A102 Multidisciplinary Approach of Forensic Science in Historical Study: St. Fortunato of Serracapriola (Italy)

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After attending this presentation, attendees will appreciate St. Fortunato of Serracapriola (Italy) as a historical figure and the role that forensic science can play in bringing scientific evidence to support historical findings.

This presentation will impact the forensic science community by presenting a multidisciplinary approach in forensic science to the remains of a historical figure venerated as a Saint by the Catholic Church.

This presentation discusses the case of St. Fortunato, who lived in Rome in the 3rd century AD. Although there are no historical references about St. Fortunato's martyrdom, his death dates back to the persecution of Christians under Maximinus Thrax, the Roman Emperor from 235 AD. In 1761, St. Fortunato was hailed patron *minus principalis* of Serracapriola, a small town in the area of Foggia (Puglia region), and in 2010 (250 years later), his remains were exhumed by mandate of the clergy for a complete forensic analysis. It is rare that such a forensic multidisciplinary approach is applied to the study of ancient sacred human skeletal remains, as finding data not consistent with St. Fortunato's life might bring into question the believers' faith.

After exhumation, all bones were cleaned and classified according to anatomical topography. A detailed description of bone status was performed and osteological measurements were taken. Multi-Slice Computed Tomography (MSCT) was performed. The elements were placed on the scan table anatomically for easier radiological interpretation; scans were filtered for specific elements in order to determine sex, age, stature, and any pathologies. The radiological data were consistent with a young male, 153cm to 165cm tall, with no signs of pathological or traumatic conditions. Permission was granted for a piece of bone (7g of femur) to be radiocarbon dated. The resulting date indicated an age of approximately 230 AD (95.4%), which is compatible with St. Fortunato's death.

A complete genetic analysis was performed in order to genotype the bony samples. Forensic methodologies were therefore applied in this study, because ancient DNA is often problematic to study given its inherent nature. In ancient skeletal remains, the quantitative and qualitative differences in results can be attributed to environmental factors or to storage conditions. In addition, when dealing with religious relics, one is often limited to investigating a small sample.

Previous protocols were slightly amended in order to improve the DNA quality and minimize the need for the use of expensive equipment and chemicals, yet still ensure a technique compliant with those adhered to by molecular biology laboratories. A complete Short Tandem Repeat (STR) panel was obtained using a low initial concentration of extracted DNA. In accordance with radiological analysis, this data confirmed that the skeletal remains analyzed belonged to a European male rather than one of a different ethnicity.

Although STR profiling is preferred due to its discriminatory power, mitochondrial DNA (mtDNA) analysis is often utilized in these cases. A mtDNA analysis was performed with a Mini-Primer Set (MPS) amplification strategy, following the guidelines described by Melton et al., Budowle et al., and Butler.[1-3] The profile, in terms of differences from the Anderson sequence (i.e., the Cambridge Reference Sequence (CRS)), was compared with databases to determine haplotype frequency. This analysis confirmed that the skeletal remains belong to a European man rather than one of a different ethnicity.

Using multidisciplinary forensic recovery methods, the lines of evidence used toward the identification were: (1) radiological investigations for preliminary information; (2) radiocarbon analysis for dating of skeletal remains; (3) biological profile of the remains (STRs and mtDNA); and, (4) statistical analysis of genetic data.

In conclusion, despite the inability to perform a DNA matching test, this study demonstrates the relevance of a multidisciplinary approach that significantly helped in gathering a variety of information that was consistent with the historical findings about the saint's life. There is a strong scientific concordance between these findings and the époque of the saint's existence, sex, and ethnicity.

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2. Budowle B., Di Zinno J.A., Wilson M.R. Interpretation guidelines for mitochondrial DNA sequencing. *Crime Laboratory Digest.* 1993. Vol. 20. P. 68-77.
3. Butler J.M. *Advanced topics in forensic DNA typing: methodology*. Academic press 2011.

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