

THE STOCHASTIC MECHANISM THAT PRODUCED THE LATENT IMAGE ON THE SHROUD OF TURIN

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Abstract

In recent papers we presented and described a new and realistic hypothesis around the Shroud body image formation. We can now show that the charm of the Shroud remains unaltered in spite of the extraction of the mechanism of the Shroud body image formation. The interest of the scholars will be transferred from both the 3-D characteristics and the negative properties to the impossibility of extracting the energy source that triggered, by a small quantity of energy, the stochastic process.

Keywords: Shroud of Turin, stochastic fibrils distribution, latent image

In the article[1] we have shown that the fibrils which yielded the Shroud body image have a stochastic distribution in the region where the image lies. Therefore, on the Linen of Turin there is a latent image produced many years ago.

This result is very important because it makes clear the “Shroud question” which has endured for a century: the image is not a medieval forgery, as described in an interesting article, a synthesis of the work done by the STURP members[2]. The Shroud body image is the result of a stochastic process of cellulose oxidation and dehydration triggered by a small quantity of energy[1].

The discovery of the mechanism of the Shroud body image formation does not agree with the recent studies reported in Refs. [3,4]. These two works, with different approaches and results, cannot reproduce the chemistry of the image at a microscopic level. In fact, the two attempts are not able to discern the fibrils that must be yellowed from the other ones that must retain the background optical density value [5].

Since the fibrils are of the order of 10-15 μm and the linen contributing to the body image is yellowed at a thickness of about 20-30 μm [6,7], only a stochastic phenomenon can yield a yellowed fibril distribution as on the Shroud. The macroscopic result is a correlation between the image intensity (or yellowed fibrils density) I and the cloth-body distance z , well represented by a linear regression:

$$I(z) = I_b + I_M (1 - z / R_0), \quad (1)$$

where I_b is the intensity of background colour, $I_b + I_M$ the intensity in the contact areas (where $z=0$)

and R_0 is the cloth-body distance, which gives $I(z) = I_b$. The first term of the equation (1) is due to the action of electromagnetic radiation, the second is the contribution of the cloth-body interaction by stochastic effects.

We underline the fact that deterministic effects must be excluded because they cannot reproduce the mix of fibrils present on the surface of the Shroud of Turin. In fact, the yellowed fibril distribution in the Shroud region where the image lies is stochastic: (i) the probability of a fibril yellowing is a function of the energy received from the linen, (ii) the optical density value of a fibril is not a function of the above energy [1].

Successively, we have shown that the natural mechanism that led to the latent image is able to explain the chemical and physical characteristics of the Shroud body image[8]. This confirms that the attempts described in [3,4] produce images that are different from that obtained by a natural process [1,8]. In the off-image area, the fibrils have only the background colour. In fact, in these regions there was no interaction between the human body and the fabric.

The existence of the correlation described in (1), allows for a 3-D reconstruction with no distortion. Moreover, the Shroud body image appears as a photographic negative. This last discovery was made by chance (on 25 May 1898) by an amateur photographer, (Secondo Pia), who, unconsciously, started research on the Shroud of Turin. Over time, both the characteristics have endowed the Linen of Turin with a certain charm. Nowadays, this burial cloth is known as the most studied object in the world.

Our attempt has verified that the latent image explains the chemical and physical characteristics of the Shroud body image. Unfortunately, it has also showed that the 3-D and the negative properties are a consequence of the above formation mechanism [8]. Indeed, these are the results of the stochastic process. Therefore, the Shroud loses part of its charm.

Now, by a careful analysis of the latent image formation [1], it is clear that various energy sources could have acted providing the little quantity of energy necessary to start the stochastic effects. In such a case, the nature of the stochastic phenomena does not permit the extraction of the energy sources that triggered the process and generated, over a few decades, the image by oxidation and dehydration of the cellulose structure.

Therefore, the Linen of Turin recovers the lost charm that even increases if we take into account that no other cloth exists with images produced by stochastic effects. This latter question is not clear because the formation mechanism is natural. It is not understandable and needs further studies. In every case, the charm of the Shroud of Turin is safe.

Finally, to resolve the “Shroud question” a new radiocarbon dating is necessary to solve the uncertainty [9,10] of the authenticity of the 1988 sample, extracted from the bottom left of the Shroud of Turin.

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