

SEM-EDXA Analysis of Red Particles Removed from the Underside of the Turin Shroud in 1988

Ryan L. Parr (Ryan.Parr@genesisgenomics.com), **Brian Reguly, Allan MacKenzie, D. Andrew Merriwether, M. Sue Benford** (MSBenford@aol.com), **Piero Baraldi, and Giulio Fanti** (giuliofanti@tiscalinet.it)



ABSTRACT

SEM-EDXA was used to evaluate the chemical composition of selected material, named “Red Particles,” which was removed from the underside of the Shroud of Turin in 1988 by G. Riggi di Numana, an area in proximity to the sample cut for the C-14 analysis (a corner near the left foot of the frontal image).

In particular, this sample of “Red Particles,” was removed from filter “i,” which is conserved in the archive of Fondazione 3M of Milano-Segrate (Italy). G. Riggi di Numana removed samples from the filter with a “sticky tape” technique. From the sticky tape, Giulio Fanti selected “Red Particles” indicating the potential presence of blood using cross-polarization and UV light followed by a Raman technique.

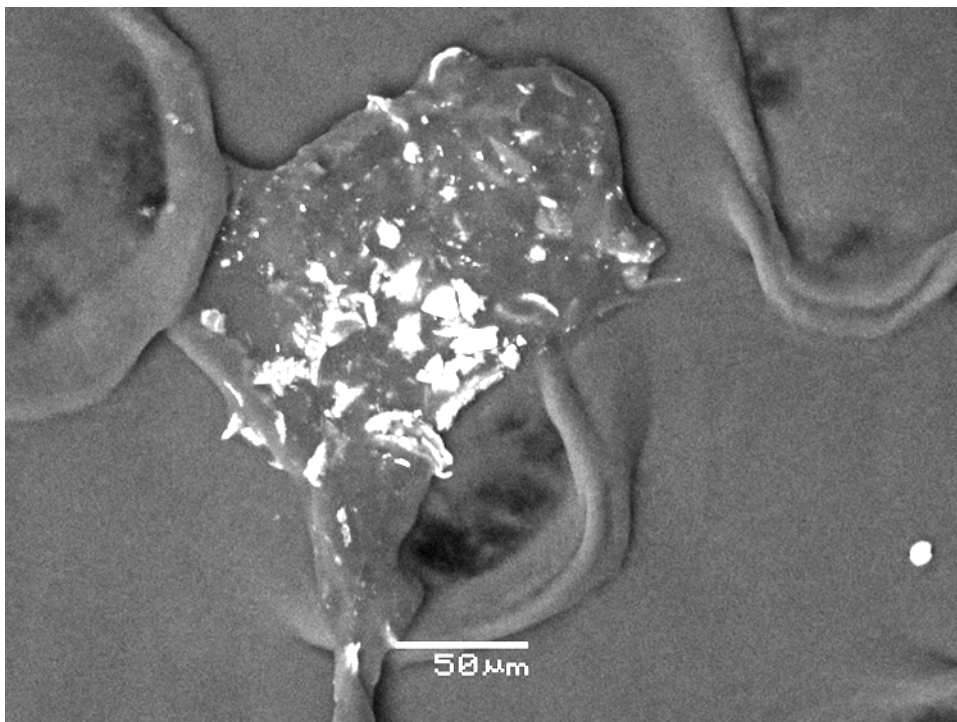
Finally, the sample was provided to Ryan Parr for DNA analyses; however, the minute sample was inappropriate for

DNA work due to its limited cellular content. Alternatively, the material was subjected to SEM-EDXA.

This paper compares the results obtained for the “Red Particles” in terms of cross-polarization, UV light, Raman spectra, and SEM-EDXA plots.

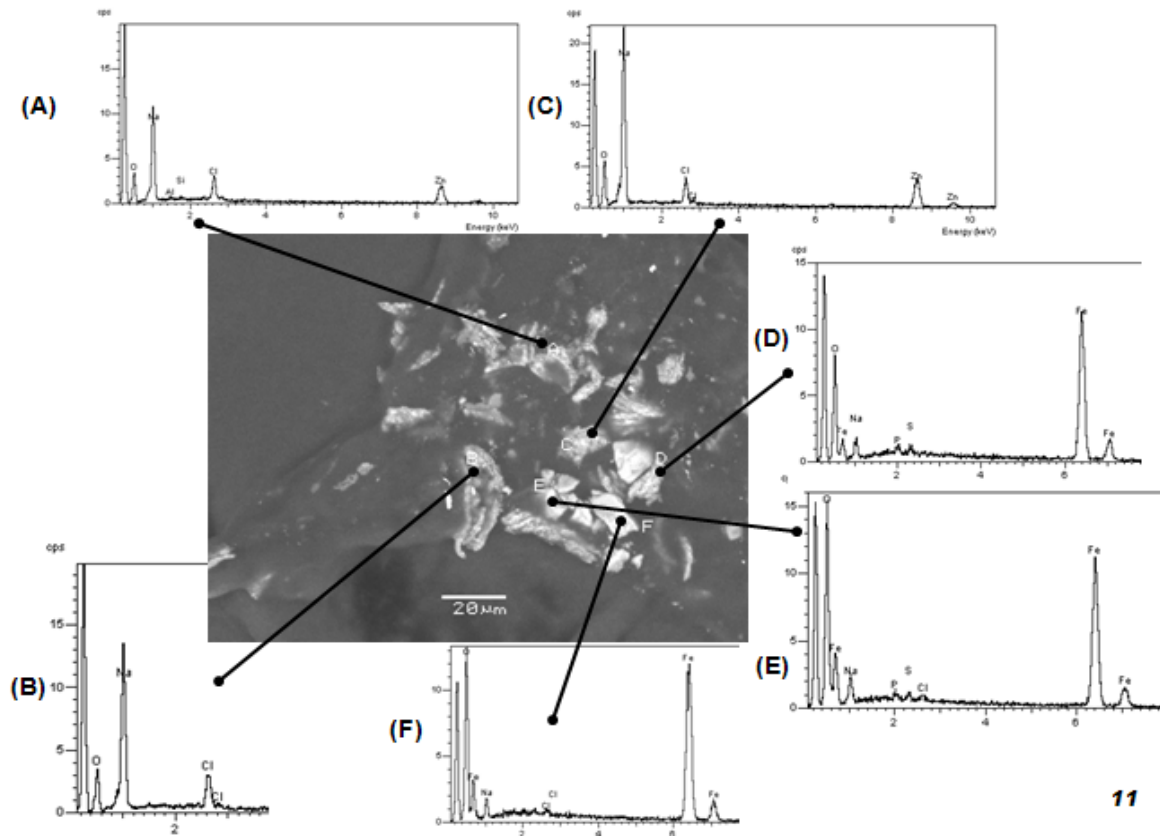
Results indicate that the sample contains elemental iron as well as both sodium and chloride. These results are consistent with those of Giulio Fanti, which are not inconsistent with the presence of both blood and sweat.

A process for DNA analysis of this type of material from the TS will be presented, including recommendations for the amount of blood cells required for successful analyses. The various types of data available through DNA science will also be discussed. Finally, a research outline will be proposed.

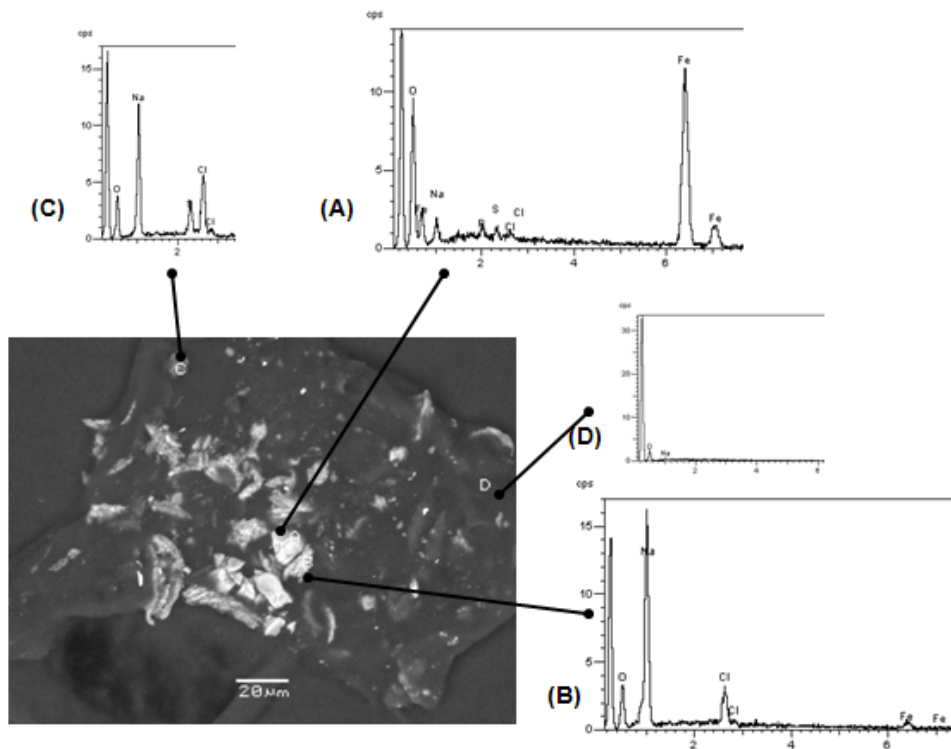


Electron Micrograph of TS Sample: 350X

TS SEM-EDAX: Results A



TS SEM-EDAX: Results B



Results & Conclusion

Sample	Na	Cl	Fe	Ca
TS	✓ greater than Cl	✓ less than Na	✓	-
Fayum linen	-	-	✓ less than TS	✓
blood	✓ equal to Cl	✓ equal to Na	✓	-
bleach	-	-	-	-
sweat	-	-	-	-

TS sample consistent with blood