

Ethical Considerations Associated with the Display and Analysis of Juvenile Mummies from the Capuchin Catacombs of Palermo, Sicily

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Abstract

The Capuchin Catacombs of Palermo (Sicily) are a unique and culturally rich site utilized from the late sixteenth to mid-twentieth century. The Catacombs are home to the largest collection (n = 1,284) of partly or completely mummified remains in Europe, and the largest assemblage of juvenile mummies (n = 163) in Sicily. As a result, the site attracts thousands of visitors every year. This raises a number of ethical concerns in terms of the preservation, display, and scientific analysis of these mummies. This article will investigate the ethical challenges associated with the display and analysis of juvenile mummified individuals in the Capuchin Catacombs. Initially, ethical issues that arise when displaying mummified children at a visitor site will be explored. Subsequently, the value of adopting non-invasive techniques to answer highly focused, ethically grounded research questions will be addressed. Furthermore, this article will demonstrate the importance of transparent, open dialogue with religious groups and cultural heritage bodies in the study of juvenile mummies. Recommendations for best practice are provided at the end of this paper. These guidelines aim to ensure that juvenile mummies are

displayed and analysed appropriately, whilst simultaneously respecting the beliefs and wishes of the living and deceased.

Keywords: Mummy studies, display, cultural heritage, tourism, ethics, non-invasive investigation, Sicily

Introduction

Mummies have long gripped the public's interest and imagination about the lives and deaths of people in the past. In the late Georgian (1714-1837 AD) and the Victorian (1837-1901 AD) periods, mummy unwrapping parties were popular with the upper echelons of society (Moshenska, 2014; Stienne, 2016), while in the present mummies continue to be one of the most popular exhibitions in museums (Taylor & Antoine, 2014). The world's most renowned mummies hail from Ancient Egypt, but mummification has been practiced as a funerary rite in various prehistoric and historic societies around the world (Aufderheide, 2003). The largest collection of mummified remains in Europe can be found in the Capuchin Catacombs, located two kilometres to the west of the historic city of Palermo, which is the present-day capital of Sicily. This unique site was founded in the late sixteenth century, and continued to be used through to the mid-twentieth century. The Catacombs contain at least 1,284 mummified and skeletonized bodies and offer an unparalleled snapshot into the lives and deaths of individuals that inhabited Palermo in the past.

The Catacombs were established in 1599 AD by the Capuchin Order as they needed a place to bury the spontaneously mummified bodies of forty-five Capuchin Friars. These individuals had been exhumed from a mass grave (which was reserved solely for members of this religious order) near the Church of Santa Maria della Pace (Farella, 1982; Piombino-Mascali, et al.,

2010). The Friars noted the exceptional preservation of the exhumed individuals and believed this was a direct intervention from God. These individuals were subsequently moved to a newly constructed room behind the main altar in the aforementioned church; additional rooms and corridors were later constructed by the church to house the bodies of the increasing number of individuals living and dying in Palermo (Piombino-Mascali, et al. 2010). This burial place was subsequently known as the Capuchin Catacombs. Following the inauguration of the Catacombs at the end of the sixteenth century, the mummified bodies of clergymen and lay people were buried here up until 1880 AD, although human remains continued to be stored there, sometimes permanently, up until 1952 (Piombino-Mascali, 2017; 2020). It should be noted that mummification was an expensive process¹, meaning only the most prominent or wealthiest in society could afford this funerary rite during the modern period (1599-1880 AD), for example the clergy, nobility, and members of the middle class (Piombino-Mascali, 2018). The process of preserving bodies was conceived as a sign of sophistication, performed to maintain the social persona after death. Evidence also indicates that this mortuary treatment was related to the worship of the souls of the purgatory, a cult which subsequently became defunct in the twentieth century. Followers believed that the souls of loved ones became protective entities for the living after death (Piombino-Mascali & Nystrom, 2020). Yet, whilst mummification was deemed to be an exclusive funerary rite, all age groups are represented in the Catacombs, including babies and children.

The mummification of babies and children was at its peak during the late modern period (1787-1880 AD). There are around 163 children buried throughout the Catacombs, and there is also a dedicated ‘Children’s Room’, which is situated adjacent to one of the primary corridors (the ‘Men’s Corridor’). In this room, mummies of children are positioned in alcoves, ledges, and

¹ For further details pertaining to the mummification process in the Capuchin Catacombs, please refer to Piombino-Mascali, et al. (2010) and Panzer, et al. (2010; 2013).

coffins (Figure 1). The babies and children at the site are in variable states of conservation from fully preserved (e.g. Rosalia Lombardo, who exhibits exceptional preservation and lays within an environment-controlled glass coffin) to others where there is more extensive decomposition and skeletonization (Samadelli, et al., 2019). The environmental conditions in the Catacombs require urgent attention as relative humidity peaks at eighty percent, and the temperature fluctuates between ten degrees Celsius to over twenty-five degrees Celsius (Querner, et al., 2018). This may, in part, be due to structural changes to the crypt, which have included the permanent closure of some openings. These conditions encourage biodeterioration phenomena, such as microorganism and insect proliferation, which compromise the integrity of mummies, clothing, and coffins (Piñar, et al., 2013; 2014a; 2014b; Querner, et al., 2018). This could be improved by introducing climate-controlled air conditioning to the entire structure; whilst this appears to be the most effective solution, it would require funding to implement.

Figure 1: The Children's Room situated adjacent to the Men's Corridor in the Capuchin Catacombs, Palermo (photograph courtesy of the Sicily Mummy Project).

Until recently, researchers have principally focused on the adult human remains at this site, whilst juveniles have been largely overlooked with the exception of a small number of

individuals (e.g. Panzer, et al., 2010; 2013; 2018). There is very little documentary evidence that provides details about the children that were granted mummification, though it is believed that those offered this funerary treatment belonged to families with wealth. The death records from the seventeenth to nineteenth century contain limited information (specifically, the name of the individual and the date of death), with no particulars about funerary rites offered to the youngest members of society (Biblioteca Cappuccini Palermo, n.d.; Farella, 1982; Piombino-Mascali, 2018). However, osteological and radiological analyses of these individuals, and their accompanying funerary attire and mortuary related objects (e.g. chairs, canes, and wooden boards), are starting to reveal more about the bio-histories of these children (Piombino-Mascali, 2018).

The Capuchin mummies are one of the world's largest and most renowned collections of mummified individuals in the world (Piombino-Mascali, 2017; Spineto, 2020). The Catacombs, and the mummies housed within, hold great socio-cultural significance as they provide a unique insight into changing attitudes towards death and mortuary rites over time. It is therefore not surprising that the Catacombs are a popular tourist site. The Catacombs have always been open to visitors, but became popular in the late 1700s when Patrick Brydone, a traveller and author, and companions toured Sicily. Brydone documented and published his travels and account of his visit to the Catacombs through a series of letters (Brydone, 1806; Soriano Nieto, 2011). In Brydone's letters, he describes the state of preservation of the mummies and the daily visits made to the Catacombs by family members and friends of the deceased. Interestingly, he assures the reader that 'they [the mummies] are not such objects of horror as you would imagine: they are said, even for ages after death, to retain a strong likeness to what they were when alive' (Brydone, 1806: 257). The reassurance Brydone offers, and the vivid descriptions of the deceased, are likely to have further piqued the interest of potential visitors. Consequently, the

site became a key attraction for those visiting Palermo, though it was not until after World War II that it became a point of interest for mass tourism. Today, the site continues to attract thousands of visitors every year. This in part can be attributed to the rise of social media, television shows, online articles and videos, and travel websites, such as TripAdvisor. Many tourists visiting the site wish to document their excursion through photography and videos. However, this is increasingly becoming an issue as visitors are not respecting the 'no photo' policy as outlined on signs at the entrance and throughout the site, and also on the Palermo Catacombs website (Palermo Catacombs, n.d.) (Figure 2). This presents many ethical challenges in terms of the display of mummified remains. The primary aim of this article is to explore such challenges and how they can be overcome. This research will also consider how mummified individuals can be analysed respectfully and ethically, without compromising the scientific vigour of research, at a visitor site. For the purpose of this paper, we will be focusing upon juvenile mummies throughout, though we will also explore some broader issues that relate to the display and analysis of both juvenile and adult human remains. Ethical approval to conduct the present study was granted by Staffordshire University in July 2020.

Figure 2: Sign at the entrance of the Capuchin Catacombs requesting visitors not to take photographs or use recording equipment. Note the CCTV warning at the bottom of the sign (reproduction courtesy of the Sicily Mummy Project).

Ethical challenges associated with the display of juvenile mummies

The ethics of displaying juvenile skeletons and mummies are rarely addressed by researchers (e.g. Wilson, 2015). Research carried out in the heritage sector has highlighted that museum visitors often have conflicting views around the display of children in museums (Leeds Museums & Galleries, 2018; Biers, 2019; Quorum, 2019). The overall reaction to the display of juvenile human remains tends to be positive as it facilitates visitor's understanding around child mortality, growth and development, and health and disease (Randi Korn & Associates, Inc., 1999; Chamberlain & Parker Pearson, 2001; Wilson, 2015; Leeds Museums & Galleries, 2018; Biers, 2019). However, this is not always the case and some members of the public do not feel comfortable viewing juvenile human remains. In 2001, Rumsey conducted a questionnaire which explored the public's views on displaying human remains in Britain (Brooks & Rumsey, 2006). The author asked fifty-one respondents the types of human remains they would not like to see in museums. 'A baby's skeleton', 'a medically preserved baby (flesh intact)', and 'a skeleton from the early twentieth century' were among the most common responses (Brooks & Rumsey, 2006). Comparable answers were recorded during interviews

and focus groups at the National Museum of Health and Medicine in Washington, DC (USA). This research aimed to gain an insight into opinions and views of human remains collections, including foetal and juvenile remains (Randi Korn & Associates, Inc., 1999). Out of forty post-visit questionnaires, two children and two adults who had visited the museum felt the display of foetuses was ‘disturbing’, while of the twenty focus group participants, the majority did not find any of the displays ‘disturbing’ (Randi Korn & Associates, Inc., 1999). Similar themes were noted in a visitor survey at Perth Museum and Art Gallery (Scotland). Several responses noted that it was sad to see the skeletons of children on display, while other answers expressed fear of these young individuals (Hall, 2013). Focus groups, comprised of eighteen individuals in total, conducted at the Museo Egizio (Turin, Italy) found that only two (11%) individuals felt uncomfortable with the display of (Egyptian) mummified foetuses and children; this is in stark contrast to the views held by the other participants (Quorum, 2019).

Even though these visitor surveys are insightful, we must be mindful that they were conducted in museums and not catacombs. This is a pertinent point as the way in which human remains are displayed in catacombs is very different to museum contexts given the sheer quantity of individuals on display. Consequently, this could have an impact on the way that visitors react and feel towards human remains in catacombs (see Roberts, 2018 for a discussion on sensemaking at ‘dark tourist’ sites). Furthermore, all studies, bar one, were conducted outside of Italy. Over recent years, there has been mounting interest in the ethics of displaying human remains, their excavation, documentation, and conservation across Italy. This is evident in the exponential rise of publications (e.g. Licata & Monza, 2017; Ciliberti, et al., 2018; 2019; 2020; Quorum, 2019; Licata, et al., 2020; Mytum, 2021) and conferences and webinars on the topic².

² Recent examples include the conferences “*Human Remains. Ethics, Conservation, Display*” (2019), Pompeii, Naples, and Turin, Italy; “*Eticamente Sapiens. Dallo scavo alla valorizzazione dei resti umani*” (2019), Bari, Italy; and the virtual webinar “*Etica e resti umani in campo archeologico. Linee guida e codici deontologici tra ricerca, documentazione, tutela e valorizzazione*” (2020), Rome, Italy.

However, very little has been done in terms of developing and implementing ethical guidelines and codes of conduct (i.e. Consiglio Nazionale delle Ricerche, 2019).

The use of TripAdvisor to gauge visitor attitudes towards the display of juvenile mummies

To support the discussion points raised throughout this paper, online quotes from TripAdvisor have been used. TripAdvisor was employed in this research to gauge how tourist visitors felt about the display of juvenile mummies in the Capuchin Catacombs. TripAdvisor was selected as it is not only the world's largest travel website (Moskwa, 2021), but it is free to use, open access, and contains more online reviews for the Capuchin Catacombs than any other website. The authors of all comments have been fully anonymized; this approach falls in line with methodologies of published studies that use open access online quotes to further understand attitudes towards human remains (e.g. Huffer and Charlton, 2019; Huffer, et al. 2019).

Upon the examination of 1,011 English reviews of the Capuchin Catacombs on TripAdvisor in July 2020, 220 (22%) visitors commented on the display of juvenile mummies. Visitors had mixed reactions to the display of these children. Of the 220 reviews that mentioned juvenile mummies, sixty-nine (31%) visitors did not leave an emotive comment, but instead described their experience in an objective manner. In total, forty-six (21%) reviewers left a comment detailing positive emotive reactions, for example several left the Catacombs feeling moved, educated, and reminded of one's own mortality. Visitors leaving reviews with mixed emotions totalled twenty-six (12%). Many of these tourists were glad they had experienced the Catacombs, but they felt uneasy viewing juvenile remains. The majority of reviewers (n = 79; 36%) wrote negative comments, as highlighted below.

'Definitely don't take children here as there are bodies of children hanging from the wall.'

TripAdvisor Juvenile Comment 25

'I don't understand why anybody should like it to be shown like that after death. The categories are strange, like presenting virgins and to show little kids [sic] bodies like that, is more than without Moral. I am sorry I don't understand this kind of religion.'

TripAdvisor Juvenile Comment 62

'What I didn't expect was to be so affected by the babies. Having family and friends who have experienced this loss hit a bit too close to home for me.'

TripAdvisor Juvenile Comment 74

'I understand that this is a cultural experience, but I found the experience unpleasant and disturbing. I was leading a group of college students who were also horrified by what they saw...The infants, in particular, were very disturbing to me and to the students.'

TripAdvisor Juvenile Comment 108

'One word of warning to most women with any kind of motherly instinct – DO NOT LOOK AT THE CHILDREN SECTION. There are babies only a month or so old and it really affected me and a couple of the other ladies I saw looking. Even my husband was a bit affected by that. The rest of it was very interesting and worth a visit but the babies are just lying there rotting.'

TripAdvisor Juvenile Comment 184

These responses further demonstrate that visitors are more likely to have an emotional response when faced with juvenile remains than those belonging to adults (Biers, 2019). Similar views were expressed in the Museo Egizio focus groups (Quorum, 2019). A number of the

TripAdvisor visitor comments noted that viewing juvenile mummies provoked personal memories of living and deceased children. This appears to be a recurrent comment in visitor surveys at museums where juvenile human remains are on display (e.g. Randi Korn & Associates, Inc., 1999; Wilson, 2015). Suchy (2006) has highlighted that when visitors view museum exhibitions, the social-emotional connection is strong and dominates any other memory of the display, that is, after visiting the exhibition they have a deep and lasting memory of the emotional connection of a display but recollection of the exhibition itself is much weaker. The strong social-emotional connection visitors have when visiting the Capuchin Catacombs may explain why some individuals convey strong visceral reactions to the juvenile mummies.

Interestingly, one TripAdvisor reviewer commented on the negative online reviews about the Capuchin Catacombs and exclaimed:

‘People complain about it being morbid.... It is a catacombe [sic]. It says what it is on the tin.’

TripAdvisor Juvenile Comment 2

The relatively high number of negative responses concerning the presence of juvenile mummies on display, or mummified remains in general, may indeed raise the question as to why tourists visit a site where mummies (in variable states of preservation) are on display. Unless visitors have carried out some research before their excursion to the Catacombs, for example visiting the Palermo Catacombs (n.d.) website³ or accessing a free, online (Italian) audio guide about the site (Piombino-Mascali and Franco, 2016), it is unlikely that they are aware of the juvenile mummies housed at this site. Palermo is a popular cruise tour destination. Cruise tour operators that stop at the city offer shore excursion packages to the Capuchin Catacombs (e.g. Princess,

³ The history of the site and visitor guidelines are available on the Palermo Catacombs website, though this is somewhat outdated and some features (e.g. videos) no longer work (Palermo Catacombs, n.d.).

2020; Costa Cruises, 2021). However, minimal information about the Catacombs is provided on their websites, and there is no mention of juvenile mummies. Costa Cruises (2021) do note that the site is ‘not recommended for children or highly sensitive people’. Whilst this warning is in place, there is insufficient information to prepare and educate visitors about the socio-cultural importance of mummification, and the presence of children at this site, nor are there any links to additional resources where readers can learn more about the Catacombs.

Several TripAdvisor comments noted that the Capuchin Catacombs are not suitable for children or other demographic groups, such as women (see above for examples). Similar responses were made in visitor surveys and focus groups at the National Museum of Health and Medicine (USA) (Randi Korn & Associates, Inc. 1999) and the Museo Egizio (Quorum, 2019). At the National Museum of Health and Medicine, several adult visitors were concerned that some exhibitions (e.g. the temporary foetus exhibit) were not appropriate for younger children. At the Museo Egizio, some adults felt that children would be upset when viewing foetal, juvenile, and adult mummies, though the majority of participants believed children would find the exhibitions to be of great interest. Interestingly, one of the focus group respondents noted that children are exposed to images of mummies in schoolbooks meaning they are prepared and will not be affected when viewing a mummy in a museum (Quorum, 2019).

Despite warnings against taking youngsters to the Capuchin Catacombs on TripAdvisor, the majority of visitors that took their children to this site stated that their offspring found it fascinating. Of particular note are the comments of two parents/guardians:

‘My 8 y/o enjoyed looking at all the corpse [sic] and guessing how old the babies were.’

TripAdvisor Juvenile Comment 106

‘We were troubled by the many advices warning people not to visit this place with small children. After showing them some pictures however we eventually decided to visit this place with our 6 yo son and 3 yo daughter and both of them were very interested and intrigued by this place. For them it was definitely a highlight of our journey. If you prepare them well (ask them whether they want to go, tell them the truth and warm [sic] them it may be a bit scary), they will most probably not be afraid but interested in learning more about this fascinating place.’

TripAdvisor General Comment 33

Although the latter quote does not specifically address juvenile mummies, both comments do raise an important point about visiting sites that display juvenile and, indeed, adult human remains; namely the value of conducting prior research before visiting. The overall lack of information in the Catacombs was noted by 122 (12.1%) TripAdvisor reviewers; several of whom recommended reading about the site prior to visiting as this would offer some context to the mummies and Catacombs (e.g. see Palermo Catacombs, n.d.; Aufderheide, 2003; Piombino-Mascali, et al., 2010; Piombino-Mascali, 2018 for an overview of the site and mummies). The distribution of free leaflets and educational panels in the Catacombs would thus be useful for those that did not read the website or listen to the audio guide (Piombino-Mascali and Franco, 2016) prior to their visit. Indeed, this could be funded by the three-euro entrance fee. This approach has been adopted in the Paris Catacombs (France). Here, educational panels are located throughout the site and add valuable context for tourists. Furthermore, their website includes a virtual guided tour of the Catacombs and a visitor’s guide, which features a map, highlighting areas of interest and its history, alongside visitor guidelines (Les Catacombes de Paris, 2018). By adding context to the Capuchin Catacombs, visitors can gain a better insight

into the lives and deaths of the children that lived in late modern Palermo. Indeed, it is widely acknowledged that contextual information can improve visitor experience and their understanding of a site, as well as any human remains that may be on display (Redfern & Bekvalac, 2013; Antón, et al., 2018; Roberts, 2018; Roberts, 2019).

There are currently no signs warning visitors that there are juvenile mummies located throughout the Capuchin Catacombs, either at the entrance or in the site itself. Therefore, some visitors may be caught off guard when encountering such young individuals. Given the prominent location of the Children's Room in the Catacombs, visitors would need to know where this is located if they wished to avoid it on their visit. The Catacombs are still overseen by the Capuchin Friars (a role that harks back to the foundation of the Capuchin Catacombs) who must ensure that the requests of the deceased, and their families, are respected with regards to the display of their mummified remains. Shielding, covering, or removing juvenile mummies from view for the benefit of visitors (e.g. Egypt at the Manchester Museum, 2008; Day, 2014) is not an option given the socio-cultural factors at play (such as the religious beliefs of the Capuchin Friars, and the wishes of the deceased and/or descendant families), as well as the historic value of the site. The use of maps on freely available leaflets would allow visitors to bypass the Children's Room if they did not wish to view this area. The use of signage to notify visitors of the display of human remains is not only good practice but is becoming a standard procedure in the United Kingdom (Redfern and Bekvalac, 2013; Bonney, et al., 2019). As of the present day, this practice has not been employed at sites that house Italian mummy collections even though visitors support this initiative (e.g. Quorum, 2019). Therefore, signs informing visitors that juvenile remains are on display, at the entrance and throughout the Catacombs (particularly in areas where there are large numbers of mummified children), would allow visitors to make informed choices in what they viewed.

The lack of understanding of the societal and cultural importance of mummification in modern Palermo is manifested by visitors in two different ways. Firstly, visitors have expressed that displaying children and adults in the Catacombs for visitors to view is disrespectful:

'The children and baby section was very sad. No photos are allowed which is understandable. Overall I felt a bit disrespectful and wondered if these people are truly at peace being on show for everyone to see. Walked out sad.'

TripAdvisor Juvenile Comment 10

'A weird insight into ancient beliefs and a less than respectful way to be remembered but nevertheless - fascinating!'

TripAdvisor Respect Comment 6

'I was attracted by the history and the story but I did feel guilt wandering around and staring into the faces of the upper crust of society from centuries ago who are now on show for the public in their former fineries. Some will find it undignified and disrespectful and others will justify it as the families of the displayed did centuries ago.'

TripAdvisor Respect Comment 31

The latter two comments demonstrate that some visitors are aware that the display of mummified individuals was linked to social and cultural trends, and ideological beliefs in the past (see Spineto, 2020 for further details on socio-cultural factors and religious beliefs). Individuals, and their families, consented to the display of their mummified remains in the Capuchin Catacombs (Aufderheide, 2003; Spineto, 2020). This is in stark contrast to Egyptian

mummies and other human remains that are on display in museums around the world where, in the vast majority of cases, consent is not provided by the deceased or their kin (e.g. Holm, 2001). The point around consent does need to be emphasized in the Catacombs as visitors, without any prior knowledge of the site, may not know how these individuals came to be displayed for public viewing. That being said, even where contextual information is provided, there is still the possibility that individuals will fail to fully comprehend or understand the way in which people lived in the past, and how they treated their dead (Day, 2014). It is therefore the responsibility of scientists, the Capuchin Friars, the Superintendence for the Cultural and Environmental Heritage of Palermo, and the Department of Cultural Heritage and Sicilian Identity to provide facts and contextual information in an accessible manner. Clear communication and more widely available information about the display of the mummies, and the wishes of the deceased and/or their families, will reduce the amount of misinterpretation, and will improve understanding of the mummification funerary rite in modern Palermo. This will further demonstrate that the display of these individuals is not disrespectful as this is what the deceased and/or their families requested.

The second way in which some visitors exhibit their lack of socio-cultural understanding of mummification in modern Palermo, is by acting inappropriately in the Capuchin Catacombs. The authors of this paper have witnessed numerous visitors eating, drinking, talking loudly, laughing, and taking photographs despite signs and verbal warnings reiterating that it is prohibited and is disrespectful to the dead. This issue was also raised in eight (0.8%) TripAdvisor reviews. These visitors commented upon inappropriate behaviour and the lack of respect shown by some tourists. There is a CCTV warning on a sign at the entrance of the Catacombs (Figure 2). The door keeper monitors visitors from the office at street level. Visitors that break rules are verbally reprimanded by the door keeper over a tannoy, however there is

no security or attendants in the Catacombs to enforce these rules. Whilst it could be argued that staffing costs can be prohibitively expensive, and thus takes funds away from the upkeep and development of the site, it is essential that there is a physical presence in the Catacombs (Dovey, 1992; Samis and Michaelson, 2017). Indeed, studies have shown that the implementation of museum attendants not only deters inappropriate behaviour but can improve visitor experience and attitudes towards displays (Hooper-Greenhill, 1994; Antón, et al., 2018; Black, 2018; Timothy, 2021). This approach would be suitable in the present case as attendants would not only offer security but, with some training, could educate visitors about the history of the site (given the current lack of information boards), the different demographic groups afforded mummification, and the societal and cultural importance of mummification in modern Palermo.

Ethical approaches to the analysis of juvenile mummies at a visitor site

The second part of this paper will explore the value of adopting non-invasive techniques in the investigation of mummified juveniles as a means of furthering our understanding of the lives and deaths of these individuals. In the past, autopsy was used by scientists to establish the age at death, disease and health, and embalming methods of mummies from different contexts (e.g. Aufderheide, 2003; Fornaciari, et al., 2015; 2018). However, many researchers working in mummy studies now believe that this practice is unethical and unnecessarily destructive (Aufderheide, 2003; Lynnerup, 2007; Piombino-Mascali & Gill-Frerking, 2019). Over recent years, the use of radiology has been employed to answer highly focused research questions about the Capuchin mummies. Previous studies that have used imaging methods (e.g. a mobile digital radiography system and portable CT scanner, both of which were used on site) have primarily focused upon adult mummies, though there have been a small number of exceptions (Panzer, et al., 2010; Piombino-Mascali, et al., 2012; Seiler, et al., 2017; Piombino-Mascali, 2018).

Radiography and non-invasive imaging can provide a plethora of information about the Capuchin children. This is particularly important as no studies have solely focused on the juvenile mummies in the Capuchin Catacombs, and we know very little about these individuals compared to the adult mummies. Firstly, the age of these individuals is not known. For the majority of juvenile mummies, there is no associated biographical information; it is thus not possible to marry up the physical body with details in the death records (Biblioteca Cappuccini Palermo, n.d.). However, the use of radiographs can be employed to establish biological age at the time of death; this information can subsequently be utilized to explore age-related patterns and funerary treatment. Secondly, pathological lesions, developmental defects, and stress indicators of these children can be detected using radiography, which can provide key information about the health of these children during life (Lewis, 2018). Whilst non-destructive techniques can be used to answer questions about the age, health, and identity of these children, there are ethical considerations that must be tackled before any research can begin.

First, and foremost, it is imperative that research is founded on meaningful, highly focused research questions, as opposed to exploratory studies (Piombino-Mascali & Gill-Frerking, 2019; Squires, et al., 2019). Exploratory research projects that use non-invasive methods not only contribute to the degradation of mummies, through unnecessary handling and transportation, but may also be unethical, demonstrate a lack of respect for the deceased, and can produce misleading results. One such case took place in 2012, when an unauthorized survey of the Capuchin mummies was carried out, with the purpose of sampling insects. In this instance, the local Superintendence and the site curator were not informed the study was taking

place⁴. This caused significant issues among various stakeholders in terms of irregular activity, lack of communication and approval to conduct the study, and overlap with previously agreed research (Baumjohann & Benecke, 2019). Secondly, research must have a clear purpose that advances our knowledge and understanding of juveniles from late modern Palermo. Unfortunately, this is not always the case in high-profile mummy studies. Howard, et al. (2020) created the ‘sound’ of Nesyamun, a 3,000-year-old mummy from Egypt, by using CT scanning to produce a 3-D printed vocal tract. The researchers highlighted that there were ethical implications of this research but decided to go forward with the study as they believed that 1.) it would inspire and enthuse the public, 2.) the methods employed were non-destructive, and 3.) Nesyamun wanted to ‘speak again’ (Howard, et al., 2020). The justification for conducting this research was weak, particularly as the researchers did not recreate speech, but produced acoustic output. Concerns have been raised about this study as it was not possible to obtain consent to use the deceased’s body in this way and the research was deemed to be unethical in nature, with some scholars noting that it was merely a publicity stunt as it did not further our understanding of the life and death of Nesyamun (e.g. McDaniel, 2020). Whilst this study did not involve invasive, destructive sampling, it does pose ethical questions regarding the appropriate nature of this type of study and what it actually adds to our current understanding of this individual and past societies. Therefore, all research questions and non-invasive methods that focus upon the juvenile mummies housed in the Capuchin Catacombs must 1.) serve a clear purpose in terms of what we can learn about children living in late modern Palermo, and 2.) adhere to local regulations and national laws, religious beliefs, and the wishes of the deceased and/or their family.

⁴ In order to conduct scientific research on the Capuchin mummies, evaluation of proposals is carried out by the scientific curator (Dr Dario Piombino-Mascali), after which time, permission is requested to the Superintendence for the Cultural and Environmental Heritage of Palermo.

In line with the wishes of the deceased and current cultural heritage regulations (namely, legislative decree N° 42, 22 January 2004, which is more commonly referred to as the ‘Codice Urbani’), the mummies, regardless of biological age at death, cannot be removed from the Catacombs. Whilst this is challenging from a research perspective, the use of in-situ, non-invasive methods is essential from both an ethical and a conservation standpoint. These imaging technologies do not injure or cause harm to the living in clinical settings, nor do they damage mummies from historical contexts (Pain, 2016). Given that mummies are incredibly delicate, transportation of individuals can result in the disarticulation of appendages and bones, as well as the detachment of hair and skin fragments. In-situ analysis is also essential as, within the Christian community, the Catacombs are considered a sacred space from which the dead should not be removed. Furthermore, the religious beliefs and wishes of the deceased, their descendants, and the care granted by the Capuchin Friars must be respected. On a similar line, where the names or identifying traits (e.g. coats of arms associated with an individual) of mummies are known, these individuals must be anonymized and no personal identifying details should be included in publications or other outputs (Alves-Cardoso, 2019; Márquez-Grant, et al., 2019). Moreover, removing bodies from a cemetery context could pose additional issues related to hygiene and the safety of researchers as biodeterioration activities may be present in the bodies. For instance, a microbiological study of these mummies has revealed the presence of organisms that could pose a potential risk for visitors, especially immunocompromised individuals (Piñar, et al., 2014a). These points highlight that transportation of the mummies outside of the Catacombs should not be performed, meaning all scientific analyses must be conducted on site.

A key challenge faced by researchers working in the Capuchin Catacombs is the limited time available to study the mummies. The majority of work must be conducted during opening hours

(09:00-13:00 and 15:00-18:00) when the public are able to visit the site. It is not possible to shield the area when studying the mummified juvenile remains, unless radiology is being conducted; in such instances, areas of the Catacombs may be cordoned off for health and safety reasons. This on-site research does allow interaction between the public and researchers, meaning visitors have the opportunity to learn about current research and further their knowledge and understanding of the juvenile mummies, and the reasons for their mummification. Based on personal experience of working in the Catacombs, it could be argued that by observing bioarchaeological investigations being carried out on site, it is possible to foster interest towards the collection, and further demonstrate that this unique site is professionally curated and cared for. Even though studies in the Catacombs are not carried out on a daily basis, the creation of information panels throughout the site illustrating former, current, and future research may enhance the public's understanding of the mummification process, religious beliefs and, ultimately, the importance of preserved human remains when conducting research into the lives and deaths of this population (Piombino-Mascoli, 2019).

A multi-disciplinary and collaborative approach is essential in research that focuses on juvenile mummies (see Wade, et al., 2019 for a more in-depth discussion on the value of multi-disciplinary working in mummy studies). Here, radiographers capture and analyse images of the mummies, whilst bioarchaeologists assist in the interpretation of radiographs and put the biological findings into context through the use of associated personal effects, funerary artefacts, and documentary evidence. Yet this research is not possible without open dialogue and collaboration with cultural heritage bodies and the Capuchin Friars, who can provide invaluable information about the site and the ethical approaches that should be adopted. However, this is not always the case (e.g. Willmann, 2012; Piombino-Mascoli, et al., 2021). Where researchers conduct studies without consent, even where mummies are accessible (such

as the Capuchin Catacombs), the research is deemed as unethical and may create tensions with key stakeholders, such as heritage bodies, religious groups, and descendants of the deceased (Piombino-Mascali, et al., 2021). Thus, it is essential that ethical approval is obtained by the researcher's home institution, and consent is granted by the scientific curator of the Capuchin Catacombs and the Superintendence for the Cultural and Environmental Heritage of Palermo prior to conducting any research on the mummies. It is not appropriate to submit ethics forms, or acquire consent, retrospectively as this shows a lack of transparency in research given that researchers may be using inappropriate methodologies or may practice unethically. By working transparently and openly with these groups, scientists can gain a more comprehensive insight into the lives and deaths of children in the past, whilst working in an ethical manner, and respecting the beliefs and wishes of the living and deceased.

Conclusion

The aim of this article was to address the key ethical concerns around the display and analysis of juvenile mummies from the Capuchin Catacombs. Whilst the website for the Capuchin Catacombs contains some information about the mummies, visitors would benefit from additional resources upon arrival at the site, such as complimentary leaflets with maps, additional signage, and educational panels. The use of digital tools on mobile devices would also be beneficial, for example a downloadable map and information about individual mummies and areas within the Catacombs. These resources would allow visitors to make an informed decision in terms of what they view during their visit. The use of educational boards and leaflets can add valuable context to the site, particularly the cultural and societal importance of mummification in modern Palermo. This, in turn, not only improves visitor experience, but further emphasizes the importance of treating the site and deceased with respect and dignity.

A multi-disciplinary investigation of the Capuchin juvenile mummies will provide a valuable insight into the lives and deaths of children that lived in late modern Palermo. A non-invasive, biocultural approach to such studies ensures that these individuals are studied respectfully and ethically, without compromising the scientific vigour of research. We also need to continue open dialogue and transparency with cultural heritage groups and the Capuchin Friars. Without such a collaboration, it is not possible to conduct ethically grounded research of the Capuchin juvenile mummies. There is still much work to do in terms of the analysis of these young individuals, but ethics must lie at the core of all future work, as it has done in all previous authorized research at this site.

In light of the ethical challenges explored in this article, recommendations to improve visitor experience, security of the juvenile and adult mummies, and to ensure all research activities that focus on the Capuchin mummies are ethical, collaborative, transparent, and answer meaningful research questions, have been developed. The authors propose the following recommendations:

- Improved signage throughout the Catacombs highlighting the presence of children, particularly within the vicinity of the Children's Room;
- Improved online and offline visitor resources (e.g. maps, background history of the Catacombs, and details about the display of children);
- The implementation of attendants in the Catacombs to improve security and visitor behaviour, as well as visitor experience and understanding of the site, and its societal and cultural importance;
- All studies that employ non-invasive techniques of the juvenile mummies in the Capuchin Catacombs must be designed around highly focused research questions, that

are ethical, and clearly contribute to our knowledge and understanding of the lives and deaths of these individuals;

- All research conducted must follow local regulations and national laws, in collaboration with the scientific curator, Capuchin Friars, Superintendence for the Cultural and Environmental Heritage of Palermo, and the Department of Cultural Heritage and Sicilian Identity. This will guarantee that studies answer highly-focused, insightful research questions, which are ethical in nature, and respect the beliefs of the living and the deceased;
- Ethical approval for all studies must be obtained prior to conducting any research on the Capuchin mummies.

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