

The influence of the Pray Codex in the Debate About the Shroud of Turin

Abstract

The Shroud of Turin is a controversial linen cloth thought by some to be a medieval artifact and by others to be the burial cloth of Jesus of Nazareth. To better explain the reasons why reaching a consensus among experts seems highly unlikely, this paper focuses on the possible relationship between the Shroud of Turin and the Pray Codex, the first illuminated manuscript in Hungarian (c. 1192 – c. 1195). An analysis of the recent literature, including a qualitative survey, highlights not only the variety but also the weakness of the reasoning processes of the scholars, from less complete and intuitive to extremely detailed and systematic approaches. A new methodological approach excludes the position according to which it is certain that the Turin shroud has no direct or indirect link with the Pray Codex. A better understanding of the historiographical criteria and of the Bayesian framework might constitute a precious basis for solving similar interdisciplinary disputes.

1 Introduction

A centenary dispute, fueled annually by new arguments and new techniques. Lost in the bibliographical forest, the reader interested in the Shroud of Turin has an excuse if he feels confused when he wants to increase his knowledge about this simple linen sheet. Who should we trust? On which methodologies to rely? This interdisciplinary controversy, which extends from theology to the physical sciences, continues in academic journals and in the media. It seems one of those "cancerous spots" mentioned in the 1950s by the French historian Henri-Irénée Marrou, when the "bibliography proliferates without any real benefit."

The essential question of the Turin Shroud dating has never seemed easier to solve. Nowadays we have more indulgence for the eternal return of philosophical disputes like the one opposing nominalism to realism from Plato to the present day, or questions about the existence and nature of time. However, our vision of modern science, attached to the physical world, allows us less to understand this extension of a banal archaeological debate. We dated the parietal art present in the Chauvet cave or attributed with historical certainty some objects to Tutankhamun. The careful study of the STURP in 1978 provided valuable elements but still spoke of the image formation process as an "ongoing mystery", while the radiocarbon dating ended in an undeniable failure: there is no guaranty about the representativeness of the sample, the statistical analysis based on the raw data showed that the famous calendar interval (A.D. 1260-1390) had no meaning. One can notice, among specialists in archaeology, that this caution about the reliability of the conclusions of *Nature*, once unimaginable, is now in order. The professor of history of primitive Christianity Dale Allison (Princeton), in his book *The Resurrection of Jesus: Apologetics, Polemics, History*, published in 2021 dares to delve at length into

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the dispute over the authenticity of the Shroud. He is in favor of the thesis of falsehood – but not strongly. This is noticeable. It could well be part of a fundamental movement resulting in large part from the loss of credibility of the results of the radiocarbon dating.

To better understand the reasons for the impossible emergence of a scientific consensus, we will focus on a specific point of the ongoing historical debate: folio XXVIIIr of the Pray Codex, a Hungarian manuscript bearing the name of the Jesuit who rediscovered it in the 18th century, commonly dated around A.D. 1192-1195. This folio presents certain features of the Shroud of Turin: it is a miniature divided into two parts: the upper part representing the anointing of the dead Christ carried out by Joseph of Arimathea with two other people during the setting at the tomb, and the lower scene showing those that tradition identifies as the three Marys arriving on Sunday at the tomb.

2 The Pray Codex in the historiography of the Shroud of Turin

In 1978, Ian Wilson first tried to show a link between this scene and the Shroud. According to him, certain features of the drawing lead to the conclusion that the artist was familiar with the Shroud of Turin, which Wilson assumes was at least present in Constantinople between the 10th century and A.D. 1204, the year of the sack of the city. The strong relationship between the Byzantine Empire and the Kingdom of Hungary during the second half of the 12th century supported this connection.

In the 2000s, the historical debate concerning the dating of the Turin Shroud still engages with this topic. The Dominican Father André-Marie Dubarle and the geneticist Jérôme Lejeune had already produced, in the 1980s and 1990s, two iconographic analyzes going in the direction of a relationship between the Pray Codex and the Shroud. In 2009, the Italian paleographer Barbara Frale chose the representation of the upper scene of the Pray Codex as the front cover of her book *La Sindone di Gesù Nazareno*. The British art historian Thomas de Wesselow carefully examined the records in 2012 in *The Sign: The Shroud of Turin and the Secret of the Resurrection*, as did in 2015 Andrea Nicolotti in *Sindone. Storia e leggende di una reliquia controversa* (2015 for the Italian edition and 2020 for the updated English translation).

In 2020, the Byzantine art expert Gary Vikan provides a significant counterexample. He does not say a word about the Pray Codex in a popular book sprinkled with personal memories published. Vikan's work is interesting in that it shows, contrary to his thesis, all the difficulties in supporting the hypothesis of a medieval forgery. Not only Vikan does not dwell on historical elements that do not go in his direction, but he also finds himself forced to speculate on the appearance of an ephemeral medieval and immoral "genius" benefiting, in the early 1350s, from the support of the dying anti-Pope Clement VI, then in Avignon. Vikan hypothesizes that this unknown genius having produced one of the most remarkable works in history would be Naddo Ceccarelli, a disciple of Simone Martini, of whom there is no trace of activity in France after the 1340s. The absence of deepening in the historical debate goes with setting aside scientific knowledge: for example, Vikan, in his attempt to reproduce the image, does not consider its extreme superficiality (one-fifth of one-thousandth of a millimeter).

The same year, the Italian art historian Tomaso Montanari, trying to put forward the solution of the medieval fake, also showed, against his will, that it was imperative to discard much data. And the physicist Paolo di Lazzaro rightly worried in *Sindone* about the lightness of treatment and omissions of the scientific chapter of Nicolotti's last book.

3 Significantly incomplete approaches

The sindonologists recently studied the Pray Codex but how did they talk about it? The considerable number of articles and books leads us to choose a qualitative survey as a starting point for our reflection. This sample – which we hope is representative – includes 11 international specialists with a wide variety of fields of expertise and professions (from amateurs to mediaevalists to textile experts), published by academic publishers or aimed at a popular audience (cf. Table 1). Their conclusions are sometimes contradictory – ranging from the certainty of a representation inspired by the Shroud to the absolute rejection of this possibility. In their assessments, these researchers mentioned 11 miniature features or reflective elements. Significant variations appear between the level of detail reached (from 1/11 to 10/11). This choice might reveal their ways of practicing history and some of their biases.

The Italian mediaevalists Franco Cardini and Marina Montesano are explicitly concerned with this question of prejudice. In a book published for the 2015 ostension, the authors put forward their alleged neutrality. Surprisingly, Cardini and Montesano mentioned four characteristics but ignored the point on which all the other scholars linger: the "poker holes", these L-shaped holes existing before the 16th century, which marked so many artists representing the Shroud. One can legitimately wonder if this impasse is not the regrettable consequence of the desire to appear as neutral as possible. The best explanation for this absence appears probably just after their analysis of the Pray Codex. They indicate that the pro and contra arguments regarding the ancient dating of the Shroud, always tend to balance each other out, for the Pray Codex as for the rest.

Conversely, Emmanuel Poulle, French mediaevalist and former director of the Ecole des Chartes, in his academic article published in 2009, explicitly considers only these "poker holes". For him, the cause seems settled, and this single element seems sufficient to support the link between the Pray Codex and the Shroud of Turin. For the rest, he refers to the topological study conducted by the geneticist Jérôme Lejeune.

4 Detailed approaches

Detailed approaches are frequent: in the qualitative survey, six authors mention at least six characteristics. Two Frenchmen examine the Pray Codex in detail: the independent researcher Sébastien Cataldo and the journalist Brice Perrier. The same goes for Ian Wilson in 2010. He offers a nuanced conclusion: according to him, the resemblance is "probable". Thus, we have a spectrum ranging from professional mediaevalists to an independent researcher via a journalist, who produce non-polarized conclusions. Thus, contrary to Nicolotti's assertion in his book, it is possible, even for researchers interested in the Shroud, to introduce a dose of caution into their historical judgments. The evaluations made by Cardini-Montesano, Cataldo, and Perrier show that it is possible to avoid polarization on a controversial religious topic.

Art historians Thomas de Wesselow and Andrea Nicolotti provide two examples of detailed approaches with polarized conclusions. De Wesselow, clearly influenced by Dubarle's research, analyzes the Pray Codex over four pages: he undertakes a search for "telling correspondences". He finds eight of them, with an uneven distribution between the upper part representing the anointing (5) and the lower part (3). His conclusion, considering these points of correspondence, is in favor of a relationship between the Pray Codex and the Turin Shroud. However, De Wesselow does not explicitly engage with scholars opposed to his analysis... unlike the skeptic Andrea Nicolotti, whose analysis may appear as a reply to Frale's book.

Nicolotti indeed offers the most meticulous analysis: little escapes to his critical gaze. And his opinion is also clear: the Shroud of Turin could not have inspired the artist of Pray Codex. The magisterial tone employed paradoxically emphasizes surprising shortcomings. Here we will mention three of them:

1) Nicolotti does not seem surprised by the nudity of Jesus appearing in the entombment. For him, it frequently appears elsewhere. But he provides no note for his one-sentence claim. Sometimes, artists represented Jesus naked in the 12th century – for example, the depictions of the baptismal scene. In the third and fifth centuries, a couple of Christian Fathers imagined the nakedness of Jesus during or after the Crucifixion (Pietro Savio, *Sindon*, 1960, 3, p. 18-19). However, the pictorial representation of his post-crucifixion nudity does not appear until the end of the 14th century. The main reason is that the authors of the Gospels do not mention Jesus' nudity during the Passion. So why would a 12th-century artist take this initiative?

2) Nicolotti opposes the interpretation according to which the herringbone fabric appears on the folio. The artist "would have to enlarge it dozens of times", because these marks are hardly visible to the naked eye. But these enlargements do constitute an ordinary artistic practice, which appears on two mediaeval representations of the Shroud: the Cluny medallion and the Machy mold found in 2009.

3) The third point concerns a dark sign present on the face of Jesus. Was it done voluntarily, and does it correspond to the epsilon on the forehead of the Turin Shroud man? Are we facing a coincidence? According to Nicolotti, we would be here in the presence of "an indistinct smudge, which is not similar to the epsilon in terms of its shape or its position (on the Shroud, it is at the center of the forehead)." This assertion can only leave one wondering: on the Shroud, the epsilon is not strictly above the nose, so much so that the epsilon "extends" entirely over an eyebrow. Lejeune, who examined in Budapest the Pray Codex, was convinced that this mark was intentional.

5 Methodological approaches

5.1 The threat of hypercriticism

The desire to strive for exhaustiveness does not offer a guarantee of arriving at a shared assessment, as shown by the divergent opinions of Lejeune and Nicolotti. Nicolotti's stated desire to convince the reader that he will – finally – provide a critical and complete reasonable historical analysis will lead us to wonder about hypercriticism, in the sense that Henri-Irénée Marrou understood it, namely an "obstinacy in disbelief".

A lack of open-mindedness is often correlated with over-detailed analyses. Mark Guscini, at the end of his thesis on the tradition of the image of Edessa, attacked Andrea Nicolotti. According to Guscini, Nicolotti's aim "seems to discredit the Shroud of Turin and anyone who does not reject it in the same terms as him, which blinds him to certain other historical facts". In 2021, Ian Wilson in his review of Nicolotti's translated book into English made the same kind of critique (Wilson, *The Catholic Historical Review*, 108, 2, 2022, p. 391-404), as archaeologist William Meacham in 2022 (https://www.academia.edu/89911497/On_Nicolotti_the_Flagrum_and_the_Shroud). Emanuela Marinelli amplified this criticism. With an obvious polemical tone, she described Nicolotti's work as "the sum of extreme negationism. According to Marinelli, "Nicolotti is against any possibility that there could be a minimal historical indication that the Shroud existed before the fourteenth century, and this conviction is not offered as an alternative hypothesis to the others, but as an absolute certainty". This accusation of negationism must not fail to remind us that this is a concrete danger especially when

experts tackle a theme at the heart of our civilization, as shown by the intellectual trajectory taken by the French journalist and essayist Paul-Eric Blanrue, author of two books supporting the thesis of the mediaeval forgery. Since 2011, Blanrue, mentioned without reservation by Nicolotti as one of the French "leaders among skeptical scholars" in Turin Shroud studies, has appeared won over by the discourse of French negationist Roger Faurisson.

Of course, this hypercritical threat works both ways. It seems difficult to annihilate. To make an overall judgment on the authenticity of the Shroud of Turin requires, in addition to a sure methodological approach, to constantly question oneself during the investigation: "I study, I publish but in the event of contrary evidence, would I be ready to change my mind?" The quarrels of egos and the possibility of benefiting from international media coverage come in addition to this disturbing question, which is sometimes so intimate that it can affect the most rooted religious and philosophical convictions. These elements were already present from the first photography taken by Secundo Pia in 1898. Was the picture faked? Canon Ulysse Chevalier hid among the references some facts once he had obtained all the historical documents from the 14th century. In 1988, the failure of radiocarbon dating seemed unthinkable for laboratories. The experiments made up by Kuznetsov remain in scholars' minds. In an audio interview with the French-language monthly *Québec Science* in 2021, Andrea Nicolotti mentioned his belief that his opponents, even if they greet him cordially in the street, deep down would not be unhappy if he prematurely passed away. Once this level of intensity has been reached, we realize how difficult it can be to have always enough critical perspective. However, this critical distance is crucial for the reliability of the subjective evaluation. If we can torture a document so that it confesses, we can also force it to be silent.

5.2 Intuitive assessments

The subjectivity of the expert plays a significant part in the critical assessment process. Historians and experts frequently rely on a mixture of knowledge of the different artifacts, the period, and relevant prejudices, which come together to develop an opinion. This "expert's experience" which is an intuitive approach still used in the art world to detect fakes or to make attributions. The confirmation bias limits the efficiency of this method. Hardly reproducible and objective, it only fits a broad definition of the scientific realm. But this approach should not be rejected. It is a perilous treasure, with little power of conviction, which should be used with caution.

In the case of the Pray Codex, this use of an intuitive approach is more perceptible in incomplete approaches. Mechthild Flury-Lemberg refers to "a remarkable source [...] much more significant than any other comparison with an ancient artifact could be, and for the textile historian it is equally powerful."

5.3 More systematical approaches

Even if they are far from avoiding all appeals to personal intuition, more systematic approaches have appeared. A listing of common features can be used. According to art historian Thomas de Wesselow, eight significant similarities between the image on the Turin Shroud and the miniature of the Pray are sufficient. Like a police expert finding common features on two fingerprints, Wesselow wrote that the "only reasonable conclusion is that the artist of the Pray Codex was aware of the Shroud." Nevertheless, this identification should be immediately nuanced by emphasizing that the miniaturist may not necessarily have ever been in the presence of the Shroud. This comparison does not lead us to think that the medieval artist was only trying to reproduce an artifact and not simply to evoke it. In the latter case, this miniature would then have been a testimony of faith and spiritual support, without

ever being thought of as evidence. An evocation does not seek the accumulation of convincing elements.

And why not going further by attributing a probability to each feature? Jacques Bara in 2010, and “O.K”, an anonymous Polish apologist, in 2014 developed this argument. O.K. attributes a probability, each time extremely low, to six characteristics that he describes as common to the Pray Codex and the Turin Shroud. Those characteristics are proposed as “independent, non-trivial and non-disputed”. This approach not only is systematic but also a minimal facts approach, because it is based on the broadest academic consensus and eliminates some characteristics common to the images and the less consensual features (the stain on the forehead is absent). The probabilities attributed to the various characteristics (nudity, four fingers on each hand, cut legs at the end of the page, the zigzag drawing, two red lines that may refer to the dorsal blood belt of the Turin Shroud, the four L-shaped holes) are each time extremely low. A simple multiplication of those extremely low independent characteristics makes the coincidence infinitesimal. If we adopt this frequentist perspective, the conclusion is obvious: there is link between the Pray Codex and the Turin Shroud.

But this line of reasoning has some inherent weaknesses. First, one can think of some bias selection given the fact that hundreds of images contain two common characteristics and that our brain is looking for them. Secondly, historiography tells us that one or two common characteristics rarely allow a definitive conclusion. In the 1970’s, historian Hans Belting refrained from identifying the Shroud with the byzantine funeral lamentations (*epitaphoi threnoi*).

5.4 A Bayesian framework

This frequentist approach has the merit of clarifying the choices, but it is not without significant obstacles. A Bayesian framework seems preferable. As emphasized by epistemologist Christopher Behan McCullagh in 1984 (*Justifying Historical Descriptions*, Cambridge University Press), many researchers have often applied the Bayesian reasoning without even knowing it. However, its ignorance or absence of practical application has led many philosophers like Hume or top physicians nowadays to erroneous or unjustified conclusions.

This approach insists on the *a priori* evaluation (plausibility) which it re-evaluates in the light of the new pieces of evidence. A Bayesian reasoning explains why an extremely low probability can quickly be counterbalanced by one or more highly probable elements. For example, I know that it is extremely unlikely that I will win the lottery tonight (extremely low plausibility). However, if television news announces my numbers, my belief in my gain becomes justified. It is extremely unlikely that an exceptionally reliable source would be wrong for the first time that very evening. This Bayesian approach is an invitation to be attentive to the general context, and to keep an open mind.

Independent testimonies, however unlikely, are also likely to quickly counterbalance an assessment. In the case of the Pray Codex, one keeps in mind the testimony of Nicholas Mesarites, the sacristan of the imperial palace in Constantinople, who mentions the nudity of Jesus (for three recent translations in French and English: Dubarle, *Histoire ancienne du linceul de Turin*, 1986, p. 39; Guscini, *The Tradition of the Image of Edessa*, 2016, p. 145; Nicolotti, 2020). This nudity is, as mentioned above, difficult to explain if we find ourselves in the presence of a forger. What is the probability that the Pray Codex and Nicholas Mesarites were not influenced by the same object? Robert de Clari’s eyewitness testimony is also coherent with the image of a lengthy cloth, which could have been brought, even weekly, from the Pharos Church to the Church of the Blachernae.

Optionally, one may be surprised to see the diocese of Troyes appear in the historical landscape of the translation of relics after 1204. Bishop Garnier brought many relics to his diocese of Troyes: the list is

incomplete, but obviously no document allows us to say that the Shroud of Turin figured among them. In a revealing way of the historiography of the Turin Shroud, Ian Wilson evokes this possibility when Andrea Nicolotti rejects it by using a fragile argument from silence.

A general evaluation in the Bayesian framework requires taking into account the elements going in the opposite direction. The Psalter of Ingeborg highlights the similarities and dissimilarities between this folio from the Pray Codex and other models of the time. The layout of the scene of the Psalter of Ingeborg is quite similar, but of higher quality. They are both of Byzantine inspiration, but the latest research shows that it was produced around 20 years later (1214-1218) than the Pray Codex. That said the differences are still obvious: Jesus is dressed in a long sheet with only one hand visible (no thumb), there are no chevrons, no Greek crosses, etc.

Let us take an example to try to better understand the decision-making process. Let us imagine that we find ourselves in front of a drawing produced in the 16th century in the region of Châlons-en-Champagne, about a hundred kilometers from the hamlet of Lirey, showing the burial of Jesus. Jesus is wrapped in a white sheet, completely naked, arms crossed, with traces of blood all over his body, a crown of thorns, a bifid beard, but without an epsilon trace on the forehead, without dorsal image, without marks in the palms, without burn holes. Could we say, based on this iconographic presentation, that it is certain that the Shroud of Turin did not directly or indirectly influence the artist? However, this drawing exists: it is kept in the municipal library of Châlons-en-Champagne (ms. 0336, f. 071). The Pray Codex shares more features with the Shroud of Turin than this 16th century drawing. The parallel between the manuscript of Châlons-en-Champagne and the Pray Codex shows why it is impossible to claim beyond a reasonable doubt that the Shroud had no influence on the folio XXVIIIr of the Pray Codex.

6 Conclusion

At the end of this simplified presentation, let us first state a hypothesis which should be uncontroversial: the artist of the Pray Codex did not seek to help the sindonologists of the 21st century, whether they are *a priori* for or against the thesis of an antique image. If the artist referred to a relic of his time, he sought to integrate his work into the artistic framework of his time and he sought more to evoke than to demonstrate, hence the difficulty for our iconographic and historical analysis.

The comparison between the Pray Codex and the Shroud of Turin, reinforced by a credible historical context and combined with a reliable methodological approach, makes the position that the Turin Shroud has absolutely no direct or indirect link with the Pray Codex untenable. The obstacles to certainty remain our incomplete knowledge of this period including artistic practices, the lack of a dorsal image on the Pray Codex, and the absence of definitive testimony. However, it can be said with confidence that the miniaturist of the Pray Codex probably had a direct or indirect link with the Shroud of Turin.

The subjective nature of these analyzes invites us to cautiousness. This caution in front of such a long-lasting controversy is reinforced by the ongoing crisis of reproducibility in science, that is to say by the difficulty of reproducing many results that have yet appeared in leading academic journals. This crisis also concretely affects the research on the Shroud. Given the current difficulty of reproducing the conclusions of some papers dealing with the so-called "hard science", one should not be surprised by the difficulty of obtaining a wide consensus on the intent of a medieval anonymous artist.

The scientific study of history remains a rational practice, even when dealing with religious topics. To arrive to a wide consensus about endless controversies, discussions should be based on standards of justification including historiographical criteria and a good understanding of a probabilistic reasoning

(cf. Behan Mc Cullagh, *The Logic of History*, Routledge, 2003).. A Bayesian framework should be privileged to safeguard researchers against important biases and prejudice. A good understanding of the Bayesian mechanism helps to emphasize the importance of common characteristics when they significantly differ from the artistic models of the late 12th century. The ongoing debate about a possible relationship between the Pray Codex and the Turin Shroud illustrates that iconographic analyses are, in essence, subjective. Moreover, the analysis of this specific controversy helps to understand why some historical debates are still difficult to solve, especially when dealing with religious topics. However, a better understanding and use of epistemology, historiographical criteria and probability reasoning by historians might constitute a valuable objective basis for solving difficult interdisciplinary disputes.

Table 1 Qualitative survey of the characteristics of the folio XXVIIIr of the Pray Codex mentioned by some Turin Shroud scholars (2008–2020).

	Poulle (2009)	Flury– Lemberg (2009)	Cardini– Montesano (2015)	Wilson (2010)	Antonacci (2015)	Frane (2009)	Cataldo– Heimburger (2008)	Perrier (2011)	Marinelli (2011)	De Wesselow (2012)	Nicolotti (2020)
Poker holes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Decorative holes	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Crossed arms	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total nudity	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bloody stain	No	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes
Herringbone weave	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Long fingers	No	No	No	No	No	No	Yes	Yes	No	No	Yes
No thumbs	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No sign of violence	No	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes
No image on the sheet	No	No	Yes	No	No	No	No	No	No	Yes	No
Psalter of Ingeborg	No	No	No	No	No	No	No	No	Yes	No	Yes
Total	1/ 11	3/11	4 /11	5/11	5/11	6/11	8/11	9/ 11	9/11	9/11	10/11
Probability of inspiration by the Turin Shroud	95–100%	95–100%	50%	80–95%	95–100%	95–100%	50–80%	50–80%	95–100%	95–100%	0–5%

Recent bibliography about the Pray Codex

- Sébastien Cataldo and Thibault Heimburger, *Le linceul de Turin* (Paris: Docteur Angélique, 2008), pp. 38–43;
- M. Flury-Lemberg, 'The image of a crucified man on the Turin Shroud: Measures taken for conservation of the legibility of the body image', *ICCROM Conserving Studies* 7 (2009), pp. 43–51 (here pp. 45–6);
- Barbara Frale, *La Sindone di Gesù Nazareno* (Bologna: Il Mulino, 2009), pp. 55–6;
- E. Poulle, 'Les sources de l'histoire du linceul de Turin. Revue critique', *Revue d'histoire ecclésiastique* 104 (2009), pp. 747–782 (here pp. 773–4);
- Ian Wilson, *The Shroud: The 2000-Year-Old Mystery Solved* (London: Bantam Press, 2010), pp. 183–4.
- Brice Perrier, *Qui a peur du saint suaire ?* (Paris: Florent Massot, 2011), pp. 183–7;
- E. Marinelli, 'Wiping the slate clean', *British Society for the Turin Shroud Newsletter* 74 (2011), pp. 11–2;
- Thomas De Wesselow, *The Sign: The Shroud of Turin and the Secret of the Resurrection* (London: Penguin, 2012), pp. 178–81;
- Mark Antonacci, *Test the Shroud: At the Atomic and Molecular Levels* (LLC: LE Press, 2015), p. 215;
- Franco Cardini and Marina Montesano, *La Sindone di Torino oltre il pregiudizio. La storia, la reliquia, l'enigma* (Milano: Medusa, 2015), p. 120;
- Andrea Nicolotti, *The Shroud of Turin: The History and Legends of the World's Most Famous Relic* (Waco: Baylor University Press, 2020), pp. 406–15, translated with minor updates from Andrea Nicolotti, *Sindone. Storia e leggende di una reliquia controversa* (Turin: Giulio Einaudi, 2015).

