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From Excavation to Community: Anthropological Study and Museum Proposal of an Individual from the Necropolis of Spina for the National Archaeological Museum of Ferrara

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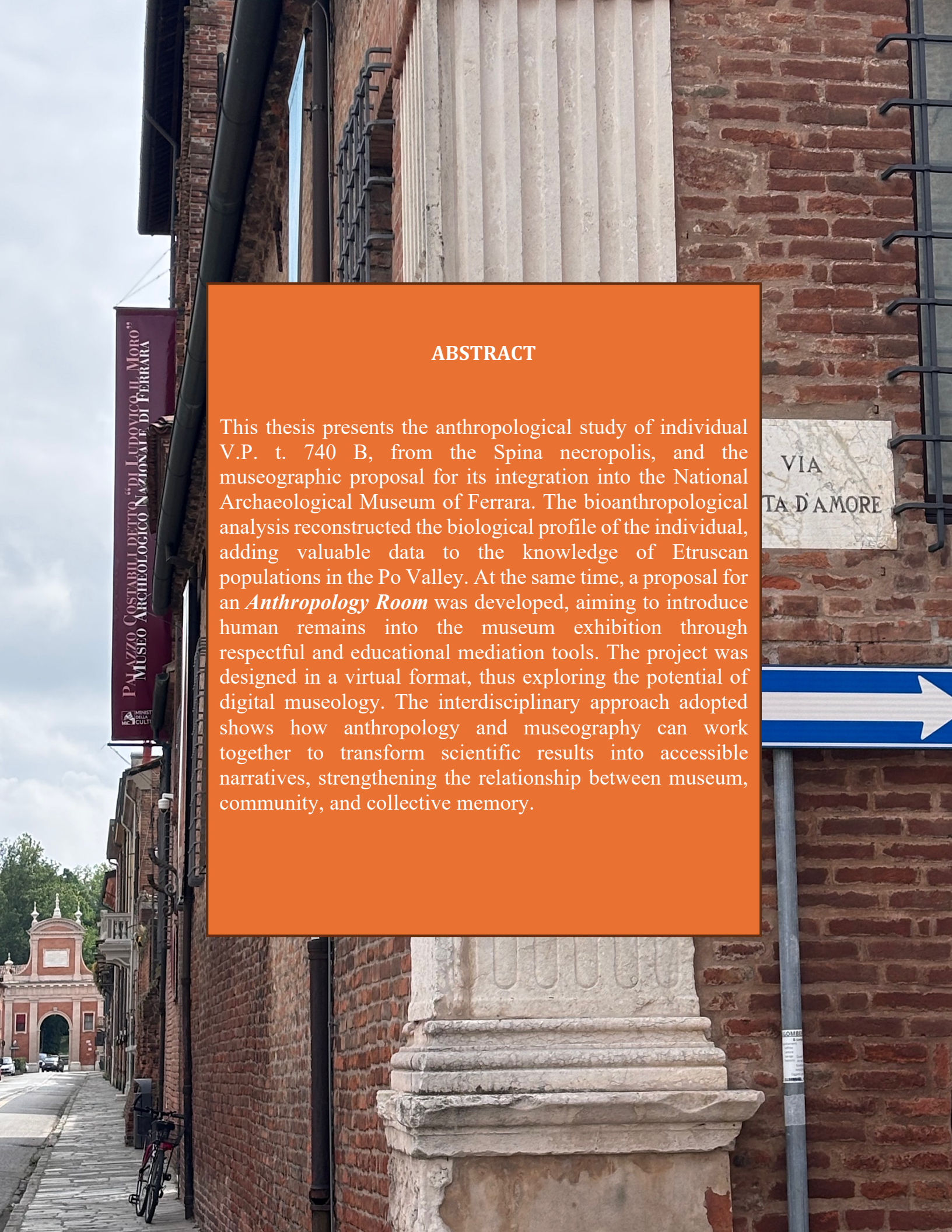
Alla città di Ferrara, per tutto ciò che mi ha dato

e per tutti coloro che mi ha fatto incontrare.



ABSTRACT

This thesis presents the anthropological study of individual V.P. t. 740 B, from the Spina necropolis, and the museographic proposal for its integration into the National Archaeological Museum of Ferrara. The bioanthropological analysis reconstructed the biological profile of the individual, adding valuable data to the knowledge of Etruscan populations in the Po Valley. At the same time, a proposal for an ***Anthropology Room*** was developed, aiming to introduce human remains into the museum exhibition through respectful and educational mediation tools. The project was designed in a virtual format, thus exploring the potential of digital museology. The interdisciplinary approach adopted shows how anthropology and museography can work together to transform scientific results into accessible narratives, strengthening the relationship between museum, community, and collective memory.

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INTRODUCTION

1. INTRODUCTION

Among the sediments of Spina, where water and earth have quietly preserved fragments of past lives, lies the individual V.P. t. 740 B of *Valle Pega*. It is not merely a set of bones deposited there centuries ago: it is a suspended story, a trace of human existence in its most intimate form. Through this skeleton, analyzed in the laboratory, arises the possibility of imagining a new way to narrate the past in the present: a project that transcends the physical space of the *Museo Archeologico Nazionale di Ferrara*, aiming to establish a dialogue between science, memory, and community.

1.1. Spina: Background, culture and development

The Etruscan people originated in Tuscany and northern Latium, in the so-called "Tyrrhenian Etruria." Their culture developed gradually through the blending of local traditions with external influences from the Near East and Greece, in a context of large Mediterranean migrations. The Etruscans expanded southward, reaching Campania, and northward, into the Po Valley (Fig. 1). According to tradition, they founded a *dodecapolis* (a group of twelve cities), attributing the foundation to mythical heroes such as Tarchon or Ocnus. Archaeology confirms these expansions at different times, linked to political and economic changes. The first colonization took place at the beginning of the Iron Age (9th century BCE, Villanovan period), in search of new agricultural lands, concentrating in Felsina (Bologna) and Verucchio, and controlling the Adriatic coast. The second expansion, from the mid-6th century BCE, coincided with urban flourishing in the Po region. The Etruscans reorganized the area, strengthening transalpine trade routes, founding cities such as Adria, Spina, Marzabotto, Mantua, and the river emporium of Forcello, while reinforcing Felsina as the capital. This system allowed the development of trade with Greek territories, the previously mentioned Tyrrhenian Etruria—the place of the original expansion—and Central Europe. In the countryside, a dense network of farms and agricultural settlements ensured high food production, sufficient for the urban population and for export to the East (Fig. 2). Po Valley Etruria reached its economic peak in the 5th century BCE, with numerous inhabited centres along the main communication routes. Their presence in the Po Valley ended in the 4th century BCE due to pressure from the Celts. Only around Spina, Adria, and Mantua did a "minor Po Valley Etruria"

survive briefly, functioning as a link between Etruscans and Celts and as a refuge for Etruscans displaced by the conquests (*Ministero per i Beni e le Attività Culturali*, 2011).

Figure 1. Origins of the Etruscan civilization: From Northern Italy to the wider peninsula. Source: *Smithsonian magazine*, 2021. Image retrieved from: https://www.smithsonianmag.com.

Figure 2. Greatest extent of Etruscan influence in Italy, from the seventh to the fifth centuries BCE. Source: World History Encyclopaedia, 2013. Image retrieved from: https://www.worldhistory.org.

Regarding Spina, this settlement was located a little inland from the coast, along a calm branch of the Po River, secured with dikes and pilings. The river, known as *Spinete* in ancient times or *Padovetere* in the medieval period, crossed coastal dunes to reach the sea; in fact, its ancient Etruscan course can still be recognized today. During the Hellenistic period (late 4th century BCE), Spina was organized as a dispersed village, like other coastal centres of the upper Adriatic, equipped with a canal-port and arranged according to orthogonal urban planning principles linked to Etruscan foundation rituals. The Etruscans carried out significant land consolidation works, including river channelling, and opened navigable canals, which made it possible to inhabit an otherwise unstable hydrographic environment (Fig. 3). The city, extensive in size, was probably structured in several nuclei situated on natural elevations reinforced with palisades and separated by artificial canals and other internal watercourses.

Figure 3. Spina among the marshes in the Po Delta. Source: *Museo Archeologico di Ferrara*, 2021. Image retrieved from: http://www.archeoferrara.beniculturali.it.

According to some scholars, from the 3rd century BCE, the increase of sediments and river flows caused the formation of new elevations in the lagoon and the advance of the coastline, with new

river branches. The obstruction of the waterways led to the gradual intrusion of the sea into the delta, creating lagoons and marshes; the Po of Spina eventually disappeared and was replaced by the Po of Volano. Nevertheless, the strategic importance of the delta remained: from the time of Emperor Augustus, a network of artificial canals, such as the *Fossa Augusta*, was constructed, connecting the Po River with Ravenna and allowing inland navigation under the economic and political control of the city. The expansion of lagoon waters in the 10th century and over-siltation events in the 16th century led to the definitive disappearance of Spina, until the major drainage works of the 20th century enabled its archaeological recovery—the first tomb of the necropolis was discovered in 1922 in *Valle Trebba* (Fig. 4), while later excavations in the current *Valle del Mezzano*, in the *Valle Lepri* area after its drainage in 1960, revealed the main nucleus of the settlement, covering approximately six hectares.

Figure 4. The area of the *Valle Trebba* necropolis, in blue, depicted in the Map Room of the National Archaeological Museum of Ferrara, Italy. Source: *Archeologia Voci dal Passato*, 2024. Image retrieved from: https://archeologiavocidalpassato.com.

Nevertheless, over the centuries, the exact location of Spina remained an archaeological mystery, with various hypotheses placing it along the lower course of the Po di Primaro, in Comacchio, or near San Biagio d'Argenta. Following its accidental discovery in 1922 (Fig. 5), scientific investigations began under the direction of archaeologist Augusto Negrioli, and in 1924 the *Regia Soprintendenza alle Antichità per l'Emilia e la Romagna* was established. Excavation campaigns until 1935, under the supervision of Salvatore Aurigemma in *Valle Trebba*, brought to light the northern area of the necropolis, with more than 1.200 tombs. Between 1953 and 1956, the drainage of *Valle Pega* allowed the discovery of the southern area of the necropolis, which, after ten years of excavations directed by Paolo Enrico Arias and Nereo Alfieri, revealed approximately 3.000 tombs. Between 1957 and 1964, the settlement in *Valle del Mezzano* was also identified, and it has been the object of extensive investigations from the late 1970s to the present, with some interruptions (*Ministero per i Beni e le Attività Culturali*, 2011).

Figure 5. Beginning of the excavations in *Valle di Comacchio*, Italy. 1922. Source: *Archeologia Voci dal Passato*, 2024. Image retrieved from: https://archeologiavocidalpassato.com.

Pit-type tombs were excavated on the fluvio-marine elevations that rose above the lagoon waters, conventionally referred to by archaeologists as "mounds A, B, C, D, E" in *Valle Pega*. The inhumed bodies were generally oriented northwest/southeast and, in some cases, were placed along with their grave goods and personal objects inside wooden boxes. In the case of cremations, the remains of the fire could be placed directly on the bottom of the coffin—made of wood—or collected in

simple dolmens, but also, more rarely, in Attic figurative vessels or in terracotta or Greek marble boxes, which in turn were placed inside the wooden box with the grave goods. The ashes could also be wrapped in cloth and placed in a small pit dug into the ground. Some burials were originally covered by a tumulus and, occasionally, marked with large characteristic river cobbles, often phallic in shape. In the absence of complete osteological analyses, it is possible to infer the sex of the deceased from the grave goods. Female tombs are usually identified by the presence of indicators of textile activities, such as a spindle, whorl, and cones, as well as ornaments, cosmetic items, and typically female ceramic forms, such as *hydria* (water container), *pelike* (container for oil or liquids), and *pyxis* (container for cosmetics, jewellery, medicines, or incense) (*Ministero per i Beni e le Attività Culturali*, 2011).

In relation to our burial, the individual V.P. t. 740 B (5th century BCE) exhibits feature that clearly reflect the role of women in Etruscan society. The Etruscan female figure was closely linked to both the domestic and convivial spheres, playing a central role not only as a mother and weaver but also as the mistress of the household. In the context of banquets—a fundamental aspect of daily life, which also had a funerary dimension—women assumed prominent functions in managing the servants, preparing food, and mixing wine, as evidenced by the pots found in the tombs of Spina, many of them bearing ownership inscriptions with female names. However, their role was not limited to these practical tasks, as they actively participated in the symposium, sitting or reclining alongside their husbands and sharing food and drink with them. Documentation from Spina clearly highlights the significance of this practice, as demonstrated by the large number of ceramic vessels—both locally produced and imported—that underscore the social and symbolic importance of the banquet in the lives of Etruscan elites and the participatory role women played in it (Nizzo, 2014).

In this case, the type of material culture found in the burial provides a clear idea of this woman's social status. Apart from the objects recovered from the tomb, including everyday utensils and plates, there is a set of gold jewellery, amber pieces, and polychrome glass vessels, among others, which help to understand how material elements reflected not only the social status of the deceased but also a broader symbolic horizon. In this regard, amber—also found in our burial (Fig. 6)—is particularly significant, as Greek mythology linked it to the story of Phaethon's death and the Po River. The tears shed by his sisters, transformed into poplars along the riverbanks, solidified as

resin, becoming amber. The presence of this material in the funerary assemblage of Spina cannot be reduced solely to its decorative or commercial value; it also acquires symbolic meaning, evoking death, mourning, and transformation. Thus, the funerary assemblage, composed of both everyday items and prestige objects imbued with strong symbolic significance, reflects the social position of the deceased while also indicating her integration into a system of shared beliefs and narratives between the Etruscan and Greek world (Nizzo, 2014).

Figure 6. Amber pendants with female heads wearing a tutulus. Spina, tomb 740 B of *Valle Pega*, late 5th century BCE. *Sala degli Ori* (Hall of Gold), National Archaeological Museum of Ferrara. Source: Author.

Like amber, small polychrome glass vessels originated in distant regions—as the Near East, particularly Rhodes—, reached Spina via the trade routes of Attic pottery. These containers held ointments and perfumes and formed part of the set of objects used—especially by women—for

personal care. The sophisticated manufacturing technique of these vessels involved creating a sand or clay core, shaped according to the desired form and attached to a support, which was then coated with molten glass. These small pieces actually reproduced the shapes of large ceramic containers, demonstrating both stylistic and functional continuity in these objects. Regarding gold, its main characteristic is incorruptibility: unlike other metals, it does not oxidize or visibly deteriorate, which gives it exceptional value. The Etruscans were renowned throughout the ancient world for their skill in gold jewellery craftsmanship (Fig. 7), a mastery clearly reflected in the ornaments present in burial V.P. t. 740 B, reinforcing the idea that luxury objects and precious materials served as indicators of social status and female prestige in Spina (Nizzo, 2014).

Figure 7. Gold earrings. *Sala degli Ori* (Hall of Gold), National Archaeological Museum of Ferrara. Source: Author.

In general, personal adornment objects, such as jewellery, amulets, and grooming items, constitute clear indicators of female presence in Spina and provide valuable insight into their social and symbolic identity. The fact that only a limited number of tombs have yielded jewellery underscores the selective and prestigious nature of these objects, as well as of the tombs themselves, whose significance went beyond mere decorative function. The funerary ritual, by assembling these items in the grave goods, emphasized the care given to female adornment and today allows us to understand the centrality of these aspects in earthly life, revealing how prestige, beauty, and the symbolic dimension of such objects accompanied the deceased in her passage to the afterlife.

1.2. Museo Archeologico Nazionale di Ferrara

The National Archaeological Museum of Ferrara, inaugurated in 1935, houses materials from the Etruscan city of Spina, the important Etruscan commercial centre. The museum is in the 16th-century *Palazzo Costabili* in the city of Ferrara, Italy, and was restored to recover its original splendor, featuring the architecture of Biagio Rossetti and the frescoes by Tisi da Garofalo and Dosso Dossi (*Ministero per i Beni e le Attività Culturali*, 2011) (Fig. 8).

Figure 8. Facade of the National Archaeological Museum of Ferrara. Source: Author.

The museum open to the public is composed of two floors (Figs. 13 - 14): on the ground floor, visitors can primarily enjoy projections, videos, and digital displays offering a sensory tour, as well as access to the large Neo-Renaissance gardens. Nevertheless, this floor is particularly notable for rooms such as the *Sala dell'Abitato di Spina* (Spina Settlement Room**)** (Fig. 9) and the *Sala delle Piroghe* (Canoes Room) (Fig. 10). These two rooms are especially interesting from a museological perspective: the first, with exceptional lighting, places special emphasis on material culture and presents a clear chronological framework of the exhibited events. The second room plays with the environment, lighting, and the specific conservation needs of the dugout canoes from the 3rd – 4th century CE, discovered in 1940 in the *Valle Isola*.

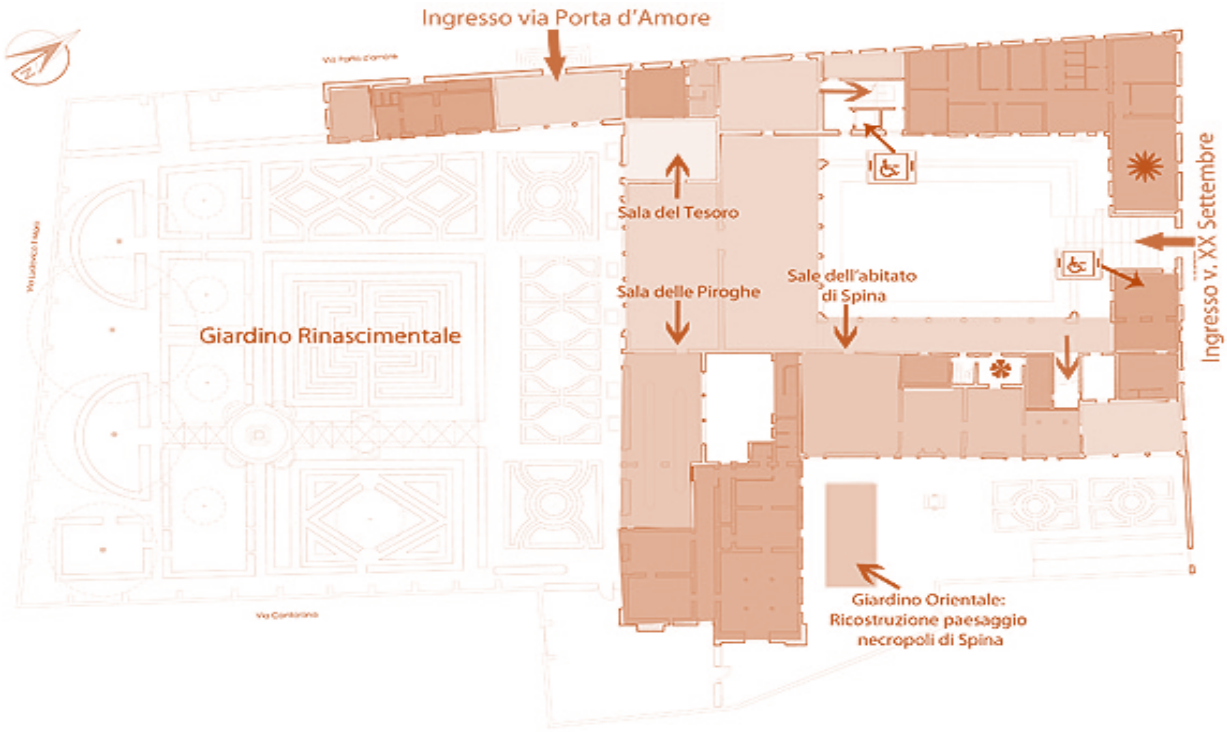
Figure 9. *Sala dell'Abitato di Spina.* Source: *Musei Italiani*, 2025. Image retrieved from: https://cultura.gov.it.

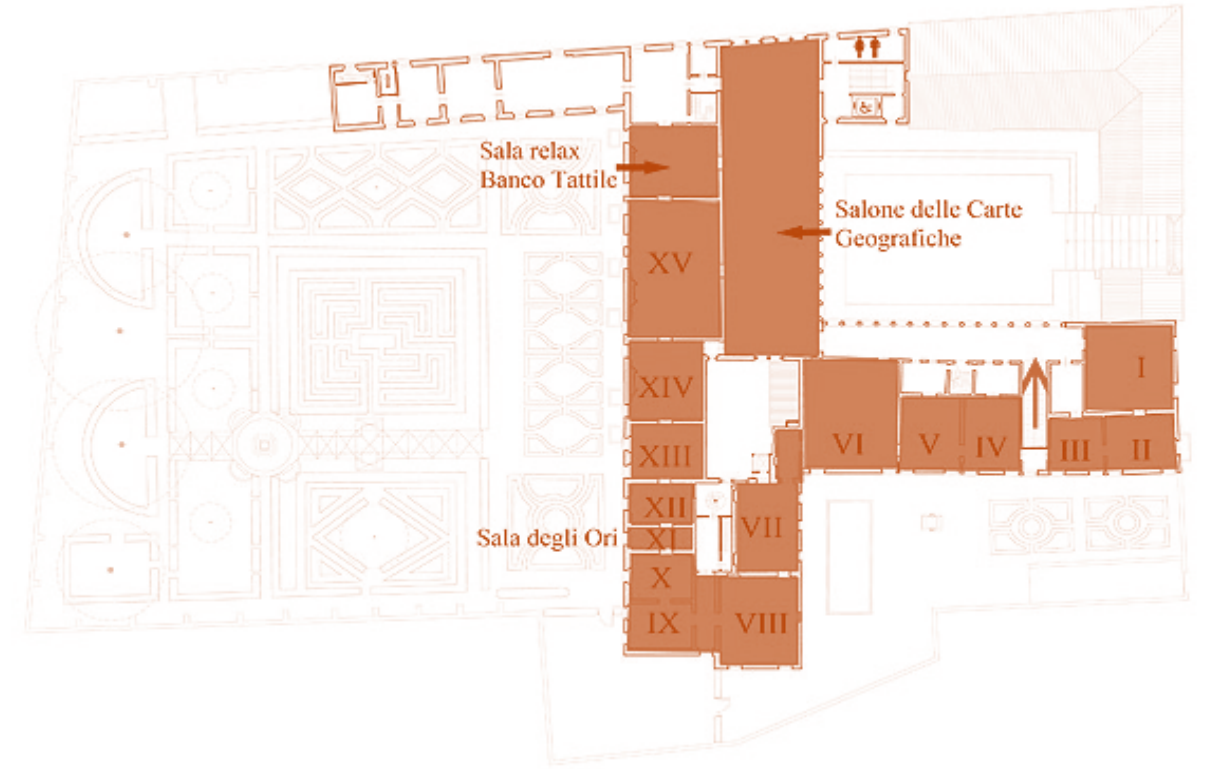
Figure 10. *Sala delle Piroghe*. Source: *Museo Archeologico di Ferrara*, 2025. Image retrieved from: http://www.archeoferrara.beniculturali.it/.

On the noble floor, visitors can view funerary assemblages, plates, vessels, kraters, and gold objects, among many other items of diverse character and function, culminating in a more scientific information room where the public also can rest. Notable rooms on this floor include the *Salone delle Carte Geografiche* (Cartography Hall) (Fig. 11), with its space filled with maps and a large capacity for hosting meetings and informative discussions, and the *Sala degli Ori* (Hall of Gold) (Fig. 12), full of jewellery from the tombs of Spina and undoubtedly one of the most attractive rooms for visitors.

Figure 11. *Salone delle Carte Geografiche.* Source: *Musei Italiani*, 2025. Image retrieved from: https://cultura.gov.it.

Figure 12. *Sala degli Ori.* Source: ARTE, 2001. Image retrieved from: http://www.arte.it.





Figures 13 and 14. Museum floor plans. Source: *Museo Archeologico Nazionale di Ferrara*, 2025. Image retrieved from: http://www.archeoferrara.beniculturali.it/.

It is worth noting that, among all these rooms filled with remarkable archaeological objects, only one stands out for housing more scientific content: one of the rooms on the noble floor contains the results of the anthropological study led by Dr. Barbara Bramanti and the team from the *Università degli Studi di Ferrara*, which presents the facial reconstruction of an Etruscan woman from the necropolis (6th – 3rd century BCE). The exhibition, titled "*Hyper-Spina: L'iXbolico Sogno Possibile di Incontrare i Nostri Antenati*" ("Hyper-Spina: The iXbolic Possible Dream of Meeting Our Ancestors"), inaugurated on June 20, 2021, showcases the laser scans of the skeletal remains of the deceased woman, allowing for 3D reconstructions (Fig. 15), carried out by experts from the Laboratory of Archaeo - Anthropology and Forensic Anthropology at the University of Ferrara.

Although this exhibition with a more archaeological and scientific focus is unique in the museum, Dr. Bramanti remarked that "it is the first time in the world that an LED holographic fan has been used in a museum to publicize scientific research content; until now, this technology has mostly been employed for commercial purposes".[1]

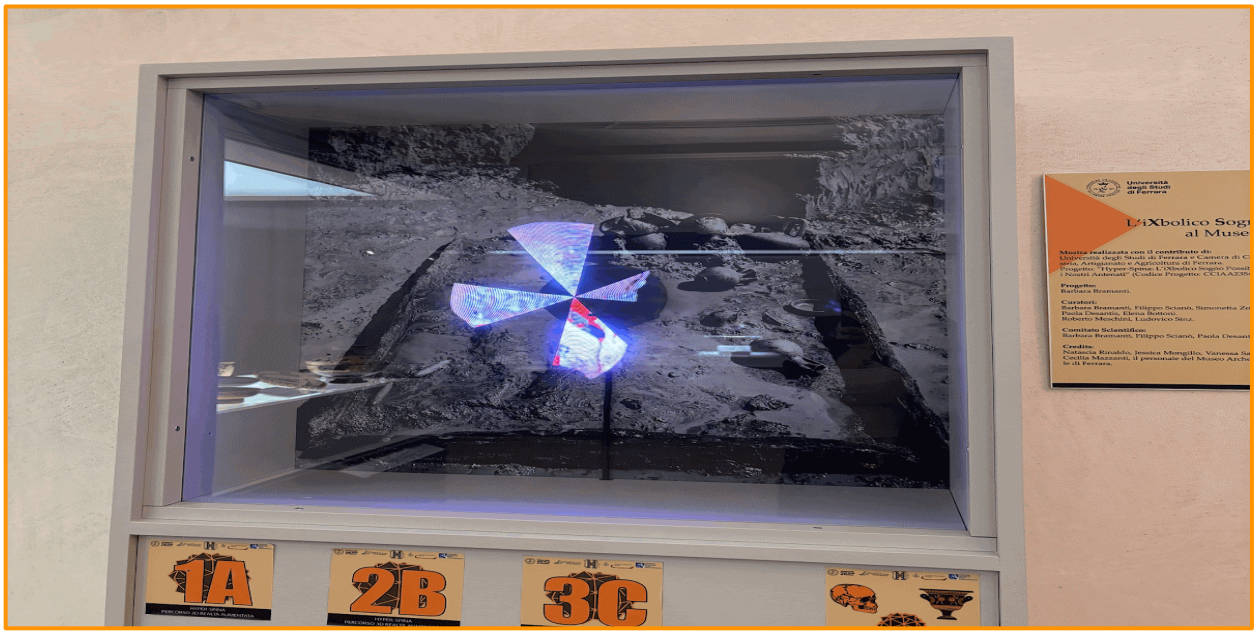


Figure 15. Display showing the reconstructed skull at the National Archaeological Museum of Ferrara. Source: Author.

[1] BRAMANTI, BARBARA, "Mostra | Unife ricostruisce i volti degli antichi etruschi. Al Museo Archeologico Nazionale", *Università degli Studi di Ferrara*, 2021, https://www.unife.it/it/notizie/2021/scienza-cultura-e-ricerca/hyper-spina, 15 June 2021. (Translated by the author)

AIMS OF THE WORK


MUSEO ARCHEOLOGICO NAZ.LE - FERRARA

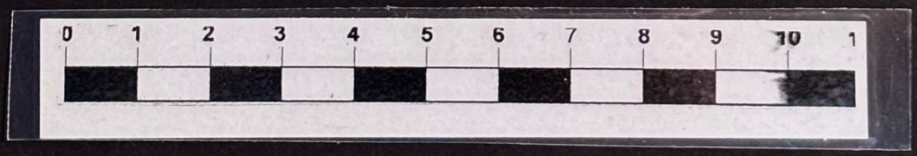
Si autorizza il prelievo dei sottoindicati oggetti:

Sala: Vetr.: Piano:

N. Inv.: T. 740 B

Motivo:

Visto: IL RICHIEDENTE



2. AIMS OF THE WORK

Taking all this information into account, and considering the current content of this thesis, it would be quite easy to envision, within the limits of the National Archaeological Museum of Ferrara, the creation of a room dedicated to exhibits of a more anthropological nature. After all, work of this kind had already been carried out before; yet the reality is far from what one might imagine. In fact, museology encompasses many nuances that must be considered (Hernández, 2007): the implementation of museology deals with numerous factors, such as conservation, knowledge acquisition, research, or the exhibition of objects, but also with theorizing about what can—or cannot—be musealized, and how it should be done.

Perhaps the most appropriate approach would be to conceive the museum as a tool to communicate and protect heritage (Sola, 1997). In this way, the museum becomes directly connected to the territory, equally exhibiting both material and immaterial, natural and cultural, and immovable and movable heritage. If the objective is to establish a connection with the community of the local territory—in this case, Ferrara—the introduction of human remains related to the cultural past of its inhabitants, within the city's museum, becomes an extraordinary project. The objectives were clear:

I. Proposing a project for the integration of an anthropological exhibition room in the National Archaeological Museum of Ferrara, aimed at incorporating human remains from individual V.P. t. 740 B of the Spina Necropolis as part of the cultural and scientific heritage, thereby strengthening the connection between the museum institution and the local community.
II. Analysing the theoretical and museological framework regarding the exhibition and conservation of human remains in archaeological museums, considering their ethical, social, and scientific implications.
III. Evaluating communication and cultural mediation strategies that allow human remains to be presented to the public, promoting an understanding of the past while avoiding practices of sensationalism.
IV. Designing a preliminary museographic proposal for the creation of an "Anthropology Room" in the museum, adapted to the resources and limitations of the institution.

V. Analysing the available inventory and its conservation state in order to determine appropriate musealization.

VI. Applying a laboratory analysis protocol (including documentation, cleaning, conservation, anatomical determination, biological profile—sex, age, stature—, taphonomy, paleopathology, and context) on the selected remains.

VII. Integrating the laboratory results into the curatorial narrative, translating the findings into interpretative scripts, mediation resources, and accessible messages.

VIII. Establishing operational guidelines "from the laboratory to the exhibition room": documentation, chain of custody, non-destructive sampling criteria, exhibition recommendations, labelling, and risk assessment.

It should be noted that the development of this project has been conditioned by various factors that limited its practical scope. Firstly, the period of on-site work in Ferrara was reduced to three months (from March to June 2025), which required concentrating both laboratory activities and the preparation of the museographic proposal within a short timeframe. From June onward, returning to my country of origin hindered the continuity of fieldwork and direct interaction with the museum and its collections. Moreover, the current situation of the National Archaeological Museum of Ferrara presents structural and material limitations: there are not yet sufficient resources to immediately implement a project of this magnitude. Likewise, the lack of grants and institutional financial support prevents moving toward a physical realization of the proposal in the short term.

In this context, it became necessary to virtualize the project, understood as the creation of a theoretical and digital museographic model that allows visualization of how the human remains could be displayed and the results of the anthropological analysis communicated. This strategy not only constitutes a viable alternative in the face of resource limitations but also opens an innovative field in museology by exploring new forms of cultural mediation that do not rely exclusively on physical installation.

METHODOLOGY

3. METHODOLOGY

The methodology adopted in this study is designed to integrate archaeological, anthropological, and museographic approaches, with the aim of developing a comprehensive proposal for the creation of an Anthropology Room (*Sala dell'Antropologia*) at the National Archaeological Museum of Ferrara. Given the interdisciplinary nature of the project, this methodology combines laboratory analysis of human remains, museographic design, and strategies for cultural mediation and public engagement.

3.1. Anthropological research

The anthropological study was based on the analysis of some skeletal remains from Spina, specifically from that part of the necropolis named *Valle Pega*. The remains belong to a skeleton (V.P. t. 740 B) provided by Prof. Barbara Bramanti, with the authorization of the Soprintendence, and the analysis was carried out in the Archeoanthropology and forensic anthropology laboratory (*AntropoLab*) of the *Università degli Studi di Ferrara*. The provided remains were human remains selected for an exposition, thus intended to be displayed to the public after their analysis for cultural and scientific dissemination. The analyses of the human remains were carried out in four sessions of 4 hours each:

- **First session (11/02/2025):** Identification of bone elements, counting the number of bones, counting the teeth, and analysing dental pathologies.
- **Second session (12/02/2025):** Determination of sex and age.
- **Third session (17/02/2025):** Determination of stature, general measurements, and detection of possible pathologies.
- **Fourth session (25/02/2025):** Taking photographs for the exhibition.

For the handling process I wore protective equipment—laboratory gloves and a lab coat—while bone elements were placed on a plastic tray previously sanitized (Fig. 16). The tray prevents bone loss and helps keep the bones together for easier recognition. Additionally, it gathers any remaining sand to avoid dirtying the work table. After use, it must always be cleaned and sanitized.

Figure 16. Individual's skeletal remains on a tray. Source: Author.

Regarding the cleaning operation, metal tools are not recommended as they can damage the bone material itself. In this specific case, only a small soft-bristled brush was used to remove some remaining sediment. In general terms, the bones were quite clean. The last explanation discards completely the use of water or any type of basin or sponge for its cleanliness. The restoration process was carried out carefully, avoiding damage to the outer surface to prevent incorrect future diagnoses, preventing fractures during cleaning, and facilitating the future collection of sediment samples. Two cranial fragments were restored using basic paper tape to attach them together, avoiding the use of any glue. The instrumentation was supplemented by two primary measurement tools: the osteometric board, employed for measuring long bones, and the Vernier calliper, utilized for precise measurements of smaller structures such as bone heads, short and flat bones, and teeth (Fig. 17).

Figure 17. Measurement of a femur with the osteometric board. Source: Author.

Regarding the sealing, packaging and deposition process, the bones were initially stored in a cardboard box in the laboratory. As previously mentioned, they had not been previously analyzed in any way, making it impossible to catalogue them until that moment. Another methodological information, as reference manuals for anatomical comparison, will be commented on the following points. Next, the presence or absence of skeletal parts, the state of fragmentation, any alterations, possible pathologies, and other observations will be described.

3.1.1. Identification of bone elements

For the identification of the skeletal remains, two primary atlases were used: *The Human Bone Manual* (White & Folkens, 2005) and *An Atlas of Human Osteology* (Mohamed, 2001). The identification was predominantly conducted through visual examination. Fragmented or smaller remains were compared with those shown in the atlas photographs, supported by scientific analysis under the guidance of Dr. Nicoletta Zedda, researcher from the Department of Environmental and Prevention Sciences at the University of Ferrara.

3.1.1.1. Pathologies

In this case, pathologies were identified through simple visual inspection, with the assistance of Dr. Nicoletta Zedda. It is important to highlight that it refers to paleopathologies, as the individual originates from an archaeological site dated between the 6th and 3rd centuries BCE. Nevertheless, the identified pathologies are of a nature that can also be attributed to diseases present today.

3.1.2. Identification of dental elements

For the identification of dental elements, the atlas *The Archaeology of Human Bones* (Mays, 1998) was used, which illustrates all dental elements.

3.1.2.1. Dental pathologies

Dental pathologies were identified through visual examinations, revealing some common conditions affecting teeth. The affected teeth will be specified in the results section. It is important to highlight that the study of dental pathologies was previously covered in some academic modules at the university, during which we conducted an in-depth study of the human skeleton and its pathologies. For this reason, and due to the limited number of pathologies observed, they were identified without the need of bibliographic comparisons.

Caries develops due to the progressive demineralization of tooth enamel caused by the acidic attack of bacteria, whose growth is promoted by carbohydrate consumption and alterations of the normal oral bacterial flora (Canci & Minozzi, 2005). The localization, position, and severity of the caries indicate the pathological level. In this case, all the identified caries are classified by localization as occlusal caries—developed on the upper surface of the tooth—and by position as lingual caries—located on the side facing the tongue. Regarding severity, some are considered penetrating caries because they have progressed into the inner part of the tooth, affecting both the enamel and the dentin (Fig. 18). Calculus forms as a hardened mineral deposit on the lingual and buccal surfaces of teeth. It develops due to the calcification of bacterial plaque that builds up over time (Canci &

Minozzi, 2005) (Fig. 19). Chipping refers to small, irregular fractures affecting the enamel or both the enamel and dentin, commonly found on the incisal edges of anterior teeth and the cusps of posterior teeth (Bonfiglioli et al., 2004) (Fig. 20). Finally, hypoplasia appears as transverse linear grooves on the enamel surface, resulting from disruptions or slowdowns in amelogenesis (the process of enamel formation). It is caused by nonspecific stress and can also serve as an indicator of physiological stress experienced during childhood (Bertoldi et al., 2007) (Fig. 21). Hypoplastic lines cannot be used to estimate age-at-death, but only age of insurgence of the stress that produced hypoplasia.

Figures 18, 19, 20 and 21. In order, from the top left to the bottom right: caries, calculus, chipping, and hypoplasia. Source: *Pardiñas. Clínica Médico Dental*; University of York; Selim, 2008; Wikimedia Commons. Images retrieved from: https://clinicapardinas.com; https://www.york.ac.uk; https://www.researchgate.net; https://commons.wikimedia.org.

3.1.3. Sex determination

The identification of the individual's sex was determined using various methods. It is important to clarify that, although more exhaustive tests could be performed through laboratory analyses, the sex determination was solely based on a visual analysis of the skeletal remains. As previously mentioned, the university courses taken earlier in the same faculty laboratory were key to gaining a clear understanding of the discipline and analysis methods. It is also important to emphasize that sex determination can be reliably applied only to adult individuals (Canci & Minozzi, 2015). For sex determination, there are two main skeletal groups: the cranial bones and the pelvic bones. These bone sets are important because they exhibit the greatest sexual dimorphism. Additionally, this determination can also be made through specific bone measurements, which will be described below.

The identification of sex through the analysis of cranial bones is done by visually recognizing cranial features, a method which is considered accurate with up to 80% validity (Cattaneo & Grandi, 2004). At this point, the morphological analysis begins, which will be followed by a metric analysis. More robust features are associated with male traits, while more delicate and fragile features are linked to female traits. In this case, it is important to note that the available cranial remains were scarce, so cranial recognition must be as accurate as possible. The recognition and identification tables used (Canci & Minozzi, 2005; Nikita, 2017) were essential for specifying the traits of the remains. Considering the available cranial remains, it was possible to analyse only the inclination of the frontal bone, the type of mastoid, the general shape of the mandible, the chin, the gonial angle and the lower mandibular border (Figs. 22 - 23 - 24 - 25).

For a more accurate analysis, the following guidelines were used (Canci & Minozzi, 2005) (Tab. 1):

TRAIT	**FEMALE**	**MALE**
Cranial morphology	Smooth, smaller, and rounded, thin thickness.	Marked muscular impressions, larger and heavier.
Frontal inclination	Vertical or slightly inclined.	Tending to recede.
Glabella and supraorbital ridge	Weak and slightly defined.	Pronounced and protruding.

Zygomatic bone	Narrow, delicate, and smooth; the zygomatic arch terminates anteriorly to the external auditory meatus.	Broad, robust, and rugged.
Mastoid process	Small and pointed, with a medial direction.	Large, voluminous, and verticalized.
Nuchal plane and occipital protuberance	Upper nuchal line is slight or not visible; smooth or slightly prominent occipital, with a poorly pronounced union.	Very pronounced.
Frontal and parietal tuberosity	Pronounced.	Weak or absent.
Orbital cavities	High and rounded; relatively large compared to the face, with sharp edges.	Low and angular, square-shaped, relatively small compared to the face, with rounded margins.
Nasal passage	Low, wide.	High, narrow.
Occipital condyles	Small.	Large.
Palate	Elliptical and narrow.	Circular, broad, and deep.
Mandible	Slender.	Robust.
Chin	Small and rounded or pointed.	Prominent, angular, and square-shaped.
Mandibular condyle	Small.	Large.
Mandibular ramus	Inclined and narrow.	Verticalized and broad.
Posterior margin of mandibular ramus	Straight.	Concave.
Mandibular angle	Smooth or slightly rough.	Rough or with backward-facing roughness.
Lower mandibular margin	Thin.	Thick.

Table 1. Guidelines for sex determination.

Figure 22. Right mandible of the examined individual. Source: Author.

Figure 23. Left mandible of the examined individual. Source: Author.

Figure 24. Mastoid process of the examined individual. Source: Author.

Figure 25. Mastoid process of the examined individual. Source: Author.

The previous guidelines also provide models for recognizing the individual sex through dental analysis (based on the difference in the width of the canines and incisors, and the size of the molars), but in this case, they were not used. In addition, in the case of needing a less complex definition of the traits, the following guidelines were also used (Nikita, 2017) (Tab. 2):

TRAIT	FEMALE	MALE
Overall size	Smaller.	Larger.
Robusticity	Less robust.	More robust.
Supraorbital margin	Sharp.	Blunt.
Supraorbital ridges/glabella	Less pronounced.	More pronounced.
Frontals and parietals	More bossed.	Less bossed.
Mastoid process	Small.	Large.
External occipital protuberance	Small.	Well developed.
Nuchal lines	Less pronounced.	More pronounced.
Chin shape	Round.	Square.
Mental eminence	Less pronounced.	More pronounced.
Mandibular ramus	No or very slight flexure.	Flexure.
Gonial eversion	Minimal.	Pronounced.

Table 2. Guidelines for sex determination.

Based on this information, the method for calculating sex determination (Broca, 1875; Acsadi & Nemeskeri, 1970; WEA, 1980) relied on a series of morphological interpretations assigned to specific calculations involving addition and subtraction. In this case, traits to be calculated are 15, but just 6 were used, due to the lack of remains. The highest expression of a female trait was assigned a score of – 2, while the highest expression of a male trait was assigned a score of +2. A

score of 0 represented a moderate and intermediate expression of these traits. These values, ranging from – 2 to +2, are considered the X values.

Each X values is multiplied together with its W values—representing the significance of each trait. The final calculation, which determines the result, is obtained by summing the inserted values (X*W) (ranging from – 2 to +2) and dividing them by the sum of the importance value (W). In this way, a specific value greater or less than 0 is obtained, indicating the sex of the individual (values below 0 correspond to the female sex, while values above 0 correspond to the male sex):

$$\frac{\Sigma (W \times X)}{\Sigma W}$$

Below, based on the guidelines from the previous tables, the table with the X and W values of each trait is provided to illustrate how these values function depending on the morphological traits (Ferembach et al., 1979) (Tab. 3):

TRAIT	VALUE	EVALUATION				
		Superfeminine (-2)	**Feminine (-1)**	**Intermediate (0)**	**Masculine (+1)**	**Supermasculine (+2)**
Glabella	3	Very weak.	Slightly marked.	Medium.	Marked.	Very strong.
Mastoid process	3	Very small, pointed.	Small.	Medium.	Large.	Very large, rounded.
Nuchal plane surface	3	Smooth.	Superior nuchal line weakly indicated.	Prominent superior line, weakly developed occipital crest.	Large and developed.	Rounded, very strong.

Zygomatic process	3	Very low, Gracile.	Low, moderately gracile.	Intermediate.	High, strong.	Very high and strong.
Supraorbital ridge	2	Very weak.	Slightly marked.	Medium.	Marked.	Very strong.
Frontal and parietal tuberosities	2	Marked.	Moderately marked.	Intermediate.	Weak.	Absent.
External occipital protuberance	2	Very weak.	Weak.	Medium.	Strong.	Very strong.
Frontal inclination	1	Vertical.	Almost vertical.	Slightly inclined.	Slight, receding.	Strongly receding.
Zygomatic bone	2	Very low, smooth.	Low, smooth.	Moderately high, with a regular surface.	High, with irregular surfaces.	Very high, with irregular surfaces.
Orbital shape; Supraorbital margin	1	Circular; very sharp.	Circular; sharp.	Intermediate; intermediate.	Slightly square; slightly rounded.	Square; strongly rounded.
Mandible	3	Gracile.	Moderately gracile.	Medium.	Robust.	Very robust.
Chin (Mentum)	2	Small, rounded.	Small.	Medium.	Prominent, strong, angular when viewed from the front.	Strong with bilateral protrusion.
Mandibular angle	1	Smooth.	Slightly rough.	With pronounced roughness.	With pronounced roughness and slight retroversion.	With significant roughness and retroversion.

Inferior margin		Thin.	Rather thin.	Medium.	Rather thick.	Thick.

Table 3. Guidelines for sex determination.

Secondly, continuing with the morphological analysis, the bones of the pelvis were analyzed, a method which is considered accurate with up to 95% reliability (Cattaneo & Grandi, 2004). This method is similar to the analysis of cranial bones (Acsadi & Nemeskeri, 1970; WEA, 1980). Therefore, following the same procedure, a series of morphological traits were used to obtain X values, which were multiplied together with their specific W value. For the pelvis, the following table (Canci & Minozzi, 2005) was used as a reference (Tab. 4):

TRAIT	FEMALE	MALE
Pelvic cavity	Wide.	Narrow.
Hip bone	Low and broad, with slightly marked muscle attachments; longer pubis.	High and narrow, with pronounced muscle insertions; shorter pubis.
Greater sciatic notch	Wide and broad, approximately 60°, U-shaped.	Narrow and deep, V-shaped and deeper.
Ilium	Expanded ala, concave iliac fossa.	Narrower ala, more flattened iliac fossa.
Iliac crest	S-shaped curvature slightly marked in superior view.	More pronounced S-shape in superior view.
Auricular surface	Flat.	Irregular.
Preauricular sulcus	Outlined.	Absent.
Composite arch	With double curvature.	With a single curve.

Obturator foramen	Triangular, with sharp margins.	Oval, with rounded margins.
Body of the ischium	Narrow, with slightly evident tuberosity.	Wide, with prominent tuberosity.
Ischiopubic ramus	Flattened dorsoventrally with a narrow medial border.	Widened and robust, with rounded edges.
Subpubic angle	Rounded and greater than 90°.	Acute, less than 90°.
Ventral arc	A ridge is present on the anterior surface of the pubis, starting at the midpoint of the symphyseal margin and extending downward and laterally.	Absent, smooth surface.
Subpubic concavity	Depression on the medial border of the ischiopubic ramus, just below the symphysis.	Absent, straight edge.
Sacrum	Short and broad, slightly arched. Sacroiliac joint at S2 (shorter and smaller).	Narrow and elongated, arched. Sacroiliac joint at S3 (wider and longer).

Table 4. Guidelines for sex determination.

Below, based on the guidelines from the previous table, it is provided a table to illustrate how these values function depending on the morphological traits (Ferembach et al., 1979) (Tab. 5):

TRAIT	VALUE	EVALUATION				
		Superfeminine (-2)	**Feminine (-1)**	**Intermediate (0)**	**Masculine (+1)**	**Supermasculine (+2)**
Preauricular sulcus	3	Deep, well-defined.	Flatter, less well-defined.	Well-defined.	Present, only as traces.	Absent.
Greater sciatic notch	3	Very wide, U-shaped.	Wide, U-shaped.	Intermediate.	V-shaped.	Very narrow, V-shaped.

Pubic angle	2	Strongly obtuse and rounded angle.	Obtuse, tending toward a right angle.	Noticeably at a right angle.	Slightly acute, A-shaped.	Strongly acute, A-shaped.
Composite arch	2		With double curve.		With a single curve.	
Hip bone	2	Low, wide, with expanded iliac wing and slightly marked muscle attachments.	Slightly less pronounced female characteristics.	Intermediate form.	Less pronounced male characteristics.	High, narrow, with marked muscle attachments.
Obturator foramen	2	Triangular, with sharp margins.	Triangular.	Unclassifiable form.	Oval.	Oval, with rounded margins.
Body of the ischium	2	Very narrow, with slightly impressed ischial tuberosity.	Narrow.	Medium.	Wide.	Very wide, with strongly developed ischial tuberosity.
Iliac crest	1	Very flattened S-shape.	Flattened S-shape.	Intermediate form.	Clearly S-shaped.	Accentuated S-shape.
Iliac fossa	1	Very low, wide.	Low, wide.	Medium in height and width.	High, narrow.	Very high and narrow.
Greater pelvis	1	Very wide.	Wide.	Medium.	Narrow.	Very narrow.
Minor pelvis	1	Very wide.	Wide.	Medium.	Narrow.	Very narrow.

Table 5. Guidelines for sex determination.

In this case, traits to be calculated are 10, but just 7 were used, due to the lack of remains: the preauricular groove (or sulcus), the greater sciatic notch, the arcuate line, the body of the ischium, the iliac crest, the iliac fossa, and the general morphology (Figs. 26 - 27 - 28 - 29).

Figure 26. Lateral view of the pelvis of the examined individual. Source: Author.

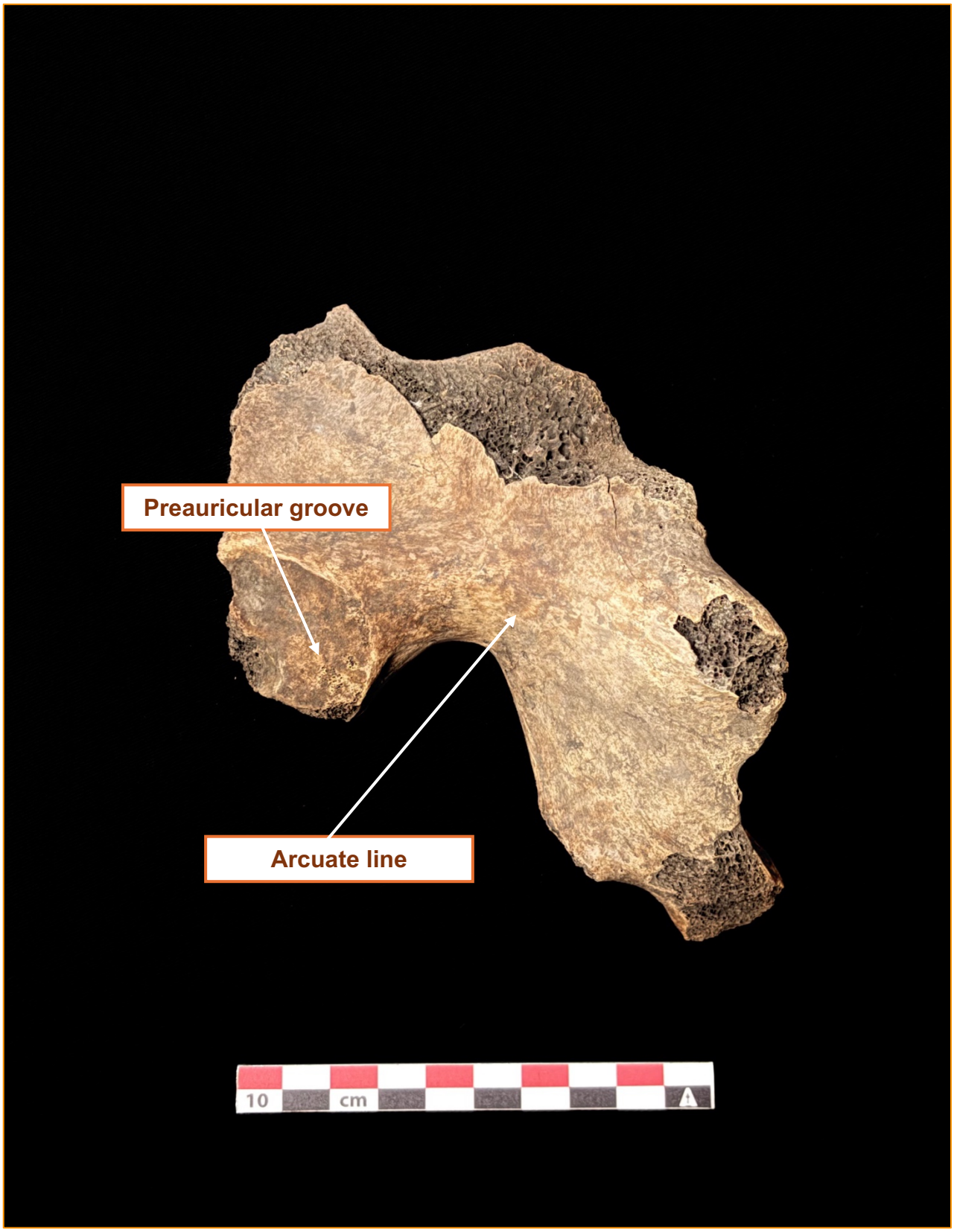


Figure 27. Medial view of the pelvis of the examined individual. Source: Author.

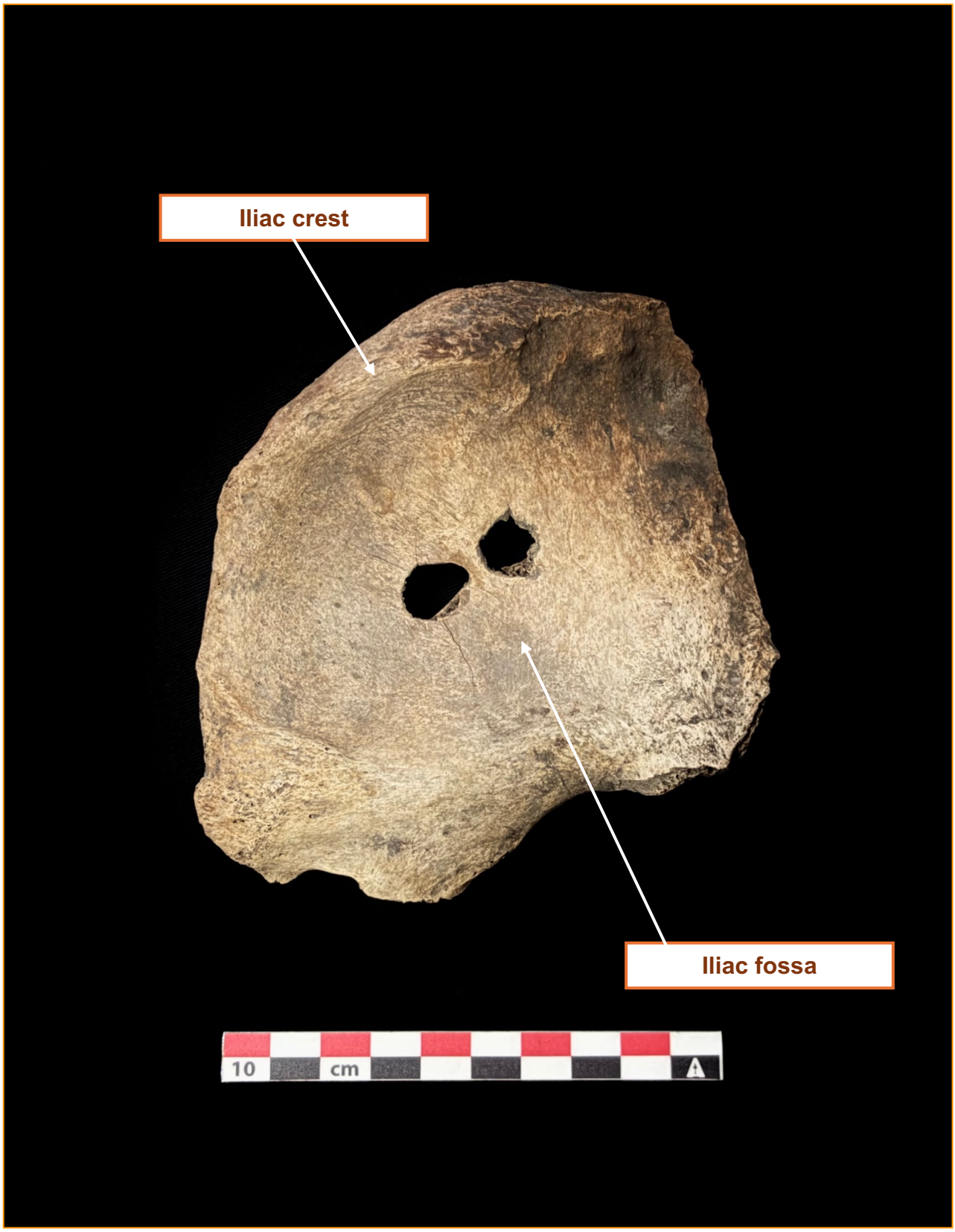


Figure 28. Anterior view of the ilium of the examined individual. Source: Author.

Figure 29. Posterior view of the ilium of the examined individual. Source: Author.

The metric analysis is the second procedure for sex determination. Generally, this is done by measuring the length of long bones and through some measurements taken from the epiphyses or other smaller bone parts. In this specific case, the following measures were taken:

- The diameter of the femoral head (Stewart, 1979) (Tab. 6):

Table 6. Maximum diameter of the femoral head (Stewart, 1979).

FEMALE	FEMALE?	INTERMEDIATE	MALE?	MALE
< 42.5 mm	42.5 - 43.5 mm	43.5 - 46.5 mm	46.5 - 47.5 mm	> 47.5 mm

- The height of the mastoid process (Demoulin, 1972) (Tab. 7):

Table 7. Height of the mastoid process (Demoulin, 1972).

MALE				FEMALE			
RIGHT		LEFT		RIGHT		LEFT	
27.97	3.20	**28.64**	3.02	**24.00**	2.95	**25.85**	2.53

- The diameter of the humeral head (Stewart, 1979) (Tab. 8):

Table 8. Vertical diameter of the humeral head (Stewart, 1979).

FEMALE	INTERMEDIATE	MALE
< 43 mm	43 - 47 mm	> 47 mm

- The length of the glenoid cavity (Dwight, 1894) (Tab. 9) (Fig. 30):

Table 9. Length of the glenoid cavity (Dwight, 1894).

MALE	FEMALE
36 - 40 mm	32 - 36 mm

Figure 30. Glenoid cavity of the examined individual. Source: Author.

To proceed with the measurements, the necessary tool was a Vernier calliper (Fig. 31).

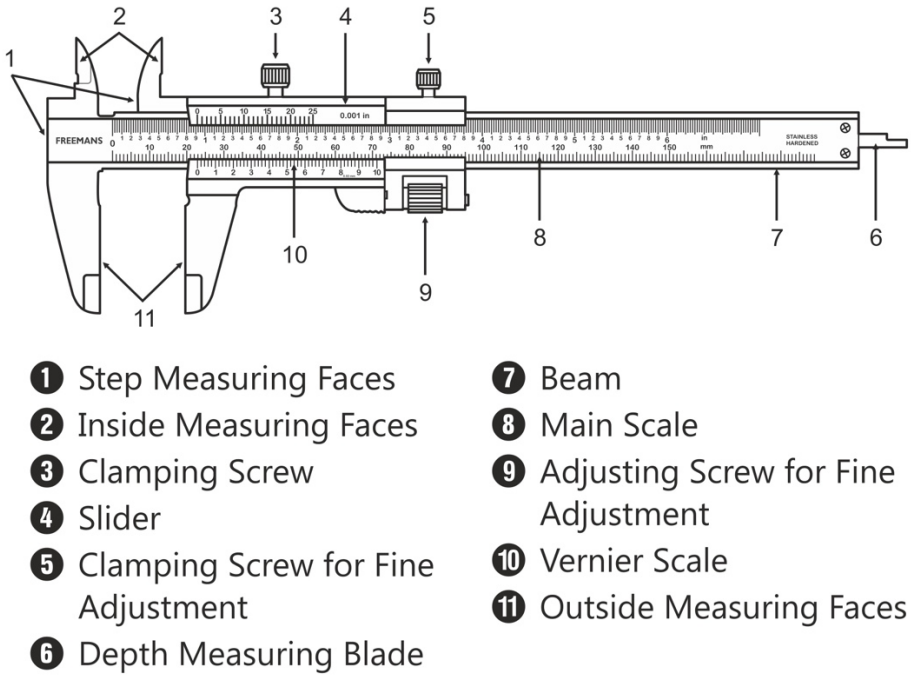


Figure 31. Vernier calliper. Source: *Freemans*, 2018. Image retrieved from: https://www.freemansgroup.com.

3.1.4. Age estimation

Once the analysis was completed and the sex was determined, the identification of the age at death was carried out. To establish these values in adults, as with sex determination, the most important skeletal elements are the skull—which provides information through cranial sutures and dental wear—and the pelvis, particularly the pubic symphysis and the auricular surface. In other cases, the wear of the external surface of the fourth rib can also be a determining factor. However, in this case, it was not present among the available remains, preventing the use of this analysis. Starting with the morphological analysis of the skull, the methods used included recognizing the degree of obliteration of the ectocranial sutures (Meindl & Lovejoy, 1985) and analyzing dental wear according to two different methods (Brothwell, 1985; Lovejoy, 1985). It is important to highlight that the first methodology related to dental wear (Brothwell, 1985) uses methods applicable only to the analysis of molars (M1, M2, and M3), with an age range from 17 to 45 years. On the other

hand, the second methodology (Lovejoy, 1985) is applicable to all teeth (incisors, canines, premolars, and molars), fitting an age range from 22 to 55 years in the Libben population (Lovejoy, 1985). It should be noted that these methods are designed to estimate age ranges in individuals whose dentition is complete; for subadult age estimation, the methods used are based on dental eruption rather than wear.

As illustrated before, the first methodology related to the skull uses the degree of fusion of the cranial sutures, which generally begin to fuse between the ages of 20 and 30 and continue until complete obliteration in old age (Meindl & Lovejoy, 1985). In this way, the degrees of obliteration are divided into four phases: the number 0 represents a completely open suture with no trace of ectocranial synostosis, while the number 3 represents a fully fused suture with total obliteration (Fig. 32). The following table shows the information used for the analysis (Meindl & Lovejoy, 1985) (Tab. 10):

Degree of obliteration	**Open Suture (0)**		**Inferior Closure at 50% (1)**		**Superior Closure at 50% (2)**		**Complete Obliteration (3)**	
Suture	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Mediolambdoid	**32.2**	10.1	**40.5**	11.7	**46.8**	10.7	**52.7**	11.4
Lambda	**31.2**	9.3	**38.8**	10.0	**45.2**	13.2	**49.7**	10.2
Obelion	**27.8**	9.2	**36.0**	7.5	**37.7**	9.6	**44.8**	12.4
Anterior sagittal	**31.3**	10.0	**41.0**	11.1	**45.6**	11.9	**46.9**	12.3
Bregma	**33.6**	10.4	**43.7**	12.0	**47.1**	12.4	**49.2**	10.7
Mediocoronal	**33.8**	11.2	**42.6**	11.3	**46.8**	12.0	**51.0**	11.3
Pterion	**29.4**	8.9	**36.2**	8.4	**40.2**	9.3	**48.8**	11.3

Sphenofrontal	**34.9**	11.3	**39.2**	10.1	**46.1**	10.3	**50.6**	11.0
Inferior sphenotemporal	**38.0**	11.6	**45.6**	12.8	**51.8**	11.0	**55.4**	10.7
Superior sphenotemporal	**39.4**	11.9	**52.6**	14.6	**56.0**	9.2	**52.6**	11.4

Table 10. Guidelines for age estimation.

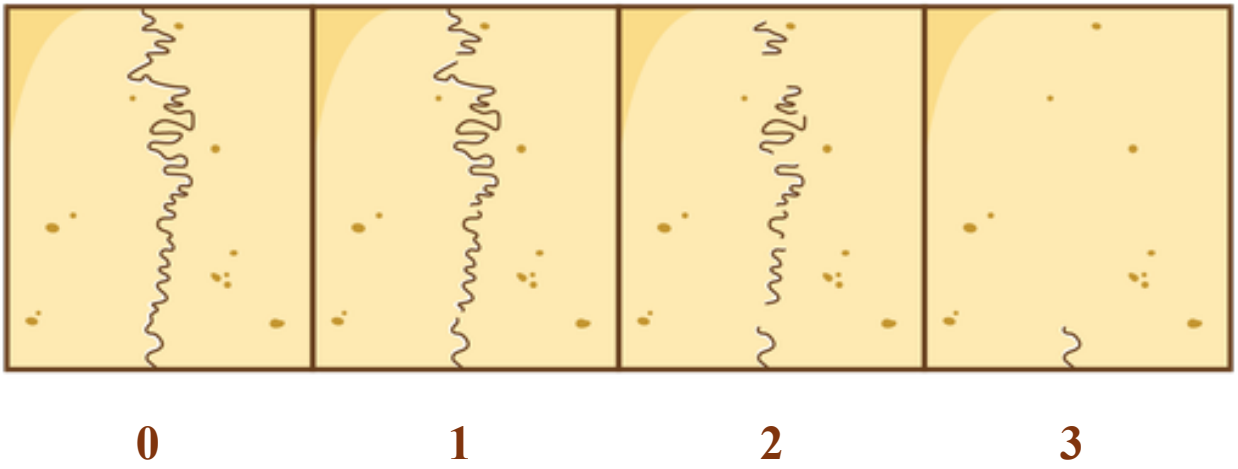


Figure 32. Degree of obliteration of the cranial sutures. Source: *Labster*. Image retrieved from: https://theory.labster.com.

Continuing with the analysis related to cranial factors, the first dental wear examination (Brothwell, 1985) shows the following parameters, dividing the wear of the molars into four stages (17 - 25; 25 - 35; 35 - 45: >45) (Fig. 33):

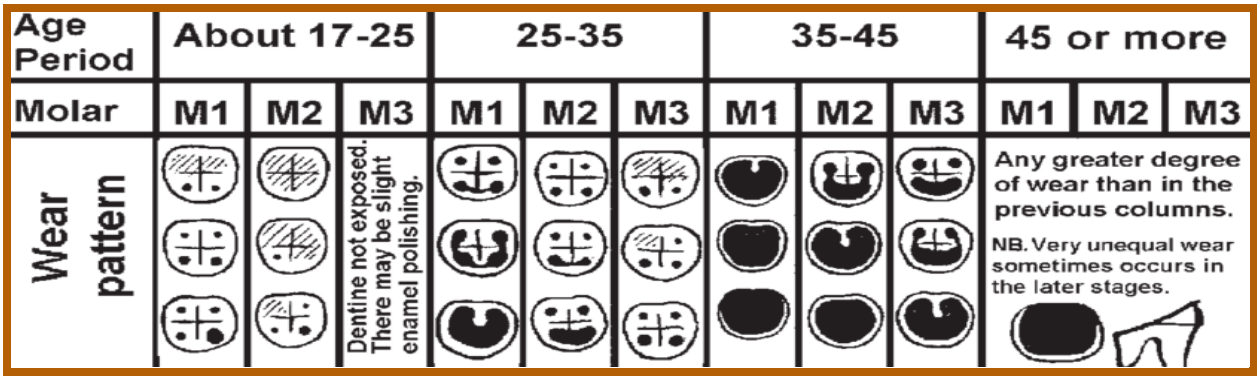


Figure 33. Wear of the molars (after Brothwell, 1985).

The second dental examination (Lovejoy, 1985) is somewhat more complex. Firstly, dental wear appears differently in the maxillary teeth compared to the mandibular teeth. For this reason, both dental sets are presented using different wear grades. Secondly, this analysis is not presented through age groups, but through dental wear sets with specific names. In this way, the sets named A and B1 are those with the minor wear, and they do not include the third molar (subadult). Starting from set B2, the third with the minor wear, the third molar appears (adult). Thus, wear is represented progressively, reaching up to the dental set H.

To simplify the recognition, applied to the maxillary part, the description is reported according to Lovejoy (1985):

> In phase A, M1 shows no dentine exposure, with polishing of most cusps and occasional distinct facets on the trigone. M2 presents unworn to slight polishing, with infrequent small facets in older individuals. M3 is unerupted, with the crypt slightly to 50% open. Premolars are erupted with minimal polishing. The anterior teeth show slight linear dentine exposure on the incisors, but none on the canines. The estimated age range is 12–18 years.[2]

On the other hand, the major dental wear would be described, according to Lovejoy (1985), as:

> In phase H, M1 shows coalescence of the protocone and hypocone, with large circular exposure of the paracone, or rarely of the metacone, but never both. In older individuals, some coalescence of all cusps is observed, except for the metacone. M2 presents a semilunar exposure of the protocone, a large circular exposure of the hypocone and paracone, and a small circular exposure of the metacone. M3 shows a large circular exposure of the protocone, accompanied by a small circular exposure of one additional cusp. Premolars exhibit large circular exposure of both cusps, often with coalescence. The anterior teeth present 40–60% crown loss. The estimated age range is 40–50 years.[3]

[2] LOVEJOY, OWEN, Dental wear in the Libben population: Its functional pattern and role in the determination of adult skeletal age at death. *American journal of physical anthropology*, no. 68, vol. II, 1985, p. 48.
[3] *Ibid.*, 51.

The graphical representation shows the following parameters (Lovejoy, 1985) (Figs. 34 - 35):

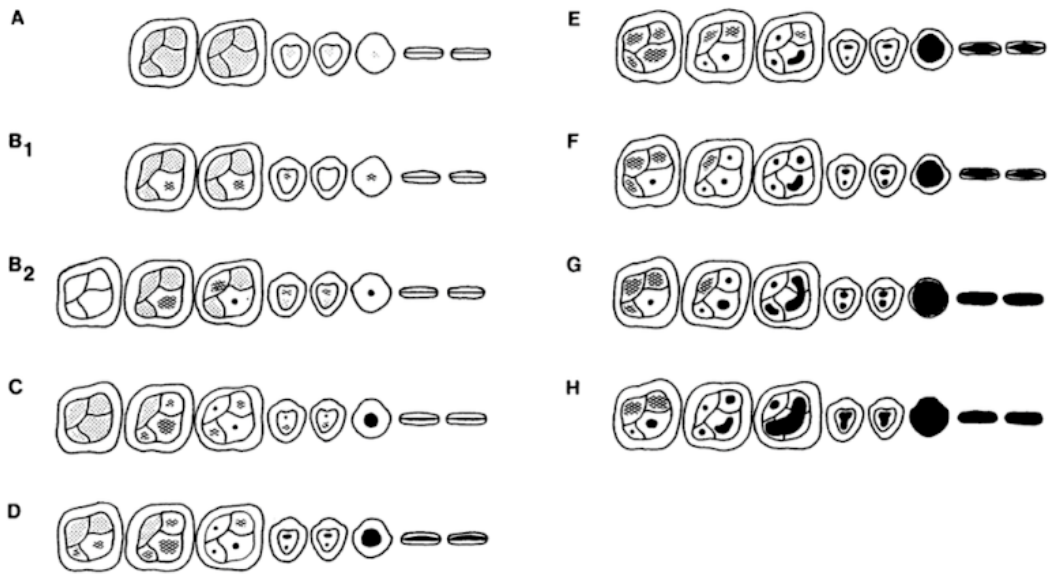


Figure 34. Functional attritional stages of the maxillary dentition (after Lovejoy, 1985).

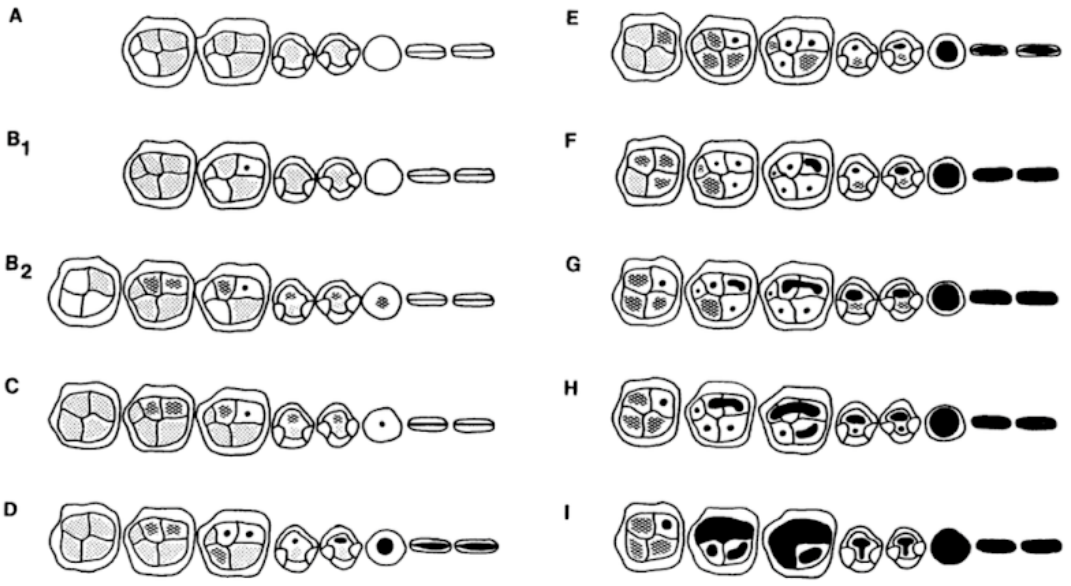


Figure 35. Functional attritional stages of the mandibular dentition (after Lovejoy, 1985).

Lastly, as previously mentioned, some parts of the pelvis are used to determine the age at death. In this case, although it is certain that enough different pelvic fragments were available, it was only possible to establish the individual's age at death through the analysis (Meindl & Lovejoy, 1989) of the auricular surface of the ilium. Each stage of wear of the ilium is divided into eight phases, from phase 1 to phase 8, the latter representing the most advanced stage of wear and thus corresponding to the highest age range.

The parameters used to conclude a wear analysis are the following (Meindl & Lovejoy, 1989) (Tab. 11) (Fig. 36):

Phase 1 (Age 20 - 24)	Billowing and very fine granularity.
Phase 2 (Age 25 - 29)	Reduction of billowing but retention of youthful appearance.
Phase 3 (Age 30 - 34)	General loss of billowing, replacement by striae, coarsening of granularity.
Phase 4 (Age 35 - 39)	Uniform coarse granularity.
Phase 5 (Age 40 - 44)	Transition from coarse granularity to dense surface; this may take place over islands on the surface of one or both faces.
Phase 6 (Age 45 - 49)	Completion of densification with complete loss of granularity.
Phase 7 (Age 50 - 59)	Dense irregular surface of rugged topography and moderate to marked activity in preauricular areas.
Phase 8 (Age 60+)	Breakdown with marginal lipping, microporosity, increased irregularity, and marked activity in preauricular areas.

Table 11. Guidelines for age estimation.

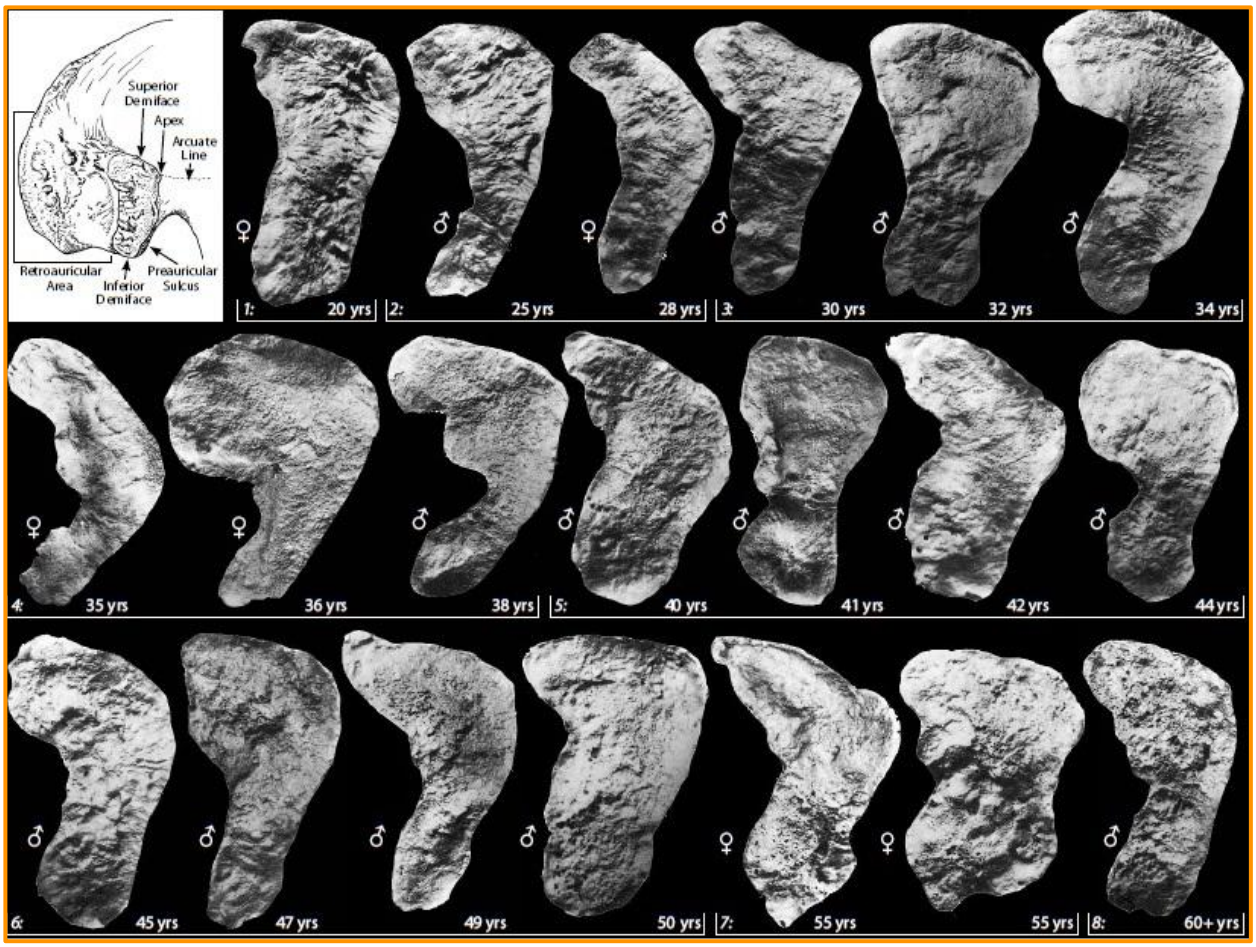


Figure 36. Wear of the auricular surface (after Meindl and Lovejoy, 1989).

3.1.5. Stature estimation

The determination of an individual's stature is calculated through the measurement of long bones: humerus, radius, ulna, femur (considering both maximum[4] and physiological length[5]), tibia—without the spine—and fibula. Methods from various authors recommend taking measurements from the left bones; if unavailable, the right bones are also valid. In this specific case, two methods (Trotter & Gleser, 1952, 1958, 1977; Manouvrier, 1892, 1893) were applied on two bones: the right femur and the left ulna. These bones were chosen because, among the entire set, they are the only completely intact specimens. Their maximum length was used.

[4] Distance from the highest point of the femur to the deepest point of the medial condyle.
[5] Distance from the highest point of the femur to the plane tangent to the fixed condyles simultaneously with the vertical wall.

The first method (Trotter & Gleser, 1952, 1958) is one of the most widely used in anthropology to determine the stature of a skeleton. Through initial studies conducted in 1952 with victims of World War II among remains of both White and Black males, and a subsequent study in 1958 involving individuals of various phenotypes (including Asians, Mexicans, and Puerto Ricans) (Jeong et al., 2023), it was possible to establish a stature model that works using subtraction and division.[6] However, in this case, the most relevant study was the one developed by the same researchers in the '70s, which also included data on female stature (Trotter & Gleser, 1977). In this case, the reconstruction of stature is based on the maximal length (in cm) of the long bones.

The following table was used to perform the calculation (Trotter & Gleser, 1952; 1958; 1977) (Tab. 12):

WHITE MALES			**BLACK MALES**		
FORMULA		STANDARD ERROR	FORMULA		STANDARD ERROR
2.38 Femur	+ **61.41**	± 3.27	2.11 Femur	+ **70.35**	± 3.94
2.68 Fibula	+ **71.78**	± 3.29	2.19 Fibula	+ **85.65**	± 4.08
2.2 Tibia	+ **78.62**	± 3.37	2.19 Tibia	+ **86.02**	± 3.78
3.08 Humerus	+ **70.45**	± 4.05	3.26 Humerus	+ **62.10**	± 4.43
3.78 Radius	+ **79.01**	± 4.32	3.42 Radius	+ **81.56**	± 4.30
3.60 Ulna	+ **74.05**	± 4.32	3.26 Ulna	+ **79.29**	± 4.42
WHITE FEMALES			**BLACK FEMALES**		
2.47 Femur	+ **54.10**	± 3.72	2.28 Femur	+ **59.76**	± 3.41
2.93 Fibula	+ **59.61**	± 3.57	2.45 Fibula	+ **72.65**	± 3.70
2.90 Tibia	+ **61.53**	± 3.66	2.49 Tibia	+ **70.90**	± 3.80
3.36 Humerus	+ **57.97**	± 4.45	3.08 Humerus	+ **64.67**	± 4.25

[6] Example of calculation using the femur: 2.47 × Fem + 54.10 (Trotter & Gleser, 1977).

4.74 Radius	+ **54.93**	± 4.24	3.67 Radius	+ **71.79**	± 4.59
4.27 Ulna	+ **57. 76**	± 4.30	3.31 Ulna	+ **75.38**	± 4.83
MONGOLOID MALES[7]			**MEXICAN MALES**		
2.15 Femur	+ **72.57**	± 3.80	2.44 Femur	+ **58.67**	± 2.99
2.40 Fibula	+ **80.56**	± 3.24	2.50 Fibula	+ **75.44**	± 3.52
2.68 Humerus	+ **83.19**	± 4.25	2.92 Humerus	+ **73.94**	± 4.24
3.54 Radius	+ **82.00**	± 4.60	3.55 Radius	+ **80.71**	± 4.04
3.48 Ulna	+ **77.45**	± 4.66	3.56 Ulna	+ **74.56**	± 4.05

Table 12. Guidelines for stature estimation.

The second method (Manouvrier, 1892, 1983) relates the measured length of the bones to the corresponding stature. The table used was as follows (Tab. 13):

Stature	**Tibia**	**Femur**	**Fibula**	**Humerus**	**Radius**
MALE					
1530	319	392	318	295	213
1552	324	398	323	298	216
1571	330	404	328	302	219
1593	335	410	333	306	222
1615	340	416	338	309	225
1630	346	421	344	313	229
1645	351	428	348	317	232
1664	357	434	353	320	236

[7] This is a term considered obsolete in some contexts. In more recent classifications, it is preferable to use "East Asian males" or "individuals of East Asian ancestry".

Stature	Tibia	Femur	Fibula	Humerus	Radius
1677	363	440	358	324	239
1690	368	446	363	328	243
1704	373	453	368	332	246
1716	378	460	373	336	249
1730	383	467	378	340	252
1745	388	475	383	344	255
1754	393	482	388	348	258
1766	398	490	393	352	261
1780	404	497	398	356	264
1795	410	504	403	360	267
1812	415	512	408	364	270
1830	420	519	413	368	273
FEMALE					
1400	284	363	283	263	193
1420	289	368	288	266	195
1440	294	373	293	270	197
1455	299	378	298	273	199
1470	301	383	303	276	201
1488	309	388	307	279	203
1500	314	393	311	282	205
1513	319	398	316	285	207
1528	324	403	320	289	209
1543	329	408	325	292	211

Stature	Tibia	Femur	Fibula	Humerus	Radius
1556	334	415	330	297	214
1572	340	422	336	302	218
1582	346	429	341	307	222
1595	352	436	346	313	226
1610	358	443	351	318	230
1630	364	450	356	324	234
1647	370	457	361	329	238
1672	376	464	366	334	242
1692	382	471	371	339	246
1715	388	478	376	344	250

Table 13. Guidelines for stature estimation.

Other osteological measurements were not taken due to the lack of available bones.

3.1.6. Taphonomic alterations

The observation was entirely done visually, using some anthropological atlases (mentioned earlier) to compare the observed traits.

3.2. Institutional integration and project implementation timeline

The following section describes the methodological process carried out to plan and design the future *Sala dell'Antropologia* at the *Museo Archeologico Nazionale di Ferrara*. My project supervisor in anthropological terms, Dr. Barbara Bramanti, who has various connections with the staff of the archaeological museum, oversaw managing the first procedures. On her behalf, at the beginning of March of this same year, a letter in the form of a bureaucratic e-mail was written to introduce me to the museum team and to formalize, from both institutions—*Università degli Studi di Ferrara* and *Museo Archeologico Nazionale di Ferrara*—the acceptance of an internship period inside the museum.

The reception and support were immediate both from the museum director, Mr. Tiziano Trocchi, who once again welcomed the cooperation between the two institutions, and from Dr. Elena Bottoni, who guided me through each of the phases of the project's development. The rapid approval of the authorization was essential to start designing the musealization idea. The study project was also accepted by the *Ministero della Cultura* (*Musei Nazionali di Bologna – Direzione Regionale Musei Nazionali, Emilia-Romagna*) (Fig. 37) according to the principles of *d.lgs.* No. 82/2005, and with the following statement:

> *«Si invita la dr.ssa Maria del Mar Repiso Anoro a prendere accordi operativi per l'accesso al Museo e ai relativi depositi con la Direzione.»*
>
> ("Dr. Maria del Mar Repiso Anoro is invited to make the necessary operational arrangements for access to the Museum and its related storage areas with the Management.")

The agreement between all parties would be fundamental to ensure the accessibility, understanding, and appreciation of the human remains on display.

Figure 37. *Museo Pinacoteca Nazionale di Bologna*, headquarters of the *Regional Directorate of National Museums in Emilia-Romagna*, Italy. Source: Muse3ums, 2019. Image retrieved from: https://www.mus3ums.com.

The on-site work was carried out through five sessions, which included meetings with the museum management and practical activities:

- **First session (13/03/2025):**

The initial meeting took place with the director, Dr. Tiziano Trocchi. This session marked the inception of the project. For the first time, a master's thesis proposal was presented, which included a potential renovation within the museum. In this way, the main objectives of the idea were defined, and the limitations and possibilities of the exhibition space were discussed. The discussion of the project objectives was conducted through a presentation in the director's office (Fig. 38), together with Professor Barbara Bramanti, in which the museographic criteria to be considered were addressed: an exhibition development appropriate to the anthropological importance of the Spina remains and the current need for the musealization of modern European museums, aiming to create

constant interaction with the public and to generate interest among all potential visitors to the museum.

Figure 38. Cover of the presentation used for the introduction of the project to the director, Tiziano Trocchi.

The presentation proposed a primary objective: the creation of a *Sala dell'Antropologia* to display the human remains of individual V.P. t. 740 B. The use of the human remains and the archaeological materials from this specific burial for their subsequent musealization had been decided quite some time ago: Dr. Barbara Bramanti clearly explained to me that the choice to exhibit burial V.P. t. 740 B had been made by the Spina archaeologists in the past. In this room, in addition to the analysed human remains, the personal objects found in the burial would also be included. These objects are currently stored in the collection warehouse of the *Museo Archeologico di Ferrara*, as, until now, the few objects from burial V.P. t. 740 B are displayed in the so-called *Sala degli Ori* (Hall of Gold).

Nonetheless, it is worth noting that, apart from the presented project of a single room dedicated to one individual, the presentation brought to light different musealization ideas. A set of innovative activities was proposed, combining scientific dissemination, sensory experiences, and digital

technologies with the aim of valuing not only the osteological remains of individual V.P. t. 740 B but also the other objects displayed in the museum and other archaeological practices. The intervention considered both the scientific and educational dimensions, being structured into different levels of interaction aimed at a broad and diverse audience. According to Jorge Wagensberg, physicist and professor specializing in museology at the University of Barcelona:

> The museographic elements are primarily used to stimulate the maximum of the following three types of interactivity with the visitor: manual or emotion-provoking interactivity (Hands On), mental or intelligible-emotion interactivity (Minds On), and cultural or culturally-emotion interactivity (Heart On). The third is highly recommended, the first is very desirable, and the second is simply essential. Interactivity means conversation. To experience is to converse with nature. To reflect is to converse with oneself. A good museum corner also triggers conversation among visitors.[8]

Regarding scientific dissemination, various practical activities were designed to promote active learning. One of these consisted of a workshop in which visitors would participate in the reconstruction of skeletons from fragmented replicas (Fig. 39), thus simulating the work of anthropologists. This experience allowed the scientific methodologies to be explained in a playful and participatory way, fostering the public's engagement with bioanthropological research.

Figure 39. Example of a replica of an archaeological excavation carried out by the network of Archaeological Museums of Catalonia in Girona, Spain. Source: Empordà Turisme, 2025. Image retrieved from: https://empordaturisme.com.

[8] WAGENSBERG, JORGE, "Principios fundamentales de la museología científica moderna", *Cuaderno Central*, no. 55, April - June 2001, p. 23. (Translated by the author)

Another possibility was to set up a section where visitors could analyse bone replicas at interactive stations, learning to identify sex, age, and possible pathologies of ancient individuals—similar to what is actually done in the laboratory. Furthermore, the project could also incorporate advanced digital tools. According to Hande Çil and Burak Boyraz:

> One of the main functions of museums today is documentation. This function, which points to more archiving works, is the task of sorting and registering existing collections. If museums leave vivariums in the background and focus on augmented reality, a different type of digital archive can be created for visitors.[9]

Through an augmented reality application, visitors could be offered a realistic visualization of what ancient individuals might have looked like, based on facial reconstructions and paleoanthropological studies. In parallel, a "historical facial recognition" experience (Fig. 40) could be developed, allowing visitors to scan their own faces and view an adaptation of them in a prehistoric context, thereby promoting a personalized and emotional connection with the museum's content.

Figure 40. Facial recognition tool at the Natural History Museum (*Naturhistorisches Museum Wien*), Vienna, Austria. In this example, the facial recognition allows visitors' faces to be merged with a Lower Pleistocene hominin. Source: Author.

[9] ÇİL, HANDE; BOYRAZ, BURAK, "Changing and developing museology: Assessments on the museums of the future and the possibilities", *Journal of the Human and Social Science Researches*, March 2024, no. 13, pp. 32 - 54.

In parallel, sensory and immersive activities were proposed to enrich the museum experience. For example, a sound installation would recreate acoustic environments from prehistory, including sounds of ancient instruments, natural noises, and animal vocalizations. A route called *Cammina nella storia* was also developed, in which visitors would walk over different types of terrain—sand, stone, soil, etc.—to physically experience how movement would have felt in ancient times. Alongside these initiatives, visitors were given the opportunity to replicate prehistoric daily tasks, such as grinding grain with stones, thus providing a hands-on understanding of the past.

The project also included the organization of special events and immersive reenactments, taking advantage of the large gardens available at the *Museo Archeologico Nazionale di Ferrara* on the ground floor. In this way, during the *Giornate dell'archeologo*, small groups would participate in archaeological excavation simulations guided by specialists, while *Living protohistory* would involve historical reenactors or guides who, using prehistoric clothing and tools, would dynamically illustrate daily life during that period.

In the final section of the route, somewhat gamified activities would be integrated, specifically designed for children and young audiences. One of these would be the creation of a *Prehistoric Escape Room*, where participants would solve puzzles based on archaeological findings from the museum. Considering the mythological importance of the scenes depicted on many of the displayed ceramics, an *Archaeological treasure hunt* was also developed, in which visitors would follow clues to reconstruct the story of an individual through the objects in which they appear, reassembling the hero's biography from material evidence.

Despite the richness of the proposal, a difficulty arose regarding the availability of suitable spaces within the museum. Overall, the complete project would contribute to transforming the museum visit into a richer, more active, educational, and emotional experience, involving the visitor not only as an observer but as a true protagonist of historical and anthropological discovery. Nevertheless, due to the available resources and the timeframe established for the internship (ending in early June), the only idea accepted was the creation of a room dedicated to burial V.P. t. 740 B.

- **Second session (25/03/2025):**

The second meeting was held with the director, Tiziano Trocchi, and the collection manager, Elena Bottoni, during which the available materials were evaluated and the initial guidelines for the creation and layout of the room were outlined. As previously mentioned, the museum has two accessible floors: the ground floor and the main floor (Fig. 41). On the ground floor (*piano terra*), visitor flow is mainly directed from the entrance towards the exhibition rooms, allowing for a linear and comprehensive route. The space appears suitable for working with display cases and explanatory panels without causing congestion, but adapting already themed spaces to a new exhibition is a truly challenging task.

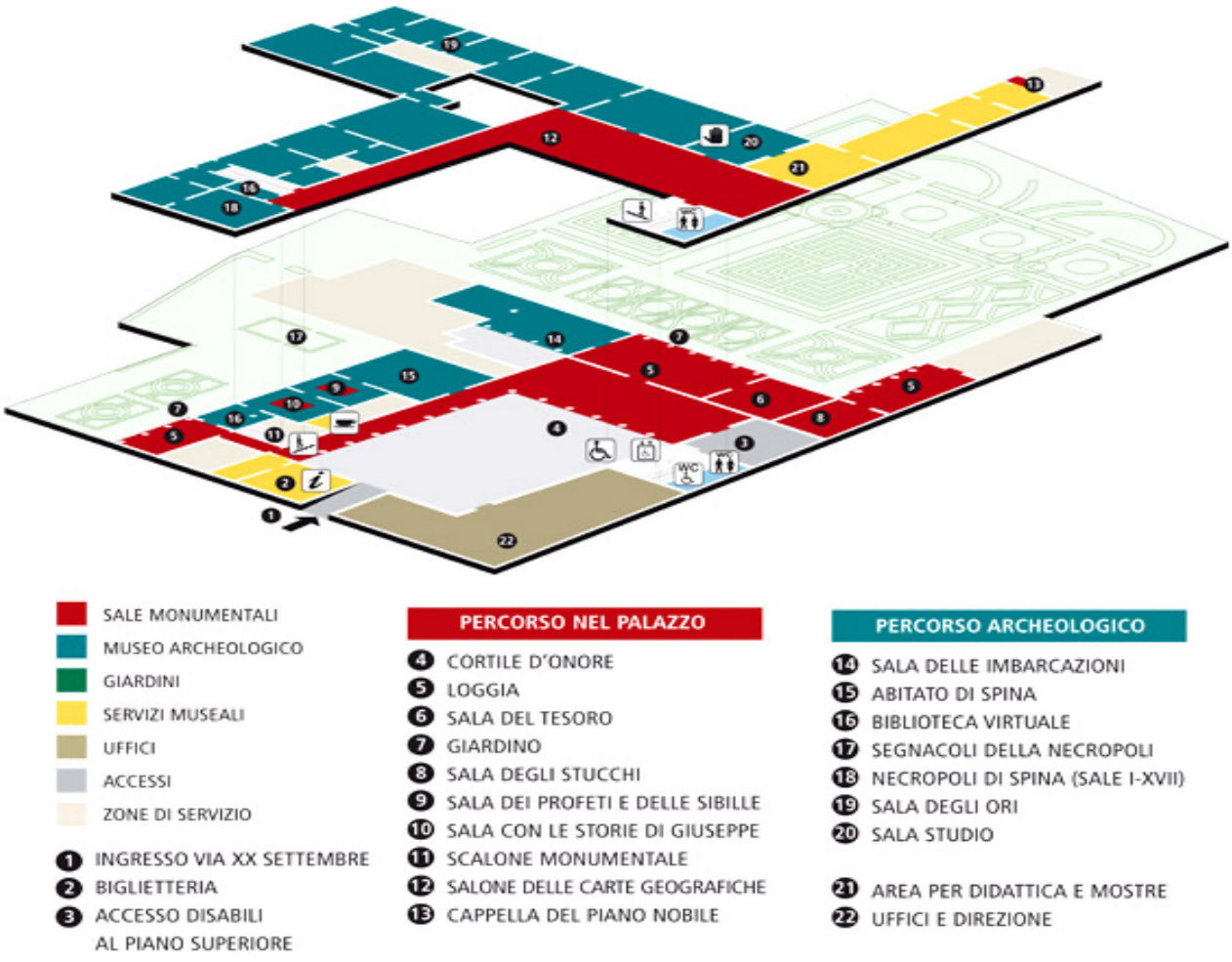


Figure 41. General plan of the *Museo Archeologico Nazionale di Ferrara*. Source: *Museo Archeologico Nazionale di Ferrara*, 2024. Image retrieved from: http://www.archeoferrara.beniculturali.it

On the second floor (*piano nobile*), the large central hall and the adjacent rooms facilitate circular itineraries. The *Salone delle Carte Geografiche* (Fig. 41; Room 12) acts as a moderating axis of the route, serving as a transitional space, as it provides a spacious central area for visitor groups and complementary activities. In this way, the rooms on the ground floor have relatively contiguous and regular dimensions, suitable for modular temporary exhibitions or interactive activities, while the second floor, with rooms of variable size and ornamental structures, allows for selective adaptations—for relatively large groups—but also with limitations due to its frescoes, which require an environment that supports their preservation, and to the historical decoration—for example, the *Sala del Tesoro* (Fig. 41; Room 6), with the frescoes by Garofalo, executed between 1503 and 1506 (Pattanaro, 2016).

The building is of high architectural and historical value. Therefore, any adaptation must respect the integrity of the spaces, especially in areas decorated with frescoes or original elements, such as the palace furniture, the Renaissance staircase, the garden, and zones as the *Sala del Tesoro*. The initial options were numerous:

I. Optimization of the *Salone delle Carte Geografiche* as a multipurpose space: it could be used as a versatile room for conferences or small exhibitions, such as those introduced in the initial project presentation, while always respecting the mural artworks.
II. Redesign of the ground-floor rooms to integrate interactive technology and movable panels, while maintaining a progressive exhibition narrative. The difficulty lay in the potential changes required for the technologies already integrated into the current exhibitions—considering, as well, the limited time available.
III. Use of the Renaissance garden as an outdoor museographic extension (for example, displaying tactile replicas or hosting educational activities), complementing the interior spaces. The main issue with this option was precisely that it was outdoors. Obviously, when designing a room to house archaeological objects and human remains, an outdoor option would be completely ruled out.

For these reasons, the location finally selected was a small square room (7.25 × 4.35 m^2) situated at the corner of Rooms I and III on the *piano nobile*, directly connected to the corridor receiving

the stairs, on the right, leading up from the ground floor, as well as to the elevator and the rear part of Room III (Fig. 42).

Figure 42. Plan of the museum's *piano nobile*. The room selected to house the *Sala dell'Antropologia* is indicated within the circle. Source: *Museo Archeologico Nazionale di Ferrara*, 2024. Image retrieved from: http://www.archeoferrara.beniculturali.it. (Edited by the author)

This room, currently closed to the public, was considered strategic because it connects both to the corridor leading to the first room of the *piano nobile* (Fig. 43) and to Room III (Fig. 44), making it highly visible and, in this way, more visually attractive to visitors who have just ascended to the new floor. That is, its layout with two access points facilitates circulation and creates a visual invitation, encouraging visitors to enter the room before continuing their tour of the floor. Furthermore, the empty room has sufficient space to accommodate all possible exhibits—it is small but fully capable of housing a human skeleton and some of its personal objects.

Figure 43. Access door to the space selected to house the *Sala dell'Antropologia*, from the corridor connecting to the stairs from the ground floor. Source: Author.

Figure 44. Access door to the space selected to house the *Sala dell'Antropologia*, from the rear of Room III. Source: Author.

- **Third session (27/03/2025):**

The visualization, and first direct contact, with the materials from the necropolis was carried out, with special attention to the specimens already on display. The first detailed photographs of the archaeological remains were taken to document the inventory and facilitate the exhibition design. The former director of the *Museo Archeologico Nazionale di Ferrara*, Mrs. Paola Desantis, had compiled a list (Fig. 45) on paper of all the objects related to the burial in question, although not all were available for handling. This list was used to document the archaeological objects that could be exhibited.

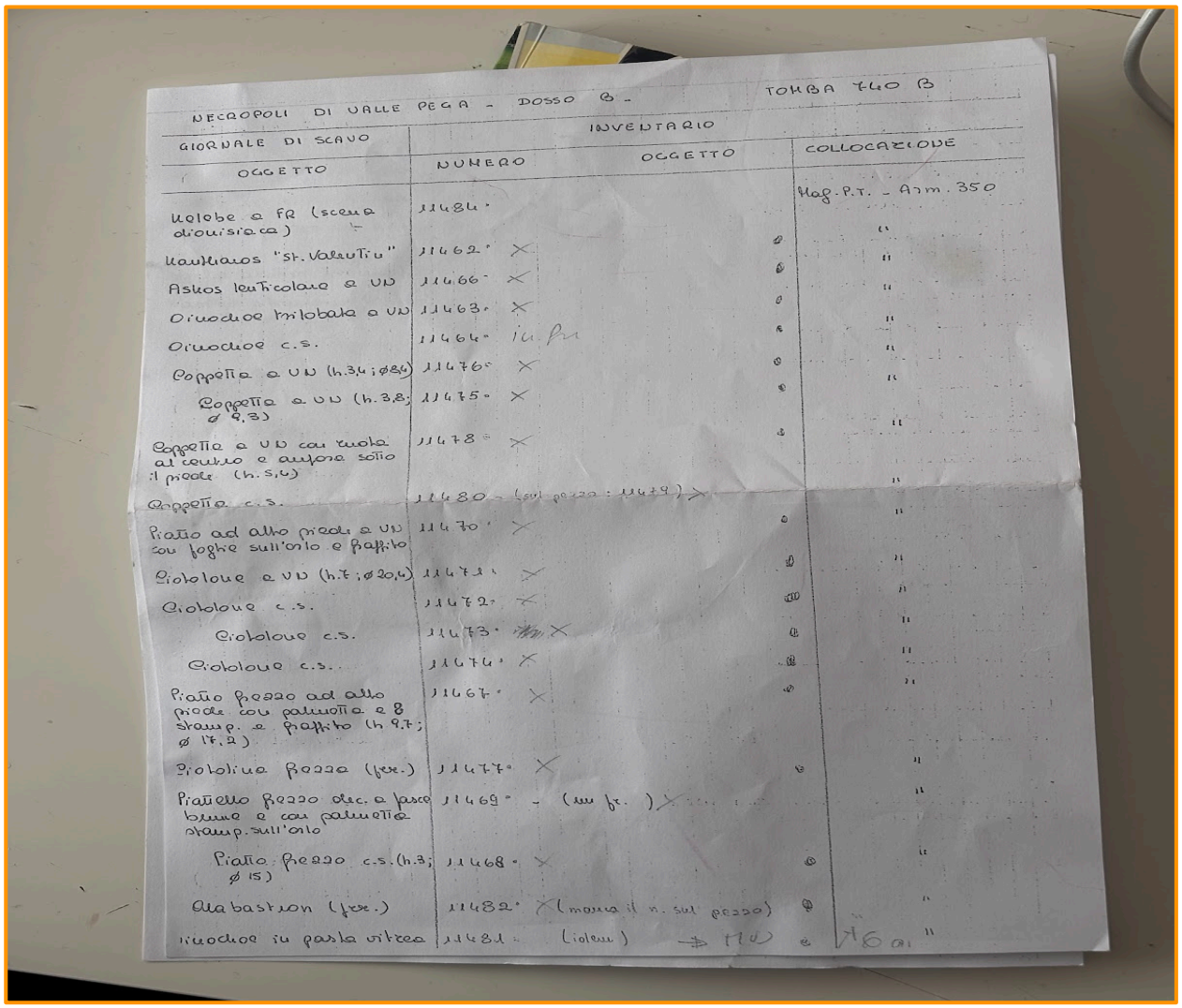


Figure 45. Original list used to identify, select, and photograph the inventory, compiled by Dr. Paola Desantis. Source: Author.

The photographic documentation of the archaeological materials was carried out on the third floor of the *Museo Archeologico Nazionale di Ferrara*, a room not accessible to the general public, located next to the inventory area of the unexhibited collections (Fig. 46). This space, usually intended for technical and cataloging tasks, allowed work under conditions of focus and controlled lighting.

Figure 46. Objects from the burial regrouped on a wooden table in the study room, within the collections. Source: Author.

For the photography, a black cardboard of approximately 1.5 m² was used as a neutral background, aiming to facilitate visual contrast with the ceramic objects and other smaller items. Two sources of artificial light were employed: an adjustable halogen lamp and a diffuser panel, mounted on fixed wall supports. As can be seen in the image (Fig. 47), this setup minimized harsh shadows and contrasts and achieved uniform lighting of the object from multiple angles.

The photographic series includes the ceramic objects from the tomb that were available for handling in the museum, photographed individually from two viewpoints: top view (plan) and side view (profile). The purpose was to facilitate both typological analysis and museographic presentation, while also giving the photographs a relatively aesthetic appearance. The images were taken with a high-resolution smartphone camera, using the same methodology applied for the documentation of the human remains.

Each object was carefully placed in the centre of the cardboard, accompanied by a metric scale to ensure accurate measurement of its dimensions. The process was carried out following preventive conservation measures, handling the materials with nitrile gloves and avoiding any direct contact that could compromise their integrity.

Figure 47. Photography area: includes the adjustable halogen lamp, the diffuser panel, and the black cardboard. Source: Author.

- **Fourth session (01/04/2025):**

The session concluded with the photographing of the remaining objects that would form part of the exhibit, thereby consolidating the complete inventory for subsequent museographic selection. During this session, the *Sala degli Ori* was also visited with Dr. Elena Bottoni. The objective of this session was to photograph the only objects that, as mentioned previously, were already on display in the museum (Fig. 48). There was only one exception: the small column-shaped boundary marker cippus (Fig. 49), located on the floor of one of the exhibition rooms. Regarding the remaining objects, the display cases in the room were opened and the objects were photographed without handling, also using a mobile phone.

Figure 48. Vessels from the burial displayed in the *Sala degli Ori*. Source: Author.

Figure 49. Small column-shaped boundary marker cippus. Source: Author.

3.3. Museographic reconstruction of the exhibition space

The design of virtual exhibitions is based on the museological principles of physical exhibitions, such as the central idea, the selection of objects, and their narrative arrangement. However, a virtual medium can always offer greater flexibility, while still requiring specific adaptations. The development of a virtual exhibition would be organized into three main phases (Anastasovitis et al., 2024):

I. Preliminary phase: literature review, identification of audience needs, and analysis of key and advanced factors.
II. Methodological phase: divided into pre-production (planning), production (creation of the 3D environment and content integration), and evaluation (simulation of user behavior).
III. Technological approach: immersive technologies are incorporated, such as augmented reality, multisensory stimulation (touch, smell, etc.), and open-architecture game engines, allowing for customization, accessibility, and future expansion.

The objective, therefore, was to create an immersive virtual cultural experience aligned with the principles of virtual museology.

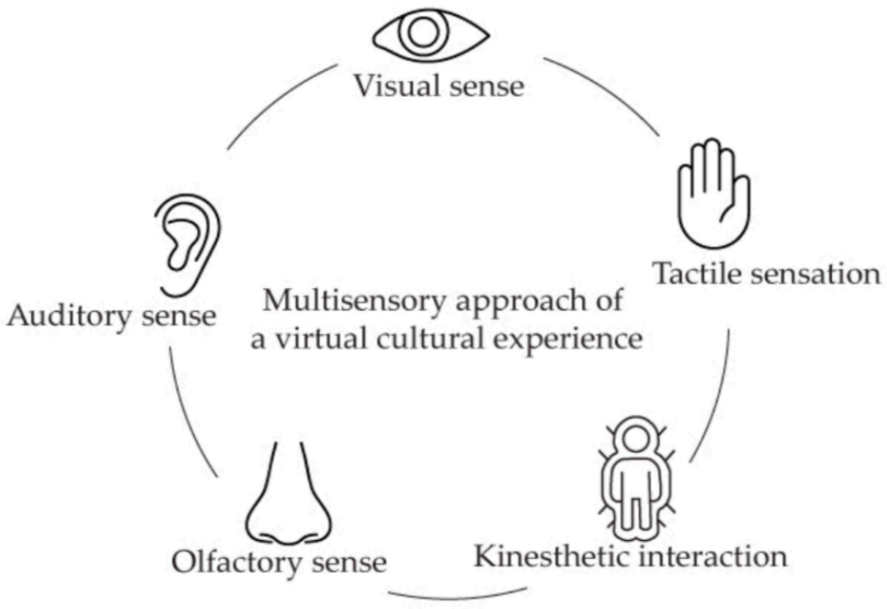


Figure 50. Multisensory approach of virtual cultural experiences (after Anastasovitis et al., 2024).

Despite the many advantages associated with the digitization of museum spaces and the development of virtual exhibition environments—as previously discussed—it is important to emphasize that the implementation of a project of this scale requires not only a solid methodological foundation but also a considerable investment of time, specialized technical skills, and material and technological resources. After all, in this case, the virtual project is intended to be implemented in a real setting, making it essential to take these aspects into account.

In this context, and considering the actual conditions of the present work, it must be acknowledged that both the available time and the resources at hand have been limited, largely constrained by the academic nature of the project. Therefore, despite the interest in exploring and applying an innovative museological approach based on immersive technologies and multisensory experiences, it has not been possible to develop a prototype fully meeting such expectations due, as mentioned before, to the lack of resources. To address this issue, the project has focused on establishing a well-founded and viable theoretical proposal, which could be expanded and applied in more favourable future contexts, where human, technical, and economic resources would allow for a more ambitious and complete implementation. The visitor becomes the main protagonist of the exhibition, and it is not the objects or knowledge that generate the relationship with them, but their own active participation. This has led to changes in the way museums conceive and manage exhibitions (Hernández, 2007). The objects and knowledge act as elements that create an interactive environment, offering the visitor different perspectives to explore the exhibitions. In this way, the visitor is integrated into the scenography, and around them the technological resources are organized, such as reconstructions, videos, filmes, display cases, infrared headsets, theatrical animations, and reenactments.

In this case, there is full agreement with the reflection of Dr. Francisca Hernández Hernández, a museology expert from the Complutense University of Madrid, regarding the historical tension between elitist culture and popular culture, as well as her warning about the need to reconsider the role of museums in the contemporary context. While it is true that there is a risk of "Disneyfication" of exhibitions (Hernández, 2007), it should not be overlooked that contemporary audiences increasingly lean toward cultural experiences that integrate elements of symbolic, narrative, and emotional consumption (also connected to the territory).

In this sense, although the most important aspect of a museum exhibition—and especially in our case, from an archaeological perspective—is to respect and preserve the original context of the findings, it is also essential to generate interest and awaken the visitor's curiosity. This conviction has guided the careful selection of the objects comprising the proposal for the *future Sala dell'Antropologia*. Not only have pieces been chosen that allow the burial under study to be properly contextualized, but efforts have also been made to ensure that the room is configured as an attractive, dynamic, and memorable space within a museum already rich in archaeological wonders. The ultimate goal is not to trivialize the scientific content, but to make it accessible and meaningful to a broad audience, thereby facilitating a more inclusive, participatory, and emotionally impactful museological experience.

A study conducted in 2013 by Isto Huvila in a middle-sized Nordic museum, published in the *Journal of the American Society for Information Science and Technology*, examines the importance of museum staff teamwork when organizing a new exhibition. From a methodological perspective, this ethnographic study focuses on the analysis of information dynamics within a medium-sized Nordic museum, placing special emphasis on staff structure and diversity as a key element of the research. Over a period of three months, data were collected through non-intrusive observation and structured interviews with six employees, selected from a staff composed of both permanent personnel and a high turnover of temporary workers. The museum had seven employees in fixed or semi-permanent positions, but throughout the year it hosted between 20 and 30 temporary workers: interns, freelance guides, and project-based specialists. This diverse composition allowed the researcher to observe a variety of information interactions among professionals with different backgrounds—from humanities and graphic design to tourism, nursing, and political science—which substantially enriched the analysis.

The variety in professional profiles and employment stability among the staff provided a solid methodological basis for applying analytical tools such as the faceted classification scheme of information interactions and the constant comparative method. Furthermore, the heterogeneity of the team made it possible to identify significant differences in how information is accessed, used, transmitted, or evaluated within the museum environment. Although the study is limited to a single institution, the combined use of in-depth interviews, observation, and analysis of negative cases helps to reinforce the validity of the results, particularly regarding the relationship between staff

structure and information interaction in complex cultural settings. Considering these factors, the development of the *Sala dell'Antropologia* becomes even simpler. The project focuses on a single person (the author of this research, a history graduate), so that each methodological function centres on the knowledge and experiences of one individual.

Faced with these challenges, the project methodology became meaningful and was adjusted to the available resources. In this way, the steps to follow were twofold:

I. Identify the importance and function of the objects being worked with.
II. Comply with and adapt to the laws governing the creation of spaces within a museum.

Firstly, the reflections of Nayra Llonch Molina and Joan Santacana Mestre, professors at the *Escola Universitària d'Hoteleria i Turisme* of the University of Barcelona, were taken into account. According to them, one of the major challenges for museums is to differentiate between space and place, and between spectator and interpreter:

> The mediation between object and subject must be all the more intense the more distant both are from the codes they should share. When we walk through a shopping center and look at a shop window, it is usually arranged to convey messages quickly and effectively; the display aims to share with the greatest number of people the maximum amount of symbols, until it finally invites us to consume the product being exhibited. In the same way, the museum also functions as a display; however, its codes are often encrypted. The more hidden the code is, the higher the level of mediation must be.[10]

On the other hand, they also emphasize considering the museum, besides its cultural importance, as a mixture between a department store and a funeral home, which in this case would be seen as a mausoleum (Fig. 51):

> What difference exists between the great pantheons and these mausoleums of culture? Identical aesthetics and similar function. In that distant nineteenth century, there was a distinct building concept for each function; large markets, with their metal structures and central layout, bore no resemblance to museums. However, the museum was different; it resembled the Greek temple. (...) Just like the ancient temple, the museum was the dwelling of gods whose only needs were to survive the passage of time and to be preserved.[11]

[10] LLONCH, NAYRA; SANTACANA, JOAN, "El museo: ¿edificio o lugar?", *Her&mus*, no. 1, vol. 4, January - February 2012, pp. 16 - 18. (Translated by the author)
[11] Ibid., p. 19. (Translated by the author)

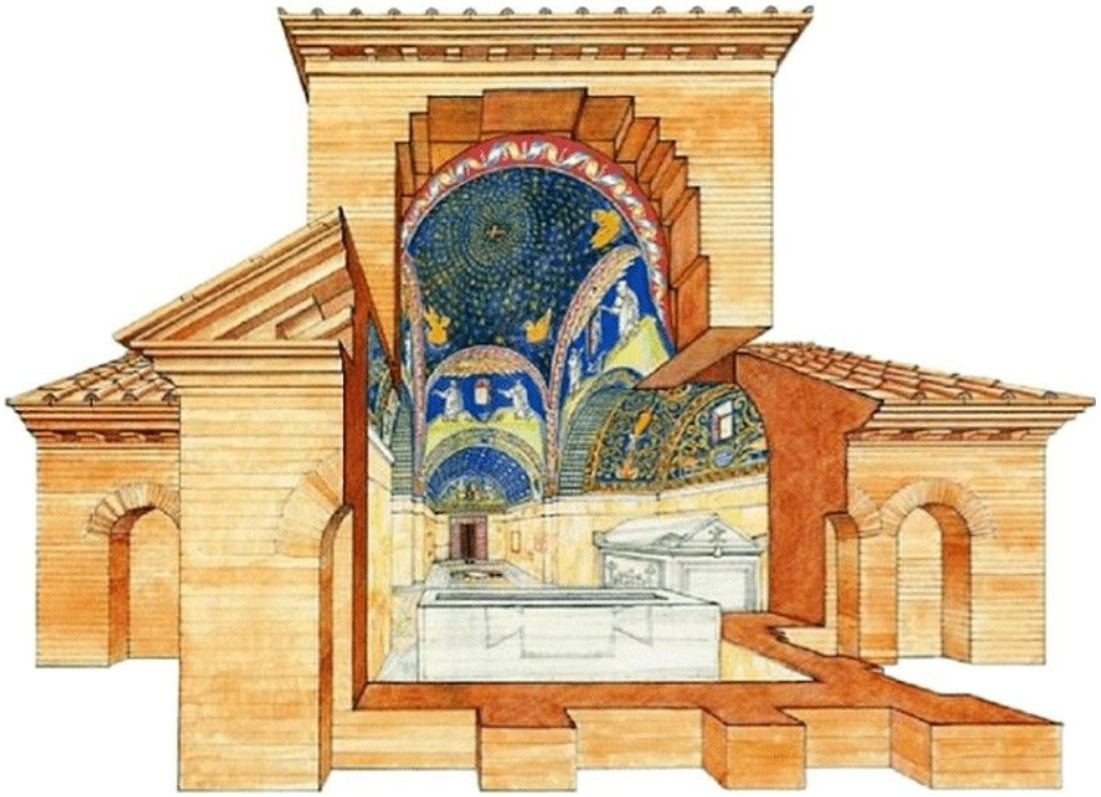


Figure 51. Illustration of the architectural organization of the Mausoleum of Galla Placidia, Ravenna, Italy. The importance of the figure is shown, with her tomb located at the centre of the building. Source: Turismo Prerromanico, 2021. Image retrieved from: https://www.turismo-prerromanico.com.

This concept is particularly important in the case of our *Sala dell'Antropologia*. When working with human remains, it is necessary to provide, in addition to respect, a relative sense of community, religious, social, and anthropological significance. Based on this principle, the human remains from burial V.P. t. 740 B would be placed in the central area of the room, receiving maximum attention.

Secondly, the room would be structured according to specific parameters[12], following the *LUQ*. The *LUQ* are the *Livelli Uniformi di Qualità* for museums, adopted by the Minister of Cultural Heritage and Activities and Tourism through Ministerial Decree No. 113 of 21 February 2018. The

[12] Istituto per i beni artistici, culturali e naturali della Regione Emilia-Romagna. (2018). *Livelli uniformi di qualità per i musei* [Uniform levels of quality for museums]. Bologna, Italy: IBACN. Retrieved from http://www.ibc.emilia-romagna.it. (Translated by the author)

LUQ were later implemented by the Emilia-Romagna Region through Resolution of the Regional Council No. 1450 of 10 September 2018.

The definition of uniform quality levels for museums, monuments, and archaeological sites in Italy is based on Article 114 of the *Codice dei beni culturali e del paesaggio* (Legislative Decree No. 42, 22 January 2004). This regulatory framework results from joint work between the Ministry of Culture, regional and local authorities, and various experts in the museological, academic, and heritage management fields. The document builds on the 2001 *Atto di indirizzo*, which organizes the essential management, conservation, and enhancement functions of museums into eight areas, and is further enriched by the proposals of the Commission chaired by Massimo Montella (2006) on minimum quality requirements. Additionally, it incorporates regional experiences in the accreditation of non-state museums and aligns with international regulations such as the ICOM - *Codice etico dei musei* and the UNESCO - *Recommendation on the Protection and Promotion of Museums and Collections* (2015). Regarding state museums, it also considers the ministerial decrees of 2014 and 2016 on organization, operation, public opening, supervision, and security. Finally, in the specific case of archaeological sites, the *Guidelines for Archaeological Parks* adopted in 2012 are applied.

The *LUQ* cover a wide range of aspects, differentiated into thematic areas, all related to the functioning of the museum. For the creation of this room, only the criteria that applied specifically to the creation of a single, unique room within the entire museum space were selected. For this reason, the criteria related to the operation and information management of the entire building are not shown below. In this way, among all the parameters related to cultural activity and staff, the ones considered were the following (Tabs. 14 - 15 - 16 - 17 - 18 - 19 - 20 - 20 - 21 - 22 - 23):

COMFORT OF EXHIBITION SPACES	
Minimum standards	**Improvement objectives**
Presence of adequate lighting systems.	Presence of systems ensuring suitable environmental conditions.

Adequate and constant cleaning of the facility and equipment.	

Table 14. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

According to the *Ente Italiano di Normazione* (Italian Standardization Body) (*UNI*), applied to museums and conservation spaces in general, and following the *CEN/TS* 16163:2014 (a European regulation adopted in Italy in 2014), the lighting levels are defined as follows (Baronchelli, 2019): sensitive artefacts (textiles, papyri, pigments) must be exposed to 50 up to 100 lux, ideally 50 lux if they are very fragile. Moderately sensitive objects (paintings, wood, leather) can reach up to 150 lux, while resistant materials (ceramics, stone, metal) may be exposed up to 300 lux. Warm lights are recommended.

Apart from these aspects, it was also important to consider the shape and direction of the lighting. For this reason, several options were considered (Ezrati, 2017) with the aim of balancing the proper visibility of the pieces and their conservation. Among the evaluated alternatives, the use of wall-washers was proposed, allowing a uniform illumination on the walls, with an installation angle between 25° and 35° to minimize shadows and reflections. This option is especially useful for exhibiting mounted objects or flat pieces. On the other hand, the implementation of spot-lighting was analyzed, which provides focused light to highlight specific elements. For this technique, it was suggested to keep an angle between 35° and 45°, limiting the luminance ratio between the object and the background to a maximum of 5:1 or 10:1, in order to avoid glare and facilitate visual perception. In the case of sculptures or three-dimensional elements, the possibility of using multiple lighting from different angles was considered, with specialized narrow lenses to define the volume without creating strong shadows that could interfere with the appreciation of the object.

All these aspects should obviously be implemented without forgetting the need to adjust lux levels according to the sensitivity of the exposed materials (ceramics and human remains), aiming to maintain low and balanced lighting values for delicate objects in order to preserve their integrity in the long term.

To conclude the organization of the spaces, the recommendations of the *Conservation Center for Art & Historic Artifacts* (CCAHA), an-American institution, were adopted. These establish a maximum limit of ultraviolet radiation of 75 µW/lm, although it would also be technically possible to reduce it to values between 0 and 10 µW/lm through the use of suitable filters or lighting systems. In line with European standards, the CEN/TS 16163 was considered, which sets a maximum acceptable ultraviolet radiation limit of 75 µW/lm.

In addition, the Joint Declaration of ICOM-CC and IIC (2014) supports the sustainability approach, suggesting that the environmental conditions of any exhibition room should be realistic and adaptable to the local climate, using passive methods of environmental control.

SECURITY	
Minimum standards	**Improvement objectives**
Compliance with regulations on the safety of structures, people, and preserved works. The facility must comply with structural stability, plant engineering, health and hygiene requirements, and the removal of architectural barriers.	Risk analysis document, including assessment and mitigation measures, as well as emergency management planning.
	Adequate insurance coverage.
	Preparation of an evacuation plan for the museum's heritage.
	Continuous staff training on all aspects of safety.
	Facility report.

Table 15. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

The circulation within the spaces must be logical, simple, and fluid, avoiding overcrowding. The information regarding accessibility and the removal of architectural barriers in museums was based on the *Piano per l'eliminazione delle barriere architettoniche* (*P.E.B.A.*), prepared by the

Ministero per i Beni e le Attività Culturali – Direzione Generale Musei. This strategic plan sets clear guidelines to guarantee inclusive access to museums, monumental complexes, archaeological sites, and parks.

Among the main recommendations, the most important were the planning of spaces that respect the reach standards for people with reduced mobility, the creation of obstacle-free routes with rest areas (Fig. 52), and the inclusion of tactile and sensory resources to facilitate the museum experience for visitors with different abilities. This integrated approach aimed to remove physical barriers and promote greater participation of all audiences in the enjoyment of cultural heritage.

Figure 52. Seats and rest areas included along the itinerary of the Louvre Museum, Paris, France. Source: *Sortir Paris*, 2024. Image retrieved from: https://www.sortiraparis.com.

The plan also establishes some general rules, such as avoiding the overcrowding of spaces with display cases—which could be with or without filtration, depending on the type of artefact exhibited (Sánchez et al., 2015). Other accessibility standards were also taken into account, such

as the width of aisles, set with a minimum width of 90 cm, and the slope of ramps and stairs, with a maximum incline of 10%.

HEAD OF EDUCATIONAL SERVICES	
Minimum standards	**Improvement objectives**
Role carried out by staff with specific professional expertise, possibly also shared with other institutions, with formal assignment of the position.	Continuous training.
	Identification of dedicated staff if the museum is organized as part of a network.

Table 16. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

HEAD OF COMMUNICATIONS	
Minimum standards	**Improvement objectives**
Role carried out by staff with specific professional expertise, including in digital environments.	Continuous training of the assigned staff.

Table 17. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

Regarding the quality of the sample and its conservation, the selected parameters were the following:[13]

PERIODIC MONITORING OF THE CONSERVATION STATUS OF THE HERITAGE/ASSETS	
Minimum standards	**Improvement objectives**

[13] Istituto per i beni artistici, culturali e naturali della Regione Emilia-Romagna. (2018). *Livelli uniformi di qualità per i musei* [Uniform levels of quality for museums]. Bologna, Italy: IBACN. Retrieved from http://www.ibc.emilia-romagna.it. (Translated by the author)

Detection and periodic monitoring of microclimatic conditions (temperature, relative humidity, lighting).	Annual and multi-year maintenance plans.
Monitoring and prevention of attacks by organisms (insects and rodents) and microorganisms (bacteria and fungi).	Annual scheduling of restoration activities.
Routine maintenance of the heritage, display structures, and green areas.	Preparation of an evacuation plan for the museum's heritage.

Table 18. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

Following the *Environmental Guidelines ICOM-CC* and *IIC Declaration* of 2014, regarding environmental control, the recommendations established by the *Bizot Protocol* were followed. These propose maintaining relative humidity within a range of 45 % to 55 %, with maximum fluctuations of ±5 % over a 24-hour period, and a stable temperature between 15 °C and 25 °C (Fig. 53), allowing variations of up to ±4 °C. In contexts where it was necessary to apply more flexible or sustainable conservation criteria, these guidelines would allow the ranges to be extended to 16 °C–25 °C and 40 %–60 % RH, with daily fluctuations not exceeding ±10 % RH.

Figure 53. *Musée de la Marine* (National Maritime Museum), Paris, France. The museum is fully climate-controlled. Source: *Sortir Paris*, 2024. Image retrieved from: https://www.sortiraparis.com.

The same organization (CCAHA) recommends continuously monitoring these parameters using, if possible, dataloggers tools for monitoring environmental changes in real time. Display cases designed with light-filtering or blocking materials, including UV filters, blinds, or special films, which should be periodically checked, were chosen. For the conservation of human remains, filtered display cases would be used.

There were two options to choose from: display cases with external filtration, which contain a system that allows the interior air to be renewed by connecting to a portable external filtration unit. This device incorporates an adjustable fan and a set of filters, including stages for particle retention, gas removal, and air purification. The other type of display case (internal filtration) contains its own continuous recirculation and filtration system. This mechanism, integrated into the structure of the display case, combines an activated carbon filter, a particle filter, and several fans arranged to maintain a constant flow of treated air (Sánchez et al., 2015).

REGISTRATION, DOCUMENTATION AND CATALOGING OF THE HERITAGE	
Minimum standards	**Improvement objectives**
Progressive and unique registration of incoming assets / or heritage inventory.	Updated asset valuation of the collection's values.
Identification cards of the works on display accompanied by appropriate iconographic documentation.	Inventory of assets.
Registration of incoming and outgoing assets for various reasons present in the museum and other cultural sites.	Computerized cataloging with identification cards of the assets present in the museum accompanied by appropriate photographic documentation according to regional and national cataloging standards.
	Free access (also with multimedia tools) to cataloged information and images, in compliance with regulations on the reproduction of cultural assets and copyright law.

Table 19. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

PERMANENT EXHIBITION	
Minimum standards	**Improvement objectives**
Selection, arrangement, and presentation of works based on a scientific project that highlights the criteria and reasons behind the choices made.	Scheduling of rotating exhibitions for assets in storage.
Photographic documentation of historical arrangements (in case of new exhibitions).	

Table 20. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

Finally, regarding the signage of the collection and the communication and relationship with the surrounding area, the selected parameters were the following:[14]

SIGNAGE	
Minimum standards	**Improvement objectives**
Clear and obvious indication of the full name of the institute and opening hours outside the building.	Presence of signage on access routes.
Presence of essential information and orientation tools inside the museum or site (informational, directional, and identification signage).	Inclusion of the facility in search tools (Google Maps, etc.).

Table 21. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

The planning and design of accessible signage in the museum were based on official Italian regulations governing accessibility in public spaces, in particular the *Decreto Ministeriale* 236/1989 and the recommendations contained in the *Linee guida ANCI-ISS* (*Associazione Nazionale Comuni Italiani – Istituto Superiore di Sanità*). According to *DM* 236/1989, high visual

[14] Istituto per i beni artistici, culturali e naturali della Regione Emilia-Romagna. (2018). *Livelli uniformi di qualità per i musei* [Uniform levels of quality for museums]. Bologna, Italy: IBACN. Retrieved from http://www.ibc.emilia-romagna.it. (Translated by the author)

contrast between text and background is ensured to facilitate readability, using clear typefaces, preferably Sans Serif, which improve comprehension for people with visual impairments. In addition, the use of uppercase letters and italics is avoided to prevent reading difficulties. The *Decreto Ministeriale* establishes that the center of symbols and signs should be positioned at a height of approximately 150 cm from the floor, facilitating their visibility and accessibility for both standing individuals and wheelchair users. The decree also indicates the inclusion of universal accessibility symbols accompanied by braille and tactile lettering to ensure autonomous orientation for people with visual impairments. These recommendations are complemented by the *Linee guida ANCI-ISS*, which emphasize the importance of integrating multisensory systems, including audio guides and braille texts, to enrich the accessible and multisensory museum experience (Capasso et al., 2019).

It should also be noted that the aesthetics of the *Museo Archeologico di Ferrara* are very well defined. The rooms adjacent to our *Sala dell'Antropologia* display signs in shades of gray and white, with lettering in reddish tones, highlighting burgundy (Fig. 54). As a conclusion, visually clean panels should be used to create contrast with the walls, floors, and furniture, especially for people with low vision. If necessary, maps, images, or graphics could be included to provide context.

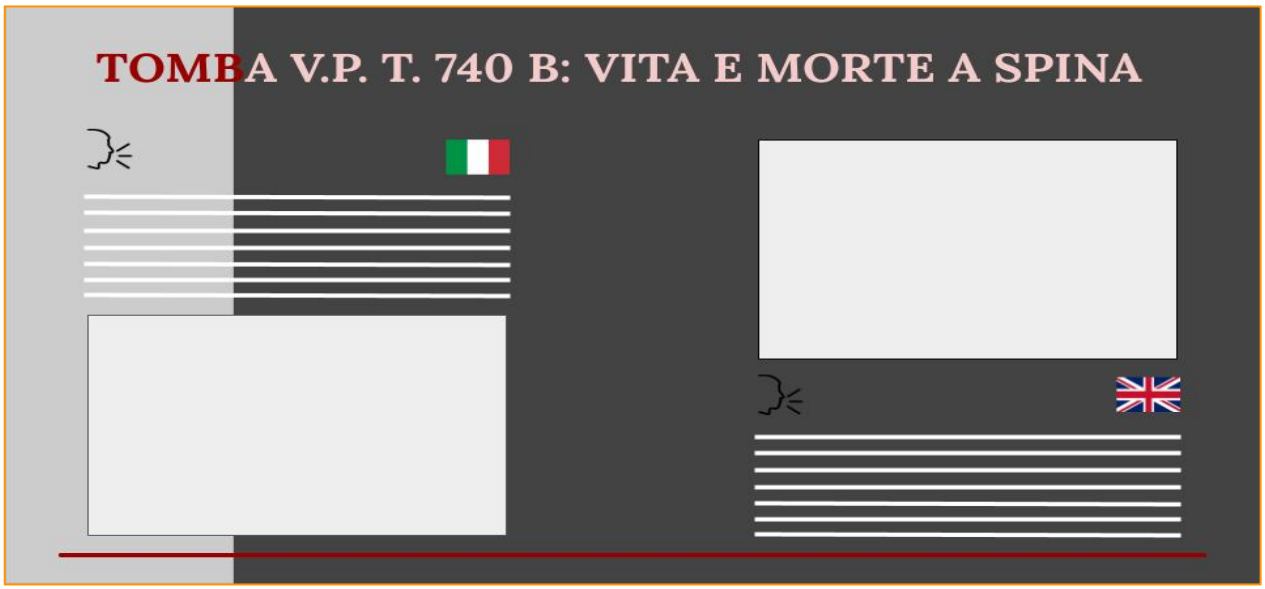


Figure 54. Example model of an informational sign in the *Sala dell'Antropologia*.

INTEGRATED COMMUNICATION IN THE EXHIBITION DESIGN	
Minimum standards	**Improvement objectives**
Captions and information panels, or movable sheets with clear and readable information.	Captions and information panels, or movable sheets, also in a foreign language, preferably in English.
	Multimedia tools related to the museum, the heritage, and the local area.
	Software and applications for mobile devices, related to the heritage and temporary exhibitions, available for download.
	Tools that improve access to heritage for people with disabilities.

Table 22. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

CONTEXTUALIZATION OF THE HERITAGE / MUSEUM / SITE WITHIN THE TERRITORY	
Minimum standards	**Improvement objectives**
Presence of elements that connect the heritage to its historical, cultural, and environmental contexts.	Indication of programs and research activities to be carried out in the local context, in collaboration with other institutions and interested parties.

Table 23. Regulations of the *Livelli Uniformi di Qualità per i musei* (*LUQ*) (Resolution of the Council No. 1450 of September 10, 2018).

As mentioned earlier, all the criteria discussed follow a methodology that has not yet been applied to the room selected for musealization. Everything is part of a project properly designed to be implemented in a museum setting, which, up to now, has only been recreated virtually.

3.3.1. Virtual modelling of the project

Due to the impossibility of physically organizing the *Sala dell'Antropologia* because of time and resource constraints, it was decided from the outset to use virtual reality and the digitization of museum spaces to plan and simulate the future exhibition area at the *Museo Archeologico Nazionale di Ferrara*. This methodological approach has made it possible to anticipate the museographic layout, ensure accessibility, and evaluate the potential educational impact of the collection, always respecting the integrity of the human remains and archaeological materials involved. With the aim of recreating this space practically and in detail, the SketchUp Go application (basic plan) was used, selected for its accessibility, ease of use, and compatibility with mobile devices, as well as for its ability to import three-dimensional models generated from real objects, including archaeological pieces and human remains. The application allowed the precise reproduction of the room's actual dimensions and the planning of its museographic layout with greater clarity (applying the parameters described in the previous section).

The work began with the visualization of the room's measurements during inventory visits to the museum, considering the plans provided, including height, width, length, and the location of doors and windows. Additionally, photographic records of its architectural features were made to ensure an accurate digital representation. Subsequently, the virtual recreation of the space was carried out using SketchUp Go, digitally constructing the walls, floors, and openings according to the measured dimensions (7.25 × 4.35 m²), ensuring that the digital room corresponded to the actual museum space (Fig. 55).

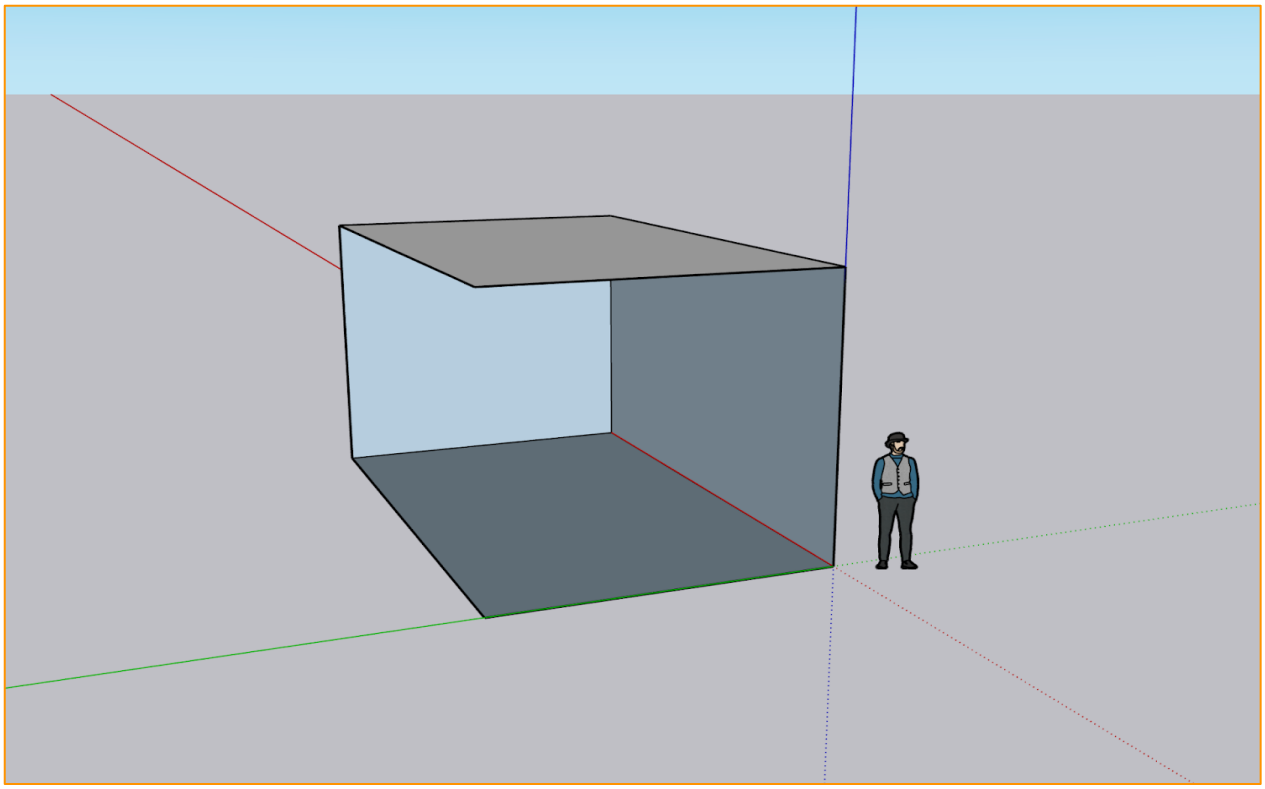


Figure 55. Walls, floors, and openings according to the measured dimensions (7.25 × 4.35 m²).

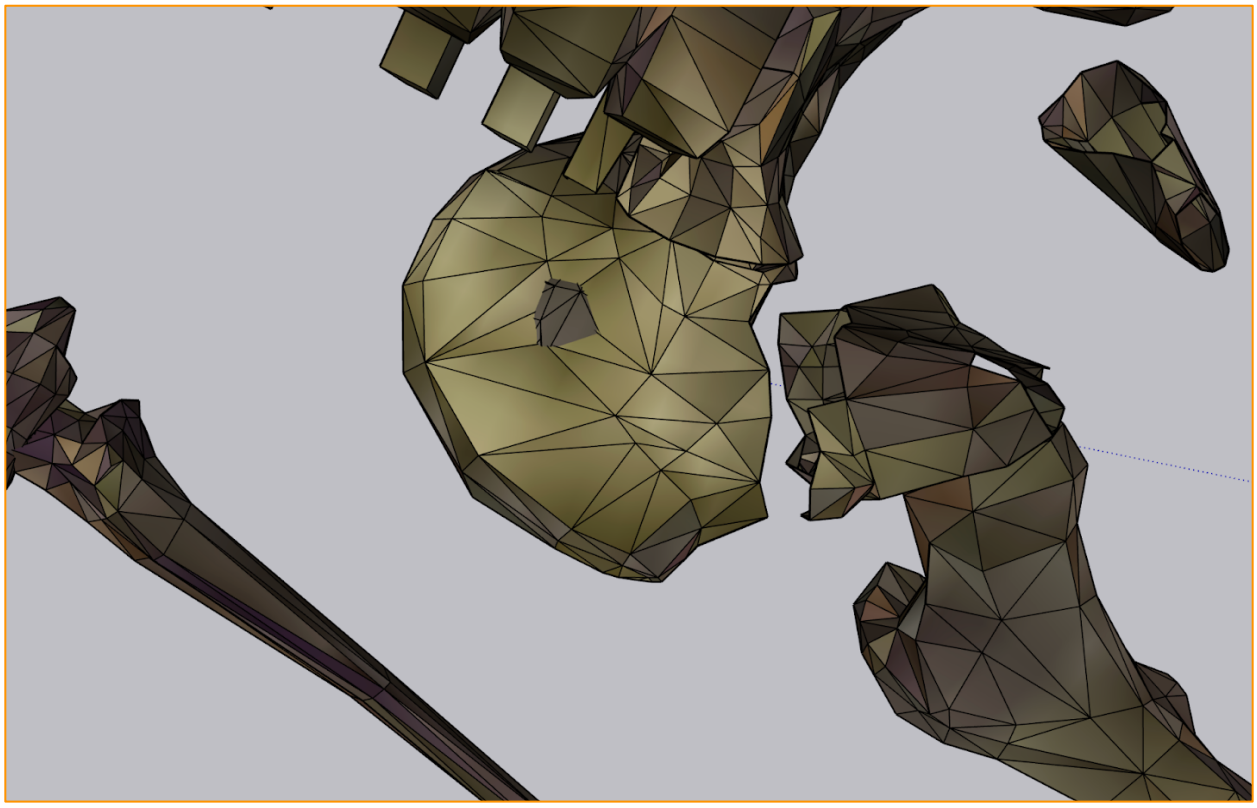
Once the virtual space was created, the museographic planning of the future *Sala dell'Antropologia* began, analysing the layout of potential display cases, informational panels, and circulation areas, with the aim of optimizing the visibility of the objects and ensuring a smooth and accessible route for all types of visitors. The exhibition requirements of a paleoanthropological nature were also considered, considering both the preservation of the remains and public accessibility. The only measure that was not applied virtually was lighting, as the basic version of SketchUp does not allow the incorporation of artificial lighting beyond the daylight provided by the base application.

During the modelling phase, specific program tools were used, such as the Paint Bucket function for applying materials and the predefined texture library, to approximate the colours and finishes of the real museum space (Fig. 56). Additionally, tones and surfaces were manually adjusted using the application's material editor to achieve a more realistic initial representation of the actual architectural environment. However, these solutions were conceived solely as a first visual approximation, since it was expected that textures and colors would be replaced or refined in later stages of the project, adapting them to the space.

Figure 56. Representation of the actual architectural environment.

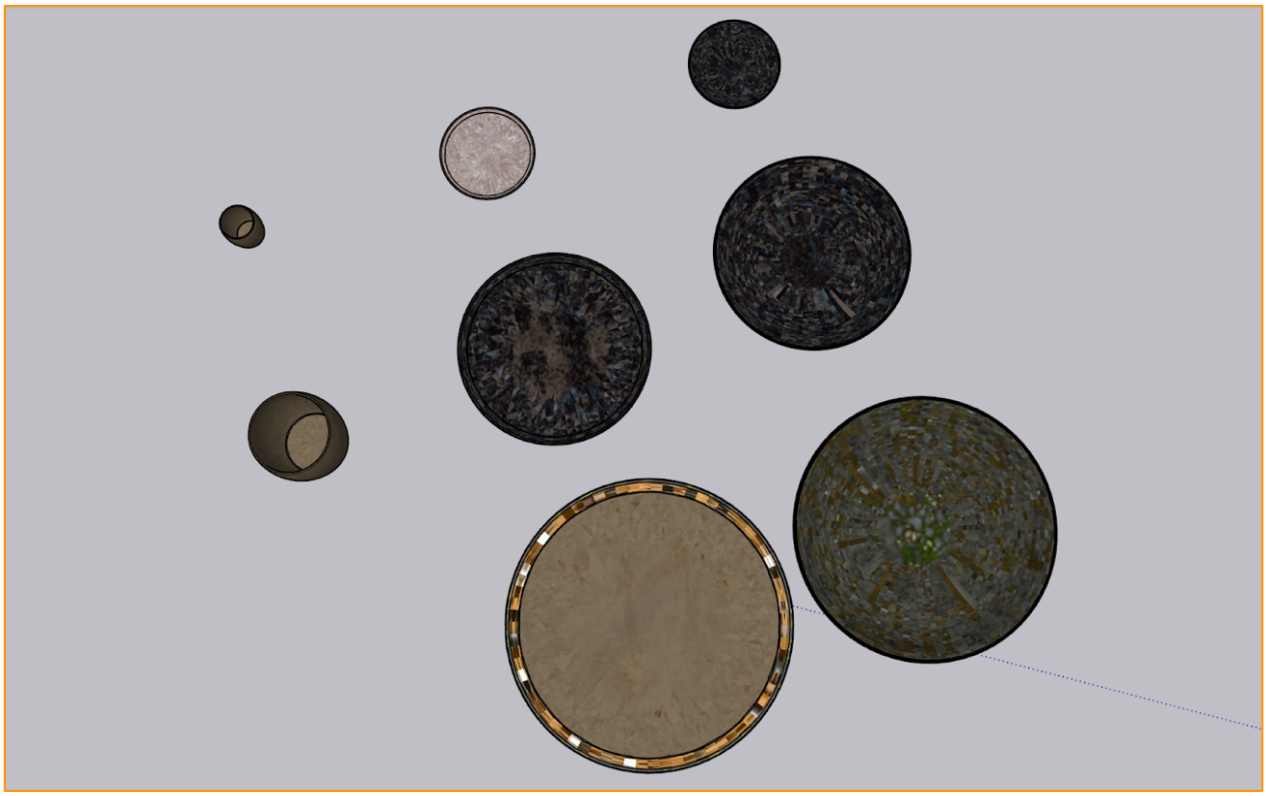
Once the architectural and aesthetic structure of the room was defined, the work of editing the objects to be included in the exhibition began. The first element addressed was the most significant for the proposal: the human remains of individual V.P. t. 740 B. For this phase, the SketchUp 3D Warehouse tool was used, which allowed the identification of three-dimensional models previously created by other authors and the selection of the skeleton that most closely resembled the reference osteological material. Since the obtained model was a complete skeleton, while the real sample does not preserve all bones, a piece-by-piece editing process was necessary (Figs. 57 - 58 - 59), manually removing elements absent in the archaeological record. In this way, it was possible to accurately reproduce the number of remains actually recovered from the tomb, ensuring a faithful and realistic representation of skeleton V.P. t. 740 B.

Figures 57 and 58. Piece-by-piece skeleton editing process.



Figures 59. Piece-by-piece skeleton editing process.

The same procedure was applied to the other objects intended for the exhibition, all selected based on the actual materials documented in the tomb. In this case, four ceramic vessels (Fig. 60), eight plates (Fig. 61), an amber necklace, and a gold earring were modelled using the SketchUp 3D Warehouse tool. Once the three-dimensional models closest to the originals were selected, their visual characteristics were modified through colour and texture editing, aiming to approximate their appearance as closely as possible to that of the authentic pieces. In this way, a coherent and representative set of digital objects was generated, capable of reproducing the material composition of the tomb more faithfully in the virtual environment.



Figures 60 and 61. Attic ceramic vessel and plates.

Next, using the same SketchUp 3D Warehouse tool, the selection of the exhibition furniture required for the room was carried out. Special attention was given to the placement of the skeleton, considered the central element of the exhibition. Following the approach established in earlier phases, it was decided to give it a prominent and symbolic location, inspired by the monumentality of Greek mausoleums (Fig. 62). Its placement in the centre of the room ensures that visitors can view it from any point of the route, whether entering from the main corridor or from Room III, thus reinforcing its status as the main object and conceptual core of the exhibition.

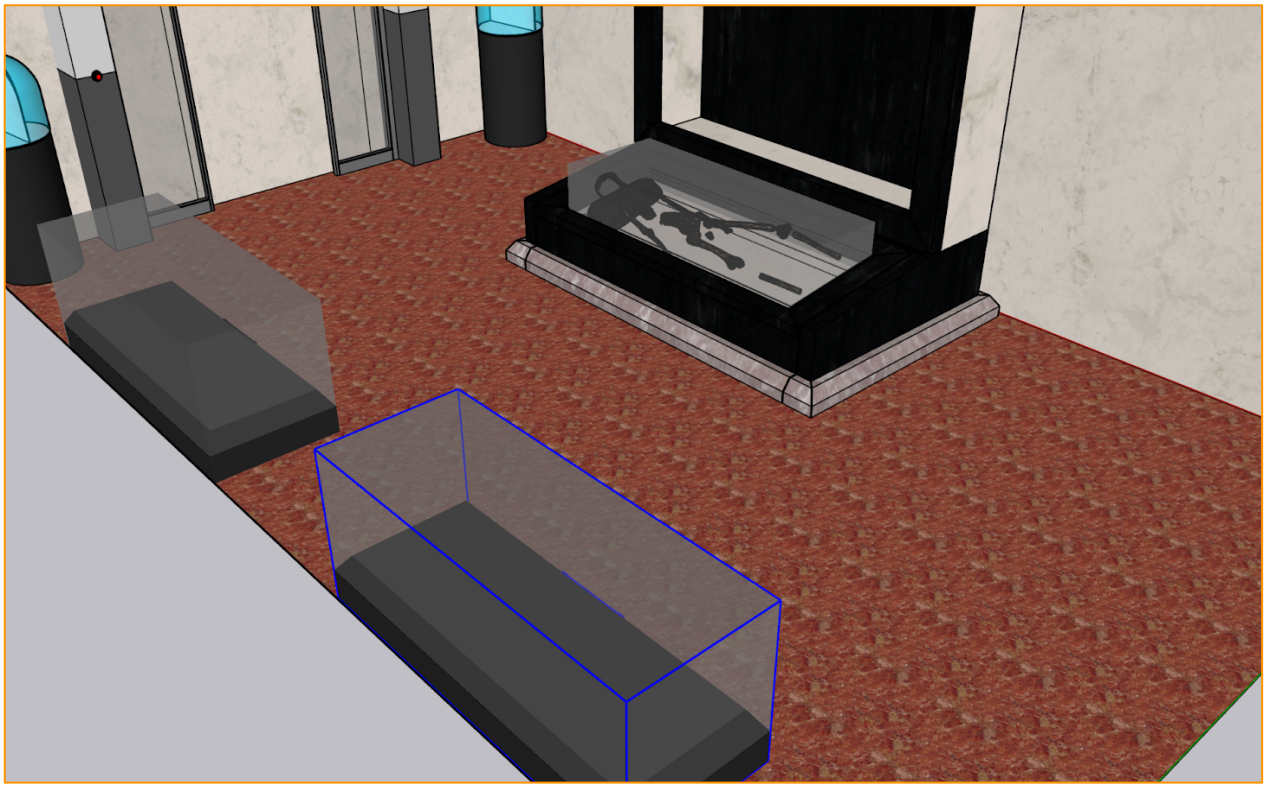


Figure 62. Placement of the skeleton considered the central element of the exhibition.

Once the furniture and object arrangement were defined, the design of the signage and informational panels to accompany the exhibition began. The positions of these elements were carefully selected, placing the main information directly above the burial to facilitate visitor understanding and reinforce the centrality of the skeleton as the main object (Fig. 63). Regarding colour aspects, greyish tones were chosen (Fig. 64), aiming for sufficient contrast with the displayed objects without distracting the audience, while maintaining a sober and coherent aesthetic consistent with the overall room design. In this way, it was ensured that the signage

fulfilled its educational and guiding function without compromising visual harmony or the perception of the exhibits.

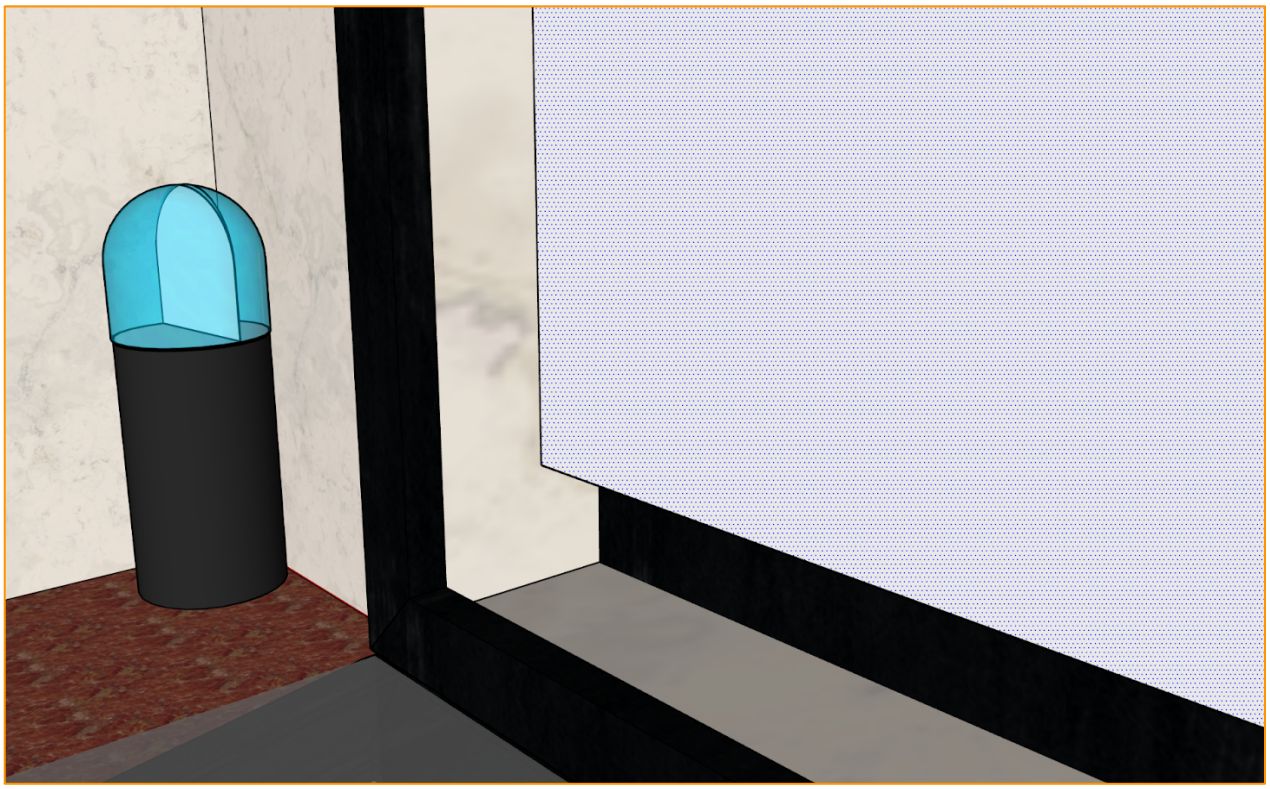


Figure 63. Information panel.

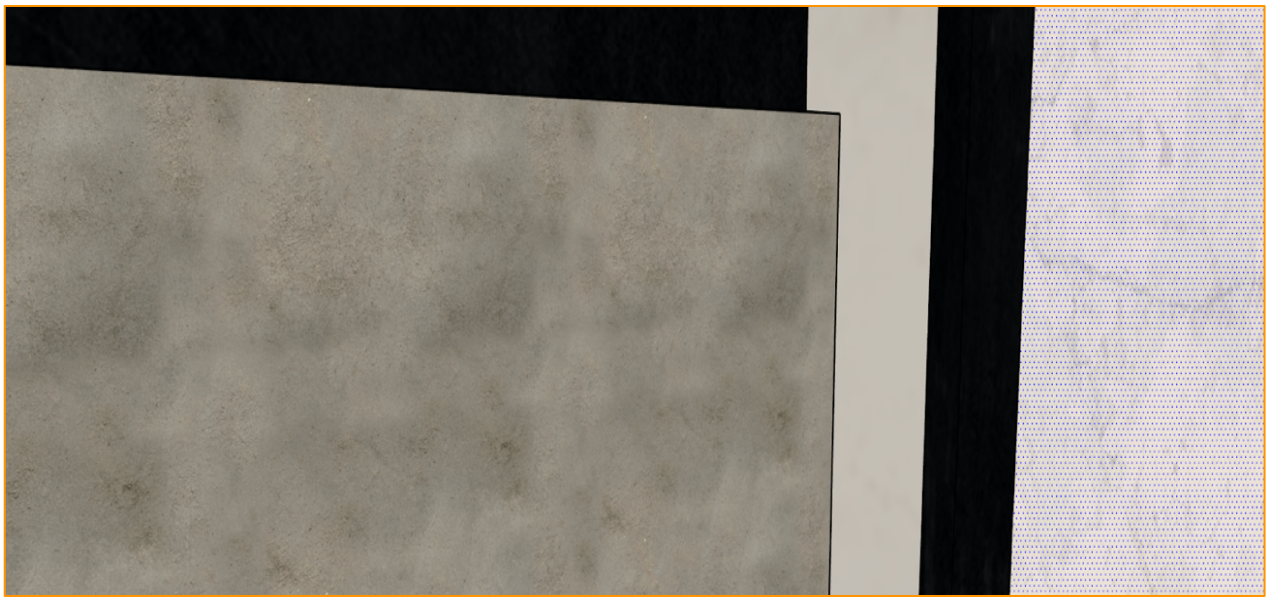


Figure 64. Grayish tones chosen for the exhibition.

In parallel with the definition of the signage, the explanatory texts for the exhibition were drafted in two languages: Italian and English. This was intended to ensure accessibility to a broad audience. Additionally, the relevant official symbols were incorporated, such as that of the *Direzione Regionale Musei Emilia – Romagna*, complying with institutional requirements. Following current regulations, all texts were written using the Microsoft Sans Serif typeface (Fig. 65), except for the name of the room and the exhibition itself, which were highlighted with a differentiated typographic style to emphasize their titular and distinctive character within the exhibition.

Figure 65. Explanatory texts panel.

Next, the final selection of the room's furniture was carried out, choosing pieces that provided good contrast with the other elements, both in colour and form, thereby reinforcing the overall aesthetic and visual clarity of the exhibition. In parallel, the access doors were redesigned (Fig. 66).

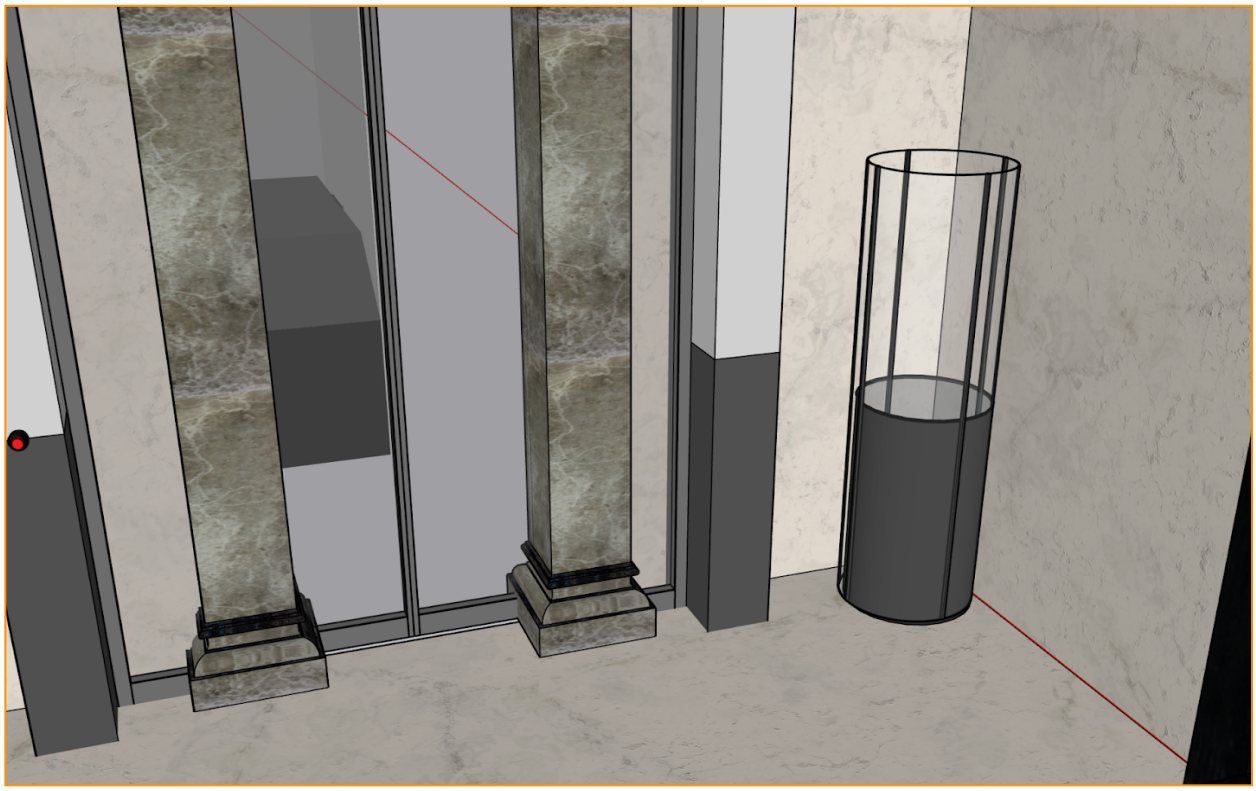


Figure 66. Redesigned access doors.

With the room fully furnished, all materials were placed inside the display cases, organizing the objects in a way consistent with the museographic proposal. Exhibition labels were also created for each item, indicating only the name (in Italian) and the corresponding serial number, ensuring clarity and simplicity in the information presented. Additionally, the legally required signage and a touchscreen were incorporated, placed in an accessible location in order to complement the interactive experience.[15]

Finally, once the interior arrangement of the room was completed, an exterior model was designed (Fig. 67) that approximately reproduces the actual rooms surrounding the exhibition space, allowing the exhibition to be visualized from an external perspective. This approach not only enabled the evaluation of spatial coherence and the integration of the room within the museum's architectural context but also generated renders and visual materials showing how the room is

[15] Cf. *Results and discussion.*

perceived in relation to its surroundings, offering a more complete and realistic view of the museographic proposal.

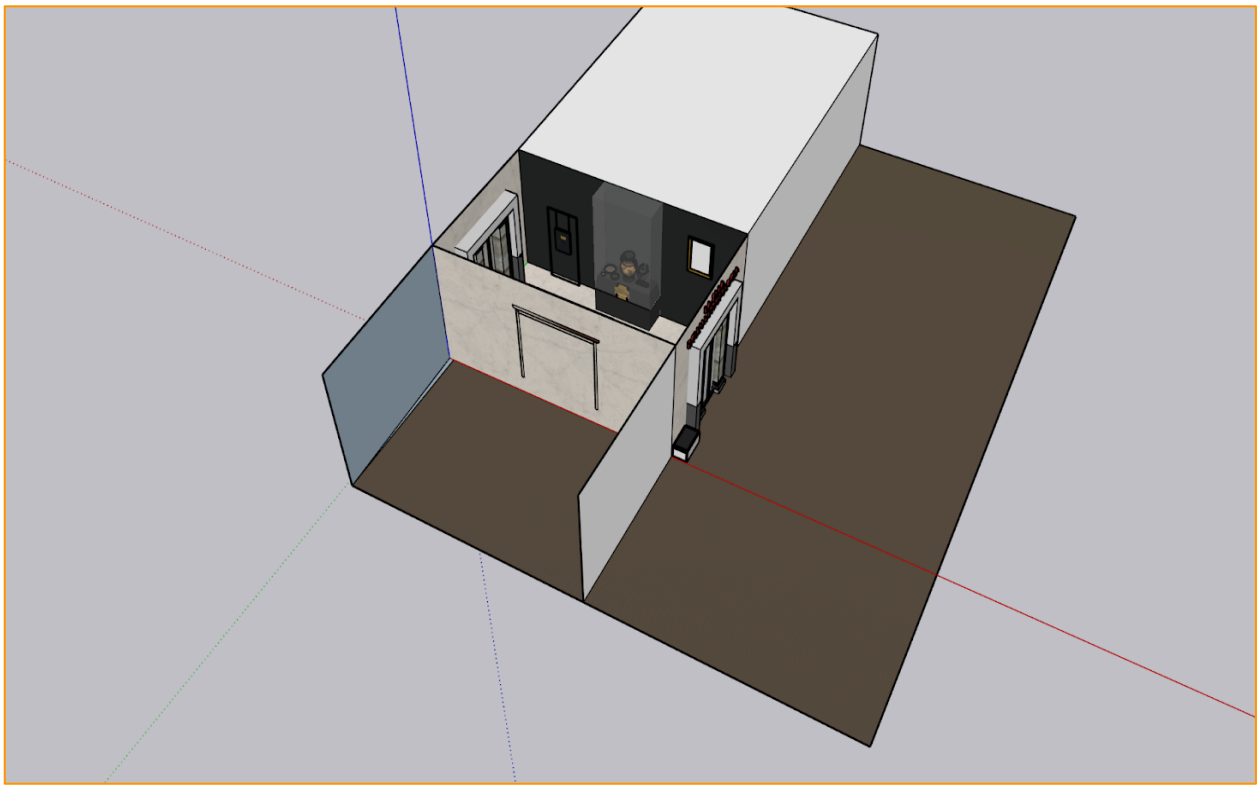


Figure 67. Exterior model of the rooms surrounding the exhibition space.

This digital working process allowed the innovative materialization of the *Sala dell'Antropologia* proposal, ensuring that it adapted to the museum's educational and outreach needs.

RESULTS AND DISCUSSION

4. RESULTS AND DISCUSSION

The results of this research are presented in two complementary dimensions: on the one hand, those obtained from the osteological laboratory analysis, and on the other, the outcomes related to the museographic field, developed through a proposal for dissemination and exhibition at the *Museo Archeologico Nazionale di Ferrara*.

4.1. Results of the scientific study

Firstly, the results of the scientific study will be presented.

4.1.1. Identification of bone elements

In general terms, 39 elements were recovered, including some smaller fragments that were impossible to identify. Regarding the cranial district (Fig. 68), the calvarium shows three parietal fragments, two of which clearly display the sagittal suture (Figs. 69 - 70), while the other shows the temporal line (Figs. 71 - 72). There are also two occipital fragments—one is an anterior right occipital fragment, and the other is a posterior fragment (Figs. 71 - 72). Additionally, there are two temporal fragments (Figs. 71 – 72), one of which corresponds to the right mastoid process (Figs. 73- 74), and a right frontal fragment belonging to the squama (Fig. 75 - 76).

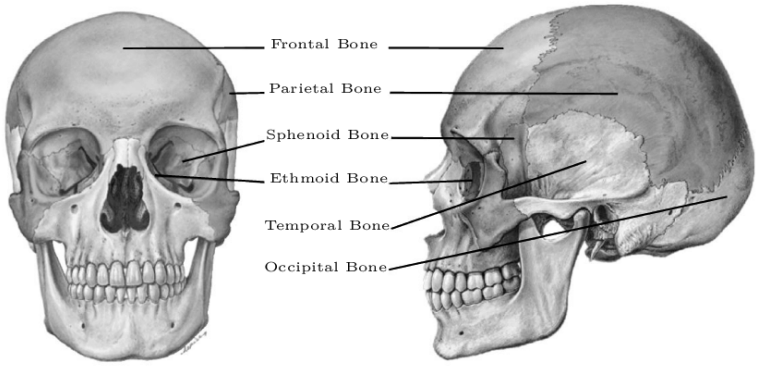
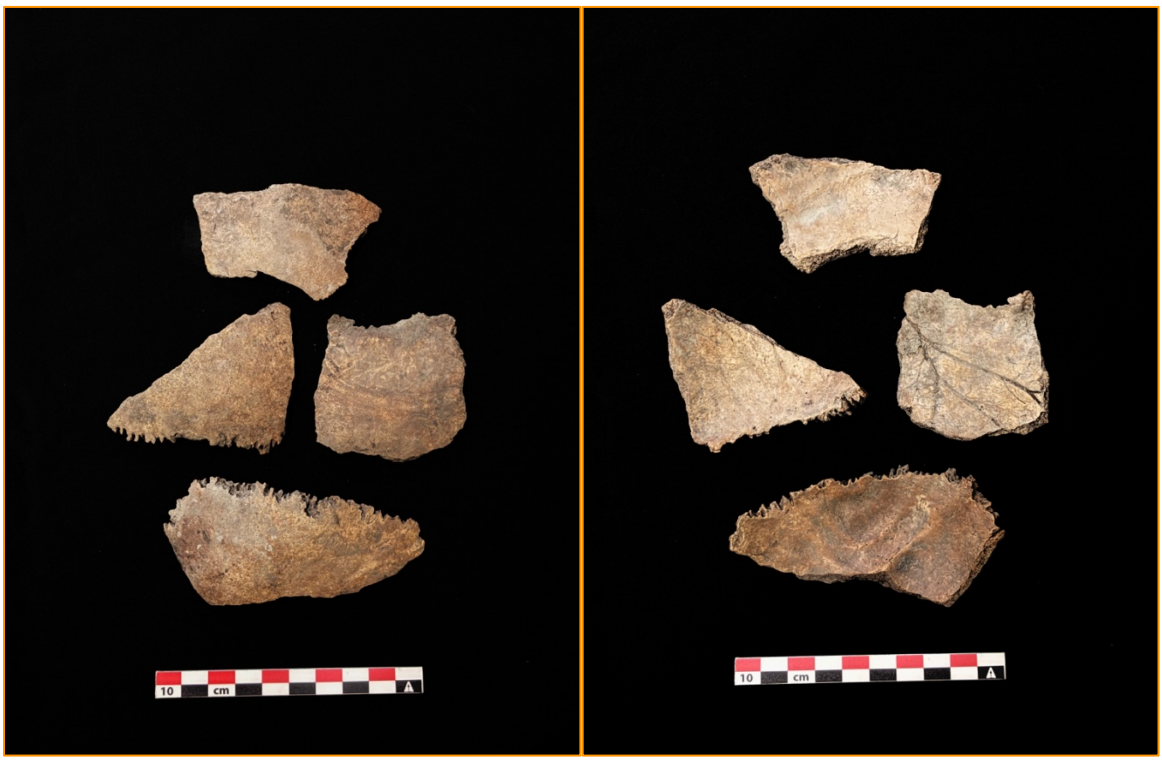


Figure 68. Cranial bones. Source: De Kegel, 2018. Image retrieved from: https://www.researchgate.net.

Figures 69 and 70. Parietal fragments with sagittal suture. Source: Author.



Figures 71 and 72. From top to bottom and left to right: fragmented parietal bone with temporal line, both fragmented occipital bones, and fragmented temporal bone. Source: Author.

Figures 73 and 74. The mastoid process. Source: Author.

Figures 75 and 76. The right frontal fragment. Source: Author.

Regarding the trunk district, the manubrium and the first (fragmented) left rib are present (Fig. 77). Among the vertebrae, there is one cervical vertebra with a spinous process (Fig. 78), two partially complete thoracic vertebrae, and three lumbar vertebrae—one of which corresponds to the last lumbar vertebra (L5) (Fig. 79)—none of which have spinous processes. Finally, one sacral vertebra (S1) is present (Fig. 80). Additionally, two vertebrae remain unidentified and could be either lumbar or thoracic. In total, nine vertebrae were recovered.

Figures 77 and 78. From left to right: the manubrium, the first left rib, and the cervical vertebra. Source: Author.

Figures 79 and 80. From left to right: the lumbar vertebra (L5) and the sacral vertebra. Source: Author.

Regarding the upper limb district, the first left clavicle (Fig. 81) and the right scapula (fragmented), showing elements such as the acromion, coracoid process, and glenoid cavity (Fig. 82), were recovered.

Figures 81 and 82. From left to right: the left clavicle and the right scapula. Source: Author.

Among the long bones, both humeri are present, with the distal epiphysis missing from the right humerus (Fig. 83) and the proximal epiphysis, as well as the mid-diaphysis, missing from the left humerus. The left radius is also present, though the proximal epiphysis is missing (Fig. 84), and both ulnae are complete (Fig. 85). Regarding the lower limb district, the right ilium was recovered (Fig. 86), showing some of its parts, such as the iliac fossa, iliac crest, and preauricular sulcus. Both coxal bones are fully fragmented—revealing the right acetabulum and the left ischial tuberosity (Figs. 87 - 88). Among the long bones, both femurs are present: the right one is complete, while the left one is partially complete, missing the distal diaphysis (Figs. 89 - 90). A fragmented right patella is also present (Fig. 91), and finally, both tibiae are fragmented (Fig. 92), with all epiphyses missing.

Figures 83 and 84. From left to right: the right humerus and the left radius. Source: Author.

Figures 85 and 86. From left to right: the ulnae and the ilium. Source: Author.

Figures 87 and 88. From left to right: the right coxal and the left ischial tuberosity. Source: Author.

Figures 89 and 90. From left to right: the right femur and the left femur. Source: Author.

Figures 91 and 92. From left to right: the right patella and the left tibia. Source: Author.

4.1.1.1. Pathologies of the skeleton

As commented previously, health pathologies were identified through simple visual analysis, with the assistance of Dr. Nicoletta Zedda. It was possible to determine only one potential pathology or signs of bone wear:

- **Schmorl nodes (SNs):** "The herniation of nucleus pulposus (NP) through the cartilaginous and bony end plate into the body of the adjacent vertebra. SNs are common findings on imaging, and although most SNs are asymptomatic, some have been shown to become painful lesions."[16] Several theories exist about the pathogenesis of SNs, but the axial load

[16] KYERE, K.A.; THAN, K.D.; WANG, A. C.; RAHMAN, S. U.; VALDIVIA, J. M.; LA MARCA, F.; PARK, P. "Schmorl's nodes", *European Spine Journal*, vol. *21*, April 2012, p. 2115.

model has the most support. Symptomatic SNs likely result from an inflammatory response triggered by NP herniation into the vascularized vertebral body. SNs are common and often asymptomatic, though they can sometimes cause back pain (Kyere, 2012) (Fig. 93).

Figure 93. Schmorl nodes (SNs) of the examined individual. Source: Author.

Furthermore, pronounced muscle insertions on the femoral epiphysis are shown. The anterior compartment of the thigh contains muscles that flex the hip and extend the knee. Key muscles include the pectineus, iliopsoas, sartorius, and quadriceps. The pectineus is a small, square muscle that helps adduct, flex, and rotate the thigh. The iliopsoas group, made up of the psoas major, psoas minor, and iliacus, mainly works to flex and stabilize the hip (Launico et al., 2023).

4.1.2. Identification of dental elements

From the maxillary part, the first right molar (M1) was recovered in *situ* (Fig. 94). From the right mandibular part (Fig. 95), the first and second incisors (I1 and I2) were recovered—isolated teeth due to PMTL[17] —, along with the canine (C)—an isolated tooth due to PMTL —, the first premolar (P1)—an isolated tooth due to PMTL—, and the three molars (M1, M2, M3)—*in situ* (fig. 96); from the left side, the first and second incisors (I1 and I2)—isolated teeth due to PMTL—and the three molars (M1, M2, M3)—*in situ*—are present (Fig. 97).

Figure 94. The first molar (M1) from the right maxilla. Source: Author.

[17] *Postmortem* tooth loss.

Figure 95. The right mandible. Source: Author.

Figure 96. The canine (C), the first incisor (I1), and the first premolar (P1) from the right mandible. Source: Author.

Figure 97. Mandible with right M1, M2, and M3, and left I1, M1, M2, and M3. Source: Author.

4.1.2.1. Dental pathologies

Regarding the dental pathologies that can be identified, in the mandibular area, there are penetrating occlusal caries on the right second and third molars (M2 and M3), which are located on the lingual side. On the left side, there is a non-penetrating occlusal caries on the second molar (M2) and a penetrating occlusal caries on the third molar (M3), both in the lingual position. Slight presence of calculus, classified as grade one, is observed on the right first and second molars (M1 and M2), as well as on the left second and third molars (M2 and M3). Slight chipping is also present on all the incisors (In this case, the chipping is minor when fractures in the enamel measure approximately 0.5 mm), along with subtle canine hypoplasia.

4.1.3. Sex determination

As mentioned in the methodology, for sex determination, there are two main skeletal districts, the cranial bones and the pelvic bones, that exhibit the greatest sexual dimorphism. The results of the analysis of cranial bones, done by visually recognizing the cranial features, are the following (Broca, 1875; Acsadi & Nemèskeri, 1970; WEA, 1980) (Tab. 24):

TRAIT	SIGNIFICANCE (W)	VALUE (Y)	**W × X**
SKULL			
Glabella	**3**		
Supraorbital ridge	**2**		

Frontal and parietal bosses	**2**		
Frontal inclination	**1**	**- 2**	**- 2**
Mastoid process	**3**	**0**	**0**
Nuchal lines	**3**		
External occipital protuberance	**2**		
Temporal zygomatic process	**3**		
Zygomatic bone	**2**		
Supramastoid crest	**2**		
Orbital shape; Supraorbital margin	**1**		
Σ SKULL	Max. 24.	**4**	**- 2**
MANDIBLE			
Mandible	**3**	**- 1**	**- 3**
Chin	**2**	**- 1**	**- 2**
Gonial eversion	**2**	**- 2**	**- 4**

Inferior margin	**1**	**- 1**	**- 2**
Σ MANDIBLE	Max. 8.	**8**	**- 11**
Σ HEAD	**Max. 32.**	**12**	**- 13**

Table 24. Sex determination based on cranial bones, visually assessed for dimorphic features (Broca, 1875; Acsadi & Nemèskeri, 1970; WEA, 1980).

Considering that the highest expression of a female trait was assigned a score of –2, while the highest expression of a male trait was assigned a score of +2—the score of 0 represented a moderate and intermediate expression—, it is represented the calculus (♂ > 0; ♀ < 0) of the different degree of dimorphism:

$$\frac{\Sigma\,(W \times X)}{\Sigma\,W}$$

- **Degree of sexual dimorphic traits in the skull:**

$$\frac{-2}{4}$$

(♂ > 0; ♀ < 0)

The result is – 0.5.

- **Degree of sexual dimorphic traits in the mandible:**

$$\frac{-11}{8}$$

(♂ > 0; ♀ < 0)

The result is – 1.375.

- **Degree of sexual dimorphic traits in the head:**

$$\frac{-13}{12}$$

(♂ > 0; ♀ < 0)

The result is – 1.08.

All the results are below zero, so the obtained value can be directly associated with a **female individual.**

Secondly, continuing with the morphological analysis, the bones of the pelvis were analyzed, showing the following results (Acsadi & Nemeskeri, 1970; WEA, 1980) (Tab. 25):

TRAIT	SIGNIFICANCE (W)	VALUE (Y)	W × X
PELVIS			
Preauricular sulcus	**3**	**- 1**	**- 3**
Greater sciatic notch	**3**	**- 1**	**- 3**
Subpubic angle	**2**		
Composite arch (– 1, + 1)	**2**	**- 1**	**- 2**
General morphology	**2**	**- 1**	**- 2**
Obturator foramen	**2**		
Body of the ischium	**2**	**- 1**	**- 2**
Iliac crest	**- 1**	**- 1**	**- 1**
Iliac fossa	**1**	**- 1**	**- 1**
Greater pelvis	**1**		

Σ PELVIS	Max. 19.	**14**	**- 14**

Table 25. Sex determination based on pelvic bones, assessed through morphological features (Acsadi & Nemeskeri, 1970; WEA, 1980).

As previously stated, 10 traits were intended for calculation; however, only 7 were used. The results are based on the same established criteria:

- **Degree of sexual dimorphic traits in the pelvis:**

$$\frac{\textbf{- 14}}{\textbf{14}}$$

(♂ > 0; ♀ < 0)

The result is – 1.

All the results are below zero, so the obtained value can be directly associated with a **female individual**.

Finally, a metric analysis was done by measuring the length of long bones and through some measurements taken from the epiphyses or other smaller bone parts. The results are the following:

- The diameter of the femoral head (Stewart, 1979): The femoral head has a diameter of 37 mm (Fig. 98).
- The height of the mastoid process (Demoulin, 1972): The mastoid process has a height of 24 mm (Fig. 99).
- The diameter of the humeral head (Stewart, 1979): The humeral head has a diameter of 35 mm (Fig. 100).
- The length of the glenoid cavity (Dwight, 1894): The glenoid cavity has a length of 34 mm (Fig. 101).

All the results obtained are related to a value that can be directly associated with a **female individual.**

Figures 98 and 99. From left to right: femoral head and mastoid process. Source: Author.

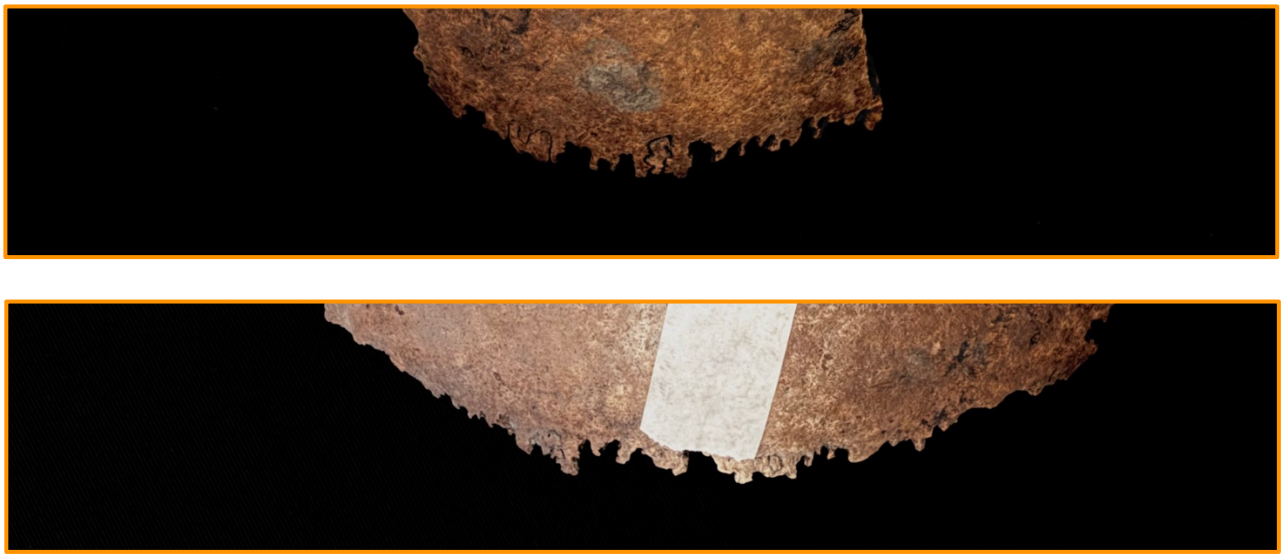
Figures 100 and 101. From left to right: humeral head and glenoid cavity. Source: Author.

4.1.4. Age estimation

As mentioned in the methodology, to establish these values, as with sex determination, the most important skeletal elements are the skull—which provides information through cranial sutures and dental wear—and the pelvis, particularly the pubic symphysis and the auricular surface. In other cases, the wear of the external surface of the fourth rib can also be a determining factor.

The results of the degree of obliteration of the ectocranial sutures were obtained from the analysis of two main sutures: the midcoronal suture and the anterior sagittal suture.

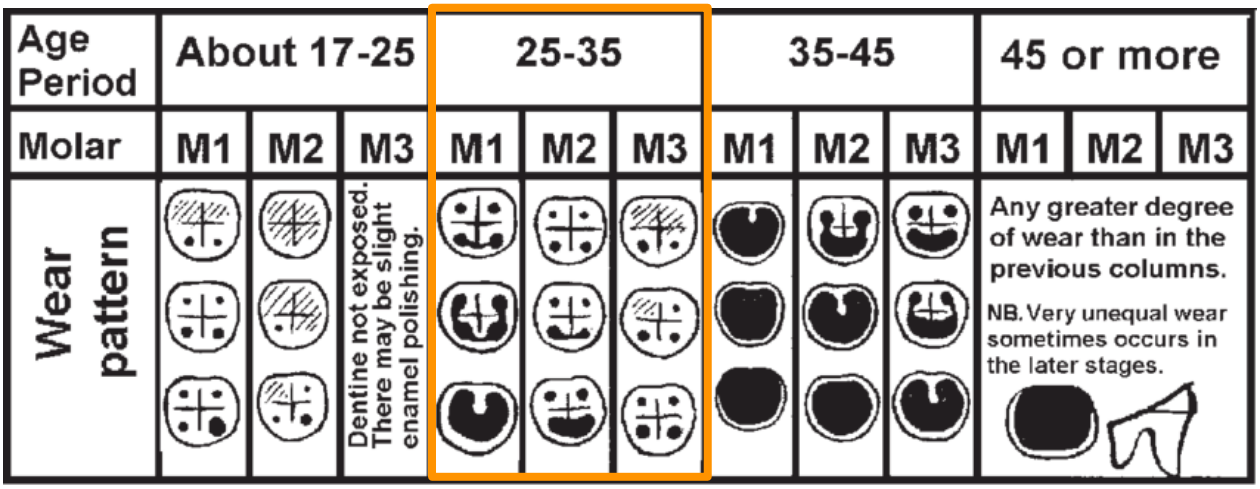
- The midcoronal suture does not show any trace of ectocranial synostosis, so it can be considered "open," corresponding to synostosis stage 0, as shown in the methodology. According to the ectocranial suture closure rates (Meindl & Lovejoy, 1985), a stage 0 in the midcoronal suture would correspond to an estimated age of 33.8 years—with a standard deviation of 11.2 years (Fig. 102).
- The anterior sagittal suture shows a minimal trace of ectocranial synostosis, related to a single bony bridge with at least 50% synostosis, corresponding to synostosis stage 1, as shown in the methodology. According to the ectocranial suture closure rates (Meindl & Lovejoy, 1985), a stage 1 in the anterior sagittal suture would correspond to an estimated age of 41 years—with a standard deviation of 11.1 years (Fig. 103).



Figures 102 and 103. From top to bottom: midcoronal suture and anterior sagittal suture. Source: Author.

By calculating the average age based on the synostosis results from both sutures, the mean estimated age obtained is **37.4** years +/- **11.1** years.

Continuing with the analysis related to cranial factors, the first dental wear examination (Brothwell, 1985) shows the following results (Fig. 104):



(From *Figure 33*)

Figure 104. Dental wear analysis of three molars (after Brothwell, 1985). Source: Author.

This dental wear (Brothwell, 1985) can be related to an age between **25** and **35** years.

The second dental wear examination (Lovejoy, 1985) appears differently in the maxillary teeth compared to the mandibular teeth. For this reason, both dental sets are presented using different wear grades. Nevertheless, both the mandibular and maxillary bones show dental wear comparable to stage 'G'. It shows the following results (Figs. 105 - 106):

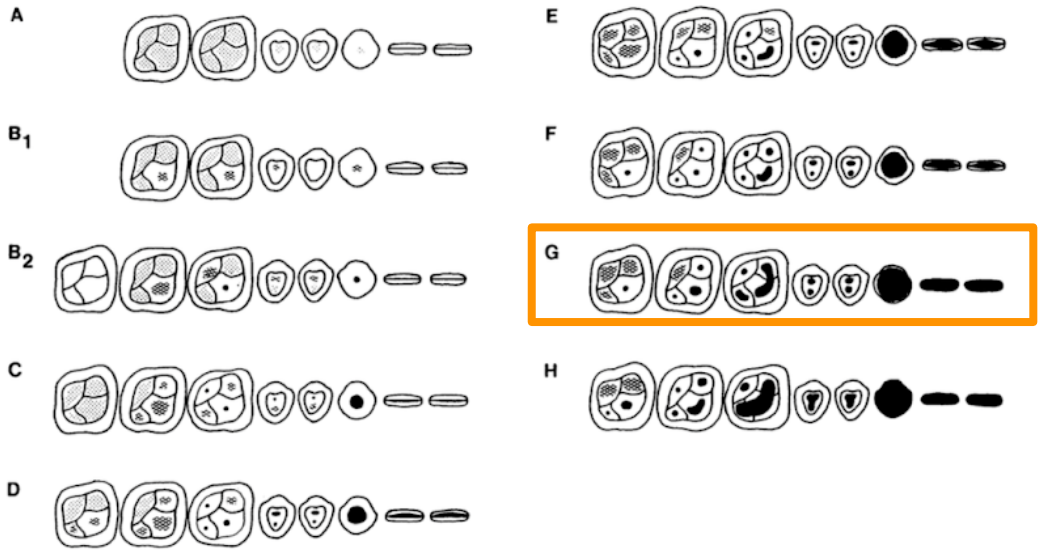


Figure 105. Functional attritional stages of the maxillary dentition (after Lovejoy, 1985).

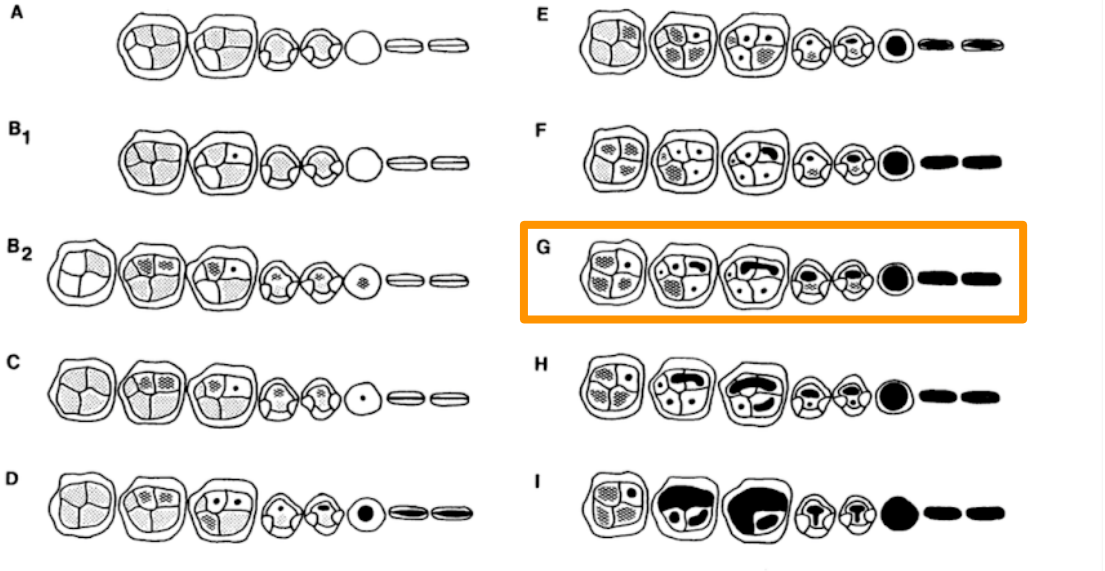
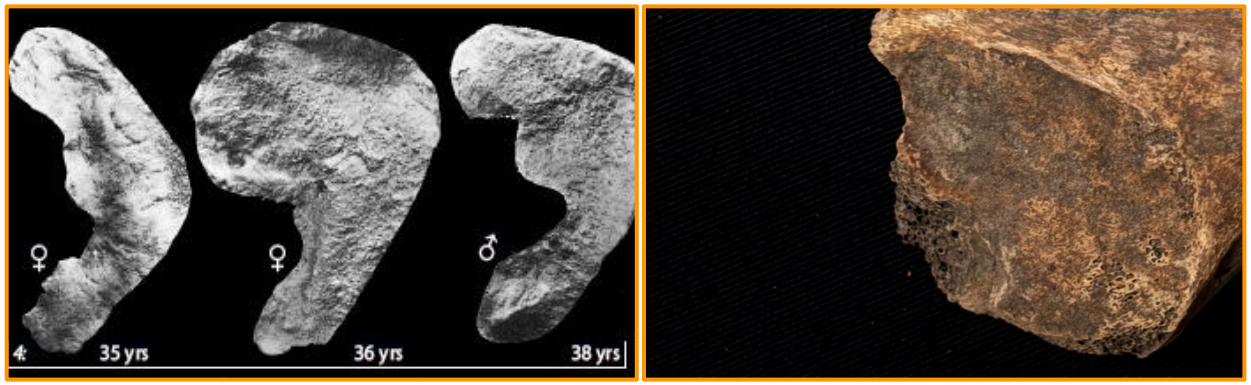


Figure 106. Functional attritional stages of the mandibular dentition (after Lovejoy, 1985).

This dental wear (Lovejoy, 1985) can be related to an age between **35** and **40** years.

Finally, some parts of the pelvis are used to determine the age at death. In this case, although it is certain that enough different pelvic fragments were available, it was only possible to establish the individual's age at death through the analysis (Meindl & Lovejoy, 1989) of the auricular surface of the ilium. The results are the following (Figs. 107 - 108):



Figures 107 and 108. From right to left: phase 4 of auricular surface wear (after Meindl & Lovejoy, 1989) and the real auricular groove. Source: Author.

The auricular surface of the individual can be related to phase 4 of bone deterioration (Meindl & Lovejoy, 1989), which corresponds to an age between **35** and **39** years.

Given the variety of results, the most appropriate approach was to estimate an age between **25** and **40** years at the time of death.

4.1.5. Stature estimation

The determination of an individual's stature is calculated through the measurement of long bones: humerus, radius, ulna, femur (considering both maximum and physiological length), tibia—without the spine—and fibula. In this specific case, two methods (Trotter & Gleser, 1952, 1958, 1977; Manouvrier, 1892, 1893) were applied on two bones, the right femur and the left ulna. The results are the following:

- The maximum length of the right femur is 410 mm, while its physiological length is 400.6 mm.
- The maximum length of the left ulna is 230 mm.

According to Trotter and Gleser (1952; 1958; 1977), the length of the femur would correspond to an individual approximately 155.37 cm tall, with a standard deviation of 3.72 cm, while the length of the ulna would correspond to an individual approximately 155.97 cm tall, with a standard deviation of 4.3 cm. On the other hand, according to Manouvrier (1982; 1983), considering that the maximum length of the femur is 410 mm—a measurement not directly provided among the values listed by the researcher—the results closest to this femur measurement range between 408 mm and 415 mm. In this way, a femur measuring 408 mm corresponds to a height of 154.3 cm, while a femur measuring 415 mm corresponds to a height of 155.6 cm. If a simple proportion calculation—rule of three or cross-multiplication—is applied, the estimated height for a femur measuring 410 mm, based on the provided measurements, would be 155.05 cm.

The measurements obtained allow the studied individual to be associated with an average stature of **155.67** cm according to Trotter and Gleser (1952; 1958; 1977), and **155.05** cm according to Manouvrier (1982; 1983).

4.1.6. Taphonomic alterations

As mentioned earlier, the observation was entirely done visually, using some anthropological atlases to compare the observed traits, and consulting the professional and Doctor Nicoletta Zedda. Nevertheless, considering that the remains were stored in a cardboard box until the time of analysis (with preservation considered to be from fair to good), it was possible to identify pre- and post-mortem taphonomic signs and fractures, as well as taphonomic traces related to the effects of weather and organic conditions. Finally, it was also possible to associate two bone remains among the human remains with an animal origin. In this case, the remains were identified as coming from the pelvis of an unknown animal, due to the presence of a pubic symphysis of reduced size (3 cm) (Fig. 109).

Figure 109. Pelvis of an unidentified animal, identified by the small pubic symphysis. Source: Author.

4.2. Results of the museographic process

The museographic dimension of this research focuses on the development of a proposal for the dissemination and exhibition of the findings at the *Museo Archeologico Nazionale di Ferrara*, complementing the results obtained from the osteological laboratory analysis.

4.2.1. Burial goods

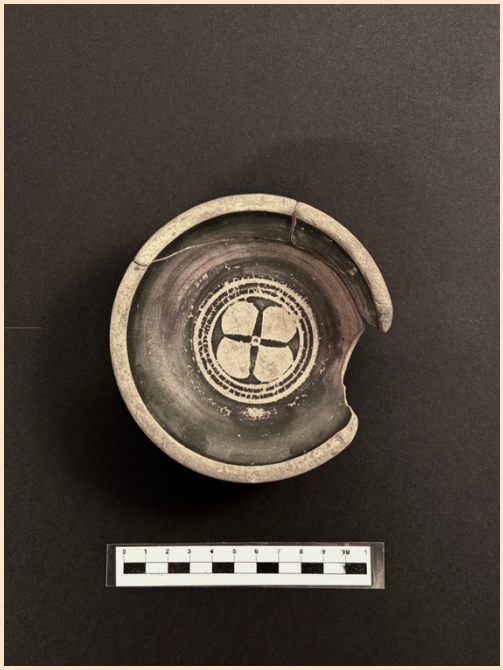
The third session of the project within the museographic space, conducted on March 27, 2025, marked a significant advance in the documentation and analysis of materials from the necropolis. This session initiated the direct and detailed inspection of objects associated with the burial, allowing for a deeper engagement with the archaeological assemblage. Thanks to the preliminary inventory provided by the former director of the *Museo Archeologico Nazionale di Ferrara*, Paola Desantis, it was possible to accurately identify the elements available for study and potential inclusion in the exhibition. The existence of this inventory greatly facilitated the cataloguing and organization of the materials.

Photographic documentation was carried out in a controlled space, inaccessible to the public, ensuring the capture of clear and high-quality images. The assemblage of available objects, consisting of 41 pieces—not all present for photography—was documented from two complementary perspectives (top view and side view), allowing for a detailed typological analysis and adding aesthetic value for future museographic presentation. The use of the same equipment for photographing both human remains and ceramics ensured uniformity in visual documentation. It is worth noting that careful handling of the objects, with nitrile gloves and under strict preventive conservation conditions, safeguarded the preservation of the heritage throughout the process. Below is the complete list of identified objects, along with their inventory numbers and the images (27 in total) taken during these sessions. This visual and descriptive documentation will be essential for the development of the exhibition design (Tab. 26):

OBJECT	SERIES NUMBER	IMAGE (Taken by the author)
AES RUDE		
ALABASTRON AND BASE OF ALABASTRON	11482 | 11483	
AMBER PENDANT WITH FEMALE HEAD	44877	

AMBER PENDANT WITH FEMALE HEAD	44878	
STIPPLED ASKOS	11466	
BASE OF A WOODEN JAR		

BLACK-GLAZE CUP	11475	
BLACK-GLAZE CUP	11476	

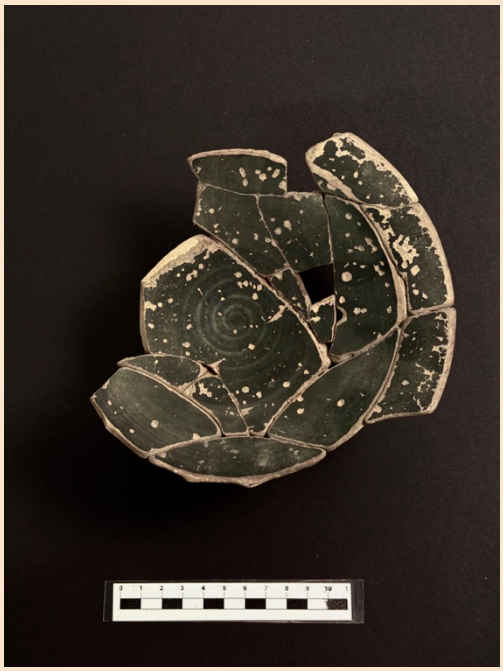
BLACK-GLAZE CUP WITH CENTRAL WHEEL DESIGN AND AMPHORA UNDER THE FOOT	11478	
BLACK-GLAZE CUP WITH CENTRAL WHEEL DESIGN AND AMPHORA UNDER THE FOOT	11480 (On piece 11479)	
BONE TUBE DECORATED WITH INCISED CIRCLES	44880	

BUST OF DEMETER	11465	
CYLINDRICAL WOODEN JAR		
CYLINDRICAL WOODEN JAR COARSE HIGH-FOOT PLATE WITH STAMPED EIGHT-PETAL PALMETTE AND GRAFFITO	11467	

COARSE PLATE	11468	
COARSE SMALL BOWL	11477	

COARSE SMALL PLATE DECORATED WITH BROWN BANDS AND STAMPED PALMETTES ON RIM	11469	
COLUMN-KRATER (KELEBE) WITH DIONYSIAC SCENE	11484	

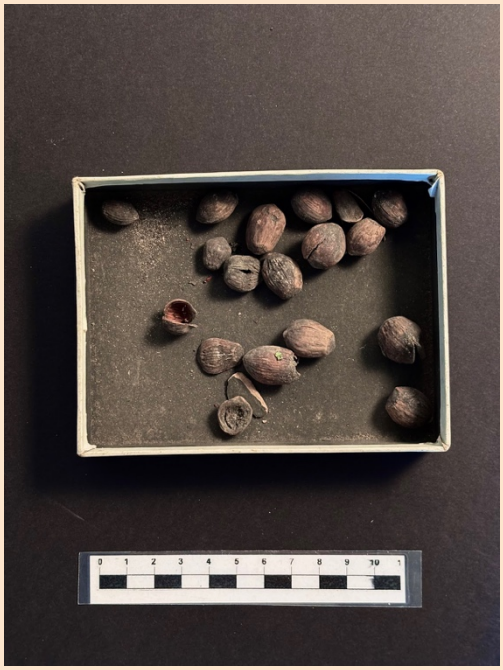
FOUR AMBER PENDANTS OF VARIOUS SHAPES	44879	
FOUR ROUNDED GLASS-PASTE BEADS	44879	
GLASS-PASTE OINOCHOE	11481	

GOLD EARRING WITH LION PROTOME	44909	
HIGH-FOOT BLACK-GLAZE PLATE WITH LEAF RIM AND GRAFFITO DECORATION	11470	

KANTHAROS (ST. VALENTIN)	11462	
LARGE BLACK-GLAZE BOWL	11471	

LARGE BLACK-GLAZE BOWL	11472	
LARGE BLACK-GLAZE BOWL	11473	

LARGE BLACK-GLAZE BOWL	11474	
PERFORATED BONE DISC	44881	
REMAINS OF WOODEN CRADLE DECORATED WITH PHYTOMORPHIC MOTIFS		
REMAINS OF WOODEN KLINE	11912 - 11996	
REMAINS OF WOODEN PLATFORM		
ROUND AMBER BEAD	44879	

SEVENTEEN SMALL NUTS		
SHAPED WOOD FRAGMENT		
SMALL BONE BUTTON	44882	
SMALL-COLUMN-SHAPED BOUNDARY MARKER CIPPUS		

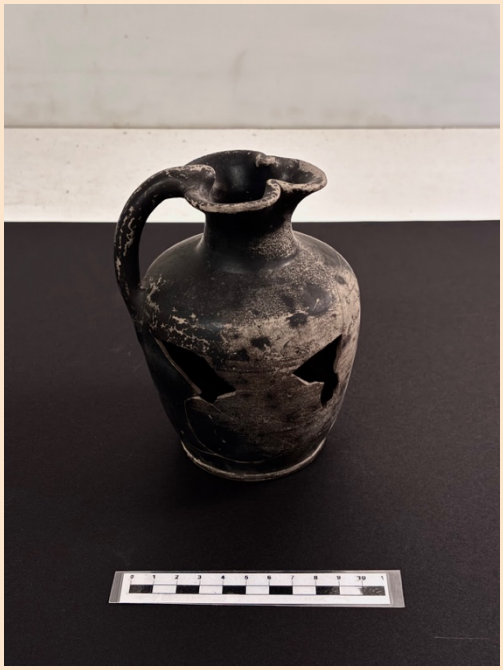
BLACK-GLAZE TREFOIL OINOCHOE	11463	
BLACK-GLAZE TREFOIL OINOCHOE	11464	
WOODEN JAR (DISSIDE) WITH INCISED LINE DECORATION		

Table 26. Material inventory of the individual V.P. t. 740 B.

4.2.2. The "Sala dell'Antropologia"

Once all the objects had been identified and photographed, the next step was to create the expected collection within the designated space: the *Sala dell'Antropologia*. With the results of the laboratory study and the selected objects of interest—that is, those to be included in the sample—the chosen room in the museum was virtually arranged to house each of these treasures. First, the layout of the space (7.25 × 4.35 m²) was analyzed, starting with circulation areas, display cases, and panels. In this case, the room complies with the *P.E.B.A.* regulations, providing wide passage areas both inside and outside the room (Fig. 110). Specifically, the room is accessed via the main corridor of the piano nobile, which connects to the ground floor, and through Room III, another spacious exhibition area. In addition, a wide corridor of at least 90 centimeters runs through the room, forming an area without slopes or inclines and allowing free movement for entry and exit (Fig. 111).

Figures 110. Actual reconstruction of the entrance to the Anthropology Room.

Figure 111. Complete room from an aerial view.

The arrangement of the display cases was important to create these circulation areas. In total, five display cases were installed:

- A display case for the human remains.
- Two circular display cases for ceramic and glass vessels (11462 and 11481) (Fig. 112).
- A square display case, with a high glass front and placed in front of the human remains case, for the *kelebe* (11484), the three bowls (11468, 11467, and 11474), and the piece shaped like a female head in amber (44877) (Fig. 113).
- A display case elevated in the air, supported by a metal frame, housing one of the gold earrings (44909).

Dark-toned display cases and supports were chosen, with equally darkened glass—which, if applied in reality, would include light-filtering and blocking properties, including UV filters, allowing a clear view of the objects without direct exposure to light (Fig. 114). This decision responded to both aesthetic and conservation criteria, seeking a balance between museographic

presentation and the protection of the material. Among all types of display cases suitable for these kinds of remains, internal-filtering cases were chosen, as this autonomous and compact system allows installation without adding external machinery, which is especially important given the limited space of the project.

Figure 112. Circular showcase with *kantharoi* (11462).

Figure 113. Showcase with, from left to right: the three bowls (11468, 11467, and 11474), the *kelebe* (11484), and the amber piece in the shape of a female head (44877).

Figure 114. Showcase with the human remains from a ground-level perspective.

Figure 115. Close-up view of the *kelebe* and the amber necklace.

Figure 116. Decorative image in a frame of the female head in amber, included in the necklace.

The inclusion of tactile and sensory resources was also chosen to enhance the museum experience for visitors with different abilities. To complement the interactive experience, a touchscreen was installed, allowing visitors to explore additional details of the tomb, such as closer observation of the bones and other objects of interest, thereby reinforcing the educational and sensory dimension of the exhibition (Fig. 117).

Figure 117. Touchscreen allowing visitors to explore additional details of the tomb.

Based on the official Italian regulations governing accessibility in public spaces—particularly *Decreto Ministeriale* 236/1989 and the recommendations contained in the *Linee guida ANCI-ISS*—informational panels were chosen in neutral tones (greyish), like those in other rooms of the museum, and using a Sans Serif typeface (both in Italian and English). This typeface is applied both to the main information about the tomb and to the serial numbers of the objects. The only texts that do not follow these regulations are the ones introducing the name of the room and of the exhibition (*Vita e Morte a Spina*).

Alongside all the main information, specifically that concerning the tomb, there is an AI-generated photo of an Etruscan woman of the same age as the exposed remains, wearing gold earrings like those of the virtual exhibit (Fig. 118). The sign provides information about:

> The exposed skeleton (V.P. t. 740 B) comes from the necropolis of Spina, in the area of Valle Pega, and belonged to a woman who lived between the 6th and 3rd centuries BCE. She died between the ages of 35 and 40, and the burial yielded 39 skeletal remains, which show some dental pathologies, such as cavities, while the cause of death remains unknown. The funerary goods, including precious ceramics and gold earrings, among other things, highlight her belonging to the wealthy classes of the Etruscan city.

Figure 118. AI-generated image of an Etruscan woman of the same age as the exposed remains, wearing gold earrings similar to those in the virtual display.

As indicated by the regulations, all panels are placed at a height of approximately 150 cm from the floor, or slightly lower (such as the case of the tomb itself, bringing it closer to a more realistic, eye-level perspective). The decree also recommends the inclusion of universal accessibility symbols accompanied by Braille and tactile typography to ensure independent orientation for visually impaired visitors. Therefore, a metal panel in Braille was also installed, containing all the information from the panel located above the tomb (Fig. 120).

Figure 119. Aerial view of the touchscreen next to the main burial information.

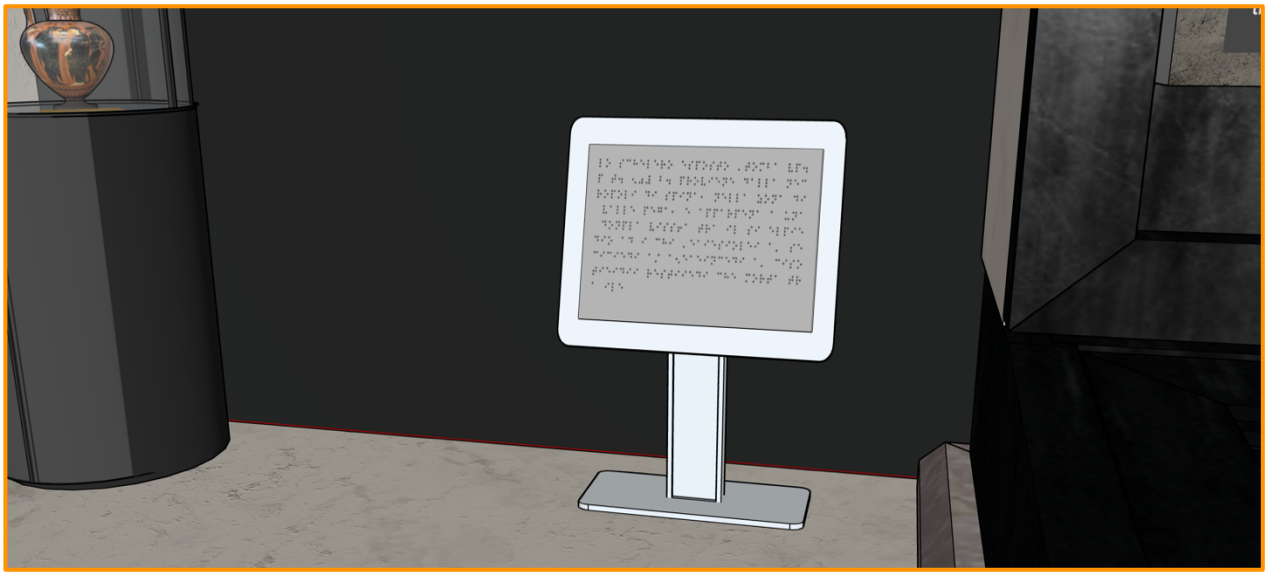


Figure 120. Braille panel located next to the burial.

The exhibition requirements of a paleoanthropological nature were also analysed, considering the preservation of the remains. For this reason, airtight doors were implemented, which can be opened using a button (Fig. 121), ensuring the maintenance of a constant and appropriate temperature within the room, set between 15 and 25 degrees, thus fulfilling optimal conservation criteria for the displayed objects. Following the *Environmental Guidelines ICOM-CC* and *IIC Declaration* of 2014, and regarding environmental control, the recommendations established by the Bizot Protocol were also followed to maintain relative humidity within a range of 45% to 55%, with maximum fluctuations of ±5% over a 24-hour period, and a stable temperature, allowing variations of up to ±4 °C. If applied in practice, more flexible or sustainable conservation criteria could be considered, expanding the ranges to 16 °C – 25 °C and 40% – 60% RH. Finally, a datalogger would be installed in the room, as advised by the CCAHA.

Figure 121. Hermetic doors opened via a button or switch.

At the same time, when redesigning the entrance doors, Doric columns were incorporated (Fig. 122) to give the entrance a more classical appearance, in keeping with the monumentality of the central skeleton.

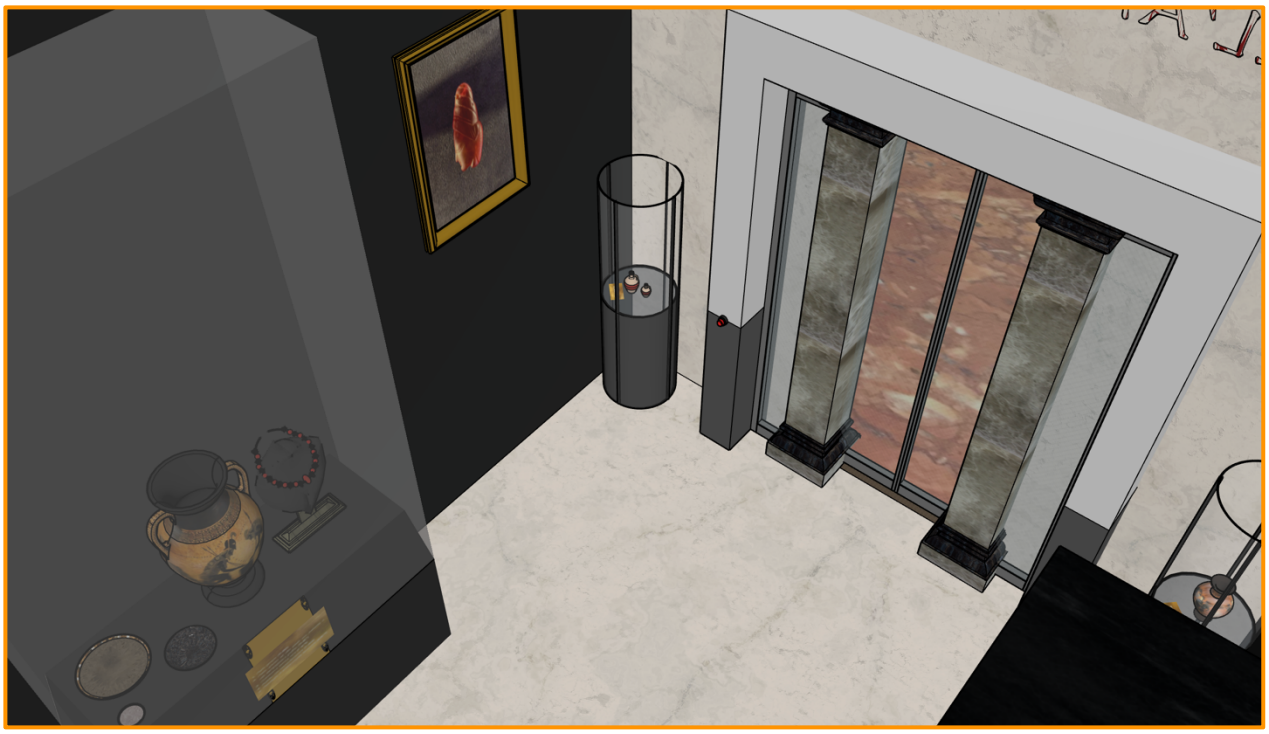


Figure 122. Doric columns placed on both access doors.

As mentioned previously, the only measure that was not applied virtually was lighting, but in the development of a real project, it would be a topic of great importance. The regulations of the *Ente Italiano di Normazione* (*UNI*), applied to museums and conservation spaces in general, would be followed, adopting *CEN/TS* 16163:2014, which establishes that light levels for sensitive objects and artifacts (such as textiles or human remains) should not exceed 100 lux, ideally remaining at 50 lux, as these materials are very delicate. The form and direction of the lighting would be arranged through the implementation of spotlighting, which provides focused light—giving importance to each of the displayed remains, as they are few—to highlight specific elements. In this case, it is proposed to maintain an angle of 35° to 45°, limiting the luminance ratio between the object and the background.

Finally, the adopted radiation levels would range between 0 and 10 µW/lm using appropriate filters or lighting systems—for example, using LEDs, a very easy measure to implement. This is important because radiation degrades the collagen in bones (Fig. 123), and it would therefore be best to avoid it.

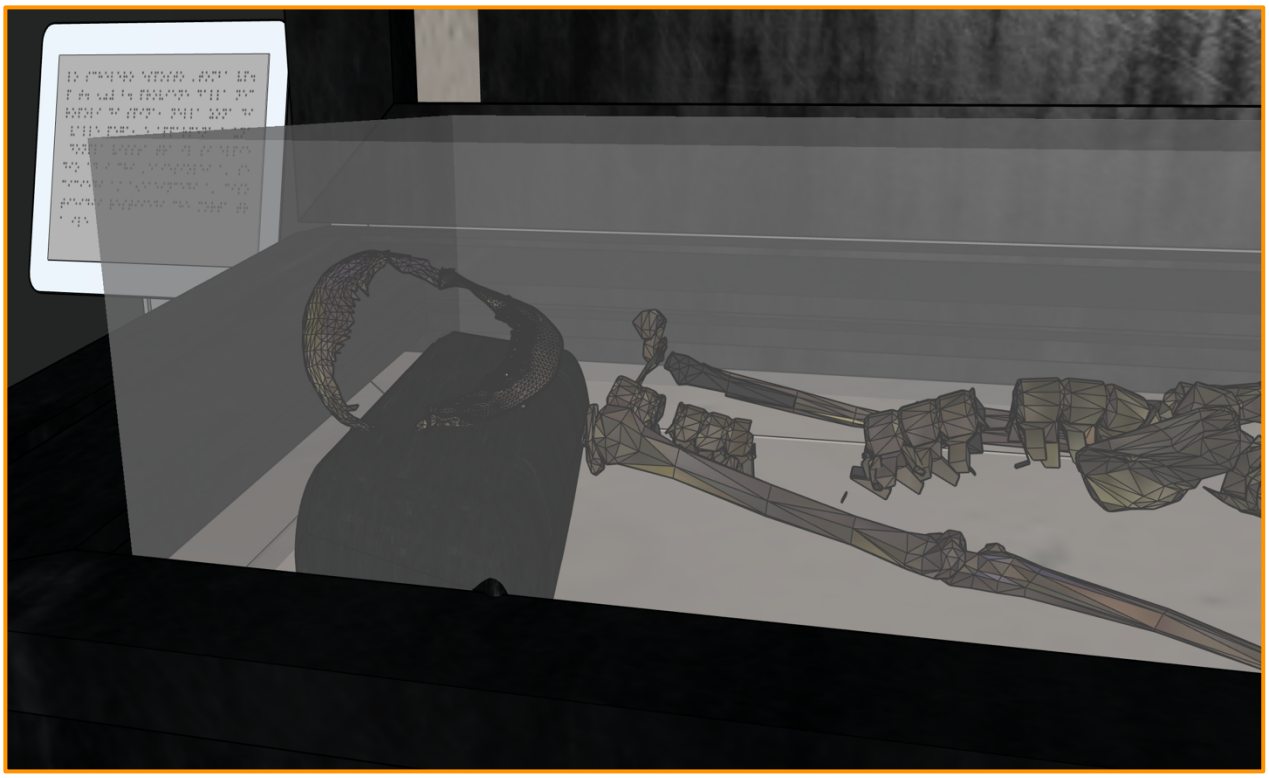


Figure 123. Human remains in the showcase.

Figure 124. *Sala dell'Antropologia*.

4.3. Application of anthropological and museographic resources

This study has allowed the integration of two main aspects: the anthropological analysis of individual V.P. t. 740 B from the Spina necropolis and the museographic proposal for its potential display at the *Museo Archeologico Nazionale di Ferrara*. Although distinct, both aspects converge on a single objective: to value human remains not only as objects of study but also as vehicles of memory and cultural mediation.

From an anthropological perspective, the results confirm that the individual was female, in young-to-mature adulthood, with a stature consistent with other Etruscan contexts in the Po Valley. These estimates align with previous references in the bioanthropological literature, which supports the reliability of the methods applied despite the fragmentation of the remains. However, the identification of common dental pathologies and taphonomic signs raises broader interpretative questions. In particular, the presence of penetrating caries and dental calculus suggests specific dietary patterns and limited hygiene practices, a hypothesis consistent with observations in other high-status Etruscan populations. Nevertheless, the absence of additional analyses—such as paleogenetic studies—prevents these inferences from being conclusively confirmed.

From a museographic perspective, the proposal to create a *Sala dell'Antropologia* offers a novel approach to the museum's exhibition narrative. Although the institution already houses exceptional materials from Spina, the absence of visible human remains highlights a gap in the historical storytelling. The integration of skeletal remains would provide a greater human dimension to the collection while also opening a debate on the ethics of displaying human bodies in public spaces. At this point, the project aligns with recent discussions in museology, which call for greater transparency in the management of human remains and a cultural mediation strategy that avoids both concealment and spectacle. In fact, one of the main contributions of this work lies in the way bioanthropological results have been incorporated into a museographic proposal. The characterization of the individual (sex, age, stature, pathologies, taphonomy) is not conceived here as an end in itself but as a narrative foundation to construct an exhibition discourse understandable to the public. The *Sala dell'Antropologia* proposal transforms technical data into cultural mediation tools—informative panels, digital reconstructions, participatory workshops—that allow visitors to engage with the scientific results in an educational way.

In this way, the combined use of anthropological and museographic resources creates a bridge between academic research and cultural experience. While anthropology provides methodological rigor and reliable data, museography translates these results into a visual, interactive, and accessible language. The joint application of both fields demonstrates that the exhibition of human remains can be conducted in a respectful, pedagogical, and socially meaningful manner, avoiding sensationalism and promoting a process of cultural appropriation by the local community.
On the other hand, as mentioned earlier, the limitations of this study affect the strength of some interpretations. The short duration of the on-site work in Ferrara restricted the possibility of developing a fully theoretical framework, due to the lack of funding and the structural limitations of the museum. Furthermore, working on a single individual reduces the statistical scope and requires caution when extrapolating results to the entire Spina population.

Despite these limitations, the project opens promising lines of research. In the bioanthropological field, future studies could apply molecular and comparative methodologies to complement traditional morphological analysis. In the museographic sphere, the virtualization of the project provides a transferable model for other European museums facing similar space or resource challenges, and its potential physical implementation would strengthen the museum's role as an active agent in the construction of collective identities. Additionally, the proposal encourages interdisciplinary dialogue between archaeology, anthropology, and museology, which is essential for addressing the challenges of heritage management in the 21st century.

CONCLUSION

5. CONCLUSION

The analysis of individual V.P. t. 740 B and the proposal for its integration into the *Museo Archeologico Nazionale di Ferrara* have shown how archaeological research can go beyond the academic sphere to become a cultural and social resource. On one hand, the anthropological study has provided reliable data on the biological profile of the woman buried in Spina—female sex, young-to-mature adulthood, average stature, and a set of dental pathologies—information that adds to the existing knowledge base on Etruscan populations in the Po Valley. On the other hand, the museographic proposal has highlighted that human remains, when treated respectfully and accompanied by cultural mediation tools, can serve as a bridge between science, memory, and collective identity.

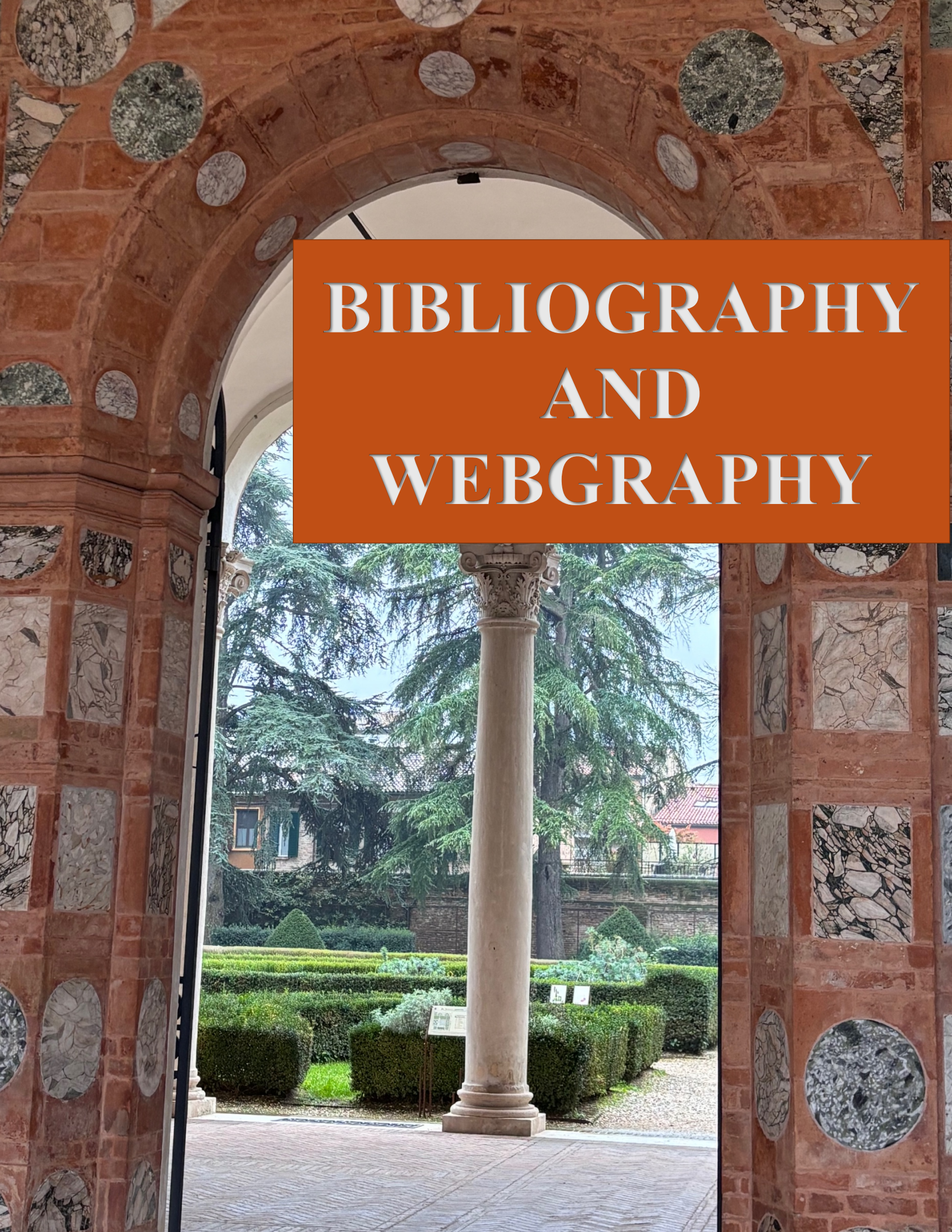
This work, in addition to addressing the initial objectives, emphasizes the importance of interdisciplinarity. Anthropology provides data and scientific methodology, while museography transforms them into a narrative that is understandable and accessible, able to engage the public and raise new questions. In this way, the project not only contributes to the academic field but also opens innovative possibilities for contemporary heritage management.
Moreover, the limitations encountered—short research time in Ferrara, lack of financial resources, and the impossibility of physically implementing the exhibition—should not be read solely as obstacles, but as a driving force to explore alternative approaches. The virtualization of the project, far from being a compromise solution, demonstrates the potential of digital tools in heritage dissemination and lays the groundwork for future applications in other European museographic contexts. The results of this study should not be interpreted as final conclusions but as a starting point. The integration of human remains into the museum narrative represents both a methodological challenge and a unique opportunity to rethink the role of museums: from containers of objects to spaces for reflection on life, death, and shared memory.

Finally, this thesis also represents a personal journey. It is not limited to data collection or the development of a museographic proposal: it has been an experience of learning, dialogue with the city of Ferrara, and academic and personal growth. Individual V.P. t. 740 B thus becomes a symbol of continuity between those who lived centuries ago and those of us today who continue to question

our origins. Concluding this work means closing one stage, but also opening new ones, with the certainty that the past continues to speak to us and that archaeology, beyond the discipline itself, is a way to connect with what makes us deeply human.

Figure 125. Complete skeleton of individual V.P. t. 740 B.
Source: Author.

APPENDIX



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