

The discovery of the Salafia handwritten manuscript and formula

Chronological and biological considerations

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PAROLE CHIAVE: imbalsamazione, storia, Alfredo Salafia, XIX e XX secolo, marchio commerciale americano, mummie moderne, Rosalia Lombardo.

RIASSUNTO — Alfredo Salafia (1869-1933) fu un rinomato imbalsamatore palermitano. Ideò un liquido per l'imbalsamazione, denominato «Fluido della Perfezione», in grado di garantire una perfetta conservazione del cadavere allo «stato permanentemente fresco». Nell'ambito dello Human Embalming Project© (H.E.P.), abbiamo condotto ricerche storiche dettagliate riguardanti il periodo che il Salafia trascorse negli Stati Uniti. Abbiamo, inoltre, identificato un'anomalia riguardante la cronologia degli eventi legati alla scoperta del manoscritto inedito dell'omonimo imbalsamatore. Fino ad oggi, si è ritenuto che la formula chimica del «Fluido della Perfezione» fosse stata rivelata per la prima volta nel 2009. Tuttavia, l'esistenza del manoscritto inedito del Salafia era già stata descritta dal Professor Umberto Di Cristina (1927-2017) e colleghi nel libro *La Dimora delle Anime*, pubblicato nel Febbraio 2007. Ne consegue che il Professor Di Cristina e colleghi dovrebbero essere riconosciuti, nell'ambito della comunità scientifica internazionale, come i primi studiosi ad aver rivelato l'esistenza del manoscritto del Salafia. Abbiamo, inoltre, appurato, che svariati studiosi, senza produrre alcuna copia della documentazione storico-archivistica e in assenza di un solido dato scientifico, hanno associato direttamente la figura di Alfredo Salafia a quella di Rosalia Lombardo (1918-1920). È perciò stato dato per scontato che Rosalia Lombardo sia stata imbalsamata dal Salafia.

Benchè siano trascorsi quattordici anni dalla scoperta del manoscritto inedito del Salafia, ad oggi, sono stati pubblicati solo alcuni estratti. La pubblicazione integrale del manoscritto permetterà alla comunità scientifica di valutare, nel dettaglio, le reazioni chimiche alla base del processo che ha garantito la conservazione dei corpi «allo stato permanentemente fresco». Consentirà, inoltre, di riprodurre, in adeguate condizioni di laboratorio, l'imbalsamazione secondo il «metodo Salafia».

Nonostante il corpo di Rosalia Lombardo sia conservato in una teca altamente tecnologica, le recenti fotografie del volto della bambina mostrano come il processo di ossidazione proceda rapidamente e il suo viso si stia progressivamente scurendo. Di conseguenza, sarebbe auspicabile che il corpo di Rosalia venisse riesaminato in tempi brevi per valutarne lo stato di conservazione; sarebbe altresì auspicabile programmarne un restauro in modo da mantenere inalterata l'originaria bellezza di questo reperto.

KEY WORDS: embalming, history, Alfredo Salafia, 19th-20th centuries, US Trademark, modern mummies, Rosalia Lombardo.

SUMMARY — Alfredo Salafia (1869-1933) was a famous embalmer from Palermo, Sicily. He created an embalming fluid, the «Perfection fluid», which was supposed to leave the corpse perfectly preserved in a «fresh state». Within the remit of the Human Embalming Project© (H.E.P.), we performed referenced historical research on Salafia's American period. We further identified what appears to be an anomaly in the chronology of the discovery of the Sicilian embalmer's handwritten memoirs. Until now it has been assumed that the formula was first revealed in 2009. However, Salafia's unpublished manuscript had previously been described and reported by Professor Umberto Di Cristina (1927-2017) and his colleagues in their book *La Dimora delle Anime*, published in February 2007. Therefore, they should have the honour of being described as the first to reveal it. We further found that the direct association between the embalming of Rosalia Lombardo (1918-1920) and Alfredo Salafia made by several authors is without documentary and scientific evidence. Fourteen years after its discovery, Alfredo Salafia's handwritten memoirs are still published only in excerpts but await complete publication. When published, it may allow the scientific community to understand the chemical reactions involved in the preservation of the bodies in a «fresh state» and to replicate Salafia's experiments in safe laboratory conditions. Recent photographs show that, despite being kept in a highly technological passive display case, the oxidation proceeds at a quick pace and that Rosalia's face is progressively darkening. Therefore, a reassessment of Rosalia's body preservation and restoration is strongly desired in order to keep this beautiful mummy in her original state.

THE SICILIAN EMBALMER ALFREDO SALAFIA (1869-1933)

Human embalming, as a scientific discipline, requires knowledge of anatomy, anatomical pathology, palaeopathology and forensic science. During early history of humankind, the development of various embalming techniques has been associated with ancient cultures. However, from the 17th century onwards, the history of embalming was dominated by the work

of exceptional scientists. The Dutch anatomist Frederyk Ruysch (1638-1731) along with the biologist Jan Swammerdam (1637-1680) were the first to inject embalming fluids into the vasculature for corpse fixation (Brenner, 2014, 316-344).

At the turn of the 19th and 20th centuries, the Sicilian embalmer Alfredo Salafia (1869-1933) was a renowned figure in Palermo. In his younger years he had developed a new embalming method allowing the corpse to be maintained in a «fresh state» over a long period of time (Johnson *et al.*, 1993, 64).

When aged 40 years old, Alfredo Salafia moved to New York City. On the 21st December 1909 he embarked, in Naples, on the ship Caronia [Passenger ID: 101254030016; Frame: 108; Line number: 16] landing in Ellis Island on the 2nd January 1910 (The Statue of Liberty - Ellis Island Foundation Incorporation, <http://www.statueofliberty.org> Accessed May 7th 2021) (Figs. 1A-B). His registered host was his nephew Achille Salomone, a licensed funeral director (Johnson *et al.*, 1993, 64).

LIST OR MANIFEST OF ALIEN PASSENGERS FOR THE UNITED STATES

Required by the regulations of the Secretary of Commerce and Labor in the United States, under Act of Congress approved February 20, 1907, to be delivered to the United States Customs and Border Protection at the port of arrival.

S.S. *Caronia* sailing from *Naples* December 21, 1909

No.	Name	Age	Sex	Occupation	Place of Birth	Port of Origin	Destination	Remarks
1	<i>Salafia, Alfredo</i>	<i>40</i>	<i>M</i>	<i>Embalmer</i>	<i>Naples, Italy</i>	<i>Naples</i>	<i>New York</i>	<i>Host: Achille Salomone</i>

Salafia, Alfredo

Fig. 1A. List or Manifest of Alien Passenger for the U.S.A. reports the departure of Alfredo Salafia from Naples, Italy, on the 21st December 1909. Reproduced with permission.

THIS SHEET IS FOR SECOND-CARRE PASSENGERS.

STATES IMMIGRATION OFFICER AT PORT OF ARRIVAL

to the United States designation Officer by the Commanding Officer of any vessel having such passengers on board upon arrival at a port in the United States.

Arriving at Port of ELLIS ISLAND January 2nd 1910 Sheet 7 B

No.	Age	Sex	Color	Place of Birth	Occupation	Education	Religion	Marital Status	Health	Character	Remarks	Signature of Officer	Date
1	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
2	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
3	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
4	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
5	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
6	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
7	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
8	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
9	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
10	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
11	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
12	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
13	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
14	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
15	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
16	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
17	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
18	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
19	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
20	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
21	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
22	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
23	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
24	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
25	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
26	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
27	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
28	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
29	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
30	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
31	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
32	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
33	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
34	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
35	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
36	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
37	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
38	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
39	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
40	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
41	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
42	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
43	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
44	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
45	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
46	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
47	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
48	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
49	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
50	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
51	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
52	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
53	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
54	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
55	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
56	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
57	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
58	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
59	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
60	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
61	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
62	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
63	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
64	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
65	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
66	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
67	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
68	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
69	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
70	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
71	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
72	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
73	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
74	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
75	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
76	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
77	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
78	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
79	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
80	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
81	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
82	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
83	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
84	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
85	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
86	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
87	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
88	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
89	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
90	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
91	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
92	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
93	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
94	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
95	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
96	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
97	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
98	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
99	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			
100	35	M	White	Italy	Farmer	High School	Catholic	Married	Good	None			

3674091 Salafia, Alfredo

Fig. 1B. List or Manifest of Alien Passenger for the U.S.A. reports the arrival of Alfredo Salafia at Ellis Island, New York, U.S.A. on the 2nd January 1910. Reproduced with permission.

On the 20th of June 1910, Salafia and Salomone formed the Salafia Permanent Embalming Method Company, which was registered under Department of State Id 985, as Foreign Business Corporation entity type. The company was registered as the Salafia Permanent Embalming Method Company- Achille Salomone 338 East 63Rd St. New York 10021. The trademark of the Salafia Permanent Embalming Method Co. was filed on the 16th November 1911 [Ser. Number 59, 748 (Class 6. Chemicals, Medicines and Pharmaceutical Preparations; claims use since the 27th of October 1911] (Fig. 2) (Official Gazette of the United States Patent Office, 1912, <https://babel.hathitrust.org/cgi/pt?id=wu.89048455893&view=1up&seq=7> Accessed May 7th 2021); this allowed the Salafia Permanent Embalming Method Co. to sell their fluid (called Perfection Fluid) to the American undertakers.

Alfredo Salafia's stay in America was quite short. Piombino-Mascali and Johnson-Williams (Piombino-Mascali, 2009; third edition 2012, 47; Piombino-Mascali and Johnson-Williams, 2009, 54) reported that Salafia returned to Palermo in July 1910, but did not produce any documentary evidence. While we know that Alfredo Salafia never went back to the U.S.A. through Ellis Island Port (email dated the 18th of May 2021 by Mr. Barry Moreno, The Bob Hope Memorial Library Ellis Island National Museum of Immigration, Statue of Liberty National Monument, New York, USA), we still have not found

documentary evidence of the exact date of his return to Palermo in 1910.

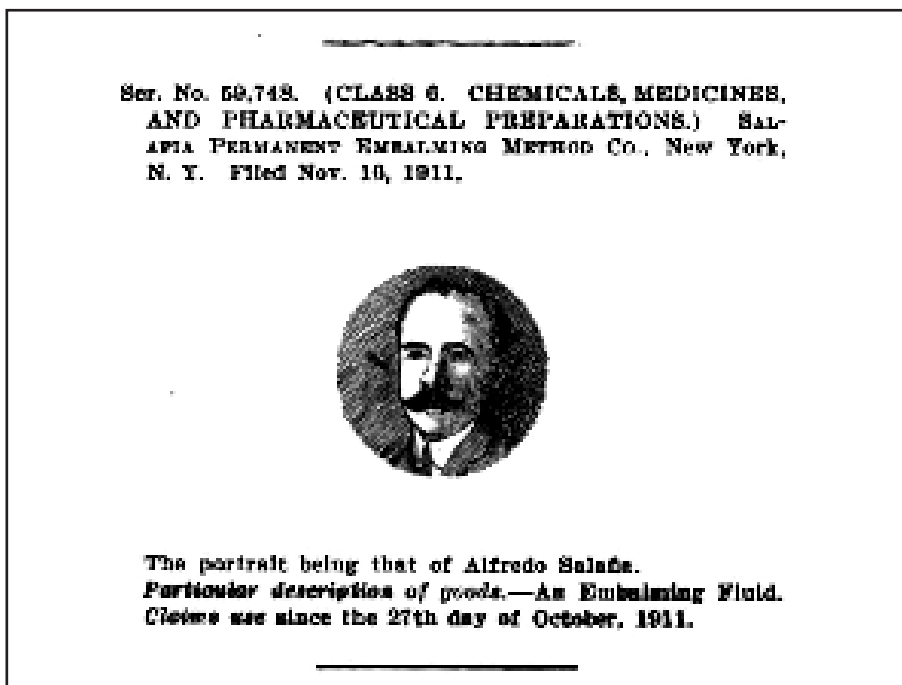


Fig. 2. The trademark of the Salafia Permanent Embalming Method Co., New York, NY filed on Nov. 16, 1911. Public domain.

Publicly available photographs confirm that, between 1911 and 1914, Salafia embalmed several important personages and notables in Palermo (Johnson *et al.*, 1993, 67; Piombino-Mascali and Johnson-Williams, 2009, 54). No information about Salafia is available during WWI (1914-1918). It is known that, in late 1927, he performed his last embalming activity (Piombino-Mascali and Johnson-Williams, 2009, 55). From 1927 till his death, Salafia apparently disappeared from public life. Archival sources indicate that, after the death of his first wife, he remarried, his second wife being Irene Sofia Elena Virga, aged 34, on the 27th October 1932 (*Registro degli atti di matrimonio*, 1932). He died 3 months later on the 31th of January 1933 (*Registro degli atti di morte*, 1933). The formula of his embalming liquid, the «Perfection fluid», was never revealed.

ALFREDO SALAFIA'S HANDWRITTEN MEMOIRS

Although Alfredo Salafia fathered two children during his first marriage, all documents and his handwritten unpublished memoirs remained with his second wife. After her death, they were kept by her descendants (Di Cristina

et al., 2007, 90).

In March 2009, Piombino-Mascalì *et al.* (2009, 355-357) reported on the discovery of Salafia's handwritten manuscript – «*New special method for the preservation of an entire human cadaver in a permanently fresh state*» – which mentioned also the embalming formula. At the time of the above publication, the unpublished Salafia's memoirs were held at the Institute for the Mummies and the Iceman, EURAC, Bolzano (Italy) (Piombino-Mascalì *et al.*, 2009, 356) but no full publication of the manuscript was made available for scholarship. The same information was published by Piombino-Mascalì and Johnson-Williams in a second paper in March 2009 (Piombino-Mascalì and Johnson-Williams, 2009, 52-55).

Fourteen years after its discovery, no full-length independent review of the handwritten manuscript has been published (Nerlich and Bianucci, 2020, https://doi.org/10.1007/978-981-15-1614-6_20-1). This holds particularly true for the so-called «Perfection Fluid», but also for other procedures, such as the chemical treatment of the body surface. Only some «extracts» taken from the original manuscript have previously been presented in their original Italian (Piombino-Mascalì, 2009; third edition 2012, 52-55, 57-58) and English (Piombino-Mascalì *et al.*, 2009, 356-357).

Within the remit of the Human Embalming Project© (H.E.P), we have identified what appears to be an anomaly in the chronology of the discovery of the Sicilian embalmer's handwritten memoirs. We have also identified that, since 1993, an unreferenced and undocumented direct association between the embalming of Rosalia Lombardo (1918-1920) and Alfredo Salafia has been constantly made (Johnson *et al.*, 1993, 68; Piombino-Mascalì and Johnson-Williams, 2009, 55; Piombino-Mascalì *et al.*, 2009, 356; Piombino-Mascalì, 2009; third edition 2012, 58-59; 2018, 59; 2020, 42, 46-47).

CHRONOLOGICAL ANOMALY

In their article dated March 2009, Piombino-Mascalì *et al.* (2009, 355) stated that: «*In 2007, after a detailed archival research and the subsequent interview of some living relatives, we were fortunate enough to be able to inspect some relevant material which belonged to this embalmer. Among his notes and papers was an unpublished, beautifully handwritten manuscript, entitled "New special method for the preservation of an entire human cadaver in a permanently fresh state"*».

In addition, it is important to underline that, in *Il Maestro del Sonno Eterno*, the author mentions «the finding of the [Salafia] manuscript» [il ritrovamento del manoscritto, Piombino-Mascalì, 2009; third edition 2012, 51]. It was PD Dr. Albert R. Zink, Director of the Institute for Mummies and the Iceman, EURAC (Bozen, Italy) who wrote in the book's preface the following statement: «...the

author's main merit is to have discovered an original manuscript by Salafia» («[il] maggior merito dell'autore è quello di aver scoperto un manoscritto originale di Salafia») (Piombino-Mascali, 2009; third edition 2012, 15). A subsequent article (Panzer *et al.*, 2013, 401) added more details on the date of the discovery: «[in] September 2007, a handwritten memoir by Salafia revealed the «secret» formula of his preservative».

This version of the discovery is additionally stated in the 2016 Italian-language monograph Ötzi, Tutankhamon, Evita Perón: Cosa ci Rivelano le Mummie (Zink, 2016, 92): «[un] nostro collaboratore è riuscito a trovare un manoscritto di Alfredo Salafia nel quale era contenuta una precisa descrizione della formula segreta» [a collaborator of ours managed to find a manuscript by Alfredo Salafia which contained a precise description of the secret formula].

However, the existence of an unpublished handwritten manuscript by Alfredo Salafia had already been noted by Di Cristina and colleagues in their book entitled *La Dimora delle Anime*, published in February 2007 (Di Cristina *et al.*, 2007, 90). They mentioned that the manuscript was kept by the descendants of Salafia's second wife. More specifically, Di Cristina *et al.* (2007) wrote (see Appendix) that, in his handwritten memoirs, Salafia described his embalming method [nel trattato descrive il suo metodo], and that the memoirs consisted of about 30 handwritten sheets [circa 30 fogli manoscritti] (Di Cristina *et al.*, 2007, 90). In 2010, Lanza made reference to the existence of Di Cristina *et al.*'s book (Lanza, 2010, 49).

Prof. Di Cristina (1927-2017) was the first person to have had access to Salafia's unpublished manuscript. However, according to the Sicilian lay press, the descendants of Salafia's second wife allowed him to see only the manuscript's frontispiece but not the part of it dealing with the embalming technique [di cui qualche anno fa i famigliari fecero vedere solo il frontespizio e non anche la parte relativa alla tecnica al Professor Di Cristina] (Sidoti, 2010). However, by seeing exclusively its frontispiece, Prof. Di Cristina would not have been able to be so precise in recording the number of pages of the manuscript nor on its contents (e.g. detail of the names of some famous people embalmed by Salafia, cf. see Appendix). It is important to underline that the discovery of Salafia's manuscript by Di Cristina *et al.*'s seems not to have been a mystery at all. In the monograph *Il Maestro del Sonno Eterno* (Piombino-Mascali, 2009; third edition 2012, 118), Di Cristina *et al.*'s 2007 book is referenced, and Umberto Di Cristina himself is acknowledged.

Therefore Salafia's handwritten manuscript was not discovered for the first time in September 2007. Hence, we suggest that the late Professor Umberto Di Cristina, along with his co-authors, should be rightfully honoured as the first scholars who revealed to the scientific community the existence and the content of Salafia's handwritten memoirs. His name and contribution

should be recognised in the international scientific literature on the Sicilian mummies and Alfredo Salafia.

WAS ROSALIA LOMBARDO (1918-1920) EMBALMED BY ALFREDO SALAFIA?

The second anomaly we identified concerns the direct attribution of Rosalia Lombardo's embalming (Figs. 3A-B) to the caring hands of Alfredo Salafia. This association was first presented by Johnson *et al.* in 1993 (1993, 25). Quoting the authors: «...in one chapel repository for children and infant's bodies, there is a glass-topped coffin containing a two years old girl, Rosalia Lombardo, embalmed by Alfredo Salafia. Appearance and color of the face and head would have led one to believe she had been dead at most a few days. Comparison photographs taken in 1920 and within the past year or two no visible change».

Johnson *et al.* (1993, 24) claimed that a photograph of Rosalia Lombardo dating to 1920 exists. However, their claim has never been supported by the publication of the 1920 photograph and no source was cited.

In the 1998 edition of the book *Modern Mummies* (1998, 50), Quigley wrote that «Rosalia Lombardo is probably the most famous and perhaps the youngest of Dr. Alfredo Salafia's clients» but reference to a documental source is lacking.



Fig. 3A. Rosalia Lombardo in an old postcard (scan copy of postcard from FMG's personal archive).



Fig. 3B. Close up of Rosalia Lombardo's face (scan copy of postcard from FMG's personal archive).

Eleven years later, in their publication dated March 2009 (2009, 55), Piombino- Mascali and Johnson-Williams wrote: «In Palermo, Italy, in December 1920, Officer Mario Lombardo called upon a well-known figure in the community to embalm the fragile body of his daughter, Rosalia, who died at age 2 of pneumonia. Permission was given to the family to have Rosalia enshrined in the catacombs of the Capuchin Convent. Rosalia was embalmed by Alfredo Salafia, who at the time was very well-versed in embalming for more than 20 years».

«However, his most celebrated case is indeed Rosalia Lombardo. She is still on display in the Palermo Capuchin Catacombs in the original glass-topped coffin which

she was placed. Her face is all that is visible with the rest of the body covered by a sheet, and shows a remarkable state of preservation...despite the fact that her face has recently turned darker presumably due to oxidation. A recent X-ray examination (the X-rays were performed on July 2008 but the scientific results were published 2 years later in Panzer *et al.*, 2010, 1126, 1130-1131) helped to establish that the tissue covered by the cloth and the internal organs are beautifully preserved with the exception of the medial thighs, which seem to have degraded».

Similarly, a further association between Rosalia Lombardo (1918-1920) and the discovery of the manuscript was proposed by Piombino-Mascali *et al.* (2009, 355-357), thus, implying that, indeed, Alfredo Salafia was the embalmer of the little child. The same view was further reiterated when the coffin containing the body of Rosalia underwent a Multidetector Computed Tomography in December 2010 (Panzer *et al.*, 2013, 401): «*Rosalia Lombardo reportedly died of bronchopneumonia in 1920 and was preserved by the embalmer and taxidermist Alfredo Salafia*».

The authors (Panzer *et al.*, 2013, 404) further added that the «*analysis of the CT examination revealed indirect indicators for the historically-reported endovascular treatment of Rosalia's body*». However, it should be pointed out that there are no published documentary, archival or photographic sources which support the claim that Alfredo Salafia embalmed Rosalia Lombardo. As to the sentence «*the historically-reported endovascular treatment*» (Panzer *et al.*, 2012, 404), this attribution is based on some vague hints existing in the archives of the Capuchin Convent in Palermo. These were most cursorily mentioned by Father Flaviano Domenico Farella in his book *Cenni storici della Chiesa e delle Catacombe dei Cappuccini di Palermo* (Farella, 1982, 101-102). This topic was, subsequently, described in more detail by Piombino-Mascali in *Il Maestro del Sonno eterno* (Piombino-Mascali, 2009; third edition 2012, 60).

According to Piombino-Mascali (Piombino-Mascali, 2009; third edition 2012, 60), there exists a letter that Father Liberato of Palermo (Ugo Saitta) wrote in 1991. Father Liberato quoted some memories attributed to Giovanni of Aliminusa (Giuseppe Todesco), a lay friar who died in 1964. Giovanni of Aliminusa stated that he had assisted in the embalming of Rosalia Lombardo and saw a man called «Solafia» making injections in Rosalia Lombardo's head and putting a bottle inside her coffin. Following Piombino-Mascali (Piombino-Mascali, 2009; third edition 2012, 60), it is more likely that Giovanni of Aliminusa assisted only in the final stages of Rosalia's embalming which took place in the Catacombs.

According to Piombino-Mascali, a similar account can be found in the notes of Father Salvatore of Gangi (Antonio Cigno who died in 1995) (Piombino-Mascali, 2009; third edition 2012, 60). None of the above documents has been published and no precise reference to their exact location and code numbers

in the Capuchins archives has been reported. Piombino-Mascali himself states that it is impossible to establish the reliability of the above accounts (*[(s)tabilire l'attendibilità della narrazione è impossibile]*) (Piombino-Mascali, 2009; third edition 2012, 60). Father Domenico F. Farella further wrote that since the physician «Solafia» died and the Lombardo family moved from Palermo, the mummy of Rosalia was allowed to stay in the Capuchin Crypts (Farella, 1982, 101-102). Since Alfredo Salafia did not die in 1920 but in 1933, all the above references appear scientifically weak or at least contradictory. Concerning the CT scan investigations, Panzer *et al.* (2013, 402) wrote: «*Rosalia Lombardo's body is still exhibited in the original glass-topped coffin in which she was placed. Only her head is visible; the rest of the body is covered by a (black) sheet. Her face shows a remarkable state of preservation- she still looks as though she is alive and sleeping. In the past few years, however, signs of oxidation and decay have become more obvious. Specifically, the child's hair and accompanying textile have become lighter, while her face has darkened and shrunk.*».

Panzer *et al.* further wrote: (2013, 402): «*CT was believed to be the best non-destructive method to investigate Rosalia because she had to be kept untouched in her sealed coffin, in order to maintain the preservation of the body.*». Concerning the embalming procedure, Panzer *et al.* (2013, 406) added: «*Salafia specified the femoral artery as the preferred injection point. He discouraged the use of the carotid and axillary arteries as possible injection sites due to the rigor mortis. As far as the evaluation of CT data was possible due to artifacts, we could not find soft tissue cuts or other defects that indicate a possible injection site*» and «*...there was no evidence that embalming fluid has been injected intra-muscularly or inter-muscularly all over the body, which Salafia had described using for some cases. Also, we could not find clear evidence of the application of a paraffin treatment although it seems very likely that this treatment was used, considering how perfectly preserved Rosalia's face appears to be*» (Panzer *et al.*, 2013, 407), and «*in general the organ preservation seen in Rosalia Lombardo is the result of an extremely effective treatment by embalming fluid, in which intracranial and intrathoracic structures were probably only treated endovascularly, while intra-abdominal organs were treated endovascularly and externally, via cavity treatment. Therefore, the ingredients of the embalming fluid were effective in stopping early decay and preventing further decomposition, allowing excellent preservation of the body to the present day*» (Panzer *et al.*, 2013, 407).

The results of the paleoimaging showed no scientific evidence to support the notion that Rosalia Lombardo was embalmed by Alfredo Salafia. Similarly, it is not scientifically proved that the «Perfection Fluid» was injected into her vascular system through the femoral artery or through any other artery (i.e. carotid arteries, axillary arteries), using a gravity injector. Similarly, no evidence of intra- or inter-muscular injection sites was found. Only a «defect» of the navel was found but was not described. The authors wrote that this

«defect» is consistent with a local treatment of the abdominal cavity (Panzer *et al.*, 2013, 406-407).

However, even if a treatment of the abdominal cavity had occurred through the insertion of a cannula in the navel, this action alone would not explain how the rest of the body was embalmed. Finally, no biochemical investigations were performed on the child's mummy to verify whether the embalming substance used to treat her really corresponded to Salafia's «Perfection Fluid» (Nerlich and Bianucci, 2020, https://doi.org/10.1007/978-981-15-1614-6_20-1).

CLOSING REMARKS AND FUTURE PERSPECTIVES

One hundred years after her death, Rosalia Lombardo's case is still open. Based upon the anomalies highlighted in the present paper, it is desirable that a complete edition of the original Salafia manuscript is published in order to provide the scientific community with a full understanding of the underlying chemical reactions required to obtain a «perfect preservation of human cadavers in the fresh state». Furthermore, an in-depth reassessment Rosalia Lombardo's mummy should be planned in the near future. The mummy should be removed from the coffin and undressed in order to perform an accurate morphological and macroscopical observation of the whole corpse. Then, the mummy should undergo CT scanning and mini-invasive sampling of biological tissues and textiles. The reason why the infant was not removed from her wooden casket between 2007 and 2011 remains unclear. Piombino-Mascali and Johnson-Williams (2009, 55) declared that: «*she (Rosalia) is still on display in the Palermo Capuchin Catacombs in the original glass-topped coffin which she was placed*». This sentence is not correct. As a matter of fact, there is ample evidence that Rosalia's mummy was exposed, more than once, without being covered by the black shroud. Over the past 40 years, different persons witnessed the child being exposed for public display with different coloured dresses and bows.

In the Seventies, one of the authors (TL) and her mother, saw Rosalia Lombardo's entire body dressed in blue and with a blue bow matching her dress (Lanza, 2010, 44). In 1998, Quigley (1998, 54) quotes the content of a letter addressed to her by John Strausbaugh, editor of the New York Press and dated February 1996: «*I had the impression she was something of a star attraction- there are few small signs on the walls leading you to her-and that there may be some local-saint sort of tradition attached to her, which would not be surprising, given her remarkable state of preservation*». Quigley continues: «*Rosalia is displayed at a slight angle in a small casket with a transparent top. She is wearing a light colored, frilly dress, and her reddish-brown hair is arranged in ringlets*» and quoting John Strausbaugh (February 1996): «*she is startlingly well preserved-looks asleep rather than dead,*

not shrunken or shriveled or dried at all, though it does have a faintly sickly yellowish cast to it... She looks like she could be ill, but she doesn't look dead, and she certainly doesn't look like she has been dead for years».

In 2000, Andrea Peers, an American student of the University of Massachusetts (Amherst), who paid a visit to the Palermo's Catacombs with her class mates, describes the striking differences between the mummy of Rosalia Lombardo and that of the other mummified bodies (<https://www.umass.edu/journal/sicilyprogram/Sicily2000/portfolio/peers/article.html>) (Lanza, 2010, 44): *«But the body of Rosalia was not a skeleton at all. She looked like she was figure in a museum. She lays in her case, eyes shut, as if sleeping. Her face was still rosy with color; her blue dress perfectly fit on her small body. Her blond locks of curly hair remained in place with a blue bow that matched her dress. Her glass coffin was showered with roses of different colors. She resembled a porcelain doll in her box, a collector's item never opened, never touched, never disturbed».*

Lastly, in 2003 (2003, 140), Corsani writes: *«...Tutte tranne una. Miracolosamente colorata; di un colore un po' pesto, come rinforzato dal fard, ma certo vivo, caldo, poroso, rispetto al bianco e nero allucinante delle altre salme. È una bambina, la piccola Rosalia Lombardo. Con il suo vestitino pesca, i capelli biondi e perfino il fiocco giallo in testa, se non fosse in una bara, e in questo posto sembrerebbe addormentata. E invece sta qui nelle catacombe dal 1920...»* [All but one. Miraculously coloured; the complexion of her face appears a bit livid as she was coloured with a fard but vivid, lifelike, and porous if compared to the hallucinating black and white of the other corpses. She is a child, the little Rosalia Lombardo. With her peach-coloured dress, her blonde hair held by a yellow ribbon, if she were not in a coffin, and in this place she would look asleep. Instead she has been here in the catacombs since 1920].

These testimonies strongly suggest that Rosalia's glass top was removed several times and the black shroud covering her body was removed. Over the decades, Rosalia Lombardo's body was manipulated to change her dress and bow. All the above information reinforces our idea that, between 2007 and 2011, Rosalia's mummy could have been carefully removed from her coffin and thoroughly examined.

Having established that Rosalia's mummy underwent several manipulations, it would be important to verify whether, underneath the black shroud, her body had originally been wrapped in white shroud. In one of the few published «extracts» of Alfredo Salafia's memoirs (Piombino-Mascalì, 2009; third edition 2012, 57), it is stated that: *«La salma avvolta in un lenzuolo bianco... Poi un lenzuolo nero dovrebbe coprire la salma...in modo che resterebbe nuda solo la testa, e dare all'osservatore l'illusione di trovarsi alla presenza di uno che dorme»* [the corpse (has) to be wrapped in a white shroud... Subsequently, a black shroud shall be positioned to cover the body...so that only the head

is visible and give to the observer the illusion to look at someone who is sleeping]. In case the two shrouds were present, it would be important to verify whether they were both repeatedly washed over the decades. In the latter case, a huge amount of information on the child's embalming technique would have been lost forever.

In 2011, the coffin containing Rosalia's mummy was placed into a passive controlled atmosphere display case (Samadelli *et al.*, 2019, 152) to slow down the oxidation process. Apparently, the process of degradation progressively developed after the 2000s. In 2000, Andrea Peers describes Rosalia as follows: «*She lays in her case, eyes shut, as if sleeping. Her face was still rosy with color...*» (<https://www.umass.edu/journal/sicilyprogram/Sicily2000/portfolio/peers/article.html>).

The pictures taken by the professional photographer, Marco Lanza in 2000 (Lanza and Facchi, 2001) confirm that the child mummy was still beautifully preserved. On the 23rd of February 2008 (Fig. 3C), Rosalia's face showed slight evidence of oxidation. Conversely, the picture taken by Vincent J. Musi in 2009 for the National Geographic Magazine shows that Rosalia's face had completely lost her plumpy appearance and her rosy face had turned to brownish-blackish (Le catacombe di Palermo, Jan 29th 2018, <https://www.youtube.com/watch?v=yDpNv3DhQJ8> minute 43:29).



Fig. 3C. A picture of Rosalia Lombardo dated the 23rd of February 2008 (Credits: Dr. Giuseppe Carotenuto).

Cotton tampons are clearly visible in her nostrils, her eyes are slightly opened and extended brownish-blackish areas of oxidation appear on her cheeks, upper lips, on the nose and on her forehead; the nose morphology appears completely altered from the original one (Le catacombe di Palermo, Jan 29th 2018) <https://www.youtube.com/watch?v=yDpNv3DhQJ8>, minutes 15:18 to 15:29; Onda TV, La Mummia Bambina Rosalia Lombardo, la sua vera storia, Jul 23rd 2017, <https://www.youtube.com/watch?v=UGGpl3How6w> minute 0:48; Sora Morte, 2015, April 21st 2016, <https://www.youtube.com/watch?v=8x5c9uftErA>, minute 2:23,24; Palermo la mummia bambina- Dario Piombino espone le tecniche di imbalsamazione, Jan 5th 2017, <https://www.youtube.com/watch?v=phbUj4j6dJI>, minute 0:14),) (Figs. 3A-B) and from the photograph dated the 23rd February 2008 (Fig. 3C). The 2014 photograph by Carlo Vannini shows a marked degree of oxidation (Cenzi and Vannini, 2014). Finally, the photographs taken by forensics Baumjohann and Benecke (2019, 73-93 and SI) (Fig. 3D) show that, despite being kept in a highly technological passive display case, the oxidation proceeds at a quick pace and that Rosalia's face is progressively darkening.



Fig. 3D. Rosalia Lombardo in her passive display (© Mark Benecke, *Entomol heute* 2019, SI; Reproduced with permission).

CONCLUSION

The existence of Salafia's manuscript of his embalming technique was first reported by Di Cristina in February 2007. There is a need for the contents manuscript to be put in the public domain. There is neither documentary nor biological evidence to support the view that Rosalia's mummy was really embalmed by Salafia. Meanwhile, biochemical investigations should be performed to understand how she was embalmed and which compounds were used in her treatment. Taking the aforementioned issues together, a reassessment of Rosalia's body preservation and restoration are recommended and more efforts to keep this beautiful mummy in her original state must be made.

APPENDIX

English translation by the authors of this article of note 21, p. 90 from the book *La Dimora delle Anime* by Di Cristina *et al.*, 2007:

«Alfredo Salafia studied the process of mummification of the bodies and dedicated his life to the research of the methods to preserve the corpses by the use of pharmacological substances and chemical preparations. He wrote a treatise entitled *Nuovo Metodo Speciale per la conservazione del cadavere umano intero alla stato permanentemente fresco* (New Special Method for the Preservation of the Entire Human Cadaver in the State of Permanent Freshness). It consists of around 30 handwritten pages where Salafia performs a concise description of the mummification techniques from the Egyptians to the Capuchins, and provides information on the European and American studies in the first years of the twentieth century; in his treatise he describes his own (embalming) method and describes the history of the embalming procedures of some illustrious personages, (whose bodies were) well-preserved thanks to his method: among those (are), Francesco Crispi, the cardinal Michelangelo Celesia, Archbishop of Palermo, and the Senator Giacomo Armò».

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