heritage

MDPI

Article

The "San Giacomo di Galizia" Warship Galleon (1597)—Building Narratives through an Archaeological and Historical Reading of the Ribadeo I Shipwreck

Tânia Manuel Casimiro [1,*], Sagrario Martínez-Ramirez [2], Ana Crespo-Solana [3], Miguel San Claudio Santa Cruz [4] and Inês Almendra Castro [5]

[1] História Territórios Comunidades, Centro de Ecologia Funcional, NOVA University of Lisbon, 1099-085 Lisbon, Portugal
[2] Institute of Material Structure (IEM, CSIC), 28006 Madrid, Spain
[3] Institute of History (IH, CSIC), 28006 Madrid, Spain
[4] Xunta de Galicia, Dirección Xeral do Patrimonio, 15781 Santiago de Compostela, Spain
[5] History Department, NOVA University of Lisbon, 1099-085 Lisbon, Portugal
* Correspondence: tmcasimiro@fcsh.unl.pt

Abstract: Early November 1597. After an intense combat with four enemy ships, *San Giacomo di Galizia* (also known as *Santiago*), a just over 1000-ton galleon, enters the Ribadeo harbour in a terrible state, where it wrecks. This war vessel had been built in Naples in 1590 and sailed the Mediterranean and the Atlantic until it sank. In late November 2011, during an archaeological survey of the dredge area to improve the navigation of the ports in Galicia, a large ship was found and identified as the San Giacomo, which wrecked 414 years prior to its discovery. Several archaeological campaigns permitted a thorough record of the wreck and the recovery of hundreds of objects which this ship carried on its final journey. These artefacts included ceramics, metalwork, and wood, objects which reflected the activities that occurred on board during its short life. Combining an interdisciplinary approach based on artefacts, documents, and chemical analysis, the aim of this paper is to, on the one hand, attempt to reconstruct the sailing itinerary of the ship over its period of use and, on the other, to discuss how these commodities can help to write new narratives about the activities which occurred on board.

Keywords: shipwreck; material culture; archives; archaeometric analysis; San Giacomo di Galicia

Citation: Casimiro, T.M.; Martínez-Ramirez, S.; Crespo-Solana, A.; San Claudio Santa Cruz, M.; Castro, I.A. The "San Giacomo di Galizia" Warship Galleon (1597)—Building Narratives through an Archaeological and Historical Reading of the Ribadeo I Shipwreck. *Heritage* **2023**, *6*, 1732–1753. https://doi.org/10.3390/heritage6020092

Academic Editor: Mauro Francesco La Russa

Received: 28 December 2022
Revised: 26 January 2023
Accepted: 27 January 2023
Published: 6 February 2023

1. Introduction

What is a ship? What is the first thing that comes to our minds when we think of those wooden vessels that crossed the oceans and sailed the world in the Early Modern Age? A complex machine built with cutting-edge technology in conformity with traditional knowledge? A vehicle destined to connect things from one point to the other? A small part of the world where lives happened for a few or many months? In fact, a ship is all that and so much more. For us, it is a combination of different ontologies and ontological relations. It is more than its hull and much more than its cargo and people. It is a mereology where the study of its parts is combined in different relations with all of its parts [1]. Additionally, the ship is a floating space, a place without a place—remembering Mack's reinterpretation of Foucault–which also evokes the ship as a key element in the microhistory [2] (p. 137), [3]. These relations occur not only with humans but with non-humans in a complex system of networking where every agent (or object in a more philosophical and wide approach) had a fundamental role in the creation of what we call a ship. Additionally, what about a shipwreck? Is it still the same ship or is our work as historians and archaeologists a vague attempt to recover what we consider a ship to be? Studying shipwrecks is more than studying archaeological sites. Although it is depending on many factors, it is mostly a

study of the dense trade of networks between places, agents, and relations that are reflected in the historical and archaeological data.

These are just some theoretical concerns that we will attempt to discuss in this paper based on a specific case study. We will combine the archaeological information based on all the artefacts recovered in the Ribadeo I shipwreck, the majority of which are ceramic sherds, where some archaeometric analysis was possible. We will add an analysis of the documentary information retrieved from several archives and develop an epistemological combined approach.

The wreck of the ship *San Giacomo di Galizia*, identified as the Ribadeo I site, occurred in early November 1597 in the Ribadeo river. As we will discuss in this paper, from the moment it was built in Naples (1590) until its final journey, *San Giacomo di Galizia* generated several types of relations connecting places, people, and things (Figure 1). More than 400 years after it sank, we are joining several types of information that will help us not only to construct the narrative of its existence but debate how this ship was a fundamental context in the development of relations. This paper is a combination of different knowledge linked by its authors. History, archaeology, and archaeometry were brought together in order to produce the results.

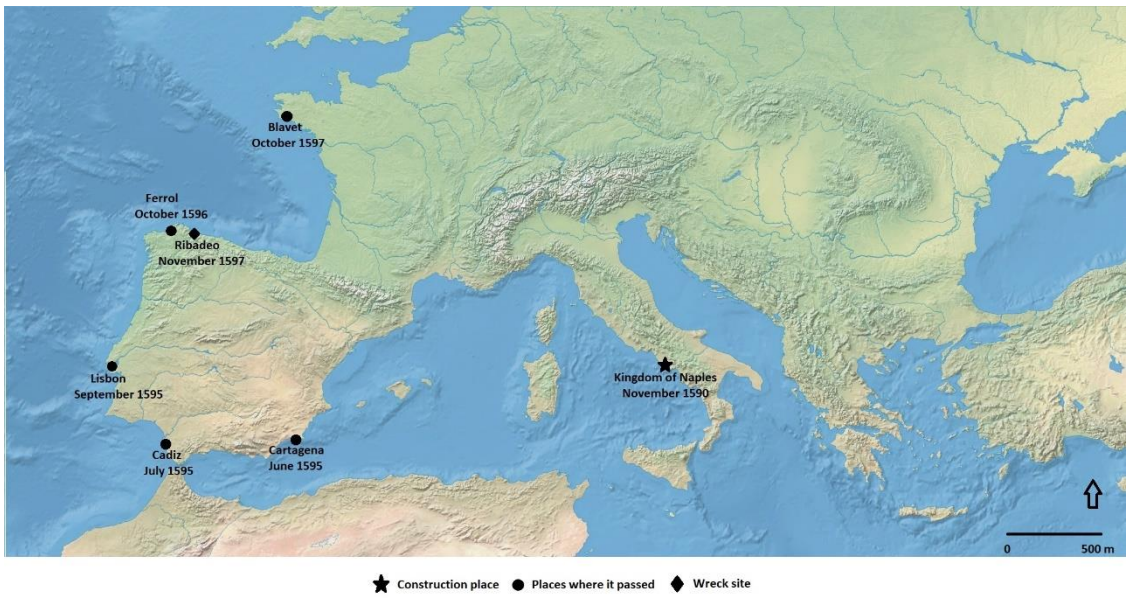

Figure 1. Map with the locations where *San Giacomo di Galicia* stopped.

Our purpose is to recreate the itinerary of *San Giacomo* and understand how the archaeological record reflects that path and maybe add to the existing information that could never be obtained solely by history, archaeology, and archaeometry but is only possible with the combination of these three disciplines. By combining all these sciences, methods, and techniques, we intend to create a whole that will be bigger than the sum of its parts.

When an Iberian shipwreck or a ship with Iberian cargo is discovered, its artefacts are never ignored, but rarely published in a monographic way. In fact, except for *Nossa Senhora dos Mártires* (1606) that wrecked in the Tagus River Mouth which, through several publications and theses, has a large part of its assemblage published [4,5], the wreck of *Esmeralda* (1503) off the coast of Oman [6] and the Studland Bay wreck with its cargo of Seville pottery [7], most ceramic assemblages from such wreck sites are only referred to in outline. This seems to have happened with several wrecks when the objects recovered on board are presented but never fully quantified since the most important aspects tend to be the excavation and the discovery of the hull or artillery. Still, some attempts have been made to provide some information about the cargo or other artefacts on board ships

discovered either in Portugal, in Spain, or in other countries where Iberian wrecks have been found ([7–14], among many others).

2. The Discovery of the Ribadeo I Shipwreck Archaeological Site

In November 2011, during the dredging of the access channel to the port of Mirasol, in Ribadeo, structural wood remains belonging to a ship's hull were located. The discovery of what could be a 16th century ship of about 34 m in length and with a maximum beam of about 12 m–confirmed by an underwater survey–motivated the implementation of various archaeological interventions. The remains of the wreck were covered by sand, with a double outer and inner hull construction with planks about 30 cm high and 15 cm thick and frames of about 25 cm, providing the hull's structure with a total thickness of around 50 cm, while the submerged part of the hull was covered with lead. It, therefore, constituted an archaeological site of important heritage interest [14].

The first surveys and sampling occurred in 2012 and 2015; since then, various phases of study and registration of the wreck took place using a geophysical survey to examine the geological matrix of the site, the naval architecture, and the recording of artefacts. The purpose was to identify the structural elements related to the wreck and verify the cases in which they could have been displaced by the action of the ocean, anthropic action, or during the depositional process itself. The first interdisciplinary research led to the recording of the visible remains and structures of the wreck, establishing a physical barrier to protect it, and proposing a method of wood sampling. The wood analysis led to the dating and identification of the ship located in the Ribadeo I underwater site. Dendroarchaeology is traditionally applied in northern Europe for the dating and study of the origin of wood from archaeological sites, including shipwrecks [15–17]. The analysis of the wooden structures located in the Ribadeo estuary was decisive for the confirmation that they were the remains of a warship galleon, a unique specimen, due to its conservation conditions. It was also possible to conclude the dating and origin of the hull wood as well as the construction date of this vessel based on its architectural features [18,19] (vol.2: pp. 1–59), especially the lead covering the wreck's lower hull and the considerable thickness of the planks of the outer hull. The building characteristics of the first deck, especially the way it was finished, were considered "characteristic in Spanish ships of the sixteenth century, (. . .) documented in the construction of galleys and galleons, although this is the first time that it has been empirically documented in a shipwreck" [20] (vol. 2: p. 100).

At the same time, a cartographic analysis of the seabed was carried out, throughout successive campaigns, in attempt to understand the depositional process that affected the site, a study that led to several photogrammetry surveys [21] that has allowed for the documentation of the evolution of the site since 2015.

The dendrochronological analysis was developed since the first campaign (2012), during which the first samples of structural wood were taken. Twenty-nine samples were taken from various areas, both structural and inside the ship, the bulkheads and elements related to cargo, of which nineteen corresponded to deciduous oak (*Quercus* subg. *Quercus*). The non-structural woods were of a different species, including spruce (*Picea abies*/*Larix decidua*), white spruce (*Abies alba*), chestnut (*Castanea sativa*), Scots pine/black pine (*Pinus sylvestris/nigra*), poplar (*Populus* sp.; bulkhead), and beech (*Fagus sylvatica*), the latter being a barrel stave. In the 2015 campaign, nineteen more samples of the structural parts of the wreck were collected, which were sent to the laboratories of the University of Santiago de Compostela, Lugo campus, within the framework of the work were carried out during the ForSEAdiscovery project [22,23]. The results confirmed the use of oak in the structural areas of the ship. Two of the samples have been dated with the last surviving ring dating to the years 1568 and 1586, which makes them consistent with the time the galleon *Santiago* was built, around the year 1590. One of these samples matched against a tree-ring chronology from Daunia, near Foggia, about 60 km from the Parco Nazionale del Gargano [24]. Although this last piece of information requires a further statistical replication, it is suggestive of an agreement with the historical information regarding the

source of timber for *San Giacomo di Galizia*. According to this, the origin of the wood is established specifically in the mountains of Albania and Mount Gargano [25].

The study of the wood and its origin, as well as the archaeological record of the artefacts and cultural references related to the site, was combined from a very early stage of the study of the wreck, with an exhaustive historical-documentary investigation made in the Municipal Archive of Ribadeo and in the General Archive of Simancas, as well as an extensive investigation in the 16th century literature and in historiographic studies. This extensive interdisciplinary research allowed us to study the galleon *San Giacomo di Galizia*, identified at the Ribadeo I site while considering the historiography of the armadas in the context of the wars of the Habsburg dynasty in 16th century Europe [20] (vol. 1, pp. 97–119), [26] (pp. 73–97).

The historical contexts of the northern wars represent a chapter that has been scarcely studied from an underwater archaeology perspective despite the existence of important sites available for research. The cases of *La Trinidad Valencera* and other shipwrecks of the *Grande y Felicísima Armada* (1588) are still the subject of scientific archaeological studies, although important questions should be made in light of other historical sciences, which would allow the construction of new narratives where a material culture should be included [27–31].

In general, what was called the Iliric squadron (the fleet in which *San Giacomo di Galicia* sailed) represents an enormous historical–archaeological heritage value as several of its ships were found sunk in the waters of Galicia (Spain). The wrecks of the *San Girolamo* and *Santissima Annunziata*, sunk in Corcubión and Finisterre, respectively, and *San Giacomo di Galizia*, have been studied within the framework of the ForSEAdiscovery research project [22]. This project highlighted the interdisciplinary research carried out by different teams developing coordinated activities at the different archaeological sites.

3. The History of the San Giacomo di Galizia, Also Called Santiago

When combining the historical documentation with the archaeological record, it was possible to infer about the nature and construction characteristics of the ship identified at the Ribadeo I site and clearly identify that it was the galleon *San Giacomo di Galizia*, also referred to as *Santiago* in Spanish historical documents. It is an interesting archaeological example of a ship that, similarly to the rest of its contemporaries in the Illyrian fleet, had a fundamental historical significance as an authentic war machine, a fundamental piece for understanding the complex, bellicose, and expansionist character of 16th century Europe. The historical event that contextualizes the Ribadeo I wreck comprises the attack planned by Diego Brochero de la Paz y Anaya, admiral in the service of Phillipe II, on Britain in order to support the cause of Catholic Ireland against the Protestant monarchy personified by Queen Elizabeth. The armada under the command of Captain General Martín de Padilla was organized in the ports of Cádiz, Lisbon, and El Ferrol [26] (vol. 2, pp. 73–97). The ships which formed this armada had different origins, reflecting the transnational nature of the Hispanic Monarchy itself and its many allies. The fleet of Pedro de Ivella (or Ibella), a sailor from Slano, in Ragusa, who belonged to a family of merchants, shipowners, and sailors, was part of this armada, in which *San Giacomo di Galicia* was included. This so-called Ragusa squadron was part of the Illirica fleet, or "Classis Illyrica", and consisted of 12 ships. They were known as the "12 Apostles", under the command of Ivella, named the captain general of the squadron, and his nephew, Stephano de Oliste de Ivella, the admiral. In September 1595, when the fleet reached Lisbon, these 12 galleons were inspected, including the *San Giacomo di Galizia* [31]. The galleon was commanded by Captain Jacobe Joan de Polo (Giacomo or Jacome Juan de Polo), a native of Ragusa and owner of the galleon, who was admitted as Admiral of the Ragusan fleet.

The galleon *San Giacomo di Galizia* was built in the Kingdom of Naples, in the shipyards of Castellammare di Stabia. Both the dendrochronological analysis of pieces of oak from the structure, as well as the petrographic analysis of materials from the ships ballast, located the galleon's origin in southern Italy. The galleon travelled from the south of Naples to Cádiz,

and from there to Lisbon to integrate the Armada. This Armada was supposed to attack the British ports and it was formed by 98 ships, an effort developed by Don Esteban de Ibarra, general provider of the kingdom of Portugal based in Lisbon, in combination with several servants of the crown [32] (AGS, GyM, leg. 285, doc. 231). These efforts provide an idea of the international nature of this navy with ships from various regions of Europe also built with wood and extracted from various geographical locations. Similar efforts were being made in El Ferrol for the meeting of other ships that would make up this Armada on war commission [32] (AGS, GyM, leg. 286, Docs. 69 y 87, Contract 14 July 1590).

A document on "Galleons and Private Ships" (sic), named Relación de los nauios que ban en el Armada de Su Magestad y las toneladas que tienen y los bastimentos que cada uno lleua, describes the galleon Santiago de Galicia weighing 1,200 tons, where it is referred to as Almiranta de Ivella [32] (AGS, GyM, leg. 490, Doc. 431). A letter from Madrid signed by Andrés de Prada and dated November 31, 1597 refers to the prizes of enemy ships. He offers to find a suitable person for Don Pedro's secretary; he advises that the galleon Santiago de Ibella arrived in Ribadeo [33] (doc. 1736) [34] (Cap. XI) The galleon also appears in the documents called Almiranta de Ytalia, Santiago de Galiçia, considered to be of great importance for transporting royal wealth. After its time in Lisbon, in 1595, San Giacomo di Galizia or Santiago went to El Ferrol in order to join the rest of the Armada that was to leave on service.

The Ribadeo Galleon was part of the Ragusan fleet. Ragusa was the cradle of an important colony of sailors, merchants, and shipbuilders at the service of the Habsburg dynasty. They were allies of the wars sustained by Philipe II, who encouraged the construction of a fleet in 1589 that would be in the charge of Pedro de Ibella (or Ivella) and Stefano de Oliste, and whose ships were stationed in various port cities and shipyards in the Adriatic and South of Italy [35] (pp. 238–260), [36] (pp. 188–222). Under the command of the captain-general of the squadron, Pedro de Ivella, the galleon, met with the rest of the Armada in the company of 11 other galleons of the so-called Illírica fleet, forming part of the Navy of Martín de Padilla, Count of Santa Gadea, Major Adelantado of Castile and Captain General of the Galleys of Spain, and Armadas of the Ocean Sea, in September 1596.

After various misfortunes that led to the delay of the expedition, Martín de Padilla was once again commissioned to carry out a punitive mission against England, and to attack the Cornish port of Falmouth. However, bad weather made it impossible for him to reach his objective and he had to return, facing many losses. *San Giacomo di Galizia* sailed with the Ragusan fleet and in the armada of Martín de Padilla commanded by its former owner, Captain Juan Jacome de Polo. A document dated July and August 1597 makes a detailed description of the provisions and cargoes that served to supply the galleon for its mission [37] (AGS, CMC, 3° época, leg. 2556, parte 6, Ship accounts from Juan Jacome de Polo, captain and owner of the "San Giacomo di Galizia Galeon"). This document transmits how the supply networks worked around a navy galleon and the origins of the different supplies and products that these ships needed for the voyage. The list goes back to 1595, when he was still in Lisbon, also detailing some payments by his general command (referring to Pedro de Ivella) and with Admiral Esteban de Oliste, the payment of two thousand ducats of ten carlines–a coin from Naples worth 618,182 mrs—and he received this money in the city of Genoa by order of Pedro de Mendoza, the ambassador of Philippe II in Genoa, on December 6, 1594, which was delivered to him on October 6, and from that money a portion was paid to the city on account of the expenses owed to Naples and for its seafarers (*por su mandato se tomó con el dicho general* (refereing to *Pedro de Ivella) y con el almirante Esteban de Oliste de dos mil ducados de a diez carlines moneda de Nápoles que valen 618.182 mrs que recibió en la ciudad de Génova de orden de Pedro de Mendoza embajador en ella por Su Majestad, en seis de diciembre de 1594, los cuales se le libraron en seis de octubre de él y se pagaron en la ciudad a cuenta del sueldo de Nápoles y para la gente de mar*) [37] (AGS, CMC, 3° época, leg. 2.556). This information points to the origin of the payment of provisions from Naples, Genoa, Seville, Cádiz, Málaga, Cartagena, Lisbon, and La Coruña.

The historical documentation recounts the return of the galleon to the Galician coast and the process of its sinking in the Ribadeo estuary. According to the minutes of the *Cabildo de Ribadeo*, between the days of November 9 and 13 (1597), a galleon named Santiago "*Dio al través*" (ran through) the Ribadeo estuary, an event confirmed by various letters sent to the Council of War during November 1597 [32] (AGS, GyM, leg. 490 and 491). The *San Giacomo di Galizia* "ran through" (that is, ran aground or ran ashore) the estuary. It is very likely that in the days immediately following the disaster, Crown officials ordered the recovery of the artillery, although there is no indication of this action in the minutes of the *Cabildo de Ribadeo*, nor in the letters of the following months sent to the Council of War [37] (AGS, CMC 3ª época, leg. 2556. Pago por el salvamento de la artillería del rey).

Various sources agree that the arrival occurred on November 16, 1597 and also state that it had inside ninety-one thousand shields "being the strongest and best of the Illirian squadron", as Don Alonso de Velasco commented in his letter. In this letter, it is also indicated that another galleon of the squadron, *San Bartolomé*, had entered the port of *Viveiro*, during a storm that broke five of its cables. It stopped there for a few days on its way to Vizcaya [32] (AGS, GyM, leg. 491. Doc. 129). The damage on the ships was so great that the 1597 Armada was known as the "Armada de la tormenta" (sic) (Storm Armada) [32] (AGS, GyM, 491/190: Carta de Bernabé de Pedroso, La Coruña, 6 de noviembre de 1597). During the attack, it had split and spread out, arriving at various ports located from Galicia to the barra de Portugalete (now Bilbao), leaving sunken ships throughout the area. It was also expected that some of them, of which no news was heard, had arrived safely on the coasts of France and Ireland.

The two galleons *Santiago* and *San Bartolomé*–the latter would eventually go down in the Basque Country—were valued at a total of 120,000 ducats and were the strongest ships. Adding to the damage made by the storm, some food for the crew, namely the hardtack, had spoiled or was of a poor quality, which is why many people had fallen ill.

San Giacomo di Galizia did not sink alone; there are also indications of an urca that became lost in Ribadeo in December 1597, which arrived at the town together with the galleon *San Francisco de Paula* and was part of Marcos de Aramburu's fleet. *San Giacomo di Galizia* was described as a "very strong ship" [32] (AGS, GyM, 491, Doc. 136, el adelantado el 7 de noviembre de 1597 desde A Coruña). Castile's own *adelantado* points out that "Don Ambrosio de Castro writes to me saying that he was on board the Santiago de Galicia who fought at the same time, with three Flemings and one Englishman, and that the Flemings had musketry, according to these they were from the enemy Navy" [32] (AGS, GyM, 491, 146: La Coruña, 16 de noviembre de 1597; y carta de 16 de noviembre de 1597. Carta del Adelantado de Castilla a la villa de Ribadeo). The town of Ribadeo granted favours to the crown by helping to rescue the galleon in November 1597, which gave rise to the granting of certain royal prerogatives such as the signing of subsequent records for the construction of new ships. The village of Ribadeo helped to save the galleon's people in November 1597 and the crown responded by permitting the construction of new ships.

4. Methodology

Except for one single sherd which could have originated from Northern France, although with great reservations in concluding so, the material culture found on board this ship is of Iberian origin. These objects reflect how the people on this ship were included in a system of cultural and technological structures that modelled their lives and behaviours. They also relate to the connections *San Giacomo de Galicia* made and thus it is not surprising that most of the objects were produced either in Andalucía or in Lisbon.

Ceramics, as expected, were the highest number of finds, followed by wood and stone. A total of 691 pottery fragments, corresponding to a minimum of 201 vessels, were recovered in the archaeological intervention. While a few correspond to complete or almost complete vessels, others are just small sherds. We tried, as much as possible, to recognize their origin and corresponding form, something that was not always possible.

The study of the collections was made based on the material culture recovered in all four seasons of the fieldwork, which are either kept in the Museum of Vigo or at the archaeological stores in Ribadeo. All the objects were allocated an inventory number and inserted into an Excel database. Every sherd was observed, and this analysis is based on sherd and a minimum number of vessels (MNV) count. The majority of the fragments were identified as body sherds and although it was possible, for the majority of sherds, to understand where they were produced or what type of vessels they were, not much information could be added to that.

The objects were considered based on their defining form characteristics, when possible; the type of rim, body, base, and handles, if any. The fabrics were considered according to their composition and colour based on the *Munsell Soil Colour Chart* (MSCC). The surface was described based on the treatment; that is, if it was smoothed or glazed. Finally, decoration was observed and described. All the objects were photographed and the ones presenting a complete or partial profile were drawn and are presented in this paper. When two similar objects presented a complete profile, the more complete specimen was chosen for illustration.

The ceramics in this assemblage are fragmented and eroded by the action of water. In many of the glazed wares, the glaze has disappeared. Some ceramics have iron concretions attached and even though they are included in the counts, were not easy to recognize.

Six ceramic sherds were chosen to perform archaeometric analysis. The chosen techniques were Infrared Spectroscopy in Attenuated Total Reflection (ATR) mode, thermodifferential and thermogravimetric analysis (DTA/TG) and Raman spectroscopy. Raman spectra were performed with Micro-Raman and due to the inhomogeneity of the samples, different spectra were obtained from different points, so we decided to present only infrared results. Using these techniques, it was possible to recognize the inorganic chemical components of such objects and characterize some production methods. These results were considered when compared with the amount of pottery and the origins of the objects. The number of sherds was not elevated; however, the sampling was made among the different types of pottery, especially what we classified as olive jars from Andalusian workshops and tableware from Lisbon potteries.

5. The Collection

Most of the ceramic vessels are of Lisbon origin (481 fragments), followed by Seville/Andalucía (67 fragments), although there is a large number (143 sherds) that are either too small or too eroded to be able to recognize their origin (Table 1). There are 22 fragments of white tin glaze wares that were not attributed to any origin (and included in the unknown) because we do not know if these were made in Andalucia or Lisbon since both areas were producing similar objects. We do not believe that this was the totality of the ceramics traveling on board the galleon. During the four seasons, the archaeological work did not recover all the artefacts, making this necessarily a partial analysis. This partial recovery was related to the fact that the artefacts were only recovered in the areas where the site was being excavated. In this sense, we cannot discard the possibility of Italian objects on board.

The study of Iberian ceramics from late 16th century contexts has increased in the last decade. These objects are mostly known in archaeological contexts from domestic activities both in Portugal and Spain. Cities such as Lisbon or the surrounding sites [38,39], Coimbra [40], Aveiro [41], Porto [42] or Silves [43], Seville [44], Granada [45], Cadiz [46], or Oviedo [47] have been essential in discovering not only what was produced and consumed but also how the circulation of these artefacts occurred within the Iberian Peninsula. This means that the majority of what we know about ceramic artefacts comes from land sites. Thus, we have to be extremely careful while using this information for underwater shipwreck sites.

Table 1. Minimum number of vessels (MNV) by type and origin.

Forms	MNV	Portugal	Spain	Unknown
Cooking pots	67	55	12	-
Costrels	5	5	-	-
Jars	4	3	1	-
Bottles	20	16	4	-
Cups	11	7	4	-
Lids	7	7	-	-
Bowls	27	23	3	1
Plates	17	4	4	9
Milk pans	12	12	-	-
Olive jars	16	4	12	-
Pots	15	12	3	-
Total	201	148	43	10

Cooking and eating on board 16th century ships was usually not done in ceramic vessels but in metal ones, evidence for which comprises only one large cauldron in Ribadeo, possibly related to the fact that this was a military ship and not one where people entered on board and took their belongings. Pottery was highly breakable and was used to keep water and food, especially for the conservation of sugar and vinegar and for conserving food on long maritime voyages [48].

The majority of ceramics found on the Ribadeo I shipwreck site were made in Portugal [49,50]. In fact, from the 691 sherds, at least 481 present a red micaceous fabric associated with shapes that are known to be produced in Portugal in the late 16th century, corresponding to approx. 70% of the entire collection. Varying from light red (2.5 YR 2/4 MSCC) to dark brown (5YR 5/4 MSCC) in colour, the sherds present a homogenous fabric with small–medium quartz, lime, and micaceous inclusions. The pots were all wheel-thrown, displaying marks on the interior surfaces. Most of them present smoothed exterior surfaces and a smaller percentage demonstrated the remains of green and yellow lead glaze, especially in the interior of bottles. These objects would be used in everyday activities on board.

The shapes correspond to what was being produced in late 16th century Portugal (Figures 2–5) [49]. The Portuguese objects found on this site were all produced in Lisbon. No evidence of northern or southern productions was found.

Similar ceramics are found frequently in Portuguese contexts or abroad [39,50]. Most of the types found correspond to the everyday wares mostly used to cook and store liquids. However, many of these vessels have been found in terrestrial Portuguese domestic contexts and, in fact, such objects may have had different functions on board ships; for example, a cooking pot could transport food.

Cooking pots, either used to cook or store considering that only one object presents sooting marks, contrary to what was expected, were the most frequent form. Their shapes can be divided into boiling or frying vessels and seem to correspond to 67 vessels (MNV). The ones used to boil have flat bases and globular bodies with vertical and horizontal handles and semi-circular rims. Frying pans are wider, shallower forms with or without handles. When handles are present, they have different morphologies, with the most frequent being wide concave handles, similar to the ones found in costrels or triangular ones. Such objects were largely used in cooking activities as stated in the 15th/16th century *Livro de Cozinha da Infanta D. Beatriz*, one of the oldest cookbooks in Portugal [51]. Although the general designation for these objects is cooking pots or kitchen wares, it is possible that many of them were not used to cook but to serve or transport and store food such

as sweets, marmalade, butter, or even honey. However, since we do not have evidence of metallic kitchenware, the overall potential functionality of the vessels must be discussed. One of the bases of a cooking pot presents soot marks, indicating that it has some contact with fire, although this may not prove its use as a cooking pot.

Costrels were a type of vessel whose main use was to store and serve water and are usually the most frequent find in ship contexts. Although the wall sherds of costrels and cooking pans can sometimes be confused, these seem to correspond only to five vessels. These appear in different shapes, though the Ribadeo costrels correspond to five large vessels with flat bases and globular bodies with tall necks and two handles. Although a common find in European early modern sites, one has to be aware that water evaporated quickly from inside these containers since the main purpose was to keep the water fresh and semi-chilled, not for long-term storage. Evaporation could be minimized if the vessels were glazed. Similar objects were found on the Studland Bay wreck site in the UK, dated to the first part of the 16th century [7].

Among the water-related ceramics, there are also four jars that were usually used not to store but to serve water. In Portugal, these were used for table service and are frequent finds in domestic collections. Twenty bottles were recovered with globular bodies and narrow necks; ten of those were glazed.

If water was stored inside ceramic objects during the 16th century, then water was also drunk from pottery vessels. Several fragments of ceramic water cups were found, one of them very complete. Thirty-four sherds correspond to a minimum of eleven separate vessels, seven being Lisbon-made and four from the Andalusia area. Pottery cups were used to drink water in Portugal since at least the 13th century, an inheritance of the Islamic period, though the shapes changed over time. In the late Middle Ages, the cups presented pedestal-footed bases, but one had to wait until the late 14th century to start observing flat-based cups, which progressed to shapes similar to the ones found on this wreck. The cups change their form over time, losing their neck and becoming more globular by the 18th century. These were widely spread through Iberian domestic environments from all social categories, equally found in poor and wealthy archaeological contexts, and were appreciated all over Europe [52].

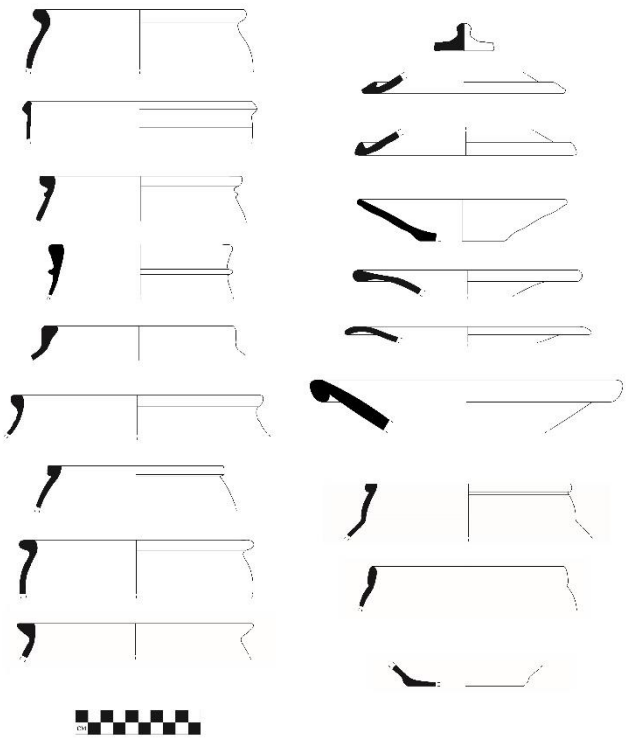

Figure 2. Cooking pots and lids (drawing by T.M Casimiro).

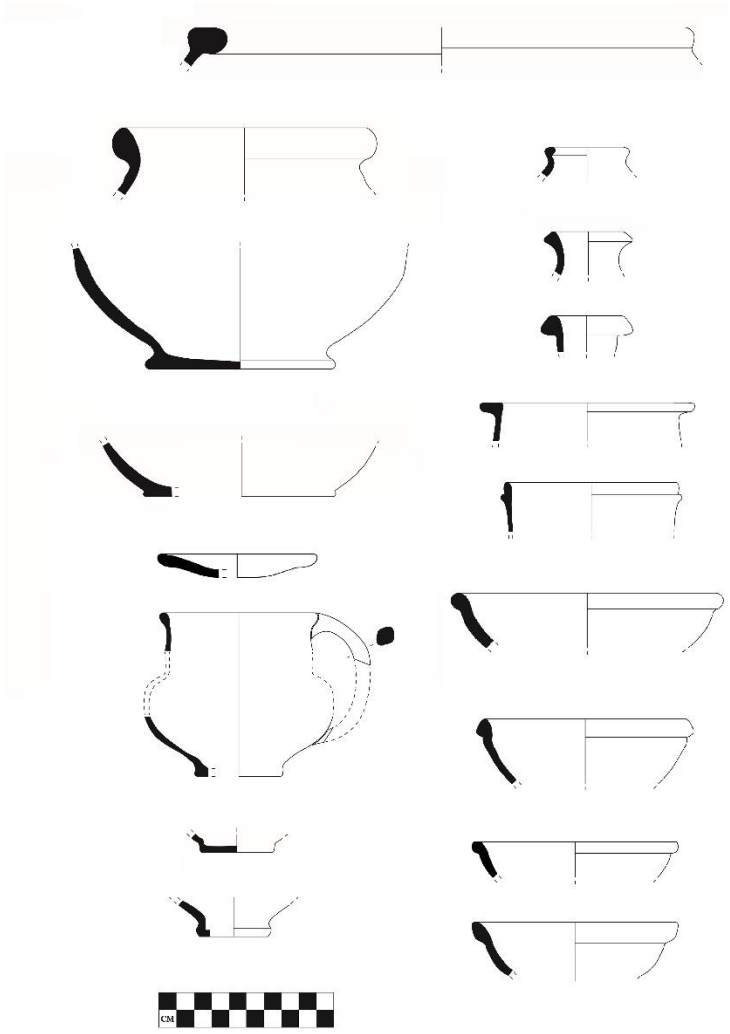

Figure 3. Pots, costrels, cups, and bowls (drawing by T.M Casimiro).

All of these storage and cooking pots would be covered by pottery lids, which are represented in this collection with seven objects with a trunco-conical shape, flat base, and central knob. These objects are some of the most frequent in medieval and post-medieval archaeological contexts, especially due to their frequent use and found frequently in underwater sites, such as on board the Great Armada ships [29] and several other wrecks [6].

Bowls are a frequent find, with 78 sherds corresponding to a minimum of 27 vessels. These are basically from two different types: hemispherical with semi-circular rims and slightly trunco-conical with a very low ring foot or carinated with a ring foot. Although both have semi-circular rims, the hemispherical ones are thicker while the others are thinner. Of these 27 vessels, 13 have no surface treatment and one has white tin glaze covering its surfaces; the remaining objects are all green glazed.

Thirty-nine sherds correspond to seventeen plates. Twenty-two of these sherds are covered with white tin glaze and seventeen are lead glaze, either green or yellow. The shapes are frequent of the 16th century, with recessed bottoms and semi-circular rims. These tin-glazed objects have been found in archaeological contexts at least since the mid-15th century and mainly in the first half of the 16th century [53]. By the time the Santiago wrecks in Ribadeo, the production of different plates has already started happening, although these would be very expensive. Similar objects have been found in many archaeological sites, including underwater sites [7]. Considering the form and glaze of these objects, it is complicated to attribute an origin. Until recently, they were said to be made only in

Andalucía, but we now know that they were also made in the Lisbon area as early as the mid-15th century [54]. As for *San Giacomo*, since the ship was in the Mediterranean and the Atlantic, it is difficult to know the origin of these objects. On the other hand, these objects were always circulating in the Iberian Peninsula. The trade between southern Andalusia and Lisbon is documented to have taken place since the Islamic period and continues through at least the 16th century, with ceramics originating in Seville, Malaga, Valencia, and Talavera [55].

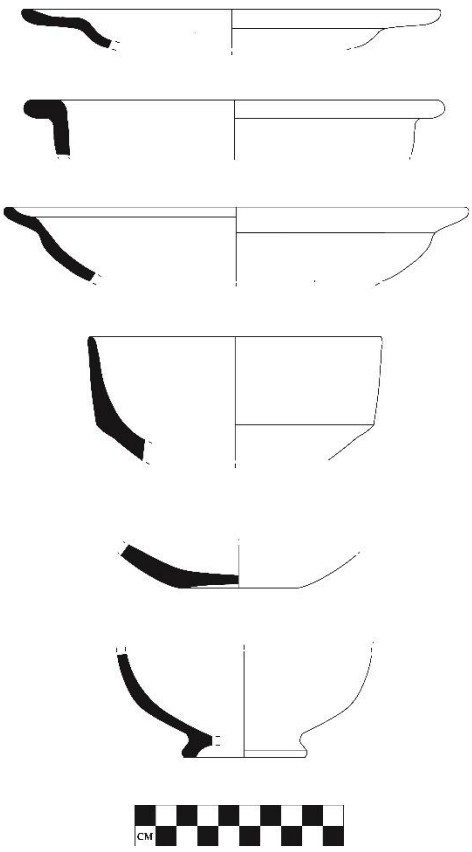

Figure 4. Bowls and plates (drawings by T.M Casimiro).

The existence of twelve large milk pans or large flared bowls is curious. These were large vessels with a large variety of functions, but usually not very frequently found on ships.

Olive jars are only known to have been produced first in Spain and later in Portugal around the early 16th century (Figure 6). Despite the Portuguese production, the southern Spanish workshops were the main production centres, thus it is without surprise that we find twelve of these objects classified as Andalusian productions and only four made in Portugal. Their main purpose was to transport olive oil, although other things have been found inside, such as olives or even ammunition [11].

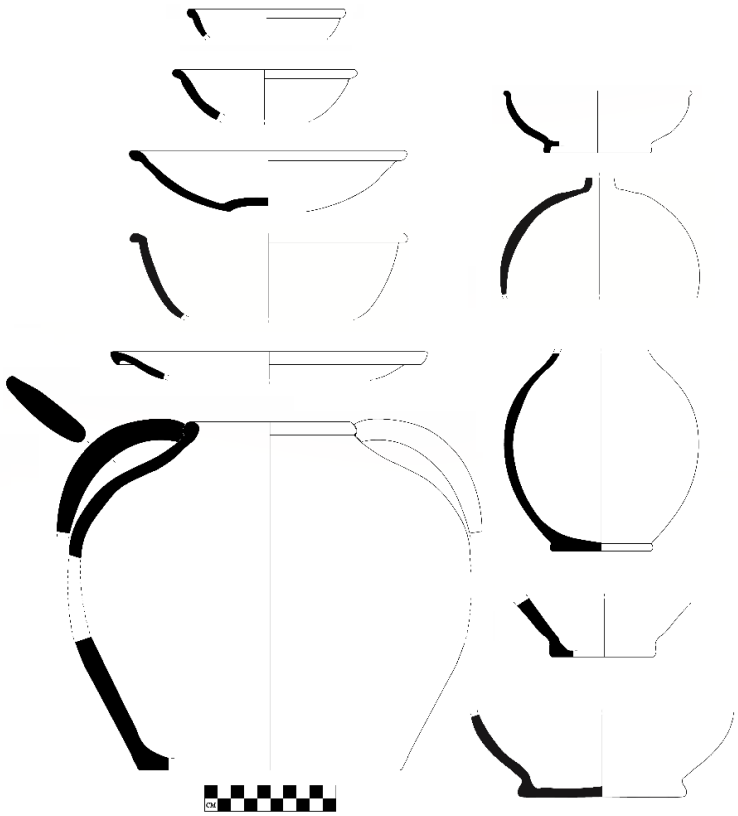

Figure 5. Glazed ceramics (drawings by T.M. Casimiro).

Figure 6. Olive jars (photo by L. Carmona).

Storage and transportation could also be made in the fifteen pots found on board with flat bases, everted rims, and globular bodies.

Four wooden objects were recovered: two plates, one cup (Figure 7), and one comb (Figure 8). Wooden tableware is a frequent find in shipwrecks independently of the place where these originated [56]. Their function was to be used to drink and eat from and were most likely part of the crew's table set. One of the bowls found in the Ribadeo wreck has an X inscribed at the lower bottom. These was probably an owner's mark. Such marks are very frequent on pottery vessels, inscribed after the object is finished and acquired. The majority are X's, although occasionally there are also lines and even letters. A fragment of one wood comb reveals an object which is frequently recovered on board shipwrecks. These artefacts were not used with an aesthetic purpose but had a very practical function. During the voyage of the ship *São Martinho* towards India in 1597, the death of a child covered with lice was reported [57] (p. 302) and certain infestations could cause pain and death. These wooden combs were used to control the spread of these plagues. Although barbers were always on board and the hair was cut often, lice were a common presence onboard as much as any other bug.

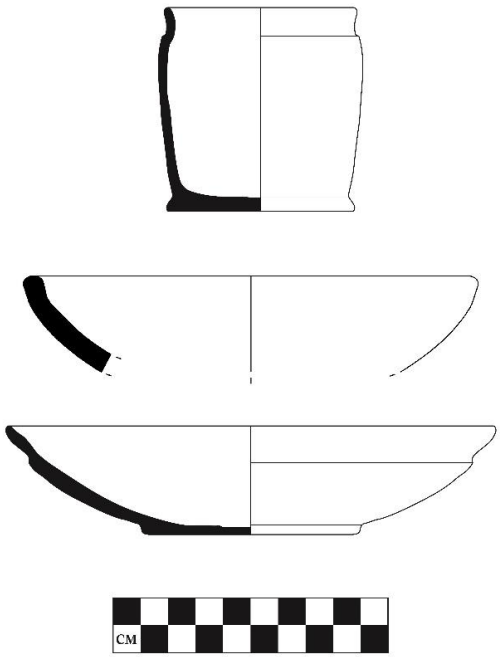

Figure 7. Wooden vessels (drawings by T. M. Casimiro).

Figure 8. Wooden comb [© ForSEAdiscovery-CSIC /Xunta de Galicia].

One leather shoe sole was also found. This may have belonged to any sailor and its size seems to be what we could consider a man's shoe. Although there are not that many studies of shoes, and clothes in general, for sailors, the discovery of shoes on board ships is not rare, even Iberian shoes [58], maybe indicating that this was part of the regular clothes people wore.

Contrary to what regularly happens on shipwrecks, metal objects are very rare and just a few were discovered, most of them too small to identify. There is a lead object that resembles a weight, although it is hollow inside could have been used as a lid and bears an unrecognizable mark. What we found most interesting was a large cauldron made of bronze that had burning marks all around the rear half area and where, curiously, a large majority of food remains were found [59]. Although very damaged, it was possible to recognize its globular shape (Figure 9). Its large size suggests that this was a vessel destined to cook for a large number of people and not for isolated individuals, which in fact seems to demonstrate that there was some sort of military unity on board and food was cooked for all and not for just a few.

Figure 9. Cauldron found in the Ribadeo wreck [© ForSEAdiscovery-CSIC /Xunta de Galicia].

6. Archaeometric Analysis

As mentioned, six sherds were analysed using archaeometric techniques. As this was a preliminary study, six samples were selected that were thought to be representative of different production areas. A larger number of samples will be analysed in a subsequent study.

Using different instrumental techniques, the samples were analysed from a chemical and mineralogical point of view. Infrared spectroscopy was used to determine the main phases (crystalline and amorphous) present in the sample. By means of thermal/gravimetric analysis, mass losses associated with different temperatures are determined, which makes it possible to identify losses of water from the crystallization of feldspars, clays, etc., present in the sample, as well as loss of CO_2 associated with carbonates (exothermic processes). Structural modifications without an associated mass loss (generally endothermic processes) can also be determined.

The FTIR analyses were conducted on an ALPHA II (Bruker) instrument in the ATR mode; 128 scans were registered in the interval of 4000–400 cm^{-1}, with a 4 cm^{-1} resolution. The DTA/TGA analyses were conducted on a Q600TA Instruments thermal analyser in a N_2 atmosphere, in which the samples were heated at a rate of 10 °C/min from the ambient temperature to 1000 °C.

The FTIR spectra are shown in Figure 10 and the vibrational frequencies of the spectra are indicated in the FTIR Table (Table 2). All the samples present a wide band in the

vibration interval of the Si-O groups, 1000–900 cm^{-1}, where there is an overlapping of the quartz and feldspar signals, as well as gehlenite, wollastonite, and diopside. These last three phases are the newly formed ones, produced in the firing process. In samples Rib38, Rib41, Rib 51, Rib52, and Rib53, the most intense signal appears around 970 cm^{-1}; while in sample Rib45, the most intense signal appears at 1040 cm^{-1}. This indicates that this last sample presents mostly gehlenite, while the others present mainly wollastonite. On the other hand, samples Rib38, Rib45, and Rib52 show calcite signals of a strong and medium intensity, respectively (Figure 10).

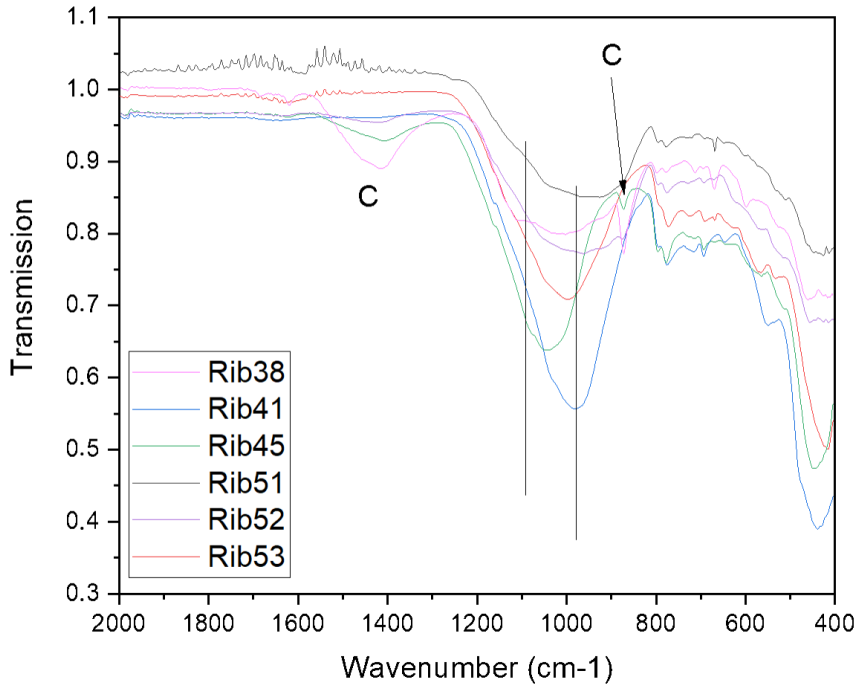

Figure 10. Infrared spectra of the samples in the interval 2000–400 cm^{-1}. C = calcite.

The presence of wollastonite is indicated by the presence of signals at 1020, 969, 933, and 903 cm^{-1}, while the presence of gehlenite is observed by the presence of signals at 1050, 979, and 921 cm^{-1}. Additionally, quartz presents in this zone intense absorption bands at 1160 and 1080 cm^{-1}, while diopside absorbs at the 1096–1080 interval and at 970 cm^{-1} [61].

The sample with more carbonates is Rib38 and it also contains wollastonite; that is to say it was fired below 800 °C. The rest have small percentages of calcite, which may either be impurities of the sample or marine deposits; they have a higher percentage of gehlenite, which would indicate that it has been fired at temperatures above 900 °C. The Rib45 sample may contain a mixture of wollastonite and gehlenite.

DTA/TG

The DTA curves of the five samples show four endothermic signals and no exothermic signals (Figure 11). The first peak with a maximum before 100 °C corresponds to adsorbed water, probably from the humid environment in which they have been preserved. The second endothermic peak at about 130 °C corresponds to the loss of water from the moisture retained in the clays, but this is not observed in samples Rib41 and Rib52. All the samples show a small endothermic signal around 500 °C (third peak) produced by the decomposition of the structural OH of muscovite and/or kaolinite. The presence of kaolinite is not clearly observed by FTIR [Ilić et al., 2016], indicating that the endothermic signal about 500 °C corresponds to the dehydroxylation of wollastonite. The last endothermic peak between 600 and 700 °C corresponding to carbonate decarbonation is observed in the Rib38, Rib45, and Rib52 samples [62,63].

Table 2. Main vibration bands of the samples and their assignments * [60]. s: strong; w: weak; m: medium; sh: shoulder; v: very; b = broad.

FTIR Bands (cm^{-1})						Bands Assignment *
RibMu38	**RibMu41**	**RibMu45**	**RibMu51**	**RibMu52**	**RibMu53**	
		3520w, b		3534 w		υH-OH
	3414 b	3400 w		3400 w		υH-OH
3319 b					3380 b	
					3230 b	
1630 w	1640 w,b	1620 w		1626 w	1620 w	δH-OH
1420 m,b	1420 w,b	1410 m,b		1420 m		
1164 sh	1162 sh	1162 sh			1165 sh	
			1121 sh		1123 sh	
	1032 sh	1079 shW?				υ_{as} Si-O-Si
1020s,b W	1006 sh	1045 vsW?	1041 sh	1051 sh	1049 sh	
	980 vs	1013 sh		1013 sh		υ_{as} Si-O-Al
					998 vs	$\upsilon_{as}(Si,Al)O_3$
957 s,b			960 vs	964 vs		$\upsilon_{as}(Si,Al)O_3$
920 s			925 vs	920 s		$\upsilon_{as}(Si,Al)O_3$
875 s	792 m	872 m	875 sh	875 s		υ_{as}Al-O-Al
795 m	772 m	797 m	793 m	793 m	793 m	$\upsilon_{s}(Si,Al)O_3$
773 m	730 sh	776 m	773 m	773 m	772 m	
	716 m	730 w	720 w	729 m	725 m	
	693 m	713 w				
693 m		693 m	693 w	693 m	693 m	υ_{s}Al-O-Al
668 m	645 m	667 m	668 m	668 m	668 m	υ_{s}Si-O-Si
		644 m	648 m			
625 sh, b	600 sh			620 sh		
605 sh		600–580 b	600 w			
	548 m					
		561 m	572w	564 m, b	569 m	
	534 m					
526 sh,b		526 sh	530 m		535 m	δ_{s}Si-O-Al(?)
	476 sh	511 m	511 m	511 w		
	460 sh		477 sh			
456 m	450 sh	463 sh	461 sh	456 m	460 sh	
	438 m	448 m	447 m	442 m	445 sh	
	426 m	441 m,b	436 m			
	419 m	429 m,b	426 m	426 m	425 m	
		421 m,b				
		415 sh	413 m	414 m	415 m	δa_{s}Si-O-Al(?)

The weight losses associated with the samples are shown in Table DTA (Table 3). The weight loss associated with moisture in the clays is small in all cases (less than 1%) and is not observed in the Rib41 and Rib52 samples. The decomposition of the clays produced in all the samples a weight loss of about 1%. On the other hand, the loss of CO_2 from carbonates is 4.36% in the Rib38 sample and less than 1% in the rest of the samples. This indicates that the Rib38 sample contains 9.9% carbonates, while the rest of the samples have the following percentages: Rib41 0.52; Rib 45, 1.27; Rib51, 1.16; Rib52, 0.72; and Rib53, 0.71.

Table 3. Samples weight loss.

Interval	Samples Weight Loss (%)					
	Rib38	**Rib41**	**Rib45**	**Rib51**	**Rib52**	**Rib53**
25–102 °C	3.01	4.01	0.10	0.28	8.79	0.35
102–160 °C	0.66		0.18	0.09		0.26
160–530 °C	1.49	1.02	1.59	1.27	1.07	1.10
530–750 °C	4.36	0.23	0.56	0.51	0.39	0.37
750–1000 °C	0.18	0.18	0.09	0.04	0.08	0.11

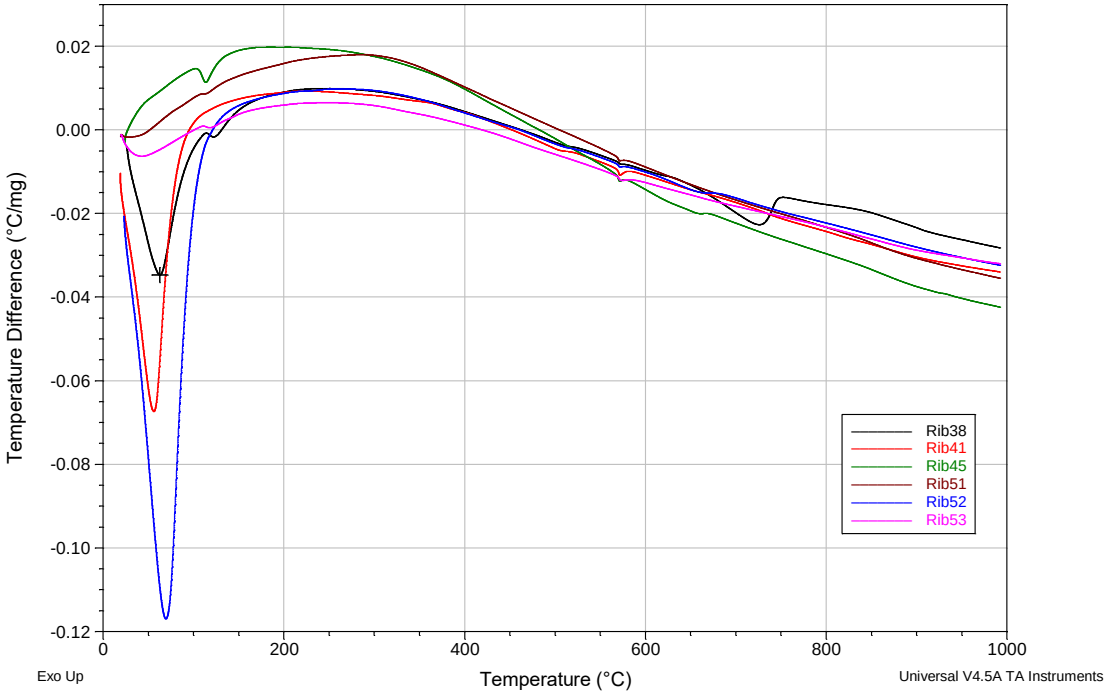

Figure 11. Differential thermo analysis of the samples in the interval 25–1000 °C.

7. Discussion

When a wreck is identified, importance is provided mostly to the structure of the ship and the guns. If large amounts of pottery are found on board, these are often studied as cargo and only their commercial importance is discussed, especially if it includes exotic ceramics. These types of debates, although interesting in terms of technology and economic conclusions, miss several key points, especially those related to theoretical approaches.

Based on the information retrieved by the ceramics and other material culture items found on board *San Giacomo*, it is possible to reconstruct its itinerary. We know, based on documentary evidence, that this ship was constructed in Naples and from there it sailed into Cadiz, passing through Lisbon before sailing to Galicia where it sunk, not before joining the Armada that tried to once again invade England. The material culture on board reflects, at least partially, the whereabouts of the vessel. We are not aware of what was on board when the ship left Naples but considering the number of Andalusian ceramics found on board (9.7% of the identifiable ceramics), we can safely say that a large portion, if not all of it, entered the ship while in Cadiz. The type of ceramics, especially olive jars, costrels, and bottles, reflect a concern of providing provisions on board. The same can be said about the time it was in Lisbon. The type of material culture reveals pottery vessels which relate mostly to storing provisions such as pans. These objects, although used on land mostly to cook, have a shape that can fit several of these pots on top of each other, tied with ropes to avoid breakage.

The ceramics collection has a high rate of broken vessels. In fact, only two complete olive jars were found on the site, which is surprising if we look at all the other objects which are very damaged.

This was a military ship. When looking at the material culture found on board, nothing suggests that this ship had any other intention besides joining that naval endeavour. The most striking absence is the absence of imports. At this time, Chinese porcelain, for example, would be considered an everyday item, even on-board ships dedicated to naval warfare such as the one belonging to the 1588 Spanish Armada [29]. Nothing on board this ship reveals that objects had a high value, and these were used as everyday objects to drink, eat, and store. On the other hand, we cannot forget that this ship was salvaged; thus, all the

valuable artefacts may have been recovered then. On the other hand, the ship has not been not fully excavated.

It is not always easy to discover what type of food these objects transported. When the Armada left Lisbon towards Ferrol in October 1597, a document was written recording, in tons, the most important food supplies [32] (AGS, GyM, leg. 490, Doc. 431). *San Giacomo de Galicia* is among these ships and they all carried hardtack, wine, smoked bacon, fish, olive oil, vinegar, rice, chickpeas, broad beans, wheat, and flour. These food items, if not stored, were at least eaten from the plates and bowls found in the excavation. Except for water, marmalade, and jam, these were the main sources of nourishment on board any ship of the Iberian armadas and while cloth bags and wood casks would be the main storage process for flour or grains, some food would be better protected inside pottery jars considering the existence of bugs, humidity, and all the other ways food could be spoiled.

The most curious thing about the ceramics used on board ships is the fact that why would someone take on board things that would have a high probability of breakage? Although many ships have plates and bowls made of pewter and wood, certain types of ceramics, such as drinking cups, are always on board [6,7]. Although a movable site, people on board a ship take with them many of the habits they have on land. Drinking water was something that Iberian populations, at least in the south, would include in their daily routines and was a difficult habit to lose. The water tasted differently when drunk from these cups [64] and it is possible that these habits would be maintained. A few cups used to drink water reveal that daily habits were firmly entrenched for some of the sailors on board and the practice of drinking water using a clay pot, so common in Iberian terrestrial households, was not forgotten in this nautical environment sailing so far from Lisbon. A few plates and bowls could have been used at the table, although it is always difficult to safely define uses for ceramics on board ships. What could have been used as a cooking pot in late 16th century Lisbon could be just a container on board these ships.

The absence of metal objects on board may be related to the boat being salvaged after the wrecking, with most of the valuable artefacts removed from its interior. The cauldron remained since it was probably too heavy, totally submerged, and its value not worth the effort.

The pottery collection reflects the itinerary of the ship (Figure 1). While it spent a lot of time in the kingdom of Naples after its construction, we are not aware for how long it navigated on the Mediterranean and before setting sail towards Lisbon, it must have been cleaned and prepared to join the Armada. During the two years it was in Lisbon, some items may have been used on board, but the majority of things would have entered when the ship set sail to Ferrol, including all the abovementioned provisions. The most frequent Spanish objects are olive jars. These objects were mostly destined to contain olive oil and although manufactured in southern Spain, it is not uncommon to see them being reused in different ports. If we interpret the 1597 document literally, then the three tons of olive oil would correspond to a large amount of these vessels, much more than the ones found. Another hypothesis is that these objects, although they were made in southern Spain, entered the galleon while in Lisbon, demonstrating that he was not only connecting harbours but was also part of a large system of networks that occurred in the Iberian Peninsula.

The spectroscopy applied to the pottery sherds originating from this site was limited; however, it allowed us to distinguish at least two groups of pots, one that was fired below 800° and another which seems to correspond to pots being fired above 900°. When we cross-reference this information with evidence for provenance, we realize that the first group was classified as olive jars while the other was the so-called table wares produced in Lisbon. The analysis performed on the six samples may indicate that they have been subjected to different heat treatments and could therefore have different origins. The clearly different sample is Rib38, which contains calcite and wollastonite, reflecting a firing temperature below 800 °C. The archaeometric conclusions may not have illuminated our understanding

of life on board in the late 16th century but they have helped us to understand that there were different production techniques in different Iberian locations.

8. Conclusions

In 1597, San Giacomo di Galicia made its final voyage into the Ribadeo harbour. Four centuries later, we were provided with the privilege of attempting to reconstruct the way people lived on board. It was a military ship, sailing with the intention of participating in a conflict between Spain and England, thus the evidence found in the Ribadeo wreck reflects a specific type of identity. Men lived on board this ship and their daily lives were orientated around a military objective. Still, they had to eat and drink to survive. The material culture on board and historical documents helped us to reconstruct these daily lives. Ceramic functions are difficult to debate and while we are sure that olive jars carried olive oil, and possibly other food items, cups were most certainly used to drink water, repeating a behaviour that was done every day, several times a day when on land. Why not continue to do this on board? Other objects, such as a shoe, demonstrate that sailors and soldiers wore footwear and a wooden comb revealed that lice were on board.

We started this paper with the question of what a ship is. However, most importantly, what are the types of relations developed not only on board these vessels but with all the political, economic, cultural, and social systems which were responsible for the construction and maintenance of these vehicles? Within this paper, we have told the story of *San Giacomo*, from the very moment of the felling of trees in southern Italy until the moment it sank in northern Spain. Most of the things that the ship and the people directly involved with it endured during those, approximately, seven years will never be known, but we are able to reconstruct small fragments of what happened through archaeology. We were able to comprehend what are the technical aspects behind its construction and the wood chosen for that very same construction [14,22,23,35]. We were able, based on documents kept in different archives, to reconstruct its history and its itinerary [32,37]. The excavation permitted the study of all the things found on board this ship and what was used on board, the majority of them studied in this paper but also in others [57]. We were also able to apply archaeometric analysis which demonstrated different production techniques. All these approaches led to the study of relations between people, people and the ship, and people and their things. Thus, a ship, and in this particular the case of *San Giacomo di Galicia*, is so much more than a war vessel. It is a space where different agents interacted in the development of relations that influenced the lives of hundreds of people and generated a countless number of different ontological interactions, some of which we were able to reconstruct.

Author Contributions: Conceptualization, T.M.C. and A.C.-S.; methodology, T.M.C., S.M.-R., I.A.C. and A.C.-S.; formal analysis, T.M.C., S.M.-R. and A.C.-S.; investigation, T.M.C., S.M.-R., M.S.C.S.C. and A.C.-S.; resources, T.M.C. and A.C.-S.; data curation, T.M.C., S.M.-R., M.S.C.S.C. and I.A.C.; writing—original draft preparation, T.M.C. and A.C.-S.; writing—review and editing, T.M.C., A.C.-S., S.M.-R. and M.S.C.S.C.; project administration, A.C.-S. and M.S.C.S.C.; funding acquisition, A.C.-S. and M.S.C.S.C. All authors have read and agreed to the published version of the manuscript.

Funding: Archaeological excavation of the Ribadeo I shipwreck took place under the ForSEAdiscovery project (PITN-GA2013-607545). This research received funding of the PIE-CSIC research project "Naufragios Históricos" Ref.: 201910E065; I-LINK "UnderHERITAGE", Consejo Superior de Investigaciones Científicas (CSIC), Ref.: LINKB20042; Xunta de Galicia, Dirección Xeral do Patrimonio, and the Institute of Nautical Archaeology (INA); and project TOP Heritage cm (S2018/NMT-4372) from Community of Madrid. Authors acknowledge support from CSIC Interdisciplinary Platform "Open Heritage: Research and Society" (PTI-PAIS).

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Rich, S. Hauntography of an Ordinary Shipwreck: Paradox, Appellation, Provenance, Apparition. In *Heritage and the Sea*; Crespo Solana, A., Castro, F., Nayling, N., Eds.; Springer: New York, NY, USA, 2022; pp. 59–72.
2. Mack, J. *The Sea: A Cultural History*; University of Chicago/Reaktion: Chicago, IL, USA, 2011.
3. Solana, A.C. ForSEAdiscovery: La Construcción Naval y el Comercio de la Madera del Siglo XVI al XVIII, Revista PH, 96. 2019. Available online: https://www.iaph.es/revistaph/index.php/revistaph/article/view/4279 (accessed on 25 November 2022).
4. Intino, R. Objectos do quotidiano. In *Nossa Senhora dos Mártires. A Últma Viagem*; Verbo: Lisbon, Portugal, 1998; pp. 219–227.
5. Coelho, I. A Cerâmica Oriental da Carreira da Índia no Contexto da cara de uma nau—A Presumível Nossa Senhora dos Mártires. Master's Thesis, Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa, Lisbon, Portugal, 2008.
6. Casimiro, T.M. Material Culture from the Al Hallaniyah Isle early 16th century Portuguese Indiaman wreck site. *Int. J. Naut. Archaeol.* **2018**, *47*, 182–202. [CrossRef]
7. Gutiérrez, A. A shipwreck cargo of Sevillian pottery from the Studland Bay wreck, Dorset, UK. *Int. J. Naut. Archaeol.* **2003**, *32*, 24–41. [CrossRef]
8. Alves, F.; Rodrigues, P.; Garcia, C.; Aleluia, M. Alves, F.; Rodrigues, P.; Garcia, C.; Aleluia, M. A cerâmica dos destroços do navio de meados do século XV, Ria de Aveiro A e da zona da Ria de Aveiro B. Aproximação tipológica preliminar. In *Actas das 2as Jornadas de Cerâmica Medieval e Pós-Medieval*; Câmara Municipal de Tondela: Tondela, Portugal, 1998; pp. 185–210.
9. Blake, W.; Green, J. A mid-XVI century Portuguese wreck in the Seychelles. *Int. J. Naut. Archaeol.* **1986**, *15*, 1–23. [CrossRef]
10. Werz, B. Saved from the sea: The shipwreck of the Bom Jesus (1533) and its material culture. In *The Global City. On the Streets of Renaissance Lisbon*; Gschwen, A.J., Lowe, K., Eds.; Paul Holberton Publishing: London, UK, 2015; pp. 89–93.
11. Mello, U. The shipwreck of the galleon Sacramento—1668 off Brazil. *Int. J. Naut. Archaeol.* **1979**, *8*, 211–223.
12. Loewen, B.; Barreiro Argüelles, S.; Cottreau-Robins, C. S'adapter pour rester: Continuités basques aux xviie et xviiie siècles. *Archéologiques* **2021**, *34*, 1–17. [CrossRef]
13. Williams, S.; Junco, R. (Eds.) The Archaeology of Manila Galleons in the American Continent. In *The Wrecks of Baja California, San Agustín, and Santo Cristo de Burgos (Oregon)*; Springer: New York, NY, USA, 2021.
14. San Claudio, M.; González, R.; Casabán, J.L.; Castro, F.; Domínguez, M. El pecio de Ribadeo, un excepcionalmente bien conservado pecio español del siglo XVI. In *Actas I Congreso de Arqueología Náutica y Subacuática Española*; Ministerio de Cultura: Cartagena, Spain, 2014; pp. 208–221.
15. Domínguez Delmás, M.; García González, I. *Dendrochronological Research of Samples from the Ribadeo Shipwreck (Galicia, Spain), Report nr: 2015005*; Universidad de Santiago de Compostela | Escola Politécnica Superior, Dep. Botánica, Campus de Lugo: Lugo, Spain, 2015.
16. Haneca, K.; Daly, A. Tree-Rings, Timbers and Trees: A dendrochronological survey of the 14th-century cog, Doel 1. *Int. J. Naut. Archaeol.* **2013**, *43*, 87–102. [CrossRef]
17. Nayling, N.; Susperregui, I. Iberian Dendrochronology and the Newport Medieval Ship. *Int. J. Naut. Archaeol.* **2014**, *43*, 279–291. [CrossRef]
18. Rich, S.; Nayling, N.; Momber, G.; Crespo Solana, A. *Shipwrecks and Provenance: In-Situ Timber Sampling Protocols with a Focus on Wrecks of the Iberian Shipbuilding Tradition*; Archaeopress: Oxford, UK, 2018.
19. Domínguez-Delmás, M.; Rich, S.; Nayling, N. Dendroarchaeology of shipwrecks in the Iberian Peninsula: 10 Years of Research and Advances. In *Heritage and the Sea: Maritime History and Archaeology of the Global Iberian World (15th–18th Centuries)*; Crespo Solana, A., Castro, F., Nayling, N., Eds.; Springer: New York, NY, USA, 2022; Volume 2, pp. 1–59.
20. Eguiluz Miranda, B.; Domíngues-Delmás, M.; Trápaga Monchet, K.; San Claudio Santa Cruz, M.; Gasch-Tomás, J.L. Can we identify the Ship through a multidisciplinary Approach? The case of the Ribadeo I wreck (c. 1597). In *Heritage and the Sea: Maritime History and Archaeology of the Global Iberian World (15th–18th Centuries)*; Crespo Solana, A., Castro, F., Nayling, N., Eds.; Springer: New York, NY, USA, 2022; Volume 2, pp. 97–119.
21. Mason, B.; Heamagi, C.; Nayling, N. The Ribadeo I Wreck—Multi-Year Photogrammetric Survey of a Spanish Galleon of the Second Armada. *Heritage* **2023**, *6*, 1069–1088. [CrossRef]
22. Crespo Solana, A.; Nayling, N. *García-González Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery (16th–18th Centuries)*; CSIC: Madrid, Spain, 2018.
23. Crespo Solana, A.; Castro, F.; Nayling, N. (Eds.) *Heritage and the Sea: Maritime History and Archaeology of the global Iberian World (15th–18th Centuries)*; Springer: New York, NY, USA, 2022; Volume 2.
24. Wazny, T. Análisis Dendrológico de las Muestras Procedentes del Galeón de Ribadeo; (M. S. Claudio, Entrevistador), 2018.
25. Fernández de Navarrete, M. *Relación de la Fábrica de doze Galeones de Guerra de la Escuadra Yllirica de Pedro de Ivella, Colección Documental Fernández Navarrete*; Museo Naval de Madrid: Madrid, Spain, 1792.
26. San Claudio Santa Cruz, M. Archaeological perspectives in Galicia during the age of Religious wars: The Capitana and Almiranta of the Illyrica Squadron. In *Heritage and the Sea: Maritime History and Archaeology of the Global Iberian world (15th–18th Centuries)*; Crespo Solana, A., Castro, F., Nayling, N., Eds.; Springer: New York, NY, USA, 2022; Volume 2, pp. 73–97.
27. Atherton, D. *La Trinidad Valencera: The History, Discovery and Excavation of a Spanish Armada Vessel in Kinnagoe Bay, County Donegal, Ireland by the City of Derry Sub Aqua Club*; Great Sea: Dublin, Ireland, 2013.
28. Gould, R.A. *Archaeology and the Social History of Ships*; Cambridge University Press: Cambridge, UK, 2001.
29. Martin, C. Spanish Armada Pottery. *Int. J. Naut. Archaeol.* **1979**, *8*, 279–304. [CrossRef]

30. Martin, C.; Parker, G. *The Spanish Armada, Mandolin*; Manchester University Press: Manchester, UK, 1999.
31. Fonseca, L.J.T. A escuadra Ilírica no mar Oceano (1595–1598). Master's Thesis, Universidade de Lisboa, Faculdade de Letras, Lisboa, Portugal, 2005.
32. Archivo General de Simancas (AGS); Guerra y Marina (GYM). Available online: https://www.culturaydeporte.gob.es/dam/jcr:0ed2d1d6-a0d5-41da-81b4-54d43e668a1d/AGS%20Cat%C3%A1logo%20de%20idds%203%C2%AA%20edici%C3%B3n.pdf (accessed on 25 November 2022).
33. *Epistolario de Felipe II Sobre Asuntos de mar: 1813 Documentos*; Editora Nacional: Madrid, Spain, 1943.
34. Fernández Duro, C. *Armada Española Desde la Unión de los Reinos de Castilla y León*; Museo Naval: Madrid, Spain, 1972; pp. 1597–1598.
35. Casabán, J.L. Santiago de Galicia and the Illyrian squadron: Characteristics, dimensions and tonnages of Mediterranean-built galleons for Philip's II Atlantic fleets (1593–1597). *Int. J. Marit. Hist.* **2017**, *29*, 238–260. [CrossRef]
36. San Claudio Santa Cruz, M. El Escuadrón Ragusano en la Armada de 1596. *Proa A La Mar* **2019**, *174*, 50–55.
37. Archivo General de las Indias, Contaduría Mayor de Cuentas. Available online: http://pares.mcu.es/ParesBusquedas20/catalogo/autoridad/46629?nm (accessed on 25 November 2022).
38. Casimiro, T.M.; Gomes, J.P. Formas e Sabores: Alimentação e Cerâmica nos Séculos XVII e XVIII. *Conimbriga* **2022**, *61*, 259–294. [CrossRef] [PubMed]
39. Bugalhão, J.; Coelho, I.P. Cerâmica Moderna de Lisboa: Uma proposta tipológica. In *I Encontro de Arqueologia de Lisboa: Uma Cidade em Escavação*; Caessa, A., Nozes, N., Cameira, I., Silva, R.B., Eds.; Centro de Arqueologia de Lisboa: Lisboa, Portugal, 2017; pp. 107–145.
40. Silva, R. O Museu Nacional de Machado de Castro—Um Ensaio de Arqueologia Urbana em Coimbra: Do Fórum Augustano ao paço Episcopal de Afonso de Castelo Branco. Ph.D. Thesis, Faculdade de Letras da Universidade de Coimbra, Coimbra, Portugal, 2016.
41. Barbosa, T.; Casimiro, T.M.; Manaia, R. A late 15th century household pottery group from Aveiro (Portugal). *Mediev. Ceram.* **2009**, *30*, 119–136.
42. Barreira, P.; Dórdio, P.; Teixeira, R. 200 anos de cerâmica na Casa do Infante: Do século XVI a meados do século XVIII. In *Actas das 2as Jornadas de Cerâmica Medieval e Pós-Medieval, Métodos e Resultados para o seu Estudo*; Câmara Municipal de Tondela: Tondela, Portugal, 1995; pp. 145–184.
43. Gomes, M.V.; Gomes, R.V. *Cerâmicas Vidradas e Esmaltadas, dos Séculos XIV, XV e XVI, do Poço–Cisterna de Silves*; Campo Arqueológico de Mértola: Mértola, Portugal, 1996; pp. 143–205.
44. Pleguezuelo Hernández, A.; Huarte Cambra, R.; Somé Muñoz, P.; Ojeda Calvo, R. Cerámicas de la Edad Moderna (1450–1632). In *Real Monasterio de San Clemente: Una Propuesta Arqueológica*; Angél Tabales, M., Ed.; Universidad de Sevilla and Fundación El Monte: Seville, Spain, 1997; pp. 130–157.
45. Ruiz Ruiz, H. La cerámica granadina en los siglos XVII y XVIII. In *Cerámica Granadina, Siglos XVI-XX*; Fresneda Padilla, F., Ed.; Fundación Rodríguez-Acosta: Granada, Spain, 2001; pp. 117–160.
46. Ruiz Gil, A. *Arqueologia de La Bahia de Cadiz Durante La Edad Moderna: Una Imagen del Comercio Entre los Siglos XIII-XVIII a Través de las Producciones Cerámicas*; Editorial Académica Espanõla: Chisinau, Moldova, 2012.
47. Busto Zapico, M. European pottery trade in the Northwest of the Iberian Peninsula during the Early Modern Period. The role of Asturias. In Proceedings of the 12th Congress AIECM3 On Medieval and Modern Period Mediterranean Ceramics, Athens, Greece, 21–27 October 2018; Petridis, P., Yangaki, A.G., Liaros, N., Bia, E.-E., Eds.; National Hellenic Research Foundation: Athens, Greece, 2021; pp. 371–379.
48. Matos, A. Quem vai ao mar em terra se avia: Preparativos e recomendações aos passageiros da carreira da Índia no século XVII. In *A Carreira da Índia e as Rotas dos Estreitos: Actas do VIII Seminário Internacional de História Indo-Portuguesa*; Universidade Católica Portuguesa: Angra do Heroísmo, Portugal, 1998; pp. 377–394.
49. Casimiro, T.M.; Newstead, S. Portuguese coarsewares in North Atlantic trade (16th-18th centuries). *Am. Ceram. Circ. J.* **2019**, *10*, 59–82.
50. Casimiro, T.M. Portuguese Redwares e Coarse Wares in Historical Archaeology. In *Encyclopedia of Global Archaeology*; Smith, C., Ed.; Springer: New York, NY, USA, 2014; pp. 6045–6052. [CrossRef]
51. Gomes, P.D. O Livro de Cozinha da Infanta D. Maria, Olaria—Estudos de Arqueologia. *História E Etnogr.* **1996**, *1*, 93–104.
52. Vasconcellos, C. *Algumas Palavras a Respitos dos Púcaros de Portugal*; Impressa da Universidade: Coimbra, Portugal, 1921.
53. Deagan, K. *Artifacts of the Spanish Colonies of Florida and the Caribbean 1500–1800, Volume 1: Cermics, Glassware and Beads*; Smithsonian Institution Press: Washington, DC, USA, 1987.
54. Henriques, J.P.; Filipe, V.; Casimiro, T.M.; Krus, A. By fire and clay. A late 15th century pottery workshop in Lisbon. In Proceedings of the 12th Congress AIECM3 On Medieval and Modern Period Mediterranean Ceramics, Athens, Greece, 21–27 October 2018; Petridis, P., Yangaki, A.G., Liaros, N., Bia, E.-E., Eds.; National Hellenic Research Foundation: Athens, Greece, 2021; pp. 41–52.
55. Brandão, J. *Grandeza e Abastança da Cidade de Lisboa em 1552*; Livros Horizonte: Lisbon, Portugal, 1990.
56. Gardiner, J.; Alen, M. Before the Mast. In *Life and Death aboard the Mary Rose*; The Mary Rose Trust, Ltd.: Portsmouth, UK, 2005.
57. Monteiro, J. *Uma viagem redonda da carreira da Índia (1597–1598)*; Biblioteca Geral da Universidade de Coimbra: Coimbra, Portugal, 1985.
58. Garcia, C.; Pinto, C.; Fragoso, I. From the Sea to the Land: An Archaeological Study of Iberian Footwear During the Early Modern Period. *Heritage* **2023**, *5*, 867–890.

59. Moreno-Garcia, M.; San Claudio Santa Cruz CCrespo Solana, A. Meat supplies at the San Giacomo di Galizia: Preliminary results from three small faunal samples. *Heritage* **2023**, *6*, 1118–1127. [CrossRef]
60. Marincea, S.; Dumitraş, D.; Ghineţ, C.; Fransolet, A.; Hatert, F.; Rondeaux, M. Gehlenite from three occurrences of High-Temperature Skarns, Romania: New Mineralogical Data. *Can. Mineral.* **2011**, *49*, 1001–1014. [CrossRef]
61. Rincón, M.J.; Romero, M.; Blanco, T.; Martínez, S. Analytical and Structural Characterization of Façade Bricks from the Pedro I Palace, Sevilla. In *VII Congreso Ibérico de Arqueometría*; Consejo Superior de Investigaciones Científicas: Madrid, Spain, 2008; pp. 628–639.
62. Drebushchak, V.A.; Mylnikova, L.; Molodin, V.I. Thermogravimetric investigation of ancient ceramics. Metrological analysis of sampling. *J. Therm. Anal. Calorim.* **2007**, *90*, 73–79. [CrossRef]
63. Palanivel, R.; Kumar, R. The mineralogical and fabric analysis of ancient pottery artifacts. *Cerâmica* **2011**, *57*, 56–62. [CrossRef]
64. Casimiro, T.M.; Newstead, S. 400 Years of water consumption: Early modern pottery cups from Portugal. *Ophiussa* **2019**, *3*, 125–133. [CrossRef]