

The Catacomb Mummies of Sicily

A State-of-the-Art Report (2007-2011)

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Summary

The large number of mummies stored in several churches and crypts on the island of Sicily represents a unique opportunity to investigate lives, lifestyles, nutrition, disease, and funeral customs of a large sample of individuals dating from the late 16th to the mid-20th century. Within the framework of the “Sicily Mummy Project” we performed scientific studies on four mummy collections, and gathered information on their historical and archaeological context. This paper will provide an overview of the technical and cultural aspects of mummification in Sicily and of the new relevant data obtained so far through the investigation of this precious bioanthropological resource.

Introduction

The large number of mummies stored in several churches and crypts on the island of Sicily represent a unique opportunity to investigate the lives, lifestyles, nutrition, disease and funeral customs of a sample group of individuals dating from the late 16th to the mid-20th century (Fig. 1)(Piombino-Mascali *et al.*, 2010). The “Sicily Mummy Project” established in 2007 is an ongoing research project aimed at documenting and studying these remains. As a continuation of this, scientific studies were performed on four mummy collections – namely those at Palermo, Piraino, Savoca, and Novara di Sicilia -, and information gathered on their historical and archaeological context (Piombino-Mascali *et al.*, 2011). The following pages provide an overview of the technical and cultural aspects of mummification in Sicily and the new data obtained so far through the investigation of this precious bioanthropological resource (Aufderheide, 2003). Specifically, discussions will focus on aspects

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regarding funerary archaeology, paleopathology, paleobotany and paleonutrition.

The Sites Investigated

The primary mummy collection incorporated in this study is that of the renowned Capuchin Catacombs of Palermo. First opened in 1599 and in use until the mid-20th century, this collection contains a huge sample of both spontaneous and anthropogenic mummies (Piombino-Masali *et al.*, 2010). Over the centuries this important location was used to inter not only the friars from the Capuchin Friary, but also other members of the clergy, the nobility, and the bourgeoisie. According to a recent survey, this crypt stores 1252 bodies and 600 wooden coffins, some of which are empty (Piombino-Masali *et al.*, 2011).

The second mummy collection is that of Piraino, a town standing 406 meters above sea level on the north of the island approximately 80 km west of Messina. The Mother Church, completed in 1585, holds the so-called “Sepulcher of the Priests”, used between 1773 and 1858 (Piraino Parish Archive, unpublished data). The collection holds 26 spontaneously mummified bodies, one of which is almost completely skeletonized.

Another important collection of mummified remains is located at Savoca, a town standing 303 meters above sea level close to the Sicilian east coast. The local Capuchin Church contains a crypt with 17 mummies and 17 wooden coffins, some of which are empty. The bodies which belong to religious and lay dignitaries have been spontaneously mummified, with the exception of one case, which provides evidence of evisceration and craniotomy. They date between 1795 and 1876 (Todesco, 1993-1994).

Lastly, the fourth collection investigated is a small group of spontaneously preserved mummies found in Novara di Sicilia – a village further from the sea than the previous two and 650 meters above sea level. The group comprises six cadavers belonging to religious dignitaries dating from between 1849 and 1873 (Figs 2-5) (Piombino-Masali & Mallegni, 2006).

Funerary Archaeology

Surveys have established that the bodies were spontaneously mummified in the vast majority of cases and as such have not been either eviscerated, excerebrated or injected. A significant feature noticed during the investigations is evidence of a simple, yet effective, post-mortem treatment which encouraged the spontaneous drying of the cadavers. The bodies were laid out in crypts and subterranean chapels following careful preparation including thorough desiccation and the use of clothing (Todesco, 1993-1994).

In general these crypts were built with designated places to store the corpses for sufficiently long to allow the fluids to drain away and to promote desiccation of the tissues. According to several sources, these storage places were called *colatoi*, *scolatoi* or *colatori*, all derived from the Latin *colum* (drain). The most common type, archaeologically documented in all areas of Sicily, consisted of a seat, typically located within a wall niche. The seat had a central basin and hole through which body fluids gathered and drained away. Other types consist of a rectangular wall aperture or a small, separate environment which contained a rack, made of terracotta pipes or

wooden lathes (Piombino-Masali & Mallegni, 2006).

Beyond the draining process itself, the examination revealed that some corpses were stuffed with vegetal materials including bay leaves, straw or tow - a technique designed to preserve the correct shape of the cadaver and to combat the odor. After these phases, the bodies were exposed in the crypts for worship and commemoration.

This original burial custom appears to be consistent with the so-called “secondary disposal”, first analyzed by Robert Hertz (1881-1915) in his landmark study on “The collective representation of death”. Hertz, a French sociologist, believed that funerary rituals were developed as a direct challenge aimed at transforming the negative aspect of death into something positive and transcendental. Thus, death is only seen as a change of status necessary to place the deceased in his, or her, correct supernatural dimension. In order for this to happen, corpses are disposed of shortly after death and later, at a culturally sanctioned time, they are retrieved and moved to a permanent place. Furthermore, Hertz argued that the journey of the soul to the after-world is mirrored by the transformation of the body into ‘clean’ remains (either skeletonized or mummified), and it is only after the decaying process is completed that the soul is allowed to enter the land of the dead. This admittance is represented by a secondary and final disposal, followed by a final ceremony (Hertz, 1978).

The Sicilian evidence discussed above, inserted in the wider context of Southern Italian funeral practices, supports the idea that there existed a concept within the heart of Catholic Europe, of death being a long, culturally established process showing some similarities with the model proposed by Hertz (Pezzini, 2006).

To better investigate the mummies’ preparation techniques and features, it was decided to rely upon conventional radiographic investigations, rather than invasive sampling and autopsy.

Paleoradiology

Soon after the discovery of x-rays in 1895, paleoradiology developed as a non-destructive method for examining mummies. Since then, radiography has remained a basic tool with the advantage of being affordable, accessible, and mobile and latterly it has become increasingly sophisticated due to the development of high spatial resolution and full digitalization (Chhem, 2006). The mobile digital radiography system (Dragon DR, CXDI-50G, Canon/Sedecal) was conceived primarily to investigate skeletal anomalies, and was utilized at the sites of Palermo, Piraino and Savoca.

Ten mummies were selected from the Catacombs of Palermo. The x-ray investigation revealed clear signs of embalming procedures in nine cases, highlighting the presence of artificial eyes or eye caps, tampons in the mouth, nasal passage or rectum, filling of the body cavities, and radio-opaque embalming fluids most probably mercury-based. The x-rays also revealed pathological features of the skeletal system, such as generalized degenerative changes in an adult mummy, and healed fractures of three adjacent thoracic vertebrae in another. Additionally, one child was affected by a skeletal condition thought to be the autosomal dominant form of Robinow syndrome. Robinow syndrome, or the so-called “fetal face syndrome”, is a genetically heterogeneous condition that can be inherited in an autosomal dominant or recessive mode, in which the recessive form tends

to be more severe. This rare condition was first reported by Robinow and co-workers in 1996 as a dwarfism syndrome consisting of mesomelic limb shortening, short fingers, hypoplastic genitalia and characteristic facial features, resembling that of a fetus at eight weeks (Panzer *et al.*, 2010). No indicators for metabolic disease or changes following nutritional disorders were found.

Within the 16 bodies investigated in Savoca, there were two cases of tooth abscesses/granulomas, three cases of DISH and one case of gout – conditions possibly linked to a protein-based diet –, a case of a healed fracture of a thoracic vertebra and one of a lumbar vertebra, a fracture of a left rib with non-union and callus formation, and a probable case of post-traumatic deformation of the left humeral head. Benign skeletal changes included a healed juvenile benign cortical defect of the left distal femur, osteolytic lesions of a left rib and the proximal right femur, presumably representing enchondromas. Twelve of the mummies showed evidence of degenerative changes and one body revealed osteopenia of the left knee, possibly related to inactivity.

Twenty-three mummies were x-rayed from Piraino. A dental inspection revealed five cases of abscesses/granulomas, two cases of enamel defect and a case of resorption. One individual revealed the presence of DISH. As far as benign bone lesions were concerned, a case of enchondroma/bone infarction of the left distal femur was noted, while another case revealed the presence of osteolytic lesions of the skull, ribs and femora, suggesting the diagnosis of plasmacytoma. Trauma was evident in two mummies with healed rib fractures, and two other cases of thoracic vertebrae fractures. However, the most common disease was osteoarthritis, with 21 subjects affected, involving the spine, the shoulders, the ileo-sacral joint and symphysis, the ankle, the hips, the knee, the femoro-patellar joint and the calcaneus.

Paleobotany

As previously mentioned, many of the mummies investigated revealed the presence of vegetal material used to stuff the body cavities. Therefore, it was of interest to identify such plants and reconstruct their properties using botanical techniques. To date (2011) the research focused on 19 specimens gathered from the Piraino mummy collection, which included branches, twigs, leaves, seeds and fruits. The samples were processed according to a standardized procedure, observed with a microscope at a 1000x magnification and then compared with the current botanical atlases (Marchesini & Marvelli, 2006). The preservation status of the granules was remarkable, and the floral richness included as many as 166 taxa.

The results obtained enabled a greater understanding of the plants employed which essentially belonged to two types: a group of Mediterranean flora, characteristic of the Sicilian coast or hinterland, and a group of aromatic plants which were probably selected to produce oils and anointments for bodily preservation (Marvelli *et al.*, 2010).

The first group includes evergreen species such as *Quercus* cf. *ilex*, *Quercus* cf. *suber*, *Pinus* cf. *pineae*, *Olea europaea*, as well as deciduous oaks (*Quercus* cf. *robur*, *Quercus* cf. *cerris*, *Quercus* cf. *petraea*, *Quercus* cf. *pubescens*), maples, elms, and hazels. The second group was probably collected in the areas surrounding the church, and was likely cultivated for its intense smell and antiseptic properties.

Macroscopic investigation suggested that the presence of walnuts in the material used to stuff the bodies reflects deliberate selection, as their cupule contains antiseptic substances such as juglone, tannin and iodine. The same reasons can be inferred for the use of ivy and cypress leaves. On the other hand, the presence of olive and plum seeds indicated the use of oils for cadaver aspersion. Other plants employed include juniper, clematis, sage, common reed, and germander, and were most probably chosen for their aromatic or bactericidal properties or because they were ideal for filling and stuffing the mummies. Specifically, it is worth mentioning that juniper wood is quite hard, rot-resistant, and with an excellent aroma, and, together with sage, appears often in recipes for embalming during the Modern Era (Marinozzi & Fornaciari, 2005).

Additionally, pollen analyses carried out on the Piraino samples provided clear evidence for a rich and varied mixture of arboreal, shrubby or herbaceous species, many of which are known for their deodorant and medical characteristics. Among these were *Agave americana*, *Citrus* cf. *limon*, *Rosmarinus* cf. *officinalis*, rue, *Anchusa* cf. *officinalis*, *Arctium lappa* cf., *Artemisia vulgaris*, *Tanacetum* cf., and several *Umbelliferae*, such as *Anethum* cf. *graveolens*, *Apium graveolens*, *Cuminum cyminum*, and *Levisticum officinale*. Of interest is the presence of numerous species belonging to the *Cruciferae* family, such as *Sinapis* and *Hornungia*, while other plants included *Lens culinaris* cf., *Pisum sativum*, and several cereals probably used to form the filling of the bodies.

Paleodiet

The nutritional status of these mummies was also under investigation in this study. The availability of human tissue (bone, teeth, hair and nails) of ancient populations enables analysis of the major components of their diet by applying mass spectrometric analyses. Stable isotope analyses of carbon ($^{13}\text{C}/^{12}\text{C}$) and nitrogen ($^{15}\text{N}/^{14}\text{N}$) from human bone collagen provide information on the consumption of animal proteins, plants and marine food (Ambrose, 1993; Katzenberg, 2008).

Twenty-five dense bone specimens were acquired by sampling 35 mummies preserved in Piraino ($n = 18$), Savoca ($n = 5$), and Novara di Sicilia ($n = 2$). All samples met established preservation criteria. The atomic C:N ratio of modern bone is 3.2 and archaeological samples with values between 2.9-3.6 are considered adequately preserved (DeNiro, 1985). Modern bone is approximately 25% protein (collagen yield). The samples exhibited modern or near modern collagen yields, averaging 23.6%. Mean carbon and nitrogen values for Savoca versus Piraino were not significantly different. The Novara data set was too small for meaningful statistical analyses. The diets of the Savoca and Piraino individuals were similar, C_3 terrestrial diets minimally enriched by the intake of marine foods and animal proteins. Moreover, the increased nitrogen values of Savoca compared to Piraino might suggest a better access to animal sources for the former (e.g. meat, dairy products and seafood). The two individuals from Novara appeared to be subsisting on diets lower in marine intake, with carbon values slightly enriched by greater reliance on cereals either directly consumed or fed to domestic animals as fodder. The presence of marine foods in Savoca and Piraino diets was further indicated by the positive correlation between carbon and nitrogen isotope values. Although significant at $p=0.05$ only among the Savoca samples, a trend towards increasing $\delta^{15}\text{N}$ with higher $\delta^{13}\text{C}$ values was present and is a characteristic of marine isotope chemistry.

In order to verify this hypothesis, stable sulphur isotopes shall be investigated in the future. Both the Savoca and Novara data sets were too small to be considered representative of a larger population, but the overall pattern was suggestive of a diet of C_3 terrestrial foods with moderate marine intake. However, small amounts of C_4 plants should also be considered. Differences among the sites were difficult to address given the reduced size of the Savoca and Novara data sets, though, it is not surprising that the cases from Novara - which is the site furthest away from the sea - show the lowest reliance on marine sources within the sample investigated.

As far as the social status is concerned, it seems reasonable to suppose that the Savoca subjects, four of which were laymen, enjoyed a diet richer in proteins than the clergy of Piraino, possibly as a result of a lesser adherence to religious dietary rules (Fornaciari, 2008).

Conclusions

The “Sicily Mummy Project” has provided us with a previously unexplored body of material which will continue to be thoroughly investigated in the future. To summarize, it has been ascertained that in Late Modern Sicily, efforts were made to preserve human remains, thus maintaining a continuing relationship with the deceased, despite the fact that there is some variability in funerary practice. In general, most of the cadavers were intentionally mummified simply by enhancing the dehydration processes through specific draining structures and exposure in well-ventilated locations. However, these treatments were accompanied by some alternative techniques, probably based on local traditions or ‘functional’ needs. In Palermo, for instance, attempts to provide the cadavers with the ‘correct’ shape and a normal consistency by using a stuffing of tow or straw were noted, even in cases where the cadaver was completely skeletonized. On the other hand, in Piraino and Savoca, a mixed vegetal material was used to fill the bodies, possibly to deodorize and improve the effects of preservation, even when spontaneous mummification had been largely achieved. Finally, at least for the ‘urban’ site of the Catacombs, the practice of preserving dead bodies clearly improved from the 19th century onwards, with the adoption of scientific methods of arterial embalming (Piombino-Masali, 2009; Piombino-Masali *et al.*, 2009). This reveals that, even within the same geographic region, a phenomenon which at first appears to be the same may actually reveal important subtle differences.

Where the health conditions of the investigated mummies were concerned, it is worth mentioning that the majority of these bodies (69.3%) showed degenerative disorders, probably due to the fact that many of these mummies belong to mature adult and senile individuals. Other interesting diseases, including DISH and gout, seem to corroborate the evidence for good standards of nutrition, which is confirmed by the isotope investigations. The diet was reasonably balanced, based on terrestrial sources, accompanied by a moderate intake of marine sources, probably – though not exclusively – a consequence of periods of fasting. No evidence for nutritional inadequacy was revealed by the x-ray investigation. All of these features were in line with expectations, bearing in mind that these mummies represent a ‘selected’ sample, and therefore they reflect biological data only for the middle and upper classes, rather than for the Sicilian population as a whole.

This report contains only preliminary and partial information on the “Sicily Mummy Project”. Further scientific

investigations planned for the years 2012-2013 will extend to other mummy collections such as those at Gangi and Lipari, allowing new light to be shed on this enormous bioanthropological treasure, which is as unique as it is relevant.

Acknowledgments

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Figure captions

Fig. 1: Geographical distribution of the Sicily mummies.

Fig. 2: A moment of the mummy expedition in early 2008. Prof. Arthur Aufderheide and Dr Dario Piombino-Masali inspecting a spontaneously mummified body in Palermo.

Fig. 3: Prof. Albert Zink and Dr Dario Piombino-Masali during the sampling of a mummy in Piraino.

Fig. 4: Commenting on the mummy of Giuseppe Nicotina in Savoca.

Fig. 5: Inspection of the mummies held in Novara di Sicilia.

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Fig. 1

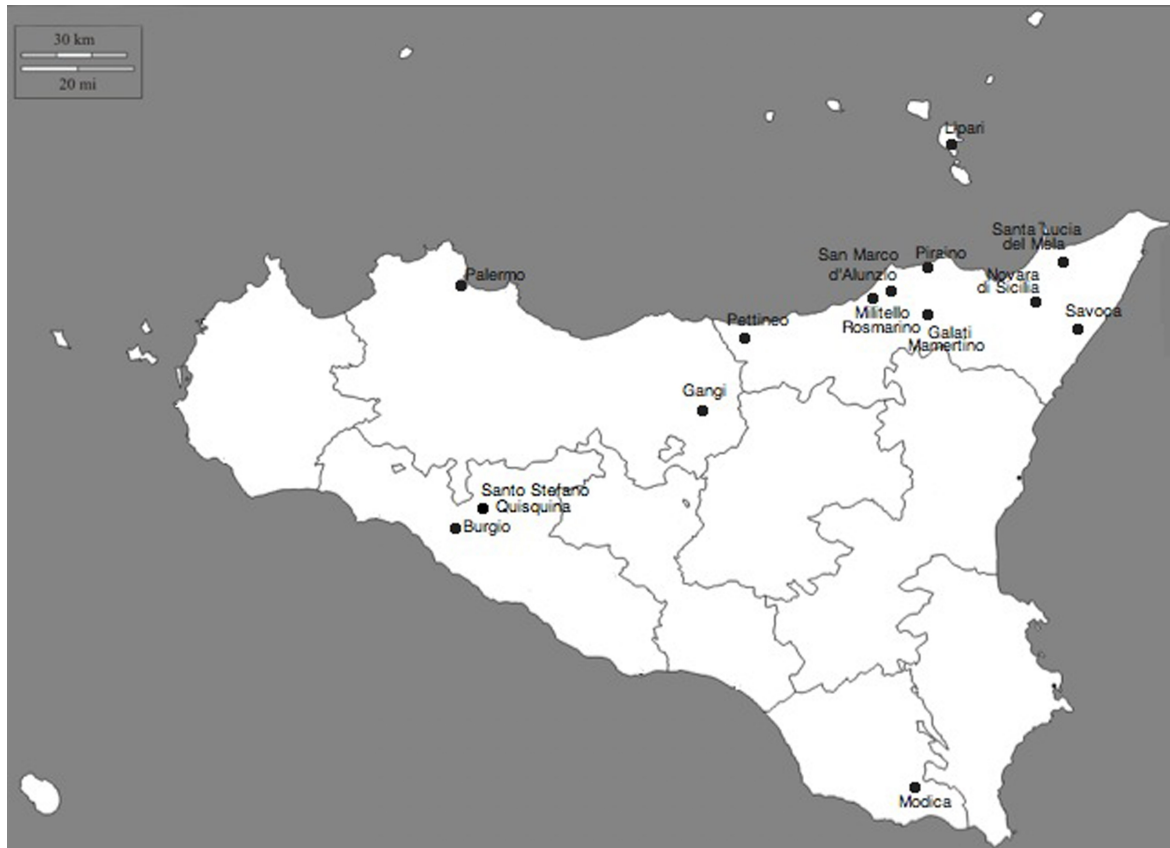


Fig. 2



Fig. 3



Fig. 4



Fig. 5

