Could an anomaly in Turin Shroud blood reopen the 1988 radiocarbon-dating result?

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Readers of the Summer 2021 edition of the BSTS Newsletter may recall that it included an article by Robert Rucker describing the neutron absorption hypothesis, which many consider to be a plausible explanation for the medieval result of the 1988 radiocarbon dating test. Since then, a scientific paper documenting the results of a spectroscopic analysis of Shroud material has been published in *World Scientific News* [1]. This analysis was conducted by Giulio Fanti of the University of Padua in Italy and has revealed some significant new evidence that may prove to be the first qualitative verification that the Shroud has at some time been exposed to neutron radiation.

This hypothesis dates back to 1989 when Physicist Thomas Phillips proposed that radiation may have been emitted from the body of Jesus Christ during the resurrection [2]. He believed that this radiation could have been responsible for the Shroud's extraordinary image and if it involved the emission of subatomic particles such as neutrons, it could have also caused a 1,300 year error in the radiocarbon date. These neutrons would have collided with nitrogen atoms that form part of the molecular structure of linen, transforming them into carbon-14 atoms. As radiocarbon dating calculations are based upon measurements of carbon-14, any increase caused by neutron radiation would cause the date results obtained by the laboratories to be more recent than the true date.

Clearly, if nitrogen atoms present in the Shroud had been transformed into carbon-14, there must have been a reduction in the amount of nitrogen remaining in the cloth. The objective of this new research was to find evidence of such a reduction by examining samples of Shroud fabric. However, this is extremely difficult in practice due to the scarcity of material taken from the Turin Shroud that is available for scientific study. The only materials available for research are a very small number of flax fibres, microscopic fragments of blood and other particles embedded in adhesive tapes that have been taken by authorised researchers during the past century. Consequently, all types of destructive or highly invasive tests normally employed in the course of this type of research have to be excluded at present and traditional tests that require amounts of material greater than that contained in micrometric particles cannot be considered.

Evaluation of Nitrogen Concentration

To overcome these constraints, the analysis employed a technique known as Energy Dispersive X-Ray Spectroscopy, which is a non-destructive method of analysing samples to identify their constituent elements. The spectrometer was also coupled to a scanning electron microscope to enable this technique to be used with microscopic samples of Shroud material. The spectra produced when analysing samples using this equipment configuration show peaks corresponding to various chemical elements, with the height of each peak providing an indication of how much of each element is present. Therefore, if the Shroud had been exposed to neutron radiation, the peak corresponding

to nitrogen should be reduced in amplitude.

One limitation of this instrumentation is that it produces a low level background noise on all frequencies of the spectrum, which masks the smallest peaks. The original intention was to measure the nitrogen content in linen fibres, but this is typically less than 0.1% and the resulting peak is too small to be detected. However, some of the Shroud materials also contained blood, which has a nitrogen content of approximately 10% that will create a peak that rises well above the instrument noise. Since this blood was already on the Shroud when the resurrection occurred, it would also have been exposed to any neutron emissions that may have been produced. Some of the nitrogen in this blood would therefore have been transformed into carbon-14 and since nitrogen is clearly visible in the spectrum obtained from blood, it should be possible to detect any decrease in the amount present. For this reason, this research began to focus on the analysis of tiny fragments of blood taken from the Shroud.

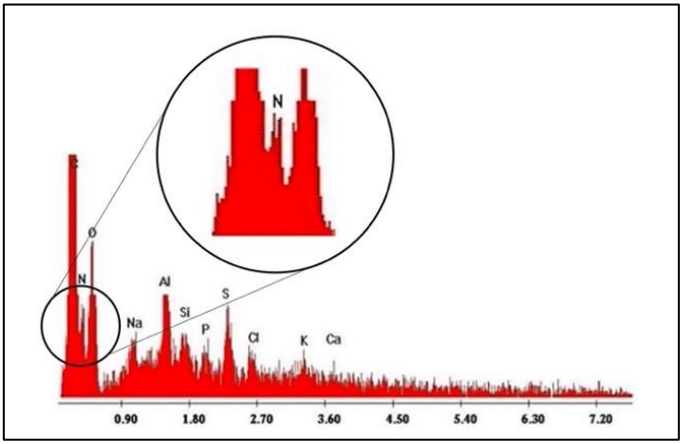

Fig. 1: The spectrum produced by a sample of human blood. The area of the spectrum which corresponds to nitrogen is highlighted, showing a clear peak which confirms the presence of nitrogen.

The instrumentation described above was used to produce a spectrum from a sample of typical human blood, which is shown in fig. 1. The highlighted area of the spectrum shows a clear peak, marked with the letter N, corresponding to the presence of nitrogen. Three different spectra were also produced from samples of blood that had been removed from the Shroud during examinations in 1978: a blood crust from dusts vacuumed from the face area, a blood crust removed with adhesive tape from a bloodstain at the left wrist and a bloody fibre removed using adhesive tape from a bloodstain near the feet. Figure 2 shows the spectrum produced by the blood from the face area, which shows that any possible nitrogen peak is so low that it has been masked by the instrument noise. The spectra of the two samples taken from near the wrist and

the feet also indicated an absence of nitrogen.

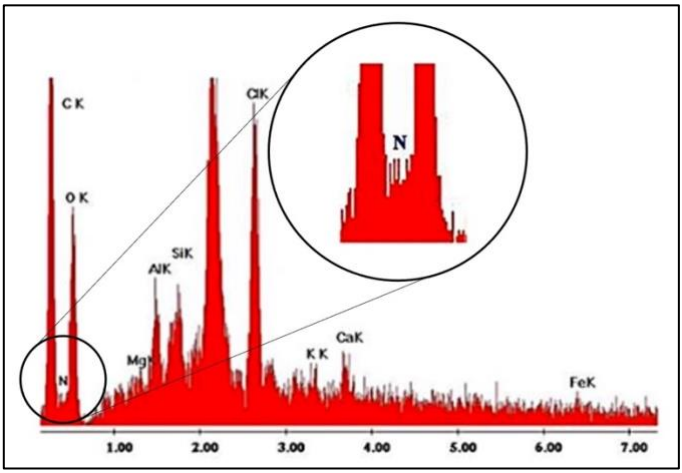

Fig. 2: The spectrum produced by a blood crust taken from the face area of the Shroud. Only background instrument noise is seen in the area where we would expect to find a peak corresponding to nitrogen. This indicates the absence of nitrogen in the blood crust.

Conclusions and Next Steps

This anomaly in the blood removed from the Shroud, which gives no indication of nitrogen in the blood spectrum, is not easy to explain as there is no obvious chemical or biological reason why the nitrogen content of blood proteins should have reduced so drastically over time. However, one possible explanation is the one offered by the neutron absorption hypothesis: that a burst of energy which produced the front and back body image of the Shroud also altered the isotopic percentage of carbon atoms present in the Relic.

This is a notable discovery which appears to provide support for this hypothesis but more work is needed to obtain additional evidence to corroborate these findings. For example, a hypothetical burst of neutron radiation would have also affected other elements present in the blood and the linen fibres, such as sodium and chlorine, so these elements may also show changes similar to those observed for nitrogen. It is also important to find a way to determine whether the linen fibres show any evidence of nitrogen reduction similar to that found in the Shroud blood. Unfortunately, the minimal amount of Shroud material available for scientific study presents a challenge to those wishing to pursue either of these lines of research. However, should there ever be a future radiocarbon dating test of the Shroud, it is essential that prior to the test, some fibres are removed and analysed for signs of any isotopic transformation such as those described above. The results of this analysis would provide a good indication of whether the cloth could have been exposed to neutron radiation and consequently, whether any subsequent dating results are reliable.

In the meantime, there are other experiments that can be done to help validate whether neutron radiation can explain the absence of nitrogen in the blood found on the Shroud. The results obtained from this recent research have captured the interest of the Shroud Science Group (SSG and SSG1[1]), which is a multinational group of over a hundred academics, researchers and scholars, who share, debate and challenge new ideas and discoveries relating to the Shroud. The research has been given an enthusiastic reception by some members who recognise that it has opened up a potential new area of Shroud science which scientists should explore. Others have expressed doubts that neutron radiation alone can account for the apparent absence of nitrogen in the Shroud blood and believe that there must be some other explanation for its absence. A key question which therefore needs to be addressed is whether the intensity of neutron radiation needed to cause a 1,300 year reduction in the age of the linen could possibly have transformed all the nitrogen in the blood into carbon-14.

This has prompted some SSG1 members from Italy, Spain and The United States to collaborate with Giulio Fanti on a series of follow-up experiments which may help to answer this question. These experiments will involve dripping small amounts of fresh blood onto linen and exposing small samples of this bloodstained linen to various intensities of neutron radiation. Blood crusts will then be taken from these samples and analysed using the same spectroscopy equipment outlined above to determine the effect of the radiation on the elemental composition of the blood, and in particular, on the amount of nitrogen remaining. Whatever the outcome of these tests, they will surely provide additional information that will add to our understanding of the Shroud. Despite the lack of Shroud material available for research, scientific study of this remarkable Relic continues.

References

1. Fanti, Giulio (2021). *Could an anomaly in Turin Shroud blood reopen the 1988 radiocarbon-dating result?* World Scientific News, Vol. 162, pp. 102-109
2. Phillips, Thomas J. (1989) *Shroud irradiated with neutrons?*, Nature, Vol. 337, No. 6208, p 594.

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[1] The Shroud Science Group consists of two forums, SSG which is a discussion forum open to all Science Group members and SSG1 which focuses on scientific research into the Shroud.