

## **The Italian Medusas: Unusual Preservation in Nineteenth-century Italy**

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### **Abstract**

The raw material of anatomy is the human body, yet anatomists have long been troubled by the body's tendency to decomposition, imposing a limited time period in which it could be studied. The development of the anatomy museum, collecting together preserved human tissue, acted to form an archive of the human body, in health and disease, which could be studied at leisure. By the nineteenth century it was said that anatomy could not be taught without a museum and the more extensive the collection the better. These anatomical preparations might be dried or preserved in fluid, or injected with wax, mercury or pigments. Anatomists were sometimes very secretive about their personal methods of preservation.

In nineteenth-century Italy a diverse group of scientists took a novel approach to preserving tissue: petrification. By subjecting the tissue to an accelerated process of fossilisation they could prevent its decay, producing an anatomical preparation that was long lasting and durable. This was not widely adopted, however, and from our 21<sup>st</sup>-century viewpoint seems a somewhat macabre outlier in an otherwise scientific discipline considered essential to the study of anatomy. This article will look at this preservation method and its limitations, examining why it was so specific to Italy, and to this time period, and why it may have failed to capture the imagination of other anatomists looking to preserve the human body.

### **Keywords**

Anatomical preservation, Petrification, Medical museum, Embalming, Nineteenth century, Italy

## Introduction

To the dying who are repugnant to become food for worms, and to the survivors who wish not to detach themselves entirely from their dear departed.<sup>1</sup>

In Ancient Greek mythology, Medusa was a gorgon with writhing snakes instead of hair. To look upon her inspired such fear that those who did so were turned to stone. They were petrified, the term coming from the Latin *petra*, which refers to a stone or rock. Walking around the Museo Paolo Gorini in the Italian town of Lodi, near Milan, a number of heads look back at you. Some look sad, some look surprised, but they are caught in frozen moment, almost as if the gorgon herself had turned her petrifying glare upon them. One infant is on their knees in a supplicant position, hands raised in prayer, as though begging Medusa for mercy.

These are not representations of a myth, however, for in the nineteenth century the idea of petrification was actually attempted on human bodies, not through fear as Medusa had done, but by attempting to recreate a process that occurs in nature, the kind of mineralisation that produces fossils. Paolo Gorini (1813-81) was one of a number of Italian men who would attempt this with human tissue, infusing it with derivatives of calcium, potassium and mercury to give it a consistency which was often comparable to stone. Their purpose was often anatomical in nature, although, as we shall see, the use of these petrified bodies would extend beyond the anatomical realm.

By the nineteenth century, the use of the body for anatomical purposes was well established. The first documented, authorised human dissection to study the body in the modern world took place in Bologna in 1315, and the practice spread from that point.<sup>2</sup> Studying from the body was always hindered by the tendency of the body to decompose, and medical men would develop techniques to try and preserve the body, and parts thereof, for teaching and study.<sup>3</sup> The idea of preserving the body was not itself new. Best known are the mummification processes used in Egypt for funerary purposes, but preservation of the body could be seen in many other cultures.

For anatomical purposes, preserving the body using fluids or desiccation goes back to the seventeenth century and leads to the development of the medical museum where preserved parts of bodies could act as an archive of the body in both health and disease, allowing it to be studied at leisure.<sup>4</sup> The Italian states had been the site of that initial

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<sup>1</sup> *'Ai morituri cui ripugnasse il diventar pasto dei vermi, ed ai supèrstiti che desiderassero di non distaccarsi interamente dai loro cari trapassaci'*. Quoted in: Gorini P. *La conservazione della salma di Giuseppe Mazzini: notizie fornite*. Genova: R. Istituto Sordo-Muti; 1873. p.39. This is the introduction to the appendix in Gorini's account of preserving the body of Giuseppe Mazzini, which was the text of a speech he had given in favour of such preservation of the corpse. This and succeeding quotations in Italian translated by the author.

<sup>2</sup> There are many sources which discuss the early history of dissection; see, for example: Cunningham A. *The Anatomist Anatomis'd*. London: Routledge; 2016; Sawday J. *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture*. London: Routledge; 1996.

<sup>3</sup> Simmons J. *Fluid Preservation*. Lanham MD: Rowman and Littlefield; 2014.

<sup>4</sup> By 1836, anatomist Frederick John Knox (1794-1873) would say that anatomy could not be taught without a museum of preserved body parts: Knox FJ. *The Anatomist's Instructor, and Museum Companion*. Edinburgh: Adam and Charles Black; 1836. p.2.

modern human dissection, and they remained a place of important anatomical developments, with key figures including Marcello Malpighi (1628-94), Antonio Valsalva (1666-1723) and Giovanni Battista Morgagni (1682-1771), as well as Brussels-born Andreas Vesalius (1514-64). And it is in the Italian states where the idea of petrification as a way of preserving the body seems to have germinated. The first person believed to have tried it was Girolamo Segato (1792-1836) from the province of Belluno in the Dolomites.

### **A mosaic of flesh**

The Grand Duke of Tuscany was likely used to fancy gifts, but the marquetry table, inlaid with 214 beautiful cut pieces presented by Girolamo Segato, was something quite different.. ‘Even to the eye of the expert’, Segato’s friend, the lawyer Giuseppe Pellegrini (dates unknown), tells us: ‘... these seem the most beautiful hard stones that nature has ever produced’. All is not as it appears, however: ‘And yet these are not stones, but (who would believe it?) are all parts of the human body, most being pathological, which vary in colour according to the different diseases they are affected by’.<sup>5</sup> He goes on to list what the assumed stones actually are: for example, what might appear to be veined sardonyx is actually the blood vessels in the membrane of an inflamed testicle, while one portion of blond cornelian is, in fact, a fibrous tumour of the uterus. It is a long list. The Grand Duke of Tuscany did not appreciate this gift, however, and decided he did not want such a table.

Segato was born in 1792 in the village of Vedana. Between 1818 and 1823 he travelled extensively in Egypt where he became fascinated by the mummified remains that he saw there. In this time of Egyptomania he was certainly not alone in this. He returned to Italy inspired to carry out experiments on preserving the human body. Working in secrecy at the Palazzo Ferroni in Florence he looked at ways to preserve tissue by mineralising the organic material. This mineralisation would prevent the usual decomposition processes from taking place, giving a method of preservation that would come to be called petrification.<sup>6</sup> He preserved human and animal parts using this method and surviving examples can be seen in the Museo Anatomico in Florence.

The idea of producing such a table using his petrified material seems to have begun as a joke.<sup>7</sup> However, once the table was actually made, Segato seems to have taken badly the Grand Duke’s refusal of this gift which showed off the skill of his preparation

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<sup>5</sup> ‘*Questi anco all’occhio del perito e’ sembrano le più belle pietre dure che da natura a’eno state prodette... Eppure queste non sono pietre dure, ma (chi lo crederebbe?) sono tutti pezzi di membra umane, per lo più patologiche, fra le quali quelli della stessa qualità variano di colore a seconda delle diverse malattie da cui sono affetti*’. Quoted in: Pellegrini G. *Della artificiale riduzione a solidità lapidea e inalterabilità degli animali scoperta da Girolamo Segato*. Padova: V. Batelli e Figli; 1835. p.14-15.

<sup>6</sup> Biographical details for Girolamo Segato from: Orlandini GE, Tempestini R, Lippi D, Paternostro F, Zecchi-Orlandini S, Villari N. Bodies of stone: Girolamo Segato (1792-1836). *Italian Journal of Anatomy and Embryology*. 2007; 112(1): 13-18.

<sup>7</sup> Vignati C. *Sopra alcune divulgatissime mummificazioni e sul nuovo trovato del professore Paolo Gorini, memori*. Milano-Lodi: Wilmant; 1847. Quoted in: Cenzi I. *Il Petrificatore*. Modena: Logos; 2018. p.71.

method. He burned his notes and refused to share his methods. He died an early death aged 43 in 1836, the year after his friend Pellegrini had published in praise of his work. His method also perished. The Italian epitaph on his tomb in the cloister of Santa Croce in Florence reads: ‘Here lies Girolamo Segato, whose body would have been entirely petrified, had his art not perished with him’.<sup>8</sup> See Figure 1.



Figure 1. Girolamo Segato’s tomb in the cloister of Santa Croce. Author’s photograph.

### **A medal for the General**

Ef시오 Marini (1835-1900) was born in Cagliari on the island of Sardinia, then its own Kingdom.<sup>9</sup> He attended university in Pisa, returning to his place of birth with degrees in medicine and natural science. Back in Cagliari, he experimented with photography and obtained a position at the Museum of Natural History there, but could not obtain a teaching post. Using the collection at the museum to research, he initially looked at paleopathology, publishing his first paper on the subject when he was 25 years old. He compared the phases of the fossilisation process, and the way they altered matter, to alchemical ideas of the philosopher’s stone.<sup>10</sup>

<sup>8</sup> ‘*Qui giace disfatto Girolamo Segato, che vedrebbe intero pietrificato, se l’arte sua non periva con lui*’. Quoted in: Cenzi. *Il Petrificatore*, 2018 (Note 7). p.71.

<sup>9</sup> Biographical details for Ef시오 Marini from: Murtas G. Ef시오 Marini e la sua città matrigna, ovvero Cagliari e il suo Figlio Rinnegato. 23 Jul 2013. Online at: Ef시오 Marini: Il Petrificatore. <http://www.efsiomarini.info/> (accessed 3 Mar 2025).

<sup>10</sup> Zedda C, Serra L. Ef시오 Marini, genio incompreso. 2015. Online at: Ef시오 Marini: Il Petrificatore. <http://www.efsiomarini.info/> (accessed 20 Mar 2025).

This kind of thinking was anathema to the scientists of the day,<sup>11</sup> and together with Marini's haughty attitude and tendency to work in solitude attracted hostility from colleagues. It did not take him long to think of applying ideas of fossilisation to preserve organic material as Girolamo Segato had done some decades earlier. Marini wished to take the idea further, however, and make a reversible process, something which would allow later dissection of a body preserved using his technique. Experimenting using bodies from the University's Anatomy School and the morgue of the local cemetery, it seems that by early 1861 he had found a technique that yielded results.

When General Giuseppe Garibaldi (1807-82) was wounded in the Battle of Aspromonte in August 1862 during the wars of unification in Italy, Marini, as a qualified doctor, was in attendance. He collected some of the General's blood from his leg wound, then petrified it and encased it in glass to make a medallion. Marini then presented this to Garibaldi, who was known as the Hero of Two Worlds because of his campaigns on the continents of both Europe and South America. The General wrote a personal letter of thanks to Marini.<sup>12</sup>

Marini was keen to use the technique to preserve whole bodies, and an opportunity came with the death of the Sardinian historian Pietro Martini (1800-66) on 17 February 1866. The funeral rites for this celebrated man were extensive and took several days. His body was said to already be showing signs of decomposition by the time Marini began his task. He worked in a small cell located in the Monumental Cemetery of Bonaria, the site of many of his previous experiments in petrification. After his body was preserved, Martini's friends lamented that only one image of the great man existed from life. On 1 June, with Martini dead for over four months, Marini took a small group to see the body. He carried out some processes to improve the preservation of the corpse, and then Pietro Martini was ready for his close-up. A photograph was taken to immortalise him in death and reproductions went on sale. Martini had been famous in life; now he was famous in death.<sup>13</sup>

Martini's preserved corpse may have been photographed but it did not get an appropriate resting place. The money to create a suitably grand monument in which to display the petrified body never materialised because the bank in which the subscription funds had been placed went into liquidation. And so Pietro Martini's remains rested in a normal grave. The body was examined several times in the following decades and was always found to be in a state of perfect preservation. However, following a renewed interest in Marini's work at the turn of the 21<sup>st</sup> century, a new application to examine Martini's preserved body was made and, in 2006, it was exhumed and inspected. Unfortunately, it was no longer found to be in a good state.<sup>14</sup>

As the scientist who had enabled the production of Pietro Martini's posthumous portrait with his preservation technique, Efsio Marini thought this would cement his reputation. However, the publicity surrounding the photograph of Martini's petrified body did not have the result that Marini hoped for. In a superstitious community he was

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<sup>11</sup> For discussion of suspicion of alchemical ideas see, for example: Inglis B. *A History of Medicine*. London: Weidenfeld and Nicolson; 1965. p.44-45.

<sup>12</sup> This incident is recounted in: Murtas. Efsio Marini, 2013 (Note 9).

<sup>13</sup> Murtas. Efsio Marini, 2013 (Note 9).

<sup>14</sup> Zedda C. La travagliata vicenda della salma pietrificata di Pietro Martini. Date unknown. Online at: Efsio Marini: Il Petrificatore. <http://www.efsiomarini.info/> (accessed 19 Mar 2025).

seen as a sorcerer. Frustrated, he left Sardinia for Paris to find the recognition he desired.<sup>15</sup>

At the Universal Exhibition of 1867 in Paris, Marini displayed examples of petrified remains. They caught the attention of Emperor Napoleon III (1808-73) who commended his work and brought it to the attention of Professor Auguste Nélaton (1807-73) of the Paris Medical School. Nélaton had been the doctor who had operated on Garibaldi at Aspromonte. This was the kind of acclaim Marini craved, and he decided to thank Napoleon III for his support. It is at this point we get another table made from petrified human remains, with mosaic work made from petrified brain, liver, lung, blood, bile and various glands. Unlike Segato's table, the human composition of which was not obvious to the viewer unless they were told of it, Marini's table advertised the source of its unusual materials. Embedded in the marquetry at the cardinal points are four preserved ears, while sitting proud in the centre is a right foot. It can still be seen in Paris at the Musée d'Histoire de la Médecine. For a similar example of Marini's work see Figure 2.



Figure 2. Table made from preserved human body parts by Efisio Marini at some point between 1867 and 1900. At the centre is the hand of a young woman wearing a bracelet with Marini's name on. On display at MUSA (Museo Universitario delle Scienze e delle Arti), Naples, Italy. Author's photograph.

These plaudits did not overcome prejudices in Marini's home city. He still hoped for a position at the University of Cagliari where his intention was to create a unique anatomy museum with preparations made using his own secret technique. Such a

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<sup>15</sup> Murtas. Efisio Marini, 2013 (Note 9).

position never materialised, largely down to what Marini's biographer Gianfranco Murtas describes as 'a wall of envy and slander' that was set against him.<sup>16</sup> As 1867 drew to a close, Marini cast his scientific equipment into the sea and moved to Naples. There he carried on with his experiments in petrification. In his apartment he opened a smaller version of the museum he had hoped to have at the University of Cagliari. It proved popular with scientists. In 1935, Marini's nephew recalled his visits as a child:

What a strange museum! The vital organs of the human body turned into very hard stone; amputated legs, arms, hands, feet, years after their removal, preserving their softness and elasticity ... especially surprising: the torso of a buxom adolescent petrified like a sculpture, and the body of a little girl stretched out as if in sleep waiting to wake up, on a bed all lace and frills. That perfect and buxom female bust ... when repeatedly struck by a hammer resonated like a block of marble or travertine.<sup>17</sup>

Another visitor was the writer Thomas Trollope (1810-92) who wrote:

It was in the spring of that year that we went, taken thither by the Marquis d'Arcais ... to see the very extraordinary preparations of the human body executed by Signor Efsio Marini by means discovered by himself. I think I may say that what we saw left upon the minds of all of us there present no shadow of doubt of the practicability of reducing the substance of the human body to the condition and consistency of marble, capable of receiving the highest degree of polish. We saw portions of the brain thus treated and resembling highly-polished madrepora; the liver assumed the appearance of the most splendidly coloured red marble. We saw, I think, a hand and fore-arm so preserved as to resemble accurately, save for a certain livid pallor, that portion of a living body. We saw a very beautiful and highly-polished table of various colours made from different portions of human flesh. I do not think we saw any complete body.<sup>18</sup>

Marini also carried on with medical practice, publishing on cholera and carcinoma. In spite of his recognitions from Napoleon III and Garibaldi, and the small museum he had established, he never achieved the success he hoped for and his final years were spent in relative poverty. When he died in his adopted city of Naples in 1900, he had never revealed his secret preservation method to anyone.

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<sup>16</sup> '... il muro di invidia e maldicenza che si alza contro di lui'. Quoted in: Murtas. Efsio Marini, 2013 (Note 9). p.39.

<sup>17</sup> 'Che strano museo! Gli organi più vitali e più riposti del corpo umano diventati pietra durissima; gambe, braccia, mani, piedi conservanti, dopo tanti anni dall'amputazione, la loro morbidezza ed elasticità... specialmente sorprendenti: il torso scultorio di una formosa adolescente petrificato ed il corpo d'una bambina steso come se ancora dormisse attendendo il risveglio, sul lettuccio tutto trine e merletti. Quel perfetto e procace busto femminile... risonava, battuto ripetutamente col martello dallo scienziato, come un blocco di marmo o di travertino'. Quoted in: Murtas. Efsio Marini, 2013 (Note 9). p.42-43.

<sup>18</sup> Trollope T. *What I Remember, Vol. III*. London: Richard Bentley & Son; 1889. p.105.

### **The cow's udder snuffbox**

There have been various claims of women whose breasts are so beautiful that a glass was moulded to mimic their shape. The first wine glass is said to have been based on the breast of Helen of Troy, and Henry II of France was said to have had wine glasses modelled on the apple-shaped breasts of his mistress Diane de Poitiers.<sup>19</sup> A champagne glass designed in Paris in the 1930s was allegedly inspired by American photographer and model Lee Miller.<sup>20</sup> Stories such as these may be nothing more than legend or wishful thinking but Paolo Gorini took the idea one step further. He used a human breast, petrified to look hard and clear, to make a chalice. It was one of a number of decorative items he made using his petrification techniques; another was a snuffbox made of a cow's udder. These were among items he showed to the Society of Scientific Readers<sup>21</sup> in the hope of gaining their support.<sup>22</sup>

Today, a collection of 169 of Gorini's 'cadaveric pieces' can be seen in his hometown of Lodi.<sup>23</sup> There are a number of preserved anatomical dissections which could be used as a valuable teaching tool for those wishing to demonstrate anatomy. However, there are also many heads prepared without anatomical purpose but to instead capture likeness and facial expression. It seems that, for Gorini, anatomical use was a justification for a different purpose with this work. He was not an anatomist but a volcanologist. His work in that field was renowned, with a commission by the Minister of Education to carry out a study into Italy's volcanoes, and making mini-volcanoes for public display.<sup>24</sup>

Gorini's interest in body preservation stemmed from a terrible event in his childhood. Aged twelve, his father, a mathematics professor, was killed in an accident caused by a runaway horse. It was, according to Gorini, the beginning of 'an infinite procession of evils'.<sup>25</sup> The contemplation of his father's untimely demise seems to have given the young Paulo a terror of what happened to the body after death:

It's a horrible thing to realise what happens to the corpse after it has been locked up inside its underground prison. If somehow we could see what went on under the ground, any other way of treating the dead would be judged less cruel, and the practice of burial would be universally condemned.<sup>26</sup>

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<sup>19</sup> See: Marilyn Yalom M. *A History of the Breast*. New York: Albert Knopf; 1997. p.66-67.

<sup>20</sup> Burke C. *Lee Miller*. London: Bloomsbury; 2006. p.60.

<sup>21</sup> *La Società delle Lettore Scientifiche* was formed in Genoa in 1866 to promote the sharing of knowledge amongst natural scientists.

<sup>22</sup> Gorini. *La conservazione*, 1873 (Note 1). p.27.

<sup>23</sup> Carli A, Piombino-Mascalì D. *Preparati Anatomici Lombardi Tra Otto – e Novecento: Paolo Gorini e Giuseppe Paravicini. Medicina nei Secoli: arte e scienza*. 2015; 27(2): 413-426.

<sup>24</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.67.

<sup>25</sup> '*Il principiare d'una infinita processione di mali*'. Quoted in: Carli, Piombino-Mascalì. *Preparati Anatomici*, 2015 (Note 23).

<sup>26</sup> '*È una cosa orribile il rendersi conto di ciò che succede al cadavere allorché sia rinchiuso nella sua prigione sotterranea. Se attraverso un qualche spiraglio si potesse gittare là dentro uno sguardo, qualunque altro modo di trattamento dei cadaveri si giudicherebbe meno crudele, e l'uso del seppellimento sarebbe irremissibilmente condannato*'. Quoted in: P. Gorini. *Sulla Purificazione Dei Morti Per Mezzo del Fuoco*. Milan: Battezzati; 1876. IX.

Gorini obtained a degree in mathematics and physics and moved to Lodi in 1834 to teach at the Municipal Lyceum.<sup>27</sup> It was around this time that his experiments with preserving the dead seem to have begun. An illustration by artist Luigi Conconi (1852-1917) showing Gorini in his laboratory feels like it draws inspiration from depictions of Victor Frankenstein's laboratory in films produced in the following century.<sup>28</sup>

Gorini was 30 years old when he first attempted petrification on an entire human body. It was 1843 and the body in question was that of Pasquale Barbieri (died 1843), a young man from the local area. Barbieri's body can still be seen laid out naked like a cadaver for autopsy. His expression is somehow unlike that of a cadaver, almost suggesting that he does not like the position he is in, and that he is about to rise. It also seems likely that he had a skin condition, possibly smallpox or pellagra, with lesions still visible on the skin. Other attempts at preserving both full bodies and body parts would follow. Until the mid-1870s Gorini would continue to try and perfect his method; the many heads preserved show an attempt to immortalise through facial expression something of the person's character in life.<sup>29</sup>

Gorini's method seems to have used mercury and calcium but the exact preparatory methods he used are still a mystery.<sup>30</sup> It was also not a single process since we have seen that he was continuously trying to refine and improve upon the results he achieved, sometimes with different aims, such as preserving the body for later dissection and preserving meat in ways that would be edible later. Wandering through the Museum in Lodi that displays some of Gorini's preparations,<sup>31</sup> this author was struck by the way there are different qualities to the appearance of the flesh suggestive of different techniques being tried. Some, for example that of Pasquale Barbieri, have skin that has a much more fragile, mottled appearance. Other attempts made the skin somewhat darkened and almost leathery, but with an appearance more akin to that in life, with pores perfectly visible and frown lines seeming naturalistic.

Gorini thought that to refer to his preparations as 'petrified corpses' was quite inappropriate because they have none of the characteristics of stone. True petrification, according to Gorini, was impossible.<sup>32</sup> Even without thinking of his work as 'petrification' successful preservation was for him a true compensation for his 'long, tiring and unpleasant studies'.<sup>33</sup> He did not have a shortage of human bodies to work with. The years of his early activity in preserving human tissue, in the 1840s, were a time of high mortality in Italy, between food shortages and respiratory illnesses. Infant mortality was particularly shocking with almost half of infants dying before their fifth

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<sup>27</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.45.

<sup>28</sup> This illustration is in Carlo Dossi's *Note Azzurre* from 1964. These notes were written before Dossi's death in 1910, then collected by his wife and published in 1912, and then in a fuller edition in 1964 containing Conconi's illustrations: Dossi C. *Note Azzurre*. Milan: Adelphi; 1964. Gorini's laboratory was in in the deconsecrated church of San Nicolò in the Piazza Ospitale, Lodi.

<sup>29</sup> Carli, Piombino-Mascoli. *Preparati Anatomici*, 2015 (Note 23).

<sup>30</sup> Piombino-Mascoli M. *Bodies of Stone*. In: Cenzi. *Il Petrificatore*, 2018 (Note 7). p.4.

<sup>31</sup> Collezione Anatomica "Paolo Gorini", Via Agostino Bassi 3, 26900 Lodi, Italy.

<sup>32</sup> Gorini. *La conservazione*, 1873 (Note 1). p.37.

<sup>33</sup> Gorini. *La conservazione*, 1873 (Note 1). p.38.

birthday.<sup>34</sup> Widespread poverty meant that families often could not afford to bury their loved ones and so they were often left unclaimed in hospitals, making them available to researchers like Gorini.<sup>35</sup> It was these unclaimed bodies that he became so well acquainted with, saying: ‘For most of my life I have replaced, without too much pain, the company of the dead for the company of the living ... Due to the many disillusionments I have suffered, I have withdrawn from the company of the living’.<sup>36</sup>

One body that Gorini’s embalming talents were applied to was that of Giuseppe Mazzini (1805-72), a politician who worked hard promoting the unification of Italy: ‘The mortal remains of Mazzini, after the pretended burial at Genoa, have been entrusted to Professor Gorini, who has undertaken the complete petrification of them within eight months’.<sup>37</sup> Mazzini died of pleurisy in Pisa in March 1872, aged 66. A telegram was immediately sent to Gorini: ‘Come immediately to Pisa, to prepare Mazzini’s body’.<sup>38</sup>

Gorini arrives in Pisa and gives the friends and colleagues who are overseeing Mazzini’s funeral a choice: he has brought with him the materials he needs for his petrification method which will keep the body preserved for ever but this process will take many months. Alternatively, he can carry out a simpler embalming process not intended for such long-lasting preservation. This is different to his petrification method, and will only take a few hours, but the results will only last a short time, enough to get the body through the funeral. The body of this well-known public figure must go on display the following day and so his friends choose the latter method. After his display, however, Mazzini’s body is given back to Gorini to go through the petrification process.

Gorini talks about the steps he takes, for example, to reduce the appearance of livor mortis, the post-mortem settling of blood, but does not give the details of what these steps involve, demonstrating again the secretive methods that form a thread through this story. He also realises that decomposition has already set in. It is 60 hours since death, which would not usually be a problem in March, but the sirocco is unseasonably warm. His embalming process is interrupted to transport the body for display, and a rumour starts to say that Gorini’s embalming is not, in fact, very good, and a stinking liquid is being emitted from the body. According to Gorini, this is actually the preservation fluid and not the ooze of putrefaction.

Following Mazzini’s death in early March, it took until August to complete the full petrification process, overcoming the issues of incipient putrefaction and its effects on the appearance of the skin. Mazzini’s preserved body now rests in the Cimiteri Monumentale di Staglieno in Genoa. Other such commissions followed for Gorini, such

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<sup>34</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.45.

<sup>35</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.45.

<sup>36</sup> ‘*Alla compagnia dei viventi per la maggior parte della mia vita ho sostituito, senza troppo dolore, quella dei morti... Pei molti disinganni sofferti, andava ritraendomi dal consorzio dei vivi*’. Quoted in: Carli A. *Paolo Gorini: La Fiaba del Mago di Lodi*. Novara: Interlinea Edizione; 2009. p.25.

<sup>37</sup> Anon. Petrification of the Body. *The London Reader*. 1 Aug 1872. p.238.

<sup>38</sup> ‘*Vieni subito Pisa, preparar Salma Mazzini*’. Quoted in: Gorini. *La conservazione*, 1873 (Note 1). p.9. This text provided much of the detail about Gorini’s involvement in Mazzini’s post-mortem treatment.

as the writer Giuseppe Rovani (1818-74), and one Signor Dezzanerini who died in Milan towards the end of 1873.<sup>39</sup>

In 1864 Gorini listed the potential uses of such preservation methods, and he included: ‘to provide new working materials for the use of inlayers, furriers and turners’,<sup>40</sup> which makes us think of the tables of petrified remains we have already seen from Segato and Marini, although Gorini specifies that the remains used for this purpose should be of non-human origin.<sup>41</sup> Three of his six uses are for anatomical or natural history studies, while memorialisation of the dead and preservation of edible meat are also considered.<sup>42</sup> Gorini is commemorated in his hometown (Figure 3).



Figure 3. Statue of Paolo Gorini in Lodi, Italy. Author’s photograph.

### **The anatomist’s experiments**

Giovan Battista Rini (1795-1856) was working at the same time as Paolo Gorini but his purpose was more truly anatomical than Gorini’s. Rini had completed a medical degree

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<sup>39</sup> Carli, Piombino-Mascoli. *Preparati Anatomici*, 2015 (Note 23).

<sup>40</sup> *Indurimento delle sostanze animali di origine non umana per favorire nuove materie di lavoro agli intarsiatori, agli impellicciatori ed ai tornitori*. Quoted in: Carli. *Paolo Gorini*, 2009 (Note 36). p.23.

<sup>41</sup> This comes from a presentation given at the Royal Academy of Science of Turin in 1864, quoted in: Carli. *Paolo Gorini*, 2009 (Note 36). p.23.

<sup>42</sup> Gorini began researching the application petrification to food stuffs in 1856. See: Cenzi. *Il Petrificatore*, 2018 (Note 7). p.73.

in Pavia and went on to work in Milan before teaching in the hospital of Saló on the shores of Lake Garda in Lombardy. In common with many of the anatomical teachers of the nineteenth century Rini had developed his own collection for teaching. This included the kind of dried and injected preparations common to other collections but he also experimented with petrification. The Museum of Saló holds eighteen of the 39 preparations which Rini intended to go to the Saló hospital for anatomical teaching. The rest do not seem to have survived.

Rini also left no explanation of his methods, but his preparations have been analysed by computer tomography and been shown to have density values considerably higher than anatomical structures, higher even than those frequently found in urinary calculi, consistent with the idea that these structures have indeed been petrified. However, the study notes that only one preservation out of the eighteen surviving, that of a heart (Figure 4), demonstrates the stony surface one would expect to see in truly a petrified preservation, and the authors note that this is the only one they could define as petrified.<sup>43</sup>



Figure 4. A heart preserved by Giovan Battista Rini in the mid-nineteenth century. On display at the Museum of Saló, Italy. Author's photograph.

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<sup>43</sup> Panzer S, Carli A, Zink AR, Piombino-Mascali D. The Anatomical Collection of Giovan Battista Rini (1795-1856): A Paleoradiological Investigation. *Clinical Anatomy*. 2012; 25: 299-307.

## **An Italian cul-de-sac**

Segato, Marini, Gorini and Rini were not the only petrifiers working in nineteenth-century Italy. One man who attempted to emulate Segato's work was Giovanni Battista Messedaglia (1810-45) from Verona. Like Segato, he died at a relatively young age. His method was intended for commercialisation after his death but the manuscript describing it was misplaced.<sup>44</sup> The Florentine Anatomy Museum holds twelve preparations by Bartolommeo Zanon (1792-1855), preserved using calcium, arsenic and silicon in the 1830s.<sup>45</sup>

Not all petrifiers were secretive: the pharmacist Luigi Tommasi (dates unknown) published an account in the *Acts and Memoirs of the Virgilian Academy* of 1868-1870 which described a method of petrification. First the fat was removed using sulphuric ether, then the body was dried and soaked in a mercury dichloride solution for almost a month. After this impregnation with mercury the body would be drained and coated in a paste of gypsum, alcohol and potassium carbonate for ten days at 35 degrees Celsius. After the coating was removed, the tissue would be left with a stone-like hardness.<sup>46</sup> Later, Oreste Maggio (1875-1937) a physician in Palermo, Sicily, brought the idea of petrification into the twentieth century.<sup>47</sup>

For these men, petrification was seen as a method with huge potential; Michele Martone (dates unknown) believed it was the only method that would give 'perfect and lasting' preservation of the body.<sup>48</sup> Yet once we get into the twentieth century attempts to preserve the body using this method seem to have largely died out. Why did petrification end up as a cul-de-sac in the history of body preservation?

One reason may be that the use of petrification spanned more than a simple anatomical role. As we have seen with the abundance of tables produced using petrified human remains, alongside other decorative items, there was perhaps a flippancy in using this method that may have seemed distasteful to some. It certainly seems that ideas about the purpose of petrification were complex and its funerary role seems to have been prominent from the beginning, with Segato's inspiration coming from the Egyptian use of mummification in funeral practice. Marini was concerned with producing a museum but also used his technique for funerary embalming. Gorini seems to have used the anatomical preparations to justify his research into its funerary applications: his collection contains dissections but largely features intact body pieces, many of heads or sometimes torsos.

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<sup>44</sup> Piombino-Mascali D. Oreste Maggio, Un "Pietrificatore" Palermitano. *Medicina & storia: rivista di storia della medicina e della sanità*. 2008; 16: 169-177.

<sup>45</sup> Piombino-Mascali D. Zanon, Bartolommeo. *Dizionario Biografico degli Italiani – Volume 100* (2020). *Dizionario Biografico*. <https://www.treccani.it/biografico/>.

<sup>46</sup> Larentis O, Tesi C, Licata M, Fusco R, Gorini I, Rossetti C. *et al.* Body petrification in Italy. Another recipe of the 19th century revealed. *Medicina Historica*. 2020; 4(3): e2020020.

<sup>47</sup> Piombino-Mascali. Oreste Maggio, 2008 (Note 44).

<sup>48</sup> Licata M, Rossetti C, Tesi C, Larentis G, Fusco R, Ciliberti R. To Save a Corpse from Decomposition – the Purpose of Petrification in the Second Half of the 19th Century. *Acta Medica Academia*. 2019; 48(3): 328-331. This article analyses a note published on petrification by Michele Martone in 1890 in the Italian Journal of Natural Sciences, but notes that there is no biographical information available on Martone.

Alberto Carli, curator of the Collezione Paulo Gorini in Lodi, recounts a popular anecdote about Gorini's intentions for his preparations: he proposed that these could adorn the tombstones in Lodi's cemetery. The idea was not taken up.<sup>49</sup> It can be imagined that for many such an idea would be truly horrifying, akin to a modern zombie film, with the dead above ground. For Gorini, as a man who seems to have had a horror of the dead decomposing beneath the ground, this idea must have been greatly comforting. Rather than rotting in the dark soil the dead could stand proud in the light, becoming their own memorial, an idea that also occurs to Trollope on seeing Marini's collection:

Signor Marini's discovery would open to the imagination vistas of the most startling kind. What would be the result of so turning into marble all the individuals of all the future generations of men? How should we live in a world peopled by marble statues infinitely exceeding in number its living inhabitants? <sup>50</sup>

Gorini recognises this problem himself: 'If this were done, in a short time the living would realise that they are very few compared to the dead'.<sup>51</sup> Later in his life he would redirect his efforts from petrification towards cremation. Cremation would also prevent the decomposition of bodies underground, and so Gorini designed an apparatus for cremation of the body, where a wheeled frame would allow the body to be introduced into an oven. This design would be adopted for funerary purposes in many places around the world, including the UK's first crematorium in Woking.<sup>52</sup> Gorini was invited to the UK to oversee its construction in 1878, and the first cremation took place there in 1885.<sup>53</sup>

There is also the question of why petrification is so specific to the Italian states which went through dramatic political change over the course of the nineteenth century. The snowball of the Italian Risorgimento, aiming to unify the disparate states of the Italian peninsula, began after Napoleon's defeat in 1815. It picked up speed with the revolutions of 1848, culminating with Rome being declared capital of the Kingdom of Italy in 1871. Writer Ivan Cenzi talks of how the unique political climate of the time contributed to the proliferation of petrifiers in the region. Giuseppe Mazzini, whose body was preserved by Paolo Gorini, had been a key figure in this process, establishing the political society Young Italy in 1831. This movement coincided with a time of scientific positivism and, in a society heavily influenced by Catholicism, there seems a need for secular relics to balance the abundance of religious ones.<sup>54</sup>

The urge for secular relics carries into the twentieth century, with figures such as Vladimir Lenin (1870-1924), Mao Zedong (1893-1976) and Eva Peron (1919-52) being given a new twist on the immortalisation of the flesh. Each of these public figures was preserved so that their bodies could be displayed in the long term, and indeed both Lenin

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<sup>49</sup> Carli A. Introduzione: Dopo la morte del "Mago". In: Stroppa A. *La pietra e la cenere. Il monumento a Paolo Gorini in Lodi*. Lodi: Società di Cremazione Paolo Gorini; 2011. p.7-15.

<sup>50</sup> Trollope. *What I Remember*, 1889 (Note 18). p.106.

<sup>51</sup> 'Se ciò si facesse, in breve tempo i vivi si accorgerebbero di èsser ben pochi a paragone dei morti'. Quoted in: Gorini. *La conservazione*, 1873 (Note 1). p.7.

<sup>52</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.78.

<sup>53</sup> The Cremation Society. *History of Modern Cremation in the United Kingdom, 1874-1974*. <https://www.cremation.org.uk/history-of-cremation-in-the-united-kingdom> (accessed 20 Nov 2025).

<sup>54</sup> Cenzi. *Il Petrificatore*, 2018 (Note 7). p.73.

and Mao are still on public view in Moscow and Beijing, respectively. However, it was not petrification that gave their mortal remains longevity, but a chemical embalming process developed from that used in the funerary industry.

That this preservation seems restricted to Italy may stem from secrecy about methods, leading to lack of opportunity to diffuse and develop the technique. Differences in attitudes towards death may also play a role as can be seen in reactions to Gorini's preservation of the body of Giuseppe Mazzini. Mrs Sara Nathan (1819-1892), who had been born in Italy but spent her adult life based in London, was present at a discussion over Mazzini's postmortem fate, and expressed her belief '... that touching corpses is a kind of profanation, and that the best that can be done for them is to leave them alone and do nothing'.<sup>55</sup> This reflects the reactions common in the UK to such treatment.

A letter comes from England expressing 'amazement and sorrow' that Mazzini is to be preserved this way, that it is sacrilegious and violates the sanctity of death.<sup>56</sup> Gorini summarises the horror expressed in British newspapers as that '... nature has destined the mortal remains of man to rest in the quiet of the tomb, where they unknowingly offer her a tribute of changes which she demands for her own mysterious purposes'.<sup>57</sup> Any attempts to prevent this are sacrilege, an impiety and a profanation. He goes on to note that 'In Italy, all traces of this ancient mysticism have disappeared'.<sup>58</sup> For the Italians, he believes, preventing decomposition is a proof of love and reverence.<sup>59</sup>

It should be noted that not all British commentary was negative. *The London Reader* noted that 'The remains of Mazzini, in the hand of this skillful operator, will escape disorganization, and retain the sublime expression of the last hour'.<sup>60</sup> This shows that while there was hostility towards this kind of post-mortem treatment from some quarters these attitudes were not so simply categorised as might be suggested. However, it is possible that this view of petrification beyond the Italian region may have contributed to the lack of uptake in trying the technique outside that geographical area.

It is worth noting that, even as an admirer of Gorini, writer and politician Carlo Dossi (1849-1910) imagines the lament of the petrified cadaver whose molecules are condemned never to be released and incorporated into a different living being. Even a marmot, Dossi thinks, would be better than the eternal stillness of preservation. 'Oh Gorini,' the petrified cadaver asks, 'why did you completely kill my molecules, why did you make me a dead man without resurrection, an immortal corpse?'.<sup>61</sup>

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<sup>55</sup> '... *che il metter mano ai cadàveri, sia una specie di profanazione, e che il meglio che si possa fare per essi è di lasciarli tranquilli e non far nulla*'. Quoted in: Gorini. *La conservazione*, 1873 (Note 1). p.13.

<sup>56</sup> Gorini. *La conservazione*, 1873 (Note 1). p.29.

<sup>57</sup> '... *la natura ha destinato le spoglie mortali dier uomo a riposare nella quiete del sepolcro, dove insensibilmente le pagano quel tributo di cambiamenti, eh' essa pe' suoi fini misterios i s'incàrica di esiger da loro*'. Quoted in: Gorini. *La conservazione*, 1873 (Note 1). p.33.

<sup>58</sup> '*In Italia di questo antico misticismo è sparita ogni traccia*'. Quoted in: Gorini. *La conservazione*, 1873 (Note 1). p.33.

<sup>59</sup> Gorini. *La conservazione*, 1873 (Note 1). p.35.

<sup>60</sup> Anon. *Petrification of the Body*, 1872 (Note 37).

<sup>61</sup> '*O Gorini, perchè uccidesti completamente le molecole mie, perchè facesti di me un morto senza rissurrezione, un immortale cadavere?*'. Quoted in: Dossi C. *Note Azzurre, Vol. 2*. Milano: Adelphi; 1964. p.595.

There are also competing methods to consider. In the 1860s, the death of soldiers far from home in the American Civil War had popularised funerary embalming using arterial injection,<sup>62</sup> based on a method used by French anatomist Jean-Nicolas Gannal (1791-1852) for preserving bodies for dissection.<sup>63</sup> This kind of arterial injection for preservation had been attempted by the anatomist William Hunter (1718-83) in the seventeenth century. Shortly after the American Civil War such methods would soon become standard practice in the American funeral industry.<sup>64</sup> While many petrifiers were secretive about their methods, those we do know of, like Luigi Tommasi's technique described above, were costly and time consuming. The relative simplicity of the method that gained acceptance in the US may have merely been more practical, especially after the discovery of formaldehyde in 1893 replaced the use of arsenic in the process.<sup>65</sup> Quicker, cheaper and less toxic, it would have been difficult to make a case to use the petrifiers' hidden processes in preference.

## Conclusion

Petrification became something of a quirk in the history of preserving human tissue for reasons which appear to be as manifold and complex as the secret techniques used by the petrifiers themselves. That secrecy was undoubtedly a large factor in limiting the spread of the idea. Without dissemination, petrification as a process was doomed to stagnation, only practised by isolated individuals constantly having to reinvent the wheel as they developed their own techniques. Lack of publication and peer assessment would inhibit progress through exchange of ideas, preventing evolution and advancement of methods. That the men who were carrying out these experiments were sometimes referred to by terms such as 'magician' and 'sorcerer' in a time dominated by belief in scientific rationalism was likely a contributing factor. Combined with the secrecy of so many of these men, this would have seemed like a throwback to earlier times, more akin to the work of alchemists than the scientific method.

The importance of anatomical preservation to teaching and understanding in the nineteenth century is undoubted. The ability to slow the decomposition process to allow more leisurely study, and to preserve pathologies and unusual anatomical variants to illustrate classes and disseminate knowledge, was a key part in medical developments. Still today, preservation methods play an important role in cadaveric teaching for both students and surgeons. Multiple methods for preservation were developing across Europe and the US in the nineteenth century, also with cross-pollination between anatomical preservation and the development of funerary embalming, so we must think of petrification as part of a larger picture. The aforementioned secrecy about methods would have led to prejudice against petrification. And, as is so often the case, economic reasons would have certainly played a major role, with cheaper and safer options undoubtedly being more appealing.

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<sup>62</sup> See, for example: Faust DG. *This Republic of Suffering: Death and the American Civil War*. New York: Knopf Doubleday; 2009.

<sup>63</sup> Gannal J-N. *Histoire des Embaumements*. Paris: Ferra; 1838.

<sup>64</sup> Quigley C. *The Corpse: A History*. Jefferson: McFarland and Company; 1996. p.54-56.

<sup>65</sup> Simmons. *Fluid Preservation*, 2014 (Note 3). p.32.

What we know of some of the methods for petrification suggests that they were time consuming and costly. The relative speed of the methods that were being developed in the American funeral industry that fed back into medical fields would surely be more appealing. The introduction of formaldehyde into the embalming process in the 1890s would also have reduced costs even further. While today we know of the health risks associated with formaldehyde, at the end of the nineteenth century, replacing the arsenic previously used in embalming with formaldehyde would have made this seem a safe option, especially if it were compared to the acids and heavy metals prevalent in petrification methods. At the dawn of the twentieth century petrification was largely forgotten about, while there was a proliferation of papers attempting to refine the use of formaldehyde as a method of preservation.<sup>66</sup> One thing is certain: whatever the opinions of the time, the petrifiers' methods allow us to look upon faces from the past, faces which return our gaze with the unblinking glare of the Medusa.

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<sup>66</sup> Simmons. *Fluid Preservation*, 2014 (Note 3). p.199-273. See Table 1 for examples.

## **Biographical details**

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