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Review

Turin Shroud: Example of Claims against its Authenticity and Comments

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Summary

After the publication of some articles that clarify why the body image of the Turin Shroud is not reproducible in the laboratory and not even explainable in its macroscopic and microscopic complexity, several opposing comments have come to light in which the opposite was declared superficially and subjectively.

The authors of this article take as an example some comments made by scholars of the Shroud Science Group, a commentary sent to a Journal but not published and a web page containing many heavy critics exemplifying observations that can be read against the authenticity and commented on scientifically.

The frequent inconsistency and subjectivity of such criticisms are subsequently emphasized, suggesting that they are driven less by a commitment to scientific objectivity and more by underlying motives probably arising from unease with the existence of this Relic that offers scientific evidence of the Passion, Death and Resurrection of Jesus Christ.

Introduction

The TS[1] (Turin Shroud or Holy Shroud) is one of history's most studied and debated religious Relics[1-8]. It is a handcrafted linen textile woven in a 3:1 herringbone twill pattern, measuring approximately 4.4 meters in length and 1.1 meters in width. The fabric bears the full-length, front and dorsal images of a human figure, inexplicably impressed upon the cloth. This figure displays wounds consistent with those of a man who underwent severe torture and crucifixion, aligning with descriptions found in the CHB (Christian Holy Bible) regarding the Passion and Death of Jesus, **(Figure 1)**.

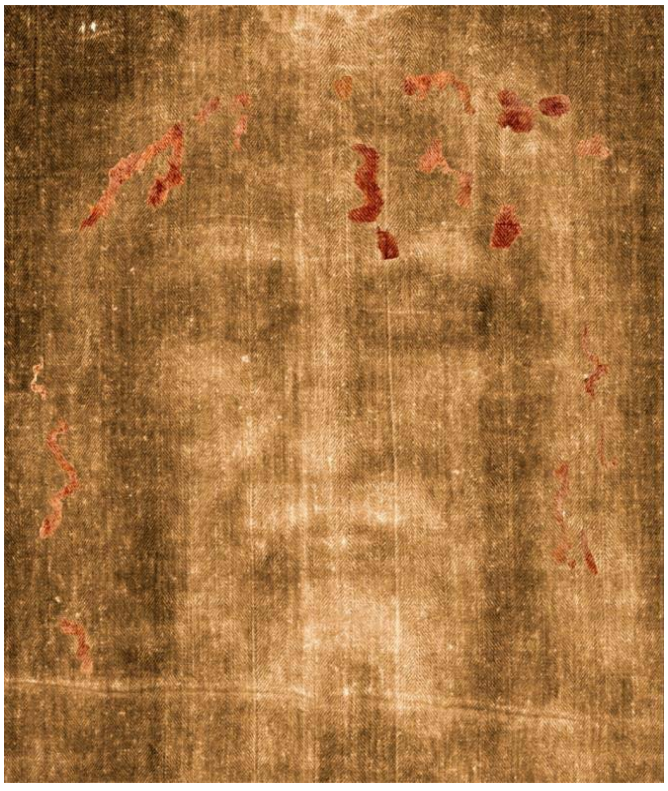

Figure 1: TS face (negative image) with bloodstains added (positive image).

Throughout history, the TS has been venerated as a sacred relic, with documented accounts tracing its presence across various locations over the centuries. Pope Julius II (1443–1513) officially recognized it as an object of adoration[9], cementing its significance within Christianity. Historical analyses suggest that the TS have been in Byzantium before the Sack of Constantinople in 1204 and later made its way to Chambéry, France before ultimately being enshrined in Turin, Italy, where it remains.

Byzantine coins[10,11] dating as early as the 7th century depict facial features strikingly similar to those on the TS, indicating that the Relic was known and venerated long before its documented appearance in Western Europe.

In 1898, the lawyer and photographer Secondo Pia captured the first photographs of the Relic, which quickly spread worldwide and marked the beginning of scientific research on the TS. To this date, the TS continues to challenge scientific understanding, as the formation of its body image remains unexplained and has never been successfully replicated despite numerous attempts. Given the religious significance of the TS and its profound implications, its authenticity was immediately questioned, prompting numerous investigations and scientific analyses.

Forensic examinations[12-16] confirm the presence of liquid blood on the TS at the moment of wrapping a human body, with the absence of evidence of smearing, indicating the body was neither moved nor manipulated after bleeding onto the cloth. Additionally, the absence of putrefaction suggests an unusual phenomenon, leading researchers to explore the concept of "material transparency"[15,16] as a possible explanation for how the corpse disappeared from the TS without disturbing its imprint.

Several discussions have arisen following the numerous articles published since 2024 regarding both the blood analysis of the TS[12-16] and the impossibility for an artist to reproduce the double bloody image of a man[13,16] that the authors, also based on a comparison with the CHB, recognized as Jesus Christ scourged, crowned with thorns, nailed to the cross, dead, laid in a tomb and resurrected on the third day.

The vast majority of observations and objections have arisen from some scholars of the Shroud Science-Group (SSG), some of whom have even published statements that the authors consider insufficiently documented or questionable. For this reason, they report their objections and explanations in this article so what was perhaps written synthetically for reasons of space can now be better clarified.

In particular, the following points will be clarified:

- Presence of different blood types on the TS and their characteristics.
- Responses to general criticisms and clarifications on the impossibility of reproducing the body image.
- Comments on various criticisms published by a member of SSG.

The Blood of the Turin Shroud

Before commenting on the criticisms raised, it is considered appropriate to summarize the recently published results[1,2,12-16], which confirm and provide further details of what has already been detected by experts[17-23,31,32] in the past.

Refs.[17-23] detected the presence of blood in correspondence with the wounds of Jesus of the TS, thus confirming the contact with a severely tortured man, but Refs.[24-30] identified the presence of only iron oxide Fe_2O_3 and mercury sulfide HgS particles in the presence of the same wounds, thus formulating the hypothesis of artistic intervention.

Refs.[31,32] subsequently clarified that the wounds in question were produced by blood but these were probably contaminated with pigments caused by the pressure of pictorial copies to make them contact relics.

Recent papers[1,2,12-16] have divided blood particles into three categories: Type A, B and C, based on their microscopic appearance.

Type A blood[12] is typical of that sampled from sticky tapes placed in contact with the TS by R. Rogers during the STuRP (Shroud of Turin Research Project) campaign in 1978 and is very similar to that published by Kohlbeck, et al. in Ref.[33] (page 24 on the left). It consists of numerous reddish particles on the adhesive tapes; both adhering to the flax fibers of the TS and being isolated in the adhesive of the tape. The elemental composition of this material is compatible with that of blood particles.

The appearance of these discoid particles is donut-shaped with a central concavity, very similar to an erythrocyte, where the elements contained in them are compatible with those of the blood (Carbon-C, Oxygen-O, Iron-Fe, Calcium-Ca, Chlorine-Cl, Nitrogen-N, Potassium-K and Phosphorus-P).

As their dimensions vary from 0.3 to 2 micrometers, one can, therefore, assume that these particles are microcytes or parts of them. Two hypotheses can be formulated: either they derive from non-coagulated blood that has undergone a strong contraction or these particles could be apoptotic bodies deriving from echinocytes (erythrocytes that have short, rounded protuberances that indicate a pathology such as acute renal failure) that have fragmented and dispersed in the plasma.

Experimental tests with human blood mixed with urea, aloe and myrrh have shown that erythrocytes can be reduced much more than those found in Egyptian mummies of Ref.[34], having dimensions of 4-5 micrometers.

Incidentally, since Jesus suffered from very high acute renal failure due to flagellation, this transformation of erythrocytes causing microcytic anemia suggests the extreme difficulties He had in oxygen exchange, causing extremely labored breathing.

Noteworthy is that no whole leukocytes were found among these microcytes, which would be typical of a living person [12]. Therefore, it seems appropriate to identify this Type A blood as postmortem.

Finally, it is noteworthy that this Type A blood is fluorescent and shows an intense Beta activity (consisting of an electron emission). This indicates radioactivity of the material that may have produced nuclear reactions in the TS linen and could have transformed nitrogen into carbon 14. Ref.[35], confirming this hypothesis, shows the anomalous reduction of nitrogen in the blood of the TS. Ref.[12] also detected other blood components mixed with Type A blood, such as fibrin and creatinine, the latter typical of a severely tortured person.

Type B blood 12 consists of fragments of compact, but fragile, crusts darker than Type A blood. It is rarer than Type A blood. Its elemental composition is compatible with that of blood and its dimensions are up to a tenth of a millimeter; it has shapes that are not rounded but with edges that suggest previous fragmentation of larger particles.

This blood appears to be pre-mortem blood that coagulated on the skin from open wounds when Jesus was still alive.

Type C blood 12 consists of very rare donut-shaped particles found only in the TS dust vacuumed from the back of the face (Filter-f).

The particle size varies from 2 to 6 micrometers and has a structure compatible with that of erythrocytes. Initially, in too small quantities to be definitively recognized, these particles were later better identified in Ref.[2] as probable residues of blood sweating (hematidrosis) that have swelled following immersion in a hypotonic liquid such as human sweat.

Refs.[1,2,12-16] have been commented on SSG both positively and negatively. "The negative comments can be summarized in blue."

The published results do not seem convincing. In fact, it is not easy to establish whether they are microcytes or echinocytes based only on their morphology. There could be several possibilities of interpretation like those regarding spores and fungi and to be sure a more direct demonstration would be needed for example using immunological methods with specific markers for red blood cells.

The authors can agree with this observation that only a morphological analysis could lead to some interpretative errors, but some details often allow for the differentiation of spores and fungi from the erythrocytes detected on the TS. For the identification of erythrocytes on the HS, in general, we must keep in mind the following.

- All the bloodstains that can be observed on the TS are perfectly consistent in shape and position, both with the wounds produced by the tortures suffered by Jesus on the TS and with the description of the CHB[15]. All the particles under analysis were sampled from these red spots.
- Morphologically, the particles under examination closely resemble erythrocytes and an expert's recent paper recognized them at first sight without any doubts[36].
- Dimensionally, the particles under examination are compatible with those of erythrocytes (microcytes of dimensions similar to those of Type A have been found in laboratory experiments[12]).
- These are the only particles recognizable as organic (for example, rounded edges) found precisely in the red areas of the TS that Refs.[17-19] have been identified as containing blood.
- Ref.[33] (figure p. 24 on the left) also published a photo of a bloody fiber containing rounded particles similar in shape and size to those under examination.
- No particles of a different species, attributable to fungi or spores, were found in the area under examination compared to those identified as erythrocytes.
- It should be noted that spores such as aspergillus are found practically on the entire surface of the HS but not in the bloodstains, while erythrocytes were found only in correspondence with the bloodstains of the HS.
- The particles under examination are red; even if some fungi and bacteria produce reddish pigments, color is an effective means of particle selection.
- The elemental composition corresponds to that of blood, including nitrogen and iron; even if some fungi and bacteria are composed of nitrogen and iron, these elements are an effective means of particle selection.

Consequently, it would be absurd for the authors to hypothesize that the particles under examination are spores or fungi because in such a hypothesis, the authors would have to affirm that the red areas examined, where traces of blood were indeed found in Refs.[17-23,31-33], should be composed only of fungi or bacteria and, therefore, devoid of erythrocytes, in contrast with the points just considered.

Immunological methods could offer additional confirmation; however, they require quantities of material that would be consumed in the analysis - an approach that is currently unfeasible, as new sampling from the TS is not permitted at this time.

Ref. [37] gives many examples of fungi and bacteria that can be mistaken for erythrocytes. For example, spores of aspergillus (Figure 5 in Ref. [37]) are very similar to the echinocytes found.

- Someone, at first glance, could confuse Aspergillus (in reality, Aspergillus Glaucus is present on the TS) with echinocytes, but a more careful analysis shows a circular discontinuity in the presence of the attachment base of aspergillus that erythrocytes do not have.
- Several spores have concavities similar to those of erythrocytes but also have asymmetries or orifices like those highlighted in Figure 5-a of Ref.[37].
- The characteristic dimensions of spores and fungi reported in the same article are frequently larger than those of Type A microcytes.

In addition to the Aspergillus, spores of Rhizopus of Ref. [37] (on the top of Figure 2) seems quite similar to a particle (on the bottom of Figure 2) presented in Ref. [12] and recognized as an echinocyte.

- We must premise that the discussion was focused on Aspergillus Glaucus because it is very common in the TS and was sometimes confused with a pollen grain in the past.
- Although Rhyzophus spores may exhibit a macroscopical resemblance to echinocytes, they differ in critical microscopic characteristics. Prior to proposing Rhyzophus as a viable alternative to the echinocyte hypothesis, it is essential to verify whether the spores contain iron and possess a red color, properties that, according to the authors, are doubtful.
- Rhizopus is a mold found in the soil, fruit and march vegetables, animal stools and bread that went bad. This does not seem to the authors to be the typical environment of a linen fabric that lasted for 2000 years in protected places. Consequently, it is not probable that Rhizopus will be found in the samples under analysis.
- It should also be noted that echinocytes derive their shape [38] from the intervention of the chemical environment on the erythrocyte membrane and in particular on the membrane

receptors for cellular nutrients [39]. The erythrocytes have the typical sunflower appearance with short and rounded protuberances, as the result of the biochemical action of ions on the membrane. The appearance of the cell appears as a biconcave lens, different from that of a spore. The alteration of the erythrocyte morphology can be caused by respiratory increase in blood pH (alkalosis) caused by hyperventilation with reduction of phosphate levels in the blood (hypophosphatemia) caused by stress due to increased respiratory rate (tachypnea) as presumably occurred during the ascent to Calvary of Jesus Christ.

- While echinocytes show less accentuated and more rolled protuberances, the Rhyzophus shows a more granular surface. Figures 10, 14 and 19 in Ref.[12] confirm hypophosphatemia in elemental analysis of blood cells.

These notes convince the authors even more that the supposed echinocyte is precisely what had been supposed.

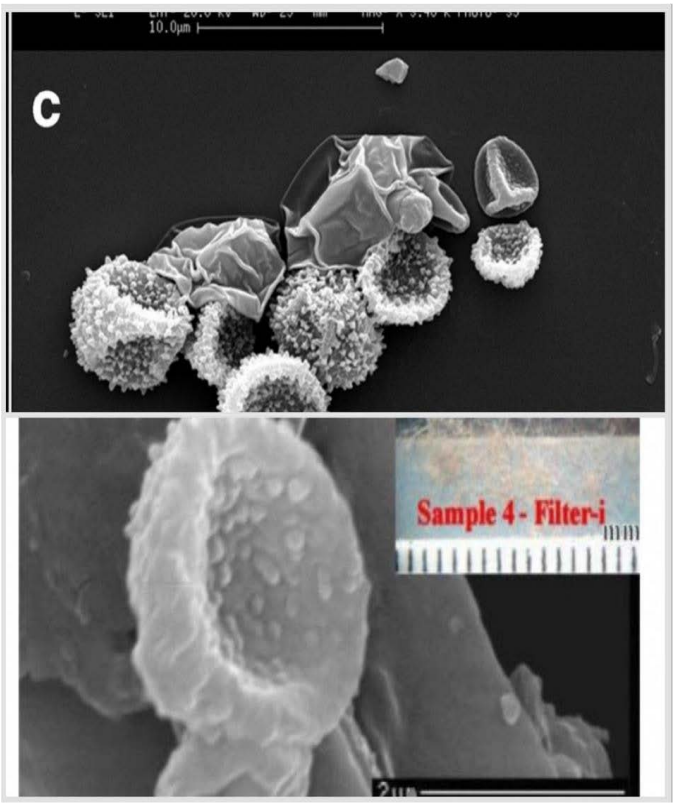

Figure 2: Comparison between spores and erythrocytes. On the top, Rhizopus of Fig. 6 in Ref. [37] and on the bottom echinocyte of Fig. 16 in Ref.[12]

General Claims Against the Turin Shroud's Authenticity

A member of SSG sent an unpublished commentary against the authenticity of the TS and, in particular, against what is published in Ref. [13] where the medical impossibility of reproducing the blood traces of the TS is demonstrated. The authors think the commentary was not accepted probably because of the lack of facts supporting the reported point of view. Here is an excerpt.

The commentary began by stating that the declaration of impossibility of Ref. [13] is a bold statement that requires a very thorough analysis of the possibilities. Simply inventing a particular scenario and finding it impossible is unlikely to convince researchers who have come to different conclusions. The commentary goes on to state that the author proposes a fantastic way of operating and, finding it incredible, declares his thesis proven. However, others have thought of alternative methods of production, which are not discussed.

The commentary ends by stating that the Shroud has been very little studied and that scientific investigation has been limited to four brief occasions since 1973, during which very small samples were collected and made available to only a handful of scientists.

The author of this statement has either not reviewed the full body of scientific literature that logically led to the formulation of the scenario dismissively labeled as "invented" or, more plausibly - chooses to disregard these findings. This appears to be an attempt to align with the average reader who may be unfamiliar with the relevant analyses, in order to mislead and persuade them of a predetermined conclusion.

Kenneth Stevenson explains this behavior in a podcast[40] declaring in a similar case: "*it is an attempt to avoid facts ... if we can't avoid facts let's muddy the waters. Let's create some confusion and then we can justify what we want to believe*."

The accusation goes on to derogatorily declare the proposed method "fantastic", but the authors confirm here that this method is the only plausible for them to substantiate all the scientific facts found regarding the characteristics of the TS blood. If anyone has an alternative method to propose to interpret the particular characteristics found in the blood, it is his duty to formulate his proposal in detail so that it can be scientifically evaluated.

To state that the TS has been very little studied is a questionable point of view given the dozens and dozens of scientific papers published in important scientific journals on this topic. Finally, stating that only small samples have been made available to only a handful of scientists perhaps hides a note of resentment on the part of the person who made this statement because he was excluded from these analyses performed by dozens of esteemed scholars.

In conclusion, if we humbly place ourselves before the TS, acknowledging it not merely as an object of study but as a profound mystery of faith - and set aside our prideful need to be proven right - we believe our dialogue would shift from contention to deeper spiritual insight and shared understanding.

Claims In a Web-Page Against Authenticity of the Turin Shroud

Responding appropriately to the thousands of words written on web pages [41] probably written to confuse the reader who is not very familiar with the issue addressed would require a few tens of thousands of words that probably very few would read. Therefore, the authors decided to comment only on some statements that are clearly questionable and, in some cases, even provocative towards the authors themselves.

The Ref.[41] claims to be able to reproduce the body image of the TS using a modified technique by him, which was initially proposed by Emily Craigh[42]. This proposed method described in producing the image begins by mixing one egg yolk, 50 cm^3 of water and 50 cm^3 of malt vinegar. Then to 5 ml of this mixture is added 0.5 g of yellow ochre. The fabric is then fixed on a bas-relief and a swab, previously dipped in paint and dabbed on a piece of waste material until only a small amount is transferred, is dabbed onto the sample, producing the image. After drying,

the sample is washed or scrubbed with a toothbrush to remove surface debris and then ironed to remove creases.

As already demonstrated in Refs.[42,43], microscopic analysis clearly demonstrates that Ref.[41] is unable to reproduce the characteristics of the image fibers of the TS, which are uniformly colored only in correspondence with their superficial layer and not with pigments or supplementary substances.

The authors remember here that only one piece of evidence is sufficient to invalidate the whole hypothesis presented. However, the author of Ref.[41] is skilled at confusing ideas by mixing many collateral topics of minor importance with the justification of clarifying for the reader, who is also called to judge the information presented in a sometimes-misleading way.

For example, to sustain the similarity of the experiment with the TS fibers, that author compares a micrograph of linen fibers from his experiment, rich in additional colored particles, with a TS fiber not of pure image, but a bloody fiber photographed by Eugenia Nitowski (without clarifying that this particle was taken from a bloodstain) asserting that both contain additional particles (red blood cells in the case of the TS fiber).

For an objective comparison, **Figure 3** shows colored TS fiber, non-colored ones, bloody Ref. [41] fibers and particles rich in pigments of the mentioned experiment. The lack of additional pigments on the TS image fiber is evident.

Evidence E12 of Ref.[42] explains that the fibers are uniformly colored around their cylindrical surface; the color is not concentrated in spots as we could expect from a pigmented fiber.

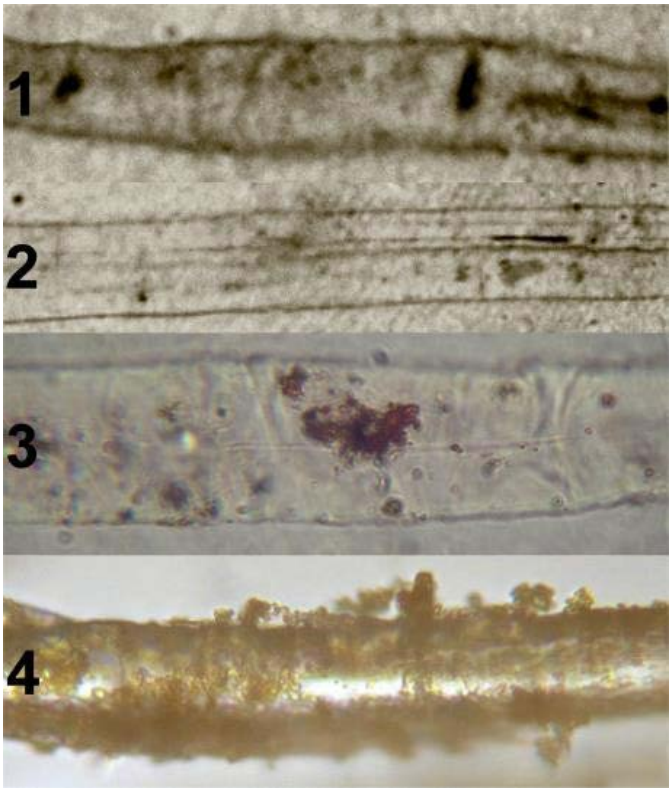

Figure 3: Comparison among image fibers. 1: image fiber coming from the TS (STuRP-1EB). 2: nonimage fiber coming from the TS (STuRP-1EB). 3: bloody fiber coming from the TS (STuRP-1EB). 4: colored fiber coming from experiment of Ref.[41]

A listener of a podcast[44] commented defining the author of Ref.[41] in this: *"(He) knows it's the real deal. Otherwise, it would make zero sense that he would be literally dedicating his life to prove it otherwise. He's a snake in the grass as you well know. Pray for him."*

Regarding the depth of penetration of the image into the tissue layer, Ref. [41] shows low magnification photographs where it is impossible to verify the real depth in question, which, however, far exceeds that found by the STuRP scholars in reference to the TS image.

The author of Ref.[41] is forced to admit the failure of the proposed experiment, but he does not accept it completely because he states the following, thus leaving some doubts in the reader, who is probably unaware that Ref. [42] has already published this comparison. Obviously, **Figure 3** clarifies everything. "*Evidence E12 ... is the true crux of the possible difference between the "paint" versus "radiation" hypotheses. Fanti illustrates the 'failure' of my experiment ... it appears he's quite right. ... On the other hand, Fanti does not show what a non-image fibre looks like, so we can't be sure if the conclusion is correct.*"

Below are some claims taken from Ref.[41] many are referred to in the twelve facts listed in Ref.[16]. With reference to the 12 pieces of evidence[42,43], based on which the results of the experiments discussed in Ref.[41] were evaluated, here is what Ref.[41] comments.

"*Fanti ... defines a list of 12 criteria against which the samples are to be judged, which are themselves more dependent on a conviction of authenticity than they are of observation.*"

Declaring "*dependent on a conviction of authenticity*" is a serious accusation not so much because it is directed at the first author of this article, but because it is equally directed at six respectable scholars who signed the study.

Ref.[41] then states that some of these 12 criteria are wrong even when they have been examined by several scholars[43]. Given the need for synthesis in the paper, it is possible that some of this evidence can be misinterpreted if there is no direct reference to the particular conditions of the TS body image and this seems to be the case where the author of Ref.[41] seems to identify himself with the inexperienced reader to make the statement seem wrong.

For example, regarding the hair Ref.[41] states "*They are dark in life and they are dark on the Shroud.*" forgetting that the TS body image did not encode the color of the hair but only the intensity with which the probable radiation emitted by the human body imprinted the body image.

Ref.[41] also makes questionable criticisms of the chemical-physical characteristics of the TS body image, previously published by the first author in collaboration with several experts from the Shroud Science Group[43]. These criticisms subjectively dismiss - without adequate demonstration - several highly significant features, some of which have recently been acknowledged by an important journal[45]. That journal not only reaffirmed but also expanded upon these findings, including the double superficiality of the body image, without any subsequent opposing commentary.

Another critical point is the blood issue previously discussed in this article. Ref.[41] states: "*The bloodstains are not involved in image formation.*"

This is not true because the particular conditions of bloodstains place several constraints, also discussed in Ref. [13], on the formation of the body image. For example, Ref.[41] reports:

"*The protease was only active against the serum coated fibers and as in the previous study revealed smooth, noncorroded fiber surfaces indicating that the blood images went onto the cloth before the image forming process and protected the underlying cloth* [19]."

Ref.[41] is not only hostile towards the first author of this article, but it also heavily discredits the important and rigorous work done by the famous chemists Larry Schwalbe and Raymond Rogers who had the opportunity to directly analyze the characteristics of the body image using appropriate means of magnification. In fact, it ridicules them by writing: "*The next of the classic canards is that the image "does not penetrate the threads… The evidence for this is miserably lacking; … Schwalbe and Rogers say, "*Microscopic studies have revealed the image to be highly superficial; the image resides in the topmost fibers of the woven material as a translucent yellow discoloration*," [4] but this could only have been ascertained by examining whole threads, not the scanty fibres extracted by the sticky tape.*"

In this regard, two clarifications are necessary. As mentioned, this evidence resulted from the direct analysis of the TS both with appropriate means of magnification and by using a proper dissecting needle and not as wrongly stated from the individual fibers taken from the adhesive tapes; furthermore, the sampled fibers are not "scanty" because several hundreds of them, see **Figure 4**, were sampled and studied in the details.

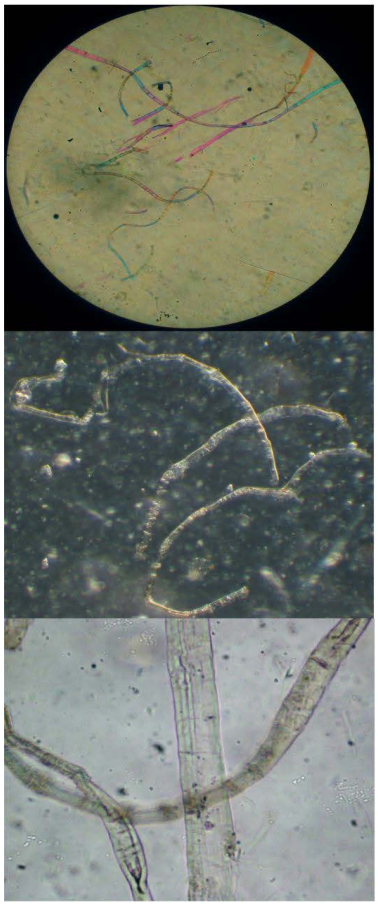

Figure 4: Example of various TS image and non-image fibers collected using STuRP-1EB sticky tape from the calf region of the dorsal image of the TS. Top: bundle of fibers observed under cross polarized light. Center same image fibers under epi-illumination. Bottom: fibers viewed in transmitted light, compared with a non-image fiber positioned nearly vertically at the center of the photomicrograph

Ref. [41] continues its unjustified hostility (only because these scientists brought important evidence in favor of the authenticity of the TS), declaring what follows. "*The truth is that the Shroud has not been sufficiently well examined for a definitive description of the image making method to be derived. Far from being the most studied artefact of all time, all we actually have is a handful of photographs, a few spectroscopic analyses and some sticky tape slides, achieved by pressing tape so weakly onto the cloth that scarcely more than adventitious debris was removed. The fibres adhering were then so thoroughly cleaned in the process of extracting them from the adhesive that it comes as no surprise that almost nothing was discovered on them....*"

The first author of this article, who had the opportunity to analyze the samples under discussion directly, can confirm the falsehoods contained in this statement.

A quick look around the web will show that the TS is by far the most scientifically researched archaeological artifact. This very important Relic does not boast a "*handful of photograps*" but hundreds if not thousands relating to the detailed spectrographic, chemical and physical studies.

The sticky tapes obtained from contact with the TS do not contain the so-called "*adventitous debris*" but very important blood samples, image and non-image fibers and many other particular elements that are very useful for understanding not only the particular characteristics of the body image but also details relating to the sufferings undergone by Jesus during the Passion and death on the cross[11-16,31,32,35,37,43,45,46].

Ref. [41] incorrectly states that… "*request from Giulio Fanti that I actually send him some of my experiments for review.*" The first author of this paper must clarify that he did not make any request to analyze the samples in question because he already assumed that they would be very different from the TS. He instead was pushed by the owner of podcast [44] to find the weak points of the method proposed by Ref.[41] and obviously had to ask the owner of the podcast to study the samples before providing a reliable judgment on them to satisfy him.

Comments

At this point, several questions naturally arise. Why would a scientist who presents himself as respectable feel the need to disparage the work of numerous scholars who have dedicated their lives to this research? And why disseminate so many falsehoods through a blog aimed at an audience genuinely seeking the Truth?

According to the authors, if one truly wishes to establish a claim scientifically - as appears to be the case here – one must begin with rigorous and comprehensive research on the subject. However, if this effort fails and the individual persists in promoting a predetermined conclusion for ulterior motives, the only remaining strategy is to discredit both the published findings and those who produced them.

In confirmation of this, Ref.[41] reports a personal attack on the first author by writing the following … "*Giulio Fanti's analysis … typifies Fanti's position in many of his papers on the Shroud and, in spite of his credentials as a Professor of Mechanical Engineering, it casts doubt on the probability of an impartial assessment of the evidence. However committed a scientist may be to a particular point of view, he does not champion it as infallible when he critiques a challenge to it. You can deny,*

but you do not easily refute a counter-argument to anything by starting with the statement that it's wrong. Fanti's principal attitude, as expressed here and elsewhere, is that any attempt to model Shroud image formation must be a failure because the Shroud is authentic and as I say, he devotes well over half his paper to establish authenticity first, without considering the samples at all. ... I was not confident that they (A/A experiments for review) *would be examined with a wholly impartial eye.…*"

This appears to be a harsh, gratuitous and unjustified criticism directed at the first author of this paper, as it misrepresents his scientific rigor and objectivity. How can one call into question the impartiality of a researcher's evaluation without presenting any supporting evidence? The authenticity of the TS, as supported by this author, is the conclusion of decades of objective scientific investigation - an evidence-based position that, over the years, has not encountered a single substantive contradiction.

It is for this reason that the first author arrives at this conclusion, though not in an absolutist manner. The first author's willingness to examine a new (ultimately unsuccessful) attempt to challenge the thesis he supports, demonstrates an openness to reconsider his position should credible and contradictory evidence emerge.

And, contrary to what Ref.[41] stated, the counter-argument was not rejected a priori as wrong, "*without considering the samples at all*". On the contrary, the samples were subjected to rigorous scientific evaluation and, as already noted, were found to be entirely unacceptable for formulating an alternative hypothesis of the TS body image formation (as later acknowledged even by Ref.[41] " *Actually, Giulio does make some valid observations*, *… Fanti is quite correct to conclude that I have not reproduced the Shroud image …*")

Concluding Remarks

This paper was written in response to several opposing comments that followed the publication of clarifications asserting that the body image on the TS cannot be reproduced in a laboratory setting, nor explained in its full macroscopic and microscopic complexity.

The authors addressed specific examples, including remarks from scholars of the Shroud Science Group, a comment submitted to a journal but ultimately unpublished and content from a web page.

Just as Jesus was crucified because His presence disturbed many, so too the TS continues to be crucified today - because it unsettles certain individuals, particularly positivist and rationalist scientists. These individuals often view the TS as a direct challenge to their belief that human science is capable of explaining all phenomena.

Since this persistent denial the TS's authenticity lacks scientific grounding and, in fact, all objective evidence continues to support its authenticity, critics often resort to two tactics: sowing confusion among the less informed and launching personal attacks against researchers who, through meticulous and sustained work, continue to uncover new findings that confirm the authenticity of the most important Relic of Christianity.

After more than 25 years of continuous scientific evidence supporting authenticity and in the absence of any scientifically credible evidence against it, the authors firmly conclude that the TS is authentic in the sense that it once wrapped the body of Jesus Christ who was tortured, crucified and resurrected after His death.

Until credible scientific evidence emerges to support their claims, it is clear that those who persist in denying it are probably driven by personal motives. In conclusion, the authors believe that it is inappropriate to equate serious scientists who have dedicated their lives to the rigorous study of this extraordinary Relic with individuals who lack scientific credibility and continue to make unfounded assertions, equivalent in value to declaring that the Earth is flat.

Acknowledgments

The authors thank the Shroud Science Group for the helpful discussion.

Ethical Statements

The authors, belonging to the Christian Roman Catholic religion, experienced a profound strengthening of faith through scientific studies on the TS.

Conflicts of Interest

The authors declare no conflict of interest.

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