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Depositional and contextual taphonomy for funerary and forensic investigation: a pilot study

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Riassunto

Viene proposto uno studio pilota che congiungendo analisi tafonomica giaciturale e deposizionale, aiuta a meglio comprendere le pratiche sepolcrali attuate dai necrofori nell'Isola del Lazzaretto Nuovo (Venezia) durante le due epidemie che falcidiarono la Serenissima tra il XVI ed il XVII secolo; tra esse la pratica piu' diffusa per il sito appare il rapido e poco ingombrante seppellimento in sudari, senza ricorso a calce o altri mezzi per arginare il contagio.
Scopo del lavoro è quello di suggerire una completa analisi tafonomica delle evidenze, siano esser relative alle modalita' deposizionali che giaciturali, per una lettura esasutiva del deposito sia per fini bioarcheologici che forensi.

Abstract

The study combines depositional and taphonomic analysis to better understand the funerary rituals used in the graveyard of the Lazzaretto Nuovo island (Venice) during the two plagues between sixteen and seventeen centuries. The usual practice was the use of hasty and less bulky burials in shroud, without any other provisions to reduce the contagion (i.e. cremation, lime).
The aim of this pilot research is to demonstrate how the correlation of data from different branches of taphonomy allows obtaining a comprehensive interpretation of the anthropological findings, both for forensic and bio-archaeological purposes.

Parole chiave: tafonomia, bio-archeologia, antropologia forense.

Key words: taphonomy, bio-archaeology, forensic anthropology.

Introduction

Between the sixteenth and seventeenth century Venice, one of the most important European ports at the time, was a cross point not only for people and goods, but also for potential pathogens and subsequent epidemics. Even if the medical knowledge was not the same as today, the Senate of the Republic instituted on the 18th of July 1468 a quarantine lazaret to cope with this problem. The chosen location was the *Vigna Murada* island in the North of the lagoon, property of the Benedictine monks of San Giorgio Maggiore Island; after the building of the facility founded by the *Ufficio del Sal* was completed, the island was called Lazzaretto Nuovo to be distinguished from the previous lazaret hospital.

After almost five centuries, in the summers of 2006 and 2007 the Soprintendenza per i Beni Archeologici del Veneto - Nucleo NAUSICAA, Archeoclub d'Italia and GASP Gruppo Archeologico Spezzino, organized with the patronage of the Centro Internazionale Ricerche Archeologiche a systematic anthropological campaign with the aim to investigate the island cemetery area. From the archive documents it was found that this health-care facility was equipped with a graveyard in spite of its quarantine original function. This leads to the assumption that during the acute phases of the plague which struck the Serenissima in 1576 and in 1630, not only suspected cases but also infected people were hosted – and buried – in the Lazzaretto Nuovo (Borrini, 2008). Evidence is provided by the 30 different skeletons in primary deposition and hundreds of fragmentary remains discovered by the first two excavation campaigns.

With the purpose of maximizing data collection from the burials, the archaeological recovery was conducted using not only the traditional stratigraphic methods, but also with the support of forensic anthropological and archaeological techniques (Borrini, 2007); this "archaeology with forensic methodologies" allowed to carry out the study of historical events with the precision and scientific rigor of a judicial investigation. This also allowed the utilization of the site as a place of development of these investigative methodologies. The nature of the site represented a significant opportunity for the delineation of protocols and guidelines focused on the recovery and identification of human remains on the *scena criminis* (Borrini, 2011; Borrini and Lusa, 2012). A bio-archaeological context as the Lazaretto Nuovo offers a versatile pool of data for physical anthropology as well as forensic applications of the discipline: having available a mass grave with different burial situations (single, double, multiple inhumations, in primary or secondary positions), the site has been proposed as a favorable opportunity for the development, application and testing of both methodologies and protocols for the recovery of human remains in specific scenarios, such as mass fatalities, massacres and natural disasters investigations.

Forensic taphonomy widens the range of field application of anthropology, and for this reason a two-branch division into depositional and contextual taphonomy has been proposed (Borrini *et al.*, 2011b). The first branch takes into consideration the location of the remains and the preservation of the joints in order to recognize the type of burial, while the second examines the macroscopic changes detectable on the bone surface as a result of the interaction between the remains and the environmental components (i.e. soil, water, weather, fire, human activity).

The aim of the present study is to illustrate the interconnection between these two aspects, which should be placed in relation to each other in order to come to a complete interpretation of a funerary archaeological site.

Materials and Methods

For the depositional study, 19 burials in primary position from both excavation campaigns were taken into account, and the level of anatomical preservation of their joints (Canci and Minozzi, 2005) have been examined. In particular, the authors identified the presence of loose, tight or disjointed articulations for each joint and anatomical connection. A modification of these could be diagnostic of a natural or anthropogenic disturbance.

The analysis was conducted with the aid of the field observations recorded during the anthropological excavation, as well as by the examination of the photographic documentation performed for this purpose on the field.

The sample selected for the contextual analysis is composed by 619 fragmentary remains from secondary deposition, interpreted by the stratigraphic seriation (Borrini, 2008) as referable to originated in the first epidemic episode occurred in 1576. According to the proposed classifications for superficial alterations traceable on skeletal materials (Borrini *et al.*, 2011a), the following marks have been examined: staining resulting from contact with soil, mineral or metal objects; exfoliation; erosion; damages from root activity; *post mortem* fractures and cut marks; weathering; staining from deposition in coffin; thermal alterations.

To better understand possible taphonomic trends, the skeletal elements have been anatomically grouped into: cephalic region (cranium and mandible), upper limb (humerus, ulna, radius), shoulder girdle (scapula, clavicle, sternum), torso (ribs and vertebrae), lower limb (femur, patella, tibia, fibula), extremities (hands and feet).

Results and discussion

The depositional taphonomic data (Tab. 1) allow identifying some indications of a body wrapped in a shroud (Canzi and Minozzi, 2005; Mallegni and Rubini, 1994; Duday, 2006), that prove to be the prevalent ritual burial practice observed at the site. Clues are offered by the position of the lower limbs (specifically by the close proximity of the feet the ankles and the knees; e.g. ID 1, 2, 12, 31), the clavicle verticalization (e.g. ID 3, 5, 19, 23) and lack of pelvic eversion. In this regard it is also relevant to remember that the presence of pins (Borrini and Nuzzolese, 2012) to fix the shroud has been demonstrated at the site by the association of these artefacts with some of the skeletons (e.g. ID 31).

Anatomical articulation	Tight	Lax	Disarticulated
Temporal-mandibular joint	4; 14; 37	9;21; 23; 24	
Cervical vertebrae	3; 4; 23	21; 24	
Scapula/clavicle		9L; 21L	21
Scapula/humerus	14R; 23L	1; 3; 5; 9L; 11L; 23R; 24; 37	13; 14L
Elbow	37L	1; 3; 5; 9R; 11L; 14; 24; 37R	
hand bones		2; 3; 5; 14	
Thoracic vertebrae	1; 37	3; 5; 9R; 11; 19; 21; 23; 24	14
Lumbar/sacral joint	1;3; 5; 21L	9; 11; 19; 21R; 22; 37	
Sacrum/coxal	1; 5R; 9R; 21; 31	2; 9; 11; 14L; 15R; 16R; 21R; 22; 37	
Coxal/femur	1R; 2L; 14; 31	1L; 2R; 3; 5L; 9; 11; 12; 15; 19L; 37	
Femur/patella	1;2;5; 12; 31	9; 15; 16	
Tibia/talus	1; 31	9; 16	
Foot bones	21	1; 9R	

Tab. 1: depositional taphonomic indicators for the main anatomical articulations.

For the contextual taphonomy, the data (Figg. 1 & 2)) show a general diffusion of soil staining and root damage without a distinction between anatomical regions; erosion and exfoliation are observed in slightly lower number of fragments, but they are still characterized by a large spread in the sample. As an environmental indicator, weathering is totally absent, such as coffin staining and thermal alterations, which indicates the absence of the related funerary activities (i.e. cremation and burial in coffin).

With regard to the remains' preservation, also in relation to other contextual-taphonomic studies focused on the conservation of the anthropometric landmarks (Borrini *et al.*, 2011b), it is useful to observe how almost all the bones are characterized by *post mortem* fractures and damage. Although the extremities seem to present a reduction of the number of general fractures respect the other bones, however hand and foot phalanges seem affected as the other long bones by cut marks. These alterations were chop marks inflicted by sharp shovels during intercutting of previous graves in the second phase of the graveyard's use (1630 plague), when new burials were dug. Instead, the portion less affected by this type of post-mortem trauma seems to be the cephalic region, which collects, however, the greatest number of general post-mortem fractures. Such findings could indicate how the exhumation trauma in the skull has resulted in fractures rather than cut marks, which retain more information about the tool used.

Conclusions

The results of the combined depositional and contextual taphonomic analysis allowed reconstructing the framework of burial practices performed by the gravediggers (called *picegamorti* in the ancient Venetian dialect) in the Lazaretto Nuovo Island during the two epidemics that mowed down Venice between the sixteenth and the seventeenth centuries.

From the primary burial point of view, it is significant as nearly half of them present clues that lead to the use of a shroud, an assumption confirmed also by the collected artifacts, while no graves provide any evidence of coffins. This conclusion is also reflected by the very few nails found within the archeological layers, and the fact that nails were never directly associated with the skeletons. This confirms the hypothesis of the use of hasty and less bulky burials (shrouds)

during the pandemic periods, and the use of boardwalks (from which the nails came from) to facilitate the movement of *picegamorti* through the cemetery (Duday, 2006).

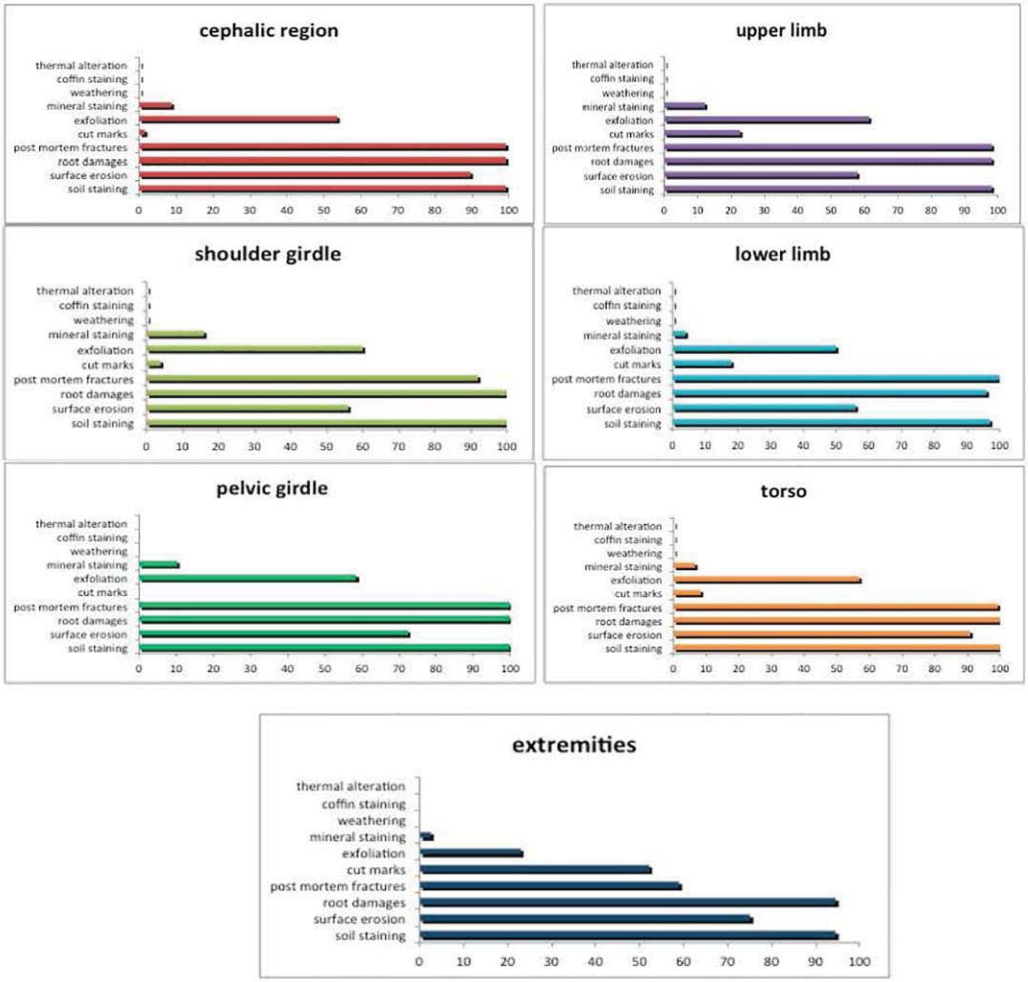

Fig. 1: contextual taphonomic alterations for each anatomical region. Results are expressed in percentage related to the total number of fragments for each region.

The contextual data inferable from fragmentary remains, was supported by the use of experimental software (Taphonomy Reader Beta –version) (Borrini and Tumbarello, 2011), supports the idea that in the Lazzaretto Nuovo only simple burial in earth graves rather than in wood coffin were used when the graveyard became a collective burial area (if not a mass grave). In fact, soil staining is wide spread on the whole sample while alterations resulting from stagnation in the decomposition fluids and/or tannins (typical of coffin deposition) are completely absent. The lack of thermal alterations suggests that cremation, according to the religious belief of the time, was not adopted as a disposal system for the infected bodies. No evidence to support the use of lime as a disinfectant was found.

In addition, exfoliation, surface erosion, root damage and the absence of weathering allow reconstructing the long contextual history of the deposit, which does not appear to have been altered by accidental exposure of bones over the centuries, with the exception of a trench excavation during the Austrian occupation of the Island in the nineteenth century.

In addition to what has been exposed, the aim of the present pilot study is to underline the importance of the application of forensic taphonomy (Haglund and Sorg, 1997; 2002) to historical contexts in order to reconstruct, with the mutual contribution of depositional and contextual analysis, both the cultural funerary practices of ancient populations, and the environment in which they occurred. The two branches of taphonomy, in fact, allow to infer

clues of actions and contexts that can be gained also through the study of artifacts but, if no other archeological information is preserved, the bio-cultural reconstructions should be performed only by the anthropological findings

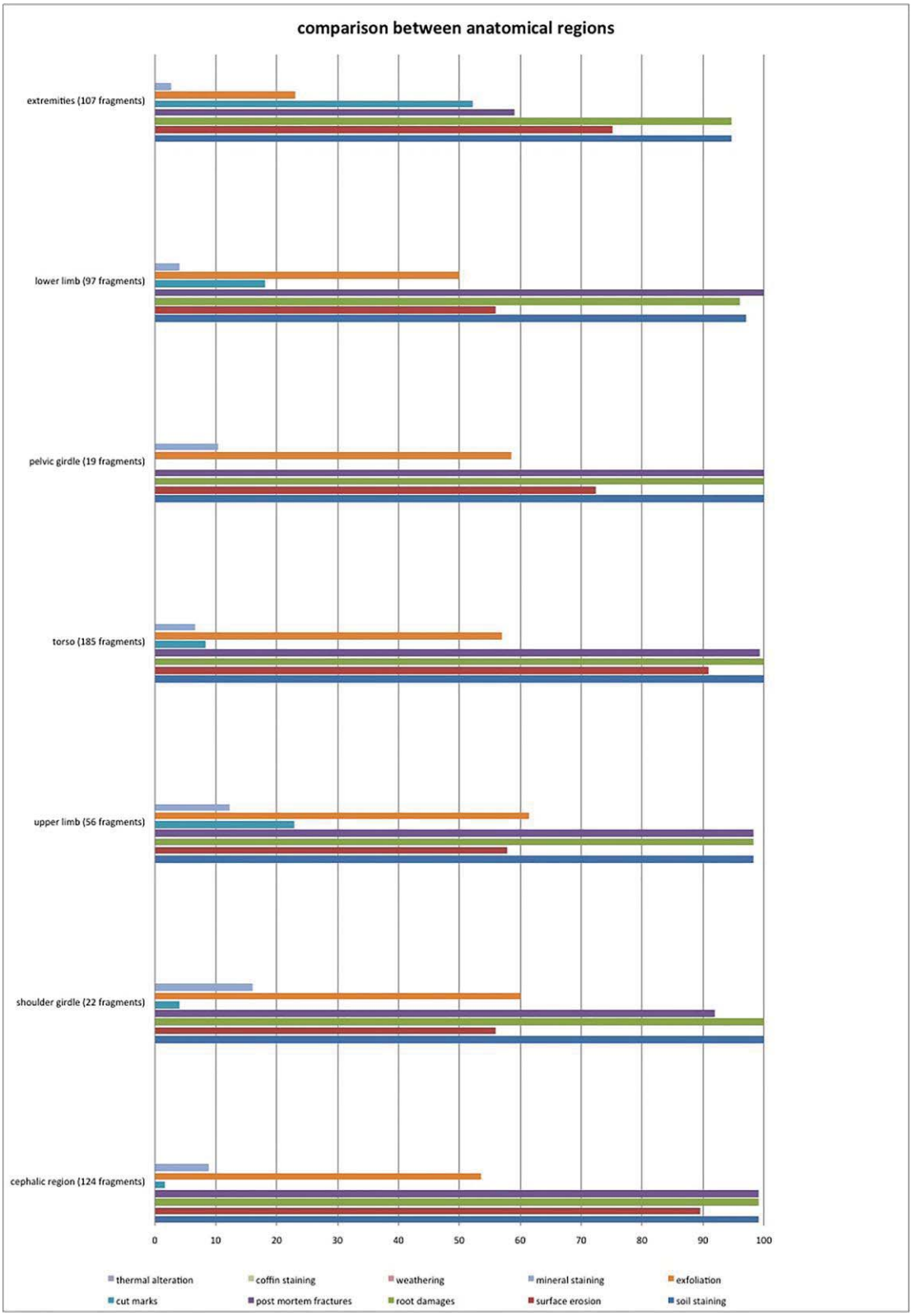

Fig. 2: comparison of the contextual taphonomic alterations for each anatomical region. Results are expressed in percentage related to the total number of fragments for each region.

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