

1 Letter to the Editor

2 Comments on "Life-Size Reproduction of the Shroud of Turin

3 and Its Image" by L. Garlaschelli

AQ: 5 The main characteristics of the double body image on
#1 6 the Turin Shroud (TS) are widely described¹⁻³ and are so
7 unique that they seem not yet all together reproducible. The
8 article published by Garlaschelli⁴ describes his reproduction
9 of the TS in this way: "...the authors were able to obtain a
10 good replica of the Shroud of Turin at a 1:1 scale that pos-
11 sesses all the above-mentioned features and the same visual
12 and spectroscopic properties as the original." The features of
13 the TS image considered by Garlaschelli are the following:
14 the image is faint, superficial, and pseudonegative with
15 three-dimensional (3D) information and consists of a dis-
16 coloration of the most superficial fibers of the fabric.

17 In agreement with Ref. 5, a misunderstanding arises
18 which seems due to the fact that Garlaschelli considered only
19 some aspects of the TS image but not all. Particularly,
20 Garlaschelli does not consider the important facts detected
21 through the microscope on the TS as described in Ref. 1. For
22 these reasons the present authors do not agree with
23 Garlaschelli's conclusions which state, "The most likely ex-
24 planation, in our opinion, is that the image, as it can be seen
25 today, is a chemical etching of the cellulose of the linen
26 fibers." First of all, according to Fanti et al.¹ the cellulose of
27 the TS fibers is not colored; the color does not penetrate into
28 the fiber but it is found only as a 0.2- μm -thick thin layer at
29 the surface of the fiber. Second etching colors the whole
30 cellulose of a linen fiber, and it is for this reason that, in
31 agreement with Ref. 6, etching seems not to be a reliable
32 hypothesis for the explanation of the body image formation
33 on the TS.

34 There are *many statements* in Garlaschelli's paper⁴ that
35 seem not in agreement with the present authors' under-
36 standing of the TS. Some of them are commented here be-
37 low.

38 1. "[In 1973] ...Standard forensic (both chemical and
39 microscopic) tests for *blood* were all negative; in-
40 stead, particles of a red pigment, ...were found." It
41 should be stated that, according to the final report
42 itself, these tests were "not positive" but not "nega-
43 tive" in the sense that no definitive proof could be
44 given because of the lack of solubility of the red
45 material. A few years later instead, during the
46 STURP examinations, the blood was found to be

real human blood by about 15 tests including spec- 47
troscopy, microchemistry, and immunology.^{7,8} 48

2. "The results of *STURP's* work were published..." 49
and the following list should be right if properly 50
improved by newer data; for example,⁸ "The image 51
resides in the topmost fibers of the flax threads and 52
does not show on the underside." is a sentence that 53
should also consider the more recent data of 2002.⁹ 54
3. Regarding the C14 dating, "...the linen used to make 55
the Shroud had been harvested somewhere between 56
1260 and 1390 C.E.¹⁰" Garlaschelli should also con- 57
sider a more recent result¹¹ that put in discussion, 58
from a statistical point of view the results published 59
in Ref. 10, as well as the published papers showing 60
strong anomalies in the C14 dated "corner."^{12,13} 61
4. "... it is a physical *impossibility for blood oozing from* 62
the scalp to flow at the outer surface of the hair..." 63

In agreement with Refs. 6, 14, and 15, it is physically 64
possible if two different events, the production of the blood 65
marks and the formation of the image, are considered. 66

5. "...*long hair* ...could not possibly leave the kind of 67
imprint one can see in the Shroud." 68

Other publications^{6,14} explain just how such an image of 69
hair can be obtained using corona discharge. 70

6. "...apparent lack of the wrap-around *distortions*..." 71
Some small lateral distortions, consistent with a 72
cloth draping a body, have been evidenced by vari- 73
ous researchers.^{16,17} 74
7. "...the *fingers* look so puzzlingly unnatural and ana- 75
tomically unconvincing..." 76

In agreement with Ref. 6, this is just the result of wrap- 77
ping. 78

Garlaschelli's first experiment (ochre dry powder) has 79
one major advantage: it is, according to Garlaschelli himself, 80
the only way to obtain a fuzzy image even if the fuzziness of 81
the TS image is difficult to obtain,¹⁸ especially for smaller 82
human parts such as the fingers. However, it is unlikely that 83
a medieval artist could use dry powder. Without some kind 84
of binder, most of the powder would have fallen off 85

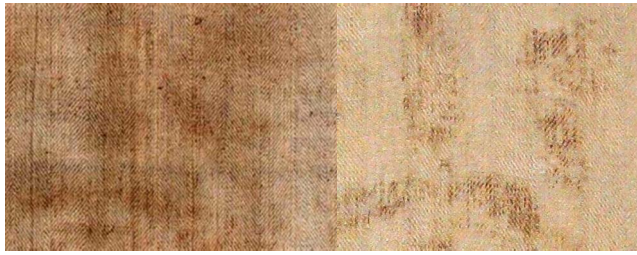


Figure 1. Detail of the TS face on the left and of the Garlaschelli face on the right (contrast enhanced).

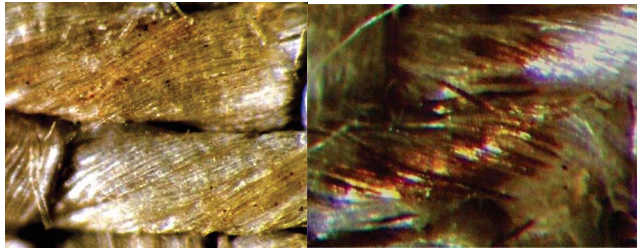


Figure 2. Typical TS image color distribution of threads on the left (© B. Schwartz) and typical Garlaschelli image color distribution on the right (both contrast enhanced).

86 quickly.¹⁹ Thus, as the TS was rolled and folded many times,
87 we should also observe some colored spots outside of the
88 image area, and the image itself should not be continuous, as
89 it is on the TS.

90 Most importantly, Garlaschelli himself has shown that
91 no image at all could be obtained, after artificial aging, by
92 any kind of sensitizing substance in the solid state, although
93 the same acidic substances in the liquid state easily discolor
94 the cellulose. This alone seems sufficient to eliminate this
95 “dry powder” hypothesis.

96 In reference to Garlaschelli’s second experiment (rub-
97 bing with acidic pigments in the form of a “slurry”), we
98 read, “...the image is not as *fuzzy* as the one generated pre-
99 viously by rubbing with a dry powder, but it is still accept-
100 able.” Figure 1 shows the contrary. The image is not con-
101 tinuous and has no fuzzy contour. There is no color at all in
102 noncontact areas. The image/nonimage spatial variation
103 (image resolution) in Garlaschelli’s experiment is less than 1
104 mm while it is 4.9 mm for the TS.²⁰ From our point of view,
105 this result is not “acceptable,” and the reason is the tech-
106 nique itself.

107 Garlaschelli states, “Microscopic photographs at ca 50
108 × magnification showed that the image was indeed made up
109 of several discrete *discolored spots* on the top fibers,” but on
110 the TS, the color covers the main part of the surface of the
111 exposed thread (no spot) and shows a clear tendency to
112 follow the direction of the fiber (striation) (see Figure 2).

113 At the fiber level, contrary to TS fibers that
114 circumferentially show uniform color¹ around the fibers,
115 tests similar to Garlaschelli’s second experiment show that
116 the color is only on the side of the fiber’s surface exposed to
117 the acid (see Figure 3). Therefore, the properties of the
118 Garlaschelli image are very different from the amazing and

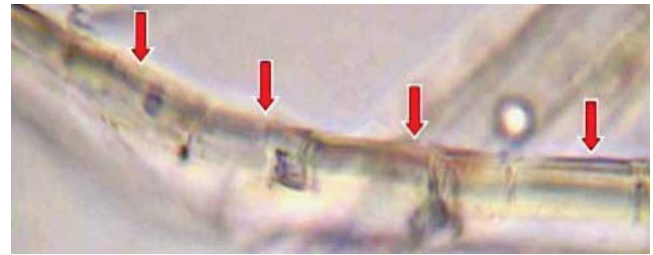


Figure 3. The color is only found on one side of the surface (arrows) in a test similar to Garlaschelli’s second experiment.

critical properties of the TS image with respect to color dis-
tribution.

The second experiment provides an image which has
some of the properties of the TS image, but careful exami-
nation shows that many *fundamental* properties of the TS
image are not verified: the Garlaschelli image has no fuzzy
borders; it is not continuous (discrete dark spots) and it has
no image in noncontact areas; and, consequently, its 3D
properties are far from the extraordinary precise and realistic
3D front and back body images of the TS. The distribution
and properties of the color at the surface of the threads and
of individual fibers is also very different.

Finally, the proven fact that there is no image color under
the blood stains on the TS, which demonstrated that the
blood was first on the linen and prevented the formation of
the image in those areas, remains very difficult to understand
in any hypothesis involving a forger (including Garlaschelli’s
hypothesis).

Incidentally, from Garlaschelli himself (personal email
to the second author), there is, as expected, no fluorescent
halo around his “blood stains” made of pigments, contrary
to the serum haloes present on the TS.

We therefore conclude that the TS image was not pro-
duced by the technique proposed by Garlaschelli and still
remains not reproducible.

REFERENCES

- ¹G. Fanti, J. A. Botella, P. Di Lazzaro, T. Heimburger, R. Schneider, and N. Svensson, “■”, *J. Imaging Sci. Technol.* **54**, 040201 (2010).
- ²G. Fanti, J. A. Botella, F. Crosilla, F. Lattarulo, N. Svensson, R. Schneider, and A. D. Whanger, “List of evidences of the Turin Shroud”, *Proc. Int. Workshop Acheiropoietos Images* (ENEA, Frascati, Italy, 2010).
- ³R. Basso and G. Fanti, “Optics research applied to the Turin Shroud: Past, present and future”, in *Optics Research Trends*, edited by P. V. Gallico (Nova Science, New York, 2007).
- ⁴L. Garlaschelli, “■”, *J. Imaging Sci. Technol.* **54**, 040301 (2010).
- ⁵T. Heimburger, “Comments about the recent experiment of Professor Luigi Garlaschelli”, <http://www.shroud.com/pdfs/thibault-lg.pdf>.
- ⁶G. Fanti, “■”, *J. Imaging Sci. Technol.* **54**, 020508 (2010).
- ⁷J. H. Heller and A. D. Adler, “■”, *Appl. Opt.* **19**, 2742 (1980).
- ⁸P. L. Baima Bollone, M. Jorio, and A. L. Massaro, *Sindon*, Quaderno No. 30, 1981, pp. 5–8.
- ⁹G. Fanti and R. Maggiolo, “■”, *J. Opt. A, Pure Appl. Opt.* **6**, 491–503 (2004).
- ¹⁰P. E. Damon, D. J. Donahue, B. H. Gore, A. L. Hatheway, A. J. T. Jull, T. W. Linick, P. J. Sercel, L. J. Toolin, C. R. Bronk, E. T. Hall, R. E. M. Hedges, R. Housley, I. A. Law, C. Perry, G. Bonani, S. Trumbore, W. Woelfli, J. C. Ambers, S. G. E. Bowman, M. N. Leese, and M. S. Tite, “■”, *Nature (London)* **337**, 611 (1989).
- ¹¹G. Fanti, F. Crosilla, M. Riani, and A. C. Atkinson, “A robust statistical analysis of the 1988 Turin Shroud radiocarbon dating results”, *Proc. Int. Workshop on Acheiropoietos Images* (ENEA, Frascati, Italy, 2010).

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