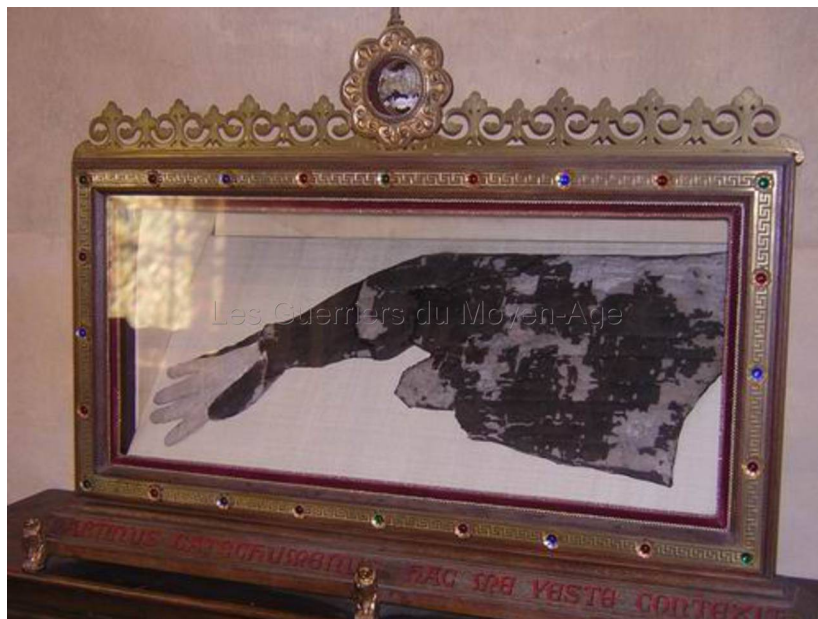


## The sleeve from the Church of Bussy-Saint-Martin

### I – Some historical informations...

Sometimes presented as a « relic », this textile artifact is registered in France's cultural heritage since 1954, under the more modest name : “Fragment of an ancient garment worshipped under the name of “*sleeve of Saint Martin*” and locked in a reliquary, made of linen, period of origin: the Middle Ages” (**photograph 1**). It is still conserved at the communal church of Bussy-Saint-Martin, in Seine-et-Marne (77), in its latest reliquary which was made at the end of the 19<sup>th</sup> century.



**Photo 1** : Current display, after being restored and placed back in its reliquary from the end of the 19<sup>th</sup> century – inside of the sleeve displayed.

The most recent reliable mention of it is a record of it being handed to abbot Boivin, the priest of Bussy-Saint-Martin in Seine-Marne, by a nun from the Royal Abbey of Chelles after it was closed. The sleeve have been identified as a gambeson by Monseigneur Barbier de Montault, at the end of the XIX<sup>e</sup> century (analyses : possible datation between 1170 and 1270).

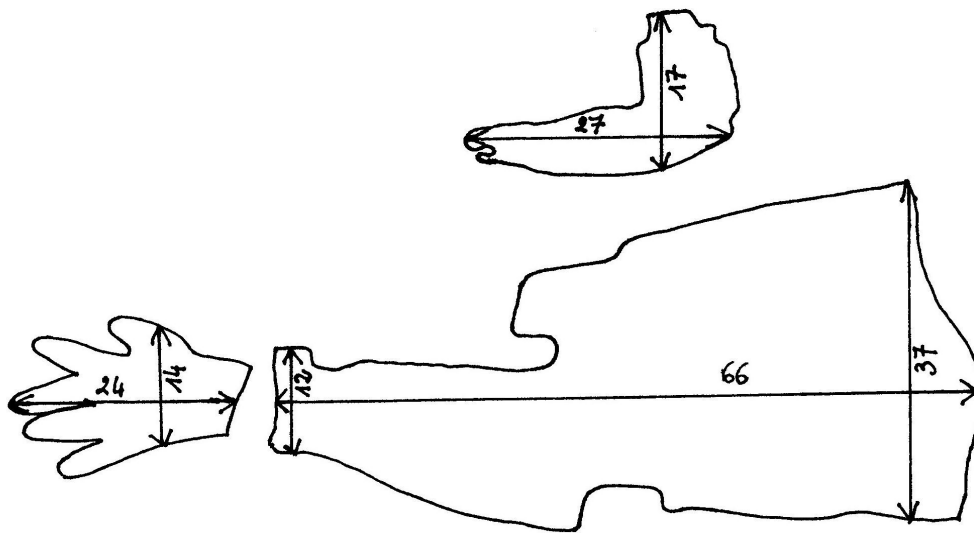
### II – Technical analysis

In 1995, for the occasion provided by the restoring of its 19<sup>th</sup> century reliquary, the sleeve was the object of a close study by the restoration service of the textiles department of the Historical Monuments. The sleeve was then removed, closely studied, photographed and restored, and then finally placed back in its reliquary but in a different position. The report

written by Mrs Isabelle Bedat<sup>1</sup>, of which a simplified version appeared in Coré magazine in 1997<sup>2</sup>, is very specific : it includes life-size patterns, sketches, and explanations about the fabrics and the sewing and assembly techniques used. The below presentation gathers these elements but under a different perspective, that of a re-creation of the sleeve.

### A – The preserved elements

The archeological artifact from Bussy includes three elements : first of all a quilted sleeve, which ends by an S-shaped shoulder protection which covers the shoulder and widens over the collarbone and shoulder blade ; then the glove of a left hand, also padded, still well-conserved, and finally a quilted piece that is rounded on the outer side and curved on the inner side, presenting a stitch. Mrs Piel and Mrs Bédât, the restorers, mention an “arbitrary” assembly done with glue during a first restoration in the 19<sup>th</sup> century<sup>3</sup>.



**Sketch 1** : dimensions of the preserved elements in centimeters (outer side – left arm) - RCR

<sup>1</sup> Any reference to the conservation-restoration file in my article will be preceded with the following mention : RCR1995

<sup>2</sup> See PIEL, Caroline ; BEDAT, Isabelle, *La manche de saint Martin à Bussy-Saint-Martin (Seine-et-Marne)*, Coré 2 (mars 1997), p. 38-43. Cet article est remis gracieusement sur place aux visiteurs qui s'intéressent à la relique.

<sup>3</sup> RCR1995 : Ainsi le gant a été fixé à la manche à l'aide de points de colle et « un fragment a été positionné à l'emplacement du coude, maintenu par des points de colle ». Les auteurs ajoutent que « le choix de la face doit être remis en question » .

## **B – The fabrics used in the sleeve**

During the restoration, an analysis of the textile fibers and the dyes was performed.

<b>Fabric</b>	<b>Fibers</b>	<b>Weave</b>	<b>Dye</b>
Brown taffeta	silk	34 threads/cm and 39 to 48 threads/cm	tannin
Canvas (inside of the sleeve) 1 visible border	White linen	24 threads/cm et 26 fils/cm	
Cloth of the palm and fingers	linen	palm + thumb 20 per 26 threads/cm index 24 per 17 fils/cm last fingers 32 per 34 fils/cm	
Stuffing	Raw cotton (presence of remains of seeds )		
Thread in the stitches	linen <sup>4</sup>		Blue linen thread : indigo <sup>5</sup> .

**Table 1** : result of the analysis – table gathering the findings of the 1998 report

## **C – The textile composition of the sleeve**

The sleeve is made of several layers of cloth, with however a **Part A** (upper arm) which is thinner than **Part B**<sup>6</sup> (forearm). Thus we get a rather thin assembly of which the maximal thickness is no more than 8mm.

<b>Part A – upper arm</b>	<b>Part B – forearm</b>
1 – brown silk taffeta 2 – cotton fiber 3 – two overlapping layers of linen 2 – cotton fiber 1 – brown silk taffeta	1 – brown silk taffeta 2 – cotton fiber 2 – cotton fiber 1 – brown silk taffeta

**Table 2** : symmetrical arrangement of the layers

The upper part of the arm clearly has thicker protection and it is interesting to note that the layers of linen are in the middle of the structure and the cotton stuffing on the outside, just underneath the silk.

The glove presents two sides : the underside, the palm, is made of only one layer of linen of which the thickness varies depending on the part of the hand concerned. The topside does in fact seem to be made of two layers of brown taffeta that contain the cotton stuffing, the same as throughout the rest of the sleeve.

<sup>4</sup> The authors specified in their analysis report « ...they are very certainly linen fibers, even though their morphological constitution is atypical compared to what is usually seen ».

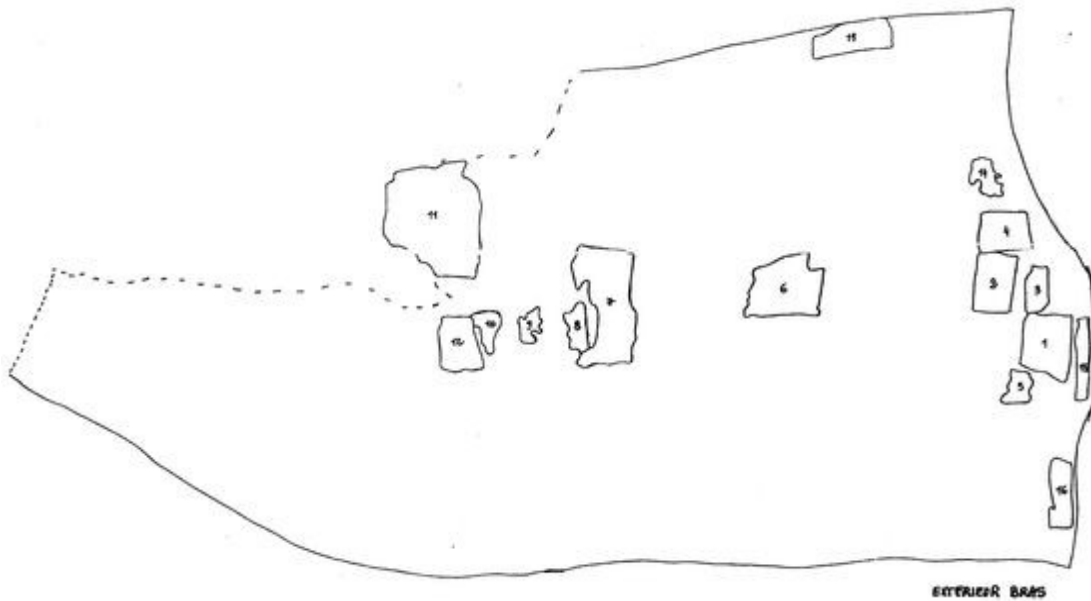
<sup>5</sup> No specification about the nature of the dye of the brown thread is provided.

<sup>6</sup> See [sketch 5](#) below.

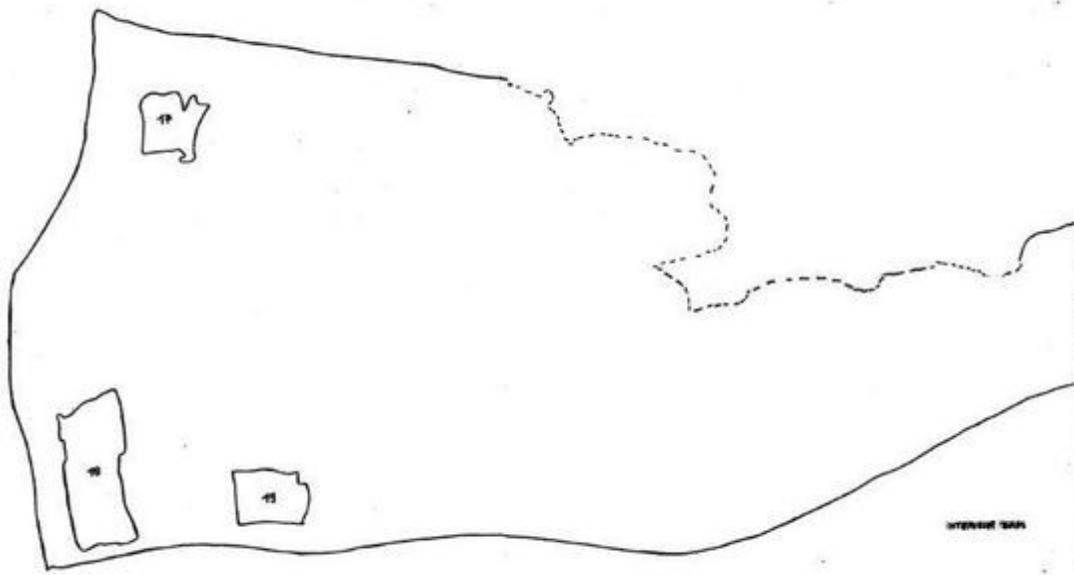
## D – The stitches

The good preservation of the sleeve shows the homogeneous nature of the stitches : the same threads are used for the sleeve, the fragment, and the glove, and sometimes the same stitching technique. Two stitches are used to assemble the cloth and the different parts of the sleeve : the running stitch intended to gather the layers of cloth along their length, and the hemming stitch which brings them together at the edges. No overcasting stitches were seen even though raw edges are seen, especially for the layers of linen on the inside of the sleeve in **Part A**. As for the silk, it presents a strip on each side of the sleeve.

## E – The patterns



**Sketch 2** – outer side – tracing of the original summary <sup>7</sup>



**Sketch 3** – inner side – tracing of the original summary

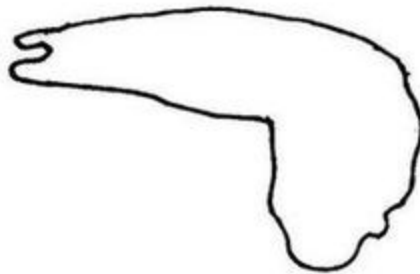
The dotted lines mark out the torn areas. The numbered elements are fragments of brown taffeta set during the restoration of 1995.

The underside of the glove is made of assembled elements : the palm and the thumb are one part and the four other fingers another. The sewing that joins them is at the base of the fingers. The outer side hasn't been patterned but in order to obtain a thick quilted volume, the pattern likely presents bigger measurements than the underside.

Finally the isolated fragment mentioned above presents a quilting identical to that of Part B of the sleeve (silk taffeta containing the cotton stuffing). It has a curved shape. During the restoration in the 19<sup>th</sup> century, it was placed at the level of the elbow, symmetrically, but on the outer side of the sleeve, which was completely illogical. (**photograph 2**). During the 1995 restoration it was unglued and placed against the inner side of the sleeve).



**Photograph 2** : the fragment was set with big stitches which are still visible at the top of the picture <sup>8</sup>



**Sketch 4** : outline of the fragment – position of **photograph 2**

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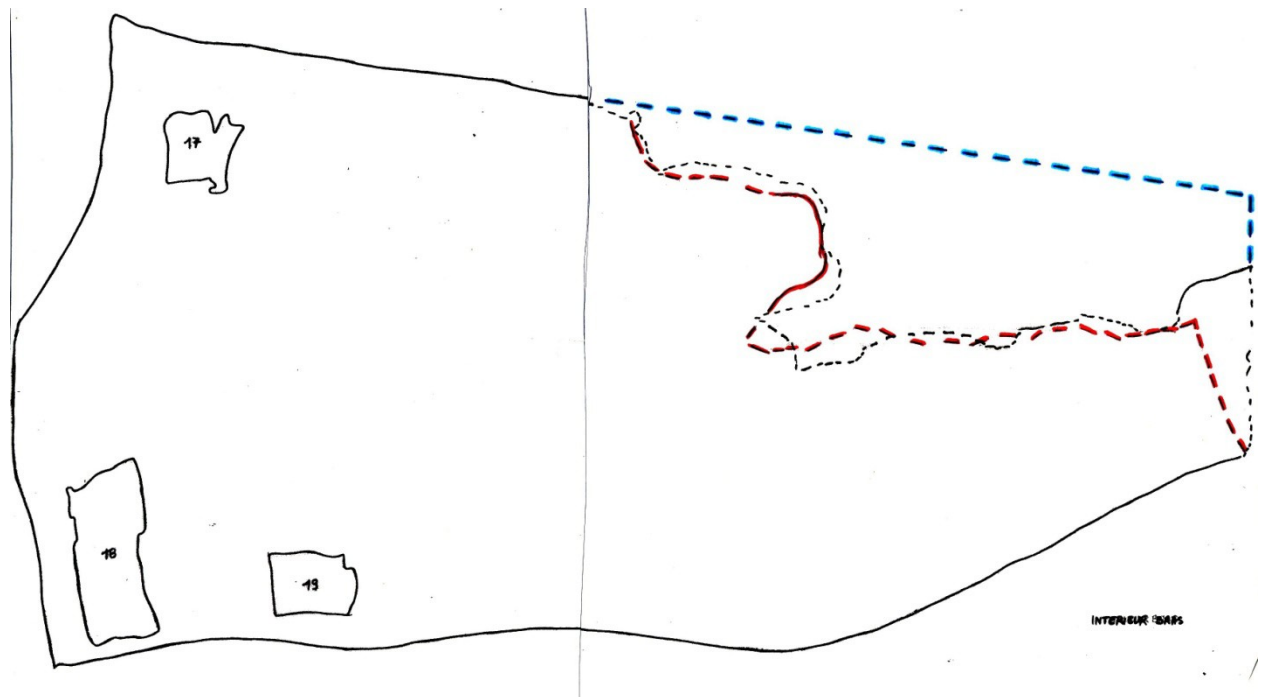
<sup>8</sup> Coloured photograph published in the initial article, Coré magazine 2 (march 1997).

#### IV – Re-creation and experimentation

After having summed up the technical characteristics of the sleeve, it is now important to use this information in order to offer a remake project and present elements allowing us to understand the item.

##### A – Final pattern : suggestions

Although the sleeve is preserved in a pretty good condition, it is still somewhat incomplete. The most essential question is that of its initial shape. **Sketch 5** proposes a re-creation of the missing piece.



**Sketch 5** – possible pattern

The black dotted lines are the outline of the inner side of the sleeve, those in red the outline of the outer side, and those in blue are a suggestion of a definitive shape. The pattern thus obtained was tested by folding it edge on edge in order to verify the hypothesis provided by the authors of the restoration report which mention the sleeve as being made of one piece folded over and then sewn from elbow to wrist. The dimensions turned out to be insufficient and the part that covers the forearm is not wide enough to go all the way around it while leaving enough room for comfort. For that, we can draw the conclusion that the inside of the arm was protected by a second quilted piece of which the fragment set on the elbow would be remains.

The report mentions that this fragment presents signs of stitching. However, the study of the lower part of the sleeve, the part that covers the outside of the forearm, shows that the edges are formed by the layers of cloth held together by hemming stitches (**photograph 3**). So it is not a part that was torn off. Therefore we can consider that the junction between the two layers of the sleeve, the elbow, and the forearm were done along these edges, doubtless with hemming stitches, as is the case on other parts of the sleeve.



**Photograph 3** : outer edge of the elbow (inside of the sleeve – photo GMA)

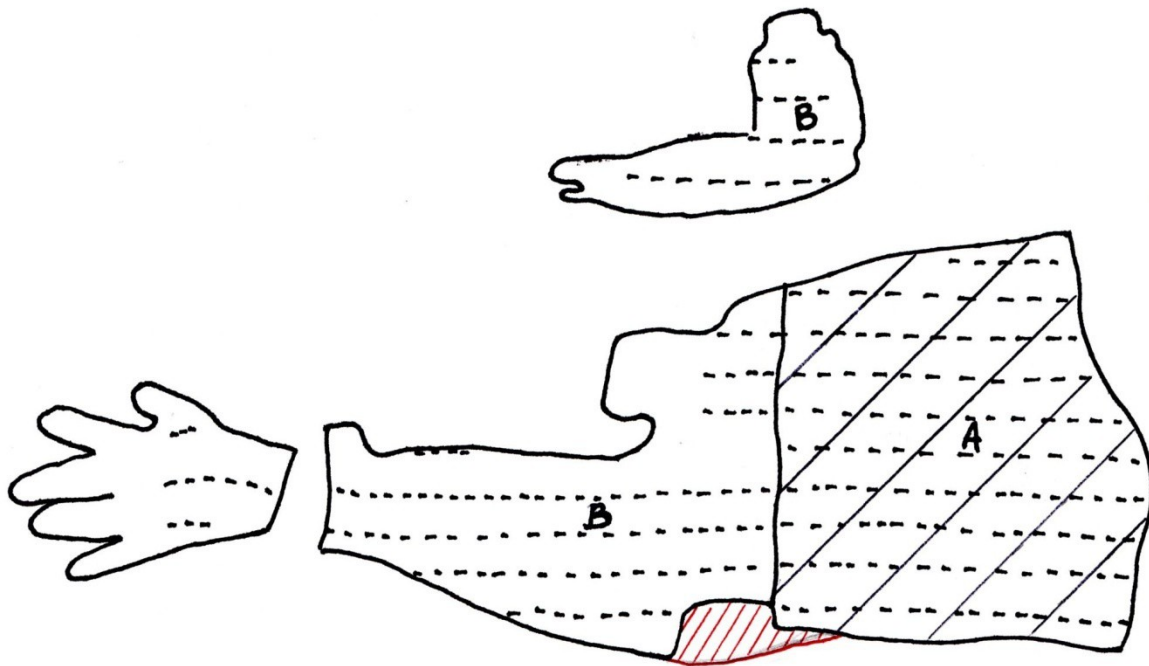
The opposite end of the fragment, around the middle of the sleeve, is shown to be cut out and properly edged with stitches (**photograph 4**) which could be the remains of an indentation.



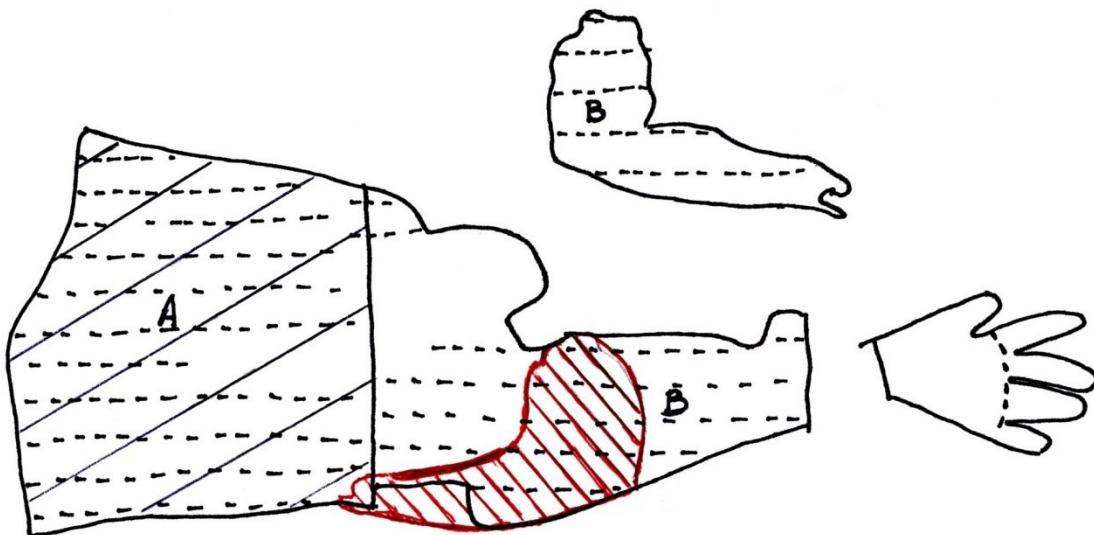
**Photograph 4** : incurved edge and quilting (GMA photograph)

This opening could correspond to the upper limit of the part that covers the forearm, which would then be protected on the inside up to the joint of the elbow.

If this is the case, then the more delicate question is about the initial form of this part of the sleeve. To better understand the assembling we suggest here, the fragment was placed on the pattern of the sleeve (**sketches 6 and 7**).



**Sketch 6** – elbow fragment (in red), placed on the outside of the forearm (croquis RCR 1995 - modifié)



**Sketch 7** – elbow fragment (in red), placed on the inside of the forearm (RCR sketch from 1995 - modified)

The dark red tracing marks a border sewn with hemming stitches on the edges. It likely matches an opening that doesn't seem to go past the elbow joint on its lower side. However, the sides might go a little past the elbow. If we extrapolate a symmetrical re-creation, we get an inner side of the sleeve which is narrower than the outer side, covering only the forearm and of which the indentation would allow to slip the sleeve on up to the elbow.



In order to verify this hypothesis, a white remake was done (**photographs 5 and 6**).



**Photograph 5** : pattern suggestion – inner side of the sleeve (GMA photograph)



**Photograph 6** : assembling of the sleeve (photo GMA)

The remaking the pattern needs to take the glove into account. During the restoration in the 19<sup>th</sup> century, it was attached to the sleeve by glue. Unstuck during the 1995 restoration, it was the subject of a close study that confirmed the homogeneity of the materials – cloths, cotton stuffing, and threads, between the glove and the sleeve. The stitches of the quilting of the sleeve can be found on only a part of the top of the hand (**photograph 7**).



**Photograph 7** : top view of the glove – RCR 1995, photograph 28

Next, the very composition of the glove is the same as in Part B of the sleeve. We can clearly see the layer of cotton contained between the two layers of silk taffeta on the outside of the fingers (**photograph 7**), and the silk taffeta that continues on in the inside of the glove (**photograph 8**), thus forming continuity with the part of the forearm.



**Photograph 8** : palm of the glove – silk and cotton stuffing visible on the edges of the finger pieces (photo GMA)



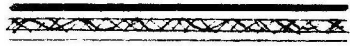

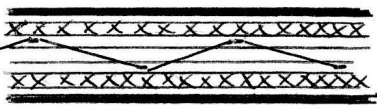
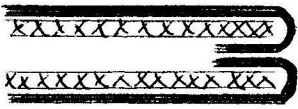
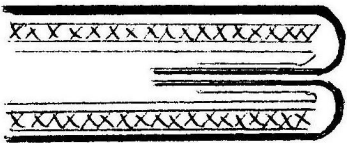
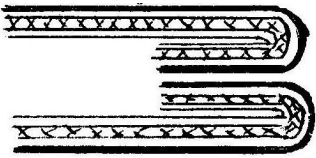

**Photograph 9** : tear mark on the area where the glove is joined to the sleeve and sewn zone of the linen from the palm to the wrist. We can notice the signs of sewing of the top of the glove in silk to the linen palm by thin running stitches with undyed linen thread (GMA photograph)

There is thus a very good chance that the glove was made separately to later be sewn onto the sleeve at the wrist. Such is the hypothesis accepted here.

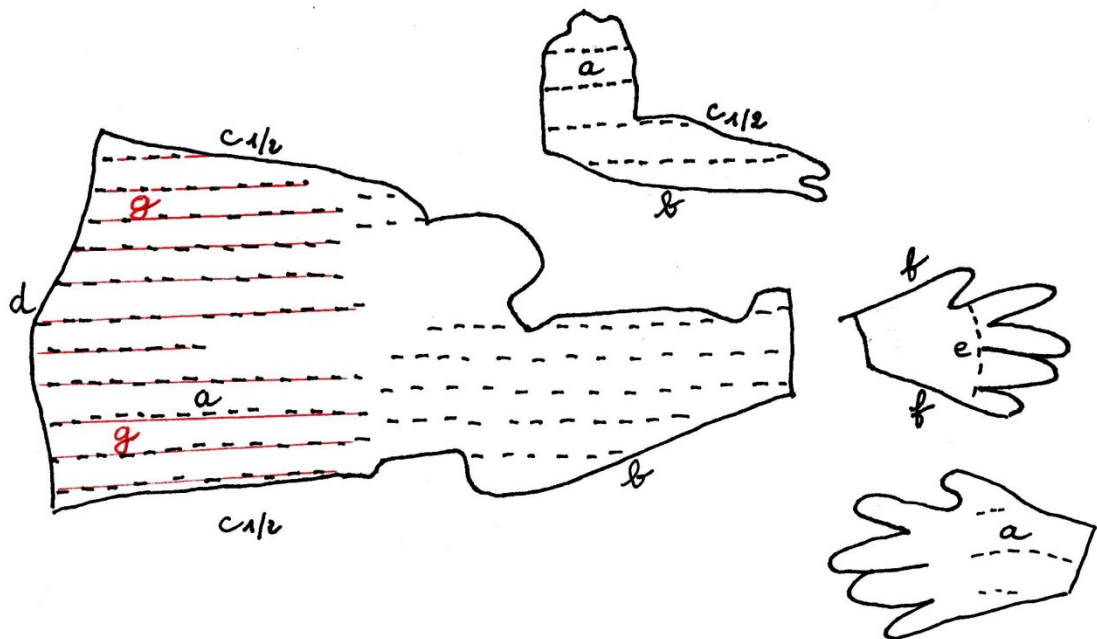
### **B – Re-creation of the sleeve : a guide**

The main objective of the study of the sleeve of Bussy was to create a copy as close as possible to the original piece. The following tutorial is thus the result of the use of the technical information from the restoration report, of a close and direct observation of the archeological artifact, and the elaboration of various suggestions to fill in the gaps of some of the information. Nonetheless it remains a hypothesis, intended to evolve.

The presentation of the stitches is gathered here in **table 3** which needs to be associated to **sketch 9** in order to re-create the sewing and stitches as accurately as possible. We can refer to the above **table 2** on page 6 which reports the internal composition of the sleeve.

<p><b>Running stitches a)</b></p> 	<p>Quilting along the whole length of the sleeve, on the glove and on the fragment.</p>
<p><b>Running stitches f)</b></p> 	<p>The sewing of the junction between the linen palm and the top of the padded glove</p>
<p><b>Running stitches c1)</b></p>	<p>Junction of two pieces of several layers (<b>edges of the part A of the sleeve and the curved inside of the fragment</b>)</p>
<p><b>Running stitches g)</b></p> 	<p>Joining of the six layers in <b>part A</b> (tracing parallel to that of the quilting)</p>
<p><b>Hemming stitches b)</b></p> 	<p>Joining of the two layers of silk folded over, without including the cotton stuffing (<b>edges of part B of the sleeve and the outside of the fragment</b>)</p>
<p><b>Hemming stitches c2)</b></p> 	<p>Joining of two groups of three layers (<b>part A</b>)</p>
<p><b>Hemming stitches d)</b></p> 	<p>Joining of two groups of 3 layers along the shoulder piece (<b>part A of the sleeve</b>)</p>
<p><b>Hemming stitches e)</b></p> 	<p>Palm side of the glove. Joining of the fingers to the palm (photograph)</p>

**Table 3** : sum of the stitching and the way it is done (thick black line = silk ; crosses = cotton stuffing ; thin black line = linen)



**Sketch 8** : location of the different stitches on the different preserved pieces (sketch RCR 1995 - modified)

A few succinct indications are provided by the authors of the restoration report<sup>9</sup>. The following presentation is inspired by them but was considerably developed in order to make a tutorial.

### **1<sup>st</sup> step : making of the sleeve – outer side parts A and B**

1 – The first step consists in cutting out the two shapes of the sleeve symmetrical to each other.

2 – On each of these, in the **part A**, was set a layer of cotton stuffing (**photograph 10**) and a layer of linen (**photograph 11**).

<sup>9</sup> RCR 1995 : paragraph entitled « order of execution ». « The zone A [...] is done in two steps : first the quilting process with the linen and the silk, twice, then the joining of these two elements into one piece by stitches which are done as the two pieces are yet open and folded over. It was thus impossible that Zone B was already quilted and so the quilting had to be done in two steps. The shaping of the glove by the sewing of the palm can take place last. As for the periphery, it is impossible to discern a specific order as the stitches don't cover each other ».



**Photograph 10** : the cotton stuffing is raw – note the presence of impurities as in the original material (GMA photograph)



**Photo 11**: in order, the brown silk taffeta, the cotton stuffing, and the linen cloth (GMA photograph)

3 – The sewing of the quilting (**point a**) is then done along the length of **part A**, joining the silk, the cotton stuffing, and the linen, with the help of stitches of which the visible parts are from 1 to 1.5 mm in length, with one stitch every 6 mm. This way we get a very tight sewing with a thread that has less of a chance of getting caught, in we consider the possibility that a hauberk was worn over it. Altogether we get sorts of tubes around 3 cm wide (**photograph 12**).



**Photo 12** : the stitches form a thin quilting (photo GMA)

4 – The same operation is done symmetrically with an identical overlapping of cloths in order to form the second layer.

5 – The two quilted pieces then need to be joined along the full length of **part A**. This is first done longways with **running stitch g** which joins the two layers of linen which will be at the middle of the whole piece once it is closed up (**photographs 13 and 14**).



**Photograph 13** : the stitches are done with undyed linen thread in the alignment of the quilting.



**Photograph 14** : the thread is then pulled on to tighten it

Next, the edges of each side need to be joined : first of all the ends of the layers of silk and linen are folded inwards (**photograph 15**).



**Photo 15** : the cotton stuffing is contained by the folds of silk and linen.

Then they are sewn together with **running stitch c1** along the full length of **part A** (**photograph 16**).



**Photograph 16** : the blue linen thread is used to make small stitches (31/10 cm)  
Finally, the two layers are joined along their edges by **hemming stitch c2** (**photograph 17**).





**Photograph 17** : done very tight, the heing stitch combined with the running stitch contributes to make a strong and flat edge.

6 – There remains the care of **part B** which covers the forearm. The quilting is continued with **stitch a**, to join the two layers of silk to the cotton stuffing. Once the ends are folded, the edges are sewn – without including the cotton stuffing – **hemming stitch b**.

### **2<sup>nd</sup> step : making of the sleeve (inner side)**

The making of the quilting is identical to that of **part B** described above : the **stitch a** joins the two layers of silk to the cotton stuffing and the **hemming stitch b** holds the folded over outer edges. On the end of the indenture, the layers of cloth are folded over and joined together with **running point c1** and **hemming point c2** (**photograph 18**).



**Photograph 18** : the double row of stitches with running stitch allow the forming of a very flat edge.

### **3<sup>rd</sup> step : joining the outer and inner sides of the sleeve**

In order to form the volume of the sleeve, the two pieces need to be joined separately.



**Photograph 19** : the two edges are aligned together before proceeding with the joining sewing

This joining sewing is not attested to on the archeological artifact as there remains only a fragment of the inner side of the sleeve. Therefore this is theoretical. The chosen thread is the blue linen thread which is present in all the hemming stitches intended to join layers of cloth (**photograph 20**).



**Photograph 20** : the stitches here are required to be quite tight but the two parts of the sleeve need to be flattened along the length of the sewing to not make a bothersome bump

#### **4th step : cutting out the glove**

Preparing the glove is the most complex part to do (**photographs 21 and 22**). It's the only part that is still voluminous. The difficulty is in obtaining a shape that allows comfort while remaining relatively anatomical.

The choice made here is the making of a glove, separate from the rest of the sleeve, than joined to it.



**Photograph 21** : the linen palm (GMA photograph)



**Photograph 22** : sewing of the fingers to the palm done from the outside (GMA photograph)

The making of the glove is thus very elaborate. First of all, the piece that covers the palm and thumb is cut from the thicker linen, and then each finger independently. The base of each is then joined to the palm (**photograph 22**) with **hemming stitch e**. This type of stitching allows for a very flat joining, without bumps that could bother the mobility of the fingers (**photograph 23**).



**Photograph 23** : the same kind of stitching is done for the middle finger, the ring finger, and the little finger pour (GMA re-creation photograph).



**Photograph 24** : comparison between the source (above) and the re-creation (GMA photograph)



**Photograph 25** : final appearance of the fingers joined to the hand (GMA re-creation photograph)



**Photograph 26** : glove palm (GMA re-creation photograph)

The top of the hand is done separately with two cuts of the brown silk taffeta (**photograph 27**). It's imperative to plan for a wide margin because this shape covers the cotton stuffing but will also be the volume of the hand (**photograph 28**). The technique used is sewing from the inside-out then turning it over, done with raw linen thread (**photograph 9**).



**Photograph 27** : the cotton stuffing is contained between the two layers of silk maintained by the quilting stitches with brown linen thread (GMA re-creation photo)



**Photograph 28** : the voluminous glove (GMA re-creation photograph)

Once turned out, the glove is able to be joined to the wrist of the sleeve. The report mentions the joining stitches<sup>10</sup> but the thread used seems to have disappeared. In the re-creation, it is brown linen thread that was used (**photograph 29**).



**Photograph 29** : joining of the palm of the glove to the wrist with hemming stitches (re-creation –GMA photograph)

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<sup>10</sup> RCR 1995, photograph 29.



**Photograph 30** : the two gloves (re-creation –GMA photograph)



**Photograph 31** : recreation possibility (GMA photograph)





**Photograph 32** : the whole sleeve (re-creation –GMA photograph)