



## About the Blood of Saint Januarius

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### Abstract

*The study of the Blood of Saint Januarius (BSJ) involves three experiments: two spectroscopic analyses (in 1902 and 1989) and an attempt to produce a compound similar to BSJ (in 1991). The first two experiments do not provide a definitive answer, while the third produced a compound with some characteristics similar to BSJ (including liquefaction). The Church does not permit the use of a Blood sample from the ampoules. Therefore, we propose: i) observing BSJ's behavior on days other than the canonical ones, and ii) comparing the spectroscopic analyses of 1902 and 1989 with the same analysis that CICAP members will do using their sample.*

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The substance referred to as the "Blood of Saint Januarius" has been a subject of study and debate that continues to this day. Januarius was born in Naples in the second half of the 3rd century AD. He became Bishop of Benevento, where he notably engaged with both believers and non-believers during his apostolate. Unfortunately, the persecutions against Christians initiated by Diocletian, the Roman Emperor, led to his martyrdom in the early 4th century AD. However, the first mention of BSJ occurred much later, approximately ten centuries after his martyrdom. A writing from the *Chronicon Siculum* notes that on 17 August 1389, there was a significant procession. Thus, the cult of the Saint began in a historical context where faith, superstition and magic were not distinctly separated, leading to considerable confusion among the faithful.

Opinions about this relic divide scientists and the public into two groups. One group claims that the substance is genuine blood belonging to Saint Januarius, while the other asserts that it is a fake. The Church does not regard the blood's liquefaction as a miracle, preferring the term prodigy. However, for the faithful, especially those in Naples, it is celebrated as a miracle. The blood is contained in two ampoules housed in a reliquary preserved in the Cathedral of Naples. The prodigy can occur three times a year (on the first Saturday in May, 19th September, and 16th December). Due to the ban imposed by the Roman Catholic Church, scientists have sought to find a solution to this mystery. In 1902, Professors Sperindeo and Januario analyzed the two ampoules

using spectroscopic analysis, identifying the presence of oxyhemoglobin and concluding that the substance was blood. Their findings are detailed in the book: "Il Miracolo di S. Gennaro e la Scienza" [1]. In 1989, Professor Baima Bollone repeated the experiment, yielding the same results. His conclusions are reported in the book: "S. Gennaro e la Scienza" [2]. We believe that these experiments are insufficient to definitively state that the ampoules contain blood; a microchemical analysis would be necessary for conclusive results. Furthermore, it should be noted that blood collected in the early years of the 4th century likely contained impurities.

In 1991, Professor Garlaschelli and two other CICAP scientists published an article in *Nature* suggesting that the prodigy was due to thixotropy, a phenomenon where certain substances change from solid to liquid when shaken [3]. They proposed a mixture of natural substances known to medieval alchemists, which, when treated appropriately, produces a red-brown compound that liquefies upon agitation. The CICAP scientists used three components: calcium carbonate ( $\text{CaCO}_3$ ), table salt ( $\text{NaCl}$ ), and ferric chloride ( $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ ) to create a thixotropic substance as described in detail. The ferric chloride is contained in Molysite, a mineral found in volcanic areas, such as those around Vesuvius. The resulting dark, gelatinous substance closely resembles the BSJ in appearance, color, and some behaviors. The authors of this intriguing scientific article assert that to fully understand the chemistry of the substance BSJ, it is necessary to open the two ampoules. Unfortunately, as previously stated, this is prohibited by the Catholic

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Church. However, having replicated the phenomenon without using blood from the ampoules, they consider it unnecessary to open them.

We find it challenging to link the contents of the ampoules to the figure of Saint Januarius, as much time has elapsed since his martyrdom. The Bishop of Benevento was executed by Diocletian in the early years of the 4th century AD, and it took nearly ten centuries until the first recorded liquefaction occurred in 1389. All of this raises uncertainties. However, we believe that faith does not require scientific validation. Neapolitans who wish to believe in and participate in this event should be free to do so.

Regarding the understanding of the ampoules' contents, we have focused our attention on the three experiments. The first two, relying solely on spectroscopic analysis, are insufficient to provide certainties. In contrast, the third experiment, aimed at producing a substance similar to that in the ampoules, employs a completely different approach as described above. The interesting results obtained were published in *Nature*, a prestigious journal. From our perspective, the results of the two spectroscopic experiments (1902 and 1989) do not allow us to affirm that there is blood in the ampoules. These two attempts cannot be conclusive. However, the CICAP experiment also does not yield definitive results. Scientifically, we can state that mixing certain substances can produce a compound that resembles the contents of the ampoules in appearance and color. Furthermore, when disturbed, it liquefies. In other words, the substance created has similar characteristics to the contents of the ampoules, but nothing more.

In light of this situation, it is essential to request that the Roman Catholic Church allow a scientific investigation into the behavior of the substance on days that do not coincide with the three canonical dates associated with the prodigy. Another possibility is to compare the spectroscopic results from 1902

and 1989 with those that CICAP scientists could obtain using the substance they produced in 1991. This comparison could provide valuable and potentially definitive information. If the experiment shows correspondence among the spectra, we could conclude that there is no blood in the ampoules. Conversely, if discrepancies arise between the CICAP spectrum and the others two spectra, we could only assert that the contents of the ampoules differ from those of the CICAP mixture.

Nevertheless, this relic, like many others, is embroiled in a religious conflict of interest, complicating efforts to resolve the issues. Our extensive experience over many years of study suggests a negative outcome. We wish to clarify our stance: in these matters, there are always two opposing groups of scientists; neither is inherently good or bad. Both groups are capable of defending their positions and freely engaging in discourse, as we do.

Currently, in the scientific literature concerning the BSJ, there exists a chaotic array of results. We are not certain that the ampoules preserved in the Cathedral of Naples are linked to the martyrdom of Bishop Januarius. Indeed, this topic is rife with speculation and few certainties, leaving us with lingering doubts. We hope, therefore, that the Roman Catholic Church will consider the two simple proposals outlined in this article. If the Bishop of Naples permits the proposed investigation, we are confident that our understanding of the BSJ relic will deepen.

### Conflict of Interest

The author states that there is no conflict of interest.

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