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BRIEF REPORT

The taphonomic effects comparison in two empty space burial structures☆,☆☆

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Abstract
Introduction: Taphonomy helps to understand the issues related to changes of the cadaveric remains in the frame of palaeontology and archaeology as well as in the frame of forensic anthropology. The first objective of the experimental project Taphos-m was to generate a *corpus* of information on taphonomy to know what taphonomic agents and process could be responsible for the observable effects in field.
Materials and methods: The cadaveric state of *Sus scrofa domestica* remains and the spatial distribution of the anatomical elements has been described. In the case of skeletonisation, the state of the cortical surface and fragmentation of the bones was evaluated too. Also the pathological and histological analysis has been observed.
Results: The animal remains buried in the stone tomb were in dried state, while the remains buried in the tile tomb were skeletonised. There were differences in the observable taphonomic effects, particularly in the spatial distribution of the anatomical elements. The lesion in the leg of one animal could be responsible of the maintenance of anatomic articulation.
Conclusions: Meteorological data during inhumation and the tomb characteristics are variables that determine the evolution and condition of the remains, but they are not the only ones: the pathological lesions may involve differences in the spatial distribution of the bones and anatomical articulations.

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PALABRAS CLAVE
Tafonomía;
Antropología forense;
Arqueología;
Estado cadavérico

Comparación de los efectos tafonómicos observados en dos estructuras funerarias de espacio vacío

Resumen
Introducción: La tafonomía ayuda a entender las cuestiones relacionadas con las modificaciones *post mortem* de los restos cadavéricos en los campos de la paleontología, la arqueología y la antropología forense. Por ello, el objetivo principal del proyecto experimental Taphos-m es generar un corpus en tafonomía que permita comprender qué agentes y procesos tafonómicos son los responsables de los efectos observados en diferentes contextos.
Material y métodos: Pasados 3 años y medio desde su inhumación, se ha valorado el estado cadavérico de 2 cuerpos de *Sus scrofa domestica* enterrados en 2 estructuras vacías de características constructivas distintas, así como la distribución espacial que presentaban los elementos anatómicos. En caso de esqueletización, también se describe el estado de la superficie cortical de los huesos y la eventual fragmentación ósea. También se han llevado a cabo analíticas complementarias, como análisis histológico y patológico.
Resultados: Los restos del animal enterrado en la tumba de piedra se encontraron en estado desecado, mientras que los restos inhumados en la tumba de tejas planas estaban prácticamente esqueletizados. Se observaron diferencias en el análisis de los efectos tafonómicos, sobre todo en relación con la distribución espacial de los elementos anatómicos, vinculados con la presencia de sedimento y el estado cadavérico. La lesión que presentaba uno de los animales en la extremidad trasera podría influir en el mantenimiento de la articulación anatómica.
Conclusiones: Los datos meteorológicos del momento de la inhumación y las características de la tumba son variables que determinan la evolución y el estado cadavérico de los restos, pero no son las únicas, ya que las lesiones pueden suponer diferencias en la distribución espacial de los restos óseos y articulaciones anatómicas.

Introduction

Taphonomy (from the Greek *taphos*, meaning ''burial'', and *nomos*, meaning ''law'') is the study of the chemical, physical, biological and geological processes occurring in corpses from the moment of death until their recovery.[1] Taphonomic studies are therefore intended to be a source of useful information for understanding the events that occurred and the *postmortem* interval in the field of forensic medicine and anthropology.[2–4] Similarly, the analysis of taphonomic effects can help to understand the funerary practices and treatment of death in ancient populations.[5,6]

Currently, there are very few palaeontological and anthropological studies that link taphonomic effects observed on site with known agents and processes.[7–9] Human decomposition has been studied using limited experiences such as those of the Forensic Anthropology Centre at the University of Tennessee, Knoxville.[10] The difficulties in undertaking human experimentation have boosted the use of animal models, especially the species *Sus scrofa domestica* (Linnaeus 1758) for its similarity to the human body with regard to amount of hair, torso size, intestinal flora, eating habits, and decomposition processes.[11,12]

The pilot project Taphos-m[13,14] was initiated in 2011, and it is based on the analysis of the decomposition of domestic pigs (*S. scrofa domestica*). Facilities include 26 burials controlled by the type of funerary structure, position and body characteristics, meteorological data, and elements specific to the remains. The project aims at testing whether individuals with similar characteristics that are buried under the same conditions, but in different funerary structures (structures infilled with soil vs empty space structures), show skeletal differences at the time of exhumation. Apart from other minor structural differences in the tombs, it seems that the main differences should be in relation to whether the structures are infilled *or* empty space. In infilled structures, corpses are buried in direct contact with sediment, so that as it decomposes soft tissue, it is replaced by soil, keeping skeletal elements well articulated. Empty space structures, however, contain corpses that are not covered with sediment, so that during the decomposition, the corpse's bones are displaced by gravity to the base of the structure, losing the original anatomical connection.[3]

Three and a half years after burying the corpses in the Taphos-m pilot enclosure, we opened 2 empty space structures (5-26 and 6-08) in order to review the status of the corpses and assess the degree in which their joints were held together. The opening of these 2 tombs aimed at distinguishing whether: (a) preservation and articulation differences exist in a corpse based on whether the type of empty structure is more or less sealed,[3,15] and (b) the presence of lesions affecting the articulation or dislocation of anatomical areas is involved.[16,17]