The Shroud of Turin:

Perspectives on a Multifaceted Enigma

August 14–17, 2008

The Blackwell Inn
and Conference Center
on the grounds of
The Ohio State University

Sponsored by:

Shroud Science
Internet Group

Raymond N. Rogers
1961 Cumbres Patio
Los Alamos, NM 87544
24 January 2003

Prof. Giulio Fanti
University of Padua
Via Venezia 1
35131 Padua
Italy

Dear Giulio:

We have discussed some different hypotheses of image formation since May 2000. You recently asked me to repeat comments I made to you in October 2002 concerning my conclusions about the Shroud of Turin. I had not previously put those thoughts into writing; however, I am willing to make a statement for you.

After 25 years of study, I have some personal opinions about the Shroud. I believe that the technology of the cloth indicates a much greater age than shown by the 1988 date. I believe that we can prove categorically, without any assumptions, that the sample taken in 1988 was invalid. I believe that the image could not be a hoax. Based on its chemical composition, I believe that the Shroud is a real shroud. I believe that those opinions are all that can be justified on the basis of the facts and observations we now have. However, no observations to date rule out the possibility that the Shroud may very well be the actual shroud used with Jesus.

My conclusion is that the Shroud may be the most important object in history. It deserves only the most careful, meticulous study and careful preservation.

I wish you all of the success in the world at carrying the studies into the future.

Warmest regards,

Ray

Raymond N. Rogers
Fellow
University of California
Los Alamos National Laboratory

"The Shroud of Turin: Perspectives on a Multifaceted Enigma" conference marks the 30th and 20th anniversaries of two of the most important events in Shroud history. It's been 30 years since the 1978 multidisciplinary study by the Shroud of Turin Research Project (STURP), which was given an unprecedented five-day access to the Shroud. STURP's overall studies suggested that the Shroud was an authentic first century burial cloth. It's also been 20 years since the 1988 Carbon-14 (C-14) test on the Shroud performed by three laboratories with the results placing the putative origins of the Shroud between A.D. 1260–1390. In many people's eyes, that ended the debate of the Shroud's authenticity.

This conference continues a string of post-1988 meetings, including Bologna 1989; Paris 1989; Cagliari, Italy, 1990; New York 1991; St. Louis 1991; Rome 1993; Nice, France, 1997; Turin 1998; Dallas 1998; Rio de Janeiro 1999; Richmond, Virginia, 1999; Orvieto, Italy, 2000; Turin 2000; Dallas 2001; Paris 2002; Rio de Janeiro 2002; and Dallas 2005.

This historic conference will highlight the contributions of the 1978 STURP team, including a special presentation by STURP documenting photographer Barrie M. Schwortz. The year 2008 also marks the third anniversary of the death of STURP and Shroud Science Internet Group member Raymond N. Rogers to whom the conference is being dedicated. Rogers, who had dropped out of sindonology for about 20 years before reentering the scene to critique some ideas in a controversial Shroud book in 2000, was in a unique position regarding the evaluation of the 1988 C-14 results. He had custody of some samples from the 1978 study and in 2003 had been given access to leftover samples used in the 1988 dating. No one else in the world had the combination of the scientific expertise and authentic Shroud samples with which to do the appropriate testing.

Despite a long-time illness, Rogers was an untiring researcher. The amount of work he did at the end of his life was most impressive. He conducted work on Shroud samples, posted countless e-mails to the Shroud Science Internet Group, carried on extensive personal correspondence with many individuals, and wrote, with the help of Barrie M. Schwortz, a book on his research, which will be unveiled here at the conference.

Shortly before his death, Rogers authored a significant paper in the prestigious peer-reviewed scientific journal *Thermochimica Acta*, in which he asserted that "Pyrolysis-mass-spectrometry results from the sample area coupled with microscopic and microchemical observations prove that the radiocarbon sample was not part of the original cloth of the Shroud of Turin. The radiocarbon date was thus not valid for determining the true age of the shroud." Skeptics, and even those otherwise convinced of the Shroud's authenticity, have contested Rogers' findings, but to date, no one has published a rebuttal in any peer-reviewed journals.

Since the release of Rogers' paper, other researchers have found additional compelling evidence supportive of his findings. Several papers related to this new research will be presented at the conference, including one from a researcher given a Shroud sample by Rogers himself before his death. Some fascinating new details will be revealed in this paper. A previously-unpublished paper by Rogers will also be presented. In addition, there will be two papers that will present analyses of dusts and particles taken during the 1988 C-14 dating. Another notable fact about the conference is that it will be the first Shroud Congress for which the proceedings will be available online. (See www.ohioshroudconference.com for details.) Scientists, historians, theologians, and researchers continue to weigh in on this enigmatic cloth. It is hoped that this conference will be another significant chapter in the saga of the Shroud of Turin.

Joseph G. Marino
Shroud Science Internet Group member

Conference Schedule

Thursday, August 14, 2008

5:00 p.m.–7:00 p.m.	**On-site registration**
6:45 p.m.–7:00 p.m.	**Opening remarks**
7:00 p.m.–8:30 p.m.	**Opening address: *The Shroud: An Eternal Challenge* by Rex Morgan, Shroud Science Internet Group member**
8:30 p.m.–8:45 p.m.	**Break**
8:45 p.m.–9:00 p.m.	***A Tribute to STURP* by Barrie M. Schwortz, STURP documenting photographer and Shroud Science Internet Group member**
9:00 p.m.–10:00 p.m.	**Informal gathering in Ballroom (refreshments provided)**

Friday, August 15, 2008

7:00 a.m.–9:00 a.m.	**On-site registration**
8:00 a.m.–9:30 a.m.	**Breakfast (provided by hotel)**
8:30 a.m.–8:45 a.m.	**Opening remarks**
8:45 a.m.–9:15 a.m.	***The STURP Experience* by Thomas D'Muhala, former president of STURP**
9:15 a.m.–9:45 a.m.	***The Sudarium of Oviedo: A Study of Fiber Structures* by Raymond N. Rogers, STURP member and Shroud Science Internet Group member, read by Joanna Emery**
9:45 a.m.–10:15 a.m.	***VP-8 Shroud Image Analysis, Impact, and History* by Peter Schumacher**
10:15 a.m.–10:45 a.m.	***My White Linen* White Paper* by Kenneth E. Stevenson, STURP member and Shroud Science Internet Group member (Rev. 19:8*)**
10:45 a.m.–11:00 a.m.	***Visibility of the Shroud Image: An Optical Physicist's Perspective* by John Dee German, STURP member**
11:00 a.m.–11:30 a.m.	***The Spectroscopy of Various Candidate Processes Associated with Image Formation and Features of the Shroud of Turin Redux (What We Might Have Seen If We Did It Right)* by Joseph S. Accetta, STURP member**

11:30 a.m.–12:00 noon	**Question/Answer session with STURP members (time permitting)**
12:00 noon–1:30 p.m.	**Lunch (provided by hotel)**
1:30 p.m.–2:00 p.m.	***Digital Image Analysis of the Shroud of Turin: An Ongoing Investigation*** **by Raymond J. Schneider, Shroud Science Internet Group member**
2:00 p.m.–2:30 p.m.	***A Physical Hypothesis on the Origin of the Body Image Embedded into the Turin Shroud*** **by Paolo Di Lazzaro**
2:30 p.m.–3:00 p.m.	***Shroud Coins Dating by Image Extraction*** **by T.V. Oommen**
3:00 p.m.–3:30 p.m.	***Revisiting the Right Eye Image: What Is It?*** **by Dr. Alan and Mary Whanger, Shroud Science Internet Group members**
3:30 p.m.–4:00 p.m.	***Aspects of the Shroud in Botany and Related Art*** **by Dr. Alan and Mary Whanger, Shroud Science Internet Group members**
4:00 p.m.–4:22 p.m.	***Body Image Formation Hypotheses Based on Corona Discharge: Discussion*** **by Giulio Fanti, Shroud Science Internet Group member**
4:23 p.m.–4:45 p.m.	***Resolution of Images Obtained Without an Acquisition System Using MTF*** **by Giulio Fanti, Shroud Science Internet Group member, and Roberto Basso**
4:46 p.m.–5:08 p.m.	***Statistical Analysis of Dusts Taken from Different Areas of the Turin Shroud*** **by Giulio Fanti, Shroud Science Internet Group member, and Roberto Basso**
5:09 p.m.–5:29 p.m.	***Scourge Bloodstains on the Turin Shroud: An Evidence for Different Instruments Used*** **by Barbara Faccini, Shroud Science Internet Group member**
5:30 p.m.–6:00 p.m.	**Questions/Answers for afternoon speakers**
6:00 p.m.–8:00 p.m.	**Dinner (not provided by hotel)**
8:00 p.m.–9:00 p.m.	**Informal presentation: *History of the Holy Grail* by Daniel C. Scavone (refreshments provided)**
9:00 p.m.–10:00 p.m.	**Judging of student posters (refreshments provided)**

Saturday, August 16, 2008

8:00 a.m.–9:30 a.m.	**Breakfast (provided by hotel)**
8:30 a.m.–8:45 a.m.	**Opening remarks**
8:45 a.m.–9:15 a.m.	***What Went Wrong with the Shroud's Radiocarbon Date? Setting It All in Context*** **by Paul C. Maloney, Shroud Science Internet Group member**
9:15 a.m.–9:45 a.m.	***Invisible Mending and the Turin Shroud: Historical and Scientific Evidence*** **by Joseph G. Marino, Shroud Science Internet Group member, and M. Sue Benford**
9:45 a.m.–10:15 a.m.	***Surface Chemical Analysis of the Shroud of Turin Identifies Discrepancies in Radiocarbon Dating Region*** **by M. Sue Benford and Joseph G. Marino, Shroud Science Internet Group member**
10:15 a.m.–10:45 a.m.	**Special presentation – to be announced**
10:45 a.m.–11:15 a.m.	***SEM-EDXA Analysis of Red Particles Removed from the Underside of the Turin Shroud in 1988*** **by Ryan L. Parr, Brian Reguly, Allan MacKenzie, D. Andrew Merriwether, M. Sue Benford, Piero Baraldi, and Giulio Fanti**
11:15 a.m.–11:45 a.m.	**Questions/Answers for morning speakers**
11:45 a.m.–1:15 p.m.	**Lunch (provided by hotel)**
1:15 p.m.–1:45 p.m.	***Neutron Radiation Effects on Linen Fibers and Consequences for a Radiocarbon Dating*** **by Francesco Barbesino and Mario Moroni**
1:45 p.m.–2:15 p.m.	***A Global Forensic Analysis of the Elements of the Shroud of Turin: Compatibility Between the Evidences of Vitality and the Absence of Signs of Death on the Cloth*** **by Dr. Miguel Lorente**
2:15 p.m.–2:45 p.m.	***The Death of the Shroud Man: An Improved Review*** **by Barbara Faccini, Shroud Science Internet Group member**
2:45 p.m.–3:15 p.m.	***The Shroud of Turin, the Holographic Experience*** **by Petrus Soons**
3:15 p.m.–3:45 p.m.	***Botany of the Shroud of Turin: An Addition Concerning New Information*** **by Avinoam Danin**
3:45 p.m.–4:15 p.m.	***Ancient Edessa and the Shroud: History Concealed by the Discipline of the Secret*** **by Jack Markwardt**

4:15 p.m.–4:45 p.m.	***On Besancon and Other Plausible Theories for the Shroud During the Missing 150 Years, 1204 to 1355*** **by Daniel C. Scavone, Shroud Science Internet Group member**
4:45 p.m.–5:10 p.m.	***Was Sixth-century Desertification a Factor in the Transfer of Relics from Palestine?*** **by Diana Fulbright, Shroud Science Internet Group member**
5:10 p.m.–5:30 p.m.	***A Note on "the Servant of Peter"*** **by Diana Fulbright, Shroud Science Internet Group member**
5:30 p.m.–6:00 p.m.	**Questions/Answers for afternoon speakers**
6:00 p.m.–8:00 p.m.	**Dinner (provided by hotel)**
8:00 p.m.–10:00 p.m.	**GENERAL OPEN FORUM:** ***20 Years After – Where Do We Stand with the Carbon Dating?*** **moderated by Barrie M. Schwortz, STURP documenting photographer and Shroud Science Internet Group member**

Sunday, August 17, 2008

8:00 a.m.–9:30 a.m.	**Breakfast (provided by hotel)**
8:45 a.m.–9:00 a.m.	***Jesus Christ, the Man of the Shroud, and Bilirubin*** **by Carol Goldoni, read by Roberto Basso**
9:00 a.m.–9:30 a.m.	***Advancing the Shroud into the 21st Century: Reaching the Next Generation*** **by Russell Breault, Shroud Science Internet Group member**
9:30 a.m.–10:00 a.m.	***Focus Projects for Student Involvement in Researching the Scientific Properties of the Shroud of Turin*** **by Raymond J. Schneider, Shroud Science Internet Group member**
10:00 a.m.–11:00 a.m.	**GENERAL OPEN FORUM:** ***The 2002 "Restoration" – Its Impact and Prospects for Future Testing*** **(and other miscellaneous topics) moderated by Barrie M. Schwortz, STURP documenting photographer and Shroud Science Internet Group member**
11:00 a.m.–11:30 a.m.	***The Tangible Emmanuel: How the Scriptures Shed Light on the Meaning and Presence of the Shroud of Turin*** **by Christopher Knabenshue**
11:30 a.m.	**Closing remarks; End of Conference**

Abstracts

The Shroud: An Eternal Challenge by Rex Morgan (rexhenry@bigpond.com). Thursday, August 14, 7:00 p.m.–8:30 p.m. (Opening address — no abstract submitted)

A Tribute to STURP by Barrie M. Schwortz (bschwortz@shroud.com). Thursday, August 14, 8:45 p.m.–9:00 p.m. (Video presentation)

The STURP Experience by Thomas D'Muhala (tdmuhala@bellsouth.net). Friday, August 15, 8:45 a.m.–9:15 a.m. (Special presentation — no abstract submitted)

The Sudarium of Oviedo: A Study of Fiber Structures by Raymond N. Rogers. Friday, August 15, 9:15 a.m.–9:45 a.m. (Posthumous paper)

VP-8 Shroud Image Analysis, Impact, and History by Peter Schumacher (Ae7c@aol.com). Friday, August 15, 9:45 a.m.–10:15 a.m.

Pia's photographs and VP-8 Image Analysis represent two major moments in Shroud studies.

When Pia developed his first glass plates in 1898, an historic moment in Shroud history was realized. A similarly astounding and historic moment was realized in the 1970's when John Jackson, Eric Jumper, and Peter Schumacher viewed the normally pseudo-three-dimensional results of isometric gray scale projection from a VP-8 analog image analyzer on an XYZ monitor display. As with Pia's discovery, a modern way to view the Shroud image had produced a result not anticipated of the process. Furthermore, the result would have been inconceivable to, and unable to be contrived by, any artist or forger of any era in history related to the origins of the Shroud image itself.

From the efforts of Jackson and Jumper and their colleagues, the 1978 investigations were permitted. The VP-8 processing results and related discoveries have proven to be an acid test for any subsequent postulations concerning image formation and Shroud origin.

Peter Schumacher describes his Shroud involvement from the time he was an installation technician without any knowledge or concern of the Shroud to the present day. The impact of the VP-8 Image Analyzer has been a major part of Shroud studies since the first day one was installed in Colorado Springs in the basement at the home of John Jackson. The history, technology, and impact of the VP-8 Image Analyzer are presented in this paper.

My White Linen* White Paper by Kenneth E. Stevenson (evcov1@frontiernet.net). Friday, August 15, 10:15 a.m. –10:45 a.m.

(Rev 19:8*)

As a graduate of the U.S. Air Force Academy with a BS degree in Engineering as well as a Master's degree in English from the University of Pittsburgh, I was uniquely qualified for my roles as the spokesman and editor for STURP. Furthermore as the 1977 Proceedings of the US Conference of Research on the Shroud of Turin demonstrated, those qualifications served me well in a document that is still recognized as the starting point for much subsequent Shroud research. What is not well known however, is that I was also selected to co-author along with the late Messrs. Robert Dinegar and John Heller what was to have been the definitive book of our research following the three year study of testing results that we obtained in Turin. Instead, in what some have dubbed our "politically correct post-Christian era" there was an attempt to expunge any "Christian" connection from STURP's research in the false hope that such an effort would render the startling results of the research more "acceptable" to the Scientific Community.

For those who may not know a "white paper" in short "…is an article that states an organization's position or philosophy about a …. subject, or a not-too-detailed technical explanation … (that) explains the results, conclusions, …. resulting from some organized committee or research collaboration … Webster's indicate(s) that the term arose … to distinguish short government reports from longer, more detailed ones that were bound in blue covers and referred to as "blue books"… A shorter government publication providing a report or position about something was bound in the same white paper as the text - hence, "a white paper." …In government… is often a policy or position paper.

Therefore my report will be MY own "white paper" with regard to the Shroud of Turin but will touch on the research of STURP from my specific position in STURP. With the loss of so many of the members of STURP over the years and particularly the only others who had been selected by consensus of STURP to write just such a report, I feel that this

conference is the perfect venue for this report. Furthermore it will cover my own personal research for the last thirty-two years.

Like my previous writings on the Shroud I will not shy away from subjects that some may consider "controversial" or "unscientific". In particular the paper will be neither "pistis-phobic" nor "logos-phobic" (from the Greek for faith and Word respectively) as I intend to deal in depth with matters of faith and the Word of God. Finally I will make my own personal attempt to take a reasoned "position" based upon the totality of the evidence rather than to argue from the "lack" of what some might call "proof". Indeed while I think faith would not allow us to find the "smoking gun" of sindonology per se, surely logic and reason can indeed reach a "position" that true science should neither shun nor fear. Sindonlogy itself is a great field entrusted to us and to cite the Apostle Paul we should "… keep that which is committed to (our) trust, avoiding profane and vain babblings, and oppositions of science falsely so called: 1Tim6:20

Visibility of the Shroud Image: An Optical Physicist's Perspective by John Dee German (deegerman@comcast.net). Friday, August 15, 10:45 a.m.–11:00 a.m.

During the 1978 STURP tests on the Shroud of Turin, the author observed an interesting phenomenon: the contrast between the image and the non-image areas of the cloth appears to increase as the distance between the Shroud and the observer (or camera) increases. At very close distances, much of the image is barely perceptible. However, at longer distances, the image becomes more perceptible and the level of discernible detail increases. At close distances, much of the image is barely perceptible. However, at longer distances, the image in general appears darker than the surrounding native cloth and the relative shade difference between the more intense image areas; such as the nose, cheeks, pectorals and knees; and the lighter portions of the image increases. The author, being an optical physicist, formed a hypothesis for the cause of this counter-intuitive phenomenon (longer distance produces increasing perception of detail) based on varying diffusivity of light reflections from the cloth. In this paper, support for the hypothesis is developed analytically and demonstrated with experimental results. Conclusions include a discussion of the implications of these results to other areas of Shroud research.

The Spectroscopy of Various Candidate Processes Associated with Image Formation and Features of the Shroud of Turin Redux (What We Might Have Seen If We Did It Right) by Joseph S. Accetta (joe.accetta@gtri.gatech.edu). Friday, August 15, 11:00 a.m.–11:30 a.m.

This paper begins with a brief review of the spectroscopy of materials and the potential information available from various spectral techniques. The 1978 infrared spectroscopic investigation is briefly discussed and lessons learned followed by a presentation and discussion of the spectroscopic data associated with various theories of image formation including several manifestations of degraded cellulose, blood, pigments and other substances that may be present. The paper concludes with commentary on future investigations including both destructive and non-destructive spectroscopic techniques that may be brought to bear on the chemistry of the cloth.

Digital Image Analysis of the Shroud of Turin: An Ongoing Investigation by Raymond J. Schneider (schneirj@comcast.net). Friday, August 15, 1:30 p.m.–2:00 p.m.

Since the Shroud of Turin is only available for viewing on long intervals at the pleasure of its custodians and is primarily an object of religious veneration, it is difficult to get new materials for study. However, since 1898 and the original photographic work of Secundo Pia a number of high quality images of the shroud have been collected by Enrie, Miller, Schwortz, Durante and others. More recently high resolution digital scanning of such images has made the application of digital algorithms feasible even with relatively modest equipment.

The present work has as its objective the development of a research program to apply comparative analysis to the several images of the shroud that are available. Among the objectives is a program to determine how much information can be extracted not only from the individual images but from comparing the same regions of different images.

Preliminary work will be presented on study of the banding structures (notably those by the sides of the head) extending both horizontally and vertically in both transmitted and reflected light, on segmentation analysis dividing the image into distinct areas based on properties such as color and texture, and investigating the properties of color transformations between digital color representations and transformations between different images taken under different illumination.

Initial results of the various investigations will be presented together with a summary describing the structure of the research program as currently envisioned. Presented work will include: 1) color normalization experiments to explore

band suppression, 2) false color substitution as part of color segmentation experiments, 3) contouring and contrast enhancement of band structures, 4) convolution filtering to identify scourge marks objectively as part of an analytical study of the scourging. Miscellaneous other results may be presented on studies in earlier stages.

A Physical Hypothesis on the Origin of the Body Image Embedded into the Turin Shroud by Paolo Di Lazzaro (dilazzar@frascati.enea.it). Friday, August 15, 2:00 p.m.–2:30 p.m.

The body image of the Turin Shroud has not yet been explained by traditional science so a great interest in a possible mechanism of image formation still exists. Here we present preliminary results of irradiation of a raw linen fabric and of a linen cloth, both uncovered and covered by a thin polysaccharides layer, using distinct Excimer Lasers having different emission wavelengths (namely, 308 nm and 193 nm) and different pulse-widths (120 ns, 30 ns, and 12 ns). We obtained a permanent coloration of linens (both sugared and unsugared) as a threshold effect on the laser beam intensity (energy per unit area per unit time). The coloration can be achieved only in a narrow range of irradiation parameters, which are strongly dependent on the laser pulse-width and on the sequence of laser shots, including time interval between consecutive shots and number of bursts. These results suggest that the coloration may be due to the addition, with different weights, of the ultraviolet induced photochemical effect and of the thermal effect, both acting to dehydrate the linen fibers.

We also obtained the first direct evidence of latent images impressed on linen that appear in a relatively long period (one year) after a laser irradiation that at the moment did not generate a visible image.

The main results (depth of coloration, color distribution, fibers morphology, appearance in cross polarized light, and ultraviolet induced fragility of single yarns) are compared to the characteristics of the Turin Shroud, commenting the possibility that a burst of directional ultraviolet radiation may have played a role in the formation of the Shroud image.

Shroud Coins Dating by Image Extraction by T.V. Oommen (tvoommen29@bellsouth.net). Friday, August 15, 2:30 p.m.–3:00 p.m.

This paper describes the results of image extraction of the eye areas of the Shroud image, carried out by a Pilate Coins expert using photo image extraction techniques. The image used was a high resolution color image of the Shroud face. The right eye image shows an auger wand and the letters OY KAI AROS, and the left eye image shows the auger wand and the letters TIBERIOU. Obviously, both coins were issued by Pontius Pilate AD 30-31 and a good coin should have the complete set of letters, TIBRIOU KAICEROS. The obverse side could have either LIZ (year 17) or LIH(year 18) from the accession of Tiberius which would be equivalent to AD 30/31 It could be argued the coins were minted in AD 30, hence a case made for an AD 30 Crucifixion date. However, if we look for Good Friday on Nisan 15, we find that only AD 33 calendar can be used, and Nisan 15 falls on April 1, AD 33. In AD 30, Nisan falls on April 4, a Thursday. Christ's earthly life lasted 33 ½ years, and if we count back we arrive at a Nativity date in September, 2 BC. The latest astronomical calculations on the appearance of the Star of Bethlehem (a planetary conjunction) give a date of Sep 27, 2 BC. This date can be supported by other recent findings on the date of Herod's death. These items are elaborated in the article with supporting documents and extracted color images.

Revisiting the Right Eye Image: What Is It? by Dr. Alan and Mary Whanger (adw2@acpub.duke.edu). Friday, August 15, 3:00 p.m.–3:30 p.m.

One of the most controversial ongoing issues in Shroud research has been what the object (if any) is over the anatomical right eye of the Man of the Shroud. If it is a coin, as many have contended, many questions and objections arise: how can it be identified; what is the nature of the formation process; why would a coin be placed over the eyes of a dead Jew; when was it first noticed; what scientific studies have been done; if it is an image of an identifiable coin, what are the implications for better understanding the nature and the mystery of the Shroud?

While the studies on the coin image are not new, most have not seen a comprehensive presentation of the issue, or some important photographs obtained by the late Fr. Frank Filas, and which we will show. Filas originally noted the appearance of the image on high grade enhanced positive and negative photographs which he had made from first generation copies of the original 1931 Enrie negatives. Some studies led Filas to believe that there is an identifiable image of a Pontius Pilate lepton (prutah or "widow's mite") coin over the right eye.

Having heard about his work and having recently developed our polarized image overlay technique for detailed image comparison and analysis, I contacted Filas in 1981. He promptly sent us important photographs from his studies, and we were able to show in our overlay examination that a lepton coin that Filas had been given is a die-mate of the one that formed the image.

Filas undertook extensive work and consultations to deal with the numerous criticisms and complaints about his work. On observing the overlay of the Filas lituus lepton coin and the Shroud image, Dr. Alan Adler noted that the image is characteristic of what would be expected from corona or electrostatic discharge from the coin. Some of the additional research studies are little known and this evidence will be presented.

We feel that there is an identifiable Pontius Pilate lepton coin of the "Julia" type over the anatomic left eye, but it is much less clear and we will not discuss it.

We will also present the historical use of coins over the eyes, and show early artistic iconic representations of the coin outlines even if their nature was not known.

We wish for the attendees to have an opportunity to view the evidence for themselves.

Aspects of the Shroud in Botany and Related Art by Dr. Alan and Mary Whanger (adw2@acpub.duke.edu). Friday, August 15, 3:30 p.m.–4:00 p.m.

The floral images on the Shroud are very subtle, being faint, fragmented, partial, and embedded in a clutter of other images. They were first written about in 1983 by Oswald Scheuermann, a German physics teacher, with whom we had already been in collaboration about images on the Shroud which have characteristics of corona or electrostatic imaging. I looked at several of our many high-grade positive and negative photographs of the Shroud mostly made from the first generation copies of the Enrie negatives which were in the possession of Father Frank Filas. I did not perceive floral images at that time, but in 1985 I first noted a definite flower image, and then, knowing what they appeared like, I began to perceive many more. I obtained the definitive botany books of Israel, and over the next four years gradually tentatively identified 28 different varieties of flower images. The 1988 carbon dating disaster precluded being able to get any of these findings into the media. In 1995 on a trip to Israel, we were able to show some of the photographs to Dr. Avinoam Danin, Professor of Botany at Hebrew University, who immediately recognized the imaged flowers and knew that they grew in Jerusalem. That began a fruitful ongoing collegiate relationship. Danin confirmed many of our initial findings and has made several more himself.

Many have not seen the remarkable detail of the images on the Shroud, and so we propose to demonstrate several of these by using our polarized image overlay comparison technique to show some of the details which help us to identify the various floral images, usually to the very species. Tabulating various botanical details enables us to show that the Shroud images originated in the immediate vicinity of Jerusalem during the month of March or April. We will demonstrate how the appearance of the imaged flowers enable us to determine the approximate time that the image was formed after death (30 to 36 hours), and even the time of day that some of the flowers were picked (between 3 and 4 in the afternoon). The botanical images, which include several thorns and thistles, give us a much more graphic idea of events associated with the crucifixion and the entombment, as well as important evidence about aspects of the image formation itself. There is also a significant correlation between the identified floral images and the pollen grains identified by Dr. Max Frei on the sticky tapes that he took from the Shroud in 1973 and 1978.

Examining early art works based on the Shroud facial image shows in a number of cases that the floral images were subtly expressed in portraits in the Roman catacombs possibly as early as the third century, and clearly in icons in the sixth century and coins in the seventh century. This indicates that the images on the Shroud were much more distinct in the early centuries, and of course refutes the notion that the Shroud is a medieval European artistic production.

The botanical studies thus provide important data to help us better understand and appreciate the complex nature and implications of the Shroud of Turin.

Body Image Formation Hypotheses Based on Corona Discharge: Discussion by Giulio Fanti (giuliofanti@tiscalinet.it). Friday, August 15, 4:00 p.m.–4:22 p.m.

A paper entitled "Body Image Formation Hypotheses Based on Corona Discharge" was presented at the Dallas conference on the Turin Shroud (TS) in September 2005 and published at www.dim.unipd.it/misure/fanti/corona.pdf. It contains different hypotheses, experimental results, and comments. At the end of the conference and during the discussions developed from the Shroud Science Internet Group, some questions pushed the author to write the present paper with the aim to clarify some aspects.

After a presentation of the main points discussed in the previous paper relative to Coronal Discharge (CD), some new evidence will be presented and discussed. For example, some obscure facts, such as the lack of corresponding image of some bloodstains (hair and knees on dorsal image and feet on frontal image) or the excessive redness of the bloodstains (in agreement with another paper G. Goldoni presented in the congress) are discussed in the light of the corona discharge hypothesis.

The paper focuses then on the following points in discussion on CD also furnishing explanations that confirm the proposed mechanism as the responsible one of the TS body image formation.

- The radiation effects are almost orthogonal to the skin.
- The resolution of the resulting CD images is coherent with the TS even over relatively long distances.
- The relationship of body-cloth luminance intensity is duplicated in CD in two different ways depending on the selected hypothesis.
- The field intensities necessary to generate a discharge vary with ambient conditions (ionization) and with the particular phenomenon involved, such as external electric field due to a ball of lightning or to an earthquake or to an internal electric field.
- Areal density and striations of image are well reproduced by CD.
- Superficiality of the image is also reproduced by CD even if only electrical effects are involved.
- CD did not degrade the bloodstains because the radiation was sufficiently brief and the involved temperature was sufficiently low.
- CD well explains why the cloth was in two different configurations; rather, following one of the proposed hypotheses, it postulates those two different positions (in partial agreement with B.A. Power). In fact, following the law "PV = kT", the rapid increase of temperature (T) in correspondence of the air between corpse and cloth due to the energy emission caused a pressure (P) and volume (V) variation, which were the explanation why the cloth moved (flattened).

An additional hypothesis that explains the mechanism involved in the body image formation with CD is proposed at the end: perhaps involved in the body dematerialization, an electric field was generated by neutrons that came out of the body. These electrons were attracted by the linen fabric following the standard patterns ruled by a normal electric field, and they interacted with the linen fibers. The fibers acted like "optical fibers" or "light pipes" (in a manner first proposed by K. Moran) and let the electrons generated by the corpse run along their length, not as supposed by K. Moran "in" the fiber but "outside" it along the thin external layer composed of polysaccharides. Some colored fibers are posed side-by-side to non-colored fibers, because they were not interested by an electron interaction (because of a bit more distant from the electron source).

NOTE: Someone classifies as non-scientific some work that makes reference to the "supernatural" events, like the dematerialization. This can be true in some cases, but in the present work some facts are only considered and discussed; the hypothesis of a "particular event" directly results from the explanations of these considerations. This can not be a priori excluded from the analysis because for the moment the only complete explanation of them requires a reference to a "supernatural" event.

Resolution of Images Obtained Without an Acquisition System Using MTF by Giulio Fanti (giuliofanti@tiscalinet.it) and Roberto Basso (roberto.basso@unipd.it). Friday, August 15, 4:23 p.m.–4:45 p.m.

This paper proposes an extension of the traditional evaluation of the modulation transfer function (MTF) curves made in photography. Normally the analysis is made knowing subject, acquisition system, and output image, but in this paper the same approach has been used also in the case in which the acquisition system is not well-defined. In addition the analysis has been extended in the case when the input is not well-known, if a relatively low quality of the result is accepted. This last approach has been applied to the Turin Shroud (TS) image and to other images to determine the corresponding resolution.

The method is at first applied when only the acquisition system is not well-defined as in the case of images of objects obtained from fabrics exposed to gas diffusion. Then the method is applied when the input is also not well-known as it is in the case of the TS. In such case both the TS face and hands have been analyzed and the input image was defined as the means of these body parts photographed using similar subjects. In this case the face and the right hand of the TS are studied underlining the relatively high resolution of such images in comparison with other examples.

In the first case of a photograph taken into consideration, the MTF curve of an image (obtained by R. Rogers), produced by chemical reaction of gas emitted by ropes, shows that the corresponding resolution at the 5 percent of

the MTF is 9±3 mm. In the case of the TS the resolution of the images reaches 4,9±0,5 mm at the 5 percent MTF value confirming the results of previous studies (those of J. Jackson for example) made in a more subjective way. The method was also applied to examples of images obtained by gas discharge visualization (GDV) that are generated using coronal discharge.

A process analogous to GDV is supposed by many researchers to be responsible for the TS body image. As the resulting resolution of GDV images of 5,3±0,3 mm is compatible with that of the Shroud images, this results is a further confirmation of the possibility that the coronal discharge process was involved in the TS image formation.

From the comparison of the MTF curves relative to the TS images with those typical of optical systems, it results in an anomaly at the low spatial frequencies that clearly presents values less than the unity in the MTF plot. The evident peak at spatial frequencies of about 30 m-1 in the TS images corresponds to spots of about 33 mm. If verified with future studies, this data would set a new interesting characteristic of the TS image: the "acquisition system" should be characterized by the fact that spatial frequencies around 30 m-1 are better represented than the others and therefore the "acquisition system" generated spots of the order of 33 mm. This could be a help for the understanding of the body image formation mechanism.

These results, in reference to the studies on the possible formation mechanism of the Shroud image not yet completely known to the science, are in favour of a radiative phenomenon coming from the inside of the body wound in the TS; they are contrary to the diffusive hypothesis as a principal cause of image formation, and they open a new possibility of comparison with the GDV technique.

These results are also discussed in terms of smooth surface effects, object-sheet distance effects, resolution of small areas, such as those obtained by means of CD experiments, and those where coins are supposed to be on the TS.

Statistical Analysis of Dusts Taken from Different Areas of the Turin Shroud by Giulio Fanti (giuliofanti@tiscalinet.it) and Roberto Basso (roberto.basso@unipd.it). Friday, August 15, 4:46 p.m.–5:08 p.m.

In 1978 and 1988, Giovanni Riggi di Numana aspired some dusts from the back of the Turin Shroud (TS) and sampled them in various filters. Some analyses have been done at micrometric levels on these dusts using a Scanning Electron Microscope (SEM) and other instruments, but these analyses were principally oriented for conservation problems.

Up to now, a description of the dust's composition and a statistical analysis of their content have not been published. For this reason, the authors have decided to study the composition of the dusts coming from five different areas of the back of the TS, considering the following material relatively easy to be detected with a petrographic microscope: 1.) cotton fibers, 2.) TS fibers, 3.) Holland cloth fibers, 4.) TS fibers coming from fire zone, 5.) red fibers, 6.) blue fibers, 7.) other fibers, 8.) red-brown particles (blood-like), 9.) red-live particles, 10.) yellow-red heads particles, 11.) opaque particles, and 12.) other.

The TS fibers have been recognized from the others by using a proper cross-polarized light. A statistical analysis of dusts samples has been performed in relation to the following filters:

- filter "e" corresponding to the hands area (1978 sampling);
- filter "f" corresponding to the area of the face (1978 sampling);
- filter "g" corresponding to the area of the feet (1978 sampling);
- filter "h" corresponding to the area of the glutei (1978 sampling);
- filter "i" corresponding to the area of the C-14 (1988 sampling).

To perform the analysis each one of the five samples has been subdivided in three or four sub-samples and a separate evaluation was performed: the selected fibers had diameters greater than 5 micrometers and the rounded particles a diameter greater than 3–4 micrometers. The results of the statistical analysis are plotted in histograms similar to that reported here below.

The different distribution of the fibers in the various filters shows the relative difficulty of remixing dusts between TS and Holland cloth; in the case of more rounded particles, a greater capability of remixing is found instead.

Apart from the cotton fibers probably coming from the filters support that have been therefore excluded from the statistical analysis, about eight fibers out of 10 result from the TS.

In sample "f," only one darker fiber similar to the TS body image has been found in agreement with the hypothesis of the double superficiality of the body image in correspondence to the face (www.sindone.info/FANTI.PDF). This is because it is not easy to suppose that an image fiber passes through the fabric thickness. Only one fiber is not so meaningful but future analyses could confirm this fact.

This study is useful for the knowledge of the contents of the filters containing TS dusts and for future analysis on this material because it is now possible to know which material is contained there and how much is in it. A future development could be addressed to the statistics of particles smaller than 3–4 micrometers.

Scourge Bloodstains on the Turin Shroud: An Evidence for Different Instruments Used by Barbara Faccini (fccbbr@unife.it). Friday, August 15, 5:09 p.m.–5:29 p.m.

Among the numerous bloodstains on the Turin Shroud, those traditionally ascribed to scourging have always been grouped together without distinction. The scientific exams of these marks began in the first half of the last century (Vignon 1939) and went on until recent times, led mainly by doctors and forensic pathologists (examples: Larato 1984, Baima Bollone 1999, Zugibe 2005).

G. Ricci made a systematic visual study of the scourge marks on a 1:1 scale copy of the Shroud obtained from Enrie's 1931 photographs (which were made with an orthochromatic film in order to enhance all details). He concluded that the Shroud man was scourged by two executors (one on each side of the body) with a similar instrument, identified as the roman "flagrum," a whip with three leather straps having dumbell-shaped metal extremities with spiky spheres (Ricci 1989).

However, thanks to enhancements and graphic elaboration of Judica Cordiglia's 1969, Durante's 2000, and Miller's UV photos, three different types of "scourge" marks can be envisaged.

The first type is found on the whole surface of the double image and can actually be associated to the kind of flagrum already mentioned. It is characterized by two blood circlets (where the sheet has been more soaked) connected by a much lesser evident bloody line.

The second type is present mainly on the lumbar region, on the back of the thighs and on the chest. It has a wider shape and is more evanescent with respect to type 1. At higher enhancement and contrast, it appears to be formed by three parallel blood lines that fade into serum.

The third type is very faint and detectable on the lower part of the calves. It is a kind of fan-shaped scratch. A graphic elaboration and comparison between the three types of scourge marks will be realized in order to show if these blood traces can be all attributed to the same whip or to different kinds of instruments.

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What Went Wrong with the Shroud's Radiocarbon Date? Setting It All in Context by Paul C. Maloney (paulcm36@gmail.com). Saturday, August 16, 8:45 a.m.–9:15 a.m.

The author provides a brief synopsis of the actual radiocarbon dating project along with reference to its earlier roots including the author's own background role. In the aftermath, beginning in 1989, numerous proposals were offered by international researchers to try and explain "What went wrong?" These are summarized. Those various probes culminated in the chemical and physical analysis of original Shroud threads from the so-called Raes Corner by Ray Rogers which shed much needed light on the nature of the sole source of the radiocarbon sample. The author includes comments and observations about the past and about where we go from here. The paper embraces some discussion regarding one of the proposed image mechanisms and how a new radiocarbon dating project may be designed to simultaneously test that proposal as well as the age of the cloth.

Invisible Mending and the Turin Shroud: Historical and Scientific Evidence by Joseph G. Marino (JMarino240@aol.com) and M. Sue Benford (MSBenford@aol.com). Saturday, August 16, 9:15 a.m.–9:45 a.m.

One prominent theory regarding the results of the 1988 Carbon-14 (C-14) dating of the Shroud is that the sample area had been repaired with a patch or "invisible reweave," thus producing a dating resulting from a combination of 16th century and first century cloth. This paper recounts the initial doubts about the validity of the C-14 results; the history behind the patch theory; the abundant historical and scientific information support of the theory, especially from the findings of the late Ray Rogers in his paper published in 2005 after his direct examination of the C-14 samples compared with other samples from the main cloth; independent confirmations of Rogers' findings; criticisms of Rogers' findings; and refutations of these criticisms. The authors conclude that the invisible reweave is the most reasonable explanation for the dating of the Shroud.

Surface Chemical Analysis of the Shroud of Turin Identifies Discrepancies in Radiocarbon Dating Region by M. Sue Benford (MSBenford@aol.com) and Joseph G. Marino (JMarino240@aol.com). Saturday, August 16, 9:45 a.m.–10:15 a.m.

Recent research reported new evidence suggesting the radiocarbon dating of the Shroud of Turin was invalid due to the intrusion of newer material in the sampling area. This evidence included the detection of anomalous surface contaminates in specimens from the sampling area. This paper reports new data from an unpublished study conducted by the Shroud of Turin Research Project (STURP) team in 1978 that supports the above-referenced research findings. Additionally, this paper reports evidence supporting the identification of replacement material in the Carbon-14 (C-14) sampling region along with previously unreported radiographic findings, corroborative textile evidence from the adjacent "Raes" sample, blinded-expert analysis of the Zurich laboratory C-14 sub-sample, independent microscopic confirmation of surface contaminates in Holland cloth/C-14 region, and historical restoration information. Based on these new data, the authors conclude that the radiocarbon sampling area was manipulated during or after the 16th century and that further testing on the Shroud is warranted.

Special presentation - to be announced. Saturday, August 16, 10:15 a.m.–10:45 a.m. (Abstract to be handed out at conference)

SEM-EDXA Analysis of Red Particles Removed from the Underside of the Turin Shroud in 1988 by Ryan L. Parr (Ryan.Parr@genesisgenomics.com), Brian Reguly, Allan MacKenzie, D. Andrew Merriwether, M. Sue Benford (MSBenford@aol.com), Piero Baraldi, and Giulio Fanti (giuliofanti@tiscalinet.it). Saturday, August 16, 10:45 a.m.–11:15 a.m.

SEM-EDXA was used to evaluate the chemical composition of selected material, named "Red Particles," which was removed from the underside of the Shroud of Turin in 1988 by G. Riggi di Numana, an area in proximity to the sample cut for the C-14 analysis (a corner near the left foot of the frontal image).

In particular, this sample of "Red Particles," was removed from filter "i," which is conserved in the archive of Fondazione 3M of Milano-Segrate (Italy). G. Riggi di Numana removed samples from the filter with a "sticky tape" technique. From the sticky tape, Giulio Fanti selected "Red Particles" indicating the potential presence of blood using cross-polarization and UV light followed by a Raman technique.

Finally, the sample was provided to Ryan Parr for DNA analyses; however, the minute sample was inappropriate for DNA work due to its limited cellular content. Alternatively, the material was subjected to SEM-EDXA.

This paper compares the results obtained for the "Red Particles" in terms of cross-polarization, UV light, Raman spectra, and SEM-EDXA plots.

Results indicate that the sample contains elemental iron as well as both sodium and chloride. These results are consistent with those of Giulio Fanti, which are not inconsistent with the presence of both blood and sweat.

A process for DNA analysis of this type of material from the TS will be presented, including recommendations for the amount of blood cells required for successful analyses. The various types of data available through DNA science will also be discussed. Finally, a research outline will be proposed.

Neutron Radiation Effects on Linen Fibers and Consequences for a Radiocarbon Dating by Francesco Barbesino (fra.bar@libero.it) and Mario Moroni. Saturday, August 16, 1:15 p.m.–1:45 p.m.

Many hypotheses have been done to interpret the dubious results of the 1988 radiocarbon dating of the Turin Shroud. Among them, those of 1.) J. Marino and 2.) R. Rogers who suppose a Middle Age patching, that of 3.) M. Alonso who supposes the sample substitution, and that of 4.) J.B. Rinaudo who hypothesizes a proton radiation responsible of the body image formation coupled with a neutron radiation responsible for a rejuvenation of the linen must be considered.

In the view of this last hypothesis, the authors, also supported by 5.) Phillips' results, have studied the influence of the cleaning pre-treatment techniques on the result of the radiocarbon analyses using irradiated linen samples of an Egyptian mummy.

In particular, they studied the possible contamination effect of a neutron radiation acting on linen fibers of a second century B.C. fabric, also considering the fact that it is not simple to change the chemical structure of the pure cellulose resident in the fiber's core.

Supposing that the chemical change of the linen fibers irradiated by neutrons takes place principally in the external layers of the fibers (those composed of lignin and pectin), the authors made the following experimental test.

They radiocarbon dated many samples cut from an Egyptian Lyma mummy of the Lyon Museum of Textiles.

Before performing the analysis, in order to remove all the contaminants, they used increasingly severe cleaning pretreatments. The C-14 content decreased with the increasing severity of these pretreatments. The result changed from 590 50 years BP with a yield of 85 percent to 1750 50 years BP with a yield of 10 percent.

These results confirm that the neutron contamination principally acts on external layers of linen fibers and that a cleaning procedure, able to only leave the inner cellulosic core, allows for a quite reliable radiocarbon dating.

These results are discussed in light of the 1988 results of the Shroud sample.

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A Global Forensic Analysis of the Elements of the Shroud of Turin: Compatibility Between the Evidences of Vitality and the Absence of Signs of Death on the Cloth by Dr. Miguel Lorente (miguellorente@supercable.es). Saturday, August 16, 1:45 p.m.–2:15 p.m.

The hypothesis about surviving the crucifixion is not new. Most of these theories were based on isolated or few data that were taken as the key to interpret the rest of the signs. The global forensic analysis puts together the analytical and scientific data with other data (historical, documental, …) to obtain a conclusion about the meaning of the information and the compatibility with the classical positions regarding this topic: the one that supports that the body was dead and the other one explaining that it was alive.

Our work gets to the conclusion that the signs found on the Shroud of Turin are compatible with the fact that the person covered by the cloth was alive. We support this conclusion with two groups of data:

1.) ABSENCE OF SIGNS OF DEATH:

- The image shows stiffness, but the pattern doesn't fit the laws and features of cadaveric stiffness. There is not a correlation between the theoretical time after death and the distribution of stiffness, especially if we considered its irregular distribution in the different parts of the body (some joints are stiff and some others are not at the same time as a muscular contraction). The incompatibility with a dead body is more evident if we considered some other factor, such as the Brown Sequard Law.
- The presence of wounds in the hypostatic zones of the body should give a different pattern in the image and blood stains in the dorsal representation. The dorsal part of the body is full of wounds; in a dead body, blood would accumulate in the hypostatic parts that would produce a hemorrhage through the wounds in the back with a completely different pattern in blood stains and image.

2.) PRESENCE OF EVIDENCES OF VITALITY:

- Blood stain pattern: Both the features of the stains (location, distribution, length … especially the ones from the nail wounds) and as the signs of clot retraction indicate physiopathological processes related to life.
- Hand position in the image with no visibility of the thumbs is compatible with metabolic alterations (hypocalcaemia) due to a traumatic shock: This process is only present in a living person and disappears after death.
- Muscular stiffness is explained by the same physiopathological process related to the traumatic shock better than by the cadaveric phenomena.

Our study and interpretation of the data reach an integral explanation of the individual elements that can integrate many of the partial and isolated elements and, consequently, analyse the events and meaning of the facts from a global perspective that can approach the classical positions regarding this topic.

The Death of the Shroud Man: An Improved Review by Barbara Faccini (fccbbr@unife.it). Saturday, August 16, 2:15 p.m.–2:45 p.m.

The death of the Man of the Turin Shroud (TSM) has been supposed for thousands of years, since the Shroud appeared in Lirey in 1356 A.D. In the second half of the last century, however, the hypotheses of the survival of the TSM have been formulated by Kurt Berna and re-examined by K. Herbst, H. Kersten, and E. Gruber in 1992 and, more recently, by H. Felzmann and Miguel Lorente (Felzmann 2002, 2005; Lorente 2007). They based their claim on mainly the opinion of the forensic pathologist professor W. Bonte from Düsseldorf, who proposed an apparent-death status for the TSM from his preliminary observations and conclusions on amount of blood, bloodstain patterns, and absence of rigor mortis.

Most medical experts, however, agree that TSM was already dead when buried, because of the severity of injuries and the presence of post-mortem stiffness as deducible from the characteristics of the double image (Barbet 1954; Baima Bollone 1992, 1994, 2000; Zugibe 2005).

In 2000 Basso et al. published a study on the compatibility of the frontal and dorsal images with a real human body. A computerized manikin was moved in order to obtain the correspondence between its anthropometric points and that of the sheet. It resulted that both images are compatible with the wrapping of a man 175 + 2 cm tall having a position similar to that of a crucified man. In particular the asymmetrical bending of knees, the unnatural bending of ankles leading to an almost flat position of the right footprint, and the absence of flattening in the buttocks area (typical of a lying subject) are only compatible with an extreme rigidity in a human body. Rigor mortis is universally considered as a sign of death.

The severity of wounds and especially that of the chest is a reasonable proof of death. Bonte, looking at a small photograph of the Shroud, interpreted the "considerable" amount of blood coming out of the spear wound as a sign of blood circulation activity not yet terminated in the grave, but he did not take note of the separation between the serum and the red blood cell rich part of the blood poured out from the chest.

The shape of the wound is consistent with the damage of a sharp-pointed tool, and the consequent bleeding is explained by the cutting of deep structures (lungs and eventually heart), with consequent entry of air in the pleural cavity, incompatible with life (Baima Bollone 1994).

The trajectory of the spear has been experimentally traced by Coppini (1987), demonstrating how the point of the spear, penetrated between the IV° and V° rib, reached the right atrium of the heart after a route of only 8–10 cm.

This kind of blow, probably inflicted as verification of death, is sufficient to guarantee the death of the TSM. The paper will enter in the details showing why it is reasonable to conclude that the TSM was enveloped as a corpse in the Shroud.

The Shroud of Turin, the Holographic Experience by Petrus Soons (petrussoons@yahoo.com). Saturday, August 16, 2:45 p.m.–3:15 p.m.

My presentation summarizes work connected with digitalizing Shroud photographs taken by Giuseppe Enrie in 1931, enhancing the digitized images to improve details, translating the enhanced images' grayscale data into depth data, generating a sequence of up to 625 images of each of these, and combining these images with a holoprinter to produce 3D images (holograms) of the Shroud. It also summarizes my study of these holograms and discovery of heretofore unseen details, which confirm many previous findings and reveal some surprises.

Botany of the Shroud of Turin: An Addition Concerning New Information by Avinoam Danin (danin@vms.huji.ac.il). Saturday, August 16, 3:15 p.m.–3:45 p.m.

During February 2007 I was first exposed to the holograms of the Shroud. I started corresponding by e-mail with Dr. Petrus Soons who had had them made. In his visit to Jerusalem during September 2007, he explained to me some basic principles of his 3D approach, including the observation of Mr. Bernardo Galmarini, the Argentinian computer expert who deals with the conversion of 2D information into 3D. Mr. Galmarini had prepared the files needed to form the anaglyphs and the holograms displaying the 3D images of the Man of the Shroud, and he could not find on the Shroud's photograph some 3D information which is needed for forming the complete 3D image of the head and other parts. In his 3D image of the head there are deep holes or depressions in the forehead and in the left cheek.

Dr. Soons recalled that he had seen in the Whangers' book about the Shroud a photograph showing my drawings of flowers seen at the "depressions" areas. During our mutual visit in November 2007 in Raleigh-Durham, North Carolina, we looked at many of the photos of the Shroud made by the STURP team in 1978. In 1995 I had seen the plant images

on photos made in 1931 by Enrie. Now I saw again the flowers on photos made in 1978 by Vernon Miller. Since I discerned the same flowers in the same places in photos obtained by two totally different methods, I can conclude that I saw real images and not artifacts interpreted as flowers through my imagination. Thomas D'Muhala assisted us in the work at his home on a few of Vernon Miller's UV photographs that we selected in November.

I counted more than 300 flowers that resemble in size and morphology those of Matricaria sp. or Anthemis sp. Although the correct botanical term of the "flower" of a plant of the sunflower family is "a flowering head" or "capitula", let us use "flower" to simplify. In order to place the ca. 300 flowers as they are seen in the photo, those who prepared the body of the Man of the Shroud for entombment had to remove the peduncles and stems and place them individually in order. It was not a casual distribution in this part of the Shroud.

These new observations raise some important questions about the image-formation process.

An additional progress since our previous publication (Danin et al, 1999) is the discovery by Alan and Mary Whanger and me of 4 capitulae of Carduus sp. and 3 spines of Rhamnus lycioides. These are assumed to be part of a "crown of thorns" as communicated in CSST NEWS in March 2006.

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Ancient Edessa and the Shroud: History Concealed by the Discipline of the Secret by Jack Markwardt (minpin05@verizon.net). Saturday, August 16, 3:45 p.m.–4:15 p.m.

The Mandylion Theory, by which Ian Wilson attempted to link the earliest history of the Shroud of Turin with ancient Edessa, was grounded substantially upon various permutations of the Abgar Legend, all of which dated the conversion of that city to the post-Crucifixion years of the first century. The best modern authority on Edessa has labeled the legend as one of the most successful pious frauds of antiquity and the weight of historical evidence clearly supports the conclusion that Edessa was evangelized during the late second-century reign of Abgar the Great; however, a satisfactory identification of the circumstances under which this pagan king permitted Christianity to be preached in his kingdom has never been made.

In this paper, the author describes an ancient Church custom, known as the Discipline of the Secret, which dictated the content of all clergy-authored writings during the early centuries of Church history and, by applying the principles of this practice, seeks to resolve the historical inaccuracies of the Abgar Legend, identify the missionaries who brought Christianity to Edessa and baptized its king, and confirm the critical role played in that historic event by the Shroud of Turin.

On Besancon and Other Plausible Theories for the Shroud During the Missing 150 Years, 1204 to 1355 by Daniel C. Scavone (dcscavon@insightbb.com). Saturday, August 16, 4:15 p.m.–4:45 p.m.

History proceeds from documents, not arguments from silence. Besancon claimed to have the TS during the missing 150 years. No other hypothesis mentions a shroud. Templar scholars (KT) (Reinach; M.Barber; Parent; Frale; Rolland) deny their possession even of an idol — introduced into their trial by the inquisitors themselves. Every KT description was different. None said the idol was on cloth. Descriptions of an idol were given by brothers not present at secret KT meetings where the idol was allegedly worshiped. No path is documented for a shroud from Constantinople to the KT or from KT to Geoffroy de Charny.

The Smyrna hypothesis has been disproved as originating from the false transmission of Pingon (1581) by duTeil in 1902. Again, no Smyrna primary document mentions a shroud. See Shroud.com (Scavone).

The hypothesis that the TS was in Paris already in 1247 forgets that the object that came to Paris and mentioned in inventories until 1791 (!) was still in all that time called "sancta toella in tabula inserta" — while the TS had long been known everywhere as a full-length cloth.

Besancon alone claims to have had Jesus' Shroud. Its claims rest on two documents from 1205 (Theodore of Epirus) and 1208 (Nicholas of Otranto) placing the Constantinople shroud with Othon de la Roche of Burgundy, who received it (1205) in the Fourth Crusade along with the fief of Athens. Another document of 1219 (DeGail; Longnon) provides an

occasion when Othon's shroud may have been sent home to Burgundy with the trusted Pons de Chaponay, or Othon himself brought it when he returned home ca. 1225. The Besancon shroud was kept in St. Etienne church until it was thought to be lost in the fire of 1350.

Geoffroy de Charny, first owner of the Turin Shroud, did not have the Shroud when he founded the Lirey church in the 1340's. In 1354 he received permission to place a cemetery by the church in Lirey and to be buried there. His possession of the Shroud may be the reason (Crispino; Chevalier). About that time he wed Jeanne de Vergy from Besancon. Note that Burgundy, whose sometime-capital was Besancon, straddled the German Holy Roman Empire and France. The Vergys were among the pro-French party. My hypothesis holds that Jeanne, descended from Othon, with a hereditary right to ownership, brought the Shroud, thought to be "lost" in the fire, to her marriage, thereby saving it for France. The king received it (Malijay) and gifted it back to her and her husband (already the king's honored porte d'oriflamme) for his new church at Lirey. Besancon thus explains how the ever-silent Geoffroy acquired it and why he was silent about it.

At Lirey an artist did fashion a copy (as the d'Arcis Memorandum asserts), and this copy was sent to Besancon about 1377–78 (Chifflet) and foisted on the people as the return of the original. This was possible since by 1378 anyone who could recognize the original was dead. The present bishop, Guillaume de Vergy, relation of Jeanne (!), "proved" it was the original by placing it on a corpse and reviving it (!). This is suspicious as a possible family conspiracy. But still, believing the "miracle," Besancon did not demand the return of its original Shroud, by now firmly embedded in Lirey. The copy was eight-feet long, frontal only, and obviously painted (See image in Chifflet.).

Sindonologists have spent pages to easily refute this copy made from the original Lirey Shroud (Vignon), but they have not refuted Besancon's original, which ca. 1354 had gone to Lirey. Besancon's entire ecclesiastical archive was burnt in the fire of 1350 and again by revolutionaries in 1794. Today, only inventories exist going back only to 1412 (Besancon archivist Gauthier). Nothing survives regarding the arrival of the Shroud from Athens, but the Shroud's possible box (Bergeret) and Othon's tomb, both in Besancon, reinforce my case.

Besancon alone has documents showing even an awareness of the Shroud in its mysterious 150 years, and it explains in the most economical way what happened to the Shroud after Robert de Clari says in 1204 that nobody knew what happened to it. A path of possession is thus documented for the Shroud from Constantinople to Geoffroy de Charny.

Was Sixth-century Desertification a Factor in the Transfer of Relics from Palestine? by Diana Fulbright (sindon@globalweb.net). Saturday, August 16, 4:45 p.m.–5:10 p.m.

This paper examines the possible connection of a sixth-century climate change in Jerusalem and the Dead Sea area, with severe societal impact, to removal of relics -- specifically the Sudarium of Oviedo and the Shroud of Turin -- from the region around that time.

Numerous paleoclimatic studies involving geology, hydrology, palynology, seismology, meteorology, archaeological remains and historical evidence indicate that the Dead Sea region, verdant from about the first century B.C., became desert rather abruptly in the sixth century.

The mid-sixth century is important in establishing the provenance of the Shroud. Iconography possibly reflecting the facial image on the Shroud is indisputably dated to that time -- in particular the Emessa Vase, now in Musée de Louvre, Paris, and the encaustic Pantocrator of the Monastery of Saint Catherine at Mount Sinai. In the late sixth century, reference to the "Image of Edessa" (adduced as the same cloth now known as the Turin Shroud) appeared in the historical record. The Sudarium is said to have been removed from Jerusalem in the early seventh century. Thus, the drastic environmental changes of the sixth century, with resulting social dislocation, may support the posited timelines of transfers of the Shroud and the Sudarium from Palestine.

In view of the extremely arid climate of the Dead Sea region in modern times, one may wonder if this could really have been a thriving agricultural area 2,000 years ago. In fact, archaeological and palynogical evidence confirms that it was. It has been observed that in marginal desert areas, even minor climatic changes can result in dramatic environmental changes.

A Note on "the Servant of Peter" by Diana Fulbright (sindon@globalweb.net). Saturday, August 16, 5:10 p.m.–5:30 p.m.

The question is: did the Gospel of the Hebrews say (according to Jerome, in his De Viris Illustribus 2), "Now the Lord, when he had given the linen cloth to the servant of the priest, or is a restoration to an alternate reading: " . . . to the servant of Peter" more plausible?

The argument for this alternate reading rests on an untenable substitution of Latin words for Hebrew words. One such suggestion follows:

"Since the Hebrew consonants for servant or slave are "ebed"... and "cohen" for priest, they are closely related to the Hebrew "kepha" for Peter and "yochanan" for John. This would be in total agreement with what Paul tells us in that, after the Resurrection, Jesus was first "seen of Cephas" (Peter). It also agrees with John's Gospel account of Peter and John having found the linen clothes lying in the empty tomb."

Another suggestion is that the vowels, not the consonants were responsible for the scribal error.

However, the emendation for the alternate reading would have to involve "Peter" replacing the "servant", not the "priest" – i.e., "Petro" instead of "puero" (Latin for "servant").

Jerome's quotation (or paraphrase) from the Gospel of the Hebrews reads: "But the Lord, after giving the burial shroud to the priest's servant, went to James and appeared to him." To substitute "Peter" (Latin "Petro") for "servant," (Latin "puero") the text would read, "the priest's Peter," making no sense at all!

Regarding the consonants: They would be:

slave/servant ("ebed")	Y-B-D. (Y=ayin)	דבע	
priest ("cohen")	K-H-N	והכ	
Peter* ("Kef" - rock)	K-P –	פכ	maybe K-P+cons., if that were a man's name, which I doubt; I think it was more like a sort of joking nickname. *Peter's Hebrew name was Shimon = ומ'ש
John ("Yochanan")	I-V-H-N-N	ננחו'	

Would Peter's Hebrew name, SIMN, ומ'ש, or his nickname, KP, פכ, likely be mistaken for והכ, KHN, "priest"? The letters do not correspond, and this is an untenable "solution" to a specious "restoration" that never should have been suggested in the first place.

Regarding the vowels: This idea involves not only the words analyzed above, but also the names "Cephas" and "Yochanan." Cephas is English transliteration of Greek transliteration of Hebrew. Yochanan is another transliteration. But whatever Hebrew vowels might be involved, we have to reject this so-called "evidence" forthwith: Since vowels in Hebrew weren't written down until about eight centuries later, this argument, too, goes nowhere.

An additional argument relies on the Gospel of John (20:5,6,7) which places Peter and another disciple in the tomb with the linens.

However, John clearly contradicts Jerome's account, which states that Jesus presented the burial cloths to [someone] whereas they are seen lying in the tomb in the account of the fourth gospel. I think we can agree that the fourth gospel's account must take precedence over a lost Gospel of the Hebrews of which we have only a few quoted or paraphrased lines.

The greater problem is that we are talking about a Latin translation involving Latin substitutions, but the Latin words in question do not correspond to the Hebrew words the scribe is supposed to have mistaken. According to Jerome, GH was written in Hebrew or Aramaic—in any case, both are written with Hebrew letters. So the alternate reading presumes that the scribe mistook "SIMN" - ומ'ש or "KP" - פכ for "KHN" – והכ,"priest," and wrote "PUERO," "servant," instead of "PETRO," "Peter." Complete nonsense.

Moreover, "servant" remains in the supposed restoration, which does not follow, for the scribe is said to have mistaken "ebed" ("puero" - "servant") for "Shimon," yet the new reading, "the servant of Peter" retains the supposedly misread puero" – "servant."

It would be a questionable, possibly reckless matter to amend a MS when we have no other text variants with which to compare -- as we have, for example, with the Gospel of Mark, where "puero" in only one Latin MS was written erroneously (in an entirely different context) for "Petro." In addition, as I pointed out, "The priest's Peter" doesn't make sense. So another emendation to the text, without any MS or actual phonetic support, is necessary: Strike the priest!

Jesus Christ, the Man of the Shroud, and Bilirubin by Carlo Goldoni. Sunday, August 17, 8:45 a.m.–9:00 a.m. (Posthumus paper)

For a long time it has been proved that the red stains visible on the cloth of the Shroud of Turin are blood clots. Among many compounds, these clots also contain a considerable amount of bilirubin with an unusual content, perhaps of traumatic origin. This excess of bilirubin could be the cause of the carmine red color that these blood stains take under special circumstances. In the past, in order to investigate the relationship between the color of the stains and the amount of bilirubin, an experimental campaign was carried out with three sets of blood samples with increasing content of bilirubin (from 2–5 times the normal concentration): a set of the sample was kept unchanged, a second set was aged in an oven for 10 hours at a temperature of 120°C, and a third set was exposed for six hours to the ultraviolet light. Only

in this last set of samples did the blood stains assume the carmine red color. Later on, on the basis of a model developed by J.B. Rinaudo, new sets of blood stains with increasing blood levels of bilirubin were irradiated with neutrons (2,59 x 1013 n/cm2). This irradiation had not altered the original brick red color of the blood stains. However, a subsequent irradiation in ultraviolet (A type) made the carmine red color emerge in all the samples within the short time of 30 minutes.

Advancing the Shroud into the 21st Century: Reaching the Next Generation by Russell Breault (DVrussbreault@aol.com). Sunday, August 17, 9:00 a.m.–9:30 a.m.

Technology is the language of today's student. The landscape of how information is received and processed is changing rapidly. In only five years, new technologies, such as the iPod, Facebook, My Space, Video iPod, YouTube, and near universal adoption of high speed Internet services, has once again leapfrogged into full adoption by today's youth. Newspapers, magazines, and books have been replaced by digital media. In an attention deficit world, how do we as holders of the sindonology torch pass it on unless we find a way to speak the language of the emerging generation. That language is technology.

The mission of Shroud University is to bridge the gap between the generations to create a digital environment that is inviting to students and encourages them to take a closer look at one the world's great mysteries. Shroud University has many sections but the core is made up of 10 schools that tackle the Shroud from many different disciplines. Each school contains unique content that is either video, audio, podcast, or PowerPoint®. In addition, numerous links are organized to relevant materials as they can be found on the Internet.

Students are encouraged to find a way to incorporate the Shroud into their academic study, such as a speech, project, or presentation. Numerous ideas are offered for student consideration. Nothing will get a student interested more than having to prepare for a class project. It is hoped that they won't end their fascination but will continue on and join us here at the next conference.

The presentation will be a live demonstration of how Shroud University is structured and organized with examples of various digital media.

Focus Projects for Student Involvement in Researching the Scientific Properties of the Shroud of Turin by Raymond J. Schneider (schneirj@comcast.net). Sunday, August 17, 9:30 a.m.–10:00 a.m.

Interesting succeeding generations of students in specialized topics such as the Shroud of Turin requires active initiatives. An important pedagogical objective is served by introducing students to research at the undergraduate level. Not only does such research teach students about basic research methods, but it often stimulates lifelong interest in the topics thus researched. The purpose of the present work is to develop a set of research projects and materials suitable for undergraduate research. The projects presented here all involve computer science, specifically the application of image processing methods to digital images of the Shroud of Turin. Many image processing tools are available in languages such as Java, MatLab, Python, Processing, and specialized environments such as Photoshop, MatLab's Image Processing Toolbox, ImageJ (a Java based toolkit), and CVIPtools (a C-based image processing toolkit).

The Focus Project concept is one which the author is exploring as a way of involving students in something bigger than the typical student project. Focus Projects are long term research projects with individual components that are within the range of undergraduate researchers. Each component of a Focus Project is a project which students could complete in a single semester that would contribute as a building block in a larger research program.

A Focus Project Component fits into the overall structure of a larger research program. It consists of a body of knowledge and techniques that have been demonstrated by previous researchers, and a set of objectives that remain to be accomplished. The basic structure of a component will be described in terms of the research materials available to the students and the tools which they can apply to the work. The results of work on a Focus Project component would be not only a paper, but results, techniques, and computer codes which contribute to further work later by other students.

The present paper will describe Focus Projects, describe the current status of the Shroud of Turin Image Processing Focus Project as well as two student contributions which were done as Honor's Projects and Senior Seminar projects. Future Focus Project components under development will be described briefly and some of the available toolsets will be demonstrated on images of the shroud.

The Tangible Emmanuel: How the Scriptures Shed Light on the Meaning and Presence of the Shroud of Turin by Christopher Knabenshue (cldsk@crucifixionshroud.com). Sunday, August 17, 11:00 a.m.–11:30 a.m.

This paper will detail the Biblical principle of the Tangible Emmanuel (coined by author) in how God, who is with us, uses His creation to show forth His glory. Tracing several Biblical passages where God uses matter as a means to reveal His message, presence, or glory, the listener will be drawn into a deeper understanding of the connection between the spiritual and material realms. Once this is established, a brief understanding of the sacramental system (matter and spirit in our own time) will be outlined, and finally the Shroud of Turin will be discussed in great detail on how it fits into the Tangible Emmanuel. By understanding the Biblical actions of God, we can understand with greater clarity the presence of the Shroud of Turin and how this "Biblically unmentioned" cloth follows the logic and pattern of the actions of God as recorded in Sacred Scripture.

The conclusion of this paper will reveal that the Shroud's presence should not necessarily be something that we should be astonished at, but rather, through tracing the Scriptural account of how God works in this world, we should almost expect something like the Shroud to come as a result of the crucifixion and the resurrection. It is the mysteries that lie within the cloth, more than its presence, which is rightfully the focus of our astonishment.

In Memorium

This conference is being dedicated to the late Raymond N. Rogers, STURP member and Shroud Science Internet Group member, whose relentless search of the truth of the Shroud of Turin, with an integrity seldom seen, was truly inspiring.

Barrie M. Schwortz, editor and publisher of www.shroud.com and good friend of Ray Rogers, published the following information about him on his web site in 2005:

In Memoriam

Raymond N. Rogers July 21, 1927, to March 8, 2005

It is with deep regret and sadness that I must report that Raymond N. Rogers, retired chemist from Los Alamos National Laboratory and member of the Shroud of Turin Research Project (STURP) team, died on March 8, 2005 after a long illness. Ray was the Director of the Chemical Research Group for STURP, the team of scientists that performed the first ever in-depth scientific examination of the Shroud of Turin in October 1978. My prayers and deepest condolences to Joan, his loving wife, and Ray's family for their loss.

Ray's passing is made more poignant by his latest research, which included publication of a peer reviewed paper that, in essence, overturned the 1988 c14 dating of the Shroud. His contributions to the world of Shroud science are a testament to his brilliance, perseverance, integrity and expertise and his impact on Sindonology is truly historical. He was the most empirical scientist I ever met and my dear friend. I will forever be honored to have known him and take some solace from the fact that he lived to see his most important Shroud work completed and published in a credible scientific journal before he died. I know that pleased him.

~Barrie Schwortz

I am also including Ray's full obituary, which was kindly provided to me by his daughter, Amy Canzona.

Raymond N. Rogers of Los Alamos died March 8, 2005 after a long illness. He was born July 21, 1927 in Albuquerque, NM. He spent his youth in California and, after his father died, he contributed to the family income as a trumpeter with local bands. He also became chief chemist at an oil refinery at age 15 when many positions were left open during the war. In 1945 he enlisted in the U.S. Navy and served as a radar technician during World War II. The GI Bill allowed Ray to complete his education at the University of Arizona in chemistry. His expertise in thermal analysis brought him to the Los Alamos Scientific Laboratory in 1951. He became a group leader of an explosives research-and-development group there and was elected Laboratory Fellow in 1981. He later worked for the International Technology division, retiring in 1988. He served on the Department of the Air Force Scientific Advisory Board from 1987 until 1992 with the equivalent rank of Lt. General, receiving their Distinguished Service Award. He received other awards and recognitions from LANL and professional organizations. He was granted a sabbatical in 1968 to pursue post-graduate studies in archaeology.

He was appointed Director of Chemical Research for the Shroud of Turin Research Project in 1978, applying thermal methods to the study of this relic. In recent years, he further researched material relevant to the dating of the Shroud, publishing his findings in Thermochimica Acta. He has also published popular articles on dogs and firearms as well as papers on chemistry, archaeology/anthropology, soil science, and energy. He has served as an expert witness on several legal actions.

Dogs, particularly Maud and Brenda, were his friends as well as his teachers throughout his life. Since his retirement, Ray was an active member of Mountain Canine Corps and participated in many search and rescue efforts. Other major interests were backpacking, hiking, photography, marksmanship, archery, music, and ham radio.

He was preceded in death by his parents and son Scott. He is survived by his beloved wife Joan; daughter Amy Canzona and her husband Tony; step-daughters Dawn Janney and Lauren McGavran and her husband Harry; grandson Kenneth; great-grandson Mark; cousin Bob and other family members; many very special friends; and coonhound Clancy.

Deaths of Significant Shroud Researchers Since 2005

Rev. Robert Dinegar, Ph.D.: d. April 21, 2005, member of STURP, head of STURP's C-14 Committee, Shroud Science Internet Group member

Rev. Albert "Kim" Dreisbach: d. April 29, 2006, founder of Atlanta International Center for Continuing Study of the Shroud of Turin, Shroud Science Internet Group member

Eugenia Nitowski: d. June 14, 2007, archaeologist and leader of the 1986 expedition "Environmental Study of the Shroud in Jerusalem"

Daniel Raffard de Brienne: d. July 7, 2007, president of Centre International d'Etudes sur le Linceul de Turin (CIELT) from 1994–2003

Luigi Gonella: d. August 8, 2007, scientific advisor to Cardinal Anastasio Ballestrero, including the period of the C-14 dating

Norma Weller: d. December 7, 2007, painter, Shroud researcher and Shroud Science Internet Group member

Giovanni Riggi di Numana: d. January 8, 2008, extracted samples for C-14 dating

Rev. Walter Abbot, S.J.: d. March 5, 2008, lectured on Shroud beginning in 1950

WE REMEMBER THEM ALL FOR THEIR GREAT CONTRIBUTIONS TO SINDONOLOGY.

1978 STURP Team

Editor's Note: The organization listed after each researcher's name is the one he or she was affiliated with in 1978 at the time of the investigation.

Investigators for the Shroud of Turin Research Project (STURP) include:

Joseph S. Accetta, Lockheed Corporation*
Steven Baumgart, U.S. Air Force Weapons Laboratories*
John D. German, U.S. Air Force Weapons Laboratories*
Ernest H. Brooks II, Brooks Institute of Photography*
Mark Evans, Brooks Institute of Photography*
Vernon D. Miller, Brooks Institute of Photography*
Robert Bucklin, Harris County, Texas, Medical Examiner's Office
Donald Devan, Oceanographic Services Inc.*
Rudolph J. Dichtl, University of Colorado*
Robert Dinegar, Los Alamos National Scientific Laboratories*
Donald and Joan Janney, Los Alamos National Scientific Laboratories*
J. Ronald London, Los Alamos National Scientific Laboratories*
Roger A. Morris, Los Alamos National Scientific Laboratories*
Raymond N. Rogers, Los Alamos National Scientific Laboratories*
Larry Schwalbe, Los Alamos National Scientific Laboratories
Diane Soran, Los Alamos National Scientific Laboratories
Kenneth E. Stevenson, IBM*
Al Adler, Western Connecticut State University
Thomas F. D'Muhala, Nuclear Technology Corporation*
Jim Drusik, Los Angeles County Museum
Joseph Gambescia, St. Agnes Medical Center
Roger and Marty Gilbert, Oriel Corporation*
Thomas Haverty, Rocky Mountain Thermograph*
John Heller, New England Institute
John P. Jackson, U.S. Air Force Academy*
Eric J. Jumper, U.S. Air Force Academy*
Jean Lorre, Jet Propulsion Laboratory*
Donald J. Lynn, Jet Propulsion Laboratory*
Robert W. Mottern, Sandia Laboratories*
Samuel Pellicori, Santa Barbara Research Center*
Barrie M. Schwortz, Barrie M. Schwortz Studios*

Note: The researchers marked with an * participated directly in the 1978 Examination in Turin. All others are STURP research members who worked with the data or samples after the team returned to the United States.

From www.shroud.com

Shroud Science Internet Group Web Sites

Group wiki page: http://shroud.wikispaces.com/
Conference page: www.ohioshroudconference.com (Conference papers will eventually be posted.)

Individual Member's Shroud Web Sites

Russ Breault: www.Shroud2000.com, www.ShroudUniversity.com, and www.ShroudEncounter.com

Joseph Durham (and Chris Knabenshue): www.crucifixionshroud.com

José Carlos Espriella Godinez: www.sabanasantamexico.org

Giulio Fanti: http://www.dim.unipd.it/fanti/Shroud.htm

Helmut Felzmann: www.shroud.info

Thibault Heimburger: www.suaire-science.com

John and Rebecca Jackson: http://www.shroudofturin.com/

Emanuela Marinelli: www.shroud.it

Dan Porter: www.shroudstory.com, www.shroudforum.com, http://shroudofturin4journalists.com/, and http://factsplusfacts.com/

Barrie Schwortz: www.shroud.com

Niels Svensson: http://www.ligklaedet.dk/

Norma Weller: www.altguide.com/turin (Although Norma Weller died last December, this web site continues to be maintained by her husband, Sydney Vale.)

Alan and Mary Whanger: http://www.duke.edu/~adw2/shroud/

Fred Zugibe: http://e-forensicmedicine.net/ and www.crucifixion-shroud.com

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Joe Marino
Shroud Science Internet Group member