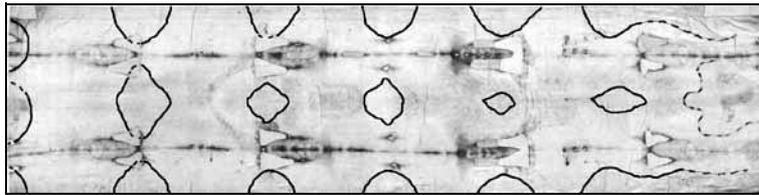


FURTHER STUDIES ON THE SCORCHES AND THE WATERMARKS

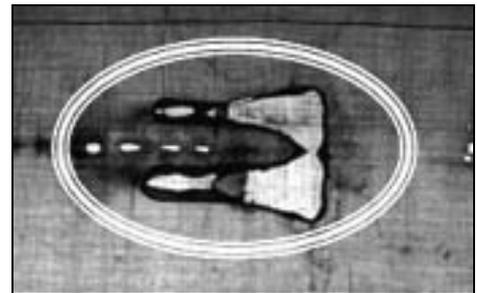
At the Paris Congress of 2002, we presented a study that took several years, where we analyzed the visible consequences of the various accidents that the Holy Shroud has suffered through the centuries.

Principally we pointed out how the holes caused by the Chambery fire of 1532 and the large water stains on the edges and in the central part of the cloth were in no way related, but were consequences of two totally distinct episodes.



In this meeting we want to return to that study in the light of further research and observations we have conducted in the past two years, to add to what we reported at that time.

The method used initially was that of marking precisely the limits of each hole and of each burn that was produced during the Chambery fire, using the photographs of Enrie and the 1978 photographs in transparency of Barrie Schwartz, in which these were quite visible although they were covered by patchwork sewn over the Shroud by the Poor Clare nuns in 1534.

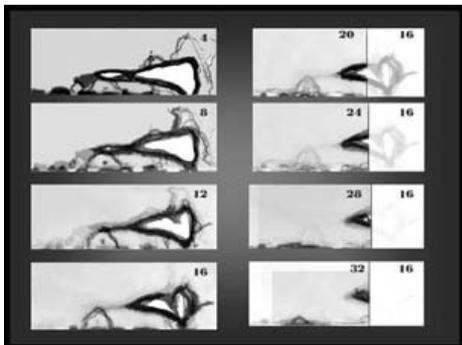


Naturally, today this research would be easier to perform after the Shroud has been restored and the patches have been removed.

In any case, the study conducted on the 1978 photographs can be considered with greater fidelity and precision in each edge, not yet vacuumed or modified.

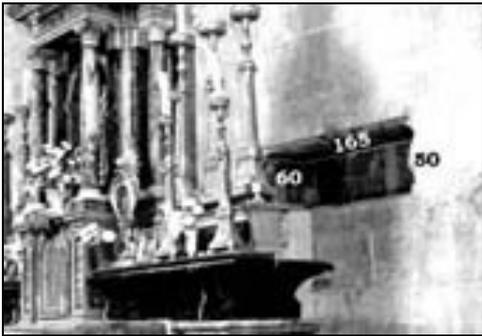
This method has enabled us to define the shapes, sizes and sequences of the various layers.

So it has been possible to reconstruct the charred craters, which we are presenting with the superposition of four layers at a time, and where the perfect regression of the burn can be seen.....



....In this way, we can find the exact corresponding folds.

No other elements or traces were found that would allow us to suggest any other method of folding, or any further fold.



The result obtained showed that the Shroud was folded into a parcel of 16 layers (about cm 28x75), partly folded over itself to make 32 layers, with an evident adaptation of the cloth to fit the reliquary, which must have had dimensions larger than those believed up to today. This would make it also more proportional to the niche (cm 165 x 60 x 50), created inside the Sainte Chapelle, in the central wall of the apse.

Let's now examine the possible dynamics of the fire.

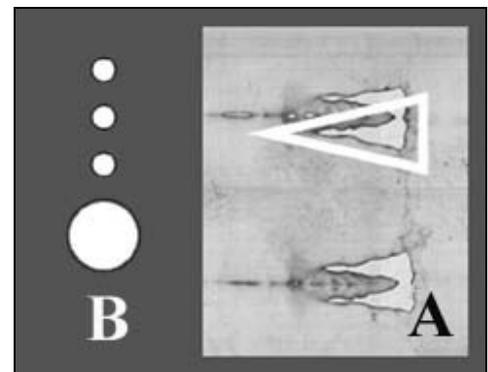
The information we have on the fire is very vague, but we know that fires follow very specific and predictable development. It is legitimate then, to think that it started from below, perhaps from the altar and the wooden structure of the choir that was located against the wall under the niche.

Also, no details are available on the reliquary, although we conducted research in this direction. We know that Marguerite of Austria, who became regent of the Netherlands, commissioned the work, in 1509, to the Flemish goldsmith, named Lievin Van Lathem, and that it cost 12,000 florins, an enormous sum for that time.

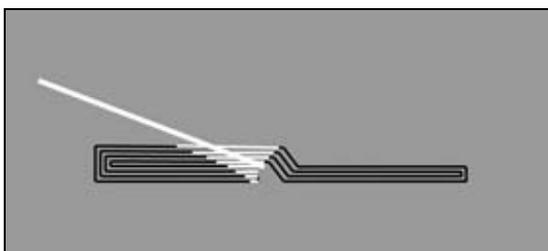
But it is not known, for example, if the reliquary was made of decorated solid silver or of wood covered with silver and gold or other material.

In any case, we do know that the effects on the fabric of the container heated by the fire occurred in a very specific and precise way.

The pattern of the burns tends to be triangular (A) and the dimensions are not compatible with the effects of some drops of molten silver (B), as has always been said, because these would have produced round holes, and the burning would have stopped by cooling after the first two or three layers.

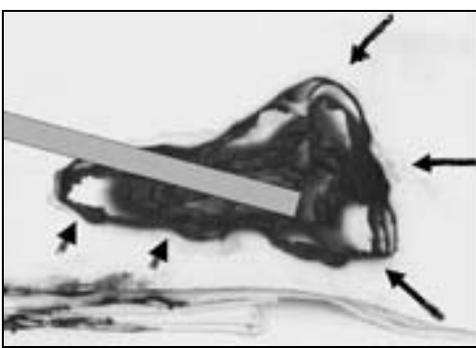


The explanation was found through experiments and simulations of the fire:



the lid of the burning reliquary, perhaps through the yielding of some weld points, or under the weight of some object burning on top, was altered and came into contact with the fabric in an oblique manner; the permanent contact with the over-heated lid burned the

linen fibers in their original components progressively charring it through the various levels.

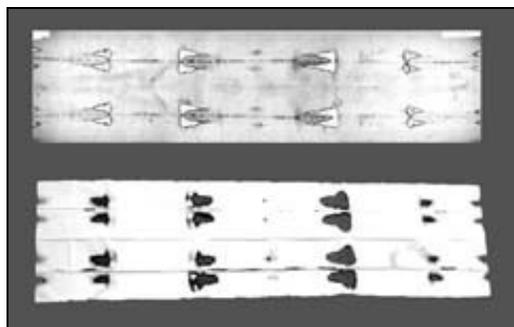


We also observed that, due to the weight of the object, the pyrolysis tended to diminish in the part directly in contact,

continuing in the free terminal part due to the supply of new oxygen, leading to the enlargement and therefore the triangular shape of the burns.

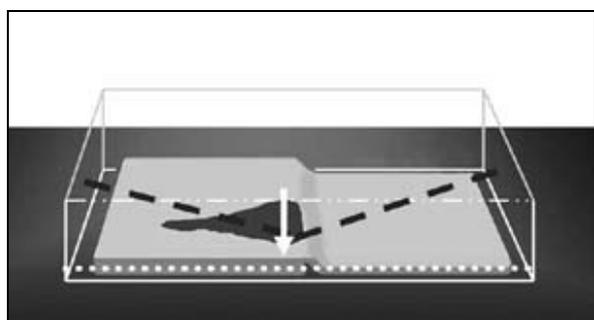
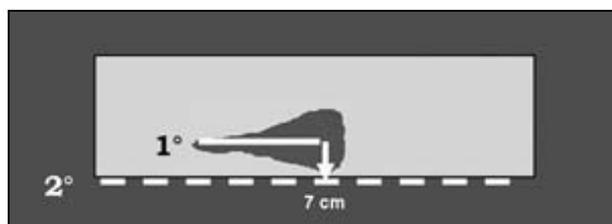
One of the simulations performed on a cloth having a size 50% of the original Shroud was presented in Paris and it showed a perfect match with the Shroud itself.

At this point we would like to add our own personal impression.



When, after it had cooled, we examined and opened the experiment, examining the burns, damage suffered, and imagining transposed to the Shroud, we realized the terrible real danger that the Holy Shroud ran and the conditions of contamination it was subjected to inside that reliquary in the fire of Chambery.

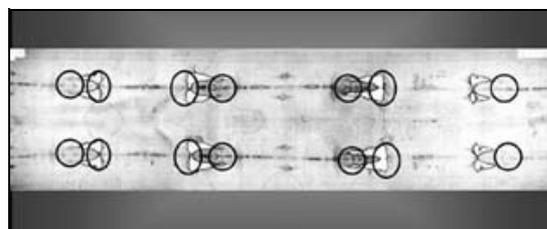
Going ahead with our study, we must add that the points of thermal contact were two, the first we have just explained; but there was also a second, less devastating, about 7 cm away, and directly in contact with the front wall of the reliquary that produced the well-known and highly visible charred traces.



Therefore, virtually reconstructing the reliquary around the Shroud folded as described above, we note how the impact occurs on the central part, perhaps by the collapse of the lid at its weakest point (dark area).

Through the resulting opening, undoubtedly a minimum quantity of water entered (light arrow) that was used to extinguish the fire and lower the temperature of the reliquary.

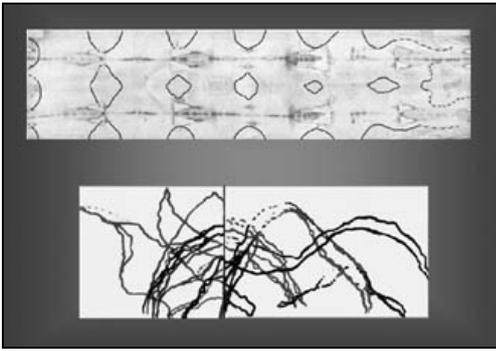
The penetration of this small amount of water was the cause of the formation of the small watermarks visible especially along the charred trace.



\* \* \*

After reaching this first result, we began the second part of our research.

After establishing the exact position of the cloth in the Chambery fire, as explained above, we continued with an inspection of the positions of the large watermarks, which, if they had been produced on the occasion of the Chambery fire as affirmed up to now, should overlap perfectly like everything else analyzed up to now.



And here we were surprised to note that these large watermarks do not relate in any way with the folds referred to above, nor with the series of small watermarks.

This means that the Holy Shroud must have been damaged in two different events separated in place, time and space.

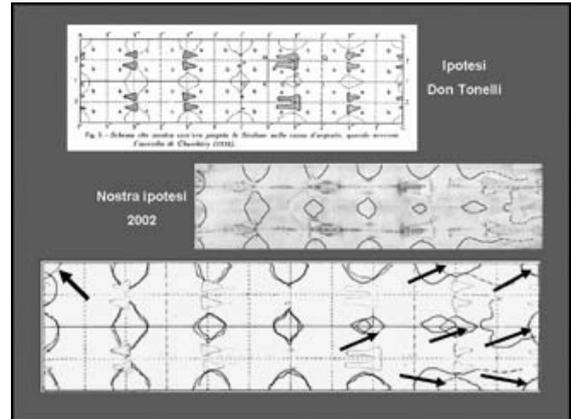
At this point we asked ourselves why up to now had all the damage been considered contemporaneous.

We found an answer to this last question in an interesting study conducted by Don Antonio Tonelli and published in the “Rivista dei Giovani” in 1933.

The writer shows the folding of Chambéry using a diagram/sketch, fruit of his studies of the photographs of Enrie.

Naturally the technological aids we have today enable us to examine these details more perfectly.

Pointing out the parts indicated by Tonelli, compared and superimposed with the real image, whose edges have also been emphasized, we can note that there are notable imperfections and inaccuracies (dark arrows).



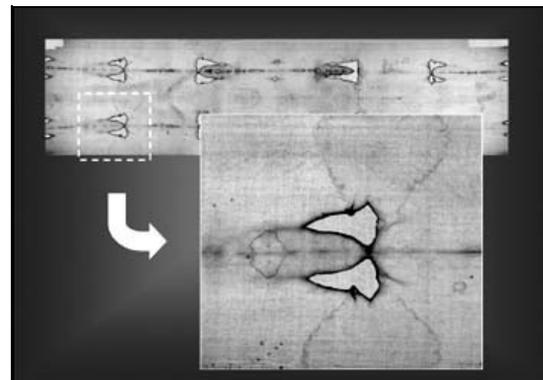
Some watermarks are shown in positions that are incorrect, or imagined in an intuitive manner, so that Tonelli’s reliability and conclusions are totally altered.

At this point we must emphasize clearly that there are two types of watermarks:

- The small ones, that we will call of Chambéry, that are located essentially along the burned traces and that we are showing in a lighter color,
- and the large ones, that we will call pre-Chambéry, located along the edges and in the central part of the Shroud, and that have a darker color.

To confirm the differences between these two sets of watermarks, there are some differences that can be observed.

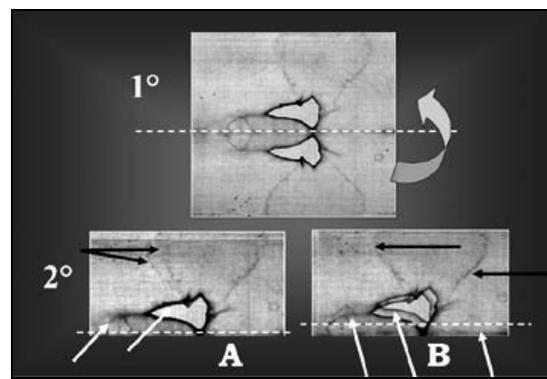
Limiting our analysis to only one example because of the short time we have, we will examine only the indicated portion of the cloth, but remember that the same checks can be made on any part.



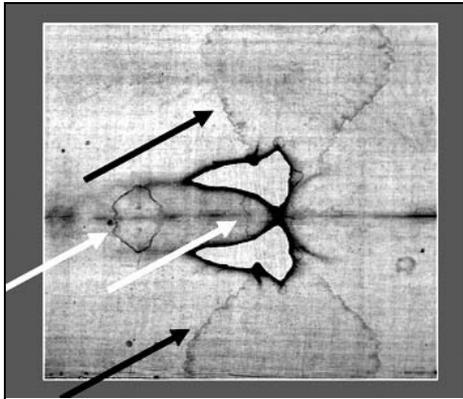
of

We selected the portion below the scorched trace, folded it over the upper part (1°) and tried superimposing it.

We note (2°A) that the holes and the small watermarks(white arrows) folded along the axis of the scorched trace, coincide perfectly. But the same is not true for the two large watermarks. (black arrows).



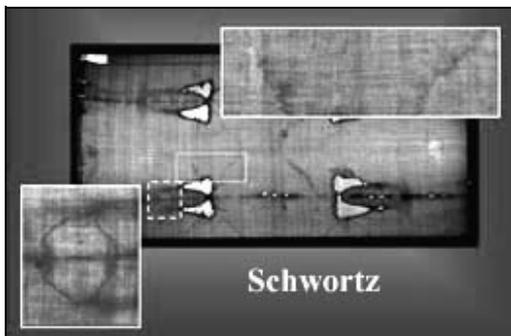
If, however, (2°B) we superimpose the large watermarks perfectly, then neither the burned trace, nor the holes, nor the small watermarks match any more.



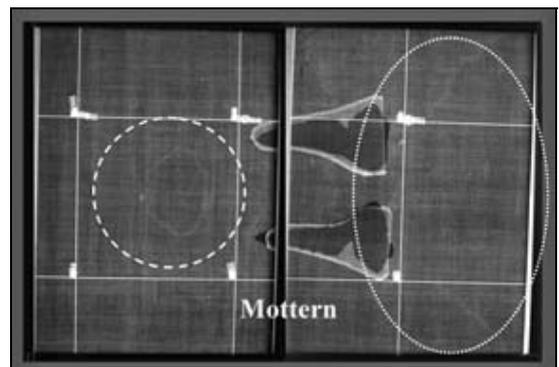
Another characteristic that differentiates the two different watermarks types is this:

- the Chambery damage shows well-defined, linear edges, due perhaps to the transport of pyrolysis products (white arrows),
- the large watermarks, on the other hand, have less intense and jagged edges (black arrows).

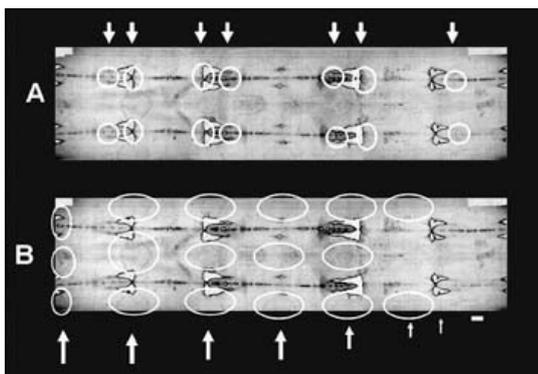
Heller's analysis, conducted in 1978, referred to a high concentration of ferrous oxide corresponding to the edges of these large watermarks.



The same can be said if we observe the same details in the photographs of Barrie Schwartz in transparency...

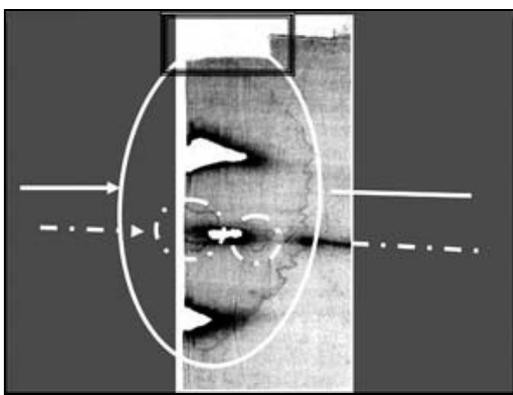


... and also on the x-rays of Mottern.



If, then, we examine generally the two series of watermarks, we note that the thickness and the density of the edges for those of Chambery (A) are constant from left to right, but we cannot say the same for the pre-Chambery (B), that start with an intensity that diminishes at the halfway point and then disappears toward the right part.

This is a further confirmation of the two different times of the formation of these watermarks .



But in what sequence were they produced?

Let us look at the detail of this corner of the Shroud that appears to be one of those where the two series overlap. (continuous line for pre-Chambery, the dotted line for Chambery).

Here we observe that the large watermark ends in the portion of the cloth removed for the C14 examination, with the consequences that we can imagine, but which we will not go into, also because it does not regard our field of investigation.

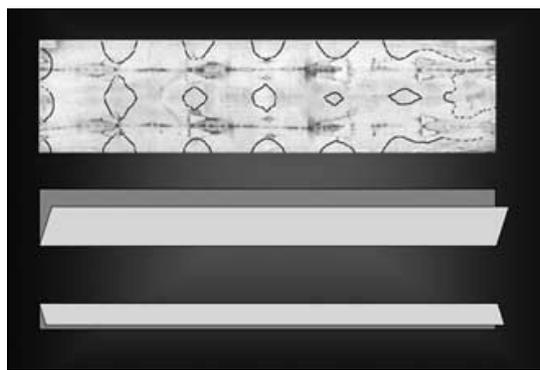
It is easy to note that the two watermarks have a central folding axis that is different one from one another, therefore with two clearly distinct origins.

Moreover, supposing that the small watermarks were formed first and the large ones later, the latter should have altered or lightened or incorporated the small ones.

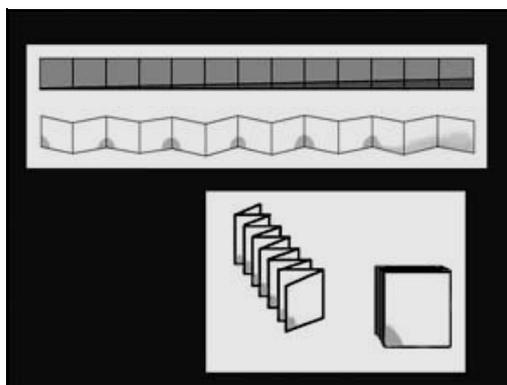
If, on the contrary, we consider the possibility that the large watermarks were formed first, then the cloth dried, perhaps for centuries, and subsequently in 1532 the other watermarks were made, we find a credible answer for the formation times of the two types of watermarks.

At this point, there arose the question of how the large watermarks were formed. This event had to go back to another historical period prior to 1532, and it should also provide explanations for the abnormalities and for some strange positions of these.

With the usual thick series of overlaps, we found an appropriate solution with an accordion-type fold into 52 segments (about cm 32x34), more easy to make, with the Shroud preserved in an unusual and unaccustomed position .



I part



II part

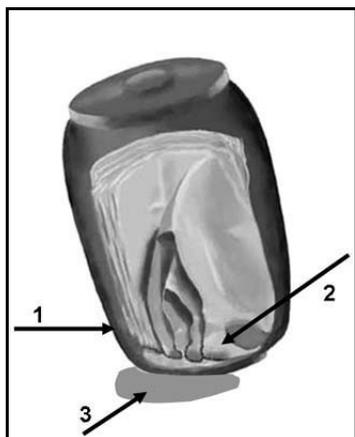


Simulation trials confirmed the possibility that if a sheet is placed almost vertically and one corner is then wet, this gives the pattern of watermarks that we were looking for.

This however, entailed other studies and other research that led us to the hypothesis that the cloth was placed or protected inside an earthenware jar, presuming an event that took place in more remote times.



In an Israeli Internet site, we came across a list of household goods discovered in the archaeological site of Qumran, with the relative measurements and photographs, and among these articles, there was a type of jar with a shape and size that gave credit to our hypothesis.



Experimental trials allowed us to test this possibility and come up with some answers that could explain some of the anomalies found on the Shroud, such as the diminution of the intensity of the edges at the terminal part (1), and especially the unusual position of the two watermarks under the C14 corner (2) in to absorption of external liquid (3).

We are showing some pictures taken from a video documentary filmed for television by Pioneer Productions in April 2004. Here they are filming live one of our simulations of the accordion- type fold of a sheet the size of the Shroud, .....



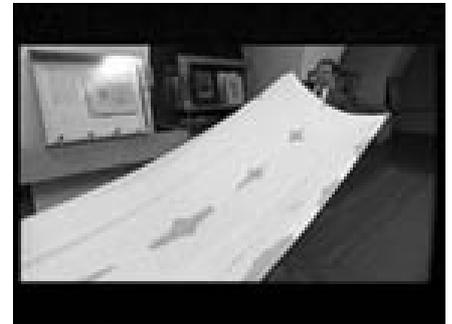
and also the introduction of this sheet into a jar specially built according to the dimensions of those found at Qumran,



and there is also the immersion of one corner of the cloth in water, following the method described above simulating the wetting that occurred at the bottom of the container.



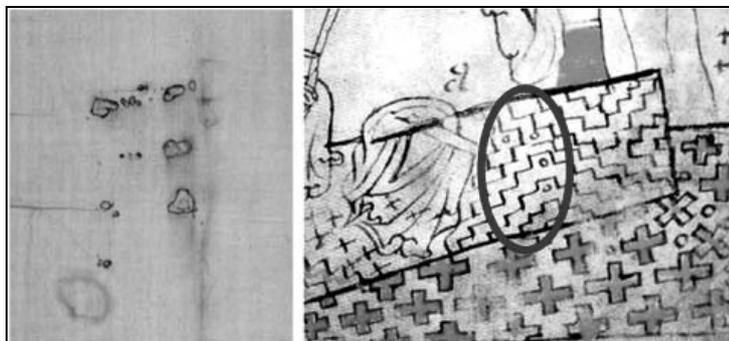
The result we obtained when the cloth was opened showed watermarks exactly in the positions present on the Shroud, with different shapes, since there are many variables that can give the shape to the watermarks: these include the absorption and the softness of the material itself, the inclination, the adherence to the concave inside shape of the bottom of the real container, the composition of the substance that wet the cloth, the time of contact, etc.



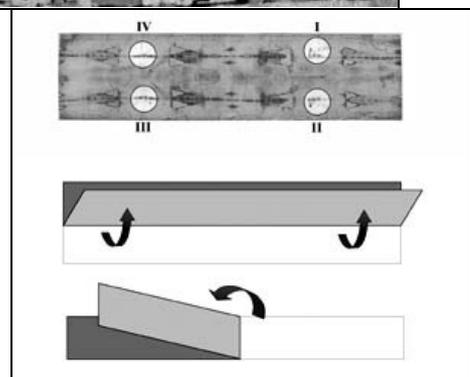
The final outcome, in any case, seemed to us significant and sufficiently eloquent.

It is true that this possibility remains hypothetical, but we believe that it should be taken into consideration, both as a suggestion for research and historical verification, and also for chemical examinations on the edges of the different watermarks to determine their composition, the differences and the possible interactions with the C14 examination, with which one of these watermarks, as we mentioned before, has already been specifically involved.

To complete our information, we recall once again from our study presented in Paris, the folding corresponding to the holes in relation to what is known as the “Codex Pray” of 1190, that shows the holes with an “L” shape.



This turned out to be in four parts perfectly overlapping, with a final shape measuring 220 x 55, a size suitable for the cloth of a Byzantine altar.



The origin of these holes is still uncertain and hypotheses have been suggested of burns from acid (Flury-Lemberg) or from incense (Legrand).

Also needing identification is the watermarks indicated by the dark arrow that marks all four layers.

Here, too, dedicated chemical examinations might provide full answers.

### CONCLUSION

So we can conclude that there were three events that left traces on the Holy Shroud over the centuries:

- 1 - The fire of Chambery in 1532,
- 2 - The burns reported in the "Codex Pray" datable prior to 1190, the year when the code itself was initiated,
- 3 - The event that caused the large watermarks that have been dealt with in this report, and where the hypothesis of storage in a jar would lead to a very ancient date.

We hope you have found our study interesting.

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