



A possible case of mycosis in a post-classical burial from La Selvicciola (Italy)



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ABSTRACT

An examination of an adult male buried from the post-classical necropolis of La Selvicciola (Viterbo, Latium, Italy; 4th–6th centuries AD) revealed a series of skeletal lesions. The lesions, both proliferative and lytic, ranging in size from small (around 0.01 mm) to extensive (up to 16.00 mm) pits, occurred at multiple sites. A holistic approach assessed lesion type, frequency and location in a differential diagnosis, which included myeloma, metastatic carcinoma, tuberculosis, leukemia, osteomyelitis, and mycoses. It was concluded that a mycosis, specifically *Cryptococcus*, was the most likely cause of these lesions. Both macroscopic analyses and X-ray scans support our diagnosis. We also provide a methodological scheme as a model for examining unknown lesion patterns.

1. Introduction

Diagnosing disease from dry bone lesions is often challenging (Buikstra et al., 2018). Nevertheless, when burials exhibit systemic pattern of lesions paleopathologists can link lesion type, frequency and location with a specific illness. While this procedure is not well standardized (Mays, 2018), there is a growing literature that attempts to do this via clinical work's descriptions and dry bone comparisons (Binder et al., 2014; Cawley and Paine, 2015).

We offer a combined metric and observational model for recording/reviewing and assessing patterns of bony lesions that can be used to interpret both lytic and bone growth lesions. In doing so we illustrate this approach using the skeletal lesion pattern observed on a post-classical burial from central Italy. The burial comes from the archaeological site of La Selvicciola. This cemetery is located near Viterbo in northern Latium, Italy (Fig. 1A). During the 1982 field season, a well-defined necropolis dated between the 4th and 8th century AD, was found near a vast rural Roman villa complex (Gazzetti, 1995). Associated with the necropolis is a Christian church dated to the 5th–6th centuries AD (Fig. 1B; Incitti, 1997). While some of the post-classical burials are clearly of Longobard origin, the earlier burials are most likely Roman. Archaeological excavations yielded 85 tombs; 19 double burial tombs and 4 triple burial tombs. In all, 110 individuals have been recovered from the site (Manzi et al., 1995). Among the Roman individuals, skeleton 84/3 stood out from the others, by exhibiting a systemic

pattern of lesions. The lesions varied in type, size and location. Their presence provides evidence for a chronic and advanced pathological condition and the challenging task of attempting to determine its nature.

In this paper, our aim is to provide a model for differential analysis of the potential pathogen that affected burial 84/3. In doing so, we are using geographical/ecological, biological and clinical information. We present a summary of common lesion types and their locations, and we use these features in creating a means for determining a causal agent. These are then compared to the lesion pattern observed in burial 84/3. As a result, we propose a methodological tool for narrowing the range of possible pathogens that might have been responsible for the lesions seen on a given burial. In the end, our assessment of lesion types, their frequency and locations are then matched to ecologically-accurate infectious agents.

2. Material and methods

The 110 individuals from La Selvicciola consist of 73 adults (49 males, 20 females, 4 of indeterminate sex), and 37 sub-adults (Manzi et al., 1995). Sex estimation was conducted using standards methods for skull and pelvic bone morphology (Acsádi and Nemeskéri, 1970; Phenice, 1969). Age was estimated using the pubic symphysis surface (Brooks and Suchey, 1990) and occlusal surface dental wear pattern (Lovejoy, 1985).

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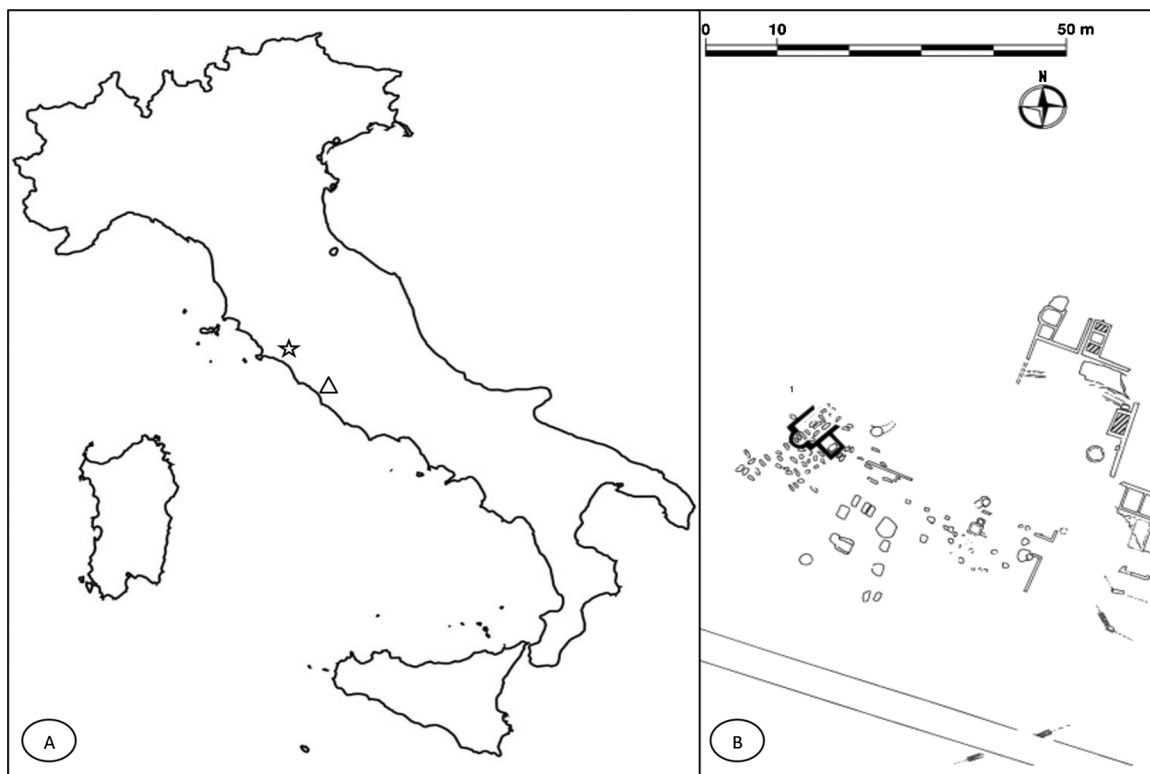


Fig. 1. A) Location of La Selvicciola (☆). The site is located 115 km North of Rome (Δ), central Italy. B) Map of the site. The necropolis is marked with the number 1 (modified from Gazzetti, 1995).

Among these burials is the adult from tomb 84/3. The tomb is located outside the church walls. The head and feet of the burial are oriented W-E position. The individual was buried without grave goods, and unpainted lithic plates covered the pit. The burial is contemporary with the post-classical phase of the settlement, and it was placed there after the church had been built. This suggested that the date of the burial is earlier than the 7th century AD.

The skeletal material from burial 84/3 is in excellent condition. The bones are intact; the only missing portions are the terminal hand and foot phalanges.

2.1. Methods for recording lesions

A gross pathological assessment was carried out to document the lesion pattern. As lesions were observed, they were mapped on to a skeleton diagram (to access the detailed description of lesion and the diagram, see the Supplementary material).

We used an organized assessment scheme, defining four size categories for the lytic lesions, with mean and size ranges recorded in millimetres (Table 1, Fig. 2). All measurements were taken with a sliding caliper.

In addition to size, we also created two lesion classes to define the morphological edge of the lytic lesions: smooth-edged and sharp-edged (Fig. 3); both are the result of an active lesion. That is, the fracture edges are not the result of post-mortem damage or taphonomic process.

Table 1
Categories of lytic lesion.

Categories	Measure	Grade
Small pits	< 1.0 mm	1
Medium size lytic lesions	1.1–9.9 mm	2
Large lytic lesions	10.0–15.9 mm	3
Extended lytic lesions	16.0 mm >	4

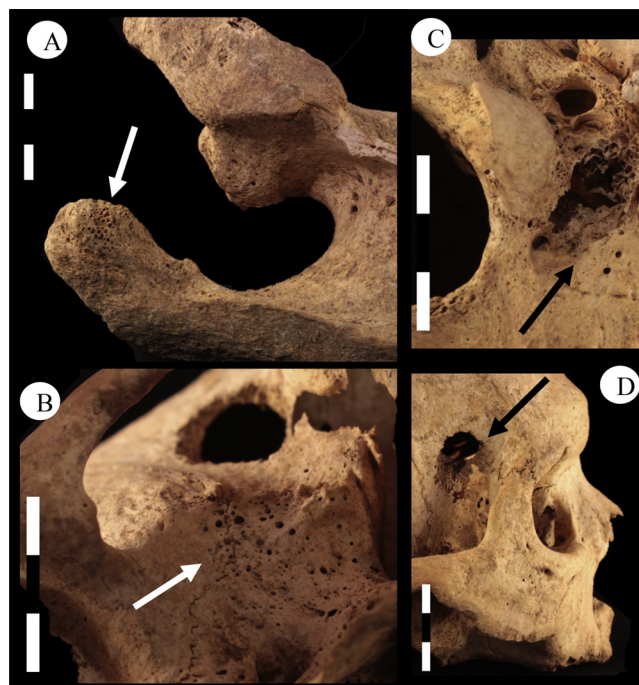


Fig. 2. Size differences among lytic lesions. A) Small pits on left scapula; B) medium size lytic lesions on left sphenoid; C) large lytic lesions near foramen magnum, on occipital; D) extended lytic lesion on left sphenoparietal bone.

These lesions occurred during life and are defined as such by a bone surface in which both the fracture feature and the undamaged surface of bone show the same color. This suggests that the bone changes occurred during life and have undergone the same time of post-mortem changes resulting in the matching color patterns. In this case we can

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