

Extended Details of Raymond Rogers' Experiments

Rogers was able to carry out his pioneering research due to having access to the following sources of shroud cloth:

1. Samples threads from the piece of cloth cut for the C14 tests.
2. Fourteen yarn segments from a sample of the cloth cut from an adjacent position to the C14 sample, cut by Professor Gilbert Raes (referred to as "Raes" samples).
3. Thirty two samples from the shroud taken using a special adhesive tape.

Access to these three complimentary samples was pivotal in allowing Rogers' conclusions to be as authoritative as they are. Rogers was part of the initial STURP team and had carried out extensive chemical tests on samples of the shroud between 1979 and 1982.

During repairs of the cloth in 1532, after the cloth was rescued from a fire, the Shroud was stitched on to another cloth known to researchers as the "Holland Cloth". This cloth now provided another source of reference for Rogers' tests.

Roger's research paper was based on 3 main areas of experimentation, each of which will be explored below:

1. Kinetic-based Experimentation

Rogers observed that Lignin deposits are to be seen all over the Shroud, and that this lignin can be tested for the presence of vanillin. He noticed that the Holland Cloth and other medieval cloths gave a clear positive result for the presence of vanillin, whereas the fibres from other areas of the shroud did not give this result.

Thus he states:

"This suggested that the rate of loss of vanillin from the lignin could offer a method for estimating the age of the shroud."

Building on research by Stanley Kosiewicz, Rogers was able to produce a mathematical model to act as a chemical dating process. Kosiewicz had analysed the rates of vanillin loss from lignin at a variety of temperatures for over 2 years, and shown that loss rates of vanillin was very low. Based upon experimental data and this mathematical model Rogers was able to give the following expected results:
Average Storage Temperature

Years Taken to Lose 95% of Vanillin in Lignin

25°C	1319
23°C	1845
20°C	3095

Rogers pointed out that the fire of 1532 would not have affected the results much as the cloth would not have absorbed much heat. Rogers also stated that if the Shroud was created in 1260AD then 37% of the vanillin would have remained in the cloth.

No samples from any part of the shroud itself gave a positive result for any trace of vanillin.

2. Microscopic Examination and Surface Composition

Following this kinetic analysis of the fibres Rogers then set about explaining the characteristics of the thread samples from the C14 sample and the Raes threads. All threads from this area gave positive tests for a dye or pigment coating. When the threads were cut open the inner fibres were a much lighter colour.

From this Rogers states:

"Specifically, the colour and distortion of the coating implies repairs were made at an unknown time with foreign linen dyed to match the older original material"

3. Mass Spectrometer Based Analysis

During the original STURP investigation Mass Spectrometry was used on samples of the Shroud from a variety of areas including the blood flows, scorched areas, heels and water stains as well as 'pure' image areas.

The Analysis had been done previously to test to see if the Shroud was a painting. The experimental results could now be used to compare the makeup of the shroud areas and the C14 and Raes sample areas.

Again the C14 and Raes sample areas were shown to be very different in composition from the rest of the Shroud. All areas tested of the Shroud showed the presence of cellulose, but the C14 and Raes samples showed instead the presence of a pentosan covering. Thus again a fundamental difference in composition between the C14 sample area and the other areas of the cloth was shown.

Conclusion

As the experiments were varied and very detailed Rogers' conclusions are bold and he is very confident in his analysis. He states:

"The combined evidence from chemical kinetics, analytical chemistry, cotton content, and prolysis / ms proves that the material from the radio-carbon area of the shroud is significantly different from that of the main cloth."

He goes on further to say:

"The radiocarbon sample was thus not part of the original cloth and is invalid for determining the age of the Shroud"

Rogers' work is emphatic on the subject of the C14 tests. It is hoped that now this debate can be put to rest and further tests, in particular a further C14 test, can be carried out.

The question about why such a mistake occurred in the first place is a very open one. It appears that human error and very bad luck were the causes for this mistake, but there are those who feel more sinister forces were at work during the whole process.

Glossary of Terms:

Vanillin - Crystalline compound found in vanilla beans and some balsam resins; used in perfumes and flavourings.

Lignin - Complex polymer, chief non-carbohydrate product of wood. Binds cellulose fibres to harden and strengthen cell walls of plants.

Mass Spectrometry - Technique to work out the constituent parts that make up a substance. Using electromagnetic techniques a graph is produced of the varying amounts of different ions present within a compound. By analysing the different masses of the compounds present it is possible to determine the elements present in the compound.