



# II MEETING NAZIONALE

Gruppo Italiano di Paleopatologia

L'AQUILA, AUDITORIUM DEL PARCO

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ries. One of the arks revealed the natural mummy of Ferdinando Orsini, 5<sup>th</sup> Duke of Gravina, identified by an epigraph with his name and date of death (1549), in good condition, with the exception of the face, completely skeletonized. The skull suffers from an extensive destructive lesion that afflicted the medial wall of the orbit right, the root of the nose and, partly, the ethmoid without osteitic reaction. The histological examination performed on the bone showed wide lacunae with, inside, epithelial-like cells, partially necrotic, positive for the immunohistochemical stain for PanCK. The border between the bone and the surrounding neoplasia were clear; the brownish fleshy appearance mass had darker margins (like a palisade) and was separated from the bone by clefting artifacts.

In our opinion, the pathology that affected Orsini 500 years ago was the basal cell carcinoma in an advanced stage, in fact it is the most frequent form of skin cancer and occurs predominantly on the sun-exposed skin of adults. Microscopically the tumour tends to infiltrate the subcutaneous tissue with a peripheral palisade surrounded by loose of stroma and cleft-like retraction spaces of artifactual nature. It grows in a slow and indolent fashion, but can ulcerate and may invade skull, nares, orbit or temporal bone with wide osteolytic lesion, enough to deserve the Latin name of 'ulcus rodens', i.e. erosive ulcer. Immunohistochemically, the cells are positive for keratin and distant metastases are very rare.

This case is very important because it represents one of the only four cases of malignant soft tissue tumor diagnosed in paleopathology.

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## From L'Aquila to Europe. Bodies and burials of the Franciscan Observance leading figures, 600 years after its introduction in Abruzzo region (1415)

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Due to a progressive decline of the Franciscan Order, a movement called Regular Observance took place in XIV century. An increasing number of monks left the friaries to live in poverty and hermitage. In a couple of centuries, they became the leading part of the Order. In 1415, some friars moved to L'Aquila to build the small convent of S. Giuliano, from which the Observance spread throughout Abruzzo region, as far as Italy and Europe.

The greatest exponent of the Observance, **Saint Bernardino da Siena** (1380-1444), visited L'Aquila twice, in order to promote reconciliation of the opposing parties. Here he died and his body was embalmed to be displayed inside a new basilica. The artificial mummy underwent at least 4 recognitions, but no detail is available about his diseases and the embalming technique adopted. **Saint Giovanni da Capestrano** (1386-1456) defended Bernardino from the charge of heresy, built

the San Salvatore Hospital (1445-1457) and guided a Crusade against the Ottomans in eastern Europe. He died during the following epidemic. His remains are traditionally known to be destroyed by the Turks in 1526, but some Author supposed they may be still preserved and ascribed to an orthodox Saint. **Saint Giacomo della Marca** (1393-1476) also had oratorical skills and received inquisitional and diplomatic commissions in Eastern Europe from the Pope. He organized the Mount of Piety to lend money to the poor without interests. He died in Naples and his body was embalmed by the procedures used for Aragonese kings. Since 2001 his artificial mummy is preserved in Montepandone (Marche region) and the fifth recognition held in 2008 evidenced well-developed muscular insertions, confirming the historical reports on his strong walking activity.

In the outskirts of L'Aquila are also preserved the human remains of the Blessed **Bernardino da Fossa** (1421-1503, skeletal remains), **Vincenzo da L'Aquila** (1435-1504, natural mummy) and **Timoteo da Monticchio** (1444-1504, skeletal remains). The mummy of the Blessed **Antonia da Firenze** (1401-1472) is an interesting example of female mummy and its recognition is scheduled in the near future. A systematic search for additional minor figures in Abruzzo region and a survey of their remains is in progress.

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## Paleopathological study of *Mammuthus meridionalis* of Madonna della Strada (L'Aquila)

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A skeleton of a male, 50-55 years old *Mammuthus meridionalis*, dated to the Pleistocene and conserved at the Spanish Fort in L'Aquila (Italy), showed a broken left tusk, in association with the presence of a deep (15x20 cm) bone erosion, involving the dental alveolus and the premaxillary bone, in close proximity to the maxillary sinus and the nasal cavity.

During gross examination, small samples from three representative areas of the eroded bone were obtained. Thin sections were made and the specimens were examined under plane and polarized light, using a high resolution microscope with an incorporated digital camera.

Microscopical study revealed the intra vitam origin of the lesions, characterized by the presence of woven bone fibers, typical of the early phases of bone remodeling, and lamellar bone with dilated and remodeled Haversian systems.

The gross and histological findings were consistent with an osteomyelitis with bone sequestration, caused by a localized blunt trauma or, more likely, resulting from an ascending,

post-traumatic chronic pulpitis, due to the tusk fracture occurred during an accident or interspecies fights.

The histological exam excluded the involvement of granulomatous inflammation (e.g. tuberculosis) or neoplasia.

A disease process of at least several months in duration may be hypothesized, as suggested by the histologically visible bone remodeling. A long survival of the animal after tusk loss may also be supposed, since alteration of masticatory function with altered molar teeth consumption and postural changes (i.e. atlantoaxial fusion), resulting from asymmetric weight distribution, were observed.

In this study, the application of (paleo)histological techniques proved to be fundamental in order to establish the nature of bone lesions detected on archeological samples, also providing a good case for studying skull trauma and shedding light on the life history of these large mammals.

### References

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## Application of nanoparticles in consolidation treatments of archeological bones

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Archeological bones may undergo conservation treatments to reinforce their mechanical features and save these materials from decay or to allow the completion of research analyses. Nevertheless, the materials used for the conservation may produce alterations on the original find, negatively interfering on subsequent studies, such as bone surface topography as well as on the analysis of some components of the bone tissues (such as isotopes and DNA)<sup>1</sup>. The loss of mechanical properties is often caused by demineralization processes, so that one simple and compatible way to strengthen demineralized bones could be the in situ growth of calcium carbonate, in form of aragonite crystals - having strong mechanical strength thanks to their acicular shape. The in situ growth of aragonite crystals should be obtained, in the presence of collagen as template, from the reaction of calcium hydroxide nanoparticles (*nanolime*) with atmospheric CO<sub>2</sub>, thanks to high reactivity and high penetration ability of the nanostructured particles<sup>2</sup>.

Aim of the present work was to analyze the application of nanolime hydro-alcoholic suspensions on whole bones, recovered from Italian medieval necropolis (XIV-XV century). Nanolime was prepared in laboratory, by a patented method, which allows to obtain pure and crystalline nanoparticles by a time- and energy-saving procedure, able to be implemented for large productions<sup>3</sup>. Before and after the nanolime treatments, bones underwent digital radiography (DR), computed tomography (CT) scanning, stereomicroscopy (SM) and scan-

ning electronic microscopy (SEM), X-ray diffraction (XRD) and DNA extraction too.

The investigations showed a penetration of the treatment inside the bones together to the filling of small pores as well as of superficial fractures, without any particular chromatic alteration. SEM images underlined the formation of a superficial thin film characterized by an acicular feature, corresponding to the aragonite growth (confirmed by XRD, showing the initial formation of aragonite crystalline phase).

Last but not at least, DNA extraction measurements put in evidence the conservation of DNA material itself after the nanolime treatments, underlying the interesting perspective of using calcium hydroxide nanoparticles in an eco-compatible consolidation of archeological bones.

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## Enlarged vascular foramina and lytic lesions in vertebral bodies: a diagnostic dilemma

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Among the skeletal material from the sites of Alghero, Mesumundu and Sant'Antioco di Bisarcio (Sassari, Sardinia) and dated back to the period comprises between the 13<sup>th</sup> and the late 16<sup>th</sup> century 5 subadult individuals aged between 5 and 15 years and a mature male showed peculiar osteolytic phenomena of the vertebral bodies. These lesions have the appearance of enlarged vascular foramina, affecting several vertebrae mainly of the thoracic and lumbar spine, sometimes with involvement of the sacrum; on the same vertebral body several lesions are generally visible. In the literature similar features have been attributed to brucellosis or tuberculosis.

As for the Sardinian skeletal material, an imaging study on the vertebrae of the adult individual was carried out in order to evaluate the appearance of the lesions within the body. Computed Tomography evidenced internal irregular elongated cavitations, sometimes joined together; erosive rounded lesions, whose presence is not detectable externally, were also showed.