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Turin Shroud: Medical Impossibility for a Medieval Work of Art

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Abstract

This article considers the impossible hypothesis, frequently cited among non-experts, that the TS (Turin Shroud or Holy Shroud) is the result of a work of art produced by a Medieval artist.

Before going into the merits of this hypothesis, the author thought it appropriate to bring to mind the recent publications - regarding the characteristics of TS blood, such as radioactivity, and to reconstruct the facts that preceded and occurred after the death of Jesus Christ on the cross. The guiding motivation for this article consists of the fact that the author is certain that the TS is authentic, and there is so much evidence for this that it does not seem necessary to list all the evidences supporting this. He then reports and comments on some of the main hypotheses for and against the authenticity of the TS which are frequently discussed, and he shows how fallacious the most important claims against authenticity are.

The author highlights in this article the extremely complicated and absurd operations that a hypothetical artist, perhaps even a Medieval one, would have had to perform. Instead, he does not consider here in detail another scientifically insurmountable problem, not only for the hypothetical artist, but also for any scientist today because it is outside of medical interest, and that is to explain how the "impossible" body image was formed.

In fact, the paper highlights the practical impossibility that the artist would have had in obtaining the very particular results that we have on the TS, if it had been a mere human work of art capable of reproducing all the very particular bloodstains of the King of Redeeming Sorrows.

Keywords: *Turn Shroud; Body image; Bloodstains; Erythrocytes; Urea; Radioactivity; Hemopericardium; Rigor mortis; Resurrection; Work of Art; Middle-Ages; Authenticity.*

Introduction

A recent study[1], drawing on new insights from the analysis of blood sampled from the TS and integrating findings from both scientific studies of the Relic and information from the Christian Holy Bible (CHB), examined the physical conditions of Jesus Christ during the twenty hours before His death on the cross and the thirty to forty hours following His death. The study reached a conclusion that currently defies scientific explanation, proposing that the transparency of matter might explain how the resurrected body of Jesus exited the TS without causing any physical disturbance to it.

According to the CHB, Jesus Christ, the Son of God made Man, endured severe physical suffering, including beatings, scourging, a crown of thorns, and carrying a heavy cross to Mount Calvary, where He was crucified and died. His lifeless body was then taken down from the cross, wrapped in a shroud, and placed in a rock-hewn tomb, where it remained for approximately: 30-40 hours before His resurrection.

The TS[2-6], regarded as both an archaeological and religious artifact, is the most extensively studied object of its kind in the world. It is unique among relics, with numerous publications in specialized scientific journals, hundreds of books in various languages, and an uncountable number of articles and notes published almost daily in newspapers and online platforms.

According to Pope Julius II, who approved the Mass and the Office of the TS in 1506 and subsequent Catholic Christian tradition, the TS is believed to be the burial cloth that wrapped the body of Jesus Christ after his crucifixion and before His entombment in Palestine approximately 2000 years ago (Figure 1). Declaring it imbued with the blood of the Redeemer, Pope Julius II asserted that the TS should not only be venerated but also adored[7].

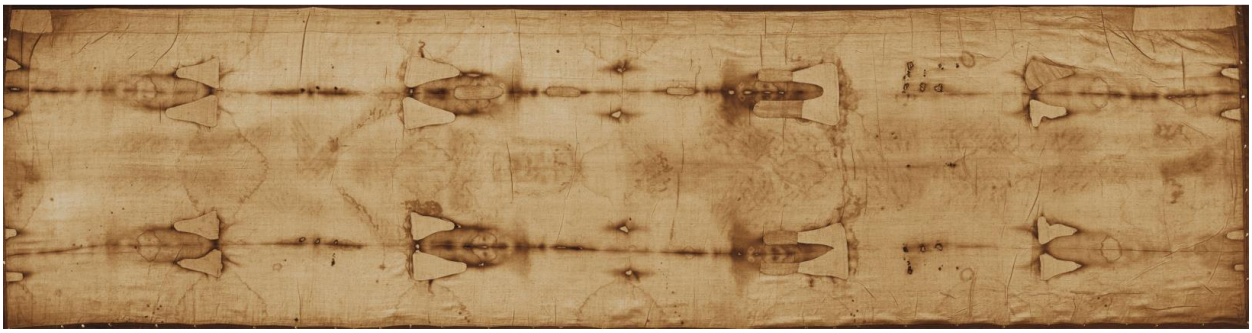

Figure 1: TS photographed by G. Enrie in 1931.

For the moment, the Catholic Christian Church does not declare the TS an object of worship, even though science has been unable to refute what is reported by tradition.

The CHB synthetically describes what one can observe from a scientific point of view on the TS with more significant details. Still, it affirms that Jesus Christ was resurrected. The author having identified compelling scientific correspondences between the narration of the CHB and the TS, is convinced that it is indeed the authentic burial shroud of Jesus Christ[3].

Refs.[1-13], show the TS is a handmade 3:1 twill linen cloth, 4.4 m long and 1.1 m wide, revealing the front and back images of a human body permanently and mysteriously imprinted in a means that has yet to be reproduced with all its notable characteristics.

The TS exhibits various significant and complex signs that are not easily understandable at first glance, partly due to overlapping thus complicating their identification. These include the double body image, both frontal and dorsal, of Jesus Christ, bloodstains corresponding to wounds produced by the tortures, the waterstains, the traces and burn marks from the fire of Chambéry in 1532 and other minor signs.

At this point of scientific investigation, the double body image on the TS remains unexplained due to its unique combination of features, which have proven impossible to replicate[1-8]. Numerous hypotheses have been proposed[8,9] regarding the formation of this image. According to the author and other experts, the most plausible explanation involves an energy of unknown origin likely of an electrical nature[8,9,12,13], possibly linked to the phenomenon of the Holy Fire of Jerusalem. This energy is hypothesized to have reacted with the linen of the TS with the irregular distribution of radiation along its surface producing both the body image and an isotopic alteration of the atoms in the fabric.

Several features found on the facial image of the TS accurately coincide with those found in depictions of Christ on Byzantine coins starting from the 7th century A.D. This proves that the TS was seen during the Byzantine Empire[14].

After disappearing during the Sack of Constantinople in 1204, the "Shroud of Christ" later appeared in Europe in 1353 in Lirey, France. In 1532, a fire damaged the HS while it was at Chambéry, France. Taken to Turin, Italy in 1578 it has remained apart from some short wartime periods when it was hidden.

In 1988, radiocarbon dating of the TS yielded a date range of 1260–1390 A.D.[15] however, this result remains controversial[16-21]. Recent findings, including evidence of radioactivity and fluorescence detected in the TS blood, as discussed in Ref.[1], further call into question the accuracy of this dating.

A piece of linen (officially 7 cm long and 1 cm wide) was cut from the Relic and given to laboratories in Oxford, Zurich, and Tucson (Arizona) for radiocarbon dating. Each laboratory measured the $^{14}C/^{12}C$ isotopic ratio to assign an age to the samples. Whether there was true independence in the radiocarbon dating between these three laboratories, the statistical procedure followed, and the underestimation of the systematic effects is highly debated.

As the process that formed the body image is still unknown, the dating method cannot be rigorously applied because the environment in which the object under analysis was conserved must be known from a contamination point of view. The imaging mechanism may have varied the percentage of carbon isotopes of the TS, which might have produced a non-negligible systematic effect, especially after having discovered an intense radioactivity present in the Relic[1] that could be related to a neutron flux[20]. A partial confirmation of this hypothesis is found on the TS blood showing poor in nitrogen[21].

To evidence the medical impossibility of a Medieval artist to construct an object like the TS, this paper will proceed in agreement with the following points.

This paper begins with a summary of recent findings regarding the blood on the TS[1] and the corresponding medical conditions of Jesus during His final hours before His crucifixion and death. It then examines the concept of authenticity as it pertains to the Relic and presents, with critical commentary, the primary evidence both supporting and challenging its authenticity.

At this point, without considering the current insurmountable problem of the "impossible" body image formation because not of medical interest, this paper highlights the extremely complicated and absurd operations that a hypothetical artist, perhaps even a Medieval one, would have had to perform to obtain the very particular result that is observed scientifically on the TS.

New Insights on Blood Evidence

In alignment with the findings of Heller and A. Adler[22,23] and others[24-27], Ref.[1] highlights the presence of hundreds of reddish spots of varying shapes and sizes on the TS, identified as blood consistent with the specific wounds corresponding to the tortures endured by Jesus before His burial in the TS. Notably, Ref.[1] also emphasizes the unusual reddish color of the blood, in contrast to the typical dark brown color of aged blood, further supporting the unique characteristics of the Relic.

Strangely, the famous microscopist W. McCrone[28-34], probably driven by ulterior motives, did not detect the preponderant blood particles in the same samples coming from the TS, but only small-sized red pigments of ochre and vermillion which are present as contamination material[26,27].

In full agreement with what is described in the CHB, there are bloodstains all over the body image consistent with pre-crucifixion flagellation, with a crown of thorns, with nailing hands and feet during the crucifixion and bloodstains on the chest that evidence a post-mortem wound typical of a spear.

Ref.[1] categorizes the blood on the TS into three types—Type A, B, and C—based on their morphological characteristics. Type A blood, significant for analyzing the medical conditions of Jesus, was shed post-mortem, either while He was still on the cross or after His body was wrapped in the TS within the sepulcher. Type B blood comprises crusts that had coagulated on the skin while Jesus was still alive, and Type C blood is of uncertain origin.

Type A blood, identified on the TS, is composed of numerous microcytes (Fig. 2) ranging from 0.3 to 2 micrometers in size. This finding confirms that Jesus likely suffered from severe uremia, a condition caused by kidney failure likely induced by the intense flagellation. The presence of microcytes also suggests significant difficulty in oxygen exchange, indicating that Jesus most likely experienced extremely labored breathing during His final hours.

Confirming the atrocious tortures suffered by Jesus, blood was found with numerous creatinine particles ranging from 50 to 200 nm arranged in agglomerates.

Finally, many particles of earthy material, typical of Jerusalem like clay and limestone, were found mixed with the blood, supporting the hypothesis that the body of Jesus was not completely washed, but only cleansed[1].

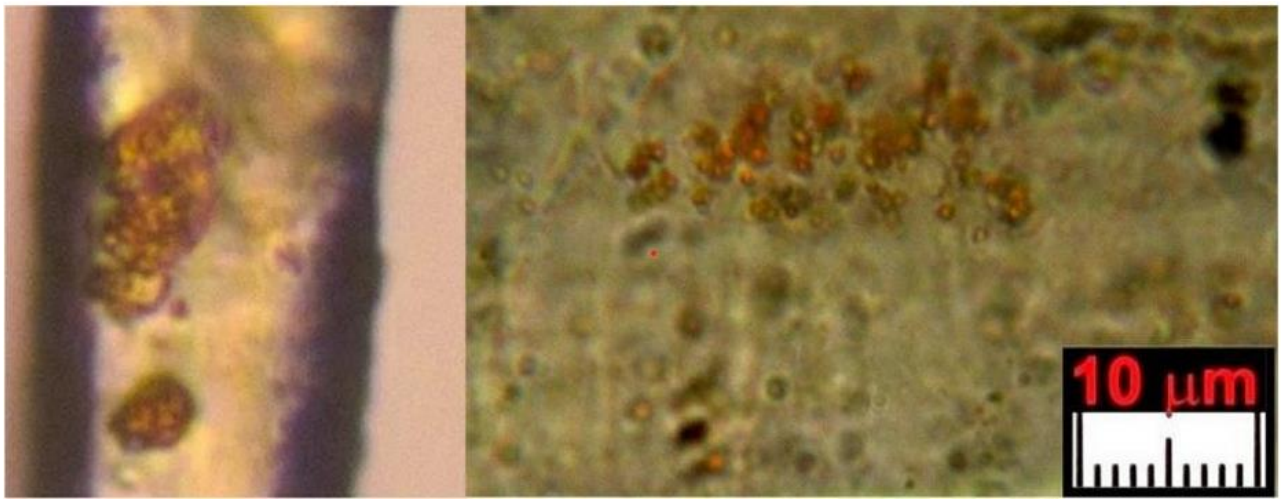

Figure 2: Example of microcytes from sticky tape STuRP-1HB taken from the feet, dorsal image of the TS.

Based on the TS bloodstains, Ref.[1] added scientific information confirming the atrocious tortures inflicted on Jesus Christ described in the CHB.

The three distinct directions of the chest bloodstains on the TS indicate that the body of Jesus was repositioned multiple times on the preparation stone within the sepulcher in Jerusalem.

The bloodstains with serum leakage observed in the left hand-wrist area show also the sign of a square-section nail, a characteristic feature of Roman crucifixion practices. Additionally, the presence of bloodstains outside the body image—highly improbable in the case of an artistic production—provides significant support for the hypothesis that the body image was formed through a corona discharge phenomenon[12].

The fluorescence and, above all, the intense Beta type radioactivity (i.e., electron emission) found in Type A blood but not in Type B blood is a significant indicator of exposure to probable intense but selective neutron-type sources. It is obvious that a Medieval artist would not have known to produce an effect that even today is not easy to obtain, especially if considered that the radioactivity is not uniformly distributed along the TS and therefore not correlated to any contamination by radioactive objects placed next to it.

The intense Beta radioactivity detected in the Type A blood sample directly challenges the validity of the 1988 radiocarbon dating of the TS. As such radioactivity would significantly alter the natural isotopic ratios of the sample, potentially making the TS appear much younger by millennia.

Moreover, the newly identified elements—including microcytes, fibrin, creatinine, biliverdin, dust consistent with Jerusalem soil, fluorescence, and especially radioactivity, as highlighted in Ref.[1]—stand in stark contrast to the hypothesis that the TS is a Medieval work of art. These findings collectively reinforce the argument for the TS's authenticity as a unique historical and scientific artifact.

New Insights on The Medical Status of Jesus Christ

Building on the features of the recently analyzed blood and decades of research on the subject, Ref.[1] reconstructs, from a medical perspective, the sequence of events and pathologies leading up to Jesus's painful death on the cross. These events culminate in a heart attack followed by hemopericardium and His subsequent placement in the sepulcher. The study then extends to the phenomenon described in the CHB as the Resurrection, a process that transcends scientific explanation.

The following summary outlines these events, which would have been practically impossible for a hypothetical artist—especially a Medieval one—to replicate on a linen sheet.

During the Last Supper [John 13:1-3], the psychological stress Jesus likely endured while sitting at the table with Judas, His betrayer, could have triggered intense emotional and physical strain. This may have led to the onset of a heart disease[35] ("crepacuore" in Italian), characterized by the breakdown of heart muscle tissue and visible lacerations, setting the stage for His subsequent suffering and death.

Jesus went then to pray in the Garden of Gethsemane, where an intense agony caused Him to experience hematohidrosis [Luke 22:44] with a copious loss of blood that predisposed to infarction. He was then severely beaten during the walking trip for kilometers [Mark 15:19, Isaiah 50:6].

Jesus was then subjected to severe scourging, including blows to the head, as evidenced by the TS, which displays over 370 scourge wounds[36], though the actual number was likely closer to 600 (Fig. 3). This brutal torture caused substantial blood loss and further debilitated an already weakened body. Notably, at least four scourge wounds are visible on the "cardiac aia." While these wounds did not lacerate the cardiac muscle, they inflicted serious damage, constituting a significant traumatic insult to the heart[1].

Figure 3: On the left, scourge marks corresponding to Jesus' back on the dorsal image of the TS; on the right, corresponding reconstruction of the scourge marks on a manikin.

The immense effort undergone by Jesus when He carried the heavy cross to Calvary was of no help, for the heart was partially torn by congestive heart failure, also induced by the violent flagellation. This stress accentuated the cardiovascular dysfunction, and there was an exacerbation of the heart problems when Jesus fell to the ground repeatedly.

On the Mount Calvary, Jesus was nailed to the cross by His hands and feet. The renal blockage and liver malfunction caused microcytic anemia that produced a pathology consisting of labored breathing that further fatigued the injured heart.

The probable coagulopathy caused by the loss of blood happened during the previous tortures, the hypovolemic shock, and the severe dehydration [John 19:28] caused reduced blood flow that further burdened the heart.

The heart injury was increased by the tachycardia, produced both by the significant reduction of the ability to exchange oxygen by part of the microcytes and by the lactic acid formed by the limbs stretched out on the cross, which in turn produced intense tonic and clonic contractions. The congestive heart failure also caused a pericardial effusion.

In addition, we must not forget the spiritual agony suffered by Jesus, accentuated by the innumerable insults received [Psalm 69, 20] that increased the stress of heart disease.

Following the immense physical and spiritual torture endured, it is not difficult to conclude that a heart attack could have occurred, even in someone as robust as Jesus Christ likely was. The extreme physiological stress and elevated heart rate would have induced a heart attack, leading to significant blood effusion into the pericardial sac and resulting in hemopericardium. This condition caused cardiac tamponade, culminating in immediate death following a sharp chest pain, consistent with the loud cry Jesus gave shortly before dying [Mark 15:37].

The serum and red erythrocyte portion with fibrin found on the TS could correspond to the "blood and water" [John 19:34] that flowed from the wound in Jesus' side when struck by a Roman centurion, verifying His death.

After death, the body of Jesus was taken down from the cross, placed on a first shroud used for transport to the sepulcher, and then placed on the preparation stone covered with powdered anti-putrid substances and finally wrapped in the TS that shows two body images of a corpse in evident rigor mortis[37,38] (which normally lasts 36-48 hours postmortem) coherent with the position assumed on the cross[38-40].

The CHB confirms that, after death, the corpse was removed from the cross, wrapped in a shroud and placed in a rock-hewn sepulcher from Friday evening to Sunday morning (time period of 36-40 hours [John 19]).

Jesus' body was then most likely covered with an oily mixture of aloe and myrrh [John 19:39], and rolls of linen bandages impregnated with anti-putrid substances were placed at its sides to better preserve the corpse from putrefaction.

Ref.[1] demonstrates that the body of Jesus was in a state of rigor mortis at the time the body image formed, indicating this occurred no later than 38–48 hours after His death. However, the evidence suggests that the body remained wrapped in the TS for only 36–40 hours, as there are no signs of putrefaction present on the cloth.

The lack of smearing in correspondence with the bloodstains transferred in a liquid state demonstrates the complete immobility of the body wrapped in the TS. Therefore, it appears that the body was not tampered with or moved because, in that case, a minimal sliding of the liquid blood clots on the fabric should be observed, especially in the back and glutei.

Combining these facts, Ref.[1] deduces, in parallel with Ref.[41], outside of current scientific knowledge, that the body of Jesus passed through the TS without materially compromising it. The perfect congruence found between the CHB, which extensively cites the Resurrection of Christ, and what is scientifically found in the TS, forced the author to find an explanation for the question of how Jesus Christ left the TS without materially disturbing it.

Ref.[1] supposes that an intense form of light-energy had been momentarily supplied to the human body, making it transparent to matter.

Science knows that the diameter of an atom is approximately 10,000 times larger than its nucleus. Therefore, it is practically composed of empty space, but interpenetration between atoms is not possible due to the considerable interatomic forces normally present.

With this intense light-energy supplied, the protons, neutrons, and electrons of the atoms that compose the human body would then have acquired kinetic energy such as to overcome the interatomic forces that prevent the crossing between atoms and atoms and, therefore, the interpenetration of matter.

The phenomena of intense luminosity frequently described also in the CHB and connected to the supernatural phenomenon of the Resurrection would, therefore, have been the cause of the momentary transparency of matter necessary to explain how Jesus came out of the TS without disturbing it in the slightest.

For example, in the CHB the apostle John [20:8-9] entered the tomb on Easter Sunday, "*He saw and believed. They still did not understand from Scripture that Jesus had to rise from the dead*." The apostle saw the arrangement of the TS in the sepulcher on the preparation stone and made him the first to believe in Jesus' Resurrection.

If we extend this hypothesis to explain how Jesus came out of the TS without disturbing it to other scientifically uninterpretable phenomena, it can also similarly explain how He came out of His Mother's womb in accordance with the Marian Dogma of the "*Virgin before, during and after the birth*"[42].

About the Authenticity of the TS

What do we mean by authenticity?

The authenticity of the TS is often discussed, but frequently without specifying what authenticity means. This term has different meanings, starting simply from the fact that the TS is not of Medieval European manufacture, as some mistakenly suppose[36], but of Eastern-Middle Eastern manufacture, carried out 2000 years ago.

The authenticity of the TS is often linked to its body image, which remains inexplicable in its entirety and, despite some claims, has not been successfully reproduced to date. It is important to clarify that while a skilled painter might be able to replicate many macroscopic details of the TS's body image on linen, he would be unable to reproduce the majority of the Relic's intricate physical and chemical features, particularly those observables at a microscopic level[8,9].

Additionally, other hypotheses regarding the origin of the TS—some suggesting a form of authenticity—cannot be dismissed outright. These include, for instance, the contentious hypotheses that the double body image on the TS might have been created by extraterrestrial intelligence or resulted from a miraculous event potentially occurring in the Medieval period.

A different type of authenticity concerns the fact that the TS wrapped the body of a man who suffered all the tortures inflicted on Jesus as described in the CHB, whose corpse was then wrapped in a linen sheet.

Ultimately, the most comprehensive definition of authenticity explored in this paper asserts that the TS wrapped the body of Jesus Christ, who endured severe scourging, was crowned with thorns, crucified, and died before being resurrected. This perspective holds that His image was transferred onto the Relic through a release of energy during the Resurrection, resulting in an indelible double body image that remains visible even after two millennia.

Claims to support the Medieval hypothesis

For those less familiar with the debates surrounding the authenticity of the TS, it may be valuable to explore an overview of the key arguments claiming the hypothesis that the Relic is a medieval work of art.

Those who argue against the authenticity generally base their statements on two points: (1) the history of the TS is documented with sufficient certainty starting only from the middle of the fourteenth century and (2) that the ^{14}C dating (Carbon 14, isotope of the more common Carbon 12) performed in 1988 assigned a date between 1260 and 1390.

Regarding point (1), the first definite historical documentation universally accepted is that the TS, in 1353, was in Lirey, France. The knight Geoffrey of Charny built a church where the Relic was displayed from 1355 to 1357.

In 1389, Pierre d'Arcy, the Bishop of Troyes, frustrated by the grand ceremonies and the influx of pilgrims drawn to the TS, which detracted from Troyes, wrote a lengthy letter to Antipope Clement VII (but neither signed or dated). In this letter, he argued that the Relic could not be genuine, alleging that a painter had confessed to forging it. However, the bishop lacked any documents or evidence to support his claims[36,43,44]. Today, it is widely acknowledged that the TS is not a painted artifact.

However, there are many historical clues that bring the TS back to the first millennium. In the interest of brevity, they are not mentioned, but, as an example of these clues Ref.[14] reports that about seven centuries before the dispute of Pierre d'Arcy, the Byzantine emperor Justinian II in 692 A.D. minted the famous gold solidi with the face of Jesus Christ assuredly copied from the TS.

Point (2), discussed in the Introduction, refers to a Medieval radiocarbon dating of the TS that has been much discussed for the many problems connected to it. The author suggests that compelling scientific evidence may soon emerge demonstrating that the linen fabric of the TS was exposed to neutron radiation, which enriched it with ^{14}C, effectively shifting the apparent date of the fabric forward by several centuries. The selective radioactivity recently detected in TS samples[1] is a strong indication that the 1988 radiocarbon dating could be linked to an event involving an intense neutron flux, potentially associated with the Resurrection of Jesus Christ.

Other minor claims for the Medieval hypothesis

Ref.[45] comments on several statements contrary to the authenticity of the TS, showing their weaknesses and explaining how these statements should be revised. The most significant ones are reported.

- *The known Jewish shrouds of the first century AD are completely different from the TS.* Indeed, the textile characteristics of the Shroud are not attributable to the Palestinian area. It could be a very fine fabric imported from India via the Silk Road.
- *The common fabric texture has a simple clockwise 1:1 structure while the Shroud is herringbone anticlockwise 3:1.* According to the Book of the Exodus of the CHB, the anticlockwise "z" twisting is typical of fabrics made for high-ranking priests. The TS is a hand-woven sheet with weaving defects, but of high quality with a particular structure 3:1 consistent with it having been purchased by a wealthy person like Joseph of Arimathea.
- *For several centuries, the Church itself considered the TS to be a forgery*. The statement is incomplete, as it omits that Pope Julius II, in 1506, officially approved the veneration and the Mass of the TS, designating May 4 as its feast day. He also declared that the TS is to be adored because it contains a part of the body of Jesus Christ, specifically His blood[2].
- *The TS image lacks lateral distortion typical of the "Agamemnon mask" to be expected from a cloth wrapping a body*. This is a too hasty conclusion because other experiments show just the opposite[12,13,46]. While some kind of pseudo-cylindrical distortions are easily visible on the body image, especially at the thorax and calves' area, the facial image is very particular and must account for the cosine effect of the energy intensity perpendicularly emitted by curved surfaces like the head in the corona discharge hypothesis[12]. Therefore, the lateral parts of the facial image that have a value of the aforementioned cosine close to zero are not visible because they are irradiated by an energy intensity tending to zero.
- *Many sub-micron red ocher particles have been found, in the image area and, more numerous in bloodstains*. This statement refers to a dated study performed by W. McCrone[28-34]. However, Refs[26,27] detected the presence of such particles mixed with the blood and earthy material, but these are absolutely not in sufficient quantity to influence the coloration of the image. More likely these particles are due to contamination of the TS with copies painted in past centuries and made relics by subsequent contact with the original.
- *An experimental study[47] showed the improbability of the position of various traces of blood of the TS.* This non-convincing study has been criticized[48,49] also because the tests performed were not sufficiently documented. Further, the experiments are overly simplistic. Other parallel experiments[39] show the full compatibility of the TS bloodstains with the traces of blood produced by a tortured man.
- *A commission formed by Cardinal Pellegrino[50] in 1973 did not detect blood*. This statement has been thoroughly analyzed in Ref.[51], which demonstrated that the Commission did, in fact, detect the presence of erythrocytes. However, due to the limited research tools available at the time, they were unable to confirm their findings with certainty. This serves as a typical example where more recent and significant findings are overlooked, while older, less conclusive results are selectively highlighted to support a particular thesis.

Strengths to support the authenticity

While the arguments supporting the hypothesis that the TS is a work of art are few and easily debunked, the evidence supporting its authenticity is vast and too extensive to comprehensively list within the limited scope of this article. For a more in-depth exploration, readers can refer to Refs.[8,9,46]. Here, the focus is on the main arguments that, by themselves, significantly challenge the persistent claim—still upheld by some—that the TS is a mere work of art.

One of the most significant arguments for the authenticity of the TS lies in the evidence that it indeed wrapped the body of a man, specifically a cadaver.

Scientific literature highlights numerous contributions also reflected in Refs.[1,38,40,52,53]. The author performed several experiments wrapping various statues and manikins with semi-transparent copies, including life-size, of the TS, both to study the characteristics of the Relic wrapping and to determine the type of distortions present in the TS body image caused by the wrapping of a fabric with a three-dimensional body Fig. 4. Moreover, some bloodstains on the TS consisting of clots surrounded by retraction rings and fluorescent serum halos[22,23] are clear indicators that the TS wrapped a corpse.

Figure 4: Experiments performed by the author wrapping various statues with semi-transparent copies of the TS to study wrapping characteristics and body image distortions.

Indeed, details relating to distortions have emerged[39], especially in reference to the chest and legs, which no artist would have considered to reproduce if he had not carried out experiments in wrapping three-dimensional human bodies.

Also important is the fact that the TS shows evident bloodstains on the forehead, temples and nape of the face's body image, which can be related to a crown of thorns in accordance with what is reported in the CHB (Matthew [27:29], Mark [15:17] and John [19:2]). This singular torture, never seen except in reference to Jesus Christ, clearly demonstrates that the TS has wrapped the King of Redeeming Sorrows.

Refs.[1,51] describe the microcytes present in Type A blood. Why would the hypothetical Medieval artist have added such a detail, especially knowing that at that time microcytes were not known, because the microscope had not yet been invented? In addition to this, the aforementioned rigor-mortis[37,38] highlighted in reference to the body of Jesus of the TS, is an additional clear indication of death with the fact that the detected microcytes in the blood Type A were obviously unable to exchange the oxygen necessary for life.

In addition, the above-mentioned fact that Jesus left the TS without disturbing it in the slightest[1], which is still scientifically inexplicable, raises serious questions about the hypothesis of the work being performed by a human artist.

Another important point in favor of the authenticity of the TS is that the double body image is so complex that even today it cannot be reproduced with all its very particular characteristics[8-10,54]. As of today the image cannot be reproduced and science is not able to formulate a complete hypothesis about how it was formed. Thus, obviously, it was impossible for an artist to impress all those extremely particular characteristics even at a microscopic level when in the Middle Ages, the microscope (invented in 1590) was not yet known.

As an example of how artists of the past were able to copy the TS to divulge the characteristics of the Relic when photography did not yet exist, Figure 5 shows the double body image painted by a non-Medieval artist (more recent in 1656) and now preserved in Palma di Montechiaro, Agrigento, Italy. Obviously, the characteristics mentioned in Ref.[8,9] are not reproduced here.

Figure 5: 1656 TS copy now preserved in Palma di Montechiaro, Agrigento, Italy. Note the crudeness, completely devoid of the details present on the TS, with which the bloodstain on the chest wound was made (on the top right, enlargement of the writing posed on the head of the dorsal image to certify the painting).

Indeed, the more one studies the TS more interesting new developments emerge. Recently the discovery that, in addition to being "doubly superficial"[10], the very thin depth of the image, only fractions of a micrometer, is not constant but varies according to the intensity of the body image[54]

In an attempt to formulate preliminary hypotheses on the formation of the body image, many scholars agree that the particular image was formed following a phenomenon acting at a distance and, therefore, a particular type of energy emitted by the corpse[8,9].

The author has recently revised his earlier hypotheses, suggesting that the image[12,13] formation was caused by the emission of body fluids, including urea, from the corpse. The urea, unfiltered due to severe kidney damage caused by extensive flagellation, triggered a Maillard Reaction. This process, the author proposes, was intensified by a unique energy phenomenon akin to the Holy Fire of Jerusalem.

What Would an Artist Have to Do to Reproduce the TS?

We have just seen the very particular characteristics of the TS both from the medical point of view (it wrapped a corpse that released particular bloodstains) and synthetically from that of the double body image (still not explainable today and much less reproducible in all its characteristics).

Setting aside the unique characteristics of the "impossible" body image, an analysis focuses on what a HA (Hypothetical Artist), possibly from the Medieval period, would have needed to do to achieve a result comparable to that of the TS.

First, the HA would have condemned a person to all the tortures resulting from the analysis reported above. He should have, therefore, caused him such moral pain as to produce suffering capable of triggering a heartbreak pathology and should have produced about 600 wounds from the scourge to the unfortunate victim.

Since scourge marks present blood oozing from lacerated-contused wounds and since the contusions occur under the epidermis, the HA must have subjected the victim to a first series of blows with flagrum and, after about ten minutes, the HA victim must have been subjected to at least a second series of lashes with ropes capable of breaking the bloody blisters previously formed.

The blows, particularly in the kidney area, likely incapacitated their function, resulting in a substantial release of urea into the bloodstream. This process may have transformed erythrocytes into microcytes, disrupting oxygen exchange and causing elevated respiration and heart rate.

The HA would have been subjected to extreme cruelty, with direct, brutal blows delivered to various parts of the body to inflict severe swelling on the face, violently tear out the beard and hair on the right side, shatter the nasal septum, and blind the right eye, leaving a harrowing imprint of suffering.

The HA would have inflicted further torment by forcing a crown of thorns onto the victim's head, causing deep wounds on the forehead, temples, and nape. Following this, the victim would have been nailed to the cross with three square-section iron nails, after violently dislocating the arms and likely the legs through brutal pulling with ropes or chains.

It remains unclear how, with the limited medical knowledge of the time, the HA could have induced death by heart attack followed by tamponade from hemopericardium. However, for the sake of argument, let us assume this exceptionally cunning HA achieved his objective.

At this stage the HA would have had no more than forty hours to unnail the corpse of the unfortunate victim from the cross, wrap Him in a burial shroud similar to the TS and position Him, rigid with evident rigor mortis (consistent with a vertical position but with dislocated shoulders allowing limited repositioning), on a horizontal plane without moving the corpse from its initial position.

Clearly, the HA could not have carried out these tasks alone and would have required assistance to perform these intricate movements.

At this stage the HA should also have smeared the victim's skin with dust similar to that of the Jerusalem soil and should have sprinkled, above all, the still liquid blood drips with very fine powder of radioactive material such as uranium and thorium to selectively make the Type A bloodstain radioactive (even though radioactivity was not discovered until the end of the 19th century).

The HA would have had to leave the corpse wrapped in the shroud for several hours to allow its wounds to drip additional blood onto the linen fabric until it formed the clots with the retraction rings and the serum halos visible under UV described by Ref.[23].

As previously outlined, the focus is not on how the HA could have produced the double body image that remains indelible to this day. Instead, attention must now turn to the issue of the absence of smearing corresponding to the still-liquid bloodstains imprinted on the linen fabric.

Given that the body could not have remained wrapped in the burial shroud for more than forty hours (as both the rigor mortis and the absence of putrefaction in the TS is evident), it is necessary to consider a technique employed by the HA to prevent friction between the body and the shroud. This would have been essential to avoid any trace of smearing, particularly around the bloodstains on the back and gluteal areas, where sliding of the body against the shroud during removal from the burial surface would have been most likely.

Achieving this result appears to offer few plausible solutions without invoking supernatural phenomena, such as the hypothesized generation of intense light-energy emanating from the corpse.

The HA whould have used at least four people to lift the corpse vertically. Two people, one placed near the feet and one near the back should have held the shroud motionless on the table, while the other two whould have lifted the still rigid corpse vertically without making the slightest horizontal movement to avoid the aforementioned smearing.

Let us now recall that the shroud, more than 4 meters long, had to be spread out on a suitable and clean surface, of at least that size, and left for at least a day, so the bloodstains composed of still liquid blood would dry without producing smudges. In fact, if the liquid bloodstains had slid one over the other due to a lack of care in the laying out of this shroud, smeared bloodstains would have been produced. The HS does not have smeared bloodstains[1].

At the conclusion of all this, the question arises: why would the HA have undertaken such an elaborate effort? Did the HA have an object to replicate, such as the HS? This seems unlikely, as it would invalidate the hypothesis of the TS being produced by the HA. Instead, the HA would have had to choose to produce something costly and complex for reasons that remain unclear and seemingly irrelevant today. A far simpler artifact could have been created, which people of that time would have interpreted in a similar manner.

Furthermore, producing an object with such complex manufacturing would almost certainly require preliminary tests and simplified models. The HA would have had to produce multiple prototypes, ultimately selecting the best result and discarding the test versions.

However, an often-overlooked small detail is that achieving this result would require killing a person after heartbreaking tortures—or potentially several people—if, as appears necessary, multiple preliminary experiments were conducted.

The HA is, therefore, a murderer—more precisely, a multiple murderer. Additionally, it is necessary to consider his accomplices, who would have assisted particularly in the tasks of unnailing the body from the vertical position, transferring the corpse to a horizontal position and taking it away from the sepulcher. Thus, this scenario involves multiple murders with the involvement of several accomplices.

Concluding Remarks

To show the medical impossibility for a HA to build an object like the TS, this paper touched on the following points.

Starting from the recent discoveries regarding the blood of the TS reported in Ref.[1], and after having ascertained the perfect congruence between what is scientifically found on the TS with what the CHB reports, the immense suffering voluntarily endured by Jesus Christ for us men and for our salvation have been commented. In particular, the tortures suffered by Jesus until death on the cross, highlighting the series of pathologies induced by them are synthetically described. The description continues by illustrating how Jesus was placed in the sepulcher and how He inexplicably disappeared from the TS 30–40 hours after being wrapped. Setting aside the currently insurmountable challenge of explaining the formation of the "impossible" body image that is of minor medical interest, this paper emphasizes the extraordinarily complex and implausible procedures that a HA, possibly from the Medieval period, would have needed to undertake to achieve the unique and specific features observed on the TS.

Among other things, it has been highlighted that Jesus of the TS was wrapped as a corpse but remained there for no more than about forty hours, that He was crowned King of Redemptive Sorrows with the crown of thorns, and that the microcytes found in the bloodstains highlight the respiratory pathology of His last moments on the Cross.

From a medical perspective, it is demonstrated how difficult and illogical it is to consider the TS as the product of an artist's work. Adding to this the fact that the double body image imprinted on the TS remains inexplicable and irreproducible even with modern techniques, the conclusion becomes evident: what is observed and studied in scientific detail on the TS cannot be of human origin. No artist, whether from the Middle Ages or the present day, could have achieved such a result.

And, assuming but not conceding that this HA had somehow arrived at this point, the question arises as to why he would have had to make these superhuman efforts to obtain an object that would have been only partially understood by scholars of the twenty-first century.

At the conclusion of this study, it is essential to emphasize a critical issue that the modern Catholic Church should address. The Church refrains from making an official statement on the authenticity of the TS, seemingly overlooking Pope Julius II's declaration that it is a Relic to be venerated and adored. This stance poses a significant risk, as failing to recognize the TS as the burial Shroud that encased the crucified, deceased, and resurrected body of Jesus Christ, leaves open the remote but unsettling possibility that the Relic could be the result of a multiple homicide. But if this were the case, it would be absurd to keep this linen Shroud, evidence of a multiple homicide, inside a Cathedral, that of St. John the Baptist in Turin, and to allow its official display to thousands of pilgrims. The author, therefore, urges that the Catholic Church express itself soon clearly in reference to the TS authenticity.

Finally, the author recalls the words written by the late Raymond Schneider, member of ShroudScience Group and Professor Emeritus of Mathematics and Information Technology at Bridgewater College, USA in reference to the TS. *"... the enduring character is the mystery, since whether authentic or inauthentic the mystery remains. If it is actually Jesus, and Jesus is God, then a miraculous account cannot be ruled out. If it is representative of Jesus, but made in some way, then the mystery is not removed, in fact I think that it is deepened because then a miraculous account ... is ruled out, and then we have an unheralded genius who created the most convincing image of Jesus. ... I think that is a deeper mystery and harder to explain than authenticity*."

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Many thanks, also, to Theodora Pappas, administrator of ShroudScience, for the very illuminating discussion during which she pushed the author to coin the new title for Jesus "*King of Redeeming Sorrows*"; she also made the following comment in reference to the paper's purpose "*Never give up an opportunity to bring new people to Jesus through the evidence for the Holy Shroud's authenticity. Each person is one person who is destined for Heaven or Hell. Don't ever forget that. Use every opportunity to try and get the lost sheep --as the Good Shepherd does*."

Ethical Statements

The author, belonging to the Christian Roman Catholic religion, experienced a profound strengthening of faith through scientific studies on the TS. These studies, conducted with a focus on objectivity and in collaboration also with scholars skeptical of

its authenticity, consistently aligned with and affirmed the insights derived from faith.

The author has faced indirect criticism in recent publications (see, for example, Ref.[1]) for integrating scientific aspects with those related to Roman Catholic Christian doctrine and faith. In response to these criticisms, the author firmly asserts that a humble researcher must remain open to all possibilities when addressing the profound mysteries that surround us. Unlike certain arrogant and prideful scientists who claim that humanity alone can uncover all the wonders of the Universe, the author emphasizes the importance of humility and openness in the pursuit of truth.

In accordance with alleged messages by Jesus received a few years ago by the mystic Renato Baron of Schio, Vicenza, Italy "*God gave us science so that, by making our lifestyle easier, we could have more time for Him and to understand Him better, but we have made it a god and we use it to do without Him. Nothing will be allowed to science without faith*".

In other words, this is confirmed by A. Einstein who declared that *Religion without science is blind; science without religion is lame*[55] and by Pope St. John Paul II who affirmed that *faith and reason are like the two wings with which the human spirit rises towards the contemplation of truth*[56].

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Following criticism received in a similar case about the possible bias present in the paper due to the origin of the funds, the author clarifies that that research has been concluded for more than a year and that he alone decided to use a portion of the funds directly assigned to him to publish this article.

Conflicts of Interest
The author declares no conflict of interest.

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