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Halal and *Makruk*: Muslim archaeological fish assemblages as cultural identifiers in the Iberian Middle Ages?

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Abstract

Muslim religion has strict rules to determine what kinds of foodstuffs, and under what circumstances, are deemed appropriate for consumption. Fishes are not an exception to this rule and features such as body shape or the presence and conspicuousness of scales dictate whether certain species are acceptable or rejected. In this paper, an overview of the Iberian ichthyoarchaeological record from Muslim sites is presented to ascertain whether differences with Christian sites existed in terms of these characters and to what extent these allow one to take fish assemblages as cultural proxies of archaeological deposits. In the case of coastal (production) sites, we also consider whether the peculiarities a given fish assemblage exhibit reflect instead certain environmental features such as the biotopes where a given local fishery operated.

KEYWORDS
dietary rules, environment, fish, fishing, Iberia, Middle Ages

1 | INTRODUCTION

Ichthyoarchaeology, as any branch of archaeozoological science, focuses on the study of animal remains, in this case fishes, retrieved on archaeological sites. From a methodological standpoint, most of the routines applied to these remains aim at gathering biological information (identification, size estimation, isotopic composition, etc.) and data to help define the agents responsible for the bone accumulation (taphonomy). Yet, when it comes to interpretation, what matters the most to achieve a correct assessment is cultural context. From such perspective, historical sites yield far more precise data on former societies and life habits than is the case of prehistoric sites whose material evidence cannot be confronted with documentary sources.

Medieval Iberia was a crucible of cultures, where the Byzantine, Visigoths, Alans, Vandals, Swabians, and Muslims interacted in multifarious ways with local Iberians deeply embedded in the Roman tradition. Within these cultures, Muslims are of particular interest not only for a prolonged presence that lasted for ca. 800 years but also for the contrast that their Islamic traditions exhibited with the Christian *zeitgeist* of the locals (Arié, 1974–1975; Díaz, 1978–1979; Foltz, 2006; Malpica Cuello, 1984; Valente & Marques, 2017).

From a historical perspective, Muslim Iberia started as an Emirate dependent on the Umayyad caliphate from Damascus (711–756 CE) from which it later became independent (756–929 CE). This was followed by the Caliphate of Córdoba (929–1031 CE) and the Taifa kingdoms along with the North African invasions period (1031–1212 CE), and ended with the Nazari kingdom of Granada which lasted until 1492 CE. The *Al Andalus* societies constituted an amalgam of people. Thus, in addition to the Christians and Jewish, the Arabs sensu stricto were also a minority group which diminished through time, whereas the people from the Maghreb (NW corner of Africa) became progressively more numerous. Still, the dominant group at all times within these societies was the local Iberians who converted to the Muslim

faith, which from the start turned into the major binding element of society.

In terms of animal foodstuffs, Christians were far more eclectic than Muslims, whose strict abiding of Islamic rule made them stricter in terms of what could and could not be eaten. In the case of the latter, identifying *halal* (i.e., allowed) and *haram* (forbidden) food is rather straightforward but *mashkuk* (doubtful) foodstuffs have always been a matter of debate among schools of Islamic rule, some considering acceptable items that other schools would deem sinful (Morales-Muñiz et al., 2011).

Fish forbidden by Muslim rule include animals devoid of scales and those with serpentiform (snake-like) bodies (Foltz, 2006). The only group of commercial value in Iberian waters featuring both characters is the anguilliform fishes (conger eels, eels, and moray eels).[1,2] Allowance for consumption becomes more debatable in groups such as flatfishes and European hake (Merluccidae) whose generally small scales might not be always readily visible upon casual inspection and less so when covered by a film of mucus, as is the case of salmonids (salmon and trout).

Other conflictive group includes the cartilaginous fishes, which feature tooth-like scales (placoid) very different from the conventional flattened types one is mostly acquainted with. This is compounded by the fact that some of these fishes, such as rays and skates, have essentially naked skins except for some few placoid scales hypertrophied into spines scattered through the skin or arranged into rows and clumps. This same combination is seen on the skin of certain jacks (Carangidae) and sturgeons (Acipenseridae). Finally, in many scombrid fishes (tunas and mackerels), the scales are so tightly packed into a lattice as to give the impression that the skin lacks scales. All these peculiarities have occasionally turned these fishes into *mashkuk* items, their acceptance a matter of debate in Muslim schools (Morales-Muñiz et al., 2011). For these reasons, one should expect law-abiding Muslims to focus fish consumption on animals with the conventional fusiform body, covered with large, conspicuous scales.

Because of these considerations, anatomical features may serve to provide a frame of reference to test the cultural identity of Muslim fish assemblages on archaeological sites, this being the aim of our paper. Indeed, for medieval Christians, just about the only "rule," if one would call it so, was to consider "meat" (i.e., that of warm-blooded vertebrates) a source of vice and concupiscence and fish of any kind as the lesser evil. And one should be keen to stress here "of any kind" because, for Christians, any vertebrate living in an aquatic environment, including beaver, otter, whales, dolphins, or even mammalian fetuses bathed by the amniotic liquid, were considered "fish" (Salisbury, 1994). The vigils, times when Christians abstained from eating meat, often meant that during a substantial fraction of the year, Christians were only allowed to eat "fish."

[1]Anguilliform fishes do have scales but these are very small and deeply embedded in the skin; thus, for all practical purposes, the body appears to be devoid of them.

[2]Anglerfish (Lophiiformes) feature naked skins but are deep-water benthonic species and have never been reported on Medieval sites, something that may also have to do with restricted accessibility due to lack of adequate gear.

One must still note that the environment and biology of the fishes also play their role in dictating what fishes can eventually be retrieved in each assemblage if that assemblage is the result of a local fishing. In this case, the issue of concern is accessibility because for all kinds of aquatic biotopes, there are species that thrive on them and others that appear only at certain times of the year. Accessibility, alas, is not only dictated by natural causes because technology also plays a role. This role might be "direct" (i.e., lack of adequate fishing tackle) or "indirect" for even if the technological know-how of a certain gear exists, other factors come into play (e.g., lack of the appropriate labor force) that render the implementation of that gear unfeasible. In these cases, one must assess to what extent a particular fish assemblage can be explained in terms of availability, choice, or a combination of both.

The scarce archaeozoological literature on the use of animal remains as a tool for differentiating assemblages of the three main religions (e.g., Grau-Sologestoa, 2017, 2023; Morales-Muñiz et al., 2011; Valenzuela-Lamas et al., 2014) groups all Muslims or all Jewish deposits as a single identity when in fact in the Iberian Middle Ages, each of these cultural groups was far more diversified than generally considered. Indeed, in addition to the better-known socioeconomic factors considered by some authors (Grau-Sologestoa, 2017), an array of ethnical groups within a territory under the same religious rule may have well impacted foodstuffs' choice. For example, a Berber, a *muladí*, and a nobility ruler, all practicing the Islamic code, may have made their choices not only based on their socioeconomic status but also on their inherited traditions and the way religion was enforced in their specific communities.

For all these reasons, though clearly attractive, our interpretative exercise is fraught with limitations in the case of Muslim Iberian sites. The problems relate to the scarce development that the research has witnessed since our first reviews of the subject were published more than a decade ago (Morales-Muñiz et al., 2009, 2011). In the case of Medieval Iberia, the development of ichthyoarchaeological research during the past decade has been far more intensive on the former Christian territories that will here serve as a reference to help with the interpretation of the Muslim assemblages.

2 | MATERIALS AND METHODS

To provide an overview of the state of the art of the ichthyoarchaeological evidence during the Muslim period in the Iberian Peninsula, a comprehensive review of published fish collections has been carried out irrespective of their sample size. Selected information about the assemblages was recorded, including their chronology, taphonomic context (Gautier, 1987), retrieval method following the categorization by Barrett et al. (1999), and the number of identified specimens (NISP; Wheeler & Jones, 1989). Because most samples derive from dump yards or middens, socioeconomic status was difficult to assess and usually not specified by the authors.

The reviewed dataset of Iberian Muslim fish collections totals 26 assemblages (Table 1). These derive from 23 sites with a balanced

TABLE 1 Summary of characteristics of Muslim sites with fish remains in Medieval Iberia.

Code	Site	Chronology (CE)	Context	Sieving	NISP	Reference
1	BNU-Tavira	8–13th	Urban dump yard (open)	None	112	Callejo-Gutiérrez (2013)
2	Alcáçova Santarém	9–11th	Militar, urban (open)	None	80	Davis (2006)
3	Convento de S. Francisco de Santarém	10–11th	Urban dump yard (open)	None	2	Ramalho et al. (2001)
4	Convento de S. Francisco de Santarém Silos 2 and 3	10–11th	Not specified	None	301	Moreno-García and Davis (2001)
5	Alcácer do Sal	9–10th	Domestic (closed)	None	10	Moreno-García and Davis (2001)
6	Castelo de Silves	8–10th	Urban (open?)	None	2	Antunes (1991) in Martins (2013)
7	Arrabal de Silves	12–13th	Urban dump yard (open)	None	88	Morales-Muñiz et al. (2009)
8	Palmela	11–12th	Fortification	None	40	Fernandes et al. (2012)
9	Alcaria de Arge	12–13th	Domestic (open)	None	50	Moreno-García et al. (2008)
10	Saltés	12–13th	Domestic (open)	Minimal	374	Roselló Izquierdo et al. (1994)
11	Alcáçova de Mértola	12–13th	Domestic (closed)	Total	31	Roselló Izquierdo (1993)
12	Casa II Mértola	12th	Domestic (closed?)	Minimal?	147	Antunes (1996)
13	Alcariais de Odeleite	10–13th	Various (open?)	None	9	Pereira (2012)
14	Portela 3	9–13th	Dump yard (open), urban	None	30	Pereira (2012)
15	Ribat da Arrifana	12th	Midden (open?)	None	18	Antunes (2007)
16	Salir	12th	Various (open)	None	620	Martins (2013)
17	Castelo de Paderne	12–13th	Domestic (closed?)	None	25	Pereira (2009)
18	Rua dos Correeiros	12th	Domestic (open?)	None	3	Martínez et al. (2017)
19	Silo 1 Paços do Concelho-Torres Vedras	12th	Silo (domestic? open)	None	9	Gabriel (2003)
20	O Paço dos Lobos da Gama	11–12th	Silo (open)	None?	2	Costa and Lopes (2012)
21	Saqunda	8–9th	Urban dump yard (open)	None	1	Casal-García et al. (2009)
22	Madinat Ilbira Area 1	9–10th	Domestic (open)	None	1	García García (2013)
23	Madinat Ilbira Areas 2 and 3	10–11th	Dump yard (open)	None	9	García García (2013)
24	C/Nueva 21	12–13th	Domestic (closed)	None?	2	Martínez-Sánchez and Carmona-Ávila (2013)
25	Plaza Oriente PO1	10–11th	Dump yard (open), urban	None	11	Roselló Izquierdo and Albertini (1997)
26	Calatrava La Vieja	12–13th	Military dump yard (open)	Total	189	Roselló Izquierdo and Morales Muñiz (1991)

Note: Retrieval categories follow Barrett et al. (1999): none (hand collection); minimal, <10% (include sieving with mesh >2 mm); partial, 10–50% with mesh ≤1 mm/flotated; substantial, >50% with mesh ≤1 mm/flotated; total, 100% with mesh ≤1 mm/flotated. Code numbers signal the location of sites in Figure 1.

Abbreviation: NISP, number of identified specimens.

representation in terms of inland (14) and coastal deposits (9) (Figure 1). Despite this number representing a substantial increase from our last overview on the subject, it includes a good number of very small samples thus weighs heavily on the large collections that were presented at that time (Morales-Muñiz et al., 2011) (Table 1). The impact of the hand collection in the representativity of fish archaeozoological assemblages is such that 10 of these new sites do not contribute much to the interpretation of the socioeconomic role of fish due to their anecdotic presence in terms of NISP, barely reaching 10 remains. In addition, most collections do not include determination to species, genus, or family level, hampering what it can be said about fish exploitation and fish role as identity markers in Muslim Iberia.

Aside from the fact that only two of these collections have been sieved, albeit incompletely, most assemblages represent open deposits, implying large losses of fish material. Intriguing is also the fact that not even one of the coastal sites appears on the Mediterranean half of the peninsula, reaching up only to the latitude of Lisbon (Figure 1). In terms of chronology, the temporal window starts with the earliest moments of the Muslim conquest (ca. 8th CE) and ends in

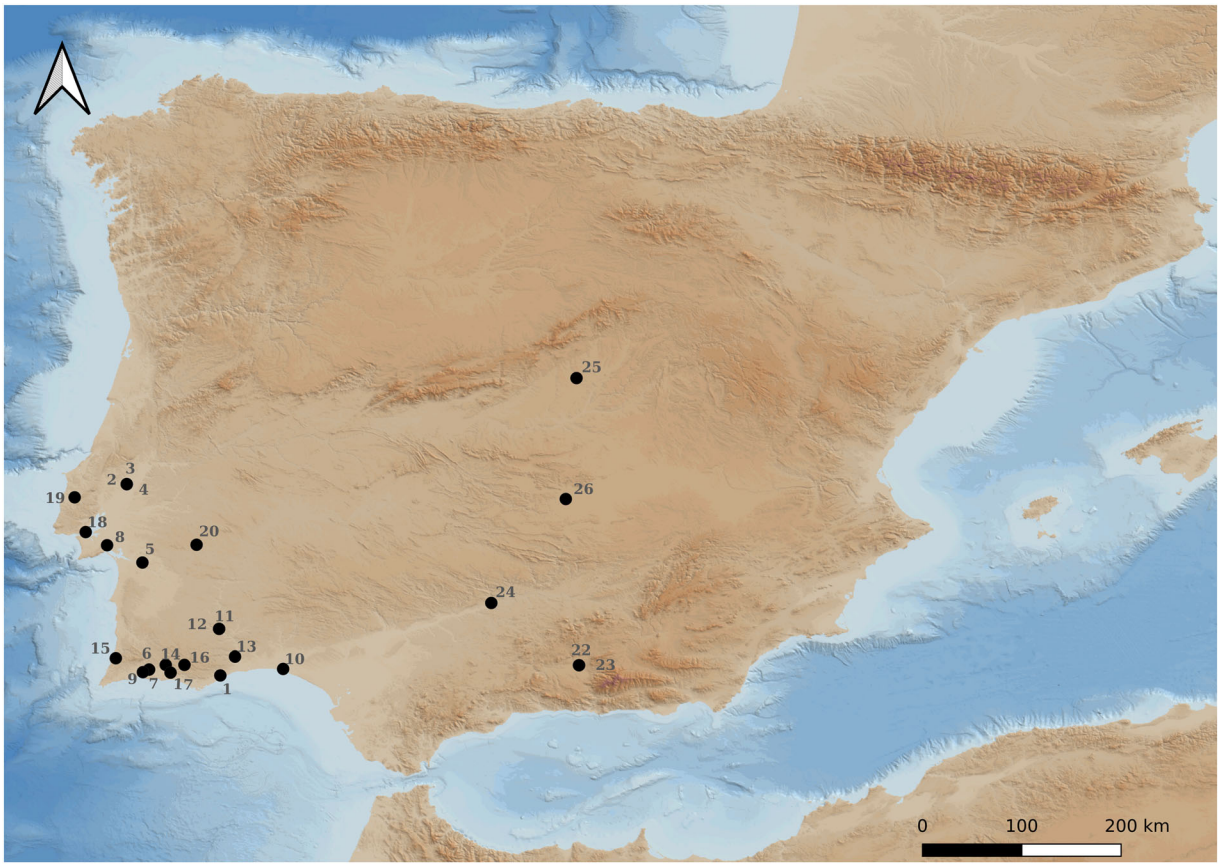

FIGURE 1 Location of sites mentioned in the text. Site code numbers are in Table 1. Map created with QGIS 3.22 geographical information system using the IGN raster cartography of the Iberian Peninsula as base map (CC BY 4.0 ign.es,2020). Scale: 1:2981288. WMS source: http://www.ign.es/wms-inspire/mapa-raster. [Colour figure can be viewed at wileyonlinelibrary.com]

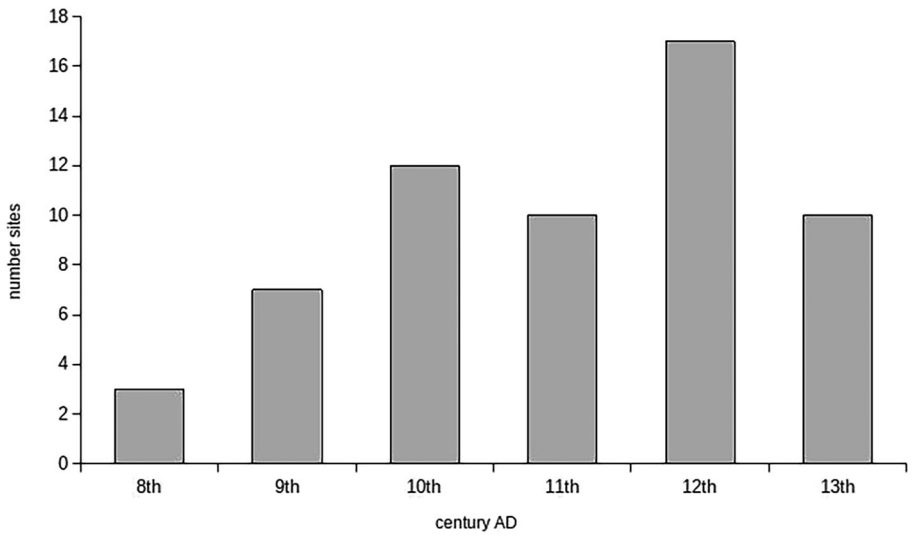

FIGURE 2 Chronological categorization of fish Muslim sites from the Iberian Peninsula.

13th ca. CE when the Almohads are expelled from *Al-Andalus* and the Muslims lost all their territories in the Atlantic coast. Only five collections can be ascribed to a single century (12th ca. CE), this being the one whose first half ends with the Almoravid rule and whose second half witnesses the Almohads taking control of *Al-Andalus* (Table 1 and Figure 2). Deposits that span the 12th and 13th ca. CE (i.e., Almoravid/Almohad) total eight and, along with those from the 12th ca. CE, signal a bias of the fish collections toward the very end of the Muslim settlement in the Atlantic façade of the Peninsula (Figure 2).

TABLE 2 Fish numbers of identified specimens (NISPs) and unidentified fish remains from Muslim sites in Islamic Iberia.

Taxon	A. Santarém	Convento S. F. Santarém	Saltés	Alquería Arge	BNU-Tavira	Alcáçova de Mértola	Casa II Mértola	Plaza de Oriente	Calatrava la Veja	Madinat Ilbira	Total
Chondrichthyes indet.			1	1							2
Galeorhinus galeus			6		1						7
Mustelus mustelus			28	1	2						31
Eugomphodus taurus			1								1
Sphyrna sp.					1						1
Squatina sp.					2						2
Raja sp.			7								7
Acipenser sturio	11	1				1	1				14
Alosa fallax + *Alosa alosa*			4			1					5
Sardina pilchardus			34			2			33		69
Sardinella aurita									39		39
Sardina sp./*Sardinella* sp.									4		4
Muraena helena				1							1
Conger conger					5					2	7
Cyprinidae		1									1
Barbus sp.	1	3				5	42	5	97	2	155
Squalius cephalus									11		11
Chondrostoma polylepis									1		1
Merluccius merluccius					5			6			11
Serranus sp.			1								1
Argyrosomus regius			4	5							9
Mugilidae	65	13	1			16					95
Sparidae			118	5		1				4	128
Dentex dentex + *Dentex gibbosus*				4							4
Pagellus acarne			24			3	2				29
Pagellus erythrinus			19	5							24
Pagellus bellotti						1					1
Pagellus sp.			25								25
Pagellus sp./*Pagrus* sp.			43	6							49
Pagrus pagrus			2	14							16
Pagrus auriga			3								3
Pagrus sp.			6								6

(Continues)

TABLE 2 (Continued)

Taxon	A. Santarém	Convento S. F. Santarém	Saltés	Alquería Arge	BNU-Tavira	Alcáçova de Mértola	Casa II Mértola	Plaza de Oriente	Calatrava la Veja	Madinat Ilbira	Total
Sparus aurata	3		1	5	1						10
Diplodus annularis			18								18
Diplodus sargus				1		1					2
Diplodus sp.			11								11
Trachurus trachurus									4		4
Scomber sp.			13							1	14
Thunnus thynnus			2		49					1	52
Solea sp.			2								2
Total NISP	80	18	374	49	66	31	45	11	189	10	873
Unidentified fishes	23	283	690	2	49	93	102	–	48	–	1290

Note: Grey mullets (Mugilidae) and barbs (*Barbus* sp.) total no less than six species.

3 | RESULTS

Some 40 fish taxa are represented on the largest fish collections selected for analysis (Table 2). By far, the most frequent group is the seabreams (Sparidae) that combined, include 10 species, and represent 37.5% of the NISP. They are followed by the cyprinids (carpfishes; 19% NISP), the clupeids (European pilchard, shad, and round sardinella: 13.5%), and the grey mullets (Mugilidae: 11%). These four groups, in particular, the mullets and carpfishes, that combined represent more than 80% of all identified remains, are characterized by fusiform bodies and large and conspicuous scales. All qualify as *halal* foodstuffs. More dubious groups, such as the cartilaginous fishes, tunas and mackerels, and flatfishes, are not only far more infrequent but also restricted to a few coastal sites (Figure 1). European hake, a frequent species on the Christian deposits (Llorente-Rodríguez et al., 2022; Roselló-Izquierdo et al., 2021), is only reported on the coastal site of BNU-Tavira, the only collection spanning the six centuries covered in this study, and on the site of Plaza de Oriente, in the center of the Iberian Peninsula (Table 2 and Figure 1). Interestingly, the scarce remains of conger eel appear on these sites and at Saqunda, a quarter from the capital city of the Emirate of Córdoba.

Arranged into groups according to type of scales, the data from the largest assemblages among the selected ones help one refine this picture somewhat (Table 3). Indeed, although specimens with large scales dominate most assemblages, fishes with small scales (e.g., European hake) as well as tunas and mackerels (i.e., fish with peculiar scales) are, respectively, the most frequent taxa at Plaza de Oriente and BNU-Tavira.

When the aquatic environment of the sites located close to a shore—either marine or fluvial—is considered, it seems clear that this condition weighs on heavily on the composition of the fish assemblages. Grey mullets, for example, are most frequent on sites located on estuaries like that of the Tagus River (Alcaçova de Santarém: 81%; Convento de San Francisco: 72%; Alcácer do Sal: 100%; and Mértola: 51%), places where they concentrate in large numbers to swim upstream during their spring migrations.

Likewise, carp fishes are only frequent in inland sites close to rivers (Calatrava la Vieja: 58%; Plaza de Oriente: 45%; Alcaçova de Mértola: 16%; Alcaçova de Santarém: 1%; Convento San Francisco Santarém: 22%; and Madinat Ilbira: 20%) (Table 2). Sturgeon is only present in the deposits from Mértola and Santarém, their highest frequency being that at Alcaçova de Santarém (14%).

It thus appears that environmental constraints also played a role in determining the composition of the catch. To further test the validity of these cultural identifiers, a comparison with Christian fish assemblages is required. To this end, we will refer to the sites presented on the most recent overview of the medieval fisheries of Galicia, on the NW corner of the Iberian Peninsula, to which data from other inland sites reported in a previous review will be incorporated (Morales-Muñiz et al., 2009; Roselló-Izquierdo et al., 2021) (Table 4). Again, only Christian deposits with significant sample sizes will be compared using the same categorization of the fish attending to the type of scale (Table 4).

TABLE 3 Number of identified specimens (NISP) frequencies of fishes attending to type of scales in Muslim sites.

	Site	NISP	No scales (%)	Small scales (%)	Large scales (%)	Peculiar scales (%)
Coastal	Alcaria de Arge	49	2	–	94	4
	BNU-Tavira	66	7.5	7.5	1.5	83.5
	Saltés	374	–	0.5	84	15.5
Inland	Mértola	31 (+)	–	–	97	3
	Alcáçova Santarém	80	–	–	86	13.8
	Calatrava la Vieja	189	–	–	98	2
	Plaza Oriente	11	–	54.5	45.5	–

Note: No scales: conger eel.

TABLE 4 Number of identified specimens (NISP) frequencies of fishes attending to type of scales in Christian assemblages.

	Site	NISP	No scales (%)	Small scales (%)	Large scales (%)	Peculiar scales (%)
Coastal	Punta Atalaia	1013	0.2	98.4	1	0.2
	Taramancos	462	–	59.3	40.2	0.5
	Area (dump yard)	1768	12.7	35	44	8
	Torre Hércules	2201	14	19	55	11
	Torres Oeste	66	6	72.7	19.7	1.5
Inland	Castelo Rocha	1016	0.01	2	91.6	6.3
	Pambre	682	–	18	75.6	6.3
	Aguilar Campóo	10	100	–	–	–
	Catedral Vitoria	35	11.4	74.3	11.4	2.8
	Plaza Oriente	11	27	18	18	36

Note: No scales: conger eel and eel (partly taken from Roselló-Izquierdo et al., 2021).

The first striking thing when this comparison is made is the secondary role that the sea breams, the dominant group in Muslim deposits, feature on the Christian collections, where only three sites reach NISPs above 7% (Castelo da Rocha: 7.5%; Torres do Oeste: 9%; and Torre de Hércules: 8%) (Roselló-Izquierdo et al., 2021). The frequency of fishes with naked skins in the Christian deposits is basically restricted to conger eel (Roselló-Izquierdo et al., 2021) and is very variable, from absence in some sites (e.g., Taramancos) to constituting the whole of the fish assemblage as happens at Aguilar de Campoó (Table 4). This reflects the trade of dried conger eel, an important export item of the Christian kingdoms that, contrary with what was the case of gadiform fishes in Northern Europe, did not imply a removal of bones or body parts prior to transport, meaning that there is no accumulation of bones at the production sites (Llorente-Rodríguez et al., 2022; Perdikaris, 1996). Interestingly, although conger eel is rare on Muslim collections (i.e., 0.8% of the total pooled fish NISP; Table 2), on sites such as BNU Tavira, this fish exhibited frequencies comparable with those of some Christian sites (Table 3: "no scales"). With these data at hand and even though the frequencies of conger eel on Muslim sites derive from very small collections, the message that conger eel frequencies alone might not constitute a reliable cultural marker to determine the Muslim nature of a fish assemblage in Medieval Iberia contradicts our earlier suggestion on this matter (Morales-Muñiz et al., 2009).

Much the same applies to fishes with the remaining types of scales. In this way, although site by site, it seems that fishes with small scales are, on average, far more frequent on Christian assemblages and that the opposite holds in the case of the fish with large scales (Tables 3 and 4), these differences tend to fade away when data from all sites are pooled or when ranges are considered (small scales: 2–98% in Christian and 0.5–54% Muslim; large scales: 1–91% Christian and 1.5–98% Muslim). In the case of the frequencies of fishes featuring peculiar scales, the scarcity of scombrids and cartilaginous fishes in Christian sites (i.e., at most 10% NISP) contrasts with far more marked oscillations in Muslim sites where they can reach up to 83.5% NISP in the case of BNU-Tavira due to the abundance of tuna (Callejo-Gutiérrez, 2013).

4 | CONCLUSIONS

The data presented evidence the difficulties inherent to this kind of analysis. To start, the use of fish, or any other animal or animal product for that matter, as a biocultural marker is fraught with all kinds of

difficulties/variables that require/ask for a precise set of requirements to be met to insure the reliability of results. To the (sadly) typical problems that derive from studying mostly open deposits and inappropriate excavation methods for fish retrieval and a lack of determined taxa due to the scarcity of specialists, this overview of Iberian Muslim fishes is also affected by the generally small size of many samples, a coarse chronological assignment of the deposits, and an equally loose definition of deposits as "dump yards," "occupation floors," etc.

From a social perspective, the main problem is that all these Iberian societies were far from homogeneous, even within each religious community, as hierarchy, gender, age, and food habits, to name the most important, all played yet to be defined roles dictating what is the contribution of fish to diet and what kinds of fish each group had access or was allowed to eat. A deeper division perhaps must be considered here to set apart coastal (i.e., fishing communities) populations from those living inland, because fishermen tend to behave more eclectically in terms of what species are consumed regularly or preferentially because of their acquaintance with fish, this inertia often overriding food rules and taboos. Finally, Muslims and Christians seem to have been involved in a fish trade between territories whose scale and intensity remains a matter of speculation and is an issue not been dealt in depth in the Iberian medieval literature. What all the evidence suggest thus far is that the traded fish were a reduced number of species foremost among which conger eel, European hake, European pilchard, and tunas were the main items. One may surmise that Muslims focused on European pilchard, because of its feasibility of preservation and its undisputed condition as *halal* food, and tuna, because of the profits this fishery implied, but Muslim fishermen had also access to European hake and conger eel if only for export. Because of this, coastal (production) sites might not be the best places to evaluate fish assemblages as markers of cultural identities. On the other hand, inland sites may also have problems related to the cultural heterogeneity of their inhabitants. This should be most pressing on large cities where the chances to confront Christians and Muslims and Jewish living together would be greater than in hamlets or rural communities where populations are expected to be more homogeneous. It is this mix of populations what would explain the early presence of conger eel in Saqunda (8th to 9th ca. CE) or European hake at Plaza de Oriente (10th–11th), dates when the large-scale fisheries of these species seem to rise in the Iberian Peninsula (Llorente-Rodríguez et al., 2022; Morales-Muñiz et al., 2020). All this will require a far more reliable database than the one presented in this paper. For the moment, we can conclude that the presence and frequency of fish with highly conspicuous scales, such as carp fishes (cyprinids) and grey mullets (mugilids), represent the best markers of Muslim identity in Iberia, perhaps more so than that of the conger eel and European hake for Christian sites. In all cases, these tentative working hypotheses are to be considered in future studies of cultural identity by ichthyoarchaeologists working in Medieval Iberia.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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