renaissance portrait, possibly by Leonardo da Vinci. This attribution that was confirmed by Nicholas Turner, Carlo Pedretti, Alessandro Vezzosi, Mina Gergori, Cristinas Geddo and others.⁴ The chief opposition came from the New York experts and observers who had “missed” it when it was in the hands of Christie’s and Ganz, and unsurprisingly from Christie’s, who were subject to legal action from Jeanne Marchig, who had consigned the drawing for sale.

Mme Marchig has over a number years been selling works of art owned with her late husband, Giannino Marchig, painter and restorer. The proceeds from her sales went to support her animal charities. Gianino Marchig worked in Florence and then in Geneva, to which he moved in 1953/4. Although the portrait was in a nice Italian frame (subsequently removed by Christie’s), he kept it in a portfolio. Some years after her husband’s death, Mme Marchig hung it on a wall in her study. Gianino Marchig worked internationally as a respected restorer, and in 1976 undertook major conservation on one of the two prime versions of Leonardo’s *Madonna of the Yarnwinder*, then owned by Wildenstein’s in New York.⁵ He was of the opinion that the portrait was by Domenico Ghirlandaio, which is understandable, given its affinities with Ghirlandaio’s refined profile portraits of aristocratic Florentine women.⁶ At the time of the writing of the book, the ownership of the portrait before 1998 was not known, leaving it’s supporters open to the charge that it might be a recent forgery undertaken with knowledge of modern technical examinations of Leonardo’s paintings – even though the technical examination of the portrait itself seemed to preclude this.

The vellum was at some point laid down on an old oak board (fig. 1), which has been repaired on two occasions with butterfly joints. Jeanne Marchig identified the later pair of untinted joints as characteristic of those made by hand by Gianino. The portrait has been subject to at least two campaigns of restoration, including that by Marchig over 50 years ago. It seems likely that the vellum had been laid down on the panel long before it entered his hands. On the reverse are two customs stamps: DOUANE CENTRALE/ EXPORTATION[?]/ PARIS. This stamp seems to have been introduced in 1864 but it is unclear when it ceased to be used in this form. The likelihood is that it is not later than the early 20th century. In any event, the stamps indicate the presence of the panel in France, presumably with its attached portrait and probably framed (as indicated by the brown paper strips around its margins). Whether it was owned for a period in France or imported temporarily is unclear.

⁴ For references to opinions and publications, see Kemp and Cotte, *La Bella*, especially the introduction by Nicholas Turner.

⁵ Martin Kemp and Thereza Wells, *Leonardo da Vinci’s Madonna of the Yarnwinder*, forthcoming.

⁶ For these and other profile portraits in the later 15th century, see Paola Tinagli, *Women in Italian Renaissance Art. Gender, Representation, Identity*, Manchester, 1997, pp. 47-83.



Fig. 1. Rear of the Panel of which the Portrait is Mounted

Given the three stitch holes along the left margin of the parchment, we concluded that portrait had originally been bound into a codex, most probably one of the luxury volumes of eulogistic poetry presented at key moments to the “princesses” at the Sforza court. We provisionally identified the sitter as Bianca, the illegitimate daughter of Ludovico Sforza, who was legitimised and married to Galeazzo Sanseverino in 1496, tragically dying only a few months later.

The possibility of matching the portrait to a surviving volume did not seem not encouraging, but David Wright, Emeritus Professor of Art History at the University of South Florida, wrote suggesting that it might well have come from one of the three or four surviving versions of the eulogistic history of Francesco Sforza by Giovanni Simonetta printed on vellum and richly illuminated. Professor Wright specifically pointed to the copy in the National Library in Warsaw.⁷ Simonetta’s eulogy, written in

the mid 1470s in the context of a campaign to legitimise Sforza succession to the Visconti in Milan, was translated from Latin by Cristoforo Landino and printed by Zarotto in 1490. Professor Wright will be publishing a full study of the function, iconography, dating and likely history of the three *Sforziads*, together with an analysis of a fragmentary frontispiece in the Uffizi. He will be showing that the frontispieces by Giovanni Pietro Birago in the *Sforziads* in the Bibliothèque Nationale in Paris, the British Library and the Uffizi were produced in conjunction with important Sforza births, while the copy in Warsaw contains clear allusions to the marriage and Bianca and Galeazzo.

The Warsaw frontispiece (Fig. 7), signed by Giovanni Pietro Birago, includes a rich series of heraldic and other allusions to the Visconti, the Aragonese, the Sforza (including three linked rings for Bianca) and Galeazzo Sanseverino (Gideon's dewy fleece). Most notably, in the amusing tableau at the base of the page, a series of mature *putti* without wings or childish dwarfs act out a little allegory in which the centrally seated "moor" (Ludovico) receives obeisance from a cast of characters, including a moorish young lady with blonde hair who enters on the arm of a young man, clearly representing Bianca and Galeazzo. Borago clearly enjoyed playing visual charades with childish actors. The inscriptions allude to the divine sacrament of marriage and the bride's fecundity – the latter underlined by the rabbits. The history of the Warsaw *Sforziad*, which for many years was in the highly distinguished library of the Polish Zamoyski family, is being researched by Katarzyna Wosniak. Not least she is studying the rebinding of Zamoyski books, since it is likely that the portrait was removed during a rebinding of the *Sforziad*. Illuminations were certainly removed from some of the books in the library. The results of her researches will be published in the Bulletin of the National Library of Poland, alongside Wright's study and a full report by ourselves on the technical investigations, which were also filmed by National Geographic.

On the basis of Professor Wright's suggestions, we undertook a close study and technical analysis of the structure and binding of the Warsaw book, followed by detailed inspections of the Paris and London volumes. These have demonstrated the binding of the first and second quires of the volumes and the way that they were designed to be printed with blank pages to accommodate the illuminated frontispieces and other elements that would adapt the opening sections of each volume to their original dedicatees. Indeed, in the case of the Warsaw book, it is possible to

⁷ Giovanni Simonetta, *Commentarii rerum gestarum Francisci Sfortiae. La Sforziada*, with additions by Franciscus Puteolanus and Franciscus Philephus, trs Christophorus Landinus, Milan, Antonius Zarotus, 1490. For the Warsaw copy, Inc. F 1347, see <http://polona.pl/dlibra/doccontent2?id=27757&from=&from=generalsearch&dirid=1&lang=pl>. The copy in the Bibliothèque Nationale, Paris is Imprimés, Réserve, Vélins 724. The copy in the British Library is G.7251. The Uffizi fragments are nos. 843, 4423-4430. For the *Sforziads* on vellum and further bibliography, see Mark Evans, 'New Light on the "Sforziada" Frontispieces of Giovan Pietro Birago', *British Library Journal*, XIII, 1987, pp. 232-47, where he reconstructs the Uffizi frontispiece; and Elizabeth McGrath, "Ludovico il Moro and His Moors", *Journal of the Warburg and Courtauld Institutes*, LV, 2002, pp. 67-94.

demonstrate that one folio and a complete sheet have been removed, and that the vellum of the portrait closely matches in all respects the physical characteristics of the remaining sheets in the first quire. The most notable match is between the stitch holes in the vellum of the portrait and those in the book. From what follows, it seems almost certain that the portrait was made for the *Sforziad* that was specifically printed on vellum for the marriage of Bianca and Galeazzo in 1496.

Foliation and Stitch Holes

Before looking in detail at the Warsaw *Sforziad*, it is worth recapitulating briefly the most relevant technical observations in the portrait itself. It is executed in a technique closely related to the *trois crayons* (three chalks) method pioneered by French artists in the Renaissance. White chalk, black chalk and red chalk are used to colour a drawing in ink and wash on a light yellow background (vellum) probably prepared with gum arabic, which may have been tinted with dilute burnt sienna.⁸ On its left edge, as we recorded in our book, are remains of three stitching holes, which have been partly filled by glue and restorations (Fig. 2 and 3). The page was excised by a sharp blade, since we can observe an incision about 6 cm-long within the left edge, where the blade has slipped during the effort to separate the page from its parent sheet (Fig. 4). High-resolution images of this and other technical examinations are available on the Internet on the Lumière Technology website.

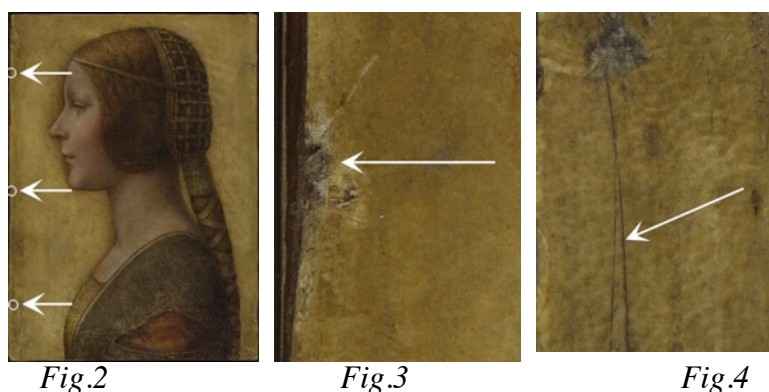


Fig. 2. The Three Stich Holes

Fig. 3. The Upper Stich Hole

Fig. 4. The Incision of the Sharp Blade

The Warsaw *Sforziad*, like those in the Paris and London, is printed on vellum, and has clearly been produced specially to order, compared to the general printed editions of the book. The vellum books were originally bound in quires or gatherings of 4 sheets (ie. 8 folios and 16 pages), with the exception of the last quire, which has only 2 sheets. The 26 quires are numbered by the printer as *a, b, c, d, e, f, g, h, i, k, l, m, n, o, p, q, r, s, t, u, x, y, z, &, C, R*. In the first quire, as we will see, two unprinted sheets were included to receive the Birago frontispieces (Figs. 5, 6 and 7) and other possible illuminations.

⁸ The technique of the image was cleverly reconstructed by the artist Sarah Simblet of the Ruskin School of Drawing and Fine Art, Oxford University, for television programmes by Japan Documentary and National Geographic.



Fig.5 . Giovanni Pietro Birago, Frontispiece to the Sforziada, Paris, Bibliothèque Nationale
 Fig.6 . Giovanni Pietro Birago, Frontispiece to the Sforziada, London, British Library
 Fig.7 . Giovanni Pietro Birago, Frontispiece to the Sforziada, Warsaw, National Library



Fig.8 Macro-photographic Analysis of the Binding

As it is obviously impossible to dismantle Warsaw volume, we used macrophotography in an innovative way to determine the precise sequence of the sheets in the first quire (Fig. 8). Taking 70 macro-photographs with a different focus at every 0.1mm, it is possible using the depth mapping method, which overlaps the sharp areas in each photograph, to produce a final image that overcomes the depth-of-field problems. In a single shooting session of about 5 minutes, this method allows us to obtain details down to a resolution of 4 microns over a field of 20 x 14 mm.



Fig. 9 – Image Produced by Depth Mapping, Resulting from the Superimposition of 70 macro-photographs.

Using this technique it is possible to trace - unequivocally - the edge of each folio and to highlight it with a color to illustrate the binding of the first two quires, and to

determine where the folded sheets or single folios may have been removed. (Fig. 10). Each folded sheet is indicated by a specific colour.

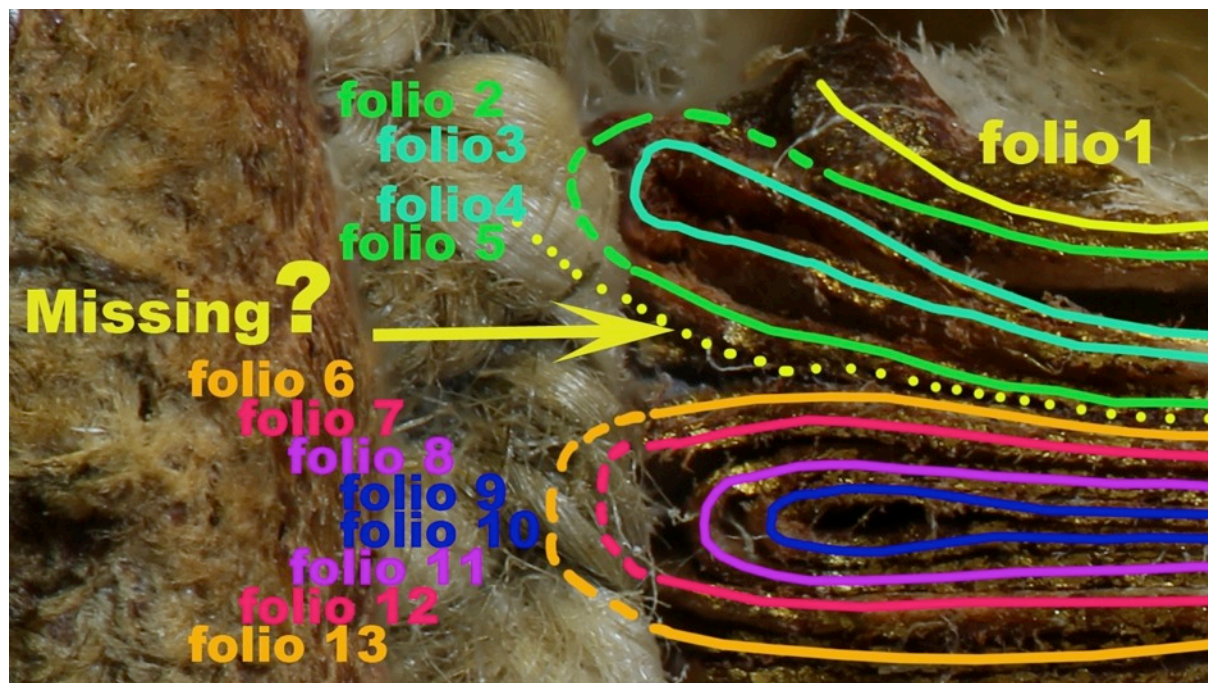


Fig. 10 – The Current Binding of the First Two Quires. The lines with dashes indicate edges that not visible in the photograph. The lines with dots indicate an excised folio, corresponding to folio 1 (yellow)

We can see that first quire presently consists of 5 folios, comprising two folded 2 sheets and a separate folio at the beginning. Folio1 has no counterpart, i.e. folio 6 is absent. Folio 1 has been glued on to folio 2 close to the binding. All the subsequent quires consist of 4 sheets (8 folios or 16 pages). The current folio 6 is the Birago frontispiece at the start of the second quire (Fig. 11). This allows for the possibility that the previous folio, which comprised a single folded sheet with folio 1, was adorned with the profile portrait, as in our digital reconstruction (fig. 12). At this stage our reconstruction is provisional, since we will in due course, need to take into account the likelihood that the first quire, like all the others, originally comprised four folded sheets. It is evident that the portraits fits visually and physically in this position, but more concrete evidence is needed if the hypothesis is to be confirmed.



Fig. 11 – Current Folios 5v and 6r



Fig. 12 – Hypothetical Reconstruction of La Bella Principessa as folio 6r



Fig. 13. Cotte and Kemp Match the Facsimile of *La Bella Principessa* with the *Sforziad*

The first task was to verify the dimensions of the portrait and the book folios. For this purpose, we brought an exact facsimile of *La Bella Principessa* to the Library, which we gently inserted (Fig. 13) in the open book, as close to the binding as possible. The dimensions of the portrait sheet differ very slightly from the folios of the book. The dimensions of the vellum sheets vary from 33.0 to 33.4 cm in height and from 23.1 to 23.6 cm in width. Those of *La Bella Principessa* are 33.2 cm (+ - 0.5 mm) in height and 23.8mm (+- 0.5) in width. Measurement of the width of the folios in the book is hindered by the inaccessibility of the inner margin in the binding. We can therefore say that the current dimensions of the portrait and the folios are very close. However, as we shall see, we need to take into account the possible trimming of the folios of the book and the portrait during a rebinding.

The second task was to see if the holes in the portrait and the stitching pattern of the book corresponds. There is an obvious difference. The current stitching of the volume involves five holes, whereas there are only three holes now visible along the left margin of *La Bella Principessa*. However these three holes correspond very closely to the corresponding ones in the book. Our digital superimposition of 3 holes in the book on the portrait's three holes is visually compelling, not least because the holes are not spaced at perfectly regular intervals. The different number of stitching holes may result from the untidy way the left margin of the portrait folio has been cut, or from two intermediate stitches being added when the book was later rebound in standard Zamoyski livery. The former explanation is the more likely.



Fig. 14. Digital Superimposition of *La Bella Principessa* and the Stitching of the *Sforziad*

In measuring the distances between the holes and matching these distances in the book and the portrait we allowed for four potential sources of error. The measurements of the stitching in the incunabulum were taken with a simple ruler, delicately placed on the surface of the vellum. The accuracy cannot be assumed to exceed 1 mm, although they can be checked against the digital images. Secondly, the dimensions of vellum vary with humidity, and the storage conditions of the portrait and the book are not the same. Thirdly, *La Bella Principessa* is glued to a rigid wooden support and the glue has played a role in contracting the dimensions of the

vellum, which is now wrinkled. Fourthly, the dimensions and precise locations of the holes in the portrait cannot be obtained with precision. Their edges are ragged and broken. Taking all these into account, it is unlikely that the margins for error are less than ± 1.5 mm.

In the book the distance (as measured by hand and digitally) between points 1 and 2 is 11.23 cm, and the equivalent interval in the portrait is 11.06 cm (i.e. a divergence of 0.17 cm). The distance between 3 and 4 in the book is 11.6 mm., corresponding to 11.47 cm in the portrait (i.e. a divergence 0.29 cm). The measured divergences are within the margins for error. Most telling is the variation between the distances 1 + 2 and 3 + 4 in the books and the portrait, which are about half a centimetre (0.41 cm and 0.53 cm. respectively). This variation indicates that the stitching was spaced by eye and not precisely measured. The correspondence of such an irregular spacing of the holes in the portrait and book is notable.

The Vellum Sheets

The next step was to compare the thickness of the vellum in *La Bella Principessa* with the sheets in the *Sforziad*. Vellum sheets are made by an elaborate and skilled process of the progressive shaving of a carefully selected calf's, kid's or lamb's skin to a desired thickness. In this case the skins appear to be those of a calf (i.e. vellum). Even within a batch of sheets prepared together the thickness will vary somewhat, as can be seen in the macro-photograph of the of incunabulum's edge (Fig. 9). The thickness of the sheets can be measured very accurately with a micrometer.



Fig 9. Measuring the Thickness of a Sheet of Parchment with a Micrometer.

The thickness of different batches of vellum can vary widely, not least according to its intended use. One sheet from the 15th century was measured at 24/100 mm. A sheet of modern vellum was as thick as 36/100 mm. The thickness of the parchment of *La Bella Principessa*, is 14/100 mm. This compares to measurements for folios 4 and 5 in the *Sforziad* of 12/100 mm and 14/100 mm. Folio one, measured using the macrophotograph is 12-14 / 100 mm. The thickness of the parchment of the portrait is therefore entirely consistent with that of the folios in the Warsaw book.

In addition to the thickness of the sheets, we can compare the various surfaces using spectrometry, which allows us to judge whether two parchments are compatible in their surface colouration. We measured the spectrum of diffuse reflection of light from the vellum of the *Sforziada* in Warsaw (Fig. 16), as well as from several types of parchments from different periods, having ensured that they exhibit similarities in appearance, touch and substance. Six points were measured on *La Bella Principessa*, mostly on the folio's periphery, in areas that are seemingly free of any pigments

applied by Leonardo or the restorers. They are indicated here in red from V1 to V6 (Fig. 17).

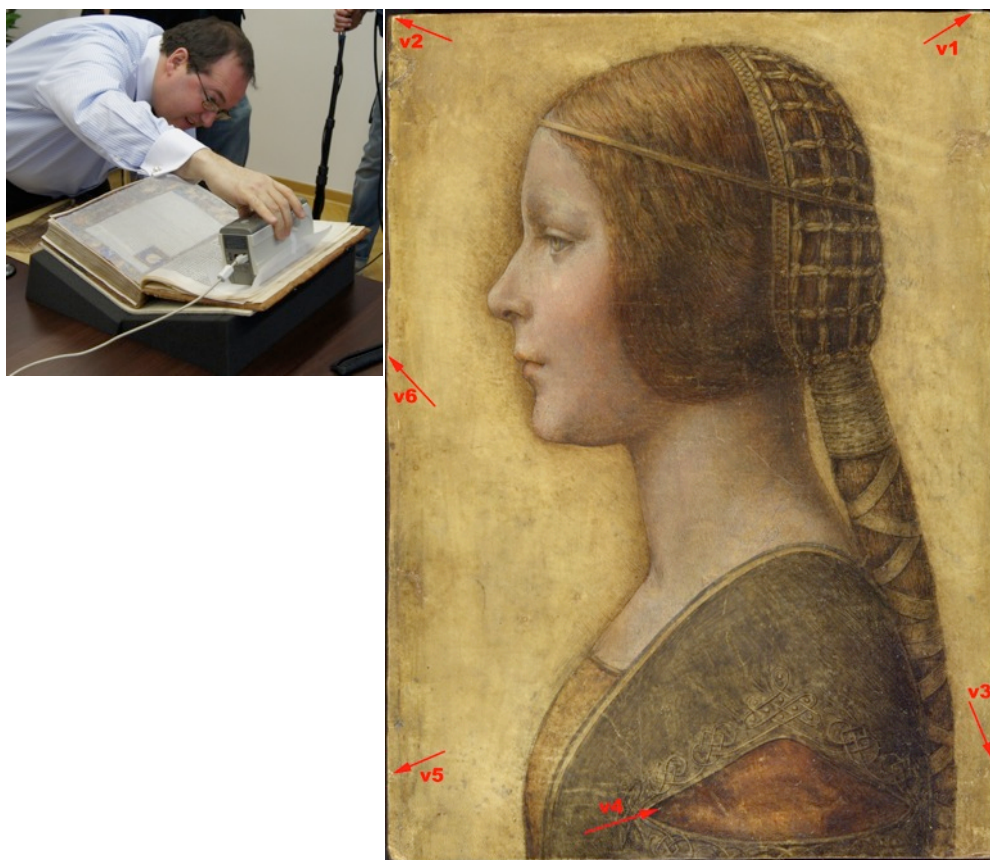


Fig. 16. Pascal Cotte, Spectrometric Measurement on the Sforziad in Warsaw
Fig. 17. Map of Virtual Samples on La Bella Principessa

Each sheet exhibits a characteristic spectral curve. It will be seen (fig. 18) that the curves for folios 1 r and 1v in the Warsaw book, a piece of modern vellum, and a sheet from 15th century vary noticeably.⁹ The variation between the rectos and versos in the *Sforziad* is explained by the difference between the hair side and the inner face of the shaved skins. To match the curve produced by the vellum of the portrait and the sheets in the book, we needed to make allowance for the likely coating of gum arabic. A substantial series of tests were made of the effects of gum arabic on vellum. From one to four layers of gum arabic were applied to modern vellum, which we then aged them artificially under an ultraviolet lamp. On this basis we were able to subtract the effect of the gum coating to arrive at a corrected curve for the vellum of the portrait. The method, experiments, data and calculations are available in the full technical report. The corrected curve for the vellum of the portrait matches very closely that of the verso of folio 1 (the surface of which would have continuous with the recto of the removed folio).

⁹ The measurements from the Warsaw book and modern parchment were obtained with a spectrometer; those for the portrait and the 15th-century sheet with Cotte's multispectral camera.

The evidence of the spectral curves is thus entirely consistent with the hypothesis that the portrait was created on a sheet from the batch of vellum obtained for the printing of the Warsaw *Sforziad*, and that the piece of vellum on which the portrait was created was once the other half of the cut sheet of the present folio1. As we will see, the second part of this hypothesis will need to be qualified in the light of what we subsequently observed in the Paris and London *Sforziads*.

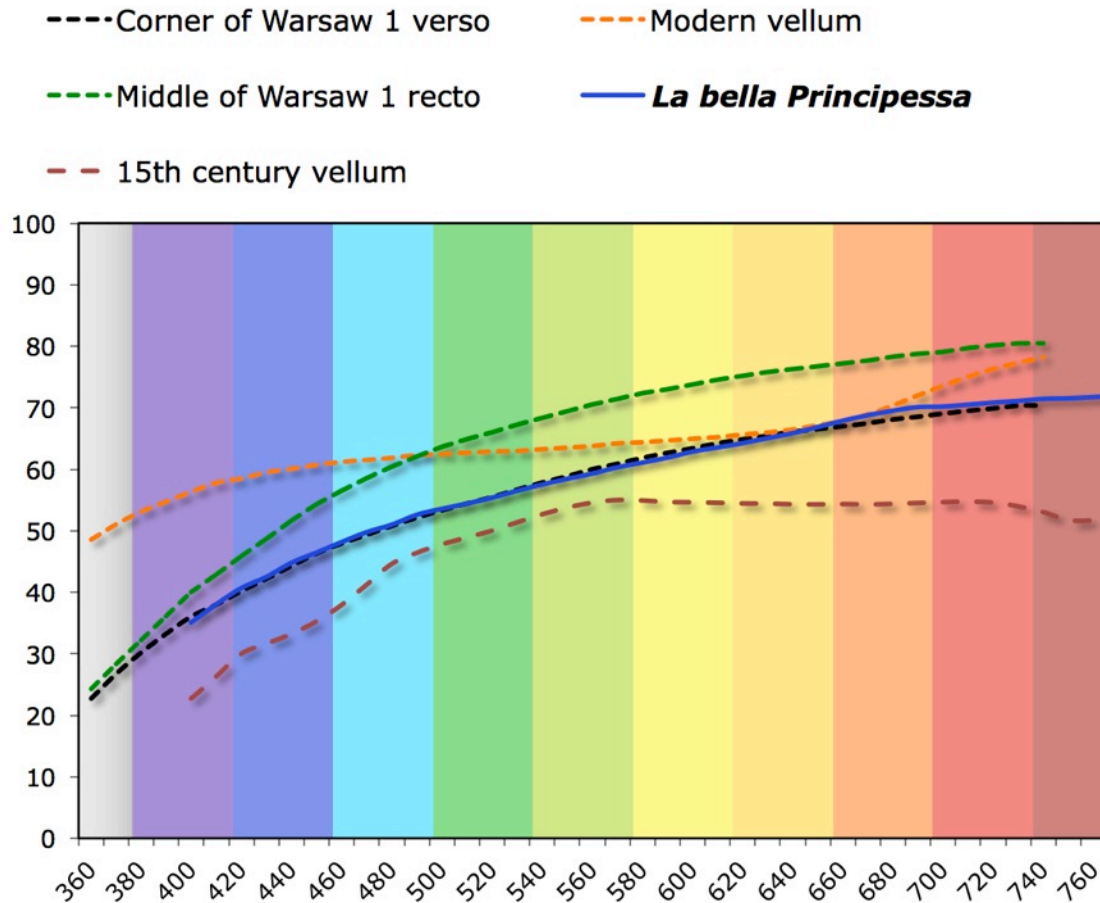


Fig.18. *Spectral Measurement of Light from a Modern Parchment, and Sheets from the 15th Century, the Warsaw Sforziada and La Bella Principessa.*

The *Sforziad* in the Bibliothèque Nationale de France



Fig. 19. *The Sforziad* in the *Bibliothèque Nationale de France*



Figs. 20-1. *Illuminated Initials on Folio a i. in Paris and Warsaw*

The printed text is exactly the same as that of the Warsaw copy, but the illumination of the initials varies (Figs. 20-1). There is one wholly blank vellum sheet and one sheet only printed on its second verso (2v) in the first quire of the Paris book (Figs. 22 and 23). It also is slightly larger. The folios measure 350 mm x 245 mm, compared to 334 mm x 236 mm. in the Warsaw copy. The irregular edges of the Paris copy do not appear to have been trimmed, and thus provide a likely indication of the original dimensions of the folios in the Warsaw book and therefore of the portrait, both of which may have been 16mm higher. The trimming of the portrait, perhaps while still bound in the book, may explain the truncation of the knot pattern in the sitter's dress at the lower margin of the sheet. The Paris version has been rebound later with a 7-stitch pattern. Printed broadsheets, probably from the 18th century, have been used as endpapers in the rebinding.



Fig. 22. *The Blank Pages Preceding the Frontispiece in the Paris Sforziad*

The foliation of the first two quires in the Paris copy is given in Fig.23. It is apparent from the comparison of the first quires of the Warsaw and Paris versions that a complete blank sheet sheet (2 folios) is missing from the former, as well as the page that we noted had been excised (fig. 23). This would mean that the first quire of the Warsaw book originally comprised four folded sheets, as might be expected, as shown in Fig. 24.

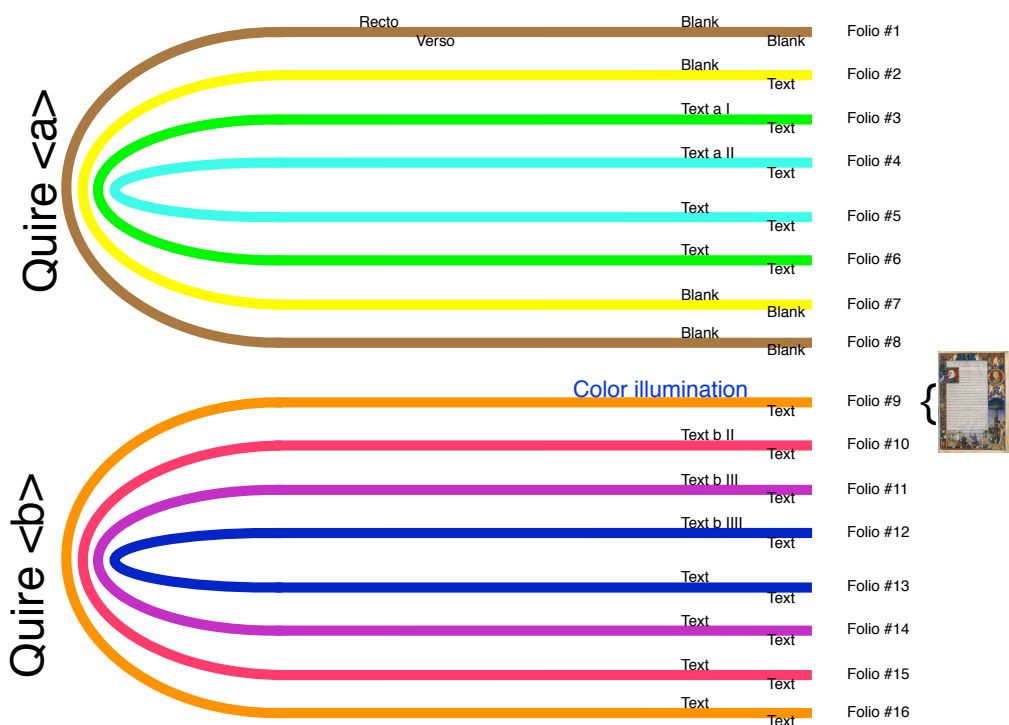


Fig. 23. *Foliation of the Paris Sforziada*

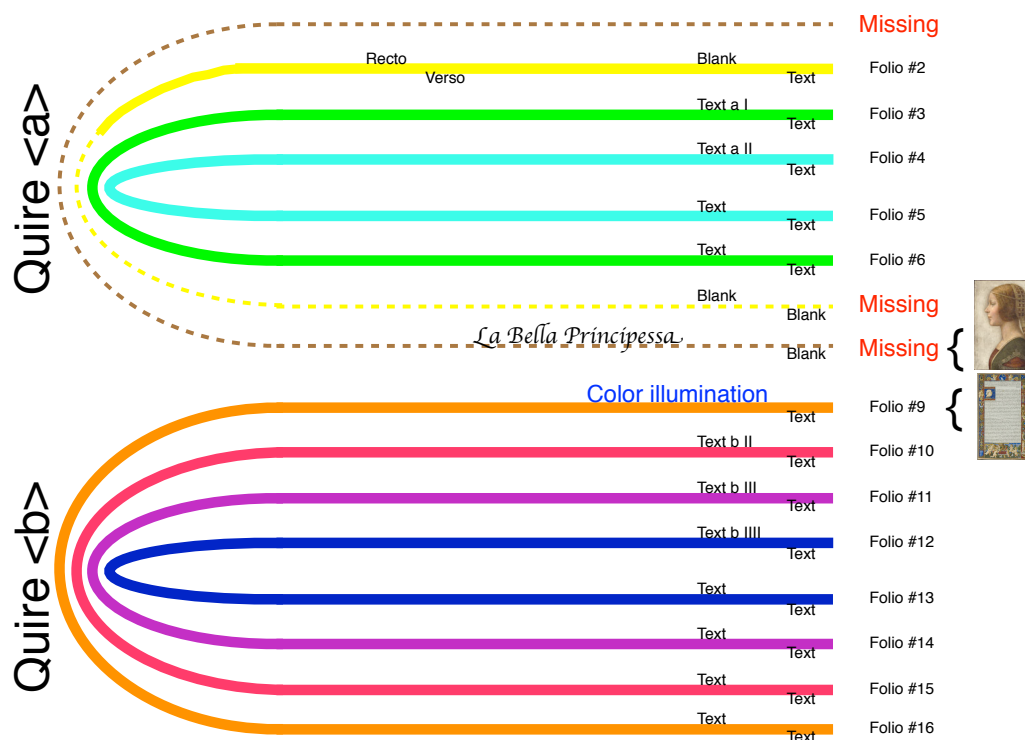


Fig. 24. Reconstructed Foliation of the Warsaw Sforziada

The portrait would thus have been located on folio 8r, with its blank side (8v) facing the Birago illumination. The portrait itself would have been faced by a blank page (7v). The single, glued folio at the start of the quire may originally have been the other half of the portrait sheet (folios 1 and 8) or of the other mainly blank sheet (folios 2 and 7). The former appears more likely. The blank facing pages were introduced in both cases to avoid the pressing of the illuminations against pages of printed text. There are indeed no signs of pigment transfer on to the printed pages in the present first quire in the Warsaw book. We can thus understand how the artist would have been given a blank sheet and asked to produce his portrait of the right half, so that it could serve as a recto in the bound volume. The position of the portrait thus can be reconstructed (Fig. 25). The lack of margins, which at first sight looks exceptional, can be compared to the splendid Mantegnesque illuminations in the manuscript of the *Passion of St. Maurice* in Albi and of Strabo's *Geography* in Paris.¹⁰

¹⁰ A profile portrait of the Venetian soldier and man of letters, Jacopo Marcello, who served with Francesco Sforza, appears on fol. 38v of Marcello's *Life and Passion of St. Maurice*, Paris, Bibliothèque de l'Arsenal, MS 940. The portrait has no border but does have a parapet. The magnificent Strabo *Geography*, Albi, Bibliothèque Municipale, MS 777, contains borderless illuminations of Guarino presenting his translation to Marcello, and of Marcello presenting the manuscript to King René of Anjou (folios 3v and 4r). Marcello and Francesco Sforza were founder-members of the Order of the Crescent, whose patron was the "moor" St Maurice, and Ludovico later became grand master of the order. The illuminations in both manuscripts are now often attributed to the young Giovanni Bellini. A profile portrait of the young Maximilian Sforza appears with a minimal border as folio 1v in his "Schoolbook",



Fig. 25. Reconstruction of *La Bella Principessa* in the Warsaw *Sforziada*

There is a nice irony in this placement. As Professor Wright has pointed out, it immediately follows a printed letter of dedication to Ludovico by Francesco del Pozzo (il Puteolano), who argues polemically for the historical superiority of the written word, as exemplified in Simonetta's literary portrait of Francesco Sforza, over any visual images that might aspire to perform the same purpose. Leonardo would have relished the challenge in the context of the polemics in his own *paragone*, where he insisted that a discerning patron will be drawn more urgently to a painted portrait than any written text.¹¹

The *Sforziad* in the British Library

The version in the British Library is the only one that retains its original, splendid covers (Fig. 26). The red velvet front cover is adorned with four silver-gilt corner bosses, and with a large central boss that displays in *niello* the lighthouses or *fanali* of Genoa, the city over which Ludovico Sforza had ruled since 1488. He wears the same device prominently on his chest in his portrait roundel in the Birago frontispiece. At the right edge of the cover is a moor's head in *niello* on a silver shield, which is missing the hinged flange of its original clasp. Marks above and below the shield testify to the original presence of two further clasps. Although the book is in its original covers, it has been re-sown in a 5-stitch pattern that differs from both the Warsaw and Paris books. The dimensions of the folios are the same as in the Paris version, confirming the original sheet size in all three copies.

Milan, Biblioteca Trivulziana, Cod. 2167, with a comparable portrait of Ludovico on 52v. For these and other comparable manuscripts and illuminated printed books, see Jonathan Alexander, *Italian Renaissance Illuminations*, London, 1977; and *The Painted Page. Italian Renaissance Book Illumination 1450-1550*, ex. Cat., London, Royal Academy of Arts, London, and Pierpont Morgan Library, New York, 1995.

¹¹ Kemp and Cotte, *La Bella*, p. 77.

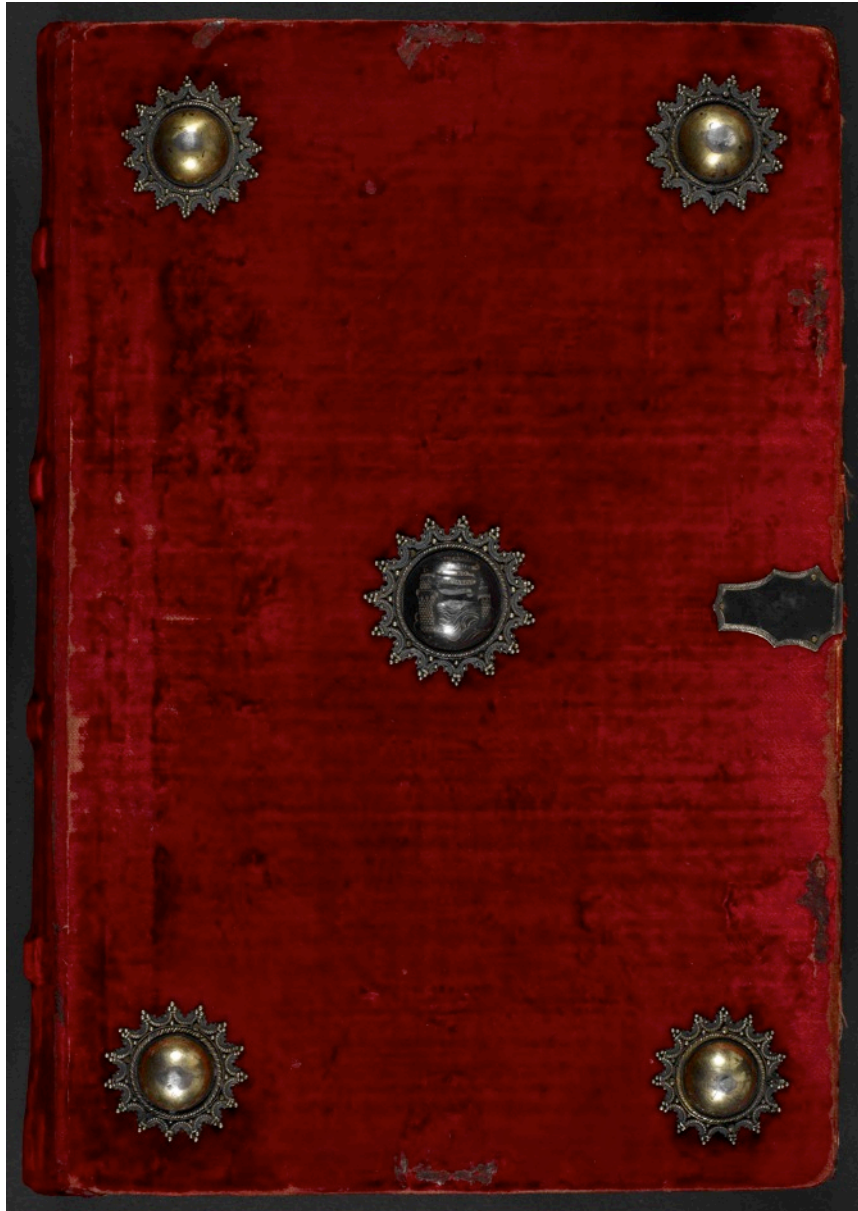


Fig. 26. Front Cover of the London *Sforziad*

The basic foliation of the first two quires corresponds to that in the Paris book and to that in Warsaw as reconstructed. However, an additional thick folio of blank vellum appears before folio 1r, and another after the blank folio 8v. They are presumably continuous (Fig. 27). That the folio after 8v was inserted later is apparent because the shield in the Birago frontispiece had deposited some pigment on 8v. Some lesser transfers of pigment from the frontispiece can be also observed in the inserted sheet.

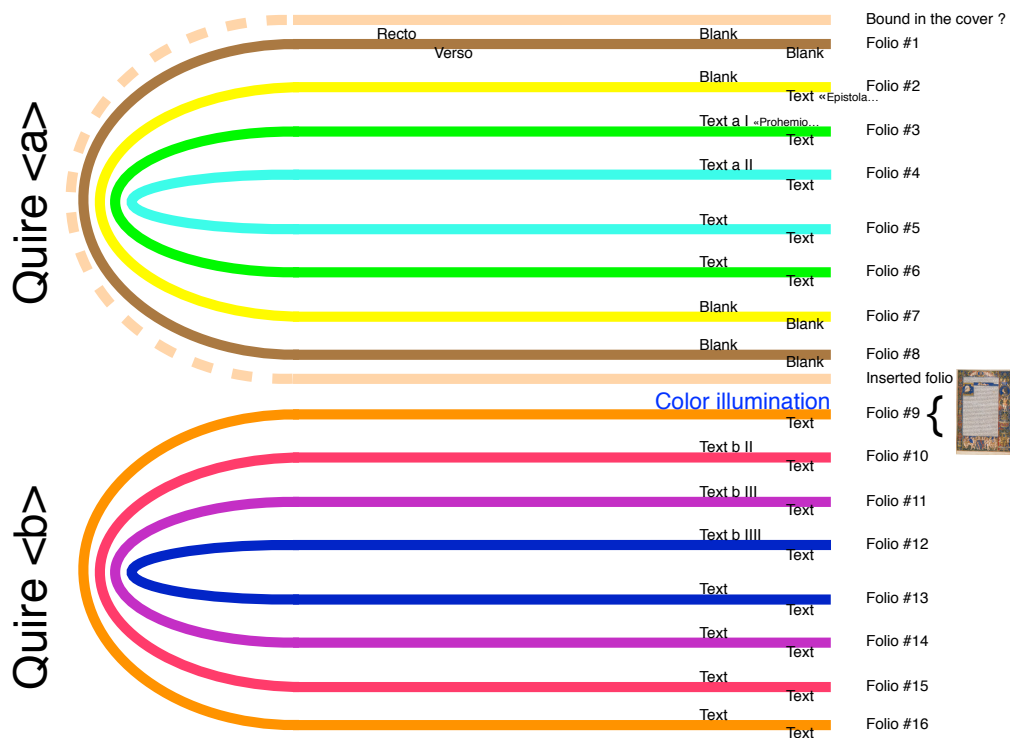


Fig. 27. Foliation of the London Sforziada

We can, therefore, confirm the consistency in layout of the three *Sforziads* on vellum, with the notable exception that the Warsaw copy took advantage of the blank folio 8r to insert a portrait of Bianca Sforza, whose marriage this particular *Sforziad* celebrated.

Conclusions and Consequences

As a result of the detailed technical investigations we can draw the following conclusions:

1. the mechanical parameters, thicknesses and dimensions of the sheets in the Warsaw book correspond closely with those of *La Bella Principessa*;
2. the stitch holes in the binding of the Warsaw book are notably consistent with those of *La Bella Principessa*, not least with respect to their irregular spacing;
3. the spectographic data for the Warsaw book and the portrait are very close;
4. the current folio 1 (folio 2 as reconstructed) is isolated and pasted in. It has no counterpart in the present quire;
5. the Paris and London versions are arranged and bound in the same way as each other, with blank pages in the first quire to mitigate the consequences of the transfer of pigment from the illuminations.
6. the Paris and London versions provide a firm basis for the reconstruction of the first quire in the Warsaw version;
7. one complete folded sheet is missing in the Warsaw version and one folio.

This technical analysis provides strong support for the hypothesis that the portrait originally comprised folio 8r of the Warsaw *Sforziad*, after the introductory texts and

before the Birago fontispiece on folio 9r. The dating of the portrait to 1496 and the identification of the sitter as Bianca are thus confirmed to a high level of probability.

The authorship of the portrait by Leonardo is also powerfully supported. Assertions that it is a modern forgery, a 19th-century pastiche or a copy of a lost Leonardo are all effectively eliminated. Leonardo is known to have been closely involved with Galeazzo Sanseverino, husband of the young bride. He designed *feste* for the palace of Galeazzo, drew horses from the military commander's stables, and in 1498 produced the illustrations *on parchment* for the prime version of Luca Pacioli's *De divina proportione*, which was dedicated to Galeazzo.¹² There is no difficulty in envisaging a scenario in which Leonardo was commanded to produce a portrait for the special book in short order. Leonardo's response was, characteristically, to research a way of accomplishing a vivid image using a method that differed from traditional illumination. He extended and transformed the *trois crayons* technique, about which he had earlier sought advice from Jean Perréal, who was in Milan with the French king in 1494.

Beginning its journey as a German 19th-century pastiche in 1998, the portrait on vellum is now one of the works by Leonardo about which we know most in terms of its patronage, subject, date, original location, function and innovative technique.

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¹² Kemp and Cotte, *La Bella*, p. 79-80.

