

# The Turin Shroud Conundrums

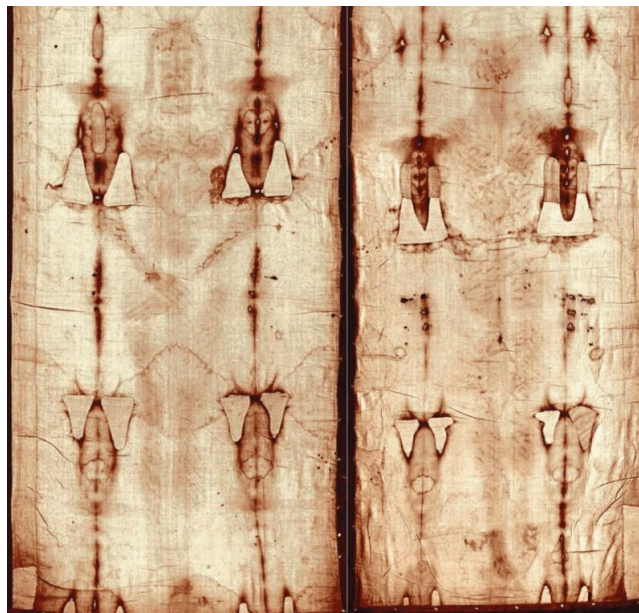
Steve Townsend, July 2023

The Shroud of Turin is a religious artefact or relic that is currently housed in the Chapel of the Holy Shroud, Turin, Italy. It consists of a single sheet of linen material, approximately four times as long as it is wide, on which can be seen a faint, blurry sepia-coloured image of the front and back of a naked man.



Turin Shroud

As a work of art it is, as far as I know, unique. The effect is as if a metal statue of a male body had been heated to the temperature of a hot iron then laid on the lower part of the cloth with the upper part of the cloth folded over from head to toe. In such a case, assuming the metal were sufficiently hot, the cloth would be scorched by the statue, causing discolouration similar to that seen. However it has been ascertained that the image on the cloth was not caused by scorching or the application of heat. For one thing the discolouration is too superficial. For another, scorch marks fluoresce when exposed to ultraviolet light, but the only parts of the Shroud that fluoresce in this way are where it was damaged by fire in 1532. Here is a slightly larger picture: the original has been cut in half, with the upper half rotated through 90° and set alongside the lower half.

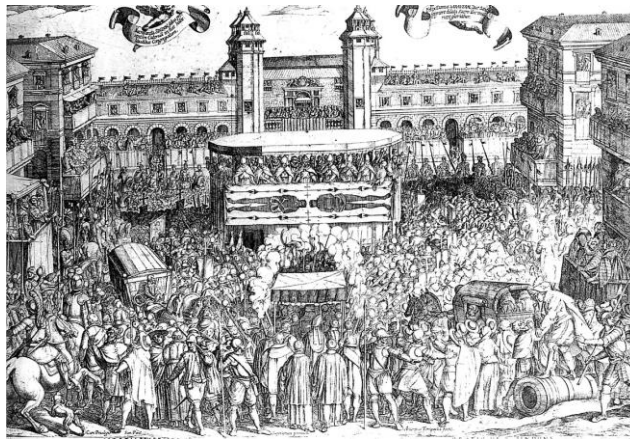


Shroud: lower portion (left) upper portion (right, rotated 90°)

The body shows signs of wounds consistent with beating and crucifixion. In particular there appear to be cuts on the forehead and the back of the head; penetrative wounds to the wrist, feet and chest, and extensive scourge marks over the entire

body. Although there were rumours of the existence of a burial cloth of Jesus Christ in previous centuries, the first reliable historical mention of the Shroud was in the fourteenth century. Between 1353 and 1356 it was allegedly in the possession of a Crusading knight Geoffroi de Charny, who arranged for it to be displayed in a church in Lirey, a village in north-central France. It was then claimed to be the cloth that had been used to wrap the body of Jesus Christ when he was buried. However this was swiftly denied by the Bishop of Troyes who in 1390 wrote to say that it had been painted by a known contemporary artist. The Shroud was damaged by fire and water in 1532. Since 1578 it has been located in Turin.

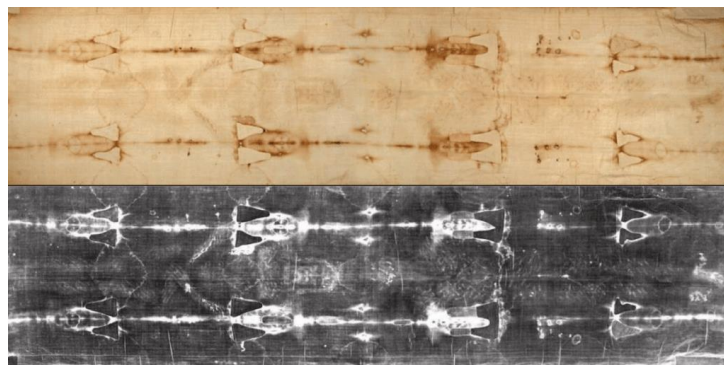
For a time the Shroud was exhibited annually on May 4<sup>th</sup>, which became known as the “Feast Day of the Shroud.” Here is a picture of an engraving by Antonio Tempesta (1555-1630) of the Feast Day in 1613. The Shroud can be seen hanging on the front of the stage, beneath the assembled clergy.



Feast Day of the Shroud, Antonio Tempesta, 1613

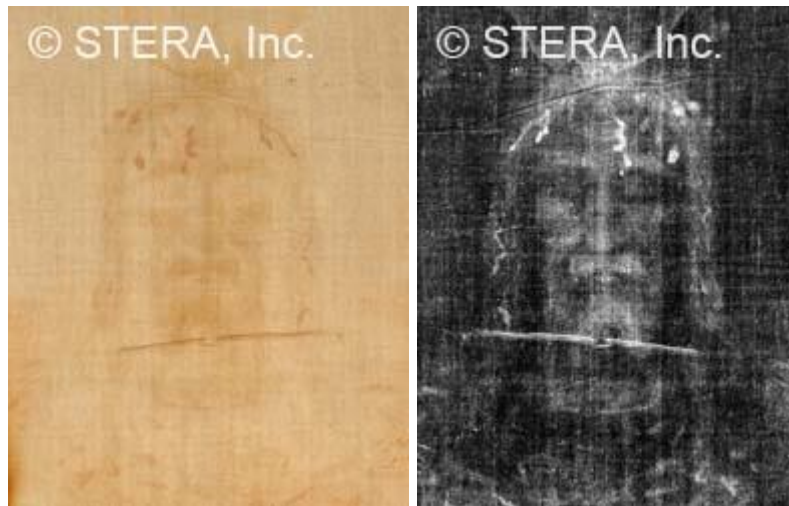
Courtesy: <https://www.medievalists.net/2014/10/origins-shroud-turin/>

Noteworthy is the fact that the image on the cloth is much clearer, but of course this might just be artistic licence. The story might have ended there were it not for a remarkable property of the image that came to light on 28<sup>th</sup> May 1898. An Italian lawyer and amateur photographer named Secondo Pia photographed the Shroud at one of the rare times it has been publically exhibited. It was one of the first times electric light bulbs had been used for photography. He needed a couple of attempts before he managed to get the lighting and exposure times correct. He said that when he first saw the negative after it had been through its chemical processing he almost dropped it in astonishment. Here the photographic negative is shown underneath a picture of the Shroud itself.



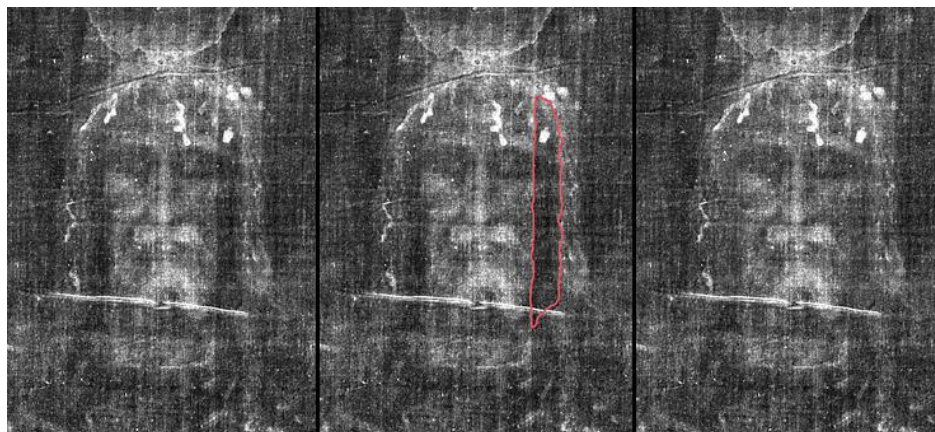
The Shroud (top) and its photographic negative (bottom)  
Photo credit: ©1978 Barrie M. Schwartz Collection, STERA Inc.

The negative actually shows a positive image, with detail that is not easily discernible to the naked eye on the cloth itself. The image on the Shroud is apparently a photographic negative of the body depicted on it. This will be a little clearer if we just look at the face of the image.



Detail of the Shroud (left) and its photographic negative (right)  
Photo credit: ©1978 Barrie M. Schwartz Collection, STERA Inc.

An interesting fact was later discovered by Barrie Schwartz, who photographed these images in 1978. You will notice dark vertical bands on either side of the face, between the cheeks and the hair. Apparently these areas also contain image information. In May 2006 Schwartz used the program Photo Shop to select these dark areas and to increase the brightness. The following pictures show the result.



Result of Photo Shop brightness enhancement  
Photo credit: ©2006 Barrie M. Schwartz Collection

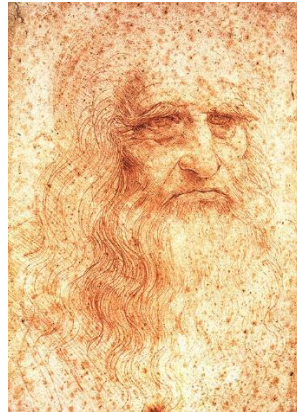
The first image (left) shows the face without any correction. The second image (center) shows the outline of one of the areas Schwartz selected for correction. The third image (right) shows the facial image with the brightness increased in the selected areas.

This discovery that the Shroud image was actually a photographic negative thrust the Shroud firmly back into the arena of public debate and speculation. It was not just some Christians, theologians and historians that were intrigued. Scientists and academics of all kinds began looking for answers. Foremost amongst these questions was how had a photographic negative image appeared on a strip of cloth in or before the fourteenth century? If it was the work of an artist, how and why had



he or she depicted a photographic negative so accurately hundreds of years before the invention of the camera?

The ensuing debate has oftentimes been acrimonious, and has led to a plethora of wild conjectures. One such idea was the subject of a Channel Five documentary in July 2009. The assertion was that the image on the Shroud is actually a self-portrait by Leonardo da Vinci, who had allegedly discovered a way of imprinting a negative image on a cloth using some kind of camera obscura device. It seems that part of the motivation for this idea was a perceived resemblance between the face on the shroud and Leonardo's portrait of a man in red chalk, generally thought to be a self-portrait.

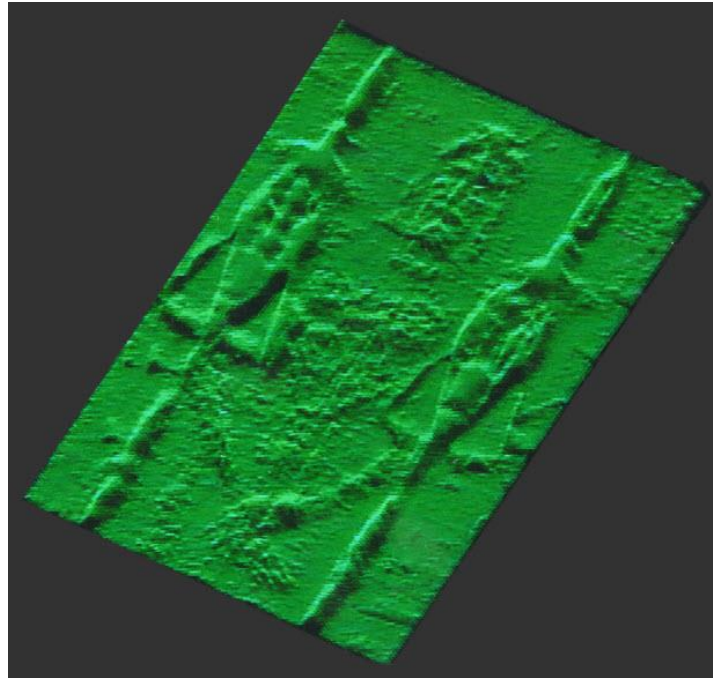


Portrait of a Man in Red Chalk

Courtesy: <https://www.leonardodavinci.net/images/gallery/self-portrait.jpg>

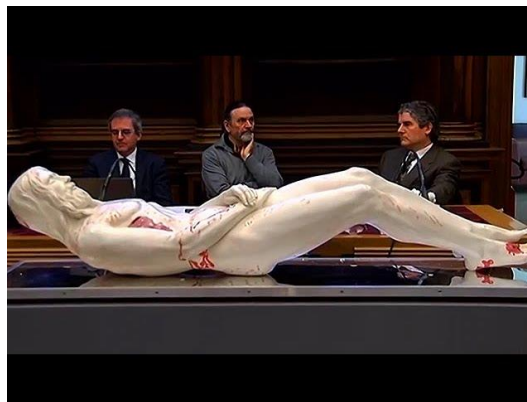
They apparently overlooked or ignored the fact that Leonardo was not born until 1452, many years after a number of official documents referring to the Shroud were in existence. For example in 1389 King Charles VI of France had written to the bailiff of Troyes ordering him to seize the Shroud from the church at Lirey and move it somewhere else!

But quite apart from the speculative ideas the renewed interest in the Shroud has served to promote genuine research on the part of the academic community into its nature and origins. Early on in the 20th century Paul Vignon, a philosopher and biologist in Paris, observed that if one imagines the Shroud being laid over a human body then the image on the Shroud varies inversely with the cloth-to-body distance. This means that the image is darker over parts of the body close to the cloth and fainter over parts of the body further away. Effectively the image on the shroud contains 3D encoding. Vignon could not prove his theory, but subsequently other scientists pursued his ideas further. In 1976 a group of scientists used a newly developed VP-8 Image Analyser that converted luminance levels into vertical distance. They proved that the Shroud image contains depth information, and produced anatomically consistent 3D images of the body depicted on the cloth. It is not possible to do this with a normal photographic image. Here is a picture of the 3D image produced by the image analyser.



3D Image produced by image analyser

Since that initial discovery of 3D encoding technology has advanced considerably. Early in 2018 Giulio Fanti, Professor of Mechanical and Thermal Measurements at the University of Padua, Italy, used the information contained in the Shroud image to create a life-sized statue of the man depicted therein. He worked in collaboration with renowned sculptor, Sergio Rodella.



2018 Statue of body depicted on the Shroud

Notice how the body seems to show consistent effects of rigor mortis. Professor Fanti is quoted as saying, "The three-dimensional reconstruction has made it possible to discover that at the moment of his death, the man of the Shroud sagged down towards the right, because his right shoulder was dislocated<sup>1</sup>." This sheds light on one of the puzzles about the image: the right arm seems to be far too long, a point that has led some to question its authenticity. Professor Fanti assumed that the dislocation occurred at or close to the moment of death. An alternative suggestion is that if rigor mortis had set in after crucifixion then forcing the arms into the lower position shown could well have caused dislocation of the joints.

<sup>1</sup> <https://www.express.co.uk/news/world/938987/Jesus-Christ-Shroud-of-Turin-3d-image-of-Jesus-Italy>

Then last year, on 13<sup>th</sup> October 2022, an exhibition opened at the Spanish Cathedral of Salamanca featuring a hyperrealistic reconstruction of the body depicted on the Shroud.



The exhibition will tour around the world. Up until the end of June 2023 it was located in the Gaudix Cathedral, Granada, after which it commenced a tour of Europe for the rest of 2023.

The discovery that the image contained 3D information led to the formation of the Shroud of Turin Research Project (STURP)<sup>2</sup>. In 1978 the Vatican allowed STURP to send 26 American scientists to Turin to perform non-destructive experiments on the Shroud. They ascertained that the image was not formed by the application of paint or dye. There was no pigment on the cloth, nor was there evidence that the fibres had soaked up liquid of any kind, other than in the location of blood stains. There was no evidence of scorching, other than the areas affected by the fire in 1532. Moreover they claimed that their tests showed that what appeared to be blood was indeed blood.

The discolouration of the linen threads that gives rise to the image only occurs on the top one or two layers of fibre in each case. A thread consists of approximately one hundred fibres. Only the fibres on the surface of a thread are discoloured, and the discoloration only affects the surface of each fibre, to a depth of about 0.2 microns (about 2% of the radius of the fibre). The STURP scientists concluded that the discolouration is caused by a rearrangement of the fibre atoms, whereby some of the single electron bonds of the carbon atoms have been changed to double electron bonds. The process that caused this effect is unclear. Of interest is the fact that under the bloodstains there is no discolouration of the fibres.

The conclusion of STURP that the image was not the product of the application of paint, dye, stain or pigment of any kind is at sharp variance with the assertion in 1990 of Walter McCrone, of the McCrone Research Institute, Chicago, that in his examination of the samples obtained by STURP he found no blood but found instead the presence of red ochre and vermilion along with a collagen (gelatin) tempera binder. He pointed out that red ochre and vermilion were two pigments commonly used by artists in the fourteenth century<sup>3</sup>. This apparent contradiction is astonishing, and disconcerting for the non-professionals seeking accurate information. Sadly the Shroud seems to have divided scholars into different camps with particularly entrenched views.

<sup>2</sup> [https://en.wikipedia.org/wiki/Shroud\\_of\\_Turin\\_Research\\_Project](https://en.wikipedia.org/wiki/Shroud_of_Turin_Research_Project)

<sup>3</sup> Walter McCrone "The Shroud of Turin: Blood or Artist's Pigment?" Acc. Chem. Res. 1990, 23, 77-83

In 1988 the Vatican allowed experts from the British Museum and Oxford University to remove small samples from one corner of the shroud for radiocarbon dating. A different sample was sent to each of three different research laboratories. They concluded that the samples very likely originated between 1260 and 1390. For many scientists this has ended the debate, concluding that the Shroud is just an elaborate fourteenth century hoax; an icon, perhaps, but not a real burial cloth. However since then a number of peer-reviewed academic papers have seriously questioned the reliability of the C-14 testing, and many now consider that the results should be discounted. Amongst these is film-maker David Rolfe, who actually came to faith in Christ through his research into the Shroud. In April 2022 he issued a public challenge to the British Museum who had overseen the C-14 dating and consequently labelled the Shroud as a medieval fraud. Rolfe said that if they truly believed the Shroud to be a fraud then he challenged them to repeat the exercise and create something similar themselves. If they could do it he would donate one million dollars to their funds<sup>4</sup>. That was over a year ago, and there has been not even one sensible suggestion as to how an image similar to that on the Shroud could be produced, even with today's available technology.

I have entitled this talk "The Turin Shroud Conundrums." So here are some of the conundrums that it presents to us.

### **How was the Shroud image made?**

Scientists have no serious idea as to how the image on the shroud was formed. Yes, like Walter McCrone there are many who are quick to assert that some medieval artist produced it. But the plain fact is, no-one has any idea how. The lack of pigments on the cloth, the negative image, the 3D information contained therein, the molecular transformation of the fibres, all combine to present a conundrum that defeats the brightest minds.

One mechanism has been suggested<sup>5</sup>, but it is rejected by many as being totally unrealistic, a completely unnatural process. If a body wrapped in linen cloth were to emit an extremely brief, intense burst of non-thermal particle radiation, this being conveyed in parallel beams from the body to the cloth, then this could cause transformation of the nearest cloth fibres of the kind observed on the Shroud. Moreover the discolouration on the cloth would not be immediate, but would develop over time – possibly months or years – as the atoms in the cloth gradually settled to their lowest energy states. Radiation from the body could explain why the images are on the inside of the wrapped configuration, why the images are negative images, why there is 3D information in the images, why the discolouration of fibres is so superficial, and why some bones in the body can apparently be seen in the images.

Although a case can be made that radiation from a wrapped body could cause the formation of an image on the wrapping cloth, this still leaves two unanswerable questions. Firstly, did this happen in the case of the Shroud? Secondly, if it happened then what caused the radiation?

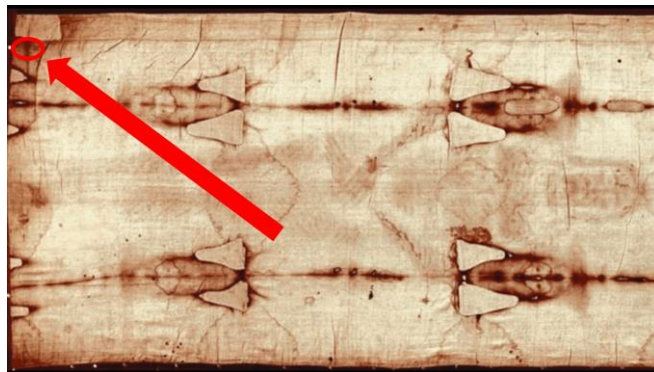
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<sup>4</sup> <https://www.theguardian.com/world/2022/apr/17/the-1m-challenge-if-the-turin-shroud-is-a-forgery-show-how-it-was-done>

<sup>5</sup> E.g. see [https://academicjournals.org/article/article1380798649\\_Antonacci.pdf](https://academicjournals.org/article/article1380798649_Antonacci.pdf)

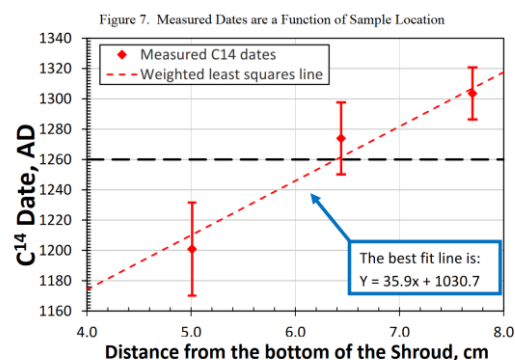
## How old is the Shroud?

Was the Shroud manufactured sometime between 1260 and 1390 or thereabouts, as the 1988 C-14 test results concluded? For many this question should obviously be answered in the affirmative. After all the tests were carried out independently by three different accredited laboratories, and in each case they carried out parallel tests on other known samples for verification. The results were broadly in agreement with each other. However, doubts have been raised as to whether the cloth samples used were truly representative of the Shroud as a whole. Firstly they were taken from a region very close to a damaged corner, and it is difficult to be sure that this had not been subject to contamination or alteration at some point in the lifetime of the Shroud.



Location of the C-14 Samples

Of greater concern is the fact that although the results from the three laboratories were broadly similar, and were averaged to obtain an overall date, they did in fact differ in a systematic way. The three dates increased almost linearly depending on the distance of the sample location from the bottom of the Shroud. There was therefore a significant possibility that the C-14 content might vary considerably over the whole Shroud, rendering the 1988 test results suspect if not meaningless. As nuclear engineer Robert Rucker pointed out in 2022, the laboratory results showed the date of the Shroud increasing by about 91 years every additional inch from the bottom of the Shroud<sup>6</sup>. If these results were both accurate and representative of the Shroud as a whole then a sample taken just twenty centimetres higher would have shown a manufacture date after the current year 2023!



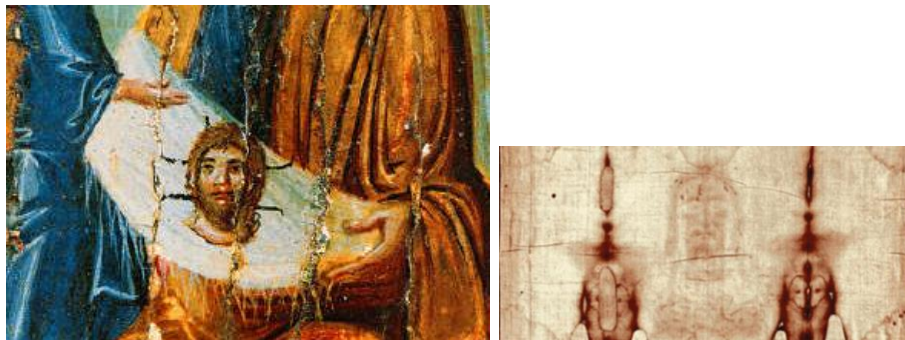
Robert Rucker: C-14 dates dependant on distance

<sup>6</sup> [https://0201.nccdn.net/1\\_2/000/000/0fe/927/solving-the-carbon-dating-problem-for-the-shroud-of-turin.pdf](https://0201.nccdn.net/1_2/000/000/0fe/927/solving-the-carbon-dating-problem-for-the-shroud-of-turin.pdf)



Other tests have concluded that the Shroud is approximately 2000 years old. The most recent was in 2022 by Liberato de Caro of the Italian National Research Council and various colleagues, who applied Wide-Angle X-ray Scattering to a sample of the Shroud in order to estimate the natural aging of the linen<sup>7</sup>. They concluded that the structural degradation of the shroud fibres through aging is quite inconsistent with an age of about 700 years and being stored in Turin for most of its life. It is however entirely consistent with an age of about 2000 years and being kept in various locations between the Middle East and France during its lifetime.

Although there are no confirmed historical records of the Shroud prior to the fourteenth century, there are earlier historical records of a folded cloth bearing the face of Jesus, the appearance of which has a fascinating similarity to the Shroud when folded. The Image (or Mandylion) of Edessa is first mentioned in historical records in 590 AD. Edessa was a city in Turkey not far from the Syrian border and is now known as Sanliurfa. It's been in the news recently, since it suffered some damage in the earthquake earlier this year, and eleven people died in the severe floods a month afterwards. A tenth century icon depicts the Mandylion, which you can see here alongside a picture of the Shroud, which has been folded in half three times.



Interestingly in two historical documents the Mandylion is referred to as a tetradiplon. These are the only two known uses of this Greek word, so its exact meaning is not entirely clear. The literal meaning derived from the two words “tetra” and “diplon” is four doublings. Of course the picture of the section of the Shroud shown here is what one would see after folding in half three times, not four, but note this fascinating property that is not immediately obvious. If you fold a cloth once and then count the number of folds the answer is, of course, one. If you fold it twice and count the largest number of adjacent folds, the answer is two. But if you fold it three times and count the largest number of adjacent folds, the answer is four! The word tetradiplon accurately describes a sheet when folded on itself three times. This raises the interesting possibility that the Image of Edessa and the Turin Shroud are one and the same.

The Image of Edessa can be traced after 590 AD, first moving to Constantinople in AD 944, and then disappearing during the Fourth Crusade in 1204 when Constantinople was attacked and looted by French Crusaders.

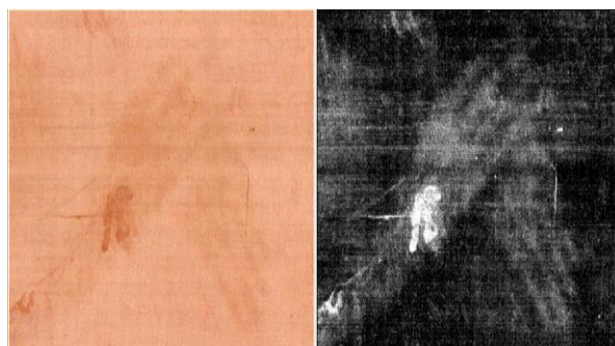
Interestingly if those who suggest that the image was fixed on the Shroud by radiation are correct then it may well imply that the 1988 C-14 test results are also correct! The reason is that C-14 is created by radiated neutrons interacting with

<sup>7</sup> [https://www.researchgate.net/publication/367586654\\_Long-Term\\_Temperature\\_Effects\\_on\\_the\\_Natural\\_Linen\\_Aging\\_of\\_the\\_Turin\\_Shroud](https://www.researchgate.net/publication/367586654_Long-Term_Temperature_Effects_on_the_Natural_Linen_Aging_of_the_Turin_Shroud)

Nitrogen atoms<sup>8</sup>. This raises the fascinating possibility that C-14 was increased in the Shroud through radiation, resulting in a much younger apparent age than is actually the case.

### **Are there human bloodstains on the Shroud?**

One of the most hotly contested areas of analysis has been the apparent bloodstains on the cloth. Is there human blood on the Shroud, and if so how did it get there?



Courtesy [www.shroud.com](http://www.shroud.com)

The reason for the controversy is essentially the limited availability of samples for testing. In 1978 STURP were allowed to carry out non-invasive measurements, and to take samples from the surface of the cloth using specially prepared adhesive tapes that left no traces of adhesive behind. Then later in 1988 small samples were removed for C-14 dating, but these were from a part of the cloth far removed from the image. No other procedures have been permitted, other than photography on the rare times the Shroud has been exhibited. The consequence has been that the kinds of in-depth, extensive and repeated tests that would normally be carried out have not been possible. So, for example, in 2017 a group of scientists placed a paper in the peer-reviewed scientific journal PLOS One, published by the Public Library of Science, in which they reported that a fibre they had tested, that had been removed from the Shroud in 1978, was soaked in a blood serum that had come from a human victim that had suffered great trauma. In 2018 the editorial board of PLOS One retracted the article (although four of their number publically disagreed with the decision)<sup>9</sup>. One stated reason for the retraction was that the results were based on analysis of a single small fibre, which they felt did not provide sufficient evidence for the conclusions drawn.

As already pointed out one scientist reported that he had detected no blood on the Shroud, but had found evidence of artist's pigments. On the other hand the STURP scientists confirmed the existence of traces of blood on the Shroud, that these adhered to the cloth before the image was applied, that no image discolouration was found under the bloodstains, and that residues of haemoglobin and albumin were present. The results were consistent with the blood being human, but they were unable to confirm whether or not this was the case.

If the STURP scientists were right, and the blood on the cloth is human blood, the next problem is explaining how the blood could have transferred to the cloth. The image seems to depict blood draining from various wounds, some running down the arms, as well as bleeding from the extensive scourging. If this blood came from a

<sup>8</sup> See <https://radioactivity.eu.com/phenomenon/radiocarbon>

<sup>9</sup> <https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0180487>

victim of crucifixion then it would have dried on the body post-mortem. But dried blood does not absorb into cloth, so how was so much of it transferred onto the cloth? Intriguingly some have claimed that the scenario of an extremely brief intense burst of radiation emitted from the body might explain it. The radiation could possibly have forced blood from the body onto the cloth by a natural process called radiation pressure. But once again we are into the realm of hypothesis and untestable conjecture.

### **Is the Shroud the cloth used to wrap the dead body of Jesus Christ?**

Mark's gospel says that Joseph bought some linen cloth, took down the body of Jesus, and wrapped it in the linen (Mark 15:46). John's gospel speaks of cloths in the plural, and that about 35 kilos of spices were packed around the body when it was wrapped (John 19: 39-40). A consistent understanding is that a main wrapping cloth was used to wrap the body and contain the spices, and that other cloths were used to hold the wrapping in place. Ultimately the question many are asking is whether the main cloth that Joseph used to wrap the body of Jesus was preserved and is in fact the cloth known to us today as the Turin Shroud.

Analysis of first century Jewish burial customs does not necessarily provide insight into how the body of Jesus might have been wrapped. The reason is that according to the gospel accounts the preparation of Jesus' body was rapid and temporary, due to the imminent onset of the Jewish Sabbath. A more thorough preparation of the body was intended following the Sabbath.

Evidently the Apostles did not consider what happened to the burial cloths a necessary thing to communicate in their writings to the growing Christian community. The same, of course, is true of other relics of the ministry of Jesus, particularly from the holy week. Nevertheless it is difficult to believe that the early Christians treated these objects with indifference or disdain. There is one very good reason why they might have kept very quiet about their existence and location: to avoid them being seized by the authorities. From the time of the martyrdom of Stephen onwards the Jerusalem Christians were persecuted and dispersed far and wide. Very likely they would have carried many sacred mementoes with them and kept them secret at least until the pressure was off.

Although there is no mention of the burial cloth of Jesus in the New Testament after the resurrection accounts, there is one passage that is particularly difficult to understand unless it is seen as a reference to some kind of physical token of the crucifixion and resurrection. In his letter to the church at Galatia Paul wrote

*You foolish Galatians! Who has bewitched you? Before your very eyes Jesus Christ was clearly portrayed as crucified. (Gal 3:1)*

Most commentators have assumed that Paul was merely referring to the time when he had first preached the gospel to the Galatians. However his reference to "before your very eyes" and his use of the Greek word *prographo*, meaning "openly depicted or displayed," are difficult to understand unless he actually showed them some evidence of what had happened to Christ. Quite clearly he was not implying that the Galatian Christians had observed the actual crucifixion!

The main reason why many are convinced that the Shroud was the actual burial cloth of Jesus, including some experts who were initially sceptical, is firstly that the body of a crucified man seems to be displayed on the cloth showing wounds remarkably consistent with those inflicted on Jesus, including scourge marks,

penetrating cuts to the head, nail wounds to wrists and feet, and a stab wound in the side. Of course this alone would merely lead one to assume that some person with a reasonable understanding of the crucifixion story had imprinted the image on the cloth. But if that possibility is ruled out, and the astonishing fact that scientists are unable to replicate the formation of the image leads many to this conclusion, then all that seems to be left is the controversial inference that the resurrection itself, by some unknown one-off process, fixed the image of Christ's body on the cloth.

This, then, is the ultimate, most perplexing conundrum presented by the Shroud.