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An Analysis of the DNA and Hematological Findings of the Shroud of Turin and the Sudarium of Oviedo

Paul A. Dreschnack, MD

A Thesis in the Field of History

for the Degree of Master of Liberal Arts in Extension Studies

Harvard University

November 2023

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Abstract

The Shroud of Turin and the Sudarium of Oviedo are the two most studied, examined, and analyzed historical artifacts in human existence. No doubt, they are also the most famous. Numerous coincidences exist that have captured the hearts and imaginations of audiences for centuries. Several high-profile scientific inquiries have been initiated in the past few decades. They have been studied extensively and comprehensively. But to what avail? They are examined independently, but there is a lack of collaboration of information and sharing of data, which could be very helpful to all the scientists involved.

It has been established that there is historical significance of these two fabrics, having originated in deaths that modern law would readily classify as a homicide. Uniquely killed by crucifixion, and then removed for burial in a time when this did not serve the Roman objective of visually offensive execution. Blood on each of the fabrics match (AB (+)), and the location of the blood stains matches as well. Blood from a human male that is most commonly found in the Middle East was identified on each. The stains superimpose on each other.

DNA analysis performed at the University of Padua traced the path across Europe from Jerusalem to Turin by examining the surface pollen. On its journey, many people venerated it, and added their DNA to what was already present. Contamination is extensive. More studies need to be done. We are examining the only remaining evidence of a violent crime. If there is evidence of a unique singular origin, the implications are

more than theological. Even scientifically and medically speaking, it is more than a matter of faith. It already is a legend.

Frontispiece



Author's Biographical Sketch

Dr. Paul Dreschnack is an established Plastic Surgeon and humanitarian. He joined Dr. Sharadkumar Dicksheet, founder of the India Project, to work in the poorest regions of India for nineteen years, giving new hope and life to children who had none. Making three to four trips to India a year, along with eleven other Plastic Surgeons from the New York area, they operated on about 300,000 children free of charge. Children with birth defects in India suffer from the deformities themselves, but social exclusion, unemployment, and limited marriage possibilities often lead to the death of these children. Estimates are as high as 10,000,000 lives were impacted by free surgery for these children. After more than nineteen years of this work, Dr. Dreschnack has received numerous awards and knighthoods. He has been nominated by the US Congress four times for the Nobel Peace Prize, along with Dr. Dicksheet. The Association of Operating Room Nurses awarded him the 1999 Distinguished Surgeon Award by the Tampa Bay Chapter. Dr. Dreschnack is very involved in advanced Stem Cell research.

Dedication

Dedicated to the

Memory of

Muriel Dreschnack

1917-1998

and

Walter Dreschnack

1915-1973

Acknowledgments

I wish to extend my sincere gratitude to Kevin J. Madigan, Ph.D., my Thesis Director, for his patience and dedication in assisting me with this work. I am also eternally grateful to Donald Ostrowski, Ph.D., and Ariane Liazos, Ph.D. for their kind continued support and assistance in making this report a reality. Historical analysis is a profound and unique phenomenon. Scientific analysis of historical information is a new vista for all.

I would also like to thank Professor Agostino Borromeo, Governor General of the Equestrian Order of the Holy Sepulchre of Jerusalem at the Vatican, and Lieutenant of Honor Mark Rodi of the Southeast Lieutenancy of the Equestrian Order of the Holy Sepulchre of Jerusalem for their essential assistance.

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Chapter I.

Introduction

The Shroud of Turin and the Sudarium of Oviedo for 2000 years have been believed by many to originate from the same person. This has never been demonstrated to be true. The Shroud of Turin was thought to have been the linen cloth that covered the body of Jesus of Nazareth when he was placed in the tomb, and the Sudarium would have been the cloth used to cover his head as he was removed from the cross. Both have been referred to in the Gospels as being seen in the tomb after John and Peter entered after the resurrection. Both artifacts have been extensively studied and analyzed. Much has been learned scientifically. However, they have not been scientifically linked as involving the same individual.

Description

The research question is what do the blood and DNA on the Shroud of Turin and the Sudarium of Oviedo have in common, if anything. Blood is an essential component of the most historic and significant religious artifacts in Europe. Many think that the Shroud of Turin and the Sudarium of Oviedo are associated with Jesus of Nazareth. There are no comparative studies of the DNA of the blood on either of these fabrics. Only supportive evidence exists currently to suggest that they were linked to the same person. It is known that they both have the same blood type (AB).[1] Only 3% of the world's population has

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[1] Kelly P. Kearse, "Empirical Evidence That the Blood on the Shroud of Turin Is of Human Origin: Is the Current Data Sufficient?," Shroud.com, 2012, http://www.shroud.com/pdfs/kearse1.pdf.

this blood type, mainly originating from northern Israel, although it can be found in Western India/Asia and some areas of Africa. Both images are superimposable. It would seem reasonable to deduce that they may come from the same individual. Historic religious artifacts tend to be handled by many people over time. Specifically, many people touched and kissed these artifacts, adding their own DNA to what is already present on each fabric. If manipulated by enough people, it may be impossible to find a matching pair of DNA double helices. Only by sequencing all the DNA can one identify what DNA is present.

Basic DNA Information

The hypothesis is that DNA from the Shroud of Turin should match the DNA from the Sudarium of Oviedo, if the oral tradition passed down is correct. Although there are studies available that show they have the same blood type (AB+ blood). This is very rare, and type AB is the universal recipient. Only one out of twenty-nine individuals have this blood type.

The ideal situation would be to sample blood from both artifacts and perform complete DNA sequencing using New Generation Sequencing instruments. The objective is to look for commonalities of the DNA sequences and differences. As the DNA is unquestionably fragmented due to age and decomposition, reconstruction using Next Generation Sequencing is necessary as it is the latest and fasted automated technology.

The significance of a DNA match, if one could be found, between the Shroud of Turin and the Sudarium of Oviedo would demonstrate that they originated from the same Individual. That is all. It is beyond the scope of any medical or historical analysis to draw any theological conclusions. I leave that to the theologians.

If both were exposed to an external energy source, the radioisotopes on each could place them in the same room at the same time. However, this too is beyond the scope of this research paper. I have no doubt that this study would be a single link in a series of studies to follow. If there is a DNA match, this could originate from anyone who might have touched both artifacts. This might include John the Apostle, Simon Peter, Mary Magdalene, or anyone between 30A.D. and today. I can imagine there were likely many Kings who added their own DNA to the Shroud and the Sudarium. It would be interesting to look for any DNA sequences that could provide any information common to both. If the blood types match, the DNA could match.

Chapter II.

Shroud of Turin History

The Shroud of Turin is a herringbone woven linen cloth composed of flax fibers that measures 14'5" long by 3'7" wide. It bears the negative sepia brownish photographic image of a human male that was apparently severely traumatized by flogging and beatings, with resultant penetrating body, head, and extremity wounds. These wounds are consistent with crucifixion. The Shroud is a famous Catholic relic that some believe to be the burial Shroud that Jesus of Nazareth's body was wrapped in, before being placed in his tomb, after his crucifixion, 2000 years ago.[2]

The Northern Traveler

The gospels tell us that Peter removed the burial cloth from Jesus' tomb in about the year 33 A.D.[3] It disappeared, but resurfaced in Edessa some years later. In 944 A.D.it was transferred to Constantinople, where it remained until the conquest of the city during the fourth crusade in 1204 A.D.[4] It surfaced in Athens for a brief period, but was transferred to Lirey, France in the mid-1350s. The Shroud was in Chambéry, France from 1502 to 1578 A.D., until the Savoy family assumed possession of it. They placed it eventually in the Cathedral of St. John the Baptist in Turin in 1578 A.D.[5] King Umberto

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[2] Domenico Agasso, "The Shroud Is Not Medieval. We Need New Studies to Know Its Age," *Inside the Vatican* (2019): 26–27.
[3] "All about the Human Genome Project," 2013, http://www.genome.gov/10001772.
[4] Mark Guscin, "The Sermon of Gregory Referendarius," Shroud.com, January 2004, https://shroud.com/pdfs/guscin3.pdf.
[5] Mark Antonacci, *The Resurrection of the Shroud* (New York, NY: M. Evans, 2000), 1.

II of Savoy transferred possession to the Pope in 1983 in his will. However, the Shroud has remained in the Cathedral of St. John the Baptist in Turin since then.

The first known person to own the Shroud was Geoffrey II de Charny. Although he was a local war hero; he was a less-than-wealthy minor noble. The Shroud had significant notoriety and financial value.[6] Some skeptics argue that this point was the origin of the illegitimacy argument. In 1356 A.D. Charny was killed in the battle of Poitiers. Although there are no prior records of the whereabouts of the Shroud before Geoffrey, pollen on the surface suggests that it was in Edessa for some time. The bishop of Troyes, France, Pierre d'Arcis, in about 1389, sent a letter to Pope Clement VII stating that a local artist confessed to forging the Shroud (Appendix A). He also related that the dean of the church in Lirey knew this, and used it to raise money despite its being a forgery. The Pope permitted the bishop to continue to display the Shroud but acknowledged that it was a forgery. Margaret de Charny sold the cloth to the Duke of Savoy in 1453.[7] It was exchanged for 2 castles after she advertised the Shroud as the authentic Shroud of Jesus. She was later excommunicated by the Church. A fire in the Sainte-Chapelle in Chambéry in 1532 nearly destroyed the Shroud.

Molten silver droplets fell onto the folded fabric, burning through several layers. Patch repair was made by the Poor Clare Nuns, which is still very visible today (Figure 1).[8] The Duke of Savoy (Emmanuel Philbert) ordered the Shroud to be transferred from

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[6] Richard J. Ball, "The Shroud of Turin and Its Alchemic Probability circa AD 1350" (PhD diss, Harvard University, 2005).
[7] Janice Bennett, *Sacred Blood, Sacred Image: The Sudarium of Oviedo: New Evidence for the Authenticity of the Shroud of Turin* (San Francisco, CA: Ignatius Press, 2005), 87.
[8] Becky Little, "The Shroud of Turin: 7 Intriguing Facts," History.com, March 25, 2021, https://www.history.com/news/shroud-turin-facts.

the Savoy capital of Chambéry to Turin in 1587 A.D. Further repairs were undertaken by Sebastian Valfrè in 1694.[9] Princess Maria Clotilde of Savoy made additional repairs in 1868. There was a second fire on April 11, 1997, and another repair was undertaken in 2002.[10] This time the backing cloth and the previous repair patches were removed. High-resolution photos were taken, and the image of the "Man in the Shroud" was seen on the rear of the cloth for the first time in centuries. The image is detailed in a negative photographic image as photographed by Barry Schwartz (Figure 2 and Figure 3).[11]

[9] John Beldon Scott, *Architecture for the Shroud: Relic and Ritual in Turin* (Chicago: The University of Chicago Press, 2003), 26.
[10] Associated Press, "Shroud of Turin Saved from Fire in Cathedral," *The New York Times*, April 12, 1997, https://www.nytimes.com/1997/04/12/world/Shroud-of-turin-saved-from-fire-in-cathedral.html.
[11] Barrie Schwortz, "The Shroud of Turin," STERA, Inc. Image Library, 1978, Shroud.com, https://www.Shroud.com/gallery/index.htm.



Figure 1. The Shroud of Turin.[12]

[12] Schwartz, "The Shroud of Turin."

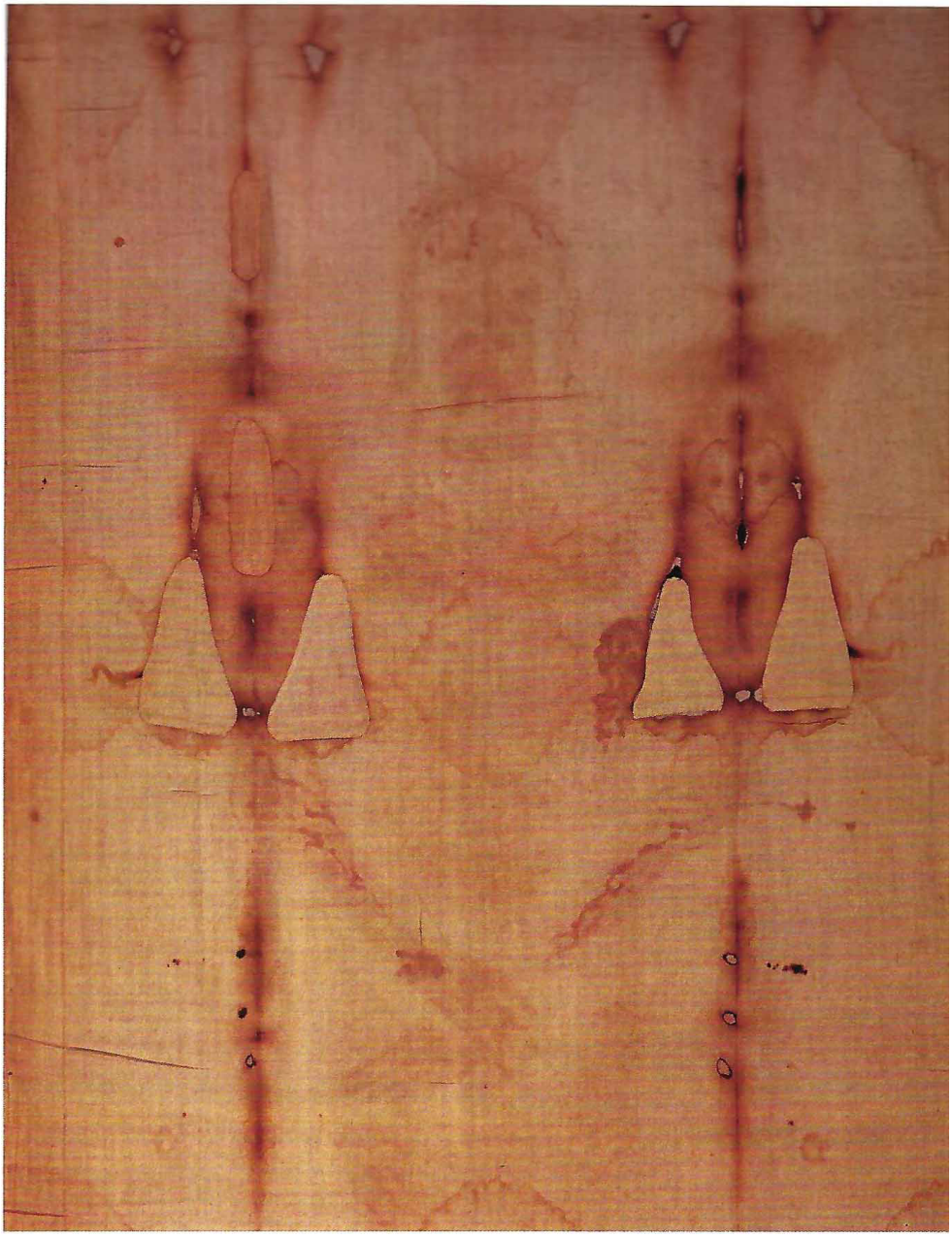


Figure 2. The Shroud of Turin. Anterior view.[13]

[13] Schwortz, "The Shroud of Turin."

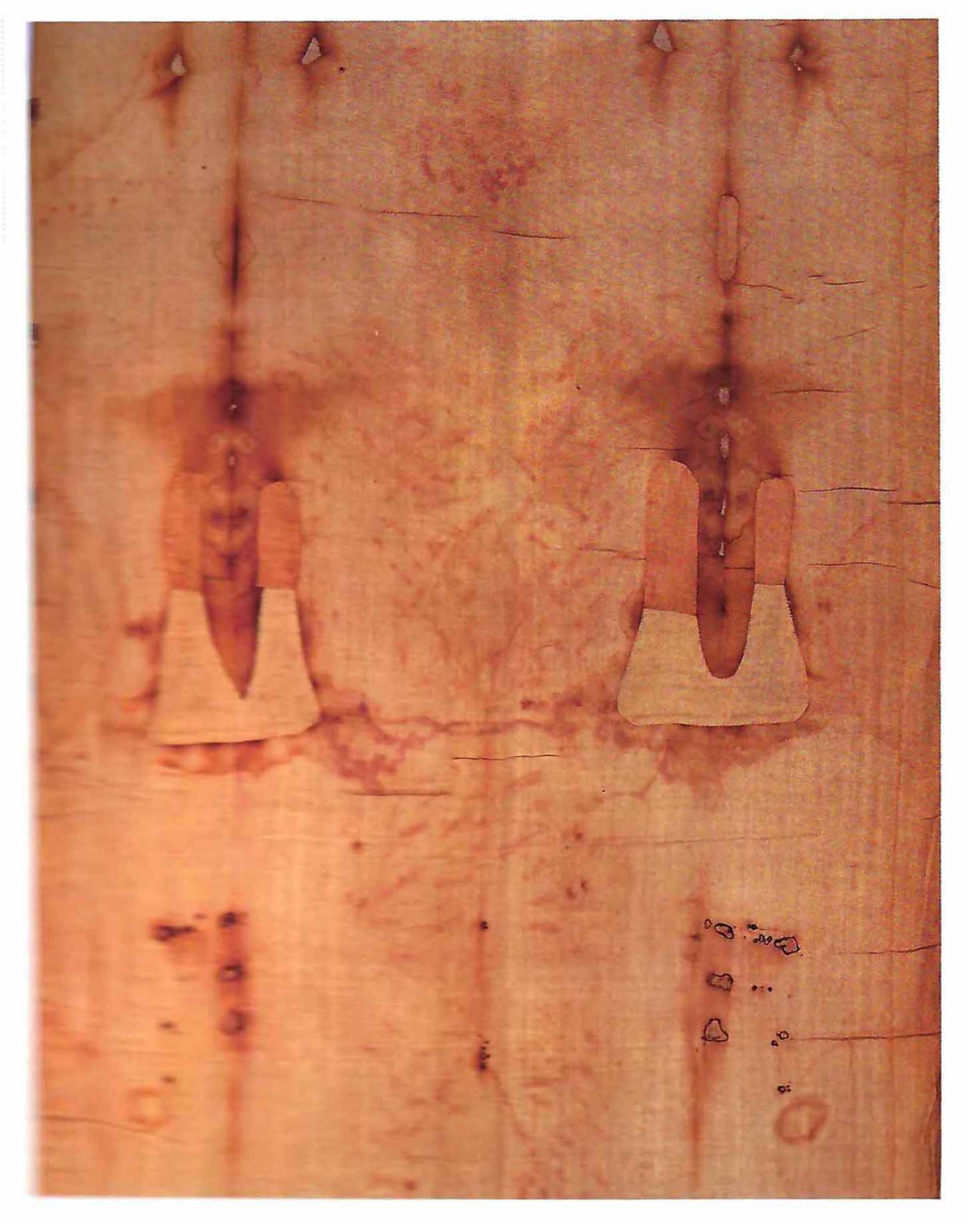


Figure 3. The Shroud of Turin. Posterior view.[14]

[14] Schwortz, "The Shroud of Turin."

The Medical Findings

The image on the Shroud has penetrating injuries of the wrists, feet and right upper quadrant of the abdomen. There are greater than 100 lacerations of the back, legs, flanks, and circumferential lacerations of the forehead and scalp. There are numerous contusions and ecchymoses of the knees, face, back and shoulders. All these wounds are similar to those described in the Gospels, which support Christian beliefs.

The blood stains both on the Shroud and Sudarium support the proposition that there was active bleeding while alive, and nasal fluid drainage post-mortem. Human red blood cells do not have nuclei. This was the case with blood on both fabrics. This means the blood present was not of animal origin. All wounds appear to be caused by sharp objects. The trails of blood on both sides of the Shroud coincide with the blood stains on the Sudarium.

According to Jewish burial rights, men were "made in the image and likeness of God." The executed and all the dead are "impure," but the dead were revered just as much as the living. Laws required that they be washed, wrapped in a proper shroud, and entombed before dusk. This was not the Roman custom. The crucified were left to rot and be consumed by animals as an example of what happens to criminals. Blood stains on the Shroud suggest that this person may not have been washed. Rebecca Jackson of the Turin Shroud Center of Colorado published an article stating that this may occur in only one of four circumstances. If that person suffered a bloody or traumatic death; if they

were executed for religious reasons; if that person was a religious outcast; or if that person was executed by a non-Jew.[15]

The Shroud of Turin Research Project (STURP)

Sindonology was the name given to those who scientifically study the Shroud. Factually, the first scientific analysis ever performed was Secondo Pia's early photographic plate of the negative/positive images of the Shroud (Figure 4).[16] This was the basis of the scientific studies that began in the 1970s. Specifically, in 1978 the Shroud of Turin Research Project (STURP) was formed to specifically study the Shroud (Appendix B). A team of scientists and other specialists were given unfettered access to the Shroud for the first comprehensive scientific study.[17] They had two weeks to photograph it and document as much information as possible.[18] This was in actuality a near forensic investigation as possible at that time.

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[15] Rebecca Jackson, "Jewish Burial Procedures at the time of Christ," Sudario del Señor: Actas del I Congreso Internacional sobre El Sudario de Oviedo, Oviedo, October-November, 1994.
[16] "Secondo Pia," Wikipedia, Wikimedia Foundation, Accessed February 1, 2023, https://en.wikipedia.org/wiki/Secondo_Pia.
[17] "STURP Team Members," STURP, Shroudofturin.com, accessed March 5, 2023, https://shroudofturin.com/Resources/CRTSUMSTURPTEAM1.pdf; Barrie M. Schwortz, "The Shroud of Turin Research Project 1978 Scientific Examination of the Shroud," Shroud.com, August 26, 2012, https://shroud.com/pdfs/schwortzv.pdf.
[18] "STURP," Shroudofturin.com, accessed May 15, 2023, https://www.shroudofturin.com/sturp.html.



Figure 4. Secondo Pia's Photo.[19]

The STURP team essentially did an excellent analysis of the Shroud. Photographic analysis began where Secondo Pia's work left off. Biomedical forensic studies were independent of the photographic analysis. A material structural analysis was the independent third group. The highest profile analysis performed was the Carbon-14 (C-14) dating study. A small sample was cut from the corner of the Shroud for C-14 analysis in 1988, and sent to three independent labs for analysis: the University of Arizona, the University of Oxford, and the Swiss Federal Institute of Technology. The consensus was that the sample dated between 1260 and 1390 AD.20 Although a 95%

[19] "Secondo Pia."
[20] P.E. Damon et al., "Radiocarbon Dating of the Shroud of Turin," *Nature* 337, no. 6208 (February 16, 1989): 611–15, https://doi.org/10.1038/337611a0. S2CID 27686437.

confidence was reported with their analysis, some authors have reported that date adjustments may be required to maintain that level of confidence.[21] The words "Medieval Forgery" appeared on the News in a loud voice. The reasoning was that it was created to encourage religious devotion in the Dark Ages.[22] Although the notorious Shroud of Turin study in 1988 carbon dated the Shroud between 1260 A.D. and 1390 A.D., an attempt to re-examine and re-analyze the data was performed at the University of Padua in 2013 using infrared light and spectroscopic analysis.[23] The resulting analysis showed that the Shroud was dated between 280 B.C. and 220 A.D.[24]

Antonacci addressed some theoretical, but important questions in his book *The Resurrection of the Shroud*. The first point he raised: was the Shroud exposed to radiation? Thomas Phillips of the High Energy Physics Laboratory here at Harvard University, published a letter proposing that the original C-14 dating could have been changed by the addition of additional C-14 by the process of irradiation.[25] If the Shroud was exposed to neutrons (a neutron flux), this could change the nucleus of the C-14 present, forming a new isotope by neutron capture. This new isotope of C-14 would

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[21] Marco Riani et al., "Regression Analysis with Partially Labelled Regressors: Carbon Dating of the Shroud of Turin," *Statistics and Computing* 23, no. 4 (2012): 551–61, https://doi.org/10.1007/s11222-012-9329-5.
[22] Janice Bennett, "Face Cloth of Jesus' Burial: The Sudarium of Oviedo: Simply Catholic," *Simply Catholic* | Helping Catholics know & love the Lord and his Church, April 1, 2021, 37, http://www.simplycatholic.com/face-cloth-of-jesus-burial-the-sudarium-of-oviedo/.
[23] Barrie M. Schwortz, "The 1988 Radiocarbon Dating of the Shroud of Turin and STURP," Shroud.com, August 26, 2012, https://www.shroud.com/pdfs/schwortz1p.pdf.
[24] Marc Lallanilla, "Shroud of Turin Authenticity up for Debate Again after New Report," *The Christian Science Monitor*, March 29, 2013, https://www.csmonitor.com/Science/2013/0329/Shroud-of-Turin-authenticity-up-for-debate-again-after-new-report.
[25] Thomas J. Phillips, "Shroud Irradiated with Neutrons?," *Nature News*, accessed May 16, 2023, https://www.nature.com/articles/337594a0.

change the dating of the Shroud to a much later time.[26] Technically this could be achieved with a relatively small amount of radiation.

The second point that Antonacci raises is even more interesting. The Shroud has several elements present that are distributed evenly in its structure, which would most likely be present from the time of manufacture. They are iron, strontium, and calcium. Calcium-40 (Ca-40) is the form we are all most familiar with. This is 97% of any available calcium. There is a rare form called calcium-41 (Ca-41) which is a man-made isotope, and does not normally occur in the elemental world. If Ca-41 were present, it would confirm that the Shroud was irradiated with neutrons, or some form of electrostatic discharge.[27]

This information is significant because limestone consists of mostly calcium carbonate. The slab in the Edicule (tomb) in Jerusalem is limestone. Thus, the posterior surface of the Shroud would have been in contact with the limestone directly. In 1998, the "STURP was not allowed to remove the backing cloth."[28] Therefore, this investigation was not performed.

The combination of this information raises the most perplexing idea. If radiation was present, then C-41 would be present on the Shroud, the Sudarium, and the limestone

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[26] Antonacci, *The Resurrection of the Shroud,*159.
[27] Giulio Fanti et al., "Evidences for Testing Hypotheses About the Body Image Formation of the Turin Shroud," Shroud.com, September 2005, https://www.shroud.com/pdfs/doclist.pdf; Giulio Fanti, "Can a Corona Discharge Explain the Body Image of the Turin Shroud?" *Journal of Imaging Science and Technology* 54, no. 2 (2010), https://www.academia.edu/62877085/Can_a_Corona_Discharge_Explain_the_Body_Image_of_the_Turin_Shroud.
[28] Antonacci, *The Resurrection of the Shroud,* 187.

of the tomb. It is theoretically possible to place the artifacts in the same place (the tomb in Jerusalem) at the same time.

Another unexplored possibility was the presence of chromium-53 (Cr-53) on the Shroud and/or the Sudarium. Humans have iron in the hemoglobin molecule of our blood. If neurons bombard blood, the iron produces Cr-53, which is an isotope that can be easily identified.[29] I have not been able to find any evidence that this examination was performed.

The National Technical University of Athens completed a restoration on the Edicule in Jerusalem in 2016 under the direction of Antonia Moropoulou. The team performed extensive analyses of the interior after disassembly of the tomb. I feel confident that we will be receiving more publications from the National Technical University of Athens in the near future.

Several inscriptions were found in the Shroud in a circular fashion around this head. This was thought to possibly be from the supports which held in head in place at the time of wrapping the body. The inscriptions are in Greek, Hebrew, and Latin. The inscriptions include the words: THEOS (God), IN NECEM IBIS, (to death you will go), and SB (possibly "Signum Baldinii, the seal of Baldwin"). This may have been one of the gifts sent to Louis IX (Saint Louis) by Baldwin de Courtenay, the king of Jerusalem in 1247.[30]

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[29] Antonacci, *The Resurrection of the Shroud*, 188.
[30] Mark Guscin, "The 'Inscriptions' on the Shroud," Shroud.com, November 1999, https://shroud.com/pdfs/guscin2.pdf.

The Medieval Repair Theory

Alternative explanations evolved as a re-examination of the data. First was the medieval repair theory.[31] The basis of the theory is that a repair weave was made in the damaged Shroud, which was almost impossible to see, and was the area that was sampled for the C-14 study. This was refuted by a textile expert at the Shroud meeting called Sindone 2000, Mechthild Flury-Lemberg. She maintained that this was not possible to have a successfully woven repair in this fashion.[32]

The Bioplastic Film Theory

There has long been a theory that there was bacterial contamination of the surface from being held in human hands. Additionally, Harry Gove of Rochester suggested that a bioplastic film contributed to false C-14 dating.[33] These theories eventually were thought to be fringe theories and fell out of fashion.[34]

A carbon monoxide theory had a similar path of theory evolution and resolution. The thought was that smoke in the church over centuries from candles eventually changed the carbon content of the Shroud itself. Ultimately it was demonstrated that carbon monoxide does not have any great affinity and adherence to the linen fibers.[35]

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[31] H.E. Gove, "Dating the Turin Shroud—an Assessment," *Radiocarbon* 32, no. 1 (1990): 87–92, https://doi.org/10.1017/s00338 22200039990.
[32] Mechthild Flury-Lemberg, "The Invisible Mending of the Shroud, the Theory and the Reality," Shroud.com, accessed May 16, 2023, https://www.shroud.com/pdfs/n65part5.pdf.
[33] William Meacham, "Turin Shroud—Image of Christ? Proceedings of a Symposium held in Hong Kong," Shroud.com, March 1, 1986, https://www.shroud.com/pdfs/ssi24part6.pdf.
[34] "Fringe Theories about the Shroud of Turin," Wikipedia, accessed May 14, 2023, https://en.wikipedia.org/wiki/Fringe_theories_about_the_Shroud_of_Turin.
[35] E. Brunati, "Note Critiche Sulla Datazione Della S.Sindone Con Il Radiocarbonio," Typescript, January 1994.

Kearse also reported that carbon dioxide would not play any role in coloration of the blood in the Shroud.[36]

The Paint Theory

The theory that the Shroud of Turin was painted began in 1978 when Walter McCrone examined adhesive tape samples from the surface under polarized light microscopy. He concluded that the dilute pigments were from techniques developed in the 14th century that were applied to the Shroud surface.[37] This was later refuted by John Heller and Alan Adler who concluded that the color in the Shroud was not from paint, and it was not plausible for it to be responsible for the image of the Man in the Shroud. McCrone has not changed his opinions or modified his theories. The C-14 data analysis remains currently inconclusive.[38]

Pollen Analysis

Pollen analysis was performed by Gianni Barcaccia and published in 2015 in *Scientific Reports*.[39] A diverse selection of plant species were isolated by DNA analysis from remote areas of the globe. Included were China, North America, the Middle East, North Africa as well as Central Europe. Human DNA was found from India, Northern and Eastern Africa, Central Europe and the Middle East. All the nucleotide sequences

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[36] Kelly P. Kearse, "Investigations into the Effect of Carbon Monoxide Exposure on Bloodstain Color: Implications for the Shroud of Turin," Shroud.com, October 10, 2017, https://shroud.com/pdfs/kearse5.pdf.
[37] Walther C. McCrone, *Judgment Day for the Shroud of Turin* (Amherst, NY: Prometheus Books, 1999).
[38] Joe Marino and Walter McCrone, "More on McCrone's Role in Shroud of Turin Studies," Shroud.com, September 23, 2011, https://shroudstory.com/2011/09/23/more-on-mccrones-role-in-shroud-of-turin-studies/.
[39] Gianni Barcaccia et al., "Uncovering the Sources of DNA Found on the Turin Shroud," *Scientific Reports* 5, no. 1 (2015): 2, https://doi.org/10.1038/srep14484.

here were listed in the Nucleotide Database of the U.S. National Library of Medicine. Clearly, innumerable people have handled, and probably kissed the Shroud, contaminating it with their own DNA. This is not surprising considering the fame and popularity of the Shroud, including the distance traveled over time. A significant amount of DNA contamination of the Shroud does complicate the scientific analysis. The conclusions of the STURP group upon completion of their studies were:

> Thus, the answer to the question of how the image was produced or what produced the image remains, now, as it has in the past, a mystery. We can conclude for now that the Shroud image is that of a real human form of a scourged, crucified man. It is not the product of an artist. The blood stains are composed of hemoglobin and give a positive test for serum albumin. The image is an ongoing mystery and until further chemical studies are made, perhaps by this group of scientists, or perhaps by some scientists in the future, the problem remains unsolved.[40]

STURP conclusions were basically a list of factors that did not contribute to the image of the Man in the Shroud (Appendix C). My belief is that more questions were raised than answered. The bottom line from all the scientific studies was that the origin and nature of the figure of the Man in the Shroud is unknown, as it was before the studies.

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[40] "A Summary of STURP's Conclusions," Shroud.com, accessed March 19, 2023, https://www.shroud.com/78conclu.htm.

Chapter III.

Sudarium of Oviedo History

The Sudarium of Oviedo is a blood-stained piece of taffeta linen measuring 34" long by 21" wide that is kept in the Cathedral of San Salvador in Oviedo, Spain. The fabric itself is dirty and wrinkled with numerous brownish bloody appearing stains over its surface without any discernable visible images of a human face.[41] The word Sudarium is Latin meaning *sweat cloth*, or perhaps the modern equivalent *towel*.

The Sudarium has been traditionally known as the cloth that was used to wrap the head of Jesus of Nazareth as he was removed from the cross. Thus, for centuries it has been known as the *Sudarium Domini*. Many religious pilgrims believe that this is so because it clearly represents an artifact that was wrapped around someone who was severely injured and experienced significant blood loss (Figure 5).[42]

Little is known about the Sudarium for the first three hundred years. Religious artefacts were not shown to the public on permanent exhibition in the Medieval days. It was thought to be enough that pilgrims would know that they are there. They were kept in caves near sites of worship. For example, the Sudarium was kept in a case in the Chapel in the Cathedral of Oviedo for centuries, and rarely opened for viewing. It was enough for people to know that they were there. In the days of the Latin Kingdom of

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[41] Bennett, *Sacred Blood, Sacred Image*, 13.
[42] Doug MacGowan, "Sudarium of Oviedo," Historic Mysteries, accessed March 20, 2023, https://www.historicmysteries.com/the-sudarium-of-oviedo/.

Jerusalem, religious artefacts had to be protected, because they would have been illegal under non-Christian laws.[43]

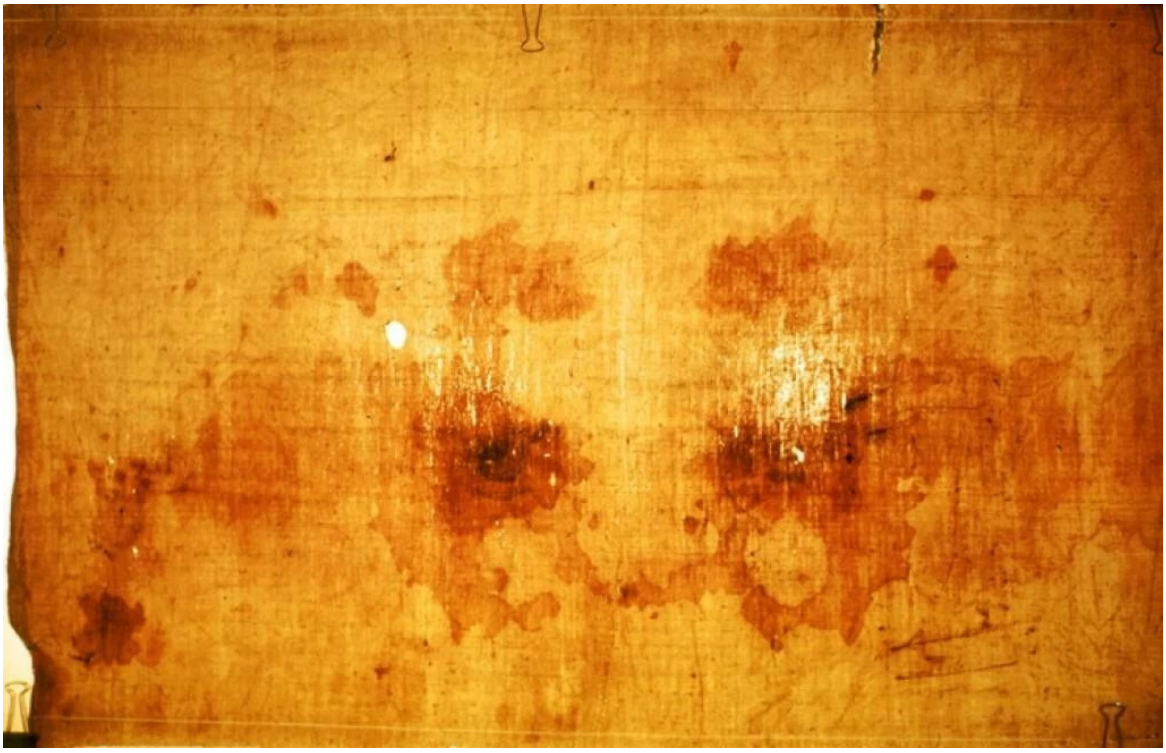


Figure 5. The Sudarium of Oviedo.[44]

[43] Bennett, *Sacred Blood, Sacred Image,* 28.
[44] MacGowan, "Sudarium of Oviedo."

The Southern Traveler

There are references to a Sudarium by John the Evangelist in the Bible.[45] Discussions are very limited but are noted to be present, nonetheless. Janice Bennett in her book *Sacred Blood, Sacred Image, The Sudarium of Oviedo: New Evidence for the Authenticity of the Shroud of Turin* relates a very detailed description of the early Sudarium references. Mentioned are the *Book of the Testaments of Oviedo*, the *Corpus Pelagianum,* the *Codex Valenciennes 99, Valenciennes 30, Cambrai B804, Bruselas II 2544*, *Silence* (the Chronicle of the Monk of Silos) in 1115 A.D., *San Antonio Mártir* (570 A.D.), and references by Santa Nino of Georgia (300A.D.).[46] These early references present more of a documented history than that which is available for the Shroud of Turin comparatively. It appears that the Sudarium was in Jerusalem for its first 600 years of existence. The first official mention of the Sudarium was by Antonius of Piacenza in 570A.D. who wrote that it was being kept in a cave near Sr. Mark's Monastery in Jerusalem, near the river Jordan.[47]

Much of the history of the Sudarium that we have originated from the *Liber Testamentorium* by Pelagius who was the Bishop of Oviedo from 1101 to 1130 A.D. He tells us that the Shroud remained in Jerusalem until the Persian King Khosrau II invaded in 614 A.D.[48] The Sudarium was transported to Alexandria for its safety. In 616 A.D., Khosrau II invaded Alexandria, so it was moved again. This time to Cartagena, Spain. Shortly thereafter, St. Isidore, Bishop of Seville, took possession of the Sudarium where

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[45] John 20:6-7.
[46] Bennett, *Sacred Blood, Sacred Image*, 22.
[47] Bennett, *Sacred Blood, Sacred Image*, 22.
[48] Mark Guscin, "The Sudarium of Oviedo: Its History and Relationship to the Shroud of Turin," Shroud.com, 1997, https://www.shroud.com/guscin.htm.

it remained until it was transferred to St. Ildephonsus, the Bishop of Toledo in 718 A.D. As the Moors invaded Spain in 711 A.D., it was moved progressively North and hidden in a cave called Montesacro, until King Alfonso II the Chaste (c. 759-842) built a chapel called the Holy Chamber in Oviedo to house it in 840 A.D.[49] This structure would later be incorporated into the Cathedral of San Salvador. The King had the wooden chest that contained the Sudarium covered with silver and inscribed with the phrase "The Sacred Sudarium of Our Lord Jesus Christ." The chapel was dynamited early in the Spanish Civil War. However, the Sudarium was undamaged. The stones were used to reconstruct the chapel at the completion of the war in 1934. The Sudarium of Oviedo is kept in the Cámara Santa of the Cathedral of San Salvador in Oviedo. Radiocarbon dating was performed on this fabric also. Results dated it to 700 A.D. However, it was first described in the literature by Antoninus of Piacenza in 570 A.D. in Jerusalem. Thus, the carbon-14 dating is known to be inaccurate.[50]

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[49] Bennett*, Sacred Blood, Sacred Image*, 24-34.
[50] "The Shroud of Oviedo: A Legendary Cloth Connected to the Death of Jesus," Ancient Origins Reconstructing the story of humanity's past, May 25, 2016, https://www.ancient-origins.net/artifacts-other-artifacts/shroud-oviedo-legendary-cloth-connected-death-jesus-005643.

Chapter IV.

Commonalities

Both artifacts are highly contaminated, with numerous stains.[51] Monsignor Giulio Ricci in 1985 was the first clergyman to step forward and suggest that both fabrics originated with the same individual.[52] Of course, they have been studied individually and independently in their respective countries. Extensive studies of both demonstrate that the blood stains superimpose. More studies had demonstrated head positioning in order to determine the direction of blood flow postmortem.[53]

The blood type present on the Shroud was identified as type AB.[54] A sample of blood was taken to the University of Texas at San Antonio by Dr. Leoncio Garza–Valdez in about 1994.[55] Utilizing Polymerase Chain Reaction (PCR) technique, he was able to reconstruct one of 100,000 genes in the genome of this blood sample: the betaglobin gene of chromosome 11. The results clearly showed blood from a human male or other high primate. This eliminated contamination from human handling and kissing the Shroud as it was identified decisively as blood. It still left the question of whose blood it is on the Shroud. Perhaps a bystander, or the Man on the Shroud? He was also able to identify an

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[51] Mark Guscin, "Recent Historical Investigations on the Sudarium of Oviedo," Shroud.com, June 1999, https://docslib.org/doc/8924758/recent-historical-investigations-on-the-sudarium-of-oviedo.
[52] Guillermo Heras Moreno, Jose-Delfin Villalain Blanco, and Jorge-Manuel Rodriguez Almenar, "Comparative Study of the Sudarium of Oviedo and the Shroud of Turin," Shroud.com, n.d., 2, https://www.shroud.com/heraseng.pdf.
[53] Moreno, "Comparative Study of the Sudarium of Oviedo and the Shroud of Turin," 5.
[54] Moreno, "Comparative Study of the Sudarium of Oviedo and the Shroud of Turin," 12; Kelly Kearse, "The Shroud of Turin, the Relics of Jesus, and Eucharistic Miracles: The Significance of Type AB Blood," Academia.edu, May 19, 2019, https://www.academia.edu/39142967/The_Shroud_of_Turin_the_Relics_of_Jesus_and_Eucharistic_Miracles_The_Significance_of_Type_AB_blood?email_work_card=view-paper.
[55] Leoncio Garza-Valdes, *The DNA of God?* (New York: Berkley Books, 2001).

Amelogenin-X gene and an Amelogenin-Y gene, showing that the blood definitively came from a human male. A human male normally has 100,000 genes, and three billion base pairs.[56]

Dr. Garza-Valdez had three short segments of DNA. Out of three billion base pairs, he had 700 to 750 pairs. No such testing was ever performed on the Sudarium of Oviedo. This was all that was known about the DNA up to the year 2000. It is possible that 95% of the DNA on the Shroud may have been replaced by fungi and mold.[57] This makes DNA analysis difficult, to say the least.

Several human DNA sequences were identified as showing many diverse haplotypes (groupings of individual genes characteristic of local ethnicities) that could be found in different areas of Europe, Asia, and Africa. The sequences were human contaminants, not blood. Group H1 haplotypes are found in the Iberia's, northwest Africa, the Caucasus and the Near East. Haploid group H33 is found in the Druze people of Israel, Jordan, Lebanon, and Syria. Haplotypes U5a and U5b are found an Eastern and Western Europe. Haplogroup R0a is found in the Arabian Peninsula and Southeast Yemen. Haplogroup L3c is found in East Africa and groups M39, M56, R7 and R8 are found in Asia, particularly India.[58] One can conclude overall that numerous people have handled the Shroud from every corner of Europe, the Middle East, Africa, India, and contamination is very extensive. Blood from the Shroud needs to be sampled and analyzed independently. No such DNA studies have been published or identified as

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[56] J. Craig Venter et al., "The Sequence of the Human Genome," *Science* 291, no. 1304 (2001): 1304-51, doi: 10.1126/science.1058040.
[57] Garza-Valdes, *The DNA of God?*, 45.
[58] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 4.

coming from the Sudarium of Oviedo. All blood samples were identified as Type AB. However, current hematological studies suggest that the Rhesus factor antigen for the Shroud is positive (i.e., AB+).[59] Hence, it would appear to be AB (+), a very rare blood type. There cannot be any proof of divinity. I defer any such commentaries to the theologians. If there is a match of non-hematological DNA, then they were handled by the same man. Perhaps St. John the Evangelist, Peter, or some other witness to them both. This could include anyone who examined both artifacts. Kearse recommended further immunological studies of the Shroud blood to safely verify the human (primate) origin of the DNA.[60]

It is worth noting that the Sudarium and the Shroud both superimpose on one another (Figure 6, 7). The drip patterns of the blood also align, as well as the tissue lacerations.[61]

Barta and colleagues at EDICES produced an interesting study where they looked at calcium at the tip of the nose in the Sudarium and compared it to the X-ray fluorescence studies performed by Morris in 1980.[62] Dirt on the tip of the nose is

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[59] "Facts about the Shroud of Turin (Age, Dimensions, Blood Stains)," Magis Center, January 25, 2023, http://www.magiscenter.com/blog/facts-about-Shroud-turin.
[60] Kelly P. Kearse, "The Blood on the Shroud of Turin: Species Unknown," Academia.edu, May 26, 2019, https://www.academia.edu/39251164/The_Blood_on_the_Shroud_of_Turin_Species_Unknown; Kelly P. Kearse, "Blood on the Shroud of Turin: An Immunological Review," Shroud.com, August 2012, https://shroud.com/pdfs/kearse.pdf; Kelly P. Kearse, "What Type of Blood Is Present on the Shroud of Turin? Existing Data vs. To Be Determined," Shroud.com, October 10, 2017, https://shroud.com/pdfs/kearse4.pdf; Kelly P. Kearse, and Thibault Heimburger. "The Shroud Blood Science of Dr. Pierluigi Baima Bollone: Another Look at Potassium, among Other Things," Shroud.com, January 21, 2014, https://shroudofturin.files.wordpress.com/2013/12/bbk-7.pdf.
[61] "New Study: The Shroud of Turin and the Sudarium of Oviedo Covered the Same Person," *Aleteia*, January 1, 2020, https://aleteia.org/2016/04/11/new-study-the-Shroud-of-turin-and-the-sudarium-of-oviedo-covered-the-same-person/.
[62] César Barta et al., "New Coincidence between Shroud of Turin and Sudarium of Oviedo," *SHS Web of Conferences* 15 (2015): 12, https://doaj.org/article/6b0df837967b45fab12ccf17c01159e2; R. A. Morris, L. A. Schwalbe, and J. R. London, "X-Ray Fluorescence Investigation of the Shroud of Turin," *X-Ray Spectrometry* 9, no. 2 (1980): 45, https://doi.org/10.1002/xrs.1300090203.

consistent with falling on one's face. There was dirt and calcium on the tip of the nose in both specimens (Figure 8). They performed an analysis of the calcium and strontium present and concluded "we consider that the fluids, when still fresh, acted as cement for the environmental dust and thereby the stained area should have a higher proportion of mineral particles from the place where it was used. The ratio in the stained area of the Sudarium is even closer to the Calvary limestone ratio. These results lead to the hypothesis that over 75% of the limestone deposited in the Sudarium comes from the Calvary" (Figure 9).[63]

Kathy Schiffer summarized the similarities as follows:

> The Sudarium also helps to authenticate the Shroud of Turin because of notable similarities between the two cloths;
>
> 1. Of prime importance, the blood and lymph stains on the two cloths match—both are type AB, which was uncommon among medieval Europeans but is a common blood type in the Middle East.
>
> 2. The material used in the two cloths is identical, although there are differences in the manner of weaving.
>
> 3. Pollen residues on the Shroud and the Sudarium both provide evidence that the cloths were in the same region of Palestine.
>
> 4. Stains on the two cloths would also seem to match. Because of the way the Sudarium would have covered the head, there is no clear face print—but there are remarkable correlations between stains on the two cloths. The Sudarium would have been wrapped over the head of Christ while his relatives waited for permission to remove the body; and so the stains show that the body was held in a vertical position with the head dropping back. At the back of the head, the cloth shows blood from deep puncture wounds, similar to the wounds on the Shroud of Turin, which may have been made by the crown of thorns.
>
> 5. A second, overlaying stain was produced by fluids excreted from the nostrils when the body was lain horizontally. According to the

[63] Barta, "New Coincidence between Shroud of Turin and Sudarium of Oviedo," 10.

Investigation Team from the Spanish Centre for Sindology, which has been studying the Sudarium since 1989, this second set of stains is composed of one part AB-type blood and six parts oedemal fluid. This fluid proves, according to scientists, that the victim died from asphyxiation—which is the cause of death for people who are crucified.

6. Comparing the cloth to the Shroud of Turin, one researcher has identified 70 points of correlation on the front of the Sudarium and 50 on the back. Dr. Alan Whanger, professor emeritus from Duke University, used a Polarized Image Overlay Technique to demonstrate correlations between the two cloths.[64]



Figure 6. The Shroud and Sudarium superimposed.[65]

[64] Kathy Schiffer, "The Sudarium of Oviedo: The 'Other Shroud' of Jesus," National Catholic Register, accessed April 9, 2023, https://www.ncregister.com/blog/the-sudarium-of-oviedo-the-other-shroud-of-jesus.
[65] "2018 Update! the Sudarium of Oviedo; and the Shroud of Turin | Strange End Times Signs," YouTube, April 2, 2018, https://www.youtube.com/watch?v=alRlq5uU0Fg.



Figure 7. The Shroud and Sudarium applied together.[66]

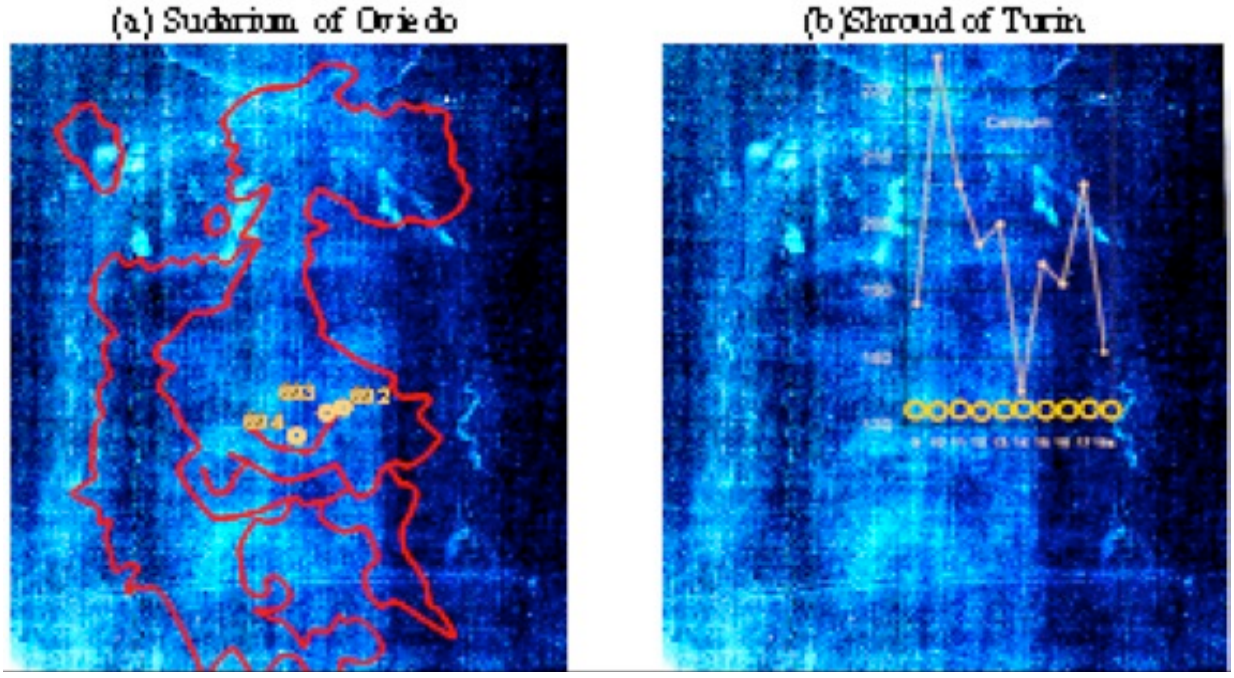


Figure 8. Calcium on the Shroud of Turin face and the Sudarium stains.[67]

[66] Bennett, *Sacred Blood, Sacred Image,* 122.
[67] Barta, "New Coincidence between Shroud of Turin and Sudarium of Oviedo," 11.

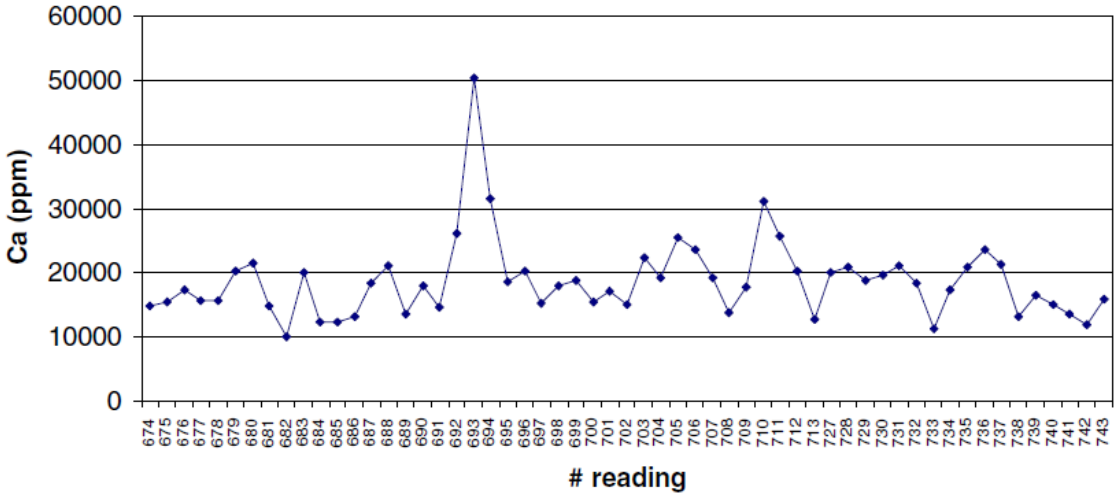


Figure 9. Calcium measurements from the Sudarium, nose spike.[68]

A meeting was held in Spain in 1998 called the III Congresso Internazionale di Studi Sulla Sindone. One of the purposes of that meeting was to examine what was known to exist regarding both relics scientifically. The following was the summation of what had been established at that time:

> We now have to talk about the blood as a common element on both cloths. We have already said that it is human blood of group AB in both cases. The definitive proof would be the DNA test on the cloths, still pending due to the difficulties of working with old blood and the low number of cells. Having reached this point we can only repeat Ricci's question - were the cloths used on the same body? Can we say that this body was that of Jesus of Nazareth? From the archaeological point of view the cloths of Oviedo and Turin have points in common as far as use is concerned, especially the following;
>
> 1 - From the point of view of textile study, there is nothing to eliminate the possibility that they existed together, except of course the C 14 results

[68] Barta, "New Coincidence between Shroud of Turin and Sudarium of Oviedo," 10.

(13th or 14th century for the Shroud, 7th century for the sudarium). There are many older linen cloths in existence.[17]

2 - From the forensic point of view, it is clear that the Shroud wrapped the dead body of a man who had been whipped, crowned with thorns and crucified. The sudarium of Oviedo wrapped the head of a body whose death is perfectly compatible with crucifixion and the wounds inflicted before death visible on the Shroud. The two deaths are very similar.

3 - The Shroud wrapped the whole body, including the head. The sudarium wrapped all the head of a corpse and touched the shoulders (especially the left one) and the back slightly. The correspondence between the bloodstains on the cloths is practically biunique i.e. each bloodstain has a corresponding stain on the other cloth as far as size and blood group is concerned, always bearing in mind (with the margin of error) that this correspondence is evident ALL ROUND THE HEAD. The stains on the left-hand side of the front show the sideways movement described by Jackson. The further the stains are from the middle of the face, the more this movement can be seen. It should also be said that the bloodstains on the head of man on the Shroud show signs of having been covered with another cloth. The specific nature of these stains and their relative position on the cloths coincide in such a way as to make it necessary to see on the Shroud if the coincidence is also evident on the reverse side of each cloth. This would enable us to evaluate in terms of geometric probability the formation of the stains with the cloths unfolded on a flat surface. We could ask the following question - what is the probability that two sets of stains formed at random, at different times by different bodies, could correspond to such an extent on flat surface? Although we do not have the answer to this question yet, it is clear that the probability is very small. If we add to this the physical (time involved and formation mechanisms of the stains) and historical conditions, we are left with only one possible answer - everything seems to indicate that both cloths wrapped the same body and this body was that of Jesus of Nazareth, a Jew crucified in Jerusalem under the Roman governor Pontius Pilate on 3rd April 33 (or 7th April 30) at midday, local time, in the place called Golgotha.

_ Despite the positive sound of this answer, we should remember what we said at the beginning of this brief geometric presentation - the conclusion could be totally wrong and should be properly evaluated with studies on the Shroud itself.

4 - Regardless of what has just been said, attention should be called to certain points which could go unnoticed, as for example;

For some reason that has yet to be explained, the sudarium of Oviedo was taken off the body whose head it had wrapped. The cloth was then kept

and venerated. Tradition tells us that this is not unusual if the body in question was that of Jesus of Nazareth, as we know he was wrapped in a Shroud and in John's gospel the position of the sudarium in relation to the Shroud tells us that it had been taken off before the Shroud was used.

There are similar arguments when we talk about the Shroud. A coincidence that normally goes unnoticed is therefore brought into the spotlight - the dead bodies of each cloth have never been found. This coincidence is only coherent if the body was that of Jesus of Nazareth. Another possibility, remote and illogical, would be the faking of the Oviedo cloth, contrary to the ideas of the time and despite the lack of knowledge of the physiopathological process involved.

The Oviedo cloth could not have been placed between the face and the Shroud, as if it had been, the image on the Shroud would not have been formed. So in the case of Jesus of Nazareth we have this double coincidence - unusual use of the cloth called a sudarium and the disappearance of the body it was used on. Neither the Shroud nor the sudarium have ever been connected to any body other than that of Jesus of Nazareth. Consequently, we can say that the Shroud of Turin and the Sudarium of Oviedo provide information that agrees perfectly with the shroud and sudarium mentioned by the gospels. The only negative element is the C 14 dating, which causes discrepancies in the case of both cloths.

This contradiction, in our opinion, makes the result of the C 14 dating very difficult to interpret, because even if the body in question is not that of Jesus of Nazareth, we do not see how it can be affirmed that the two cloths did not cover the same body. This immediately throws the C 14 dating out by seven centuries. Apart from the agreement with the cloths mentioned in the gospels, from the archaeological point of view the two cloths provide us with very valuable information both in quantity and quality about the process followed for a crucified corpse wrapped in this manner in accordance with the funeral rites and customs of Palestine 2,000 years ago. This information cannot be faked. The exceptional circumstances of this case enable us to connect it with Jesus of Nazareth. No other corpse has been identified as the cause of the stains and image analysed in this paper.[69]

[69] Moreno, “Comparative Study of the Sudarium of Oviedo and the Shroud of Turin,” 12-13.

Chapter V.

Human Genome: DNA Structure and Function

Deoxyribonucleic acid (DNA) is unique molecule located inside the nucleus of every eucaryotic cell, including singular cellular and multicellular organism, such as the human body. This molecule contains the genetic information responsible for the development, function, reproduction, and existence of an organism itself. This information in encoded in the language of four chemical bases called nucleotides, which are symbolized by the letters A, T, G, and C. DNA is shaped in a double helix, which consist of two linked strands that resemble a twisted ladder (Figure 9).

Each strand is formed by nucleotides joined to one another in a chain. The nucleotides of one strand are bonded in a paired complementary fashion with nucleotides of the parallel strand, following the rule where base A connects only with base T, and base G with base C. The result is the complex double-helix of DNA. Helices are supercoiled around each other, twisted together, and packed into structures called chromosomes. There are twenty-three unique pairs of chromosomes in each cell of the body, despite two sexual cells (the egg and spermatozoid) which have only twenty-three chromosomes. Red blood cells lose their nucleus as they mature, and therefore their DNA molecules. DNA is not necessary for these cells to function. The chemical information of the DNA has the instructions required for the survival and development of human body. This information must be read and carried out of the nucleus of the cell to go where the body requires them. In other words, certain DNA sequences must be translated into messages in a shape of a protein. A certain physical segment of the two DNA strands which carry the information to form a protein is it called a gene. The entire human

genome was sequenced in 2003, and showed that human DNA has only 20,000-30,000 genes which encode proteins. The rest of the human genome contains noncoding segments, that are localized between genes and do not encode specific proteins. Thus, genes account for only about 2% of a total human DNA. However, together the noncoding sequences and coding segments (genes) represent the most important information and instructions that is necessary for an organism, particularly the human body to function. This genetic blueprint is called the genome.

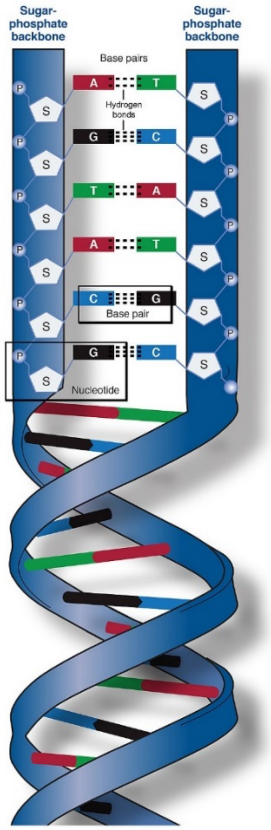


Figure 10. DNA structure[70]

As we use letters of the alphabet to construct words and sentences, we use base nucleotides to construct chromosomes and genes. There are segments of encoding genes

[70] National Human Genome Research Institute, https://www.genome.gov/genetics-glossary/Phosphate-Backbone, Public Domain, https://commons.wikimedia.org/w/index.php?curid=125057969.

that serve a specific function (such as making proteins), and non-encoding segments (Figure 10). Together they constitute the human genome. Chromosomes are made up of rolled up helices.

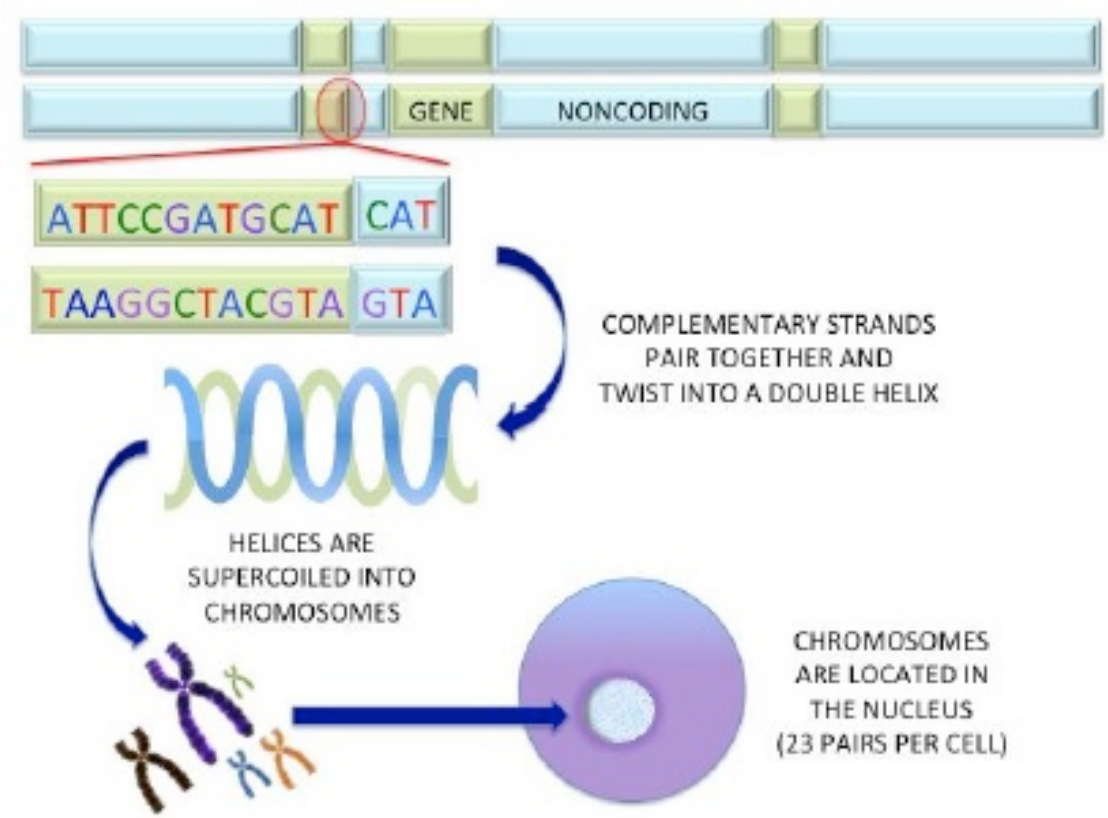


Figure 11. How genes function.[71]

There are two types of DNA that can be examined. Nuclear DNA and Mitochondrial DNA. Nuclear DNA are contained in the nucleus of a cell and contain genetic material from each parent's genes. This is where the vast majority of the 20,000

[71] Kelly P. Kearse, "DNA Analysis and the Shroud of Turin: Development of a Shroud CODIS," Shroud.com, January 21, 2014, 2, https://shroud.com/pdfs/kearse3.pdf.

to 30,000 genes are located. Mitochondrial DNA is contained only in the mitochondria of the cell and contains DNA *only from the mother* of the person in which it is found. There are only 37 genes in a circular ring that functions in routine cell activity.

Chapter VI.

A History of Shroud DNA

According to Kearse,

> In the late 1990s, Garza-Valdes reported in the book "The DNA of God" the sequencing of portions of three genes from threads taken from Shroud bloodstains: the beta-globin gene (a subunit of hemoglobin), and the amelogenin X and amelogenin Y genes, present on X and Y chromosomes, respectively. The threads examined were from the left-hand area and the occipital region (the back of the head). Garza-Valdes concluded "all three segments of human genes tested were positive, indicating the blood of the Man on the Shroud came from a human male."[72]

Kearse also reported that Canale analyzed the DNA of blood samples he obtained in 1995 from the soles of the feet of the Shroud of Turin. Interestingly, he also sampled blood from the Sudarium of Oviedo. This was significant as both male and female DNA was found to be present on the surface of the Shroud. From a practical standpoint, the only way this could be expected is if many people touched or handled the Shroud directly. This action would add their own DNA to that already present. By adding one's own DNA to this relic, the forensic evidence would be significantly contaminated, making DNA of the original person difficult to isolate.[73] The FBI has a database of DNA profiles similar to their famous collection of fingerprints. In examining the DNA sequences, they look for repeating patterns of recognizable segments called Short

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[72] Kearse, "DNA Analysis and the Shroud of Turin: Development of a Shroud CODIS," 6.
[73] Kelly P. Kearse, "DNA on the Shroud of Turin: Distinguishing Endogenous versus Exogenous DNA," 2012, https://www.shroud.com/pdfs/kearse2.pdf#:~:text=Here%2C%20a%20simple%20experimental%20approach%20is%20described%20for,white%20blood%20cells%20%28lymphocytes%29%20present%20on%20the%20cloth.

Tandem Repeats (STR's). The US database is called the combined DNA Index System (CODIS). Different ethnicities around the globe can be grouped by repeating STR's unique to that geographic location. Often you do not have adequate DNA to identify a single person, but you can identify that a person originates from a certain geographic area, such as eastern Africa, or northern India. Next Generation Sequencing has been able to sequence large quantities of DNA based on fragments of droplets in a matter of a few hours. As some sequences were able to be identified, the entire genome is insufficient for obtaining the complete DNA sequence of the Man in the Shroud.[74]

Kearse notes, "Several sequences were examined, including the amelogenin X and Y genes, THO1 (Tyrosine hydroxylase), vWA (von Willebrand factor), FES/FPS (tyrosine kinase), and F13A1 (Coagulation factor XIII). Two of these regions, THO1 and vWA, are part of the CODIS standard 13 STRs."[75] Studies performed in the 80s and 90s use older PCR techniques that provided much of the information that we now have available. However, Professor Barcaccia of the University of Padua has been able to produce voluminous information that is reliable and more localizable in recent years.

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[74] Kelly P. Kearse, "MUST READ: Cloning the Man on the Shroud of Turin.," Shroud.com, November 25, 2012, https://shroudstory.com/2012/11/25/must-read-cloning-the-man-on-the-shroud-of-turin/.
[75] Kearse, "DNA Analysis and the Shroud of Turin: Development of a Shroud CODIS," 6. See also "Combined DNA Index System (CODIS)," 2013, http://www.fbi.gov/about-us/lab/biometric-analysis/codis; "CODIS core loci," 2013, http://www.nfstc.org/pdi/Subject04/pdi_s04_m02_02.htm; Casarino et al., "Ricerca dei polimorfismi del DNA sulla sindone e sul Sudario di Oviedo," *Sindon N.S. Quad*. 8, no. 39 (1995); O. Petrosillo and E. Marinelli, "The Enigma of the Shroud," (San Gwann, Malta: Publishers Enterprises Group, 1996.

Chapter VII.

DNA and Plant Studies of the Shroud

In November 1973, Max Frei-Sulzer took some pollen samples from the Shroud. After analysis, he reported:

> In subsequent analyses of dust samples, it was possible to find and classify many pollen grains which, properly treated, have allowed the precise determination of the family, genus and species of the plant itself. Each identification result was verified and checked on herbarium material and in botanical gardens worldwide renowned for their collections, as well as documented in photomicrographic surveys. The first *conclusion* (italics in the original text) that the performed studies allow to suggests refers to the presence on the Shroud of pollen grains that come from desert plants that grow in Palestine. The most frequent pollen on the Shroud is identical to the most frequent pollen in sediments of the lake of Gennesaret sedimentary layers of two thousand years ago. Another sample comes from Asia Minor and more specifically from the area surrounding Constantinople, while a large number of granules are of French and Italian origin. It is therefore logical the deduction that the geographical and historical life of the Shroud corresponds to the migration that it suffered in time as a function of the evidence acquired.[76]

Frei-Sulzer's conclusion was:

> The presence on the Shroud of pollen of 29 plants of the Near East, and especially of 21 plants that grow in the desert or the steppes, directly leads to the hypothesis that the Shroud, now preserved in Turin, in the past was exposed to open air in countries where these plants are part of the normal vegetation. (...) Three-quarters of the species found on the Shroud grow in Palestine, of which 13 species are very characteristic or unique of the Negev and the Dead Sea area (halophyte plants). The palynology thus allows us to say that during its history (including manufacturing) the Shroud resided in Palestine. This result does not explain the presence of

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[76] Max Frei, "Note a seguito dei primi studi sui prelievi di polvere aderente al lenzuolo della S. Sindone," *Sindon* 23 (1976): 5-9; Emanuela Marinelli, "La Cuestión De Los Pólenes Presentes Sobre La Síndone De Turín y Sobre el Sudario de Oviedo," April 28-30, 2012, 5, http://www.sindone.info/VALENC-5.PDF.

> pollen of steppe plants that are missing in Palestine or are extremely rare there.
>
> According to palynology, the Shroud must have been exposed to open air in Turkey because 20 of the found species are abundant in Anatolia (Urfa, etc.) and four around Constantinople, and are completely lacking in the Central and Western Europe.[77]

Barcaccia at the University of Padua extensively studied the DNA on the surface of the Shroud of Turin. Nineteen separate plant species were identified collected by vacuuming dust particles on the surface. Table 1 presents his comprehensive studies on analysis of the plant residue.[78] Overall, samples from the Shroud represented a diverse collection of species from Asia, North Africa, Central Europe, the Middle East and even several species from the Eastern United States. DNA specifically were identified from spruce trees, clover, pears, plantains, plums, ryegrass, and black locust from the Appalachian area of the US. Prominent species from Asia included walnuts, chicory, hops, and willows. Some species were present before 1492, and some may have been introduced at a later time, The opening of the Silk Road probably contributed significantly to the introduction, and subsequent migration, of Asian plant species (Figure 10).

[77] Frei, "Note a seguito dei primi studi," 5-9.
[78] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 3.

Table 1. Plant species identified from DNA on the Shroud of Turin.[79]

GenBank Accession No.	TS Filters	Genus/Species	Taxonomy ID	Common Name	Gene/ Barcode	Sequence length (bp)	Best Match Accession No.	E-value	Identity (%)
JQ007384–JQ007389	E	*Picea* spp.[2]	3328	Spruce	trnL	563	HF937082.1[7]	0e + 00	99–100
JQ007391/ JQ007393–JQ007398	F	*Picea* spp.[2]	3328	Spruce	trnL	563	HF937082.1[7]	0e + 00	99–100
JQ007399–JQ007400	G	*Picea* spp.[2]	3328	Spruce	trnL	563	HF937082.1[7]	0e + 00	99–100
JQ007402	G	*Picea* spp.[2]	3328	Spruce	trnL	315	JX508522.1[7]	4e–161	99
JQ007403–JQ007404	H	*Picea* spp.[2]	3328	Spruce	trnL	516–518	HF937082.1[7]	0e + 00	99
JQ007405–JQ007406	I	*Picea* spp.[2]	3328	Spruce	trnL	563	EF440555.1[7]	0e + 00	99–100
JQ007355/JQ007413	E	*Robinia pseudoacacia* L.[3]	35938	Black locust	ITS	344–348	DQ006010.1	9e–163	98–99
JQ007359/JQ007360	F	*Robinia pseudoacacia* L.[3]	35938	Black locust	ITS	344	DQ006010.1	5e–170	99
JQ007407/JQ007410	I	*Trifolium fragiferum* L.	97023	Strawberry clover	trnL	610	DQ311791.1	0e + 00	99–100

[79] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 3.

GenBank Accession No.	TS Filters	Genus/Species	Taxonomy ID	Common Name	Gene/ Barcode	Sequence length (bp)	Best Match Accession No.	E-value	Identity (%)
JQ007361−JQ007363	I	*Trifolium striatum* L.	3898	Knotted clover	ITS	412−417	AF053172.1[7]	0e + 00	99
JQ007408−JQ007409	I	*Trifolium repens* L.	3899	White clover	trnL	621−622	JN617179.1	0e + 00	99
JQ007412	I	*Carpinus* spp.	12989	Hornbeams	trnL	530	AY211425.1[7]	0e + 00	99
JQ007381	I	*Carpinus* spp.	12989	Hornbeams	rbcL	256	KF418948.1[7]	5e–130	100
JQ007390/JQ007392	F	*Cichorium intybus* L.	13427	Chicory	trnL	518	GU817987.1	0e + 00	100
JQ007372/JQ007373	I	*Cucumis* spp.[4]	3655	Cucumber	trnH−psbA	275−276	KF957866.1[7]	1e–140	99–100
JQ007368/JQ007369	I	*Humulus lupulus* L.	3486	Common hop	trnH−psbA	414	FN687524.1	0e + 00	99
JQ007382/JQ007383	I	*Juglans regia* L.	16718	Persian walnut	trnL	599−600	AY231167.1	0e + 00	100
JQ007354/JQ007356[1]	E	*Lolium multiflorum* Lam.[5]	4521	Annual ryegrass	ITS	333	X99974.1	0e–150	96
JQ007357/JQ007358	E	*Lolium multiflorum* Lam.[5]	4521	Annual ryegrass	ITS	329	X99974.1	4e–161	98
JQ007377	I	*Nicotiana* spp.	4085	Tobacco	rbcL	511	KM025249.1[7]	0e + 00	99
JQ007376[1]	I	*Solanaceae* fam.	4107	Nightshades	rbcL	234	KM025249.1[7]	4e–116	99

GenBank Accession No.	TS Filters	Genus/Species	Taxonomy ID	Common Name	Gene/ Barcode	Sequence length (bp)	Best Match Accession No.	E-value	Identity (%)
JQ007364/JQ007375	I	*Prunus kansuensis* Rehder	329890	Chinese plum	trnH−psbA	388	KF990036.1	0e + 00	99
JQ007370	I	*Pyrus spinosa* Forssk[6]	1143245	Almond-leaved pear	trnH−psbA	229	HG737342.1	3e–103	97
JQ007371/JQ007374	I	*Pyrus spinosa* Forssk[6]	1143245	Almond-leaved pear	trnH−psbA	382−383	HG737342.1	0e + 00	98–99
JQ007365−JQ007367	I	*Salix suchowensis* W.C. Cheng	1278906	Shrub willow	trnH−psbA	344−345	KM983390.1	8e–174	99
JQ007379	I	*Equisetum* spp.	3257	Horsetail	rbcL	461	AB574684.1[7]	0e + 00	100
JQ007380	I	*Glycine max* (L.) Merr.	1462605	Soybean	rbcL	469	KF611800.1[7]	0e + 00	99
JQ007378[1]	I	*Crataegus* spp.	23159	Hawthorn	rbcL	477	KJ506869.1[7]	0e + 00	100
JQ007411	I	*Plantago argentea* Chaix	185776	Plantain	trnL	582	AJ430931.1	0e + 00	99
JQ007401	G	*Vitis* or *Parthenocissus* spp.	3603 or 3606	Grape	trnL	594	AB235078.1[7]	0e + 00	99

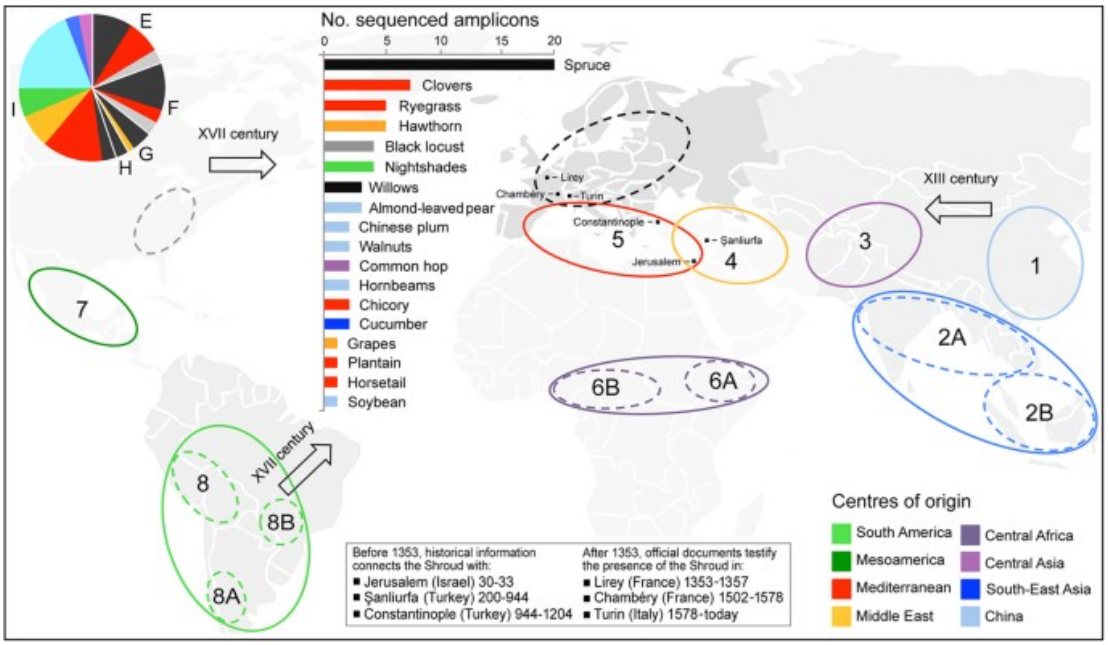


Figure 12. DNA from plant pollen on the Shroud.[80]

[80] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 4.

Chapter VIII.

DNA and Human Studies on the Shroud

While looking at plant DNA vacuumed from the surface of the Shroud, Barcaccia also identified DNA that was human in origin. Mitochondrial DNA from ninety-three individuals were sampled and sequenced. Table 2 lists his reported results.[81]

A haplotype is a group of DNA nucleotides that are inherited as a group because of their close proximity to each other. That is, they move as a group together from one parent to offspring. This information in Table 2 tells a story. First, the DNA is human. Also, the haplotypes are not limited to one geographical location. They are numerous and from many different locations. DNA sampled from groups of people from one location may have common haplotypes that function as a fingerprint for ethnic grouping. In examining the haplogroups, the DNA can be traced to diverse locations (Figure 11).

Haplogroup H is broken down into subgroup H_1, which is commonly found in Western Europe (Iberia) and North Africa. Subgroup H_{33} is most common in the Druze people in the Middle East. The U_2 group is mostly found in South Asia (Appendix D). Other groupings were identified from South Asia, the Arabian Peninsula, East Africa, Western Europe, and Eastern India.[82] The diversity of the DNA on the surface of the Shroud suggest that it was handled by many individuals from the Middle East, North, and East Africa and as far east as India. These data are not unexpected. Barcaccia was able to effectively catalog and characterize the human DNA that is present on the surface of the

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[81] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 5.
[82] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 7.

Shroud. Most likely this represents those individuals who have touched it, held it, or kissed it. Thus, multiple individuals left their DNA on the surface of the Shroud.

Table 2. Human species identified from DNA on the Shroud of Turin.[83]

GenBank Accession No.	TS Sources	MT Locus	Sequence Range (from np to np)	Haplotype[1,2,3]	Haplogroup	Sub-Haplogroup	Quality[4]
KM655914	EFGH	DLOOP	16303–16569;1–154	16519C, 73G	H1	H1a	100
KM655923	EFGH	HV1	15986–16425	16240G	H1	H1j8/H1bz	100
KM655924	I	HV1	15976–6419	16234T	H13	H13a1d	100
KM655908	EFGH	CO1	6977–7492	7173G, 7403G, 7404A	H13	H13b1b	100
KM655909	I_R	CO1	6977–7494	7403G, 7404A	H13	H13b1b	100
KM655926	I_R	HV2	16–428	263G, 286T	H2	H2a2a	100
KM655932	EFGH	HV2	10–428	263G, 363C	H2	H2a2a	100
KM655928	EFGH	HV2	10–426	263G, 410T	H2	H2a2a	100
KM655881	I_R	ND5(−5P)	12279–12763	12385A, 12418T, 12427A	H2	H2a2a1	0
KM655910	I_R	DLOOP	16285–16569;1–154	16375A, 16419A, 16519C	H2	H2a2a1	0

[83] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 5.

GenBank Accession No.	TS Sources	MT Locus	Sequence Range (from np to np)	Haplotype[1,2,3]	Haplogroup	Sub-Haplogroup	Quality[4]
KM655903	I_R	CO1	6977–7552	7316A	H2	H2a2a1	0
KM655904	I	CO1	6977–7494	7342T, 7402G	H2	H2a2a1	0
KM655902	I_R	CO1	7093–7472	7402G	H2	H2a2a1	0
KM655889	I	ND5(−5P)	12279–12763	12399T, 12441C	H3	H3ae	100
KM655883	EFGH	ND5(−5P)	12279–12763	12314C, 12372A, 12419T	H3	H3au	100
KM655918	EFGH	HV1	15980–16425	16188T	H33	H33c	100
KM655917	I_R	HV1	15976–16425	16188T	H33	H33c	100
KM655922	I_R	HV1	15976–16425	16188T	H33	H33c	100
KM655916	I	HV1	15980–16425	16188T	H33	H33c	100
KM655915	I_R	HV1	15976–16425	16188T	H33	H33c	100
KM655921	I_R	HV1	15978–16425	16179A	H4	H4a1c2	100
KM655907	EFGH	CO1	6997–7495	7028N[1], 7132T,7146G, 7232T, 7256T,7316A	L	L2’3’4’5’6	77
KM655906	I	CO1	7051–7532	7028N[1], 7394G	L3	L3c	73
KM655913	I_R	DLOOP	16286–16569;1–	16519C, 66T	M	M39	59

GenBank Accession No.	TS Sources	MT Locus	Sequence Range (from np to np)	Haplotype[1,2,3]	Haplogroup	Sub-Haplogroup	Quality[4]
KM655901	I	ND5(−3P)	13320–13807	13753C	M	M56	100
KM655900	EFGH	ND5(−3P)	13320–13807	13753C	M	M56	100
KM655882	I	ND5(−5P)	12279–12763	12406A, 12738C	R7	R7a1	68
KM655896	I_R	ND5(−3P)	13320–13807	13630G, 13782T	R8	R8a1	75
KM655899	EFGH	ND5(−3P)	13320–13807	13751C, 13782T	R8	R8a1	100
KM655898	I_R	ND5(−3P)	13320–13807	13758A, 13782T	R8	R8a1	100
KM655897	I	ND5(−3P)	13320–13807	13767G, 13782T	R8	R8a1	100
KM655905	EFGH	CO1	6977–7552	7232T, 7256T, 7316A	R0a	R0a2e	72
KM655925	I_R	HV2	14–428	58C, 60T[2], 64T, 263G	R0a	R0a’b	100
KM655934	I	HV2	16–428	58C, 60T[2], 64T, 263G	R0a	R0a’b	100
KM655933	EFGH	HV2	22–428	58C,60T[2], 64T, 263G	R0a	R0a’b	100
KM655920	I_R	HV1	15976–16425	16051N[1], 16209N[1], 16239N[1], 16352C, 16353T	U2	U2b2	77
KM655895	I_R	ND5(−3P)	13320–13807	13630G,13789C	U2	U2d2	73
KM655894	I_R	ND5(−3P)	13320–13807	13617N[1], 13630G, 13637N[1]	U5	U5b2b	69

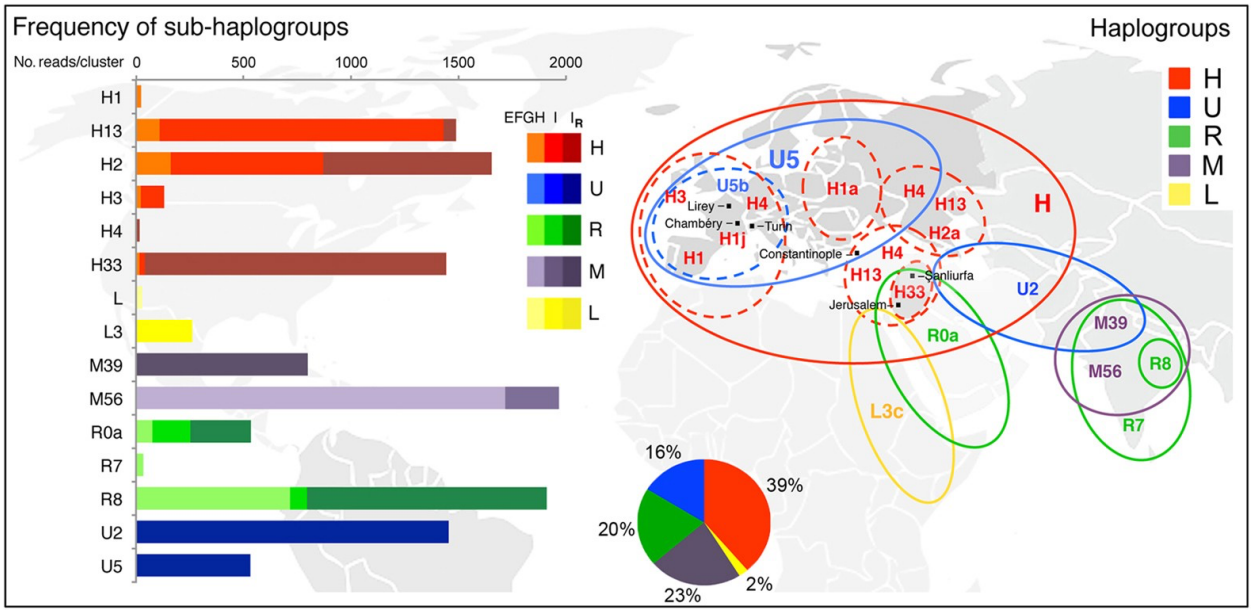


Figure 63. Groupings of human DNA haplotypes from the Shroud.[84]

[84] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 6.

Chapter IX.

DNA and Plant Studies of the Sudarium

Max Frei-Sulzer examined the surface of the Sudarium for pollen in 1970. The material that he found was totally consistent with pollen from the Middle East. More specifically, he reported that the pollen was representative of 1st century Jerusalem. Two of the six plants found were localized to this area. Others were localized to North Africa and Spain.[85] The pollen evidence from this study is very supportive of the record in the Liber Testamentorium by Pelagius. According to Emanuela Marinelli in "The question of pollen grains on the Shroud of Turin and the Sudarium of Oviedo,"

> He also identified the pollen of 13 plants, four of which do not grow in Europe while are frequently encountered in Palestine, in the deserts, in salt places or on rocks, and five others are Mediterranean plants that grow also in Palestine. Frei stressed: "The *Acacia albida* is typical for the Dead Sea area and the *Hyoscyamus aureus* still grows on the walls of the Old Citadel of Jerusalem. These two plants are represented also on the Shroud." On the Sudarium, the pollen of plants that instead indicate a presence of the Shroud in Anatolia and Constantinople are not present; this can be explained by a different route of the two relics to get in Europe. The presence on the Sudarium of pollen of *Phoenix dactylifera, Ceratonia siliqua, Tamarix africana a*nd *Acacia albida* could mean a trip of the Sudarium through the North Africa.[86]

Thirty years after the death of Frei—Sulzer modern scientists have suggested repeating his studies as a verification of the scientific data and analyses. His original samples have deteriorated over time as they were sampled with adhesive tape in the 1970s. As a forensic botanist, the man and his work are respected. But it remains

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[85] Lorenzo Bianchi, "Clues to the Resurrection of Jesus. The Sudarium of Oviedo." 30Giorni.it, April 2009. http://www.30giorni.it/articoli_id_21068_l3.htm.
[86] Emanuela Marinelli in "The question of pollen grains on the Shroud of Turin and the Sudarium of Oviedo," accessed April 6, 2023, https://www.shroud.com/pdfs/marinelli2veng.pdf.

unverified.[87] Blood from the Sudarium was studied in 1985 and 1993. Type AB blood was identified definitively. As previous studies had been performed on the Shroud, it was recognized that there is a type match. However, DNA analysis was attempted but was unsuccessful. The DNA was determined to be too fragmented with inadequate volume to successfully sequence.[88] Since then, Next Generation DNA sequencers have been developed to expedite the amount of time required to sequence the DNA. This is done by running many sequences concomitantly, not sequentially. Equipo de investigación del Centro español de Sindonologia (EDICES) findings were summarized in Appendix E.

The Proceedings of the Second International Conference on the Sudarium of Oviedo was held in Oviedo in April of 2007. It was reported Dr. Antonio Alonso at the National Institute of Forensic Science and Toxicology examined blood samples from the Sudarium attempting to sequence the DNA. Although he was unable to identify nuclear DNA, he did find mitochondrial DNA that was clearly human. He declined further discussion or publication to avoid sensationalism in the press.[89] It was additionally revealed at the conference that further DNA studies were being conducted by Manuel Rey at Newbiotechnic in Seville, and Enrique Monte at the University of Salamanca.[90] It has been suggested that this information originated with a man of Middle Eastern origin. However, there is currently no further information available.

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[87] Paul C. Maloney, "McCrone and the Max Frei Sticky Tapes of 1978 – Shroud," Shroud.com, July 14, 2014, https://www.shroud.com/pdfs/maloneypollen2014.pdf.
[88] Kearse, "DNA on the Shroud of Turin."
[89] "The Second International Conference on the Sudarium of Oviedo," Shroud.com, April 2007, https://www.shroud.com/pdfs/n65part6.pdf.
[90] "The Second International Conference."

Chapter X.

Summary and Conclusion

In looking at the overall possibilities that both fabrics have the same blood type, which is rare, superimpose on one another, with similar wound orientation, formation of blood stains, and someone removed from the cross, when burial at that time when this was not commonly allowed, in the same geographic area, in the same time period is likely that they came from the same individual. The legs were frequently mechanically fractured at the time of the crucifixion, and the abdomen was usually not pierced with a lance.[91] They were always left for decomposition in-situ, which was probably malodorous and visibly offensive. Jesus may not have been the only person removed from the cross and buried in Palestine, but it was done infrequently. The Man in the Shroud is one of those rare people. A crown of thorns was also placed on his head. We know this was performed on Jesus, but why did the Man in the Shroud suffer the same fate? The consistency of the medical physical evaluation and DNA findings is historically significant, aside from anyone's theological opinions. The pollen identification verified the journeys that each respective relic made. If the Christian claim that these artifacts are original, they would have been secured and protected for their historical significance over time. If lost or damaged early in their existence, they would have been difficult to replace

[91] "Were Jesus' Bones Broken during the Crucifixion?" *Faith Filled Family Magazine*, April 24, 2019, https://faithfilledfamily.com/jesus-bones-broken-crucifixion/.

adequately in such a fashion that we would find it difficult to verify today. Technology was extremely limited 2000 years ago.

It is likely that the Shroud was taken to the geographic locations from the Middle East to Edessa, and then to France and Italy. This is where the pollen DNA suggests. In comparing the human DNA, could it have traveled to the remote regions suggested by the DNA? For example, could Thomas the Apostle have taken it to India? Since Thomas was martyred in Goa, who would have returned the Shroud to North Africa, Edessa, France, and Italy? Possible, but not likely.

Bennett in her book *Sacred Blood, Sacred Image* raises an interesting question. The Sudarium was known to be in Spain in the seventh century. The C-14 dating believes that the Shroud was made in the thirteenth century. Considering the evidence, especially the routes of travel in my opinion, how could the forgery be so successfully completed to align scientifically with the Sudarium centuries later?[92]

Human DNA from the Appalachian area would have to be introduced in the post-medieval era as clearly the Shroud did not travel to North America. The most common species of pollen on the Shroud was spruce, commonly found in the Swiss Alps and France. The numerous other species suggest wide Mediterranean exposure.

The human DNA findings are totally consistent with the stories of exhibitions of the Shroud in France and Italy, where large crowds of people may have left traces of physical contact. It would also be not surprising that people journeyed from distant lands to see the exhibitions of this artifact exposing the Shroud to many different ethnicities.

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[92] Bennett, *Sacred Blood, Sacred Image*, 87.

Barcaccia examined the possibilities of the Shroud movement. He believes that it is possible that it may have had a European origin. Or, it could have been manufactured in India prior to traveling to Jerusalem, as the original name of the Shroud is *Sindon*. The name could "derive from *Sindia or Sindien*, a fabric coming from India."[93]

Both the Shroud and the Sudarium both were involved with someone who was killed in the Middle East by a similar mechanism of execution. The blood and the hair pattern both match on the front and the back of the head. The blood stains match up, and both were dead at the time the fabrics were in contact with their tissues. Yet, neither has ever been linked to Jesus of Nazareth. It is possible that they may have involved two different individuals. However, they have not been disproven to originate from the same individual.

There is one weakness in the analysis of the scientific data. Each is highly prized by different research groups, that do not communicate with each other.[94] There needs to be a joint evaluation with competent scientific teams who work together. Some of the results would assist in the evaluation of the other. I have communicated with many, if not most, of the researchers involved in most of the historic projects. Some have asked me if I can obtain one piece of information or a sample of another.

Another interesting point in the analysis is that if the DNA could show a match, then that would invalidate the C-14 dating of the Shroud. The whereabouts of the

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[93] Barcaccia, "Uncovering the Sources of DNA Found on the Turin Shroud," 7.
[94] Barrie M. Schwortz, "The Role of the Internet in the Future of Shroud Research," Shroud.com, June 1998, https://www.shroud.com/schwortz.htm.

Sudarium was well known in Spain during the time of the Moors. The Shroud could, therefore, not be a medieval forgery.

The Shroud of Turin and the Sudarium are unquestionably two of the most studied historic artifacts in the history of humanity. Each study that was undertaken was exhaustive in nature to try to answer two simple questions: How was the Shroud created? And are these the burial cloths of Jesus of Nazareth? Despite all of the studies that were completed, we still do not know the answer to these questions. The question that I ask in my query is a bit simpler. Does the Shroud and the Sudarium involve the same individual? I do not have a definitive answer. Yet…

"Qui Santiago it et non Salvatori, servum visitat, sed non Dominum suum."[95]

'Those who go to Santiago and not to Salvador (Oviedo), visit the servant (St James the Apostle) and not the Lord (Jesus Christ)'. Ninth-century Spanish quote about the Sudarium.

[95] Maria, "Pilgrims to Oviedo and Not Santiago," CaminoWays.com, March 19, 2021, https://caminoways.com/for-pilgrims-who-go-to-oviedo-and-not-santiago#:~:text=There%20is%20a%20saying%20that%20illustrates%20the%20traditional,James%20Apostle%29%20and%20not%20the%20Lord%20%28Jesus%20Christ%29%E2%80%99.

Appendix A

Memorandum of Pierre d'Arcis, Bishop of Troyes to The Avignon Pope Clement VII

The case, Holy Father, stands thus. Some time since in this diocese of Troyes the Dean of a certain collegiate church, to wit, that of Lirey, falsely and deceitfully, being consumed with the passion of avarice, and not from any motive of devotion but only of gain, procured for his church a certain cloth cunningly painted, upon which by a clever sleight of hand was depicted the twofold image of one man, that is to say, the back and front, he falsely declaring and pretending that this was the actual Shroud in which our Saviour Jesus Christ was enfolded in the tomb, and upon which the whole likeness of the Saviour had remained thus impressed together with the wounds which He bore. This story was put about not only in the kingdom of France, but, so to speak, throughout the world, so that from all parts people came together to view it. And further to attract the multitude so that money might cunningly be wrung from them, pretended miracles were worked, certain men being hired to represent themselves as healed at the moment of the exhibition of the Shroud, which all believed to the Shroud of our Lord. The Lord Henry of Poitiers, of pious memory, then Bishop of Troyes, becoming aware of this, and urged by many prudent persons to take action, as indeed was his duty in the exercise of his ordinary jurisdiction, set himself earnestly to work to fathom the truth of this matter. For many theologians and other wise persons declared that this could not be the real Shroud of our Lord having the Saviour's likeness thus imprinted upon it, since the holy Gospel made no mention of any such imprint, while, if it had been true, it was quite unlikely that the holy Evangelists would have omitted to record it, or that the fact should have

remained hidden until the present time. Eventually, after diligent inquiry and examination, he discovered the fraud and how the said cloth had been cunningly painted, the truth being attested by the artist who had painted it, to wit, that it was a work of human skill and not miraculously wrought or bestowed. Accordingly, after taking mature counsel with wise theologians and men of the law, seeing that he neither ought nor could allow the matter to pass, he began to institute formal proceedings against the said Dean and his accomplices in order to root out this false persuasion. They, seeing their wickedness discovered, hid away the said cloth so that the Ordinary could not find it, and they kept it hidden afterwards for thirty-four years or thereabouts down to the present year. And now again the present Dean of the said church with fraudulent intent and for the purpose of gain, suggested, as it is reported, to the Lord Geoffrey de Charny, Knight, and the temporal lord of the place, to have the said cloth replaced in the said church, that by a renewal of the pilgrimage the church might be enriched with the offerings made by the faithful. Acting upon the Dean's suggestion, who was thus treading in the footsteps of his predecessor, the knight went to the Cardinal de Thurv, your Holiness' Nuncio and Legate in French territory, and suppressing the facts that the said cloth at the time above referred to was asserted to be the Shroud of our Saviour, and that it bore the Saviour's likeness imprinted upon it, and that the Ordinary had taken action against the canons in order to stamp out the error which had arisen, and that the said cloth for fear of the Ordinary had been hidden away, nay even, it is said, conveyed out of the diocese, he represented to the Cardinal that the said cloth was a picture or figure of the Shroud, which many people came to visit out of devotion and which had previously been much venerated and resorted to in that church, but on account of the war and other causes, by

the command of the Ordinary, had been placed for a long time in safer keeping, petitioning that he might be allowed to set up in the said church this picture or figure of the Shroud which so many out of devotion desired to see, so that it might there be shown to the people and venerated by the faithful. Then the said Lord Cardinal, without entirely approving the petition, but probably acting on the facts before him and so far prudently, granted to the petitioner by Apostolic authority that without asking leave of the Ordinary or of any other person he might set up this picture or figure of the Shroud of our Lord in the said church or in any other decent place. And under cover of this written authority the cloth was openly exhibited and shown to the people in the church aforesaid on great holidays, and frequently on feasts and at other times, with the utmost solemnity, even more than when the Body of Christ our Lord is exposed; to wit, by two priests vested in albs with stoles and maniples and using the greatest possible reverence, with lighted torches and upon a lofty platform constructed for this special purpose; and although it is not publicly stated to be the true Shroud of Christ, nevertheless this is given out and noised abroad in private, and so it is believed by many, the more so, because, as stated above, it was on the previous occasion declared to be the true Shroud of Christ, and by a certain ingenious manner of speech it is now in the said church styled not the sudarium but the sanctuarium. which to the ears of the common folk, who are not keen to observe distinctions, sounds much the same thing, and crowds of people resort there as often as it is shown or is expected to be shown, under the belief, or more truly the delusion, that it is the true Shroud. Moreover, it is currently reported amongst them that it has been approved by the Apostolic See by means of the letters of the said Lord Cardinal.

Accordingly, most holy Father, perceiving this great scandal renewed amongst the people and the delusion growing to the peril of souls, observing also that the Dean of the said church did not keep within the terms of the Cardinal's letters, obtained though they were by the suppression of the truth and the suggestion of what was false, as already explained, desiring to meet the danger as well as I could and to root out this false persuasion from the flock committed to me, after consultation with many prudent advisers, I prohibited the said Dean under pain of excommunication, by the very act sufficiently published [eo ipso latael] from exhibiting this cloth to the people until otherwise might be determined.

He, however, refusing obedience and lodging an appeal, in defiance of the prohibition went on with the exhibition as before. Moreover, the knight, maintaining and defending this behaviour, by holding the said cloth with his own hands on a certain solemn feast, and showing it to the people with the observances above described, caused himself, by a royal warrant [salvagardia], to be put in formal possession and occupation of the said cloth and of the right of exhibiting it, and had this notified to me; and so under cover of the appeal as well as of the said royal warrant this delusion is shielded and propagated, to the contempt of the Church, scandal of the people, and peril of souls – all which I am powerless to remedy – nay more, to the defamation of my above-named predecessor who denounced the abuse in his time, and of myself who to the best of my poor ability am also anxious to take such prudent action as I may. But, alas! The scandal is upheld and defended and its supporters cause it to be spread abroad among the people that I am acting through jealousy and cupidity and to obtain possession of the cloth for myself, just as similar reports were circulated before against my predecessor; while, on

the other hand, others aver that I move too half-heartedly in the matter and that I make myself a laughing-stock by allowing the abuse to continue. But though I have earnestly and humbly cited the said knight and besought, him that he would for a time suspend the exhibition of the said cloth until your Holiness could be consulted and should pronounce upon the matter, he paid no attention, or rather without my knowledge he had representations made to your Holiness in the same sense as those already made to the said Lord Cardinal, adding that I refused to defer to the said Cardinal's letters, that I disregarded the appeal and went on launching inhibitions and sentences of excommunication against those who exhibited the cloth and against the people who came to venerate it. But with all deference to the author of these representations, my action in thus proceeding against those who exhibited and venerated the cloth was in no wise derogatory to the said Lord Cardinal's letters, obtained though they were surreptitiously. This authorization of his by no means conceded that the cloth could be exposed with publicity or venerated, but only that it might be restored to or lodged in the said church or some other decent place. And because they would not keep to the terms of the Cardinal's permit therefore it was that I proceeded against them according to the ordinary forms of law, as in my duty I am bound, and not without much asking of counsel, with the view of removing the scandal and the said popular delusion, believing that I should be gravely in fault if I connived at such abuses. Moreover, having to look to my own security in this matter, I was compelled, acting always upon the advice of prudent counsellors, to have recourse to the aid of the secular arm, and this more particularly because the said knight in the first instance had begun to place the matter in the hands of the civil authorities by causing himself to be put in formal possession of the right of exhibiting the cloth by the

King's warrant, as said above, which seems a sufficiently absurd proceeding. Accordingly I took measures to have the cloth placed in the custody of the King's officers, always with the same end in view, viz., that at least until I could bring the whole story to the notice of your Holiness there might for the time being be an end of these exhibitions. And in this request I prevailed without any difficulty with the court of the King's Parliament when once they were fully informed of the superstitious origin of this Shroud, of the use to which it was put, and of the delusion and scandal to which I have called attention. Indeed it is a wonder to all who know the facts of the case that the opposition which hampers me in these proceedings comes from the Church, from which quarter I should have looked for vigorous support, nay, rather have expected punishment if I had shown myself slothful or remiss. However, the knight above mentioned has been beforehand with me, and, having represented the matter as I have explained, has obtained from your Holiness a Brief in which the said Lord Cardinal's letters are substantially confirmed ex certa scientia and permission is granted that in spite of all prohibitions and appeals, the said cloth may be shown and exposed for the veneration of the faithful; while, as I hear, – for I have not been able to procure a copy of the said Brief, – perpetual silence is enjoined upon myself.

But whereas the canon law requires me to see that no man be imposed upon by false representations and documents for purposes of gain, and because I am certain that this Brief was obtained by suggestion of what is false and suppression of the truth, and that otherwise it would never have been issued, while I was neither cited nor heard, especially as the resumption ought to stand in my favour that I would not interfere in such a cause without reason, or disturb any man in any practice of devotion which was

harmless and free from extravagance, I do most confidently trust that your Holiness will bear with me if in view of the foregoing facts I still oppose the said exposition until I have fuller instructions from your Holiness yourself, now better informed of the truth of the case. I would ask you then, most blessed Father, to vouchsafe to bestow your attention upon the foregoing statement and to take measures that such scandal and delusion and abominable superstition may be put an end to both in fact and seeming, in such wise that this cloth be held neither for sudarium nor sanctuarium, nor for an image or figure of our Lord's sudarium, since our Lord's sudarium was nothing of the kind, nor, in fine, under any other ingenious pretext be exhibited to the people or exposed for veneration, but that to express horror of such superstition it be publicly condemned, the surreptitious letters above spoken of being recalled, or more truly declared null and void [for fear that the keen-eyed persecutors and detractors of the Church should rail at the Church's discipline and say that a more prompt and efficacious remedy against scandals and impostures is found in the secular tribunals than in those of ecclesiastical authority]. I offer myself here as ready to supply all information sufficient to remove any doubt concerning the facts alleged both from public report and otherwise, in order to exonerate myself and also to discharge my conscience in a matter which I have greatly at heart. Moreover, if health had allowed I should have presented myself personally to your Holiness to state my complaint to the best of my poor ability, for I am convinced that I cannot fully or sufficiently express in writing the grievous nature of the scandal, the contempt brought upon the Church and ecclesiastical jurisdiction, and the danger to

souls; still I do what I can, chiefly that I may be guiltless before God, leaving all else to the disposition of your Holiness, whom may the Almighty long preserve.[96]

[96] "The Holy Shroud and The Verdict of History.' Memorandum of Pierre d'Arcis, Bishop of Troyes to the Avignon pope clement VII," The Month, Volume CI (101), 1903, Bibliothèque Nationale de Paris, Collection de Champagne, v. 134, folio 138. & Bibliothèque Nationale de Paris, Collection de Champagne, v. 154. folio 137/p 17-29, https://www.priory-of-sion.com/biblios/links/memorandum.html.

Appendix B

STURP Team Members

Name	Organization	STURP Responsibility
1978 Turin Expedition Team		
John P. Jackson	U.S. Air Force Academy Assoc Prof of Physics	**STURP** President / measurements / analysis
Eric J. Jumper	U.S. Air Force Academy Assoc Prof of Aeronautics	**STURP** Vice President / measurements / analysis
Joseph S. Accetta	Lockheed Corporation	Infrared spectroscopy
Steven Baumgart	U.S. Air Force Weapons Laboratory	Infrared spectral measurements
Ernest H. Brooks II	Brooks Institute of Photography	Scientific photography
Donald Devan	Oceanographic Services, Inc.	Scientific photography/image analysis
Rudolph J. Dichti	University of Colorado	Technical support of all experiments
Robert Dinegar	Los Alamos National Laboratory	Chemistry, tape sample removal/analysis
Thomas F. D'Muhala	Nuclear Technological Corporation	Logistics
Mark Evans	Brooks Institute of Photography	Microphotography
John D. German	U.S. Air Force Weapons Laboratory	Technical support for all experiments
Roger Gilbert	Oriel Corporation	Visible/ UV spectroscopy
Marty Gilbert	Oriel Corporation	Visible/ UV spectroscopy

Thomas Haverty	Rocky Mountain Thermograph	Thermography
Donald Janney	Los Alamos National Laboratory	Image analysis
Joan Janney	Los Alamos National Laboratory	Technical support
J. Ronald London	Los Alamos National Laboratory	X-ray radiography and X-ray fluorescence
Jean Lorre	Caltech Jet Propulsion Laboratory	Image analysis
Donald J. Lynn	Caltech Jet Propulsion Laboratory	Image analysis Of Note: Lynn was Director of imaging on the Voyager, Viking, Mariner and Galileo projects.
Vernon D. Miller	Brooks Institute of Photography	Scientific photography
Roger A. Morris	Los Alamos National Laboratory	X-ray fluorescence
Robert W. Mottern	Sandia National Laboratory	Image analysis, X-ray radiography
Samuel Pellicori	Santa Barbara Research Center	Visible / UV spectroscopy
Ray Rogers	Los Alamos National Laboratory	Chemistry / tape sample removal / analysis
Barrie M. Schwortz	Barrie Schwortz Studios	Documentation photography
Kenneth E. Stevenson	IBM	Public relations

STURP Members[97] not on Turin Expedition, but who later worked with Shroud

[97] "The 1978 STURP Team," Shroud.com, accessed March 29, 2023, https://www.shroud.com/78team.htm.

Samples

Al Adler	Western Connecticut State Univ.	Biochemist / tape sample analysis
Robert Bucklin	Harris County, Texas, Medical Examiner's Office	Medical / forensics
Jim Drusik	Los Angeles County Museum	Conservation
Joseph Gambescia	St. Agnes Medical Center	Medical analysis
John Heller	New England Institute	Biophysics
Larry Schwalbe	Los Alamos National Laboratory	Physics / X-ray fluorescesnce
Diane Soran	Los Alamos National Laboratory	Chemistry / Archaeology

Appendix C

A Summary of STURP's Conclusions[98]

No pigments, paints, dyes or stains have been found on the fibrils. X-ray, fluorescence and microchemistry on the fibrils preclude the possibility of paint being used as a method for creating the image. Ultra Violet and infrared evaluation confirm these studies. Computer image enhancement and analysis by a device known as a VP-8 image analyzer show that the image has unique, three-dimensional information encoded in it. Microchemical evaluation has indicated no evidence of any spices, oils, or any biochemicals known to be produced by the body in life or in death. It is clear that there has been a direct contact of the Shroud with a body, which explains certain features such as scourge marks, as well as the blood. However, while this type of contact might explain some of the features of the torso, it is totally incapable of explaining the image of the face with the high resolution that has been amply demonstrated by photography.

The basic problem from a scientific point of view is that some explanations which might be tenable from a chemical point of view, are precluded by physics. Contrariwise, certain physical explanations which may be attractive are completely precluded by the chemistry. For an adequate explanation for the image of the Shroud, one must have an explanation which is scientifically sound, from a physical, chemical, biological and medical viewpoint. At the present, this type of solution does not appear to be obtainable

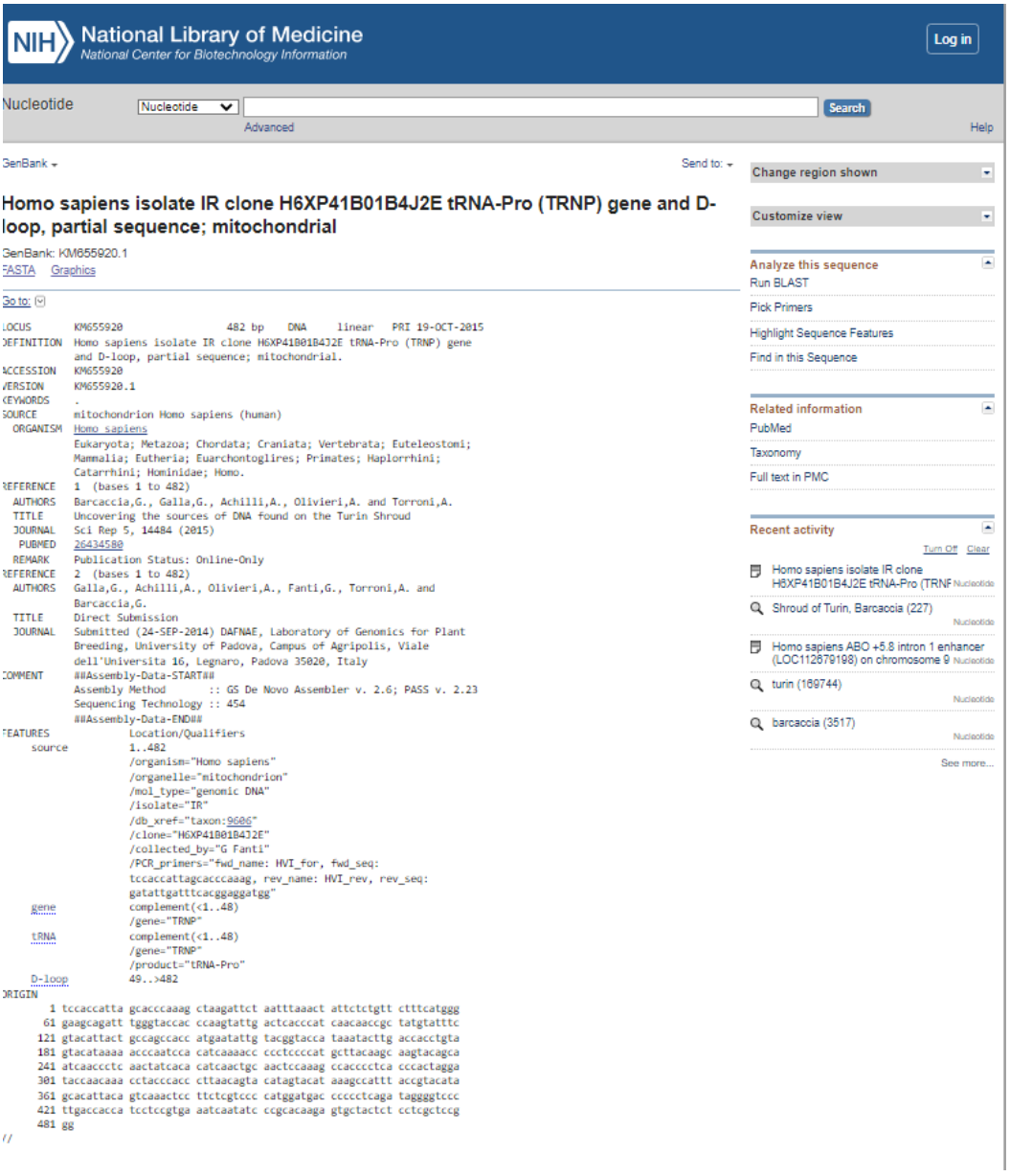
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[98] "A summary of STURP's conclusions," Shroud.com, accessed March 29, 2023, https://www.Shroud.com/78conclu.htm; "The Shroud of Turin," Mysteries of the Rosary, accessed March 29, 2023, http://www.mysteriesoftherosary.org/2018/06/the-Shroud-of-turin.html#_ftn18.

by the best efforts of the members of the Shroud Team. Furthermore, experiments in physics and chemistry with old linen have failed to reproduce adequately the phenomenon presented by the Shroud of Turin. The scientific consensus is that the image was produced by something which resulted in oxidation, dehydration and conjugation of the polysaccharide structure of the microfibrils of the linen itself. Such changes can be duplicated in the laboratory by certain chemical and physical processes. A similar type of change in linen can be obtained by sulfuric acid or heat. However, there are no chemical or physical methods known which can account for the totality of the image, nor can any combination of physical, chemical, biological, or medical circumstances explain the image adequately.

Appendix D

Asian nucleotide report to National Library of Medicine on U2 sequence.[99]



NIH National Library of Medicine
National Center for Biotechnology Information

Log in

Nucleotide | Nucleotide | Search | Advanced | Help

GenBank | Send to: | Change region shown | Customize view

Homo sapiens isolate IR clone H6XP41B01B4J2E tRNA-Pro (TRNP) gene and D-loop, partial sequence; mitochondrial

GenBank: KM655920.1
FASTA Graphics

Go to:

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            and D-loop, partial sequence; mitochondrial.
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            Catarrhini; Hominidae; Homo.
REFERENCE   1  (bases 1 to 482)
  AUTHORS   Barcaccia,G., Galla,G., Achilli,A., Olivieri,A. and Torroni,A.
  TITLE     Uncovering the sources of DNA found on the Turin Shroud
  JOURNAL   Sci Rep 5, 14484 (2015)
   PUBMED   26434580
  REMARK    Publication Status: Online-Only
REFERENCE   2  (bases 1 to 482)
  AUTHORS   Galla,G., Achilli,A., Olivieri,A., Fanti,G., Torroni,A. and
            Barcaccia,G.
  TITLE     Direct Submission
  JOURNAL   Submitted (24-SEP-2014) DAFNAE, Laboratory of Genomics for Plant
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Homo sapiens isolate IR clone H6XP41B01B4J2E tRNA-Pro (TRNF Nucleotide
Shroud of Turin, Barcaccia (227) Nucleotide
Homo sapiens ABO +5.8 intron 1 enhancer (LOC112679198) on chromosome 9 Nucleotide
turin (169744) Nucleotide
barcaccia (3517) Nucleotide
See more...

[99] G. Barcaccia et al., "Homo sapiens isolate IR clone H6XP41B01B4J2E tRNA-Pro (TRNP) gene and D-loop, partial sequence; mitochondrial," National Center for Biotechnology Information, October 15, 2015, http://www.ncbi.nlm.nih.gov/nuccore/KM655920.

Appendix E

Findings of the III Congresso Internazionale di Studi Sulla Sindone[100]

C - As a summary of the results obtained up to now from the forensic, geometrical and mathematical studies carried out by the EDICES, the following can be confidently stated;

1. The Sudarium of Oviedo is a relic, which has been venerated in the cathedral of Oviedo for a very long time. It contains stains formed by human blood of the group AB.
2. The cloth is dirty, creased, torn and burnt in parts, stained and highly contaminated. It does not, however, show signs of fraudulent manipulation.
3. It seems to be a funeral cloth that was probably placed over the head of the corpse of an adult male of normal constitution.
4. The man whose face the Sudarium covered had a beard, moustache and long hair, tied up at the nape of his neck into a ponytail.
5. The man's mouth was closed, his nose was squashed and forced to the right by the pressure of holding the cloth to his face. Both these anatomical elements have been clearly identified on the sudarium of Oviedo.
6. The man was dead. The mechanism that formed the stains is incompatible with any kind of breathing movement.

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[100] Guillermo Heras Moreno, José-Delfín Villalaín Blanco, and Jorge-Manuel Rodríguez Almemar. "Comparative Study of the Sudarium of Oviedo and the Shroud of Turin." III Congresso Internazionale di Studi Sulla Sindone, June 7, 1988, 4-5, https://www.shroud.com/heraseng.pdf.

7. At the bottom of the back of his head, there is a series of wounds produced in life by some sharp objects. These wounds had bled about an hour before the cloth was placed on top of them.
8. Just about the entire head, shoulders and at least part of the back of the man were covered in blood before being covered by this cloth. This is known because it is impossible to reproduce the stains in the hair, on the forehead and on top of the head with blood from a corpse. It can therefore be stated that the man was wounded before death with something that made his scalp bleed and produced wounds on his neck, shoulders and upper part of the back.
9. The man suffered a pulmonary oedema as a consequence of the terminal process.
10. The cloth was placed over the head starting from the back, held to the hair by sharp objects. From there it went round the left side of the head to the right cheek, where, for apparently unknown reasons it was folded over on itself, ending up folded like an accordion at the left cheek. It is possible that the cloth was placed like this because the head formed an obstacle and so it was folded over on itself. On placing the cloth in this position, two stained areas can be anatomically observed - one over the "ponytail" and the other over the top of the back.
Once the man had died, the corpse stayed in a vertical position for around one hour, and the right arm was raised with the head bent 70 degrees forwards and 20 degrees to the right. How can this be reasonably thought of as a "vertical position"? If the man of the Oviedo Sudarium was hanging by the right arm only, then the rest of the body, especially the head, would be relatively far from this arm, hanging to the left. This position is incompatible with that of the head that

the cloth wrapped. It is therefore easy to deduce that the body was hanging by both arms. But if the body was hanging like this, without support for the feet, the man would have died in 15 or 20 minutes, and there would not have been enough time to generate the amount of liquid necessary to form the stains visible on the cloth. If the body were hanging with both arms above the head, then the head would have been leaning forwards and not to the right. So the only position compatible with the formation of the stains on the Oviedo cloth is both arms outstretched above the head and the feet in such a position as to make breathing very difficult, i.e. a position totally compatible with crucifixion. We can say that the man was wounded first (blood on the head, shoulders and back) and then "crucified".

11. The body was then placed on the ground on its right side, with the arms in the same position, and the head still bent 20 degrees to the right, and at 115 degrees from the vertical position. The forehead was placed on a hard surface, and the body was left in this position for approximately one more hour.
12. The body was then moved, while somebody's left hand in various positions tried to stem the flow of liquid from the nose and mouth, pressing strongly against them. This movement could have taken about 5 minutes. The cloth was folded over itself all this time. The cloth was then straightened out and wrapped all round the head, like a hood, held on again by sharp objects. This allowed part of the cloth, folded like a cone, to fall over the back. With the head thus covered, the corpse was held up (partly) by a left fist. The cloth was then moved sideways over the face in this position. Thus, once the obstacle (which could have been the hair

matted with blood or the head bent towards the right) had been removed, the cloth covered the entire head and the corpse was moved for the last time, face down on a closed left fist. This movement produced the large triangular stain, on whose surface the finger shaped stains can be seen and on the reverse side of the cloth, the curve inscribed on the cheek. Like the previous movement, this one could have taken 5 minutes at most.

13. Finally, on reaching the destination, the body was placed face up and for unknown reasons, the cloth was taken off the head.
14. Possibly myrrh and aloes were then sprinkled over the cloth.
15. Taking these results into account, it is easy to understand the most important conclusion of the «I International Congress on the Sudarium of Oviedo, which took place in said city, in 1994.» - A complete joint study of the Sudarium and the Shroud is necessary.

Chronology

The Shroud of Turin[101]

- 1349: The Shroud surfaces in Lirey, France, and is put on display in 1355.
- 1453: Ownership of Shroud transferred to the Duke of Savoy, Geneva.
- 1471: Enlargement and embellishment of the Duke's Chapel at Chambéry where the Shroud is eventually relocated.
- 1532: Fire of Chambery causes scorch marks and other damage.
- 1534: Poor Clare nuns "mend" the damage to the Shroud.
- 1578: The Shroud arrives in Turin, Italy. This was at the request of the Bishop of Turin, so that the saintly, but sickly, Archbishop of Milan, Charles Borromeo, could venerate it. It has been housed in and around St. John the Baptist Cathedral, Turin, since then.
- 1898: First photographs, taken by Secondo Pia, reveal a positive image, showing that the image itself is indeed a negative.
- 1902: Sorbonne University professor, Yves Delage, argues the Shroud is the authentic burial cloth of Jesus.
- 1939-1945: The Shroud is hidden in a monastery during WWII.
- 1973: Scientists allowed to take samples for study.
- 1978: Two major events: Publication of Ian Wilson's book, "The Shroud of Turin: The Burial Cloth of Jesus Christ?" in which the Shroud is identified as the Image

[101] "Chronology of the Shroud," *Future Science*, September 27, 2017, https://futurescience.org/chronology-of-the-shroud/.

of Edessa, the Mandylion; and investigation by 30 scientists, known as STURP confirm image is of a real "scourged, crucified man… not the product of an artist."

- 1983: Shroud ownership is given to the Vatican.
- 1988: Carbon-dating tests report origins between 1260 and 1390—results now known to be inaccurate due to faulty sampling (see Chapter 4 below).
- 1997: Fire in Turin Cathedral as a result of arson. The Shroud was rescued by local firefighters.
- 2002: Ray Rogers, skeptic and original member of STURP, publishes a paper questioning 1988 samples.
- 2008: UV radiation hypothesis for the formation of the Shroud's image put forward by John Jackson's team of investigators.
- 2010: Paolo Di Lazzaro's team experimentally substantiates Jackson's hypothesis.
- 2013: Dr. Guilio Fanti and Saverio Gaeta write the book, The Mystery of The Shroud, documenting likely 1st century origins.[42]

The Sudarium of Oviedo[102]

- 570: Antonius of Piacenza wrote that it was being kept in a cave near Sr. Mark's monastery in Jerusalem, near the river Jordan.
- 614 : As Persian forces invade in Byzantine provinces, the Sudarium is moved to Northern Africa by John the Almoner, Bishop of Alexandria.

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[102] Mary Jo Anderson, "Library: The Other Shroud of Christ," *Catholic Culture*, accessed May 11, 2023, https://www.catholicculture.org/culture/library/view.cfm?recnum=3953.

- 616: Persians advanced into Alexandria, it was moved to Spain and given to St. Fulgentius, and it traveled to Seville.
- 711: The Sudarium traveled to Toledo and then on to Monte Sacro in Asturias to escape the Moors.
- 840: King Alfonso II built the Camera Santa in Oviedo and places the Sudarium there for safe keeping.

Glossary

Allele: A sequence of nucleotides, or an alternative sequence of nucleotides that represent a segment of a chromosome. A grouping of genes.

Antigen: A substance either from within the body or of external origin, that initiates a immune response, activating the body's defensive white blood cell's reaction.

Carbon-14 dating: A method of dating the age of an organic organism using radioactive carbon.

EDICES: Equipo de investigación del Centro español de Sindonologia or the Spanish Center of Sindonology in Valencia. Much of the current research on the Sudarium is done at this center in Spain.

Genome: The genetic sequence that defines a unique organism. A defined series of nucleotide sequences of DNA specific to an organism.

Next Generation DNA sequencing: Technique of sequencing multiple segments of DNA synchronously. This increases the accuracy and speed by reducing time.

Rh blood Group (Rhesus factor): The original study of Rhesus monkeys, which were found to be identical to humans, in which groups of 49 antigens were isolated. Positive or negative determines whether antigen "D" is present or not.

Shroud of Turin: Linen cloth in Cathedral of St. John the Baptist in Turin, Italy, which bears the image of a man thought to be Jesus of Nazareth. Thought to be the burial Shroud in which He was wrapped after crucifixion.

STURP: Shroud of Turin Research Project (often abbreviated as STURP). The team that performed the initial studies in the late 1970s into the 1980s. Their final report was in 1981.

Sudarium of Oviedo: A bloodstained fabric in the Cámara Santa of the Cathedral of San Salvador, Oviedo, Spain. The Sudarium is thought to be the cloth that was wrapped around the head of Jesus of Nazareth as he was removed from the cross.

Bibliography

"2018 Update! The Sudarium of Oviedo & the Shroud of Turin | Strange End Times Signs." YouTube, April 2, 2018. https://www.youtube.com/watch?v=alRlq5uU0Fg.

Agasso, Domenico. "The Shroud Is Not Medieval. We Need New Studies to Know Its Age." *Inside the Vatican*, 2019. 26–27.

All about the Human Genome Project, 2013. http://www.genome.gov/10001772.

Ancient-Origins. "The Shroud of Oviedo: A Legendary Cloth Connected to the Death of Jesus." Ancient Origins Reconstructing the story of humanity's past, May 25, 2016. https://www.ancient-origins.net/artifacts-other-artifacts/shroud-oviedo-legendary-cloth-connected-death-jesus-005643.

Anderson, Mary Jo. "Library: The Other Shroud of Christ." Library: The Other Shroud of Christ | Catholic Culture. Accessed May 12, 2023. https://www.catholicculture.org/culture/library/view.cfm?recnum=3953.

Antonacci, Mark. *The Resurrection of the Shroud*. New York, New York: M. Evans, 2000.

Barcaccia, G., G. Galla, A. Achilli, A. Olivieri, A. Torroni, and G. Fanti. "Homo Sapiens Isolate IR Clone H6XP41B01B4J2E Trna-pro (TRNP) Gene And." National Center for Biotechnology Information. Accessed May 12, 2023. http://www.ncbi.nlm.nih.gov/nuccore/KM655920.

Barcaccia, Gianni, Giulio Galla, Alessandro Achilli, Anna Olivieri, and Antonio Torroni. "Uncovering the Sources of DNA Found on the Turin Shroud." *Scientific Reports* 5, no. 1 (2015). https://doi.org/10.1038/srep14484.

Bennett, Janice. "Face Cloth of Jesus' Burial: The Sudarium of Oviedo: Simply Catholic." Simply Catholic | Helping Catholics know & love the Lord and his Church, April 1, 2021. https://www.simplycatholic.com/face-cloth-of-jesus-burial-the-sudarium-of-oviedo/.

Bennett, Janice. *Sacred Blood, Sacred Image: the Sudarium of Oviedo: New Evidence for the Authenticity of the Shroud of Turin*. San Francisco, CA: Ignatius Press, 2005.

Bianchi, Lorenzo. "Clues to the Resurrection of Jesus. The Sudarium of Oviedo." 30Giorni, April 2009. http://www.30giorni.it/articoli_id_21067_l3.htm.

Brotherton, Paul, Juan J. Sanchez, Alan Cooper, and Phillip Endicott. "Preferential Access to Genetic Information from Endogenous Hominin Ancient DNA and

Accurate Quantitative SNP-Typing via SPEX." *Nucleic Acids Research* 38, no. 2 (2009): e7. https://doi.org/10.1093/nar/gkp897.

Brunati, E. "Note Critiche Sulla Datazione Della S.Sindone Con Il Radiocarbonio." Typescript, January 1994.

Budowle, Bruce, Marc W. Allard, Mark R. Wilson, and Ranajit Chakraborty. "Forensics and Mitochondrial DNA: Applications, Debates, and Foundations." *Ann. Rev. Hum. Genet.* 4, no. 199 (2003): 119-41. https://doi.org/https://www.ncbi.nlm.nih.gov/pubmed/14527299.

Barta, César, Álvarez R., Ordóñez A., Sánchez A., and García J. "New Coincidence between Shroud of Turin and Sudarium of Oviedo – Doaj." SHS Web of Conferences, January 1, 2015. https://doaj.org/article/6b0df837967b45fab12ccf17c01159e2.

Casabianca, T., E. Marinelli, G. Pernagallo, and B. Torrisi. "Radiocarbon Dating of the Turin Shroud: New Evidence from Raw Data." *Archaeometry* 61, no. 5 (2019): 1223–31. https://doi.org/10.1111/arcm.12467.

Casarino, L, et al. "Research of DNA Polymorphisms on the Shroud and on the Sudarium of Oviedo. Sindon Nuova Serie." *Quaderno* 8 (December 1995).

"CODIS Core Loci." 2013. http://www.nfstc.org/pdi/Subject04/pdi_s04_m02_02.htm.

Combined DNA Index System (CODIS). 2013. http://www.fbi.gov/about-us/lab/biometric-analysis/codis.

"Combined DNA Index System (CODIS)." CODIS Information for Law Enforcement, 2013. http://www.fbi.gov/about-us/lab/biometric-analysis/codis.

"Comparative Study of the Sudarium of Oviedo and the Shroud of Turin." III Congresso Internazionale di Studi Sulla Sindone, Turin, 5th to 7th June 1998. Accessed May 12, 2023. https://www.shroud.com/heraseng.pdf.

Damon, P. E., D. J. Donahue, B. H. Gore, A. L. Hatheway, A. J. T. Jull, T. W. Linick, P. J. Sercel, et al. "Radiocarbon Dating of the Shroud of Turin." Nature News. Accessed May 12, 2023. https://www.nature.com/articles/337611a0.

Fanti, Giulio, and Giuseppe Zagotto. "Blood Reinforced by Pigments in the Reddish Stains of the Turin Shroud." *Journal of Cultural Heritage* 25 (2017): 113–20. https://doi.org/10.1016/j.culher.2016.12.012.

Fanti, Giulio, Barrie Schwortz, August Accetta, Jose A. Botella, Berns J. Buenaobra, Manuel Carreira, Frank Cheng, et al. "Evidences for Testing Hypotheses About the Body Image Formation of the Turin Shroud." Shroud.com, September 2005. https://www.shroud.com/pdfs/doclist.pdf.

Fanti, Giulio. “Can a Corona Discharge Explain the Body Image of the Turin Shroud?” *Journal of Imaging Science and Technology* 54, no. 2 (2010). https://www.academia.edu/62877085/Can_a_Corona_Discharge_Explain_the_Body_Image_of_the_Turin_Shroud

Fanti, Giulio. “Why Is the Turin Shroud Not Fake?” *Global Journal of Archaeology & Anthropology* 7, no. 3 (January 21, 2018). https://doi.org/10.19080/gjaa.2018.07.555715.

Frei, Max. Note a seguito dei primi studi sui prelievi di polvere aderente al lenzuolo della S. Sindone, in Sindone 23 (1976).

“Fringe Theories about the Shroud of Turin.” Wikipedia, May 14, 2023. https://en.wikipedia.org/wiki/Fringe_theories_about_the_Shroud_of_Turin.

Garza-Valdes, Leoncio A. *The DNA of God?* New York: Berkley Books, 2001.

Gove, H E. “Dating the Turin Shroud—an Assessment.” *Radiocarbon* 32, no. 1 (1990): 87–92. https://doi.org/10.1017/s0033822200039990.

Green, Richard E, Adrian W Briggs, Johannes Krause, Kay Prüfer, Hernán A Burbano, Michael Siebauer, Michael Lachmann, and Svante Pääbo. “The Neandertal Genome and Ancient DNA Authenticity.” *The EMBO Journal* 28, no. 17 (2009): 2494–2502. https://doi.org/10.1038/emboj.2009.222.

Grigorenko, A P, S A Borinskaya, N K Yankovsky, and E I Rogaev. “Achievements and Peculiarities in Studies of Ancient DNA and DNA from Complicated Forensic Specimens.” *Acta Naturae* 1, no. 3 (2009): 58–69. https://doi.org/10.32607/20758251-2009-1-3-58-69.

Guscin, Mark. “Addendum to Translation of Sermon by Gregory Referendarius.” Shroud.com, January 2008. https://shroud.com/pdfs/guscin3a.pdf.

Guscin, Mark. “Recent Historical Investigations on the Sudarium of Oviedo.” Shroud.com, June 1999. https://docslib.org/doc/8924758/recent-historical-investigations-on-the-sudarium-of-oviedo

Guscin, Mark. “The Sermon of Gregory Referendarius.” Shroud.com, January 2004. https://shroud.com/pdfs/guscin3.pdf.

Guscin, Mark. “The Sudarium of Oviedo: Its History and Relationship to the Shroud of Turin.” Shroud.com, 1997. https://www.shroud.com/guscin.htm.

Guscin, Mark. “The ‘Inscriptions’ on the Shroud.” Shroud.com, November 1999. https://shroud.com/pdfs/guscin2.pdf.

Heller, John H. “Report on the Shroud of Turin.” Goodreads. Accessed May 12, 2023. https://www.goodreads.com/book/show/3720751-report-on-the-shroud-of-turin.

Holland, Mitchell. “Forensic Mitochondrial DNA Analysis.” *Forensic DNA Analysis*, (2013): 249–78. https://doi.org/10.1201/b15361-17.

Image of Christ? Proceedings of a Symposium held in Hong Kong, March ... Accessed May 12, 2023. https://www.shroud.com/pdfs/ssi24part6.pdf.

Isenberg, Alice R., and Jodi M. Moore. “Mitochondrial DNA Analysis at the FBI Laboratory (Topical List; Forensic Science Communications, July 1999).” FBI, February 28, 2011. https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/july1999/dnalist.htm.

Jackson, Rebecca. “Jewish Burial Procedures at the Time of Christ.” In Actas del Il Congresso Sobre el Sudario de Oviedo, 1996.

Kearse, Kelly P. “DNA Analysis and the Shroud of Turin: Development of a Shroud CODIS.” Shroud.com, January 21, 2014. https://shroud.com/pdfs/kearse3.pdf.

Kearse, Kelly P. “Empirical Evidence That the Blood on the Shroud of Turin Is of Human Origin: Is the Current Data Sufficient?” Shroud.com, 2012. http://www.shroud.com/pdfs/kearse1.pdf, .

Kearse, Kelly P. “Investigations into the Effect of Carbon Monoxide Exposure on Bloodstain Color: Implications for the Shroud of Turin.” Shroud.com, October 10, 2017. https://shroud.com/pdfs/kearse5.pdf.

Kearse, Kelly P. “MUST READ: Cloning the Man on the Shroud of Turin.” Shroud.com, April 4, 2013. https://shroudstory.com/2012/11/25/must-read-cloning-the-man-on-the-shroud-of-turin/.

Kearse, Kelly P. “The Blood on the Shroud of Turin: Species Unknown.” Academia.edu, May 26, 2019. https://www.academia.edu/39251164/The_Blood_on_the_Shroud_of_Turin_Species_Unknown.

Kearse, Kelly P. “What Type of Blood Is Present on the Shroud of Turin? Existing Data vs. To Be Determined.” Shroud.com, October 10, 2017. https://shroud.com/pdfs/kearse4.pdf.

Kearse, Kelly P., and Thibault Heimburger. “The Shroud Blood Science of Dr. Pierluigi Baima Bollone: Another Look at Potassium, among Other Things.” Shroud.com, January 21, 2014. https://shroudofturin.files.wordpress.com/2013/12/bbk-7.pdf.

Kearse, Kelly. “The Shroud of Turin, the Relics of Jesus, and Eucharistic Miracles: The Significance of Type AB Blood.” Academia.edu, May 19, 2019. https://www.academia.edu/39142967/The_Shroud_of_Turin_the_Relics_of_Jesus_and_Eucharistic_Miracles_The_Significance_of_Type_AB_blood?email_work_card=view-paper.

Kearse, Kelly P. “Blood on the Shroud of Turin: An Immunological Review.” Shroud.com, August 2012. https://shroud.com/pdfs/kearse.pdf.

Kearse, Kelly P. “DNA on the Shroud of Turin: Distinguishing Endogenous versus Exogenous DNA.” Shroud.com, https://www.shroud.com/pdfs/kearse2.pdf#:~:text=Here%2C%20a%20simple%20experimental%20approach%20is%20described%20for,white%20blood%20cells%20%28lymphocytes%29%20present%20on%20the%20cloth.

Kersten, Holger, and Elmar R. Gruber. *The Jesus Conspiracy: the Turin Shroud and the Truth About the Resurrection*. New York, NY: Barnes & Noble, 1995.

Kircher, Martin, and Janet Kelso. “High-Throughput DNA Sequencing - Concepts and Limitations.” *BioEssays* 32, no. 6 (2010): 524–36. https://doi.org/10.1002/bies.200900181.

Lallanilla, Marc. “Shroud of Turin Authenticity up for Debate Again after New Report.” *The Christian Science Monitor*, March 29, 2013. https://www.csmonitor.com/Science/2013/0329/Shroud-of-Turin-authenticity-up-for-debate-again-after-new-report.

Little, Becky. “The Shroud of Turin: 7 Intriguing Facts.” History.com, March 25, 2021. https://www.history.com/news/shroud-turin-facts.

MacGowan, Doug. “Sudarium of Oviedo - Historic Mysteries.” Historic Mysteries, April 29, 2012. https://www.historicmysteries.com/the-sudarium-of-oviedo/.

Magis Center. “Facts about the Shroud of Turin (Age, Dimensions, Blood Stains).” Magis Center, January 25, 2023. https://www.magiscenter.com/blog/facts-about-shroud-turin.

Magis Center. “History of the Shroud of Turin (Cutting through the Controversy!).” Magis Center, January 25, 2023. https://www.magiscenter.com/blog/history-of-the-shroud-of-turin-cutting-through-controversy.

Maloney, Paul C. “McCrone and the Max Frei Sticky Tapes of 1978 - Shroud.” July 14, 2014. https://www.shroud.com/pdfs/maloneypollen2014.pdf.

Maria. “Pilgrims To Oviedo and Not Santiago.” CaminoWays.com, March 19, 2021. https://caminoways.com/for-pilgrims-who-go-to-oviedo-and-not-santiago#:~:text=There%20is%20a%20saying%20that%20illustrates%20the%20traditional,James%20Apostle%29%20and%20not%20the%20Lord%20%28Jesus%20Christ%29%E2%80%99.

Marinelli, Emanuela. “La Questione Dei Pollini Presenti Sulla Sindone Di Torino e Sul Sudario Di Oviedo.” Academia.edu, August 28, 2014. https://www.academia.edu/1536349/La_questione_dei_pollini_presenti_sulla_Sindone_di_Torino_e_sul_Sudario_di_Oviedo.

Marino, Joe, and Walter McCrone. “More on McCrone’ s Role in Shroud of Turin Studies.” Shroud.com, September 23, 2011. https://shroudstory.com/2011/09/23/more-on-mccrones-role-in-shroud-of-turin-studies/.

McCrone, Walter C. *Judgement Day for the Turin Shroud*. Chicago: Microscope Publications, Division of McCrone Research Institute, 1997.

Meacham, William. “Turin Shroud—Image of Christ? Proceedings of a Symposium held in Hong Kong.” March 1, 1986. www.shroud.com › pdfs › ssi24part6.

Memorandum of Pierre d’Arcis, Bishop of Troyes to the Avignon pope clement VII. Accessed May 12, 2023. https://www.priory-of-sion.com/biblios/links/memorandum.html.

Micklos, D. A. *DNA science a first course*. New York: Cold Spring Harbor Laboratory Press, 2003.

Moreno, Guillermo Heras, Jose-Delfin Villalain Blanco, and Jorge-Manuel Rodriguez Almenar. “Comparative Study of the Sudarium of Oviedo and the Shroud of Turin.” Shroud.com, n.d. https://www.shroud.com/heraseng.pdf.

Morris, R A, J R London, and L A Schwalbe. X-Ray fluorescence investigation of the Shroud of Turin, 1980. https://analyticalsciencejournals.onlinelibrary.wiley.com/doi/10.1002/xrs.1300090203.

Mullis, Kary B., François Ferré, and Richard A. Gibbs. *The Polymerase chain reaction*. Boston: Birkhäuser, 1994.

Murphy, Kenneth, and Casey Weaver. *Janeway’s immunobiology*. New York, NY: Garland Science, Taylor & Francis Group, LLC, 2017.

The New American Bible. Vol. 20:6-7. Wichita, KS: Catholic Bible Publishers, 1973.

Nickell, Joe. *Relics of the Christ*. Lexington, KY: University Press of Kentucky, 2007.

Norrgard, Karen. “Forensics, DNA Fingerprinting, and CODIS.” *Nature Education* 1, no. 1 (2008), https://www.nature.com/scitable/topicpage/forensics-dna-fingerprinting-and-codis-736/.

Petrosillo, O, and E Marinelli. *The Enigma of the Shroud*. San Gwann, Malta: Publishers Enterprises Group, 1966.

Petrosillo, Orazio, and Emanuela Marinelli. *The enigma of the shroud: a challenge to science*. San Gwann: Publishers Enterprises Group (PEG), 1996.

Phillips, Thomas J. “Shroud Irradiated with Neutrons?” *Nature News*. Accessed May 16, 2023. https://www.nature.com/articles/337594a0.

“Phosphate Backbone.” Genome.gov. Accessed May 12, 2023. https://www.genome.gov/genetics-glossary/Phosphate-Backbone.

Poulle, Emmanuel. “Les Sources de l’histoire Du Linceul de Turin. Revue Critique.” Revue d"Histoire Ecclesiastique. Accessed May 12, 2023. https://www.brepolsonline.net/doi/10.1484/J.RHE.3.215.

Associated Press. “Shroud of Turin Saved from Fire in Cathedral (Published 1997).” *The New York Times*, April 12, 1997. https://www.nytimes.com/1997/04/12/world/shroud-of-turin-saved-from-fire-in-cathedral.html.

Riani, Marco, Anthony C. Atkinson, Giulio Fanti, and Fabio Crosilla. “Regression Analysis with Partially Labelled Regressors: Carbon Dating of the Shroud of Turin - Statistics and Computing.” SpringerLink, April 27, 2012. https://link.springer.com/article/10.1007/s11222-012-9329-5.

Ricci, Giulio. “L’uomo Della Sindone è Gesù .Amazon.it: Libri, 1985. https://www.amazon.it/Luomo-della-Sindone-Giulio-Ricci/dp/8827001336.

Rizzi, Ermanno, Martina Lari, Elena Gigli, Gianluca De Bellis, and David Caramelli. “Ancient DNA Studies: New Perspectives on Old Samples.” *Genetics Selection Evolution* 44, no. 1 (2012): 21. https://doi.org/10.1186/1297-9686-44-21.

Schiffer, Kathy. “The Sudarium of Oviedo: The ‘Other Shroud’ of Jesus.” NCR. Accessed May 12, 2023. https://www.ncregister.com/blog/the-sudarium-of-oviedo-the-other-shroud-of-jesus.

Schwortz, Barrie. “The Shroud of Turin.” STERA, Inc. Image Library. Shroud.com, Accessed May 12, 2023. www.Shroud.com/gallery/index.htm.

Schwortz, Barrie M. “The Role of the Internet in the Future of Shroud Research.” Shroud.com, June 1998. https://www.shroud.com/schwortz.htm.

Schwortz, Barrie M. “A Brief Review of the Recent CNN Documentary and Further Comments on the Medieval Photograph Theory.” Shroud.com, March 5, 2015. https://shroud.com/pdfs/cnnreview.pdf.

Schwortz, Barrie M. “Behind the Scenes of a New Smithsonian Channel Shroud Documentary.” Shroud.com, Accessed May 2013. https://www.shroud.com/pdfs/behind.pdf.

Schwortz, Barrie M. “Five Reasons Why Some Christians Are Shroud Skeptics.” Shroud.com, 2016. https://shroud.com/pdfs/fivereasons.pdf.

Schwortz, Barrie M. “Mapping of Research Test Point Areas on the Shroud of Turin.” Mapping of Research Test-Point Areas on the Shroud of Turin. Shroud.com, Accessed May 2, 2020. https://www.shroud.com/mapping.htm.

Schwortz, Barrie M. “Religious Freedom in Scientific Research.” Shroud.com, April 19, 2013. https://shroud.com/pdfs/tedxtext.pdf.

Schwortz, Barrie M. “The 1988 Radiocarbon Dating of the Shroud of Turin and STURP.” Shroud.com, August 26, 2012. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://shroud.com/pdfs/schwortz1p.pdf#:~:text=October%2013%2C%201988%3A%20%28Thursday%29%20At%20a%20press%20conference,determined%20an%20approximate%201325%20date%20for%20the%20cloth.

Schwortz, Barrie M. “The Contributions of the Shroud of Turin Research Project.” Shroud.com, n.d. https://shroud.com/videos/Rome%20Dec%202016%20finalxx.mp4.

Schwortz, Barrie M. “The History of Shroud.Com.” Shroud.com, January 21, 2012. https://shroud.com/pdfs/history.pdf.

Schwortz, Barrie M. “The Role of the Internet in Current Shroud Research.” Shroud.com, June 1999. https://shroud.com/pdfs/schwortz.pdf.

Schwortz, Barrie M. “The Shroud in the News for Christmas 2011.” Shroud.com, January 21, 2011. https://shroud.com/pdfs/christmas2011editorial.pdf.

Schwortz, Barrie M. “The Shroud of Turin Research Project 1978 Scientific Examination of the Shroud.” Shroud.com, August 26, 2012. https://shroud.com/pdfs/schwortzv.pdf.

Scott, John Beldon. *Architecture for the shroud: Relic and ritual in Turin*. Chicago: University of Chicago Press, 2003.

The Second International Conference on the Sudarium of Oviedo, 2007. http://www.shroud.com/pdfs/n65part6.pdf.

“Secondo Pia.” Wikipedia. Accessed February 1, 2023. https://en.wikipedia.org/wiki/Secondo_Pia.

“Shroud of Turin and the Sudarium of Oviedo Link to Jesus Christ.” Aleteia, January 1, 2020. https://aleteia.org/2016/04/11/new-study-the-Shroud-of-turin-and-the-sudarium-of-oviedo-covered-the-same-person/.

“The Shroud of Turin.” The Mysteries of the Rosary, 2018. https://www.mysteriesoftherosary.org/2018/06/the-shroud-of-turin.html.

"STURP Team Members." Shroudofturin.com/Resources/CRTSUMSTURPTEAM1.pdf. Accessed May 12, 2023. https://shroudofturin.com/Resources/CRTSUMSTURPTEAM1.pdf.

STURP. Accessed May 15, 2023. https://www.shroudofturin.com/sturp.html.

"Sudarium of Oviedo," Historic Mysteries, Accessed May 12, 2023. https://www.historicmysteries.com/the-sudarium-of-oviedo/.

A summary of STURP's conclusions. Accessed May 12, 2023. https://www.shroud.com/78conclu.htm.

Sutovsky, Peter, Klaus Van Leyen, Tod Mccauley, Billy N Day, and Miriam Sutovsky. "Degradation of Paternal Mitochondria after Fertilization: Implications for Heteroplasmy, Assisted Reproductive Technologies and mtDNA Inheritance." *Reproductive BioMedicine Online* 8, no. 1 (2004): 24–33. https://doi.org/10.1016/s1472-6483(10)60495-6.

Sutovsky, Peter, Ricardo D. Moreno, João Ramalho-Santos, Tanja Dominko, Calvin Simerly, and Gerald Schatten. "Ubiquitinated Sperm Mitochondria, Selective Proteolysis, and the Regulation of Mitochondrial Inheritance in Mammalian Embryos1." *Biology of Reproduction* 63, no. 2 (2000): 582–90. https://doi.org/10.1095/biolreprod63.2.582.

Swissinfo.ch. "Sacred Relic Still Shrouded in Mystery." SWI swissinfo.ch, October 28, 2017. https://www.swissinfo.ch/eng/sacred-relic-still-shrouded-in-mystery/6545354.

Tech. "Chronology of the Shroud." FUTURE SCIENCE, September 27, 2017. https://futurescience.org/chronology-of-the-shroud/.

Venter, J. Craig, Mark D. Adams, Eugene W. Myers, Peter W. Li, Richard J. Mural, Granger G. Sutton, Hamilton O. Smith, et al, "The Sequence of the Human Genome," *Science* 291, no. 1304 (2001). DOI: 10.1126/science.1058040.

Watson, James D. *Molecular Biology of the Gene*. San Francisco: Pearson Education, 2017.

"Were Jesus' Bones Broken during the Crucifixion?" Faith Filled Family Magazine, April 24, 2019. https://faithfilledfamily.com/jesus-bones-broken-crucifixion/.

Wilson, Ian and Barrie Schwortz. *The Turin Shroud: The illustrated evidence*. London: Michael O'Mara, 2000.

Wilson, Ian and Barry M. Schwortz. *The Turin Shroud*. New York, New York: Barnes & Noble, 1979.

Wilson, Ian. *The Blood and the Shroud: New Evidence That the World's Most Sacred Relic is Real*. New York, New York: Simon and Schuster, 1998.