TECHNICAL DIGEST

International Workshop on the Scientific approach to the Acheiropoietos Images

ENEA Research Centre of Frascati
4 to 6 May, 2010

Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

First page of the cover:

Hands detail of the original Shroud of Turin photograph

Official Documenting Photographer Shroud of Turin Research Project
STERA, Inc. www.shroud.com

International Workshop on the Scientific approach to the Acheiropoietos Images

IWSAI

ENEA Research Centre of Frascati (Rome, Italy)

May 4 – 6, 2010

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Paolo Di Lazzaro

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IWSAI

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INTRODUCTION

"Acheiropoietos" images are those images that, according to tradition, are "not made by hands". In a few cases, Science is still not able to explain the origin of acheiropoietos images: the most famous example is the Turin Shroud.

The ***International Workshop on the Scientific approach to the Acheiropoietos Images*** (IWSAI 2010, http://www.acheiropoietos.info) aims to promote a bottom-up scientific discussion on chemical, physical, mechanical, forensic and historical aspects of the most famous acheiropoietos images, namely the Turin Shroud, the Tilma of our Lady of Guadalupe and the Veil of Manoppello. A cross-fertilization of different disciplines appears the only way to gain a deeper insight into these controversial images.

When looking at the outstanding IWSAI Program in the next pages, we conclude the main goal has been achieved. We have forty-three presentations by thirty-three speakers from Austria, Canada, Denmark, France, Israel, Italy, Mexico, Poland, Spain and USA that will join the respective skills in an unprecedented brain storming about acheiropoietos images.

Each summary has been peer-reviewed for acceptance by independent Referees of the Scientific Committee. Some summaries were rejected and many have been accepted after revision. Particular thanks are due to the members of the International Scientific Committee who gave up their time for refereeing the summaries, ensuring the high scientific level of this Technical Digest. This hard work, in addition to high-level speakers, makes it possible that during the IWSAI Sessions some "light" will illuminate a number of still unclear aspects of the Veil of Manoppello, of the Tilma of Guadalupe and of the Shroud of Turin. Hopefully at the end of the workshop we have improved our knowledge, and new ideas, contacts and new collaborations may arise. In fact, corroboration and collaboration are necessary elements for progressive scientific acceptability and understanding of these images.

The IWSAI venue is the **ENEA Research Centre of Frascati**, an internationally recognized top-level Research pole. One generation ago, in the Frascati Laboratories it was designed and made the first accelerator of electron and positron colliding in the same magnetic field, that is the "father" of all the modern accelerators, including the Large Hadron Collider of CERN now seeking for the Higgs particle, the so called "particle of God". Presently, the main research activities at ENEA Frascati include particle accelerators for medical purposes, the construction of high-power laser systems covering a wide emission spectrum of wavelengths from the millimetre to the X-rays, laser-matter interactions, superconductive materials and both magnetic and inertial fusion.

IWSAI was possible by the help of many. Here I would like to thank the Local Organizing Committee, in particular the technical support of Dr. Giulia Bartolomei and Dr. Monica Cimino, the most professional work of both Dr. Daniele Remoli in the financial issues and Dr. Daniele Murra for taking care of the IWSAI website. The warmest applause of the workshop is dedicated to them.

Paolo Di Lazzaro
IWSAI chair

IWSAI SCHEDULE

ENEA Research Centre of Frascati, Aula B. Brunelli

Tuesday 4 May, 2010

8,15	**Registration**		
	Session	***Speaker***	***Title***
9,15	*Opening*	**P. Di Lazzaro**	Welcome and Introduction
9,30	*Keynote lecture*	**A. Danin**	The botany of the Shroud
10,15	*Shroud image formation*	**G. Fanti**	A critical compendium of Shroud body image formation hypotheses
10,45	Coffee break and Poster Session		
11,30	*Shroud image formation*	**P. Di Lazzaro**	Sub-micrometer coloration depth of linens by deep ultraviolet radiation
12,00	*Shroud image formation*	**M. Antonacci**	Particle radiation from the body
12,20	*Shroud image formation*	**G. De Liso**	Shroud-like experimental image formation during natural electrostatic discharges
12,40	*Shroud image formation*	**G. Fanti**	A scientific comparison between the Turin Shroud and the first handmade whole copy
13,00	Lunch		

Tuesday 4 May, 2010

	Session	***Speaker***	***Title***
14,30	*Image processing*	**D. Murra**	Sight and brain. An introduction to the visually misleading images
14,50	*Image processing*	**G. Fanti**	A quantitative image of the Turin Shroud for details recognition
15,10	*Image processing*	**B. Faccini**	New image processing of the Turin Shroud scourge marks
15,30	*Image processing*	**R. Falcinelli**	Two unpublished letters of Secondo Pia about the 1898 Shroud photography
15,50	Coffee break		
16,10	*Image processing*	**M. Latendresse**	An online web tool for length measurements and web annotated presentation for the Shroud of Turin
16,30	*Textile fibres*	**L.G. Thygesen**	Dislocations in plant fibres and in Turin Shroud fibres
16,50	*Shroud characteristics*	**G. Fanti**	Scientific observables and inferences applicable to the Shroud of Turin
17,10	*Open Forum*	**All the 4th-May speakers**	Round table on the Shroud image characteristics. The "LIST" paper and live experimental observations
18,10	*End of the sessions*		

Wednesday 5 May, 2010

8,20	**Registration**		
	Session	***Speaker***	***Title***
9,00	*Archaeology*	**D. Fulbright**	Shimon Gibson's "refutation" of Turin Shroud omits evidence from the Judean Desert
9,30	*History*	**D. Scavone**	On Besançon and other plausible theories for the Shroud during the missing years
10,00	*History*	**A. Piana**	The "missing years" of the holy Shroud
10,20	Coffee break and Poster Session		
11,20	*History*	**D. Fulbright**	Were sixth-century natural disasters factors in the transfer of relics from Palestine?
11,40	*History*	**D. Scavone**	Edessan sources, the Shroud and the legend of the holy grail
12,00	*History*	**A. Piana**	An unknown hideaway of the holy Shroud**?**
12,20	Lunch		

Wednesday 5 May, 2010

	Session	***Speaker***	***Title***
14,00	*Philosophy*	**P.H. Wiebe**	The promise (and threat) of the Shroud
14,30	*Philosophy*	**K.E. Stevenson**	White linen and the blood of sprinkling
14,50	*Philosophy*	**A. Silverman**	The brightest light of all
15,10	*Iconography*	**E. Marinelli**	The copies of the Shroud
15,30	*Iconography*	**G. Baldacchini**	Crux mensuralis of Grottaferrata and Shroud of Turin
15,50	*End of the Sessions*		
16,15	Boarding the bus to visit the Greek Abbey of Grottaferrata		
18,40	Back to Frascati hotels and to ENEA		

Thursday 6 May, 2010

8,30	**Registration**		
	Session	***Speaker***	***Title***
9,00	*Oviedo sudarium*	**J.L. Fernandez Sanchez**	The Sudarium of Oviedo and the Shroud of Turin. A question of authenticity
9,30	*Forensic*	**N. Svensson**	Medical and forensic aspects of the Man depicted on the Shroud of Turin
10,00	*Forensic*	**G.R. Lavoie**	A medical study of the surface anatomy of the image and a medical forensic evaluation of the blood marks of the Shroud of Turin in relation to image formation
10,20	*Acheiropoietos images*	**G. Fanti**	How are the acheiropoietos images produced?
10,50	Coffee break and Poster Session		
11,30	*Acheiropoietos images*	**J.C. Espriella Godinez**	Acheiropoietos images: the Tilma of Guadalupe
12,00	*Acheiropoietos images*	**H. Pfeiffer**	The concept *acheiropoietos*, the icons of the likeness of Christ and the Veil of Manoppello
12,20	*Manoppello veil*	**R. Falcinelli**	The face of Manoppello and the veil of Veronica: new studies
12,40	*Manoppello veil*	**J.S. Jaworski**	Properties of byssal threads and the chemical nature of colors of the Veil of Manoppello
13,00	*Manoppello veil*	**Z. Treppa**	The appearance of the changing images on the Veil of Manoppello
13,20	Lunch		

Thursday 6 May, 2010

	Session	***Speaker***	***Title***
14,45	*Keynote lecture*	**M. Antonacci**	Can contamination be detected on the Shroud to explain its 1988 dating?
15,30	*Shroud dating*	**M. Riani**	A robust statistical analysis of the 1988 Turin Shroud radiocarbon dating results
16,00	Coffee break		
16,20	*Shroud dating*	**A.C. Lind**	Production of Radiocarbon by Neutron Radiation on Linen
16,40	*Shroud dating*	**L. Campanella**	Sensoristic approach to dating of cellulosic materials
17,00	*Shroud dating*	**R. Van Haelst**	ANOVA, a robust method to evaluate AMS radiocarbon data
17,20	*End of the sessions*	**P. Di Lazzaro**	Closing remarks
17,30	*End of the workshop*		

POSTER SESSION

Cesaremaria Glori, *Why Jesus did not bring the patibulum but the whole cross.*

Max Patrick Hamon, *Does the Shroud of Turin really bear the image of a man crucified "under Pontius Pilate"?*

Mario Latendresse, *The scientific method and the Shroud of Turin.*

Blandina Paschalis Schlömer, *The Manoppello Veil compared with the Turin Shroud and with other grave cloths of Christ.*

Andreas Resch, *The face on the Shroud and on the Veil of Manoppello.*

Tuesday May 4th, 2010

Morning Session

Botany of the Shroud of Turin

Avinoam Danin

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Summary

Studying photographs of the Shroud, shot in different photographic techniques from 1898 through 2000 and observing the linen itself in 2000, I detected several plant images on the linen, near- and on the image of the Man of the Shroud. The images are faint but seen exactly in the same locations in all the photographs. This means that the plant images are not artifacts of a certain photographic procedure but a reality depicted by diverse methods. Three species used as geographic indicators signify that the only place on earth people could use fresh sample and put them on a dead-man's body is the area of Jerusalem to Hebron.

March-April is the time of the year when the whole assemblage of some 10 of the plants identified on the Shroud is in bloom.

Special attention was given to cover parts of the head of the Man of the Shroud with daisy-like "flowers" after their carrying stalks were removed. More than 300 flowering heads of *Anthemis* or *Matricaria* were orderly laid on the head, thus partially masking the 3D information derived from the body area to the linen of the Shroud.

Ferocious thorns of two trees were found near the man's head and a reed was laid alongside his body.

Fruits of *Pistacia lentiscus* projecting from a peduncle and additional hundreds of fruits assumed to be of *Pistacia atlantica* and/or *Pistacia palaestina* left their around 2,600 images on the entire Shroud. We do not know why people put these fruits there.

References

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CSST Newsletter Insert 12 (3): 1-4.

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A critical compendium of Shroud body image formation hypotheses

Giulio Fanti

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Summary

From 1898 when S. Pia [1] published the first photographs of the TS (Turin Shroud) many scholars have proposed different hypotheses of TS body image formation without reaching a common agreement because all the proposed hypotheses do not allow a complete explanation [2]. The TS body image in fact has many peculiar characteristics that are, up to now, impossible to reproduce all together [3].

After a short presentation of the most important peculiar characteristics of the TS body image, the paper presents in a critical view the most important hypotheses of image formation such as those of diffusion [4], contact [5] and radiation [6, 7], explaining why they are not able to reproduce in a laboratory the whole characteristic of the TS body image. Also other hypotheses of minor importance such as the artist intervention [8, 9, 10] or the natural formation [11] are considered and discussed with the presentation of experimental results.

Finally it is presented a reliable hypothesis, in the author's view, based on corona discharge [12] and this hypothesis, both supported by theory and some experimental results, is compared with the somatic characteristics shown in the most important Relic of Christianity.

After a rigorous scientific discussion, a more general conclusion is reached also considering what it is reported in the Gospels.

References

[1] Zaccone G. M., ""L'immagine rivelata – 1898. Secondo Pia fotografa la Sindone".

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[4] Rogers R. N., "Scientific method applied to the Shroud of Turin, a review", http://www.shroud.com/pdfs/rogers2.pdf

[5] Moroni M., "Sulla formazione 'naturale' e sulla strinatura accidentale dell'immagine sindonica, aloe e mirra fattori determinanti per un'impronta 'superficiale', verifica sperimentale" in: "La Sindone, indagini scientifiche", Atti del IV Congresso Nazionale di Studi sulla Sindone, Siracusa 1987, Edizioni Paoline, Cinisello Balsamo (MI) 1988, pp. 142-185.

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Sub-micrometer coloration depth of linens by deep ultraviolet radiation

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Summary

We present the first very superficial yellow coloration of a linen cloth by using a burst of ultrashort pulses of deep ultraviolet light. We obtained locally a sub-micrometer depth of coloration in a critical working point: i.e., a small change in duration, or wavelength, or energy/power density of the light pulses is sufficient to change the penetration depth of the linen coloration by orders of magnitude.
We will address the interaction of deep ultraviolet light with linen fibrils, causing a photolytic degradation of cellulose and hemicelluloses that promotes the formation of chromophore with double bonds C=C ultimately leading to the yellowish coloration of the outermost part of the linen fibrils.
This result is of paramount importance when seeking for the formation process of the body image (BI) on the Turin Shroud, as it shows that an ultrashort burst of deep ultraviolet light may accomplish one of the most-difficult-to-replicate characteristics of the BI, namely a 0,2-micrometer depth of coloration of the Shroud, corresponding to the thickness of the primary cell wall of the linen fibrils.
The characteristics of our deep ultraviolet colored linens (including latent image formation, fragility, hue of color, 3-D, quenching of ultraviolet fluorescence) will be compared with those of the BI.

References

G. Baldacchini, P. Di Lazzaro, D. Murra, G. Fanti: "Colorazione di tessuti di lino con laser ad eccimeri e confronto con l'immagine sindonica" Rapporto Tecnico ENEA, RT/2006/70/FIM (2006).

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P. Di Lazzaro, G. Baldacchini, G. Fanti, D. Murra, E. Nichelatti, A. Santoni: "A physical hypothesis on the origin of the body image embedded into the Turin Shroud" Proceedings of the Int. Conf. on *The Shroud of Turin: Perspectives on a Multifaceted Enigma,* edited by G. Fanti (Edizioni Libreria Progetto Padova 2009) pp. 116 – 125. ISBN 978-88-96477-03-08 01-12.

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Particle radiation from the body

Mark Antonacci[1], Arthur C. Lind[2]

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Summary

An initial review of the many similar properties of the Shroud's body images and its light scorch marks give the first indication that radiation caused its body images. Experiments with radiation and cellulose are shown to also duplicate many chemical and physical properties and spectral reflectance curves of the Shroud's body image. Series of scientific experiments are summarized demonstrating that low temperature or non-thermal radiation will duplicate 29 key collectively unprecedented properties and characteristics found throughout the Shroud's frontal and dorsal body images at both microscopic and macroscopic levels. While some properties can be duplicated by other techniques, some features can only be duplicated by radiation, and only radiation can duplicate all of them.

Numerous scientific experiments and analyses are summarized showing that low penetrating radiation was responsible for the body images on the Shroud. Although Rinaudo has not demonstrated "ghost" patterns, image striations, unchanged crystalline structure or colorless interiors of image fibers, his experiments on the effects of protons and neutrons on linen are noted [1]. His experiments reproduced additional probable Shroud body image features such as conjugated carbonyls, straw-yellow coloration after aging, and coloration extraction by diimide.

Extensive medical, pathological and archaeological evidence clearly indicates that whole human blood flowed from a human male body wrapped within the Shroud that contained more than 100 blood marks from numerous wounds inflicted by various instruments at different times resulting in his ultimate death by crucifixion. Four reasons are provided why this particular body is necessarily the source of the radiation. It is also shown that only radiation from the body can account for all of the above features at their locations found on the Shroud.

Drawing on the author's [2] previous work and new experiments [3], this paper explains that if particle radiation was momentarily released from the dead body of the man in the Shroud, it would refute and explain the cloth's 1988 radiocarbon date, and account for the excellent condition of the cloth. It would further explain how all of the Shroud's body image features and its blood marks were encoded. No method has ever explained or accounted for all of these characteristics known to exist on the Shroud. This event would also explain corollary incidents described in the Gospels, but never accounted for previously.

References

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Shroud-like experimental image formation during natural electrostatic discharges

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Summary

It has been experimentally investigated whether images of objects laying between the two folds of a linen cloth of characteristics similar to those of the Shroud, or of a cotton cloth, smeared with different solutions (aloe, myrrh, blood in water/oil solution), and suitably placed between two horizontal gneiss rock layers in an underground cellar, partly excavated in ferromagnetic rocks, could form naturally before or during an earthquake.

The experiments have been carried out in a slightly seismic area in Western Piedmont (Northern Italy) during the years 1999-2009. Seismic radioactive, electromagnetic and magnetic precursory were monitored. The measures obtained, together with the observation of unusual phenomena in animals and plants, yielded the necessary indications that a seismic activity was about to take place.

The experiments focused also on the study of the relations between the thickness of a linen cloth, its capacity to absorb aloe and myrrh in water or oil solution, either together or separately, the way the cloth absorbs these solutions and the image formation by objects of different kind (ranging from objects of inanimate origin, such as plastic pieces, to wood pieces or the bodies of dead animals) directly in touch with the cloth, during the seismic events that occurred in the period of observation.

In about one hundred experiments carried out, images, with a 3D character and other Turin Shroud peculiarities, were observed only as the outcome of experiments performed during seismic activity. The experimental results therefore strongly support the idea of a connection between seismic activity, ambient ionization and image formation under the circumstances described, probably for “electrostatic discharge”.

References

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A scientific comparison between the Turin Shroud and the first handmade whole copy

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Summary

It is well known that the image seen on the Turin Shroud has been thoroughly studied, mainly during and after the 1978 STURP examination [1]. The main undisputable facts are known and summarized [2]. Meanwhile, a number of experiments were carried on in order to try to reproduce a "Shroud-like" image. Up to now, nobody was able to reproduce all the fundamental properties of the image. In addition, most of these pseudo-Shroud images were limited to the face.

Recently, an Italian scientist, Luigi Garlaschelli [3], provided for the first time a copy of the whole image, front and back, which is the best "Shroud-like" image ever done. According to [3], the artist used a dry powder (iron oxide pigment) and the image seen on the Turin Shroud was produced early by the discoloration of the fibers by the acidic impurities which are supposed to be associated with the earthy iron oxides used, even if the pigments themselves were not involved.

In the present paper, we will describe Garlaschelli's hypothesis and experiments.

Garlaschelli also claimed that his "Shroud-Like" image matches the Shroud image in most of its main properties. We will demonstrate that it is true only in part because some of the main properties are not reproduced.

Starting from the available data and photographs, we will show that the image in discussion does not match the main fundamental properties of the Shroud image [2], in particular at thread and fiber level but also at macroscopic level. The problem of the blood stains will also be discussed.

In conclusion, thanks to Garlaschelli, it is possible to show why and how, because of fundamental "details", the image of the Turin Shroud is up to now not reproducible and still remains an unexplainable Object.

References

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Tuesday May 4th, 2010

Afternoon Session

Sight and brain: an introduction to the visually misleading images

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Summary

It is well known that the information gathered by the eye is processed in the brain to give a perception that in some cases does not tally with a physical measurement of the stimulus source [1].
Sometimes we are able to recognize some familiar shapes in images which represent a completely different subject (or do not represent anything, such as an ensemble of stars) due to a wrong interpretation or to our past experience [2].
Concerning the images of objects "seen" on some photographic records of acheiropoietos images, there are two main sources of potential misconstruction: literal optical illusions creating images that are different from the objects that make them, and cognitive illusions where the eye and brain make unconscious inferences.
In this paper, after a back-to-basics introduction on the physiology of the human vision [3] we will discuss how the system eyes-brain can be deceived by two-dimensional and three-dimensional images.
The discussion will be guided by several examples of animated optical and cognitive illusions.

References

[1] See, e.g., http://en.wikipedia.org/wiki/Optical_illusion

[2] See, e.g., http://en.wikipedia.org/wiki/Pareidolia

[3] See, e.g., http://webvision.med.utah.edu/

A quantitative image of the Turin Shroud for details recognition

Giulio Fanti, Carlo Privitera

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Summary

This work firstly aims to produce a quantitative color image of the Shroud starting from a digital photograph realized in 2002 by photographer G. Durante [1] and from some color measurements made in 1978 by the researchers Artom and Soardo [2].

The method is based on acquisition of RGB (Red, Green and Blue) averaged values detected, by histogram function of common photographic software, in a determinate area and comparing them with colorimetric 1978's data. RGB values were acquired in 18 particular points of Shroud picture using the same circular area (68 pixel diameter) measured by colorimeter in 1978.

By color space and illuminant conversion Matrix, RGB data of 2002 photograph were transformed in CIE XYZ coordinates (the same color space of 1978 measurements) and every color channel was corrected to colorimetric 1978's values; at this point results can be directly employed in this format or reconverted in RGB color space. Total uncertainty of the quantitative image is ± 4%.

Secondly the quantitative image was processed for color measurement of some details like cloth, bloodstains, image, burns and water spots as it was done in 2008 [3]. A colorimetric database of typical xyz CIE chromatic coordinates value was then built. The results of data thus acquired has been reported in x/y and x/z diagrams showing the characteristics of some details.

Exploiting the quantitative image it is possible the direct comparison of Shroud details such as the blood stains. Method was applied for example to detect some characteristics of the blood and on three spots in correspondence of the buttocks of Man of the Shroud, noting that that they can be burns but not blood.

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New image processing of the Turin Shroud scourge marks

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Summary

Scourge marks on the Turin Shroud have been traditionally grouped together by Shroud experts and forensic pathologists, as the result of the damage of a single torture instrument [1, 2, 3, 4].
The most accurate work on scourge bloodstains have been performed in the last century by G. Ricci. He realized a systematic visual study of the scourge marks on a 1:1 scale copy of the Shroud obtained from 1931 Enrie's photographs, made with an orthochromatic film to enhance all details. He concluded that the Shroud man was scourged by two executors, one on each side of the body, each holding a Roman "flagrum", a whip with three leather straps having dumb-bell shaped metal extremities armed with small spikes [5].
Thank to enhancements and image processing of the 1969 Judica Cordiglia's and the 2000 Durante's photos, three different types of "scourge" marks have been identified [6]. The first type (Type1) is found on the whole surface of the double image and it can actually be associated to the Roman flagrum already mentioned. It is characterized by two or three blood circlets (where the sheet has been more soaked) connected by a much lesser evident line. The second type (Type2) is observable mainly on the back, on the lumbar region, on the back of tights and on the chest. It has a wider shape and it is more evanescent with respect to Type1. At higher enhancement and contrast it is similar to a large scrape, formed by small parallel blood lines fading into serum. The third type (Type3) is very faint and rare, it can be detected on the lower part of calves and generally where the body surface is curved. It is a kind of fan-shaped scratch and it could be the result of the cylindrical deformation of Type2 scourge mark.
New image processing of the three scourge mark types is being performed using Adobe Photoshop CS4 on a higher resolution version of the 2000 Durante's Shroud photo and on Miller's UV photos, in order to better constraint the shape of the impacting objects and to detect the presence of blood and serum. The use of at least two different kinds of whip seems to be confirmed on the basis of new and more accurate results. The identification of the torture instruments puts constraints on the historical period in which the execution of the Turin Shroud man took place.

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Two unpublished letters of Secondo Pia about the 1898 Shroud photography

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Summary

After the first photograph made in 1898 the lawyer Secondo Pia had extensive correspondence with many personalities and scholars throughout Europe. In particular, some letters traced by the spokesman, refer to contacts with which Filippo Crispolti dissertation of some technical details of unpublished and management Pia’s archive. The study of this correspondence is deduced when new openings for research on the first photo of the Shroud.

An online web tool for length measurements and web annotated presentation for the Shroud of Turin

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Summary

Length measurements on the images imprinted on the Shroud of Turin have been done for over a century. These measurements have usually been done using printed photographs. Such measurements are not reproducible since: 1) they do not report their endpoints, 2) the photographs used is often not specified. For example, reporting the height of the head image, of the man of the Shroud, is not reproducible since we do not know what are the endpoints of the measurement. This is in large part due to the lack of outlines of the images imprinted on the Shroud. We do not see clear boundaries for the top of the head and the chin. All the images imprinted on the Shroud have no outlines. We cannot verify the reported lengths of measurements without having precise endpoints from a specified photograph. Clear and reproducible length measurements are important since they are the basis of more complex analyses. For example, if we try to measure the height of the man of the Shroud it is necessary to do several length measurements: feet, legs, torso, and head. Without the entire list of endpoints of these measurements, it is unclear what has been measured.

We present a Web interface, available at sindonology.org (aka dshroud.com), that enables length measurements, with a precision of about 1 millimeter, and that reports its endpoints as rectangular coordinates, in pixel. These capabilities, i.e., length measurements and presentation overlay, can be done on three photographs: Pia (1898), Enrie (1931), and Arcidiocesi di Torino (restoration of 2002). The Web interface can be used with most popular browsers and was tested on IE, Firefox, Safari, and Chrome.

The Web interface provides also tools to add text and drawings, as overlays, over one of the provided photographs of the Shroud. For example, it is possible to draw a polygon around the region of the 1988 radiocarbon dating sample and annotate the polygon with text. The user can bookmark the result, as a Web link, for future reference or insert a provided piece of code in any Web page that will act as a Web link to the result. Such a feature enables the quick creation of annotated presentation over a Shroud photograph without the necessity to edit any digital images or the creation of complex Web pages.

Dislocations in plant fibres and in Turin Shroud fibres

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Summary

Some natural fibres contain dislocations, i.e. regions where the cell wall structure differs from that of the surrounding cell wall. Dislocations are also called slip planes, kinks, kink bands or nodes. Dislocations have been found in Turin Shroud fibres [1]. This presentation will give an overview of dislocations in plant fibres in order to give attendees of the workshop a fundamental understanding of these structures. This knowledge is a necessary pre-requisite to be able to evaluate and discuss the significance of dislocations in historic linens; what can we hope to learn from studying dislocations in these linens, and perhaps even more important, which phenomena are they not related to.

Dislocations have been found to be located in the S_2 layer of the cell walls of fibres and tracheids [2], but their exact structure remains unknown. The cellulose in dislocations is often assumed to be amorphous, in contrast to the crystalline cellulose found in the bulk cell wall. However, since not only the bulk cell wall but also the dislocations are birefringent, they too must be crystalline. By applying tensile force in the longitudinal direction of individual plant fibres, dislocations can be stretched and appear to align with the bulk cell wall [3]. This confirms that microfibrils in the S_2 layer of dislocations have a different angle relative to the fibre axis than the S_2 microfibrils in the bulk cell wall. Dislocations are known to absorb dyes better than the surrounding cell wall [4], and they have been found to be more susceptible to hydrolysis [5,6].

Dislocations are found already in the living plant, but may also be introduced after harvest [7]. Compression strength applied in the longitudinal direction of the fibres will introduce dislocations [8, 9]. The amount of dislocations in a batch of fibres may be quantified using acid hydrolysis, which will break the fibres at the positions of (some of) the dislocations, followed by determination of the lengths of the liberated fibre segments – the shorter segments, the more dislocations [5,6]. In situations where this type of destructive testing is not an option (for example regarding historic textiles), polarized light microscopy may instead be used to visualize the dislocations, and image analysis may be applied to calculate descriptive parameters such as the amount of dislocations, their sizes and the distances between them [10].

The presentation will give an overview over dislocations in plant fibres, and dislocations found in flax fibres from the Turin Shroud will be compared to those seen in plant fibres of modern origin.

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OPEN FORUM

Round table on the Shroud image characteristics. The "LIST" paper and live experimental observations

introduced by the presentation:

Scientific observables and inferences applicable to the Shroud of Turin

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Summary

A wide ranging discussion on the Shroud Science Group has been pursued over approximately the past five years with the objective of collecting the critical observations about the Shroud of Turin into a single compact paper with particular attention to the question of image formation. This work is an improvement of a previous paper presented in 2005 [1].
The current paper classifies the scientific observations of the Shroud of Turin into categories to aid scientific discussion about the problem of body image formation. Many hypotheses about the image formation process have been proposed, but none has explained all the facts detected on the Shroud. This paper will be helpful for future researchers who wish to study the image formation process and propose new hypotheses.
Facts directly related to the Turin Shroud are concisely presented, divided in two general categories: Type A, which are direct observables, and Type B, which are inferences based on direct observations and specific Turin Shroud studies. In the interest of completeness other facts and observations proposed by researchers that are not as universally accepted are reported.

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Wednesday May 5th, 2010

Morning Session

Shimon Gibson's "refutation" of Turin Shroud omits evidence from the Judean Desert. A brief note: did Jesus give his Shroud to "the Servant of Peter"?

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Summary

This presentation comprises two topics, the first is a discussion on the recent publication of the analysis of first-century burial cloths discovered in Jerusalem in the Spring of 2000, and the second is a brief note about the Shroud given to the servant of the priest in the Gospel of the Hebrews, according to Jerome.

Recent publication of the molecular analysis of first-century burial cloths discovered in Jerusalem in the Spring of 2000 has received enormous media attention, both in print and on the web. The sensational nature of the coverage has stemmed less from the scientific analysis than from specious comparison with the Shroud of Turin. The Jerusalem shroud consists of two pieces, naïvely said to disprove the authenticity of the Turin Shroud. Additionally, the simple weave of the Jerusalem burial cloths is claimed as further proof that the Turin Shroud, with its finer twill weave, cannot be genuine.

The assumption that the newly discovered burial cloths typify those used in Jerusalem during the first century is over-reaching. Any attempt to extrapolate from this shroud alone, out of no doubt many thousands that did not survive, that all must have been of two pieces, and all must have shared the same type of weave, and therefore any shroud differing from that one cannot be authentic, is statistically invalid.

The research article, "Molecular Exploration of the First-Century *Tomb of the Shroud* in Akeldama, Jerusalem," in fact never refers to the Shroud of Turin. Moreover, a shroud discovered in the Judean desert is of one piece, like the Turin Shroud, and another, much older, is a linen cloth seven meters in length.

The Shroud connection was hyped to the media by one of the article's co-authors, Professor Shimon Gibson, Adjunct Professor at the University of North Carolina at Charlotte and Senior Research Fellow at the W.F. Albright Institute of Archaeological Research.. Gibson, who supervised the excavation, was interviewed by *National Geographic News*, which published a story mistakenly attributing the supposed inauthenticity of the Turin Shroud to the scientific research report: The *NGN* story subsequently appeared in numerous other media.

While Gibson emphasized that no other first-century shroud has been discovered in Jerusalem, he omitted evidence from the Judean Desert, where linen, wool and leather shrouds have been excavated.

According to Jerome, in his *De Viris Illustribus 2,* the Gospel of the Hebrews contains the following curious statement: "And when the Lord had given the linen cloth to the servant of the priest, he went to James and appeared to him." The "linen cloth" is quite credibly understood to refer to the Shroud now in Turin.

Inasmuch as it would appear most unlikely that Jesus would have presented his shroud to the priest of the Jerusalem temple through his servant or otherwise, a number of emendations to the text have been suggested to support a restoration to an alternate reading: "to the servant of Peter." We show that this reading is untenable.

This passage as "restored" is the basis of the argument that the Shroud was taken to Antioch.

On Besançon and other plausible theories for the Shroud during the missing years

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Summary

Besançon alone, of all the major theories of the Shroud's location during the "missing years" (1204-1354), claimed to have the Shroud of Jesus and has documents to support its possession. Three documents dated 1205-1208 place the Shroud in Athens with Burgundian knight Othon de la Roche. Other documents support Othon's transfer of the Shroud to his castle in Burgundy [1]. After 1354 the Shroud's history from Lirey to Turin is well established. Crucially, no other scenario for the missing years even mentions a shroud. In 1349 the Shroud in Besançon "disappeared" after a fire in the cathedral. All church records to that time were lost [2]. When J.J. Chifflet in 1624 and other Besançon historians tried to reconstruct the Shroud's history, they thus had no records of its arrival [3]. No Shroud is in the foundation records of Geoffroy I de Charny's Lirey church in the 1340s. About 1351-54 Geoffroy wed Jeanne de Vergy, descended from Othon, with hereditary right to ownership of the Shroud. She brought the Shroud, wrongly thought to be "lost" in the 1349 fire, to her marriage. The Besançon hypothesis thus explains how Geoffroy acquired it and why he remained silent [4]. At Lirey Jeanne commissioned an artist to fashion a copy (as in the d'Arcis Memorandum). This copy was sent to Besançon in 1377 or 1378. The bishop who "proved" it was the return of the original by placing it on a corpse and reviving it was Guillaume de Vergy, related to Jeanne [5]. This is suspicious as a possible family conspiracy. Sindonologists have spent pages in refuting this painted copy [6]. But they have not refuted Besançon's original, which ca. 1354 had gone to Lirey with Jeanne. A copy of Othon's tombstone and a chest which once contained the Shroud, both still found in Othon's Chateau de Ray-sur-Saône, reinforce my case [7]. Besançon alone has documents showing an awareness of the Shroud in its lost 150 years. And it explains in the most economical way what happened to the Shroud after Robert de Clari said in 1203 that he saw it in the Blachernes Palace in Constantinople and afterwards "nobody knew what happened to it." A path of possession is thus documented for the Shroud from Constantinople to Geoffroy de Charny.

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The "missing years" of the Holy Shroud

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Summary

One of the more difficult steps in writing the chronology of places in which the Shroud has been preserved is the historical gap of more or less one hundred and fifty years, from 1204 in Constantinople to its re-appearance in Lirey in the 14th century. Where was It in the years between? We can state that the Shroud disappeared from Constantinople in the period between April 1204 and August 1205. Three elements confirm the presence of the Shroud in Athens in the summer of 1205. First of all a letter written on 1st August 1205 by Theodor Angel Comnenus to Pope Innocent III [1]. Moreover we have the statements of the papal legate Benedict of Santa Susanna and abbot Nicolas of Otranto.

After the splitting up of the Byzantine Empire Othon de La Roche became Lord of Athens [2]. In order to obtain more information on Othon it was necessary to visit his castle, in Ray-sur-Saône, to look for new clues. In the ancient tower of the castle are preserved numerous family treasures. Our attention is immediately caught by some relic containers could prove the direct origin from Constantinople. Behind these objects there is a wooden coffer that, according to family tradition, it could state that the Shroud, after disappearing from Constantinople, was kept in Ray-sur-Saône castle. When was it taken to France? The latest record signaling the presence of Othon in Athens is a papal bull of Honorius III dated February 12th 1225 [3]. Othon returned to France and contributed to the enrichment of Bellevaux abbey [4]. A document in the archives of the diocese of Langres states that Othon died in 1234 [5]. Othon was not buried in his own town but in the Church in Seveux, a town in the diocese of Langres.

Further proof supporting the hypothesis of a link between Lords of Ray-sur-Saône and the Shroud is a drape, preserved near the coffer. On the fabric is painted the frontal part of a male human being, extremely similar to the man of the Shroud [6]. All these elements suggest that the Shroud could have remained in the castle in Ray-sur-Saône when Othon de La Roche returned in France, probably around 1226.

Thanks to Jeanne de Vergy, related in the fifth generation with Othon, the Shroud present in France from 1226 would have been shown in public only one and a half centuries later, in a village not far away from Ray-sur-Saône: Lirey.

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Were sixth-century natural disasters factors in the transfer of relics from Palestine?

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Summary

This paper examines the possible connection of sixth-century climate changes 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 [1, 2, 3].

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 [4]. 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 [2, 5, 6]. It has been observed that in marginal desert areas, even minor climatic changes can result in dramatic environmental changes [2, 7].

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Edessan sources, the Shroud, and the legend of the Holy Grail

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Summary

In two articles [1] I provided the following points. **A.** The legend of Abgar V discusses bishops Palut and Serapion and Abgar's letter to the Roman magistrate at Eleutheropolis--Beth Gubrin renamed by Emperor Lucius Septimius Severus (193-211) [2]. All these belong in the time of Lucius Septimius Severus Megas Abgarus VIII (177-212), who took his nomenclature from this emperor, his conqueror. After Edessa's flood (201) Abgar VIII built a royal complex (Syriac: "birtha") on high ground [3]. Clement of Alexandria (165-211) wrote that Thaddaeus was buried in "Britio Edessenorum." "Birtha" thus became Latin "Britium." Abgar VIII also visited Rome in the time of Pope Eleutherus (171-185) [4]. The *Liber Pontificalis* (550) said Eleutherus received a letter from "British King Lucius" requesting guidance in the Faith [5]. (Rome = "Eleutheropolis.") Conclusion: Abgar VIII retrojected his own conversion back to Abgar V to give Edessa an apostolic foundation [6]. Bede's *British Church History* (ca.700) mistook this for a king of Britain. Before Bede, no Roman or British writer ever knew of a British King Lucius [7]. Yet after Bede, widely read, Lucius was accepted in Britain. **B.** On Easter Edessa's Jesus image was displayed at the first hour (6 a.m.) as infant, third hour as boy, sixth hour as youth, ninth hour as crucified. Christ-Child has changed to Christ-Crucified. In Grail stories, the best knight sees the Christ-Child in the Grail, then the Crucified. To witness Jesus born and sacrificed is the true secret of the Grail [8]. **C.** The Abgar legend was known in Latin from 769 on [9]. Around 1200 Chrétien de Troyes invented the legend of the Grail. Soon after, using the New Testament and ancient apocryphal stories, Robert de Boron wrote its history as the cup of the Last Supper [10]. A major source for Robert is the Lydda legend: Pilate permits Joseph to bury Jesus. On Golgotha Joseph catches Jesus' dripping blood in the Shroud [11]. Robert's near-verbatim version adds: Pilate also gives Joseph Jesus' Last Supper cup (now called "Grail"). He catches the blood not in the Shroud but in the Grail [12]. Grail stories have a crippled king healed by the Grail. Edessa's crippled Abgar V was healed by the Shroud. **D.** In 1136 Geoffrey of Monmouth's fictitious King Aruiragus (ca. 50 CE) was used as King Lucius' ancestor by Glastonbury to falsify Christianity's apostolic origin in Britain. Aruiragus (scribal variant: Aruigarus) is a virtual homophone for Abgarus (Greek: Augaros) [13].

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An unknown hideaway of the Holy Shroud?

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Summary

It is commonly accepted that the Holy Shroud once got to Turin, left the town only in two occasions: during the siege of Turin in 1706 and during the second world war in 1939 [1].
In the small town of Maddalene, near Fossano, 80 kilometres south of Turin, it is time-honoured a tradition according to which the Holy Shroud found shelter in the town local lord palace in the beginning of XVII century [2].
According to some researches of nineties some signs make presume that the Holy Shroud stayed in Maddalene, that was a belonging of Savoia from 1574, after being of Acaja's Princes, in 1617 when Turin was threatened by Spanish troops that already besieged Vercelli [3].

One can assume that, as it happened in 1706 and in 1939, the Holy Shroud was hidden in this place that was Savoia's property, very close to French territories, with the purpose of protect It from hazards coming from wars. Are there others data supporting this hypothesis? In this small town was founded in 1617 the "Brotherhood of the Holy Shroud" that was then officially recognized by local authorities[4]. Brotherhood or Congregations of the Holy Shroud were founded as in Maddalene, also in Chambéry and Turin. The Brotherhood was signed by a Clemente IX papal bull, that drew up a Summary of Perpetual Indulgences granted to the members of this Brotherhood and to the faithfuls. [5]. In fact it was Clemente IX that in 1669 founded a Congregation whose duty was to regulate Indulgences. As in Turin, also in Maddalene every year on may the 4th they honoured the Holy Shroud and The Brotherhood. The inside of the church is enriched by veneration signs either coeval either subsequent to the event; particularly interesting are the standards of the Brotherhood and a linen paint that portrays a Shroud exhibition happened, probably during the shelter in the small town.

All these data suggest that the Shroud, after its arrival in Turin and before the siege of 1706, secretly went out of the Savoia's capital city in the beginning of XVII century.

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Wednesday May 5th, 2010

Afternoon Session

The promise (and threat) of the Shroud

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Summary

In a paper published shortly before Richard Rorty's death (with Gianni Vattimo) he wrote that "empirical evidence is irrelevant to talk about God," remarking that this viewpoint, advanced by both David Hume and Immanuel Kant, applies equally to theism and atheism [1]. This remark expresses the general sentiment about God and religion found in the Academy (whether modern or postmodern), which contrasts with views hinted at, privately held, or occasionally voiced by some academicians who wonder whether the Shroud could be evidentially relevant to the Christian doctrine of the Resurrection.

In my paper I sketch an approach by which the rationality (or irrationality) of religion might be assessed using evidence (contra Rorty et al). I isolate the special forms of evidence that would be needed to argue that a once-dead person has come back to life, and examine the recent claims of Shroud researchers (e.g., John Jackson [2], August Accetta [3], and Thaddeus Trenn [4]) who conjecture that the body (mass) of a man who once lay in the Shroud is implicated in its unique image. I show how this conjecture poses a new question about evidence for the Resurrection, and show also that the Shroud either enhances the evidence for the Resurrection or surprisingly undermines it – the promise or the threat. I conclude by advancing a conjecture of my own concerning a possible difference between evidence in science and evidence in religion.

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White linen and the blood of sprinkling

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Summary

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.

A dear friend of mine suggested several years ago that I compose a "white paper" on the Shroud. 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. That suggestion brought about a whole new direction for me in my study of the Shroud. A summary of which was presented at the Ohio Conference in 2008. The result pointed toward a perspective of Shroud studies that I had not previously considered: a purpose for the Shroud more in line with its Jewish purview than its Christian significance. My report with regard to the Shroud of Turin will touch on the research of STURP from my specific position in STURP. 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". 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

The brightest light of all

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Summary

The one hypothesis that has been found to be consistent with all the evidence regarding the Turin Shroud is that the primary image on the cloth of the crucified body of a man was the result of a momentary burst of radiant energy. This would account for the distance coded information, the "photographic negative" characteristics, the confinement of the image to the surface fibres and the absence of pigment in the main body of the image.

But How?…and Why? How did a corpse shine momentarily brighter than the sun?

Did he leave us a photographic negative imprint of the very moment of resurrection?

We do not appeal to the concept of "miracle" nor to the platitudes of "mystery" but intend to demonstrate through reasoned argument and scientific evidence that the possibility of such a phenomenon is not merely plausible but is self-evident from the fundamental axioms which describe what we humans call reality such as it is.

For example: $E = mc^2$ suggests that mass is 'condensed' energy. As yet this equation has not been generally considered to have relation to the sentient observer. Quantum theory, at least according to Erwin Schrödinger (and he should know) needs the presence of consciousness to bring the equations to life.

Physicists and cosmologists believe that a "theory of everything" would need to unite quantum theory with relativity through gravity.

Schrödinger himself contended that quantum theory was consistent with the unitary nature of consciousness. That fundamentally we are all one. However, our thoughts and actions belie this by our divisiveness, self-centredness, ego and ignorance which could take humanity to the brink of annihilation or "devolution" to become beasts.

If, as the equations, and our existence as incarnate sentient beings demonstrate matter is condensed "mindstuff" or "thought" then perhaps the man on the shroud conducted the greatest scientific experiment of all time by living a life that was an antidote to the qualities outlined above and therefore returned matter to the "light" from which it is derived.

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The copies of the Shroud

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Summary

The Shroud body image, faint yellow, has characteristics [1] completely different from those of the copies [2]. The analyses prove that the Shroud image is not the result of an applied material, as a painting or a printing. Moreover it was not obtained projecting a manikin on a sensitized cloth, singeing a cloth by a hot bas-relief or pressing it on a model treated by acid substances [3]. The characteristics of the Shroud image suggest that the best explanation for its formation is a short and intense burst of directional ultraviolet radiation [4].

The reddish stains are human blood not transposed by a brush but by contact with a wounded body that was wrapped already dead. No image is present under the blood stains. The deduction is that the image formation was following the blood transposition on the cloth [5].

The existence of copies of the Shroud, at least some fifty, does not constitute a problem of "rivalry" like someone, hastily and superficially, wants to make us believe. Also the most beautiful are of modest making and clearly appear like drawings. Under analysis they are revealed as composed by painting pigments.

They hardly ever copy the exact dimensions of the original Shroud. Not every copy brings the burn marks and the darns. Trickles of blood are very rarely reproduced faithfully. Most of the copies have the side wound in the correct position, that is, on the right, but in some of them it is reproduced on the left. Also regarding the hands, in some copies the left hand is positioned over the right one, in others the right hand is over the left one, but there are also copies with the hands not crossed. In some of the copies the thumb is not visible, in others, instead, it is visible. The hand wound in some cases is in the wrist, in others it is in the palm, in others it is not depicted. Some copies have the face with the shut eyes, others have the opened eyes. The feet are depicted crossed, diverging or parallel. The trickle of blood on the back is not always depicted.

Also the modern copies, realized by N.P.L. Allen, E.A. Craig, L. Garlaschelli, J. Nickell, V. Pesce Delfino, have characteristics completely different from those of the Shroud.

The aim of making a copy was not, however, to cheat the simple-minded faithful, pretending it was the authentic funeral sheet of Jesus; so much so that it is often written on the copy when it had been made and that it had touched the original relic. The existence of the copies reveals, instead, only a devotional aim: the desire of being able to pray in front of that sacred image in an age in which the photography did not exist.

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Crux Mensuralis of Grottaferrata and Shroud of Turin

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Summary

In an inconspicuous corridor leading to the medieval bell tower of the ancient church of Saint Mary in the Greek Abbey of Grottaferrata, a small town on the slopes of the Alban Hills south of Rome, there is a cross embedded in the wall at man height. The cross is rather unusual because it is different from the well-known Greek and Latin shapes, and it is made of the rare red porphyry. Moreover, it is so well hidden that the common citizens of Grottaferrata do not know its existence and, still more, almost all the guide and learned books describing the ancient and historical Abbey seem to agree on the point of totally ignoring the cross [1, 2]. However, when the few monks still servicing the Abbey are asked about the cross, they answer unanimously that it is a Crux Mensuralis (CM). But they do not know when, how and why it was brought there, although the oldest monk among them remember to have seen it in the same place as today since 1930, when he arrived as a novice at the Abbey. It is worthwhile to note that catholic priests of the same region do not know even the name of the CM, not to speak about its meaning.

Now, the CM is a slender Latin cross with the vertical and horizontal beams having the supposed dimensions of the height and width of Jesus Christ, respectively. The first ever CM was made by using silver and gold in the 6th century at the time of the Byzantine Emperor Justinian the Great, when the body measurements of Christ were taken from old relics in Jerusalem. Soon after, an image of Christ known as the Mandylion was found by accident in Edessa, now Urfa in Turkey, where it remained for few centuries until 944 when it was brought to Constantinople amid great celebrations. It was kept there as the most precious among many relics until 1204 when it disappeared along with practically all of them during the sacking of the city by the crusaders. But well before that fateful date it was reproduced in a great number of copies. At the same time the byzantine world developed a keen interest in the physical dimensions of the image believed to be that of Christ. Moreover, in order to allow every pilgrim to have a measure (mensura) at hand of Christ, a CM was erected just outside the huge basilica of Saint Sofia, most probably a stone cross.

Taking into account that the Abbey of Grottaferrata was founded in 1004 by Basilian monks coming from the southern part of Italy which was then Byzantine, it is reasonable to relate physically and temporarily the CM of Grottaferrata with the ones still existing in Constantinople at that time. Moreover, because the Shroud of Turin is believed by many experts to be nothing less than the Mandylion [3], connections between the CM of Grottaferrata and the Shroud of Turin are taken into consideration and will be critically discussed in the light of historical documents [4].

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Guided tour to the Exarchic Greek Abbey of St. Mary of Grottaferrata

http://www.abbaziagreca.it/en/index.asp

Thursday May 6th, 2010

Morning Session

The Sudarium of Oviedo and the Shroud of Turin. A question of authenticity

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Summary

The Shroud of Turin is among the most known, controversial and enigmatic of the archeological artifacts. It shows the image of a tortured man. Various marks resembling wounds are visible on the body image. Areas having the characteristics of scorch marks and water marks are also identified. Scientific research of the Shroud of Turin began in 1900 at the Sorbonne University under the direction of professor Yves Delage, professor of comparative anatomy. Additional tests have been performed on the Shroud by diverse scientific teams from Italy, USA and other. During the 1978 test program, members of STURP (Shroud of Turin Research Project) performed photographic imaging: visible, UV, and IR spectroscopy; IR termography; x-ray fluorescence analysis; and x-radiographic imaging. They also collected microscopic samples for chemical testing. Details of these tests with results can be found elsewhere [2].

The Sudarium of Oviedo, kept at the Cathedral of Oviedo, north of Spain, is less known. The Sudarium is a small bloodstained piece of linen (84 x 53 cm), but no image is shown in it. The Sudarium's existence and presence in Oviedo is well attested since the eighth century and in Spain since the seventh century. Before these dates the location of the cloth is less certain [1]. Scientific research of the Sudarium began in the mid 1960´s by Monsignor Giulio Ricci. The Investigation Team from the Spanish Centre for Sindonology studied the Sudarium in Oviedo for the first time in November 1989 and several times in the nineties. Apart from studying the cloth as it appears to the naked eye, photographs were taken from various angles and distances, and with normal light as well as ultraviolet and infrared light. Samples of dust and pollen were taken, as well as small samples of the cloth itself. Results of these studies and tests can be found elsewhere [3]. The Sudarium of Oviedo is also as controversial and enigmatic as the Shroud of Turin because many people believe both clothes are relics related to Jesus of Nazareth Passion and death.

The approach for the question of authenticity is a complex issue that should be supported by a combination of medical and scientific analysis, and the evidence from anthropology, archeology and history. This approach may be divided into three stages:

1. Establish that each cloth is a genuine burial cloth recovered from a grave or removed from a corpse.
2. Determine both clothes as belonging to a particular corpse.
3. Establish an association of both clothes with the historical person of Jesus of Nazareth.

The scope of this presentation is to describe how past research of both clothes, and particularly the research related to the Sudarium of Oviedo, may contribute to give answers related to the problems issued in stage 1, and partially in stage 2 of the approach proposed above, but are inconclusive for establishing the association of both clothes with the historical person of Jesus of Nazareth, that is stage 3. The comparative and multidisciplinary study of both clothes is a requirement for obtaining stage 3 results. Particularly, the use of new digital image processing techniques, quantitative color analysis and stains images matching algorithms can contribute to the realization of stage 3 of the authenticity approach.

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Medical and forensic aspects of the man depicted on the Shroud of Turin

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Summary

On the Shroud of Turin is depicted a faint image of a corpse of a naked, crucified man. In addition, many bloodstains of different origin, size, form and flow are observed. For more than a century researchers of different branches of science, including physicians, have examined this body image and bloodshed. Direct observation on the cloth, blood sample analyses, Shroud photo scrutinizing, experiments with bodies and living persons fixed on crosses have let to important physiological results relating to the sufferings and cause of death of the man on the Shroud. However, the interpretation of results and subsequent conclusions in some cases point in different directions.

This paper endeavours to clarify selected Shroud problems by help of medical disciplines within traumatology, neurology and forensic medicine:

Traumata of the nose, back and right knee are pointed out in order to describe the injuries upon an empirical background. The sequelae of flogging the thorax are investigated in relation to the side wound.

Under which conditions could the specific "ε" - shaped blood flow on the forehead have been formed?

The red color of the Shroud blood has been explained in chemical and physical terms. These explanations are checked by experiments.

Neurologic sequelae of a nail in the hand wrist: a denervated or stimulated motor nerve?

To illustrate standpoints the author has done experiments in his medical laboratory.

A medical study of the surface anatomy of the image and a medical forensic evaluation of the blood marks of the Shroud of Turin are presented in relation to image formation.

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Summary

The Shroud of Turin, a cloth made of flax, is approximately 14.3 feet long by 3.7 feet wide and contains the blood marks of a crucified man that correspond anatomically to the anterior and posterior negative images of the naked man seen on this cloth. Chemical and medical forensic studies of the blood marks prove that this is indeed blood from a crucified man. These blood marks were transferred to the cloth by a simple contact process. The images are totally a separate event from the blood marks. How these images occurred has been the subject of much discussion. Many theories (man-made, natural, and supernatural) of image formation have been postulated since the 1350's.

The present paper is a study of the frontal and dorsal images from the perspective of the surface anatomy of the images and will include a medical forensic evaluation of the blood marks. *First*, studies of the blood marks demonstrate how one end of the cloth was draped over the front of a body. From this information, we can appreciate the complexity of the surface geometry of the cloth onto which the frontal image of the body was recorded. *Second*, by studying the effect of gravity at the surface contact points of a body lying in the supine position, we understand how body weight affects anatomic form. From this study we are able to appreciate the complexity of the dorsal image formation that occurred on the other end the cloth on which the body was placed.

We demonstrate from these anatomical and medical forensic studies that body image formation was a dynamic event. In other words, during the formation of this image something remarkable happened which can be deduced from the evidence at hand. The possibilities of how the image was formed are discussed, and the final conclusion is the logical outcome of the evidence presented.

How are the acheiropoietos images produced?

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Summary

There are different images in the world claimed as Acheiropoietos such as the Turin Shroud, the Tilma of Guadalupe, the Veil of Manoppello and the Padre Pio Handkerchief; all them reproduce some human features but the respective representations are quite different.

Once evidenced the extreme difficulty if not the impossibility for a human hand to reproduce some details reported in those images, some questions about the techniques involved in image reproduction arise.

For example: - How and why can we recognize that an image is of Acheiropoietos type? - Does a common technique for the construction of Acheiropoietos images exist? - Which are the points in common of those images? - Which are the differences?

The paper will try to ask, at least in part, to some of these questions presenting a comparison of the four images mentioned above.

Acheiropoietos images: the Tilma of Guadalupe

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Summary

This presentation will start explaining how the Virgin of Guadalupe made possible that Mexico aroused as a united nation. After Mexico was conquered by the Spanish soldiers in 1521, the missioners also came with them, but it was very hard for the natives (Aztecs) to abandon their beliefs and accept the new religion: the Christian religion.

One of the reasons for this was the bad example that the Spanish soldiers showed toward the natives and to the Spanish missionaries as well. At this point the Bishop Juan de Zumarraga decided to close the mission and to return to Spain "unless a miracle happen". The apparitions of the Virgin of Guadalupe took place in 1531, the Tilma was "painted" on front of the Bishop who certified the miracle and from then on, many Aztecs converted and accepted the baptism. So the mixture of both cultures was possible due to the Virgin of Guadalupe.

A scientific presentation of some peculiar characteristics of the Tilma will follow. For example on the eyes of the Virgin many human figures are visible; the vegetal fibers constituting the Tilma do not show signs of deterioration when it is well known that similar fibers degrade after few tens of years; a bomb exploded at a distance of few meters during an outrage without damaging the Tilma; it was spilled by accident with HCl with slight damage; the positions of the stars in the Tilma's mantle is coherent with that of the time in which the "painting" formed; the temperature of the image of Our Lady was measured as that of a living body (36.6 °C); a few years ago an image of a shining fetus appeared on the Lady's womb soon after a mass against abortion.

Photographs of the Tilma also in the UV will be presented, but the information in the spectro-photometric field is not exhaustive even if recent Raman analysis showed that the pigments of the image are composed of substances not known in nature. In addition it has been detected that the pigments do not adhere to the fibers but seem to be as "suspended" in the fabric.

These and other particularities will be discussed showing the extreme difficulty if not impossibility to reproduce such a particular image.

The concept *acheiropoietos*, the icons of the likeness of Christ and the Veil of Manoppello

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Summary

Outside of the context of the New Testament the word *acheiropoietos* was used for the first time in byzantine legends and Greek historical writings with the meaning of an art object not made by human hands, often described as not painted, not made in a textile weaving, but by divine art, and put in comparison with the incarnation of the word of God in the womb of the Virgin Mary.

All eastern icons of the likeness of God have as her roots the likeness of Christ on a textile fabric, explained through legends, one of them - the case of the icon of King Abgar - as a miraculous impression of the face of Christ in a towel, and explained by another group of legends, of the so called image of Kamoulia or Kamouliana as the heavenly response on the desire of a woman who wanted to see Christ himself before get baptised.

I am convinced that only objects who are not understandable in so far one has the question of their fabrication could be the source of these legends. There were two objects with an image of Christ, one seemingly produced by impression of his face in a cloth, and one very fine and mysterious, so that nobody could give an explanation that goes farther than the real fact, that the image on the veil came directly from heaven.

Now, if we seek to representatives objects that correspond on all these conditions that we have described in very synthetic way, we can name for the first one the Shroud of Turin, and for the second one the veil of Manoppello. In other words: at the very ground and basic level of each legend or historical notice of an image of Christ done in a miraculous way, is to see an object like the Shroud or like the Veil of Manoppello.

That the same dependence is to be found even in the icons will be treated in the second part of my paper. All icons of the likeness of Christ, accepted in the eastern churches as true likeness are based on different readings and interpretations of an object as the Shroud and another thing like the veil of Manoppello. Perhaps the very roots of all these icons are the real still retained relics in Turin and in Manoppello.

Which are the reasons for the admission of the two relics in order to be considered all two as *acheiropoietos*? With this question will deal the third part of the paper.

The face of Manoppello and the Veil of Veronica: new studies.

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Summary

In recent years, studies on the Holy Face have experienced substantial growth, although, up to date, no scientific study has been published in a referenced journal.
Art-historical studies have suggested a possible identification of the Face of Manoppello with the Veil of Veronica kept in the Basilica of St. Peter in Rome. But how far and how can you take this path of research? This study proposes to address this issue in the light of recent new studies carried out by the author on the original manuscript *Opusculum de Sacrosancto Veronicae Shroud* (Code H3) by Giacomo Grimaldi kept in the Vatican Secret Archives and repeatedly brought as a crucial document by supporters of that thesis. Further research has been effected on the frame of the Holy Face, dating back to the fourteenth century and now preserved in the Museo del Tesoro in San Pietro. The author, professional photographer, also proposes some photographic analysis on the relics.

Properties of byssal threads and the chemical nature of colors of the Veil of Manoppello

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Summary

The chemical nature of the image pigmentation, fundamental for hypotheses of the origin of images seen from both sides of the Veil of Manoppello, is discussed on the basis of spectral and micro-chemical analysis of natural byssal threads of the mussel *Pinna nobilis*. Two questions are considered: (i) what pigment gives the natural brown color of byssal threads and (ii) is it possible to chemically modify this pigment in order to obtain colors seen in the Veil.

Natural byssal threads under investigation have different tints of a brown color. This color is unaffected either by typical solvents, strong reducing agents or neutral hydrogen peroxide at room temperature. However, in alkaline media peroxide brighten the color. In particular, the procedure similar to proposed for the oxidative degradation of melanins [1] results in suspension of pale yellow particles, but if action of peroxide is stopped earlier, threads become yellow with fragments completely discolored and with some damaged areas seen under microscope.

The results obtained point to melanins as pigments responsible for the color of byssal threads, which is not unexpected because melanins are the most popular animal pigments accountable for the color of skin, hair, eyes and feathers. Ratio of two main forms of melanins: brown-black eumelanin to reddish-brown pheomelanin is different in human hair of different colors [2]. Both are macromolecular systems forming cross-linked oligomers from units derived from aminoacids tyrosine and cysteine. The exact structure of melanins is still under debate and the observed color depends strongly on the chemical composition, structure of oligomers and the dispersion of pigment granules. In general, colors of melanin range from black through brown and red to yellow (i.e., colors of the Veil) and color changes can be induced by strong oxidants or bleaching agents.

In conclusion, it looks highly probable that some degradation of natural byssus pigments, melanins, is responsible for different colors of images on the Veil of Manoppello. Thus, there is some similarity with the image on the Shroud of Turin created by a dehydrative oxidation of the cellulose of the linen.

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The appearance of the changing images on the Veil of Manoppello. An examination of its implications for future scientific research through the discipline of photography

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Summary

One aim of this research is to establish reasons why this Veil is so unique. I want to examine the message that it has for us. I have decided to concentrate on the semantic image. Semantics requires that we see the relationship between the language of words and the language of images. It would be impossible to read the message contained in the Shroud without the words contained in the Gospels. In the same way, it is impossible to find the meaning of the Veil without reference to the Gospels. In the case of the Veil, for a deeper understanding, it is necessary to analyse the structure of the material. All the more so, as the Veil allows us to enter into a field of exploration in a very unusual way and to start to find the secrets which have yet to be fully revealed.

I have been convinced that this is the way to gain knowledge of the Veil from the time when I was photographing it and had little expectation of being surprised. In a similar way to the Shroud, its meaning, which is hidden from the human eye, can be revealed with the aid of photography. I am a professional photographer and, when taking pictures of the Veil, I imagined I was producing a documentary file and nothing more. In the meantime, I analysed the pictures I had taken on a computer and reproduced them on a monitoring screen; there were marked differences in the photographs. The differences can be fully appreciated as the images were laid exactly in line with each other (the precision being outlined on the photos) and then the changes became apparent. The observations simply go unnoticed on casual inspection. These details are exposed when the Veil is examined under differing light conditions. The appearance of the changing images on the Veil impelled me to try to discover their true meaning.

The question has to be asked if these differences are not the capture of split-second moments in time that have been recorded on the Veil. Can we also put these recorded moments in a chronological order for a complete detailed version? I believe that it would be possible, with the aid of photography, to take a maximum number of photos and, after putting them into chronological order, to make an animated version of the whole scene.

From what we have observed, any critical mind can only want to seek an interpretation.

Thursday May 6th, 2010

Afternoon Session

Can contamination be detected on the Shroud to explain its 1988 dating?

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Summary

The only scientific test result that is inconsistent with the authenticity of the Turin Shroud as the burial garment of Jesus Christ is its medieval dating result from 1988. This test result not only stands alone, but in stark contrast to an extensive amount of medical, scientific, archaeological and historical data. This extensive data not only consistently indicates the Turin Shroud is Jesus' actual burial garment, but that every element of the Passion, Crucifixion, Death, Burial and Resurrection of the historical Jesus Christ may have actually occurred exactly as these events are described in the Gospels.

Drawing on the author's [1] previous work, the conduct of the radiocarbon dating laboratories throughout the entire almost decade-long process to date the Turin Shroud is briefly reviewed. The Trondheim Protocol demonstrated that the new technology to date small samples was not sufficiently accurate with linen samples, and that the laboratories themselves were uncertain of its reliability with linen. Principally through its leader, Harry Gove, the carbon dating laboratories engaged in lengthy, even duplicitous, efforts to prevent scientific testing in 25 concurrent areas also designed to provide information regarding the Shroud's authenticity, age, origin, conservation and the cause of its image.

The Directors' lack of preparation and knowledge of the Shroud's previous test results, along with the elimination of concurrent testing and the involvement of other scientists possessing such knowledge, contributed to their failure to understand that historical or recorded events could have altered the cloth's carbon content or contaminated it [2]. The Directors' failure to also reveal their raw data, as they agreed several times to do, or to have the raw data analyzed before dates were ascribed and published, only postponed the subsequent discovery that the dates appear to follow a gradient [3], that the cloth is contaminated [4], and that the contamination cannot be removed by standard pretreatment cleaning processes, and could be present throughout the cloth [5].

A call for many forms of future testing is made in order to definitively determine whether the Turin Shroud has been repaired at the radiocarbon site; is contaminated; the type and cause of contamination and the cloth's actual age.

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A robust statistical analysis of the 1988 Turin Shroud radiocarbon dating results

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Summary

Based on the published results relative to the 1988 radiocarbon dating of the TS (Turin Shroud), a robust statistical analysis has been performed in order to test the reliability of these results.

The raw dates obtained from the three laboratories were disposed along the surface of the TS strip, cut in 1988, in 639679 different possible configurations and each configuration was tested using robust statistic methods.

The output of the procedure enables us to understand in a quantitative ways which are, among the 639679 possible configurations, those containing homogeneous data and which are those containing outliers. The *p*-values of the robust test statistics lead us to reject the null hypothesis that the ages measured by the three laboratories are homogeneous and suggest the presence of an important contamination in the 1988 TS samples that put serious doubts about the claim by Damon et al.[1] : "…the quoted errors fully reflect all sources of error…".

References

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Production of Radiocarbon by Neutron Radiation on Linen

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Summary

Based upon the Shroud's 1988 radiocarbon date of approximately 1325 AD [1], the hypotheses of Phillips [2], the comments of Hedges [4], the experiments of Rinaudo [3] and Moroni [5] and the robust statistical analysis of Riani et al. [6], we conducted additional experiments to determine a way to detect in-situ production of carbon-14 from a neutron-producing event or other ambient contamination that would decrease its measured age. Unbleached modern flax linen whose nitrogen content was measured to be 720 ppm was used in these experiments. At three different times, two linen pieces were irradiated in air and a third piece in carbon dioxide gas. Thermal neutrons having a fluence of 1.055 (±0.021) x 10^{14} n/cm^{2,} were used.

A theoretical model, based on the known reaction between neutrons and nitrogen to produce carbon-14, predicted the radiocarbon date would be in the future, 3972 AD. The radiocarbon date of the piece irradiated in carbon dioxide was in good agreement; it dated to 4043. A sample irradiated in air dated to 8451, but another dated to 4165 after it was heated to 245 Celsius for 75 minutes; this date differed by only 5% from the calculated date. This result demonstrates that the heat treatment removed the extra carbon-14 that came from the nitrogen in the air surrounding the linen that then diffused into the linen. Additional heating experiments showed that 99% of this extra carbon-14 would diffuse out again at room temperature in about 6 years. A variety of experiments also showed that the carbon-14 produced by neutron collisions with the indigenous nitrogen in the linen was not removed by various combinations of heating up to 175 Celsius for 75 minutes followed by all seven pretreatment cleaning procedures used in the 1988 radiocarbon dating.

Experimental results from the second piece of irradiated linen taken at a location 0.5 meter distant from the first piece were inconsistent with results from the first piece. Measurements of the nitrogen content at 18 different locations in the linen cloth showed that these inconsistencies were caused by varying nitrogen content at different locations, which ranged between 453 and 764 ppm and had gradients ranging between 3 and 96 ppm/cm, with and average gradient of 40 ppm/cm. Using these measured nitrogen variations and the verified theoretical model, calculations were made to predict the variation in radiocarbon dates if the linen cloth used in these experiments had been made in 33 AD and then received a neutron fluence of 8 x 10^{13} n/cm^2. Its average radiocarbon date, as measured in 1988, would have been 1331 and would have ranged between 1018 and 1632 at different locations spanning a distance of 1.5 m. The gradients of radiocarbon age at different locations would have ranged between 190 yr/cm and 5.9 yr/cm, with an average gradient of 78 yr/cm, which is comparable with the gradient observed for the 1988 radiocarbon results of 41 yr/cm.

It is concluded that if the Shroud received a neutron flux, its carbon-14 content would increase, causing its radiocarbon age to be too young despite receiving any of the above-mentioned heating treatments and seven pretreatment cleaning procedures. In addition, in agreement with Riani et al. [6], the measured radiocarbon dates varied from place to place because of variations in nitrogen content that occurred in the Shroud.

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Sensoristic approach to dating of cellulosic materials

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Summary

The dating of cellulosic ancient objects is of great importance as paper and textiles allow us to transfer cultural and social information from generation to generation. Many experimental methods are traditionally applied to this problem such as C^{14}, dendrochronology, NMR, ir, racemisation. For printed paper dating is favoured by the contained text and by the structure of the paper sheets.

All these methods present some doubts about their results, even if toward some of them, specifically C^{14}, there is a general confidence from the whole scientific community.

Our experience in the field of sensor sciences has advised us to look for some methods based on these devices able to be applied to the dating of cellulosic materials. The first approach we adopted is based on the progress of the carboxylation process of cellulose molecule with the passage of time due to hydrolysis and oxidation by radicalic reactions and ageing. The presence of carboxylic groups allows cellulose to behave as an immobilising agent of an enzyme, catalyst of a specific reaction. The catalytic action ensures a multiplying effect on the consumption of the reagents and consequently on the concentration of the final products. The number of immobilised enzyme molecules can be so sensitively evaluated and related to the age of the sample.

A second approach is based on another process suffered by cellulose that is the increase with the time of the alkylation degree. So by measuring the alkyl content by a demethylating enzyme is possible to evaluate the age of the samples. The enzyme for this aim is a transmethylase active in presence of a cofactor and what is measured by HPLC is the concentration of the product of the demethylation. This approach results to fail in the case of coloured samples.

Comparing the sensitivities of the two methods the former results more sensitive (about 100,000 times) than the latter: for the same age $6{,}8 \times 10^{-3}$ moles determined against 81,6 nanomoles. The former one is also more rapid and needs less weight of samples, that is a precious quality in this specific case.

We successfully applied both the approach to some samples of papers, textiles, woods supplied to us by private and public institutions, in some cases previously dated in some other blind. In two cases we revealed two false and a trap sample (modern qualified as old). The environmental conditions of ageing can affect the results but, according to our results, not at so determining level. This method does not want to represent a revolution but only a contribution able to bring information and evaluations starting from a point of view largely different from the other ones applied till now.

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ANOVA, a Robust Method to Evaluate AMS Radiocarbon Data

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Summary

Ever since the publication of the Damon et al. paper [1] about the radiocarbon dating of the Shroud, the validity of the claimed 95 percent confidence has been questioned.
ANOVA (Analysis of Variance), a novel method to judge multiple measurements and to evaluate random and systematic errors has been used and promoted by the National Institute for Standards and Technology (NIST) in the United States [2].
ANOVA is also referred to as Inverted Beta [3].

The Nature article [1] noted that this type of analysis had already been known to Dr. Leese of the British Museum [4], who used an analysis of variance to estimate the t_d value, which lies between the inter- and intra –laboratory degrees of freedom.

In this paper we will use ANOVA to analyze for verification the 1986 radiocarbon dating of the Shroud, using a theoretical model, based on counted ^{14}C. By this method one can compare the *internal* (or *within*) variability with the *external* (or *between*) variability of radiocarbon measurements.

To pass the F test, the calculated Ratio $F = \Sigma (E^2)/\Sigma (I^2)$ must be equal or lower than the tabulated values, given in statistical tables. In theory, one should use only ^{14}C particles counted by a computer operated AMS facility. In practice, radiocarbon years are much easier, and provide a valid way to evaluate scientifically AMS measurements.

The theory of the method and all calculations made by a computer program will made available to the conferees.

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4, 5 and 6 May, 2010

POSTER Session

The Manoppello Veil
compared with the Turin Shroud and with other grave cloths of Christ.

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Summary

In the last century the Turin Shroud was generally considered as the only important relic from the tomb of Christ that has remained throughout history of Christianity. But there have always been existing others, less well known, as the Sudarium of Oviedo in Spain and above all the Veil of Manoppello in Italy.
A photographic comparison of the face of the Turin Shroud and the face in the Manoppello Veil has revealed very strong relations between both relics even if there seems to be no similarity. The Turin Shroud shows a dead person after crucifixion, with signs of a coronation with thorns, a broken nose, with swollen parts of the face and hurt eyes. The Manoppello Veil shows a living person with the same particularities of wounds and deformations. Both faces have the same asymmetry and show the same irregularity in deformations. There is a possibility to put together the hurt marks in a way that results in one single and congruent face. The traces of the images confound with one another and certain deformations appear more clearly and distinctly, for instance the traces on the broken nose. In both relics the mouth appears as if open and the teeth are equally visible. The difference between both images lies in the fact that there is a vital aspect in the Manoppello Veil whereas the Turin Shroud shows the dead body aspect of the same person.
A group of scientists (EDICES) have made researches on the relation between the Turin Shroud and the Oviedo Sudarium. They have verified the same group of blood (AB), only post mortal blood, and also that the position of the cloth never has been changed during the procedure of the Descent of the cross. The Oviedo Sudarium in the place of the central part of the face in consequence has real imprints of wounds that correspond exactly with the hurt marks in the Manoppello Veil along the nose and on the upper lip. There is no contradiction between the wounds in the Oviedo Sudarium, the Manoppello Veil and the Turin Shroud. These three grave cloths are documents of the Passion and the Death of Jesus Christ, but they would not exist today if there had not been an event that has extinguished the death.

The face on the Shroud and on the Veil of Manoppello

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Summary

The Shroud of Turin and the Veil of Manoppello do not only belong to the most remarkable objects in the frontiers of physics, but – because of the correspondence between the two faces – they also supply evidence of both these images representing one and the same person.

For me as a paranormologist, however, the foremost question was whether the congruencies shown were that consistent to be defined as being out of the ordinary. For an answer three requirements had to be fulfilled:

I had to take my own photos on the spot and to make a sketch of the points of congruence between the face on the Shroud and the face on the Veil. With this sketch of several points of orientation and the specific points of congruence, which I proved on the Shroud of Turin, the Veil of Manoppello and other images of Christ, I came to the following conclusions:

1. The correspondence between the face on the Shroud and the one on the Veil is, as far as the selected points are concerned, highly significant.
2. The faces on the Shroud and the Veil show one and the same person.
3. The highly significant correspondence between the faces on the Shroud and the Veil can – in terms of physics – not just be explained by putting the one on top of the other: because of the differences in consistency, folding and refraction of light between the two cloth and because the Shroud bears the face of a dead person whereas the Veil bears the face of a living person.
4. The highly significant correspondence between the faces on the Shroud and the Veil with images of Jesus Christ dating from the third century proves that even in those days there existed stringent norms concerning the proportions when portraying Jesus Christ which were taken from the face on the Veil and not from the one on the Shroud. This suggests that the face on the Veil as the holy legacy of the image of the face of Christ had already been known to Christians before the third century.

The Scientific Method and the Shroud of Turin

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Summary

What is the "ultimate" scientific method? We tackle this question in general and in particular for the Shroud of Turin. We show that the scientific community accepts some variations of the "scientific method" but that **reproducibility** is always an ultimate and essential characteristic. Repeatability is a similar concept where accuracy, precision, and statistical variations are involved. Repeatability implies reproducibility. Our presentation focuses on reproducibility. If we cannot reproduce an experiment (natural science) or a series of logical steps in a proof (mathematics) the experiment or proof is typically rejected by the scientific community. This is indeed a very good reason for rejection. The lack of reproducibility might have many sources: lack of access to the artifact tested, lack of precision in the description of an experiment, and so on. For example, we cannot reproduce the 1988 radiocarbon dating of the Shroud of Turin for the simple reason that the sample used to date it was burnt (i.e., destroyed) in the process --- the sample cannot be burnt a second time. We cannot also reproduce an experiment that required a rare instrument accessible only to a restricted group. But, despite the l ack of reproducibility, some experiments are still labeled as "scientific". For example, in 1919, Eddington and colleagues reported light deviation by the Sun during a total solar eclipse. It was not possible to reproduce this specific experiment immediately by other scientific groups although it was accepted as a strong evidence for the General Theory of Relativity. This was based on trust and the possibility of reproducing a similar experiment at a latter time. In this class of experiments, **trust** is an essential element in accepting a scientific result, but it is not as acceptable as complete reproducibility. Typically, an experiment based on trust must eventually be replaced by a complete reproducible experiment before its results are accepted by a majority of scientists and the general public. Through several historical examples, some involving the Shroud of Turin (e.g., the 1988 radiocarbon dating), we elaborate on these classes of scientific experiments and show that reproducibility is always an essential element for acceptability. Furthermore, based on these general principles, we suggest acceptable venues for publishing scientific results on the Shroud. For example, due to the general non-accessibility of the Shroud, we propose that standard Shroud photographs be accessible on the Web such that references can be made to them. We also briefly describe how reproducible length measurements can be done using an available tool on the Web. Finally, standard scientific practices can only be maintained if scientific publications on the Shroud enforce them: how this can be done is still a difficult issue for the community of Shroud researchers.

Does the Shroud of Turin Really Bear the Image of a Man Crucified "Under Pontius Pilate"?

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Summary

A thorough eidometic [1] examination of the areas of the orbital and near orbital counter-imprint of the Man of the Shroud of Turin confirms the presence-absence of nearly circular small objects. These prove closely associated with tiny blood decals each time suggestive of the letters of a very fragmentary inscription running around the vestige of a central motif. From a numismatic point of view, they might turn to two small Roman colonial coins known as the *lepton simpvlvm* and the *dilepton litvvs* minted by Pontius Pilate 29-32 AD. Two coins whose faint haematic traces left on the fabric had been more "sensed" than correctly identified up to now.

So much so that in order to leave no or very little room for subjective interpretation and unconscious bias, the best 2D and 3D images available (old and new ones from Enrie's 1931 photograph) [2] of the said areas have been submitted to a more appropriate eidomatico-numismatic reading grid. For the first time it clearly shows that both coins had been originally orientated along the vertical axis of their obverse: the one on the right eye with the central device of the *dilepton* (an augur's staff or *litvvs*) almost exactly right-side down and the other on the left eye with that of the lepton (a libation ladle or *simpvlvm*) exactly right-side up (which is in blatant contradiction with past and more hazardous observations). From the reduced scale (1/2) stroboscopic counter-imprint of the latter money type on the arch of the left eyebrow (the resilient burial cloth being initially tightly stretched in this precise area), it is even possible by computer enhancements to reconstruct the trajectory of the small coin initially placed on the left eyelid: while rotating either 170° clockwise or 190° counter clockwise, it had fallen off the eyelid lowered to half and then gradually slipped to the middle of the arch of the eyebrow after the head of the crucified man had been wrapped in the wet shroud and in a veil with a rolled up sudarium or band tied around and on top at eye level in a knot at the back.

Thus starting from the first year the two coins were struck by Pontius Pilate to his last year in office in the Roman province of Judea; the shroud image can be conclusively given the most probable average date span 29-36 AD.

Notes

[1] I.e. in relation to eidomatics or electronic imaging.

[2] In 1978, the already faint blood decal in the right eye image area was irretrievably damaged by Max Frei's too vigorous pressure of a sticky tape on the linen cloth.

Why Jesus did not bring the patibulum but the whole cross

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Summary

About forty years ago G. Ricci [1, 2] suggested that Jesus carried only patibulum on his shoulders and not the entire cross. In support of this hypothesis Bishop G. Ricci alleged the two roundish spots appearing on the back of the Shroud. Those spots were caused by the epidermis of the Shroud Man rubbing on the patibulum scraggy wood. That hypothesis was welcomed, perhaps for the reason of not being able to give a different explanation to the two spots.

Nevertheless, this hypothesis does not seem realistic for two main reasons. The first is that Jesus wore, as it is reported in the Gospels, a honor robe. Normally under the robe a lighter garment was worn. This second garment could also be the Tunic of Argenteuil, which is more a petticoat for both the fabric lightness and its size. These two garments acted as a pad between the skin and the rough wood of the patibulum. The rubbing would, first of all, ruined the fabric of the tunic causing irretrievable loss of value. Loss that is both contrary to the Gospels and to the fact that that garment was so valuable as to prohibit the division to the executors into many pieces. Also, if friction had been there, it would have covered the spine and shoulder. In the spine area however it does not appear any excoriation.

The other reason is that the shaft brought up in correspondence of the shoulders is an unnatural position. The weights are carried on the shoulders and not on the back. The shaft loaded on the shoulder blades would drag back the prisoner. Author's experiments have led to infer that this was not the way to bring a shaft.

Those spots were perhaps caused by the limited movement that the Shroud Man had to do on the cross in order to breathe. Those spots on the shoulder image cannot therefore be related to the patibulum transport but to other events that should be better studied in the future.

References

[1] Ricci G., "La Sindone Santa", Centro Romano di Sindonologia, Holy Shroud Guild, Esopus, New York, 1976.

[2] Ricci G., "Historical, Medical and Physical Study of the Holy Shroud", Proceedings of the 1977 United States Conference of Research on the Turin Shroud, Albuquerque, New Mexico, USA, K. Stevenson ed., Holy shroud Guild, 1977, p. 58-73.

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