Biological histories of an elite: Skeletons from the Royal Chapel of Lugo Cathedral (NW Spain)

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Abstract
This study aims to reconstruct the biological histories of the people buried at the Royal Chapel of Lugo Cathedral, an important religious center of NW Spain, by using anthropological, geochemical, and historical perspectives. We conducted a macroscopic and radiographic study on 955 skeletal elements, a multi-isotope (δ13Ccoll, δ15N, δ34Scol, δ13Cap, δ18Oap) analysis of human (n = 12) and animal (n = 4) samples, and the study of 1407 documents from the cathedral archives. There was a minimum of 15 individuals, including six subadults (<7 years), seven mature males, and one possible female. Several traumatic healed injuries, a pelvis osteochondroma, and a case of DISH have been detected. Males were enriched in 15N (up to 15.7‰, Δhuman-animal avg = 5.1‰) suggesting consumption of animal protein including freshwater fish. Cathedral documents reflect fora payments in the form of rye, eggs, poultry, sheep, pigs, and eels as well as the hiring of two physicians. All individuals, except one, lived between the 14th and the early 15th centuries and show characteristics of high standard of living. Males were likely members of the cathedral—chaplains, administrators, sacristans, but not bishops—or noblemen relatives of the former according to preserved documents. Isotopic and paleopathological study suggest that they had an active and traveling life and at least one of them had connections with Central Spain. Children were local and possibly connected to the nobility. Lugo Cathedral is a prime example about the possibilities of transdisciplinary research in the identification of lifestyle in past populations.

KEYWORDS
apatite, cathedral documents, clergyman, collagen, DISH

1 | INTRODUCTION

The study of human remains from an osteological or anthropological perspective greatly advanced our knowledge of past societies. The main focuses of research include studies such as morphological studies, to approach the biological profile or the analysis of paleopathology as a proxy of paleo-health. Even for periods when written sources are available, human remains produce new data that can highlight issues usually not included in the chronicles, for example, the everyday life of children or women. Osteological studies have come a long way to reconstruct past lifestyle (e.g., Larsen, 2002; López-Costas, Müldner, & Cortizas, 2015). They have progressively moved from the more anecdotal case studies to seeking a comprehensive understanding of populations and societies. Combined works, including studies of bioarchaeology/paleopathology and chemical composition of bone, have begun to appear to unravel diet and mobility...
on the population level (see, e.g., Curto et al., 2019; López-Costas & Alexander, 2019; Richards & Montgomery, 2012). The endeavor of the combined studies, however, often turned out to be more complex than previously believed because integration is not always easy. It is a great challenge to unify all the data generated by the different methods in order to avoid the mere juxtaposition of results. Paleodiet, as a paradigm of bone chemical analyses, is just starting to meet paleopathology (Katzenberg & Lovell, 1999; López-Costas, Mühldner, & Grandal d'Anglade, 2015; Richards & Montgomery, 2012).

Today, there is a new border to cross, namely, the true integration of historical sources. Studies of human remains and archaeological/anthropological findings usually consider historical or archeological literature in their discussion, but with more or less enthusiasm (see for recommendations in López-Costas & Alexander, 2019), just as historical studies only use anthropological or isotopic data to illustrate what is interpreted from the documents (Andrade Cernadas, 2006; Harper, 2017). When concerning a specific site, both types of data can often be found together in books, but normally with low integration among them, i.e. with few exceptions, osteological studies are just appendices (Patrick, 2014). We believe that historical data should be included as part of the results of a necropolis study and not only in the discussion. In this study, we aim to treat historical documents at the same level as other information directly obtained from skeletal remains. Our particular study concerns a period, when documents are especially important, the Late Middle Ages.

During Medieval and post-Medieval times, religious institutions ruled the cultural life in both Christian and Islamic European societies. Religious people were also deeply involved in the economic and social history. Human remains from convents and cathedrals, being important osteological and anthropological records, are also predominantly used in studies to address differences between ecclesiastical and lay people (e.g., DeWitte et al., 2013; Mays, 1997; Mühldner & Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014), diseases (e.g., Judd, 2020; Richards, 2007; Quintelier et al., 2014). In the case of Christian Iberian societies, the nature of monastic institutions underwent significant change from the monasteries of the early Middle Ages, often founded by prominent families, and the rich Cathedrals built during the Gothic period. The 14th century was transformative here. Known as the Medieval Crisis, this century saw severe famines and the Black Death. Intermittent poor weather in the first half of the century was followed by more general climate deterioration registered from AD 1350 onwards, known as the Little Ice Age (Oliva et al., 2018), causing crop failure and famines. Child mortality was high (Arroñada, 2002a, 2002b). Violence increased with different episodes, such as the civil war in the Castilian kingdom (1351–1369) or various assaults to Jewish quarters. Cities and village councils that had increased their independence during the rich 13th century (López-Costas & Mühldner, 2019) were in constant fights with the lay and ecclesiastic nobility, with royalty supporting one or the other (Arquero Caballero, 2016; Lacreu, 1998). Nobility reacted to the loss of wealth and power with excessive taxes and new fora (i.e., contractual agrarian documents) leveled on the peasantry (Lacreu, 1998), which in turn led to a series of social conflicts that characterized the 15th century and markedly transformed the way of life of the Castilian and Galician people (Cazón, 2006). Another result of the crisis was that records and accounts kept by monasteries and cathedrals became increasingly detailed and abundant in the Iberian Peninsula (e.g., Portela Silva, 2005, 2007a, 2007b; Risco, 1798). A large body of historic studies have analyzed these sources for reconstructing economic trends as well as the everyday life of monks, chaplains and noble people (e.g., Andrade Cernadas, 2005, 2006, 2009; Arquero Caballero, 2016; Arroñada, 2007; Risco, 1798).

In the history of the medieval kingdom of Castile, the city of Lugo in modern day Galicia (NW Spain) played an important role (Figure 1). Lugo had been a flourishing commercial center since Roman times. Its early evangelization led to the establishment of a Diocese and a small Cathedral from at least the 8th century AD. The Bishopric exercised here a strict control over the village along all the Middle Ages. The fact that Lugo bishops had close connections to the Castilian Crown during Late Medieval times allowed them to maintain this empowerment over the inhabitants (Arquero Caballero, 2016). The Cathedral was rebuilt between AD 1129 and 1273 in Romanesque style and a number of new side chapels were added in the Late Medieval period. The bishop, Pedro López de Aguilar (1315–1400; bishop from 1349 to 1390), acted as patron for the construction of the Royal Chapel in the North side at the end of the 14th century, 1379–1381 (Agrelo, 2001; Porto, 1993). A Royal Chapel was advocated to the Castilian Crown, but as far as we know, it was never used to bury members of the royal family. In 1611, the Royal Chapel was connected to the San Froilán Chapel on its west side, creating a larger chapel called Capela do Pilar, that today can be found as part of the Cathedral (Cazón, 2006; Piñeyro Pérez, 1992). In 2007 Archeological works made on Capela do Pilar discovered several tombs with skeletal remains in them (excavated by the main author of this work) (Álvarez Meraio, 2007) that will, through the analysis of skeletal remains, provide an excellent opportunity to better understand the everyday life of the rich diocese, that controlled the economy of NW Spain during the Late Middle Ages.

This study combines (1) osteoarcheological analyses, including paleopathology, to approach the biological profile and health status, (2) stable isotopes analysis, to approach diet and mobility, and (3) analysis of the Cathedral historical documents to approach the characteristics of the individuals and their quality of life; all together will be combined to obtain the biological histories of the people buried in the Capela do Pilar chapel. We will try to better understand who these people were, how they lived, how their diet was, and where they came from by integrating different analytical perspectives.

## 2 MATERIAL AND METHODS

### 2.1 Archeological background

A total of 955 bone pieces were discovered inside the Capela do Pilar chapel during the 2007 archeological survey (Álvarez Meraio, 2007) originating from 15 individuals (see Table 1). The archeological works...
uncovered seven tombs in which the bones were found with and without anatomical connection (Table 1). Nonarticulated individuals were easily identified and individualized according to sex and age criteria (see Table 1). The oldest inhumation, T10B (980–1150 cal AD (2σ)), was placed on the North side of the chapel; it was a simple earthen burial with a single skeleton in a supine position. The other skeletons were found in slate slab burials (T10B, T11A, T11B, T12, and T13). All anatomically intact skeletons and tombs were placed in a West–East direction, except for burial T11A that was placed North–South. T11A was the most recent inhumation and contained two skeletons. Burial T14 was an anthropomorphic stone burial. According to the archeological excavation, it was suggested that T10B may belong to an earlier burial phase that took place before the construction of the chapels in the 14th century (Álvarez Meraio, 2007); this means in the cemetery surrounding the cathedral (i.e., outside the temple). According to the stratigraphy and the orientation, the other burials date to, approximately, when the chapel Capela dos Reis was constructed, in the late 14th century. The change in orientation in T11A was probably connected with an early 15th century altar on the South area, facing it (Cazón, 2006; Piñeyro Pérez, 1992).

2.2 | Radiocarbon dating

Two human bones were radiocarbon dated by accelerator mass spectrometry at the SUERC Radiocarbon Laboratory. The bones that were dated were selected from reliable archeological contexts, skeleton CP-703 (995 ± 30BP; lab-code SUERC-27371/GU-20681) from burial T10B, and CP-701 (665 ± 30; lab-code SUERC-27372/GU-20682) from burial T11A; probably the oldest and the most recent burials, respectively. The calibrated (Intcal13 though Oxcal) ages from in CP-703, and from 1270 to 1400 cal AD (2σ), in CP-701. This was interpreted that the earlier phase of skeletons outside the cathedral happened around the 11th century, and the burials at Capela do Pilar finished as latter as early 15th century AD. Thus, radiocarbon dating agrees with historical and archeological records in the dates of the burials. Approximate dating of the skeletal remains can be seen in Table 1.

2.3 | Osteological and paleopathological study

No associated grave goods were found in the burials or with the skeletons. A complete osteological and paleopathological study was performed. It included the minimum number of individuals (NMI) of each burial, sex and age estimation, study of pathological and taphonomic markers. Preservation index, markers for sex and age estimation, and pathological lesions were recorded using the international standards suitable for Spanish populations (see Marquez-Grant et al., 2011). Number of bones preserved was evaluated by the conservation index (IC) (Campillo, 2001) IC = no. bones/200, and preservation index for long bones (IP1) (Safont, 2003) IP1 = no.
**Table 1** Burial typology and skeletal features of the human remains found during the archeological works inside the chapel Capela do Pilar from Lugo Cathedral

| Burial area | Sample code | Funerary deposit | Dating AD | Or | Sex | Age | CI | IP1 | Stature (cm) | OA | Main pathological features |
|-------------|-------------|------------------|-----------|----|-----|-----|----|-----|--------------|----|---------------------------|
| T10         | CP-703      | 1st supine       | 10-12th   | W/E| M   | 45-50| 54 | 67  | 170          | Moderate | Ankylosis C2-C3, cyst in T5, emerging DISH, rib fracture |
| T10A        | CP-712      | 2nd supine       | 14th      | F? | Adult| 3   | 17 |    |              | -            |                           |
| T10A        | CP-714      | 2nd supine       | 14th      | In | 4-7 | 1   | 8  |    |              | -            |                           |
| T11         | CP-704      | 1st supine       | 14th      | W/E| M   | 40-45| 69 | 100 | 163          | Moderate | 5 fractures: right maxilla, 2 ribs, T6 vertebra, 1 phalange |
| T11A        | CP-701      | 1st supine       | 15th      | N/S| M   | 50-55| 74 | 100 | 166          | Moderate | Possible DISH, 3 button osteoma |
| T11A        | CP-702      | 1st supine       | 15th      | N/S| M   | 45-50| 62 | 100 | 170          | Moderate | Rugosity and bone change at the conoid tubercle |
| T11A        | CP-705      | 2nd supine       | 14th      | M  | 40-45| 43  | 83 | 173 |              | Low         | Fracture in right zygomatic bone |
| T11A        | CP-706      | 2nd supine       | 14th      | M  | 30-35| 42  | 83 | 167 |              | Low         | Subperiosteal hematoma frontal bone, osteochondritis, osteochondroma right ilium |
| T11A        | CP-707      | 2nd supine       | 14th      | M  | 45-50| 28  | 75 | 164 |              | Low         | Necrosis in a foot phalange, periostitis in femurs, tibiae and fibulas |
| T11A        | CP-713      | ?                | In        | 0.5-1 | 2 | 17 |    |    |              | -            |                           |
| T12         | CP-710      | 1st supine       | 14th      | W/E| In | 3-4 | 5  | 42  |              | -            |                           |
| T12         | CP-711      | 2nd supine       | 14th      | In | 2-3 | 16 | 67 |    |              | -            |                           |
| T13         | CP-708      | 1st supine       | 14th      | In | 6-8 | 47 | 100 |    |              | -            | C2-C3 fusion, periostitis in ribs, greenstick fracture rib |
| T13         | CP-709      | 2nd supine       | 14th      | W/E| In | 5-6 | 27 | 92  |              | -            |                           |
| T14         | CP-715      | ?                | In        | Adult? | 16 | 25 |    |    |              | -            |                           |

*Note: Anthropological and archeological data were extracted from López Costas thesis (López-Costas, 2012). Key: M = male; F = female. In = indeterminate. 1st primary deposit, 2nd secondary deposit. Or orientation. Age expressed in years-old. CI conservation index, IP preservation index. Sin sinusitis. Vertebrae: C cervical T thoracic.*
preserved long bones/12, where no. means the number of preserved bones per skeleton. The MNI was estimated using the recommendations by Roberts (2009, p. 12). Sex was estimated through established international markers on the innominate and cranial bones (for a summary, see Buikstra & Ubelaker, 1994) and metric analyses of long bones (Aleman et al., 1997). International methods for innominate bone (auricular surface and pubic symphysis morphology), fourth rib, dental wear, and cranial suture closure were used to estimate age in adults and dental development and epiphyseal fusion in subadults (for a summary see Buikstra & Ubelaker, 1994). Subadult age was assessed using dental development and eruption (Ubelaker, 1989) and the Iberian standards for growth and maturity of postcranial bones (e.g., López-Costas et al., 2012). Stature was estimated by maximum length of humerus and femur, and length in position of the femur (Mendonça, 2000). Pathological features were evaluated macroscopically and by X-ray analysis when needed, recording the presence, appearance and distribution of abnormal bone formation and destruction in each element and compared with international reference books (Aufderheide & Rodríguez-Martín, 1998; Ortner, 2003).

2.4 | Isotopic study

The isotopic study was performed on 16 skeletal samples (see Table 2) of which four were from the local fauna. The faunal remains were found inside the burials and probably belonged to midden deposits. Twelve human bone samples were analyzed in agreement with the NMI; individuals CP-13 and CP-14 were not included due to their low LC indices—there were very few skeletal parts available, so for ethics reasons, we decided not to sample them. Collagen was extracted following the method described by Longin (1971) with modifications recommended by Collins and Galley (1998), at the Department of Archaeology at the University of Reading (UK). Carbon and nitrogen stable isotope ratios were measured in duplicate on a Europa 20-20 isotope ratio mass spectrometer coupled to a Sercon elemental analyzer. Ultrapure collagen samples were analyzed for sulfur stable isotope ratios with a Finnigan Delta Plus connected to a CarloErba NC2500 elemental analyzer through a ConfloII at the Stable Isotope Laboratory in the Department for Geological Sciences, Stockholm University. Bioapatite was extracted in a fine-milled fraction in EcoPast research group’s clean-lab at Universidade de Santiago de Compostela, following the pretreatment procedure developed by Garvie-Lok et al. (2004). Here, 200 mg of fined milled bone obtained using a hand-held drill were placed in falcon tubes; 10 ml of 2.5%–3% aqueous sodium hypochlorite was added per sample. Samples were maintained at room temperature and shaken for 8 h. After this, they were centrifuged, and the hypochlorite changed four times after every 8 h. The samples were then rinsed five times with distilled water to completely remove the sodium hypochlorite; 10 ml of 0.1 mg of acetic acid was then added, and the samples left for 4 h at room temperature before the acetic acid was removed, and the samples were rinsed five times again. Samples were then frozen and freeze dried to remove any remaining liquid. The quality of bioapatite as well as absence of organic material was tested using FTIR-ATR (Agilent Cary 630 FTIR Spectrometer)—this means that there were no absorption bands that correspond with Amide I, I, II, A, and B in the samples (see Cortizas & López-Costas, 2020; Prieto Gómez, 2018). Carbon and oxygen isotope ratios in bioapatite were measured at Iso-Analytic Inc by adding phosphoric acid and measuring CO2 by continuous flow-isotope ratio mass spectrometry (CF-IRMS) coupled to a Europa Scientific 20-20 IRMS. Analytical error was estimated by repeated analyses of internal standards and was ±0.2‰ or less for all elements (1 SD). Following the procedure applied by Dury et al. (2019), δ18Oap was converted into carbonate, phosphate, and finally bulk precipitation water δ18O (δ18Ocvsmow, δ18Ovsmow, δ18Owater) (Chenery et al., 2012; Daux et al., 2008).

2.5 | Historical sources

The analysis of the 1407 primary historical documents was based on the transcriptions of the Cathedral fora and other documents (in medieval Latin and Galaico-Portuguese languages) under custody in the Cathedral of Lugo, which were published by Portela Silva (2005, 2007a, 2007b). They were mainly fora (i.e., contractual agrarian documents between the bishopric and private individuals/families for house or land renting) but also testaments or donations. Special attention was paid to appropriate use of words in the 14th–15th centuries, for example, físico meaning medical doctor in Galaico-Portuguese language from these centuries. We analyzed the documents searching for aspects in the financial management of the Cathedral that (1) could sketch the everyday life of the Lugo Cathedral people and could be connected to the analyzed skeletons, (2) could reveal who was buried inside Capela dos Reis/Rotal Chapel or the other chapels (e.g., through testaments and last wills), and (3) could help us to understand what was the general access to food items and health care that the members of the Cathedral paid for or obtained. Information about food items was complementary retrieved through the web of Galloëcias Monumenta Historica (http://gmh.consellodacultura.org). We have counted the number of documents where each food item was mentioned in both 14th (a total 894 documents) and 15th (a total 513 documents) century books of transcriptions – and used them as approximations of the availability of this food and its importance in bishopric agrarian renting (i.e., fora).

2.6 | Statistical analysis

Statistical analysis of the data was made using the program IBM SPSS Statistics v.24. Basic descriptive statistics were calculated for each group of samples and comparisons within groups were computed by Mann–Whitney U test.
| Sample code | Burial | Animal group | Sample area | Col yield | Ap yield | % C<sub>coll</sub> | % N<sub>coll</sub> | % S<sub>coll</sub> | % C<sub>ap</sub> | C/N | C/S | N/S | δ<sup>13</sup>C<sub>coll</sub> | δ<sup>15</sup>N | δ<sup>34</sup>S | δ<sup>13</sup>C<sub>ap</sub> | δ<sup>18</sup>O<sub>ap</sub> | Sex | Age group |
|-------------|--------|--------------|-------------|-----------|---------|----------------|----------------|----------------|----------------|-----|-----|-----|----------------|-------------|--------|----------------|----------------|-----|---------|
| CP-971      | T12    | Cattle       | Skull       | 1.2       | 29.0    | 40.9          | 14.4          | 5.5            | 3.3            | -22.06 | 6.97 | -12.7 | -4.3           | -12.7       | -11.7 | -4.3           | -12.7         | -4.3 | Adult   |
| CP-919      | T10A   | Pig          | Tooth       | 12.7      | 50.5    | 41.6          | 15.0          | 6.7            | 3.2            | 389   | 120 | -21.42 | 7.14          | 12.7 | -11.7 | 2.8            | -12.7         | -4.3 | Adult   |
| CP-920a     | T10A   | Caprine      | Humerus     | 4.8       | 38.9    | 14.1          | -            | 3.2            | 416   | 128 | -22.62 | 11.21        | -11.7 | 2.8            | -12.7         | -4.3 | Adult   |
| CP-920b     | T10A   | Caprine      | Humerus     | 11.4      | 38.9    | 14.0          | 0.2           | 3.2            | 416   | 128 | -20.80 | 7.76          | 12.7 | -11.7 | 2.8            | -4.3          | -4.3 | Adult   |
| CP-701      | T11A   | Human        | Rib         | 8.5       | 59.2    | 33.5          | 11.8          | 7.2            | 3.3            | -18.38 | 15.66 | -13.5 | -2.2           | -14.6       | -2.7   | M Old adult |
| CP-702      | T11A   | Human        | Rib         | 11.0      | 39.5    | 41.9          | 15.2          | 7.9            | 3.2            | 406   | 126 | -18.27 | 14.02        | 13.5 | -14.6 | -2.7           | -14.6         | -2.7 | M Mature adult |
| CP-703      | T10B   | Human        | Rib         | 12.1      | 36.6    | 42.3          | 15.1          | 8.9            | 3.3            | 403   | 124 | -19.40 | 12.87        | 13.8 | -14.9 | -4.1           | -14.9         | -2.7 | M Mature adult |
| CP-704      | T11B   | Human        | Rib         | 9.1       | 47.8    | 35.9          | 12.8          | 7.3            | 3.3            | -17.92 | 14.42 | -11.8 | -2.7           | -12.2       | -2.8   | M Young adult |
| CP-705      | T11A   | Human        | Femur       | 6.3       | 53.9    | 17.9          | 6.1           | 6.9            | 3.4            | -18.38 | 14.00 | -12.2 | -2.8           | -12.6       | -2.3   | M Mature adult |
| CP-706      | T11A   | Human        | Femur       | 9.8       | 50.2    | 41.9          | 15.1          | 6.4            | 3.2            | -18.15 | 14.67 | -12.6 | -2.3           | -12.6       | -2.3   | M Mature adult |
| CP-707      | T11A   | Human        | Fibula      | 8.0       | 55.5    | 30.8          | 10.9          | 6.8            | 3.3            | -18.90 | 12.40 | 12.9 | -4.8           | In          | Child  |
| CP-708      | T13    | Human        | Rib         | 19.5      | 42.0    | 41.4          | 15.2          | 7.4            | 3.2            | 378   | 119 | -18.90 | 12.40        | 12.9 | -13.8 | -4.8           | -4.8          | In   | Child  |
| CP-709      | T13    | Human        | Rib         | 9.4       | 43.3    | 42.5          | 15.4          | 6.6            | 3.2            | -18.92 | 12.63 | -13.9 | -4.5           | -13.9       | -4.5   | In Child |
| CP-710      | T12    | Human        | Femur       | 16.0      | 43.7    | 42.7          | 15.5          | 7.9            | 3.2            | 431   | 134 | -18.64 | 13.72        | 13.1 | -14.3 | -3.7           | -3.7          | In   | Child |
| CP-711      | T12    | Human        | Rib         | 15.1      | 57.0    | 43.4          | 15.9          | 7.0            | 3.2            | 421   | 132 | -19.11 | 12.14        | 14.3 | -13.3 | -3.5           | -3.5          | In   | Infant |
| CP-712      | T10A   | Human        | Skull       | 12.0      | 52.6    | 38.9          | 14.3          | 6.2            | 3.2            | 411   | 130 | -18.80 | 11.30        | 14.7 | -14.1 | -4.3           | -4.3          | F?   | In     |

Note: Age group classification was done following Buikstra and Ubelaker (1994) criteria. Anthropological and archeological data were extracted from López Costas thesis (López-Costas, 2012). Key: M = male; F = female. In = indeterminate. Empty cells indicate that the analyses failed or the remained bone/collagen sample was not enough to be processed.
3 | RESULTS

3.1 Anthropological and paleopathological findings

A total of 15 individuals were recovered at the chapel Capela do Pilar. Six of them were found in primary position in the burials T10, T11 (n = 3), T12, and T13. Another eight skeletons were found in secondary position and individualized (see Table 1). In addition, T14 was almost empty with the exception of five small bone pieces. Individuals CP-712, CP-713, and CP-704 had low IC and IP1 (see Table 1). The preservation of the skeletal pieces was moderately good in average, IC 34 ± 26 and IP1 66 ± 34. Secondary deposits showed lower preservation indices than primary depositions and subadult individuals (IP1 = 34 ± 35) slightly lower than adults (IP1 = 70 ± 35). Sex and age estimation indicate that all adult individuals were males older than 40 years, but CP-706 was likely in his 30s. The cranium of CP-712 has both male and female characteristics with a female predominance. The six subadults were younger than 7 years. Stature was estimated in seven male individuals obtaining an average of 168 ± 4 cm.

Regarding the main pathological features, osteoarthritis (OA) is present in almost all adult individuals and showing an expected relation with age (Table 1). In the analyzed adults, nearly all joints presented alteration in subchondral bone. Ankyloses in the form of bridges affect the right side of the thoracic (2nd to 11th) vertebral bodies (lateral and anterior view). The left innominate and right ulna have bone formation at joint margins (acetabulum) and the entheses [Colour figure can be viewed at wileyonlinelibrary.com]

There were no lesions compatible with specific infectious diseases in adults. However, CP-707 has active lamellar osteitis covering both lower limbs and lytic lesion in two foot-phalanges (distal area). These could be caused by a systemic unspecific infection, but the necrosis is compatible with erosive lesions observed in cases of gout (uric arthritis) (Fornaciari et al., 2009; Rothschild & Heathcote, 1995). Regarding subadults, only CP-708 shows paleopathological features (Figure 4). This child had a greenstick fracture on a rib with signs of healing and two ribs with active periostitis in their internal face; in addition, the axis and C3 vertebra were partially fused. The two first features can be related to a chronic infection of the lungs including bronchitis or tuberculosis; in the case of the
3.2 | Isotope analysis

All samples fulfilled the established quality criteria for well-preserved collagen for carbon, nitrogen, and sulfur ratios and bioapatite (according to Cortizas & López-Costas, 2020; Garvie-Lok et al., 2004; Nehlich 2015; Nehlich & Richards, 2009; Van Klinken, 1999). In addition to the standard quality indicators, pyrolysis GC/MS was used to assess the preservation of the extracted collagen in two samples showing no exogenous material (e.g., humic acids), published elsewhere (Kaal et al., 2016). Individual data and summary statistics are given in Table 2 and Figures 5–7.

Domestic faunal (cattle, pig, caprine) samples have averages of −21.7 ± 0.8‰ and 8.3 ± 2.0‰ for δ\textsuperscript{13}C\textsubscript{coll} and δ\textsuperscript{15}N, respectively, which is lower than those found in the humans (δ\textsuperscript{13}C\textsubscript{coll} and δ\textsuperscript{15}N, −18.6 ± 0.4‰, max −17.9‰, min −19.4‰; δ\textsuperscript{15}N 13.4 ± 1.2‰, max 15.7‰, min 13.3‰). The Δ\textsubscript{human-animal} (Δ\textsubscript{h-a}) is 5.1‰ for δ\textsuperscript{15}N, and 3.1‰ for δ\textsuperscript{13}C\textsubscript{coll}. The oldest individual in age-at-death (with DISH), CP-701, presents the highest δ\textsuperscript{15}N, while the possible female, CP-712, has the lowest (Figure 5). No significant differences were observed between adult and subadult humans (δ\textsuperscript{13}C\textsubscript{coll} U = 7.000, p = 0.13; δ\textsuperscript{15}N U = 6.000, p = 0.11); however, subadults tend to have lower δ\textsuperscript{13}C\textsubscript{coll} and δ\textsuperscript{15}N ratios, together with the possible female CP-712 and the males CP-703 and CP-704. The other males (CP-701, CP702, CP705, CP-706, CP-707) group together in higher δ\textsuperscript{13}C\textsubscript{coll} and δ\textsuperscript{15}N.

The two samples of domestic animals (caprine and pig) analyzed for δ\textsuperscript{34}S have slightly lower isotopic ratios (12.7‰) than the average of the four humans (13.7 ± 0.7‰) and the range of human variability (12.9–14.7‰). For bioapatite, the two animal samples have δ\textsuperscript{13}Cap (−12.7‰, −11.7‰) again lower than the human average (−13.7 ± 1.0‰) but in the range of its variability (max −11.8‰, min −15.1‰). The span of human δ\textsuperscript{13}Cap is moderately wide, 3.3‰, whereas that of δ\textsuperscript{34}S is small, 1.8‰. For δ\textsuperscript{13}Cap, three groups can be observed: one composed by the mature males CP-702, CP-703, and CP-704, whose values are lower than −14.5‰; another made by all subadults, the possible female CP-712 and the old male CP701, with intermediate values between −13‰ and −14.5‰; and another with the highest values over −13‰, the males found in secondary position in T11A: CP-705, CP706, and CP-707 (Figure 7). Regarding δ\textsuperscript{18}O\textsubscript{ap}, animal isotopic values (cattle: −4.3‰, pig: −2.8‰) are like human average (−3.6 ± 1.1‰; Max −2.2‰, min −5.6‰). The range for human δ\textsuperscript{18}O\textsubscript{ap} is moderately wide, 3.4‰ and correlates with
δ¹³C_{coll} (r = 0.86) and δ¹⁵N (r = 0.76) reflecting an underlying factor in common that may affect both (probably proximity to the coast). Humans are again divided into three groups: CP-704 is separated from the rest due to his low δ¹⁸O_{ap} (lower than −5‰); subadults, the possible female and the male CP-703 have values in between −3‰ and −5‰; males CP-701, CP702, CP-705, CP-706, and CP-707 show the highest isotopic ratios, over −3‰. Because of this group-based distribution, no significant differences were observed between adults and subadults (δ³⁴S U = 2.000, p = 0.4; δ¹³C_{ap} U = 16.00, p = 1.0; δ¹⁸O_{ap} U = 8.000, p = 0.21). Conversions of δ¹⁸O_{ap} to precipitation water δ¹⁸O_{swVSMOW} can be observed in Table 3. The ratios detected in all subadults, the female and the male CP-703 (e.g., CP-703 δ¹⁸O_{swVSMOW} = −6.2‰; see Table 3)—probably buried in a cemetery prior to the construction of the chapel—are similar to those observed for rainwater in the Lugo area (approximately −5.5‰ to 6‰) (Capilla et al., 2011; Hatvani et al., 2020). Values for CP-701, CP702, CP-705, CP-706, and CP-707, and the males found in T11A (−3‰ to −5.5‰), are closer to rainwater values from the coastal areas of southern Galicia and Portugal. Finally, a value lower than −8‰ as that of CP-704 can only be found in inland areas, that is, Central Spain (see Table 3).

### 3.3 Cathedral documents study

Regarding everyday life, we have found documents indicating violent episodes between the cathedral and the city council. Clear examples are a trial judging the bishop Don Xoán for killing two members of the
council after they threw stones at him in year 1345 (document 469; Portela Silva, 2007a) as well as the assassination of the bishop Don Lopo by a group of artisans (tailors, strap makers, and furriers) and traders in 1403 (document 902; Portela Silva, 2005). In addition, a document from year 1350 expresses the concern about the fora payment by housing renters due to the increase in empty houses by the high mortality related to the Black Death, indicating the convenience to cancel or postpone the debt (document 552; Portela Silva, 2007a). Also, the Lugo nobility aimed for being buried inside Cathedral. Noble women seems to have preferred other chapels near St. Mary altar or female-Saints. A testament of a noble woman, Urraca Pérez de Santalla, indicated that her body should be placed close to the altar of Santa Marina (document 194; Portela Silva, 2007a). The testament of the noble woman Maria Eanes also begged for her corpse to be moved close to Santa María inside the Cathedral in the year 1335 (document 326; Portela Silva, 2007a). The testament of the noble woman.

Most information about who and where people were buried in the cathedral can be found in documents related to testaments. Only one will was by a workman, the shoemaker Roi Dominguez, who commanded his body to be buried at the cemetery outside the cathedral close to the main door “where his father and other God believers were buried” (document 1151; Portela Silva, 2005). The other testaments are related to clerics or lay nobility. In the first case, Xoán Monso de Castro Alfonsin, clergyman of Lugo Cathedral chorus (i.e., part of the dioceses), asked in 1487 that his remains should be placed inside Lugo Cathedral close to the main doors and close to Roi López, a sacristan (document 1369; Portela Silva, 2005). In 1340, Vasco Fernández, who was the father of the Lugo priest, asked to be buried in the chapel where his father and grandfathers were (document 410; Portela Silva, 2007a). Two years later, the dean of the cathedral made a testament expressing his wish to rest at San Miguel chapel (document 430; Portela Silva, 2007a). Also, the Lugo nobility aimed for being buried inside the Cathedral. Noble women seems to have preferred other chapels near St. Mary altar or female-Saints. A testament of a noble woman, Urraca Pérez de Santalla, indicated that her body should be placed close to the altar of Santa Marina (document 194; Portela Silva, 2007a). The testament of the noble woman Maria Eanes also begged for her corpse to be moved close to Santa María inside the Cathedral in the year 1335 (document 326; Portela Silva, 2007a). However, monks from the near St. Francisco monastery agreed with the Cathedral canons in 1326 the right to be buried in tombs that were property of the Cathedral and possibly aside its church; note that the text indicates “[...]predictos frateres recipere sepulturas directe et specialiter pertinentes ad supradictam ecclesiam cathedralem sicut sepulturas[...].” and we translated “ad” as aside (document 218; Portela Silva, 2007a). No child is mentioned in the revised documents.

The payment of fora in terms of food is shown in Table 4. Payments in rye and barley are frequently mentioned. In 1401, a long sentence confirmed that vassals from 30 parishes must continue paying a certain amount of pigs, cockerels, young goats, rams, and eggs, as well as enough wood to the cathedral every year (document 896; Portela Silva, 2005). There is only one specific mention of fish; in 1353, a document confirms that members of three parishes close to the Miño river should still pay rye and more than 120 eels per year to the bishopric; the debt was inherited by their descendants (document 595; Portela Silva, 2007b). There is an interesting document signed in 1337 in which the physician called Mestre Xoán swears to help the members of the cathedral and their relatives through his treatments and medicines. Two years later, the bishop also commanded to contract another physician and grammarian, Mestre Martiño; according to the document, the main reasons were that he was local and the

| Site | Sample | δ18OapVPDB | δ18OapVSMOW | δ18OapVSMOW | δ18OapVSMOW |
|------|--------|-------------|-------------|-------------|-------------|
| Animals | CP 971 | -4.27 | 26.5 | 17.7 | -6.5 |
| Humans | CP 919 | -2.84 | 28.0 | 19.2 | -4.1 |
| CP 701 | -2.19 | 28.6 | 19.9 | -3.1 |
| CP 702 | -2.71 | 28.1 | 19.3 | -3.9 |
| CP 703 | -4.07 | 26.7 | 17.9 | -6.2 |
| CP 704 | -5.64 | 25.1 | 16.2 | -8.7 |
| CP 705 | -2.73 | 28.1 | 19.3 | -4.0 |
| CP 706 | -2.83 | 28.0 | 19.2 | -4.1 |
| CP 707 | -2.32 | 28.5 | 19.8 | -3.3 |
| CP 708 | -4.84 | 25.9 | 17.1 | -7.4 |
| CP 709 | -4.52 | 26.3 | 17.4 | -6.9 |
| CP 710 | -3.71 | 27.1 | 18.3 | -5.6 |
| CP 711 | -3.48 | 27.3 | 18.5 | -5.2 |
| CP 712 | -4.29 | 26.5 | 17.7 | -6.5 |
| Humans Avg | -3.6 | 27.2 | 18.4 | -5.4 |
| SD | 1.1 | 1.1 | 1.2 | 1.8 |
bishopric priests talked highly about “his science” (document 339; Portela Silva, 2007a).

4 | DISCUSSION

The three levels of information, anthropological, geochemical, and documentary, are discussed together in order to answer biographic questions.

4.1 | Who were they?

According to our results, the studied individuals recovered in Capela do Pilar were buried in the Royal Chapel and died between late 14th and early 15th century, except for CP-703, who lived a couple of centuries earlier. The demographic profile is “U-shaped” with mature males buried at the North end of the chapel and young children in the South (see Figure 1 and Table 1). According to Agrelo (2001), bishop Pedro López de Aguiar—who was confessor to King Pedro I and in the royal circle of kings Enrique II and Juan I—used his privileges to transform his family chapel into the Royal Chapel of Lugo Cathedral (Risco, 1798, p. 124). To our knowledge, no member of the royal family was entombed there. The new chapel had an independent rule with associated lands, fora and its own chaplain. Besides chaplains and sacristans, any member of the bishop family could be buried here—but not the bishop, because he was buried in the Santo Domingo convent (Porto, 1993). Most bishops did not end their career in Lugo and were buried elsewhere (Risco, 1798), or they have well-recognized sepulchers (Andrade Cernadas, 2005; Piñeyro Pérez, 1992). Documents seem to indicate that noble women preferred tombs near St. Mary or different female saints. Several 14th century Galician testaments suggest the same: women often chose to be buried close to their female relatives and men to their male relatives (Andrade Cernadas, 2005). The absence of grave goods does not enable us to differentiate bishops from laymen and churchmen, contrary to the findings in Whithorn Cathedral (Müldner et al., 2009). Members of the cathedral could have lived longer than the rest of the population if we consider the mature age of some of the bishops (e.g., Pedro López de Aguiar died in his 85th year) (Risco, 1798). Few data are preserved about the elder of the nobility because chronicles tended to hide events that happened during old age (Andrade Cernadas, 2006). However, a change in the way of living is detected during 14th century: old nobles did not withdraw to monasteries and they stayed in their family home (Andrade Cernadas, 2006). This movement made more likely they were buried in a cathedral instead of in a monastery. Note that Lugo bishops were connected to the Castilian royal family by being their confessors but not by blood of kinship. In summary, the analyzed adults were more likely incumbents of the cathedral in low or medium hierarchy level or male members of the Aguiar family (since the bishop Pedro López de Aguiar built the chapel).

The presence of children in the chapel is relatively surprising. Children could be both young members of the noble family/families or be involved in cathedral life (e.g., being tutored here and members of cathedral school). During the 14th and 15th centuries, there was a high mortality in the first years of life due to the lack of pediatric knowledge in medieval medicine (Arroñada, 2007; Cabrera, 2011). For example, respiratory diseases such as that found in CP-708 were treated with oil, flax seeds, and honey (Cabrera, 2011). Children from noble families received religious education from their early years and were commonly sent away to be tutored by godfathers or patrons (Arroñada, 2007). They could be also descendant of churchmen. Between 1496 and 1499, a strong reform in religious Galician communities took place to stop the birth of children from prioress and chaplains (Arroñada, 2002b; Pascual, 1999). The relative homogeneity in the age-at-death (<7 years) suggests the South area of the chapel was devoted to children’s funerary rites. Seven to 10 years were the age for children living in religious communities to start working (Arroñada, 2002a, 2002b). According to St. Isidoro de Sevilla, infancy ends at the age of seven (Blanco, 1994). The lack of mention of children in the cathedral documents could be explained by the high mortality together with an early death, before developing active working roles (Arroñada, 2007).

### Table 4

| Material     | 14th century | 15th century | Material     | 14th century | 15th century |
|--------------|--------------|--------------|--------------|--------------|--------------|
| Wheat        | 7            | 13           | Sheep        | 1            | 11           |
| Rye          | 25           | 82           | Goat         | 2            | 9            |
| Barley       | 29           | 3            | Pig          | 32           | 17           |
| Millet       | 4            | 2            | Bacon, ham   | 2            | 15           |
| Wine         | 57           | 36           | Ox           | 36           | 4            |
| Fava bean    | 7            | 2            | Cow          | 37           | 7            |
| Fruits       | 7            | 15           | Chicken      | 7            | 18           |
| Salt         | 1            | 4            | Capon        | 10           | 18           |
| Eels         | 6            | 7            | Eggs         | 1            | 8            |

Note: Data were obtained through the web Gallaeciae Monumenta Historica (http://gmh. consellodacultura.org).
4.2  How did they live?

The members of the cathedral clergy had apparently an active life that agrees with the high frequency of OA observed in the studied assemblage. During the 14th century, at least three bishops had strong problems with the city council regarding Lugo’s keys (Risco, 1798). Rebellions took place in those years including the siege of the city in 1366 by King Enrique II in a civil war against his brother Pedro I supported by the Lugo Cathedral council, whose members participated actively in the defense (Risco, 1798). Violent acts against the bispopic have been recorded, to the bishops themselves (the assassination of bishop Don Lope, document 902), and their assistants, such as the murder of the administrator by a noble women María Castaña in her rebellion for the excessive payments to the cathedral that Pedro de Aguiar ruled (Arquero Caballero, 2016; Risco, 1798). Trauma found in the skeletons could also be caused by everyday activities (e.g., rib and phalange fractures), but cranial trauma is more likely related to interpersonal violence. Cranial depressed fractures are the most common type of head injury (Roberts & Manchester, 2005), and they have been related to accidents during rural activities (Djurić et al., 2006). However, the number of individuals affected by cranial trauma is here higher (3/7; 43%) than in other sites such as the Islamic Medieval necropolis of La Torrecilla (30% for males) (Jiménez-Brobell et al., 2009) or Serbian Late Medieval populations (1.3%–6.7%) (Djurić et al., 2006), and clearly higher than other Galician necropoleis (López-Costas, 2012). The fact that trauma and other pathologies had a good healing could be related to the medical treatment that we know these churchmen and their relatives could access (i.e., documents contracting physicians). Solitary pelvis osteochondroma is a rare pathology (see Figure 3). A very similar case described in clinic orthopedic was reported to cause snapping hip syndrome and cursed with hip pain and restriction of activity (Chun et al., 2016). Similar symptoms could have affected individual CP-706, related to high meat consumption in monasteries (Rogers & Manchester, 2005). High consumption of animal products agrees with the possible case of gout (CP-707) and DISH (CP-701; highest δ15N value (13.4 ± 1.2‰)). DISH is an idiopathic disease related to obesity and diabetes (Hajkova et al., 1965; Julkunen et al., 1971), which has been related to high meat consumption in monasteries (Rogers & Waldron, 2001), but these differences were not always observed in the isotopic data (Quintelier et al., 2014). The isotopic signal in the subadults was influenced (elevated) by breastfeeding. Interestingly, the female (CP-712) and male CP-703, buried outside the church, had lower animal protein consumption.

The δ34S and δ13Ccap values in individuals CP-704 and CP-703 suggest consumption of small amounts of marine resources and in the adults CP-705, CP-706, and CP-707 and subadult CP-711 a consumption of C4 plants (probably millet) or animal fed by C4 plants. We see no clear evidence of any input of C4 plants rich in polysaccharides, such as sugar cane, which has been evidenced in a South Spain Islamic population (Inskip et al., 2019). Historic sources indicates that sugar cane was incorporated quite late in NW Spain and despite their privileged position, it is likely that the members of the cathedral had no access to this product (Andrade Cernadas, 2009). Note that Islamic minorities (Mudejares) were integrated in Iberian Christian societies such as the Aragon Kingdom (Flores, 2018). Both the δ13Ccap values and the δ13Ccapcol values are similar to those observed in a 7th century inland population from Monte da Cegonha in South Portugal (Saragoça et al., 2016) but with lower δ15N. Here, the historical documents hardly mention any payments in the form of C4 plants (Table 4).

4.3  What did they eat?

Isotopic data indicate that their diet was mainly based on animal products from a C3 plant food chain. The δ15N value (13.4 ± 1.2‰) is elevated compared with contemporary populations representing the middle class in coastal Galicia (12.6 ± 1.2‰), even though the latter consumed a significant amount of fish (López-Costas & Müldner, 2019). In fact, Capela do Pilar male individuals have the highest in δ15N values in NW Spain, including all Galician and Asturias populations analyzed until today (Figure 8) (Kaal et al., 2016; López-Costas, 2012; López-Costas & Müldner, 2016, 2019; López-Costas, Müldner, & Cortizas, 2015; López-Costas, Müldner, & Grandal d’Anglade, 2015; MacKinnon et al., 2019).

FIGURE 8  Bone collagen δ13C and δ15N values of human from Capela do Pilar and other sites from Galicia and Asturias [Colour figure can be viewed at wileyonlinelibrary.com]
which contrasts to the large amount of millets cultivated and consumed in close coastal areas (López-Costas & Müldner, 2019). This fact supports the hypothesis about the extreme historic differences in diet between coastal and inland Galicia (López-Costas, 2012). Inland Galicia was dedicated to rye and barley (Peña-Choccaro et al., 2019). Many members of the Lugo Cathedral spent part of their life in monasteries (Risco, 1798), where we know the diet was based on bread and wine, rye being the most mentioned cereal in all monasteries’ documents (Andrade Cernadas, 2009). Meat, on the other hand, was consumed specially by noble churchmen living in large villages (Andrade Cernadas, 2009). Most monasteries had fora from coastal settlements for the supply of dry or salted conger, hake, and many sardines that were used for Lent, as well as many freshwater fish (Andrade Cernadas, 2009; Ferreira Priegue, 1987). Cheese and honey were also highly consumed in Galician monasteries (Andrade Cernadas, 2009), but they are not mentioned in the Lugo Cathedral documents.

4.4 | Where did they come from?

According to the δ¹⁸O values, both the subadults (CP-708, 709, 710, 711), the possible female (CP-712), and male buried outside the church (CP-703; before the construction of the chapel) were locals. Four males have a signal compatible with having spent part of their life near the coast; however, there are no mentions in historical texts of trips to the South coast of Galicia or coastal Portugal. But because δ¹⁸O is related to the water/liquids intake, it is a mixture of the water in food and the beverages consumed, a large consumption of wine produced in coastal areas could influence the isotopic signal (see Table 4). We know from the historical records that the basic diet of monks (and chaplains or bishops for extension) consisted of bread and wine (Andrade Cernadas, 2009). A high consumption of wine is also supported by the possible cases of gout and DISH (Choi & Curhan, 2007; Schröder et al., 2007).

Documents indicate that the cathedral received both people and food from diverse surrounding areas. Whereas it was seen a preference to hire more or less local workers, no information could be found about the chaplains’ and sacristans’ origin. Arquero Caballero (2016) suggests that bishops and royal confessors were selected among the families belonging to the lower social strata; therefore, the members of the cathedral from the lower social strata are more likely local. Locals or nonlocals at birth, the majority of the 11 bishops that commanded the Lugo church from 1300 to 1450 spent a good part of their life traveling or working abroad (Risco, 1798). At least three of them were royal confessors (Arquero Caballero, 2016) and lived part of their life in Madrid and Central Spain. During 14th and 15th centuries, Lugo was well considered in Castilian economy and was the most influential village of NW Spain (Risco, 1798). One of the analyzed individuals, CP-704, seems to have spent some of his life in Central Spain before he died (based on δ¹⁸Oap). According to the documents of the bishopric economy, the foreign connections of the Lugo Cathedral were mainly with the Castilian plateau, which where the individual CP-704 seems to have had more relation than the others.

5 | CONCLUSIONS

Biography or the story of a person’s life written by somebody else is a compilation of events that define our years in life. In this study, a group of at least 15 unknown individuals were found inside the Royal Chapel of the Lugo Cathedral, today called Capela do Pilar. The goal of this study was to reconstruct part of their forgotten story. Most of them lived in the 14th–15th century and probably belonged to a medium to high social strata closely related to the cathedral bishopric. Our research has shown that the Royal Chapel of Lugo hosted the burial of preferentially mature-age males, placed in its North side, and young children placed in its South area. Males were likely to be related to the cathedral clergy—possibly chaplains, administrators or sacristans, but not bishops—or noblemen relatives of the former. They had an active and traveling life with plenty of food resources available, including meat, eggs, cheese, and eels. Wine was possibly highly consumed, as well as rye or wheat bread, but not millet. At least one of them had connections with Central Spain. Subadults seem to have spent all, or a large part of their life, in the Lugo area. All of them died as infants (<7 years old). Despite the high mortality in these centuries, they were treated with care and were buried in a privileged area.

The lack of archeological items associated with the skeletons is here substituted by a complex three level data analysis that enhances our understanding of these individuals’ lives. The case of the Capela do Pilar individuals from the Lugo Cathedral is a prime example of the possibilities of transdisciplinary research in identifying the lifestyle of past populations. We are convinced that the obtained detailed information was only possible by equally considering historical texts, paleopathology, and stable isotopes.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT
The data that supports the findings of this study are available in the main text and tables of this article.

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REFERENCES
Agrello, M. M. (2001). Una peculiar manifestación del poder episcopal en la Catedral de Lugo. Don Pedro López de Aguilar y su proyecto de dignificación de la capilla de Santo Domingo. Hispania, 61(208), 475–491.

Ahlin Sundman, E. (2018). Masculinities and diet: An analysis of skeletal material from the dominican priory in Medieval Västerås, Sweden. Norwegian Archaeological Review, 51(1–2), 95–111. https://doi.org/10.1080/00293652.2018.1483965

Aleman, I., Botella, M. C., & Ruiz, L. (1997). Determinación del sexo en el esqueleto postcranial. Estudio de Una población mediterránea Actual. Archivo Español de Morfología, 2, 7–17.

Álvarez Meraio, I. A. (2007). Escavación arqueológica para a delimitación das estruturas constatadas nas obras de restauración da Capela do Pilar. Catedral de Lugo. Memoria da intervención arqueológica inédita (código de referencia CD 102A 2007/280-0). Original depositado en Consellería de Cultura e Deporte. Dirección Xeral de Patrimonio. Xunta de Galicia.

Andrade Cernadas, J. M. (2005). Los testamentos como reflejo de los cambios de actitud ante la muerte en la Galicia del siglo XV. Sénata, 17(Article Journal), 97–114.

Andrade Cernadas, J. M. (2004). Una aproximación a la historia de la vejez en la Galicia medieval: Algunas fuentes y sus posibilidades de información. SEMATA, Ciencias Sociais e Humanidades, 18, 229–246.

Andrade Cernadas, J. M. (2009). En el refectorio: la alimentación en el mundo monástico de la Galicia medieval. Sénata, 21, 45–64.

Arquero Caballero, G. F. (2016). El confesor real en la Castilla de los Trastámara: 1366-1504 (PhD thesis): Universidad Complutense de Madrid.

Arroñada, S. N. (2002a). Algunas reflexiones sobre la infancia (siglos XIII al XV). Meriades: Revista de Historia Medieval, 5–6, 223–242.

Arroñada, S. N. (2002b). La Baja Edad Media: una visión a través de la infancia. Fundación 2001–2002. IV.

Arroñada, S. N. (2007). Algunas notas sobre la infancia noble en la Baja Edad Media castellana. Historia, Instituciones, Documentos, 34, 9–27.

Auferderheide, A. C., & Rodríguez-Martin, C. (1998). The Cambridge encyclopaedia of human paleopathology. Cambridge University Press.

Blanco, C. M. M. (1994). Las edades de la vida: la infancia en la documentación literaria medieval. In Actas del III Congreso de la Asociación Española de Literatura Medieval: Salamanca. 3 al 6 de octubre de 1989 (pp. 563–568). Biblioteca Española del Siglo XV, Departamento de Literatura Española e Hispánicoamericana.

Buikstra, J. E., & Ubelaker, D. H. (Eds.) (1994). Standards for data collection from human skeletal remains: Proceedings of a seminar at the Field Museum of Natural History, organized by Jonathan Haas. Fayetteville, Ark: Arkansas Archeological Survey Research Series.

Cabrera, S. M. (2011). Un texto pediátrico del siglo XIV: El Tratado de los Niños de Bernardo de Gondoinio. Meriades: Revista de Historia Medieval, IX, 69–86.

Campillo, D. (2001). Introducción a la paleopatología. Barcelona: Bellaterra arqueología.

Capilla, J. E., Rodríguez Arevalo, J., Castaño Castaño, S., Díaz Tejeiro, M., Sanchez del Moral, R., & Heredia Díaz, J. (2011). Mapping oxygen-18 in meteoric precipitation over Peninsular Spain using geostatistical tools. Fall Meeting, AGU (abstract no H34C-04) San Francisco, CA, USA: American Geophysical Union.

Castells Navarro, L. (2018). DISH Everywhere: Study of the Pathogenesis of Diffuse Idiopathic Skeletal Hyperostosis and of Its Prevalence in England and Catalonia from the Roman to the Post-Medieval Time Period (PhD thesis): University of Bradford.

Cazón, J. L. N. (2006). A cidade de Lugo no século XV. In F. L. Singul Lorenzo (Ed.), Os Capítulos da Irmandade: Peregrinación e conflito social na Galicia do século XV (pp. 56–62). Santiago de Compostela: Xunta de Galicia, Consellería de Innovación e Industria de Xestión do Plan Xacobeo.

Chenery, C. A., Pashley, V., Lamb, A. L., Sloane, H. J., & Evans, J. A. (2012). The oxygen isotope relationship between the phosphate and structural carbonate fractions of human bioapatite. Rapid Communications in Mass Spectrometry, 26(3), 309–319. https://doi.org/10.1002/rcm.5331

Choi, H. K., & Curhan, G. (2007). Alcohol and gout. The American Journal of Medicine, 120(10), e5. https://doi.org/10.1016/j.amjmed.2006.09.025

Chun, Y. S., Rhyu, K. H., Cho, K.-Y., Cho, Y. J., Lee, C. S., & Han, C. S. (2016). Osteochondroma arising from anterior inferior iliac spine as a cause of snapping hip. Clinics in Orthopedic Surgery, 8(1), 123–126. https://doi.org/10.4055/cios.2016.8.1.123

Collins, M. J., & Galley, P. (1998). Towards an optimal method of archaeological collagen extraction: The influence of pH and grinding. Ancient Biomolecules, 2, 209–222.

Cortizas, A. M., & López-Costas, O. (2020). Linking structural and compositional changes in archaeological human bone collagen: An FTIR-ATR approach. Scientific Reports, 10(1), 17888. https://doi.org/10.1038/s41598-020-74993-y

Curto, A., Mahoney, P., Maurer, A.-F., Barrocas-Dias, C., Fernandes, T., & Fahy, G. E. (2019). Diet and disease in Tomar, Portugal: Comparing stable carbon and nitrogen isotope ratios between skeletons with and without signs of infectious disease. Journal of Archaeological Science, 105, 59–69. https://doi.org/10.1016/j.jas.2019.03.005

Daux, V., Lécuyer, C., Héran, M.-A., Amiot, R., Simon, L., Foureil, F., Martinneau, F., Lynnerup, N., Reycher, H., & Escarguel, G. (2008). Oxygen isotope fractionation between human phosphate and water revisited. Journal of Human Evolution, 55(6), 1138–1147. doi:https://doi.org/10.1016/j.jhevol.2008.06.006

DeWitte, S. N., Bouwman, J. C., & Redfern, R. C. (2013). Medieval monastic mortality: Hazard analysis of mortality differences between monastic and nonmonastic cemeteries in England. American Journal of Physical Anthropology, 152(3), 322–332. https://doi.org/10.1002/ajpa.22350

Djuric, M. P., Roberts, C. A., Rakocèvic, Z. B., Djonić, D. D., & Lesić, A. R. (2006). Fractures in late medieval skeletal populations from Serbia. American Journal of Physical Anthropology: The Official Publication of the American Association of Physical Anthropologists, 130(2), 167–178. https://doi.org/10.1002/ajpa.20270

Dury, G., Lythe, A., Marquez-Grant, N., Garcia-Rubio, A., Graziani, G., Mari, J., Ziriix, M., & Schulting, R. (2019). The Islamic cemetery at 33 Bartomeu Vicent Ramon, Ibiza: Investigating diet and mobility
through light stable isotopes in bone collagen and tooth enamel. Archaeol Anthropol Sci.

Ferreira Priegue, E. M. (1987). Galicia en el comercio marítimo medieval A Coruña: Documentos históricos. Fundación Pedro Barrié de la Maza, Conde de Fenosa.

Flores, D. P. (2018). Ser musulmana entre cristianos: Una aproximación a la participación socioeconómica de las mujeres musulmanas en el Aragón bajomedieval. In R. Amrân & A. Cortijo Ocaña (Eds.), Minorías en la España medieval y moderna: Asimilación y/o exclusión (siglos XV al XVII) (pp. 9–24). Santa Barbara Publications of eHumanista.

Fornaciari, G., Giusfra, V., Giuslani, S., Fornaciari, A., Villari, N., & Vitelli, A. (2009). The ‘gout’ of the Medici, Grand Dukes of Florence: A palaeopathological study. Rheumatology, 48(4), 375–377. https://doi.org/10.1093/rheumatology/ken493

Garvie-Lok, S. J., Varney, T. L., & Katzenberg, M. A. (2004). Preparation of bone carbonate for stable isotope analysis: The effects of treatment time and acid concentration. Journal of Archaeological Science, 31(6), 763–776. https://doi.org/10.1016/j.jas.2003.10.014

Hajkova, J., Streda, A., & Skrha, F. (1965). Hyperostotic spondylosis and diabetes mellitus. Annals of the Rheumatic Diseases, 24, 536–543. https://doi.org/10.1136/ard.24.6.536

Harper, K. (2017). The fate of Rome: Climate, disease, and the end of an empire. Princeton University Press. https://doi.org/10.2307/j.ctv96ztg

Hatvani, I. G., Erdélyi, D., Vreca, P., & Kern, Z. (2020). Analysis of the spatial distribution of stable oxygen and hydrogen isotopes in precipitation across the Iberian Peninsula. Water, 12(2), 481. https://doi.org/10.3390/w12020481

Hukelová, Z., & Kosiáková, M. (2021). Klipped-Feil syndrome cases from Slovakia. International Journal of Paleopathology, 33, 188–195. https://doi.org/10.1016/j.ijppa.2021.04.011

Inskip, S., Carroll, G., Waters-Rist, A., & Lin, M. (2011). Spain/España. In N. M. López-Costas, O. López-Moreno, J. I. López-Osorio, I., & Caro, D. L. (Eds.), The international guide to laws and practice in the excavation, study and conservation of human remains (pp. 423–438). London: Routledge. Taylor and Francis Group.

Judd, M. A. (2020). Coexisting clefts: Comparative health among Byzantine monastics in the Levant. American Journal of Physical Anthropology, 172(1), 70–86.

Julkunen, H., Heinonen, O. P., & Pyorala, K. (1971). Hyperostosis of the spine in an adult population—Its relation to hyperglycaemia and obesity. Annals of the Rheumatic Diseases, 30(6), 605.

Kaal, J., López-Costas, O., & Cortizas, A. M. (2016). Diagenetic effects on pyrolysis fingerprints of extracted collagen in archaeological human bones from NW Spain, as determined by pyrolysis-GC-MS. Journal of Archaeological Science, 65, 1–10. https://doi.org/10.1016/j.jas.2015.11.001

Katzenberg, M. A., & Lovell, N. C. (1999). Stable isotope variation in pathological bone. International Journal of Osteoarchaeology, 9(5), 315–324. https://doi.org/10.1002/(SICI)1099-1212(199909)9:5<315::AID-OA500-3.0.CO;2-D

Lacroix, A. (1998). Conflictos sociales en Castilla durante los siglos XIV, XV y principios del XVI. Revisión a una tesis historiográfica sobre la lucha de clases. Anales de historia antigua, medieval y moderna: Instituto de Historia Antigua y Medieval, p 95–134.

Larsen, C. S. (2002). Bioarchaeology: The lives and lifestyles of past people. Journal of Archaeological Research, 10(2), 119–166. https://doi.org/10.1023/A:1015267705803

Longin, R. (1971). New method of collagen extraction for radiocarbon dating. Nature, 230(5291), 241–242. https://doi.org/10.1038/230241a0

López-Costas, O. (2012). Antropología de los restos óseos humanos de Galicia: estudio de la población romano y medieval gallega. Doctoral thesis. Granada: University of Granada. 555 p.

López-Costas, O., & Alexander, M. (2019). Paleodiet in the Iberian Peninsula: Exploring the connections between diet, culture, disease and environment using isotopic and osteoarchaeological evidence. Archaeological and Anthropological Sciences, 11(8), 3653–3664. https://doi.org/10.1007/s12520-019-00886-5

López-Costas, O., & Mündler, G. (2016). Fringes of the empire: Diet and cultural change at the Roman to post-Roman transition in NW Iberia. American Journal of Physical Anthropology, 161(1), 141–154. https://doi.org/10.1002/ajpa.23016

López-Costas, O., & Mündler, G. (2019). Boom and bust at a medieval fishing port: Dietary preferences of fishers and artisan families from Pontevedra (Galicia, NW Spain) during the Late Medieval and Early Modern Period. Archaeological and Anthropological Sciences, 11(8), 3717–3731. https://doi.org/10.1007/s12520-018-0733-4

López-Costas, O., Mündler, G., & Cortizas, A. M. (2015). Diet and lifestyle in bronze age Northwest Spain: The collective burial of Cova do Santo. Journal of Archaeological Science, 55, 209–218. https://doi.org/10.1016/j.jas.2015.01.009

López-Costas, O., Mündler, G., & Grandal d’Anglade, A. (Eds.) (2015). Paleodiet meets paleopathology: Using skeletal biochemistry to link ancient health, food and mobility. Santiago de Compostela: Redc Con-siliencia and JAS Arqueología SLU.

López-Costas, O., Risselé, C., Tranché, G., & Turbon, D. (2012). Postnatal ontogenesis of the tibia. Implications for age and sex estimation. Forensic Sci Int, 214(1–3), 207.e1–207.e11.

MacKinnon, A. T., Passalacqua, N. V., & Bartelink, E. J. (2019). Exploring diet and status in the medieval and modern periods of Asturias, Spain, using stable isotopes from bone collagen. Archaeological and Anthropological Sciences, 11, 3837–3855. https://doi.org/10.1007/s12520-019-00819-2

Márquez-Grant, N., Risselé, C., López-Costas, O., Alemán, I., & Caro, D. L. (2011). Spain/España. In N. Márquez-Grant & L. Fibiger (Eds.), The Routledge handbook of archaeological human remains and legislation: An international guide to laws and practice in the excavation, study and treatment of archaeological human remains (pp. 423–438). London: Routledge. Taylor and Francis Group.

Mays, S. (1997). Carbon stable isotope ratios in mediaeval and later human skeletons from northern England. Journal of Archaeological Science, 24(6), 561–567. https://doi.org/10.1006/jas.1996.0139

Mendonça, M. C. (2000). Estimation of height from the length of long bones in a Portuguese adult population. American Journal of Physical Anthropology, 112, 39–48. https://doi.org/10.1002/(SICI)1096-8644(200005)112:1<39::AID-AJPA5>3.0.CO;2-#

Mühlner, G., Montgomery, J., Cook, G., Ellam, R., Gledhill, A., & Lowe, C. (2009). Isotopes and individuals: Diet and mobility among the medieval bishops of Whitham. Antiquity, 83(322), 1119–1133. https://doi.org/10.1017/S0003598X0099403

Mühlner, G., & Richards, M. P. (2007). Diet and diversity at later medieval Fishergate: The isotopic evidence. American Journal of Physical Anthropology, 134, 162–174. https://doi.org/10.1002/ajpa.20647

Nehlich, O. (2015). The application of sulphur isotope analyses in archaeological research: A review. Earth-Science Reviews, 142, 1–17. https://doi.org/10.1016/j.earscirev.2014.12.002

Nehlich, O., & Richards, M. P. (2009). Establishing collagen quality criteria for sulphur isotope analysis of archaeological bone collagen. Archaeological and Anthropological Sciences, 1(1), 59–75. https://doi.org/10.1007/s12520-009-0003-6

Oliva, M., Ruiz-Fernández, J., Barriendos, M., Benito, G., Cuadrat, J. M., Domínguez-Castro, F., García-Ruiz, J. M., Giralt, S., Gómez-Ortiz, A., Hernández, A., López-Costas, O., López-Moreno, J. L., López-Sáez, J. A., Martínez-Cortizas, A., Moreno, A., Prohorn, M., Saz, M. A., Serrano, E., Tejedor, E., … Vicente-Serrano, S. M. (2018).
The little ice age in Iberian mountains. Earth-Science Reviews, 177, 175–208. https://doi.org/10.1016/j.earscirev.2017.11.010

Ortner, D. J. (2003). Identification of pathological conditions in human skeletal remains. Academic Press.

Pascual, E. Z. (1999). Documentos inéditos sobre la reforma de los monasterios benedictinos gallegos (1493–1513). Compostellanum: Revista de la Arquidiócesis de Santiago de Compostela, 44(1), 77–103.

Patrick, P. (2014). The “obese medieval monk”: A multidisciplinary study of a stereotype. BAR Publishing. https://doi.org/10.30861/9781407312248

Peña-Chocarro, L., Pérez-Jordà, G., Alonso, N., Antolín, F., Teira-Bri, A., Tereso, J. P., Moya, E. M., & Reyes, D. L. (2019). Roman and medieval crops in the Iberian Peninsula: A first overview of seeds and fruits from archaeological sites. Quaternary International, 499, 49–66.

Piñeiro Pérez, M. R. (1992). El Arte gótico en Lugo. Lugo: Servicio Publicaciones, Diputación Provincial.

Portela Silva, M. X. (Ed.) (2005). Documentos da Catedral de Lugo. Século XV (2nd ed.). Santiago de Compostela: Consello da Cultura Galega, Sección de Patrimonio Histórico.

Portela Silva, M. X. (Ed.) (2007a). Documentos da Catedral de Lugo. Século XIV. Tomo I. Santiago de Compostela: Consello da Cultura Galega, Sección de Patrimonio Histórico.

Portela Silva, M. X. (Ed.) (2007b). Documentos da Catedral de Lugo. Século XIV. Tomo II. Santiago de Compostela: Consello da Cultura Galega, Sección de Patrimonio Histórico.

Porto, C. M. (1993). El obispo fray Pedro López de Aguiar, OP (1349–1390): Reseña biográfica y aproximación a los principales acontecimientos en su diócesis durante el reinado de Pedro I. Archivo Dominicano: Anuario, 14, 43–68.

Prieto Gómez, M. (2018). Estudio das propiedades espectroscópicas de cálculos dentais e tecido óseo en esqueletos humanos de contextos arqueolóxicos. Master thesis. Santiago de Compostela: Universidade de Santiago de Compostela.

Quintelier, K., Eryvynck, A., Müldner, G., Van Neer, W., Richards, M. P., & Fuller, B. T. (2014). Isotopic examination of links between diet, social differentiation, and DISH at the post-medieval Carmelite friary of Aalst, Belgium. American Journal of Physical Anthropology, 153(2), 203–213. https://doi.org/10.1002/ajpa.22420

Reale, B., Marchi, D., & Borgognini Tarli, S. M. (1999). A case of diffuse idiopathic skeletal hyperostosis (DISH) from a medieval necropolis in southern Italy. International Journal of Osteoarchaeology, 9(5), 369–373. https://doi.org/10.1002/(ISSN)1099-1212(199909)9:5<369::AID-OA486>3.0.CO;2-9

Richards, M., & Montgomery, J. (2012). Isotope analysis and paleopathology. A short review and future developments. In J. E. Buikstra & C. Roberts (Eds.), The global history of paleopathology: Pioneers and prospects (pp. 718–731). Oxford: Oxford University Press.

Risco, M. (1798). La España Sagrada. Tomo XI de la Santa Iglesia de Lugo continuación de su historia desde el siglo XII, hasta fines del XVIII. Madrid: En la oficina de la viuda e hijo de Marín.

Roberts, C., & Manchester, K. (2005). The archaeology of disease. Phoenix Mill, Thrupp, Stroud, Gloucestershire: Sutton Publishing.

Roberts, C. A. (2009). Human remains in archaeology: A handbook. York: Council for British Archaeology.

Robson, H., Andersen, S., Craig, O., Fischer, A., Glykou, A., Hartz, S., Lübke, H., Schmölké, U., & Heron, C. (2012). Carbon and nitrogen isotope signals in eel bone collagen from Mesolithic and Neolithic sites in northern Europe. Journal of Archaeological Science, 39(7), 2003–2011. https://doi.org/10.1016/j.jas.2012.01.003

Rogers, J., & Waldron, T. (2001). DISH and the monastic way of life. International Journal of Osteoarchaeology, 11(5), 357–365. https://doi.org/10.1002/oa.574

Rothschild, B. M., & Heathcote, G. M. (1995). Characterization of gout in a skeletal population sample: Presumptive diagnosis in a microron population. American Journal of Physical Anthropology, 98(4), 519–525. https://doi.org/10.1002/ajpa.1330980411

Safont, M. S. (2003). Métodos antropológicos usados en paleopatología. In A. Isidro & A. Malgosa (Eds.), PaleopatologíaLa enfermedad no escrita (pp. 33–46). Barcelona: Masson.

Saragoça, P., Maurer, A.-F., Söberl, L., Lopes, M. C., Alfenim, R., Leandro, L., Umbelino, C., Fernandes, T., Valente, M. J., Ribeiro, S., et al. (2016). Stable isotope and multi-analytical investigation of Monte da Cegonha: A late antiquity population in southern Portugal. Journal of Archaeological Science: Reports, 9, 728–742. https://doi.org/10.1016/j.jasrep.2016.07.010

Sarkic, N., López, J. H., López-Costas, O., & Grandal d’Anglade, A. (2019). Eating in silence: Isotopic approaches to nuns’ diet at the convent of Santa Catalina de Siena (Belmonte, Spain) from the sixteenth to the twentieth century. Archaeological and Anthropological Sciences, 11(8), 3895–3911. https://doi.org/10.1007/s12520-018-0734-3

Schröder, H., Morales-Molina, J. A., Bermejo, S., Barral, D., Mándoli, E. S., Grau, M., Guexes, M., de Jaime, G. E., Álvarez, M. D., & Marrugat, J. (2007). Relationship of abdominal obesity with alcohol consumption at population scale. European Journal of Nutrition, 46(7), 369–376. https://doi.org/10.1007/s00394-007-0674-7

Ubelaker, D. H. (1989). Human skeletal remains. Excavation, analysis, interpretation. Washington D.C: Taraxacum.

Van Klinken, G. J. (1999). Bone collagen quality indicators for palaeodietary and radiocarbon measurements. Journal of Archaeological Science, 26(6), 687–695. https://doi.org/10.1016/j.jas.1999.03.085

Väre, T., Lipkin, S., Niinimäki, J., Niinimäki, S., Junno, J., Niskanen, M., Safont, M. S., Sarkic, N., López, J. H., López-Costas, O., & Grandal d’Anglade, A. (2019). Eating in silence: Isotopic approaches to nuns’ diet at the convent of Santa Catalina de Siena (Belmonte, Spain) from the sixteenth to the twentieth century. Archaeological and Anthropological Sciences, 11(8), 3895–3911. https://doi.org/10.1007/s12520-018-0734-3

Väre, T., Lipkin, S., Niinimäki, J., Niinimäki, S., Junno, J., Niskanen, M., Safont, M. S., Sarkic, N., López, J. H., López-Costas, O., & Grandal d’Anglade, A. (2019). Eating in silence: Isotopic approaches to nuns’ diet at the convent of Santa Catalina de Siena (Belmonte, Spain) from the sixteenth to the twentieth century. Archaeological and Anthropological Sciences, 11(8), 3895–3911. https://doi.org/10.1007/s12520-018-0734-3

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