

Maria João Valente
António Faustino Carvalho
(eds.)



ATAS **XI**

ENCONTRO DE ARQUEOLOGIA
DO SUDOESTE PENINSULAR

ENCUENTRO DE ARQUEOLOGIA
DEL SUROESTE PENINSULAR

21-23 OUT
2021 LOULÉ



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Study of the malacofauna found in the main hall of the Islamic palace of Silves Castle (Algarve, Portugal)

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Abstract

During an archaeological intervention carried out in the main palace hall of Silves Castle, in 2006, abundant malacological fauna was exhumed, contributing to the reconstitution of diets and cultural practices of the medieval populations that lived here. It was possible to count a minimum number of 5547 individuals, from 20 taxa of bivalve and gastropod molluscs, and cirriped crustaceans. This sample consists mainly of clams (*Ruditapes decussatus*) corresponding to 86.9% of the collection. The relative abundance and palaeoecological analysis suggest local subsistence practices and eating habits, related to the exploitation and consumption of edible molluscs collected from estuarine areas of the Arade river. These focused mainly on the capture of clams (*R. decussatus*), common cockles (*C. edule*), mussels (*M. galloprovincialis*), and flat oysters (*O. edulis*).

Keywords

Zooarchaeology, Malacology, Islamic period, food habits, Algarve (Silves).

Resumo

Durante a intervenção arqueológica realizada no salão do palácio principal do Castelo de Silves, em 2006, exumou-se abundante fauna malacológica, que contribuiu para a reconstituição de dietas e práticas culturais das populações medievais que aí habitaram. Foi possível contabilizar um número mínimo de 5547 indivíduos, pertencentes a 20 taxa de moluscos bivalves, gastrópodes e crustáceos cirrípedes. O espólio estudado é constituído maioritariamente por ameijoia (*Ruditapes decussatus*), correspondente a 86,9% da coleção. A sua abundância relativa e análise paleoecológica sugerem práticas de subsistência locais e hábitos alimentares, ligados à exploração e consumo de moluscos comestíveis recolhidos em áreas estuarinas do rio Arade. Estas focavam-se, sobretudo, na captura de amêijoia-boia (*R. decussatus*), berbigão (*C. edule*), mexilhão (*M. galloprovincialis*) e ostra plana (*O. edulis*).

Palavras-chave

Zoarqueologia, Malacologia, Época islâmica, Práticas alimentares, Algarve (Silves).

1. Introduction

The Silves Castle, a remarkable work of military architecture built by Muslims between the 10th and 13th centuries, is located in the city of Silves (Algarve, South Portugal), as part of an outstanding defensive system that surrounded and protected the medieval city (Fig. 1).

Given the historical importance of Islamic occupation that lasted five centuries, resulting in an important cultural and political centre, and the last capital of the *Gharb al-Andalus* in south Portugal. The archaeological interest in the city of Silves has been growing since the early '80s upon discovery of an Almohad cistern-well (12th century), near a wall that surrounded the Medina excavated by the researchers Mário and Rosa Varela Gomes (Gomes & Gomes, 1992; Gomes, 2006, pp. 29-54) from NOVA University of Lisbon, School of Social Sciences and Humanities. Thenceforth, Silves has been the centre of successive scientific projects, which also involved excavations, restoration and conservation of uncovered structures and pavements, leading to important information for the characterization of this city during the Islamic times.

As a result of the excavations performed in the city, a considerable amount of malacological material was collected, in particular thousands of edible marine mollusc shells, as one of the largest malacological collections from Islamic contexts in Portugal.

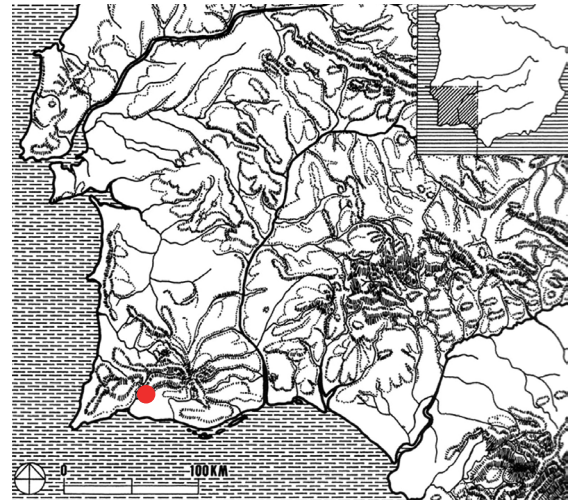
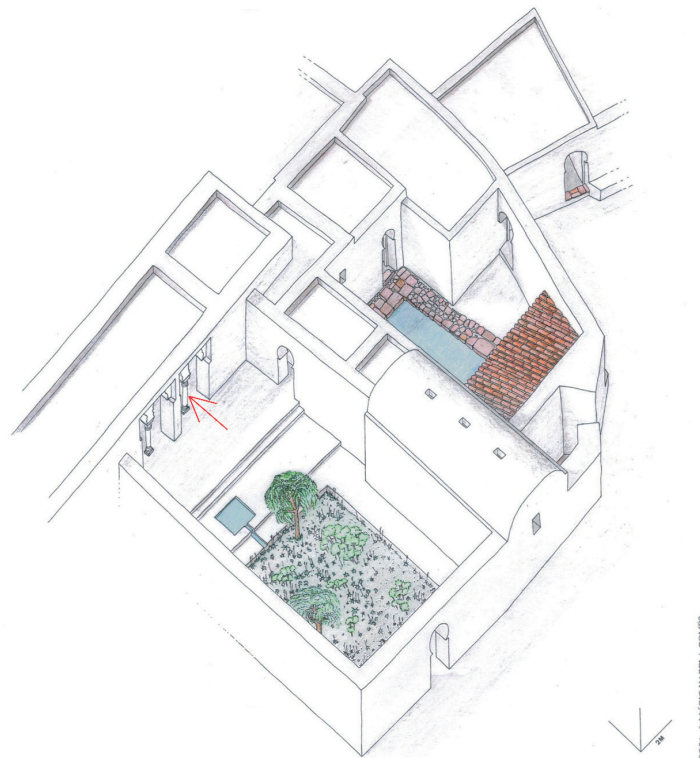


Figure 1 – Silves. Location on the map of southern Portugal and nearby Spain.



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Figure 2 – Silves Castle. Graphic representation of main palace with indication of the place where the fauna was found.

In 2006, during an archaeological intervention carried out in the main palace hall of Silves Castle (layer 2) (Fig. 2) belonging to the final phase of the Islamic occupation (1248), ceramic materials, Almohad dirhem and a large number of malacological remains were collected (Gomes, 2013, pp. 28-30).

The study presented here focuses on the interdisciplinary analysis in which the presence of biological remains in archaeological contexts allows us to recreate the food consumption habits of human communities, as well as their experiences, and aspects of the economy, recreating habits, but also reconstructing their surrounding natural environment (Callapez et al., 2016).

In this sense, we followed a methodology that includes the taxonomic and systematic classification of the mollusc sample, together with its quantification in terms of diversity, relative abundance, and stratigraphic distribution (by excavated squares). Data on the taphonomy of the skeletal remains and the ecology of the species present, compared to current populations, in order to reconstruct aspects of the food economy and the local natural environment at the time of deposition are also considered. After its study, the classified collection was handed over to the care of the FCSH UNL Archaeology Laboratory.

2. Taxonomic composition

The mollusc diversity of this sample account for 12 bivalve species, five marine gastropods, two terrestrial gastropods, and a cirriped crustacean, all species representative of the modern malacofauna of the region. Data from taxonomic identification, along with its biogeographic and ecological distribution, were based on the works of Macedo et al. (1999), Nobre (1940, 1941), Rolán (1983), Rolán et al. (1989), Poppe & Goto (1991, 1993), Saldanha (1995), Huber (2010, 2014), Hernández et al. (2011), Trigo et al. (2018), and the database WoRMS (2023).

The taxonomic list of the studied assemblage is as follows (Fig. 3):

Filo Mollusca

Class Bivalvia Linnaeus, 1758

Subclass Pteriomorpha Beurlen, 1944

Order Arcida Stolizka, 1871

Superfamily Arcoidea Lamarck, 1809

Family Glycymerididae Dall, 1908

Genus *Glycymeris* da Costa, 1778

Glycymeris glycymeris (Linnaeus, 1758)

Glycymeris nummaria (Linnaeus, 1758)

Order Mytilida Férussac, 1822

Superfamily Mytiloidea Rafinesque, 1815

Family Mytilidae Rafinesque, 1815

Subfamily Mytilinae Rafinesque, 1815

Genus *Mytilus* Linnaeus, 1758

Mytilus galloprovincialis Lamarck, 1819

Order Ostreida Férussac, 1822

Superfamily Ostreoidea Rafinesque, 1815

Family Ostreidae Rafinesque, 1815

Subfamily Ostreinae Rafinesque, 1815

Genus *Ostrea* Linnaeus, 1758

Ostrea edulis (Linnaeus 1758)

Order Pectinida Gray, 1854

Superfamily Anomioidea Rafinesque, 1815

Family Anomiidae Rafinesque, 1815

Genus *Anomia* Linnaeus, 1758

Anomia ephippium (Linnaeus, 1758)

Superfamily Pectinoidea Rafinesque, 1815

Family Pectinidae Rafinesque, 1815

Subfamily Pectininae Rafinesque, 1815

Genus *Pecten* O. F. Müller, 1776

Pecten maximus (Linnaeus, 1758)

Subclass Heterodonta Neumayr, 1884**Infraclass Euheterodonta**

Order Adapedonta Cossmann & Peyrot, 1909

Superfamily Solenoidea Lamarck, 1809

Family Solenidae Lamarck, 1809

Genus *Solen* Linnaeus, 1758*Solen marginatus* (Pulteney, 1799)

Order Cardiida Férussac, 1822

Superfamily Cardioidea Lamarck, 1802

Family Cardiidae Lamarck, 1809

Subfamily Lymnocardiinae Stoliczka, 1870

Genus *Acanthocardia* Gray, 1851*Acanthocardia tuberculata* (Linnaeus, 1758)Genus *Cerastoderma* Poli, 1795*Cerastoderma edule* (Linnaeus, 1758)

Order Venerida Gray, 1854

Superfamily Mactroidea Lamarck, 1809

Family Mactridae Lamarck, 1809

Subfamily Lutrariinae Gray, 1853

Genus *Lutraria* Lamarck, 1799*Lutraria lutraria* (Linnaeus, 1758)

Superfamily Veneroidea Rafinesque, 1815

Family Veneridae Rafinesque, 1815

Genus *Chamelea* Mörch, 1853Genus *Ruditapes* Chiamenti, 1900*Ruditapes decussatus* (Linnaeus, 1758)**Class Gastropoda** Cuvier, 1795**Subclass Caenogastropoda**

Order Littorinimorpha Golikov & Starobogatov, 1975

Superfamily Tonnoidea Suter, 1913 (1825)

Family Cymatiidae Iredale, 1913

Genus *Cabestana* Röding, 1798*Cabestana cutacea* (Linnaeus, 1767)

Order Neogastropoda Wenz, 1938

Superfamily Muricoidea Rafinesque, 1815

Family Muricidae Rafinesque, 1815

Subfamily Muricinae Rafinesque, 1815

Genus *Hexaplex* Perry, 1810*Hexaplex trunculus* (Linnaeus, 1758)

Subfamily Rapaninae Gray, 1853

Genus *Stramonita* Schumacher, 1817*Stramonita haemastoma* (Linnaeus, 1767)

Order [unassigned] Caenogastropoda

Superfamily Cerithioidea J. Fleming, 1822

Family Cerithiidae J. Fleming, 1822

Subfamily Cerithiinae J. Fleming, 1822

Genus *Cerithium* Bruguière, 1789*Cerithium vulgatum* Bruguière, 1792**Subclass Orthogastropoda**

Order Pulmonata Cuvier, 1814

Superfamily Achatinoidea Swainson, 1840

Family Subulinidae P. Fischer & Crosse, 1877

Subfamily Ruminidae Wenz, 1923

Genus *Rumina* Risso, 1826*Rumina decollata* (Linnaeus, 1758)

Superfamily Helicoidea Rafinesque, 1815

Family Helicidae Rafinesque, 1815

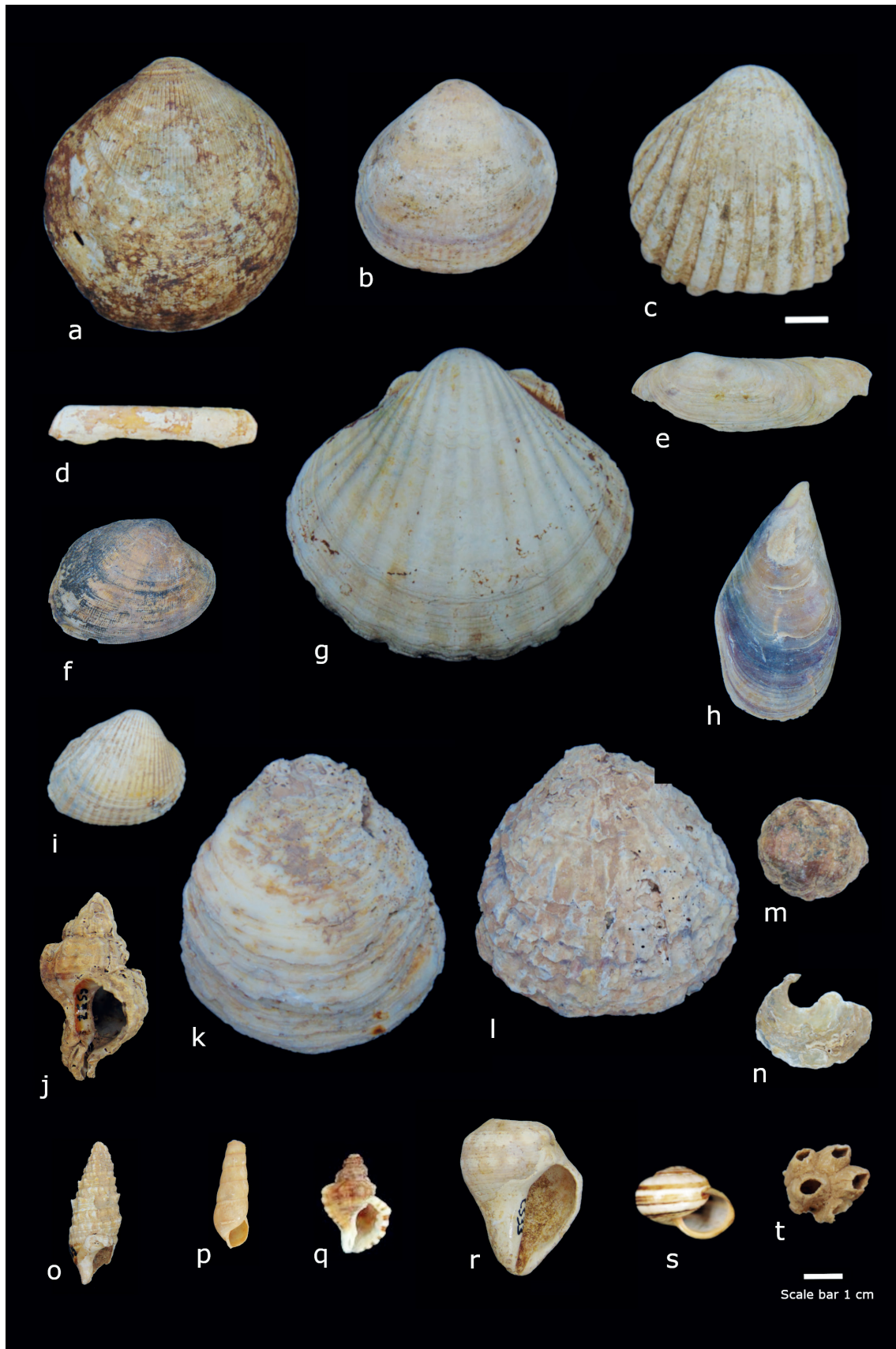


Figure 3 – Species of aquatic and terrestrial molluscs present in the zooarchaeological sampling of Silves Castle. a-*Glycymeris glycymeris*; b-*Glycymeris nummaria*; c-*Acanthocardia tuberculata*; d-*Solen marginatus*; e-*Lutraria lutraria*; f-*Ruditapes decussatus*; g-*Pecten maximus*; h-*Mytilus galloprovincialis*; i-*Cerastoderma edule*; j-*Hexaplex trunculus*; k-*Ostrea edulis* left valve; l-*Ostrea edulis* right valve; m-*Anomia ephippium* right valve; n-*Anomia ephippium* left valve; o-*Cerithium vulgatum*; p-*Rumina decollata*; q-*Cabestana cutacea*; r-*Stramonita haemastoma*; s-*Theba pisana*; t-*Perforatus perforatus*.

Subfamily Helicinae Rafinesque, 1815
 Genus *Otala* Schumacher, 1817
 Otala lactea (O. F. Müller, 1774)
 Genus *Theba* Risso, 1826
 Theba pisana (O. F. Müller, 1777)

SubPhylo Crustacea
 Superclass Multicrustacea
 Class Thecostraca Gruvel, 1905
 Subclass Cirripedia Burmeister, 1834
 Superorder Thoracicacalcareia Gale, 2015
 Order Balanomorpha Pilsbry, 1916
 Superfamily Balanoidea Leach, 1817
 Family Balanidae Leach, 1817
 Subfamily Concavinae Zullo, 1992
 Genus *Perforatus* Pitombo, 2004
Perforatus perforatus (Bruguère, 1789)

3. Quantitative analysis

The sampling of skeletal remains of marine and terrestrial invertebrates comes from six squares excavated in the main palace hall of Silves Castle. Its quantitative analysis resulted in the counting of 31,260 skeletal remains, which were divided into 20 species and respective relative and absolute frequencies of 5547 MNI determined by square and totals (Table 1). This calculation process was based on Moreno (1994), which included approximate corrections, in order to determine the minimum number of individuals (MNI), taking into consideration the fragmentation *in situ* of the skeletal remains belonging to the same specimens, as well as the occurrence of disarticulated elements, representative of species whose morphology comprises multiple skeletal parts, namely bivalve molluscs, in which the numerically dominant left or right valve was counted, by species and by sampled square, considering only complete valves and fragments with the hinge.

Square	S.179 L.2	S.181 L.2	S.190 L.2	S.191 L.2	S.192 L.2	S.193 L.2	Total	%
<i>Glycymeris</i> sp.	1	1	-	-	1	-	3	0,05%
<i>G. glycymeris</i>	1	-	-	-	-	-	1	0,02%
<i>G. nummaria</i>	-	-	-	1	2	1	4	0,07%
<i>M. galloprovincialis</i>	42	-	-	4	146	41	233	4,20%
<i>O. edulis</i>	30	8	5	2	36	21	102	1,84%
<i>A. ephippium</i>	-	-	-	-	7	-	7	0,13%
<i>P. maximus</i>	3	-	-	-	2	1	6	0,11%
<i>S. marginatus</i>	-	1	-	-	6	-	7	0,13%
<i>A. tuberculata</i>	-	-	1	-	1	1	3	0,05%
<i>C. edule</i>	22	23	1	19	265	9	339	6,11%
<i>L. lutraria</i>	1	-	-	-	4	-	5	0,09%
<i>Chamelea</i> sp.	-	-	-	-	1	-	1	0,02%
<i>R. decussatus</i>	328	106	13	112	4123	139	4821	86,91%
<i>C. cutacea</i>	-	-	-	-	1	-	1	0,02%
<i>H. trunculus</i>	-	-	-	-	1	-	1	0,02%
<i>S. haemastoma</i>	-	-	-	-	1	-	1	0,02%
<i>C. vulgatum</i>	-	-	-	-	1	1	2	0,04%
<i>R. decollata</i>	2	-	-	-	1	-	3	0,05%
<i>O. lactea</i>	-	-	-	-	3	-	3	0,05%
<i>T. pisana</i>	-	-	-	-	3	-	3	0,05%
<i>P. perforatus</i>	-	-	-	-	1	-	1	0,02%
Total	430	139	20	138	4606	214	5547	-
%	7.75%	2.50%	0.36%	2.48%	83.03%	3.85%	-	100%

Tabela 1 – Stratigraphic distribution of the mollusc associations identified in the layers under study in MNI and percentage.

The studied sampling reveals the association of skeletal remains of marine molluscs with the shells of terrestrial and freshwater gastropods. The distribution of these species through the several squares, presupposes an anthropic origin, due to the dispersion of the waste materials together with shells of autochthonous species.

As we can see in figure 3, the numerically dominant species correspond to edible bivalves (12 species = 99.72% of MNI), mainly *R. decussatus* (clam) 86.9%, *C. edule* (cockle) 6.1%, *M. galloprovincialis* (Mediterranean mussel) 4.2%, and *O. edulis* (flat oyster) 1.8%. All other species present in the sample occur more sporadically, as shown by relative frequencies of less than 1%. This evident discrepancy may reflect several reasons, including the preference for a diet based on a certain group of species, the selective choice of certain collection sites, or even the abundance of edible species available for capture during that period.

The presence of these edible bivalves (clams, cockles, mussels, and oysters) suggests that the consumption of these species by members of the local community would, whenever possible, be part of their eating habits, in what is a traditional custom dating back to antiquity and appreciated by the Islamic communities of the time. In this sense, oyster and clam farming, and cockle harvesting in estuarine areas of the Arade river are evidence of practices with secular roots that constituted an economic activity of considerable value for these riverside populations and a source of commerce.

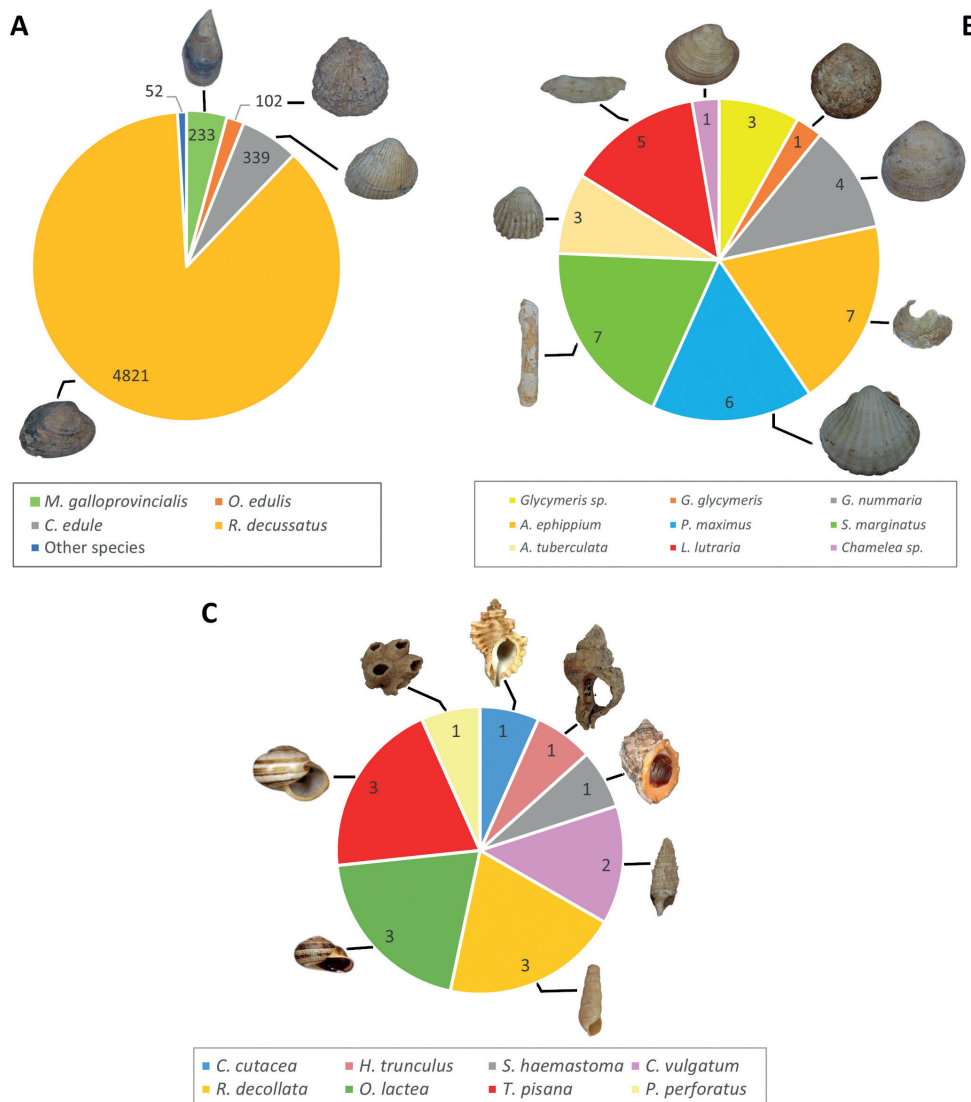


Figure 4 - Diversity and relative abundance of mollusc species collected in the archaeological intervention carried out in the main palace hall of Silves Castle. A: Minimum number of specimens of the most abundant species; B: MNI of bivalve species; C: MNI of gastropod and crustacean species.

The skeletal remains of terrestrial gastropods spread over several squares in this sample, without having observed concentrations of biostratonomic or anthropic origin, presuppose a secondary origin from the dispersion of waste materials, mixed with native terrestrial species. These local inhabitants appear in the archaeological deposits as a fortuitous way, not representing food consumption.

4. Discussion

The great majority of edible mollusc species identified in this sample are, even nowadays, common in the Arade river estuary, living in sandy-muddy substrates with variable salinity and temperature. Some of them also occur in coastal rocky areas away from the estuarine mouth. The gathering and aquaculture of some species such as oysters, clams, and mussels represented an important pillar for the local economic activity, of appreciable value for this population and a source of commerce in the Medieval period.

The sample of marine and terrestrial molluscs collected at the Silves castle deposit comprises 20 species and a total of 31,260 remains collected from squares 197, 191, 190, 191, 192 and 193. A significant part of the remains is concentrated in square 192, with a total of 4606 MNI, representing 83.03% of the entire sampling, highlighting the species *R. decussatus* with 4123 MNI.

From a point of view of food habits, molluscs were not certainly the most important resource in this community; however, they are always present very important in the Islamic diet, especially clams, cockles, and oysters, particularly abundant in the marine resources of the region. These species may have been cultured in traditional aquaculture, an activity that certainly dates back to the Roman period in Algarve (Gonçalves et al. 2007). On the other hand, the presence of inedible species, such as the bivalve *A. ephippium*, and the gastropod *C. vulgatum*, very common species in these biotopes, results from fortuitous gathering and transport, along with edible species of seafood or fish. By the same way, in the case of terrestrial gastropod *R. decollata*, autochthonous from the region and an intrusive element together with the species *O. lactea* and *T. pisana*, their presence in the sample does not reflect consumption that despite being edible.

5. Conclusions

The malacological collection in the main palace hall of Silves Castle comes from archaeological interventions carried out in 2006 under the direction of prof. Rosa Varela Gomes from NOVA University of Lisbon.

In the same context, was found a fragment of a bowl, produced in the Near East, and two Almohad dirhems. Given the inexistence of other types of artefacts, we believe that this was a deposit made right after the definitive conquest, in 1248, of that fortress by the Christians.

The sample analysis resulted in the quantification of 31,260 TNR (Total Number of Remains) and 5547 MNI with a total weight of 68.21kg. The taxonomic identification allowed the classification of 20 species in which 12 of bivalves, four of marine gastropods, three of terrestrial gastropods, and one of cirriped crustacean, from the sampling of six squares (squares 197 L.2; 181 L.2; 190 L.2; 192 L.2; and 193 L.2).

There is a predominance of edible bivalve species, namely *Ruditapes decussatus* (86.91%), *Cerastoderma edule* (6.11%), and *Ostrea edulis* (1.84%) common in the sand and sandy-muddy substrates, whose origin comes from the estuary of the Arade river, where were held traditional seafood gathering and aquaculture activities, in order to supply regional populations with this type of food. To these edible invertebrates are associated other species, with relative representation, collected in open coastal areas and rocky substrates, such as *Mytilus galloprovincialis* (4.20%). The remaining marine species are found in this sample in a residual way, the result of a fortuitous gathering. Regarding terrestrial species, these are represented by gastropods indigenous to the area, and local inhabitants, whose presence is not related to human action.

The mollusc gathering related activities in the Arade river estuary during the Medieval period are a good example of the efficient exploration of potentially available resources in the surroundings of the places where they were implanted, and which appears as an economic supplement to other very important activities at the time, such as the trade of wood and shipbuilding.

It is important to underline, to finish, that the malacological collection at Silves Castle is one of the larger available from the Islamic period in Portugal, and that this work follows a long study of this collection (Silva, 2020) that will continue in future projects.

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