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Ancient river fishing utensils in the northwest of the Iberian Peninsula: the Miño river basin between the 4th century BC and the 4th century AD

Antiguos útiles de pesca fluvial en el noroeste de la Península Ibérica: la cuenca del río Miño entre los siglos IV a.C. y IV d.C.

KEY WORDS: Exploitation of river fishery resources, hill fort culture, Antiquity, Galicia, Archaeology of fishing.
PALABRAS CLAVES: Explotación de los recursos pesqueros fluviales, cultura castreña, Antigüedad, Galicia, Arqueología de la pesca.
GAKO-HITZAK: Ibaietako arrantza-baliabideen ustiapena, kastroen cultura, Antzinaroa, Galizia, arrantzaren arkeologia.

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ABSTRACT

This paper presents a brief overview of fishing in Galicia during Antiquity on the basis of fishing equipment—in particular hooks and weights—recovered from several sites of indigenous origin (*castros* or hill forts) and newly-established Roman settlements around the basin of the Miño river. Although the topic has often passed unnoticed by archaeological research and suffers from a distinct lack of literature to guide future efforts, the more or less recent publication of papers dealing with this topic in depth has facilitated the study of the Galician record, which is supported by literary and iconographic sources as well as ethnographic documents. The latter have proved relevant in this context, as the world of fishing tends to hold on to traditions. The author sets out to establish a correlation between the remains of fishing implements found and the possible fishing gear they would have been attached to.

RESUMEN

Se presenta una síntesis del estado de la cuestión pesquera en Galicia durante la Antigüedad a partir de las evidencias de equipamiento pesquero, esencialmente anzuelos y lastres, registradas en diversos yacimientos de raíz indígena (castros) y de asentamientos romanos ex novo emplazados en la cuenca del río Miño. Pese a la falta generalizada de atención por parte de la investigación arqueológica, ausente de directrices de proyección global, la publicación más o menos reciente de ciertos trabajos que abordan en profundidad esta cuestión facilita el estudio del registro gallego, sustentado por las fuentes literarias, iconográficas y por la documentación etnográfica, la cual revela aquí su relevancia, dado el carácter marcadamente conservador del mundo de la pesca. Se propone un ensayo de correlación entre los restos de instrumental pesquero exhumado y los posibles aparejos y artes de pesca a los que irían adheridos.

LABURPENA

Antzinaroan zehar Galizian arrantzak izandako egoeraren laburpena aurkeztuko dugu. Horretarako, jatorri indigena (kastroak) duten hainbat aztarnategitan eta Miño ibaiaren arroan kokatutako ex novo kokaleku erromatarretan erregistratutako arrantzarako ekipamenduaren ebidentziak hartu ditugu oinarritzat, batez ere, amuak eta lastak. Ikerketa arkeologikoak, orokorrean, ez dio arretarik jarri gai honi, eta proiekzio-globala duten gidalerroak falta dira. Dena den, gai hau sakon lantzen duten lan jakin batzuek (batzuk besteak baino berriagoak) erraztu egin digute Galiziako erregistroa aztertzea. Horretarako, iturri literarioak, ikonografikoak eta dokumentazio etnografikoa hartu ditugu oinarritzat; azken hori garrantzitsua izan da, arrantzaren mundua bereziki kontserbadorea baita. Lurpetik ateratako tresnen hondakinen eta horiei lotuta egongo liratekeen aparailu eta txanku posibleen arteko korrelazioa ezartzen duen saiakera bat proposatzen dugu.

1. INTRODUCTION

River fishing in Antiquity as a subject of archaeological research has been rather neglected, especially in comparison to research efforts dedicated over the last two decades to marine and open-sea fishing and more specifically to the instruments used for this activity in the Atlantic-Mediterranean region (Bernal, 2010; Vargas, 2020), which also includes the north-western part of the Iberian Peninsula.

Indeed, bibliographical references concerning fishing activities associated to archaeological sites located inland, i.e. near rivers and lakes, are few and far between: they do not extend beyond the occasional list of fishing utensils as part of catalogues of archaeo-

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logical collections, published in some cases (Alarcão *et al*., 1979; Filloy and Gil, 2000) and unpublished in others (Lourenço, 2012), in addition to a few isolated references within studies of a larger scope (Jimeno *et al*., 1999; Bolado *et al*., 2010; Navas *et al*., 2017: 116-117, fig. 12). The fact that the majority of fishing implements have only experienced scarce morphological changes through successive historical stages, with typological models reaching present times almost unaltered, makes it easier to identify this category of artefacts which includes metal hooks and certain fishing weights. However, most research has been limited to their occasional mention thus eluding any in-depth and all-encompassing approach to the topic.

Nevertheless, this barren field of research is punctuated now and then by exceptions, resulting from novel studies that have produced a significant body of documents in addition to affording the required level of certainty when approaching a topic previously left on the margins. Of particular relevance are the studies carried out on river fishing practices that have been identified on Gallic territory between the Second Iron Age and the late Gallo-Roman era. These studies have looked at the material culture associated with fishing, in particular certain types of weights used for the depth-adjustment of fishing rigs. The types examined were made of lead (Fort *et al*., 2010; Mauduit, 2012; Chevet *et al*., 2014) and clay (Dubuis *et al*., 2012). The number of studies dealing with this specific question across the Iberian Peninsula is more limited. One study worth noting examines a set of cylindrical lead weights used for fishing in the basin of the Guadiana Menor river during the Late Iberian era (Mayoral *et al*., 2000).

The north-western quadrant of the Iberian Peninsula and more specifically Galicia shows evidence of fishing practices in river environments, as documented by various bronze hooks from the ancient convent capital of *Lucus Augusti*, which have been catalogued in the city's archaeological record (González, 2005: 129; Carnero and Alcorta, 2010: 199) and discussed in later publications of a broader scope (Rodríguez, 2011: 138, fig. 189). The fishing activity corresponding to hill fort settlements or *castros* located in the upper basin of the Miño river has been established by finds of other fishing artefacts such as cylindrical lead weights (Rodríguez, 2000: 38; Casal, 2019). On the other hand, the functional attribution of the stone weights with lateral notches to fishing is more problematic. These weights, which are mostly made from relatively flat pebbles, have been found in significant numbers at sites located on the *Baixo Miño* or final stretch of the Miño river (López, 1953: 159; Hidalgo, 1995: 37; Peña, 1992: 41-42; 2000: 147) and along the same river's passage through the Ourense province (Álvarez and López, 1997; 43, 53, 57; 2000: 529). In spite of the profuse bibliography referring to the massive presence of this type of stone artefacts in the north-western Peninsula, even more so in the northernmost part of neighbouring Portugal (Sarmento, 1907; Cardozo, 1956; Freitas, 1971; Martins, 1985; 1989; Bettencourt, 2001), the controversy regarding their functional attribution is still ongoing, with some regarding them as loom weights used for weaving in the textile industry while others believe them to be weights for the depth-adjustment of fishing lines and rigs, without ruling out the polyvalence. Following the assumption that they served some fishing-related purpose, some researchers argue that the largest items would have been used to weigh down fishing nets while the smaller ones would have served for the depth-adjustment of hook-and-line fishing rigs, or smaller nets (Fernández, 1929; Paço, 1970; Maury, 1977: 104-105).Other authors such as A. Viana (1961) base this correlation on whether the notches lie on the pebble's longitudinal or transversal axis, respectively. To avoid the risk of confusion due to different interpretations, in recent times a 'neutral', purely formal terminology has been adopted to group items that are morphologically identical and functionally equivalent under the generic designation of stone weights with lateral notches (Pereira, 2005).

The state of research briefly described in the previous paragraphs led the author to address river fishing on the Miño river, from its source on the western flank of the Meira mountains in Lugo to its final course where it draws a natural border between Galicia and Portugal before spilling into the Atlantic Ocean (Fig. 1). The review of the archaeological record from sites located along the Miño basin offers a relatively broad and varied collection of fishing implements and other instruments possibly linked to fishing which is presented below.

2. SOURCES OF INFORMATION

Unlike today, in Antiquity and over successive historical stages until quite recent times fishing rigs and nets were made of organic materials, basically consisting of fibres obtained from plants (flax, hemp, esparto, wicker, green woods) and from animals (wool, bristles from pigs or of bovine origin, and horsehair). The vast majority have disintegrated and thus vanished from the material record, leaving only such items protected by a combination of specific environmental conditions that have favoured their preservation. Hence, our knowledge of ancient fishing devices relies primarily on indirect evidence constituted by a group of non-perishable elements consisting essentially of hooks, harpoons, and above all—quantitatively speaking—weights, which in Antiquity were made of three basic types of raw material: clay, stone and lead.

In contrast to the abundance of classical representations addressing the subject matter of marine fishing which is particularly well-represented in Roman mosaics (López, 2006)—Tunisia ranking highest in terms of the number of mosaics representing fishing scenes—the iconographic index concerning river fishing is rather scant and tends to be limited to fish-shaped motives on different kinds of surfaces that have been registered

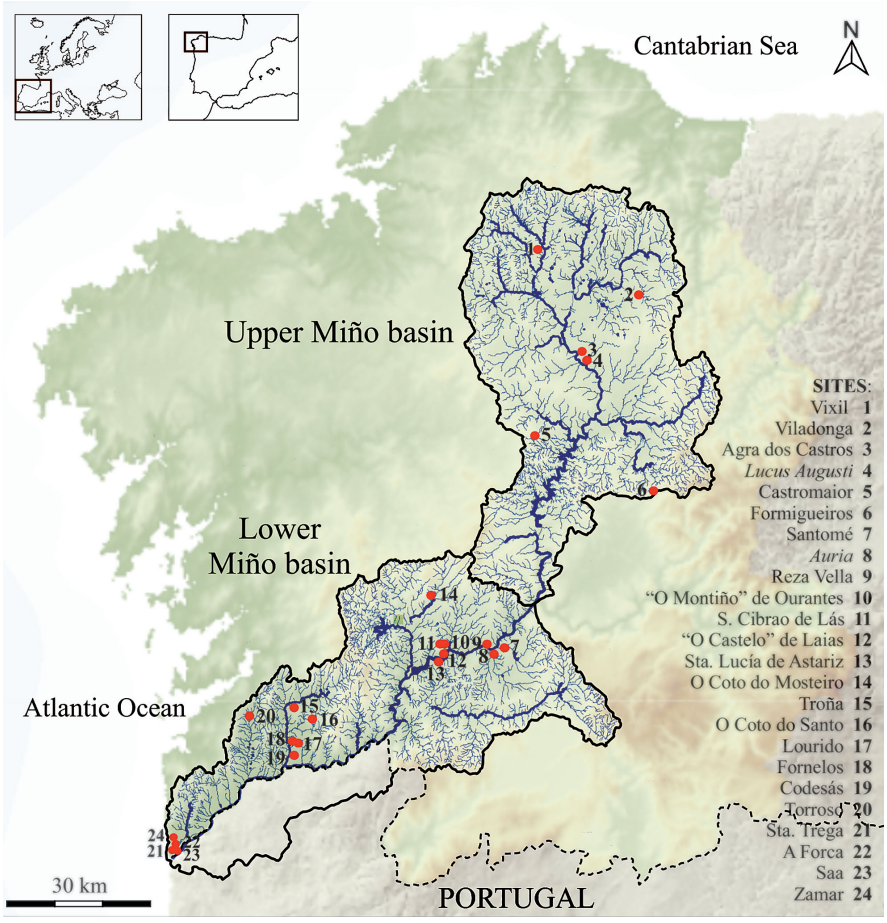

Fig.1. Map of Galicia with sectorization of the Miño river basin and location of archaeological sites with remains of fishing utensils and other artifacts potentially related to fishing compiled and examined in the scope of this article. / Mapa de Galicia con sectorización de la cuenca del río Miño y localización de los yacimientos arqueológicos con evidencias de utensilios pesqueros y otros artefactos potencialmente relacionados con la pesca recopilados y estudiados en el ámbito del presente artículo.

on sites located inland (Jimeno *et al.*, 1999: 803; *cfr.* Mayoral *et al.*, 2000: 192). At the *castro* of Formigueiros (Lugo), which is located on the upper basin of the Miño river, three representations of fish were discovered (Fig. 2). These were engraved on the slate flooring of a roofless room, similar to a patio, which has been dated to the first half of the 1st century AD (Meijide *et al.*, 2009). The morphological characteristics of the rock engravings of Formigueiros, i.e. essentially the shape of the fins and the line pattern of the skin, allowed them to be tentatively identified as salmonids which the artist would seem to have been familiar with, judging by their use of a repetitive pattern of basic anatomical aspects resulting in a highly effective economy of means.

In comparison to the marine-oceanic environment, references in classical Greek and Latin texts to fishing in inland waters are considerably less frequent. The classical authors specifically mention four basic methods of fishing, i.e. nets, harpoons, creels and hooks (Oppian, Halieutica III.72-91; Aelian, NA XII.43). A poem by Ausonius titled Mosella, which was written during the second half of the 4th century AD, probably constitutes the main classical work as far as river fishing is concerned. The author proposes a catalogue listing fish from the Moselle river (Mos. 83-149) which includes curiosities that denote a relatively deep knowledge of the different fish species and their habitats. In one passage of the poem which is especially significant for the topic at hand Ausonius describes a fishing scene that directly refers to various fishing techniques (Mos. 240-283), such as angling with a cane and a hook from the river bank or massive catches of fish using nets which are lined with cork floaters fixed to the head rope.

The literary sources indicate knowledge of other fishing techniques in classical Antiquity that are impossible to trace through the archaeological record. And although the Greek and Latin texts citing these methods refer mainly to maritime environments, they may safely be extrapolated to freshwater fishing as their traditional use in river environments is well documented by the regional ethnographic historiography. This includes practices such as hand-fishing (Aelian, NA I.23, V.37, VIII.18), or methods involving certain plants whose toxic effects on fish (inducing a daze or even causing death) make it easier to catch them (Oppian, *Halieutica* IV.647-693; Aelian, NA I.37). X. Lorenzo Fernández' work on traditional material culture from Galicia (1962: 415; 1982: 126, 149) reveals that the most common ways employed by farmers for catching trout (*Salmo fario*)—one of the most abundant and prized spe-

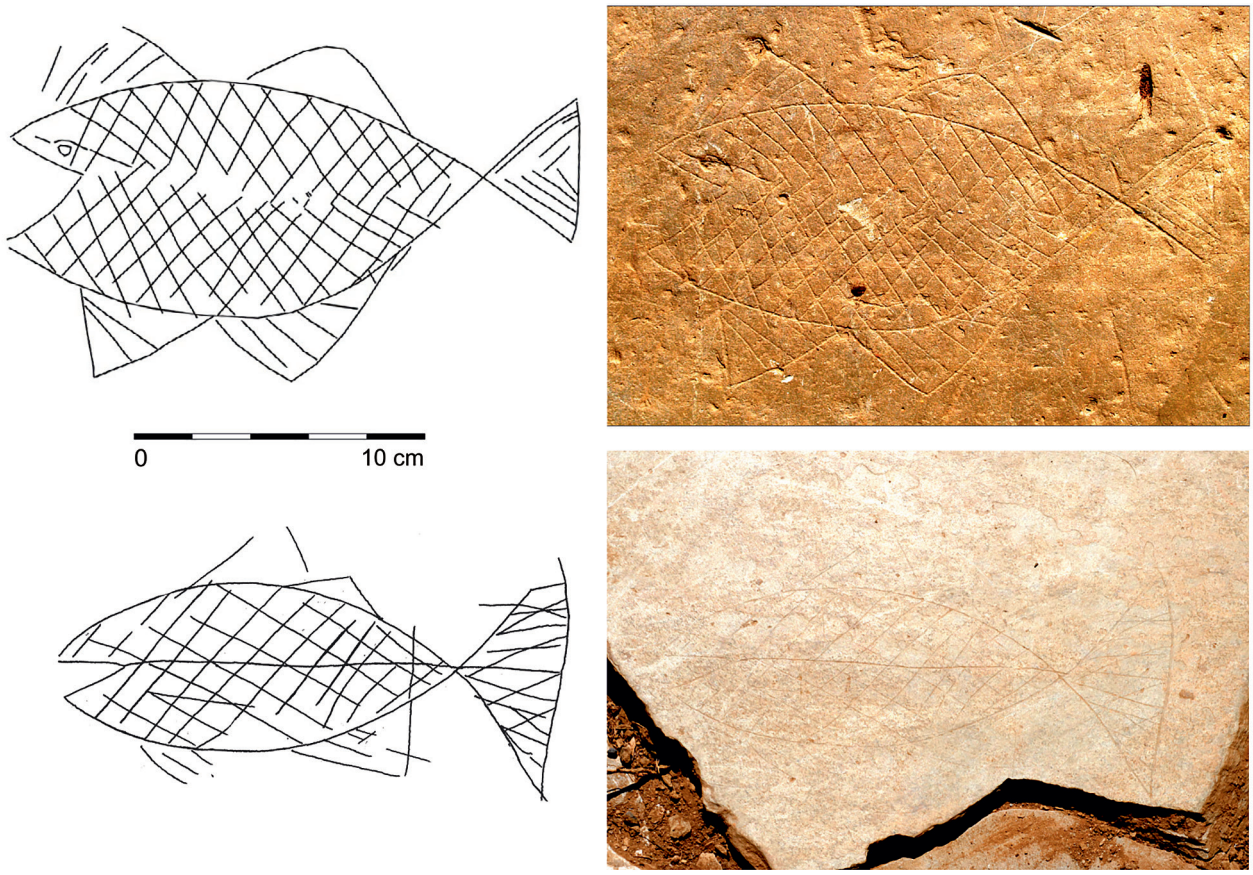

Fig.2. *Castro* of Formigueiros (Samos, Lugo). Fish-shaped rock engravings (Meijide *et al.*, 2009: fig. 4, 8-9, 14-15 cutout). / Castro de Formigueiros (Samos, Lugo). Grabados ictiomorfos sobre pizarra (Meijide *et al.*, 2009: fig. 4, 8-9, 14-15 recortado).

cies—and other similar fish was precisely hand-fishing, which was always practised in daylight and in smaller streams. This double occupation of farming and fishing among river-side communities, which had already been noted by Aelian in Roman times (NA XIV.29), is also reflected in local ethnographic studies around the Miño valley in the province of Ourense (López *et al.*, 1936: 144). These suggest the simultaneous performance of farming and fishing as well as highlighting the importance of private homes as the places for carrying out fishing-related tasks such as the making and repair of rigs, nets and creels. On the other hand, poison fishing, as it is known, was very widespread as a catching method in Galician rivers until its ban in the first decade of the 20th century (Rodríguez, 1923: 443-446; Lorenzo, 1962: 435; 1982: 156-157; Pérez, 1975: 189). Considered a means of assistance, the harmful substances were scattered in slow-flowing waters and were normally obtained from grasses which proliferate along the banks and nearby areas, notably the flax-leaved daphne (*Daphne gnidium*).

The situation described in the previous paragraph further underlines the markedly conservative character of fishing, an activity which typically tends to perpetuate anything deemed to be useful, thus reflecting a pragmatic and opportunistic approach. Indeed, the fishing equipment used in rivers remained practically unchanged in Galicia until the arrival of synthetic materials around the middle of the 20th century, which coincided with the building of large dams across the river network of the Miño river. These directly affected the migratory routes of fish species that were traditionally highly prized by fishermen, such as salmon (*Salmo salar*) or the allis shad (*Alosa alosa*). Other human-related factors have also converged in effecting a profound change in traditional river fishing, such as pollution by sewage and industrial discharges, the extraction of aggregates from riverbeds, the rural exodus and the resulting neglect of riverbanks or the introduction of alien fish species. Lastly, current regulations have affected the use of traditional fishing rigs and techniques through the ban on nets and moving creels, or the restriction of pole-and-line fishing to recreational activities only (Castro, 2016). The result of all this is effectively the transition from a traditional fisheries model, where the river fishing resources constituted a source of food or income, to a new model where fishing is associated with a leisure economy rather than a subsistence economy.

A study of traditional fishing equipment from Galicia reveals that some fishing utensils are in fact indistinguishable from items belonging to the ancient archaeological record, which adds even more significance to the context surrounding a find.

3. THE MATERIAL CULTURE OF RIVER FISHING. FISHING EQUIPMENT

3.1. Hooks

Only a limited number of fishing hooks have been collected from sites in the Galician interior. This stands in stark contrast to the corresponding record from coastal sites. So far, only three specimens have been recovered from rivers and their surroundings. They date back to contexts covering the early half of the first century AD and the Low Roman Empire in *Lucus Augusti* which is located on the banks of the upper reaches of the Miño river (Table 1). By comparison, about thirty hooks have been documented in coastal settlements, mostly concentrated in the region of the *Rías Baixas* in Galicia.

The record of hooks from Lugo is made up exclusively of bronze hooks, which reflects the predominating use of this raw material for this type of instruments in *Hispania*, as it was more durable and resistant to the corrosive effects of water than iron. The items are small (length between 2.5 and 4 cm) and medium (4-8 cm), the cross-section of their shanks is round or near-rectangular with a diameter ranging between 2 and 2.5 mm. They belong to a type with elongated shanks which results in a slender appearance. Despite minor superficial losses of material, the hooks are practically complete, making it possible to clearly recognise the system used for fastening the line to which they were attached. The collection from *Lucus Augusti* presents the two main implements used to this day: spade end hooks and eyed hooks. Both the hook that was recovered from the Roman Terms (1st century AD) (Fig. 3 a) and the one found at the *Domus* with the mosaic of Daedalus and Pasiphae (Low Roman Empire) (Fig. 3 b) present distal ends that have been flattened and enlarged by hammering in order to secure the knot of the line and to prevent the fisherman from losing such a valuable instrument. The hook recovered from the site at Rúa do Teatro (1st-4th century AD) (Fig. 3 c) presents —unlike the other two—a unique fastening system in the Galician record: it consists of an eye or ring obtained by first hammering and then bending the part towards the outside in relation to the instrument's axis. This would allow introducing and fastening the fishing line. Several identically fashioned items appeared in the Roman port of *Oiasso* (Urteaga, 2000: 14), together with other spade end hooks. In relation to the river environment, another eyed bronze hook obtained through bending forms part of the archaeological record of *Bracara Augusta*, which is located in the Cávado river basin and where items with spade-like flattened ends have also been found (Lourenço, 2012: 61-62, 306, 315). Fishing in the final stretch of the Mondego river in Roman times has been attested through the discovery of another bronze instrument with a hammered end in the Lusitanian city of *Conimbriga* (Alarcão *et al.*, 1979: 45-46, Pl. IX nº 119). Hook-fishing in river environments has also been documented in the Northern Peninsula in enclaves such as Arakaia (Álava), where a fragment of a specimen from the High Roman Empire was recovered, although it was unequivocally identified as a fishing instrument due to the presence of a barb on the preserved fragment (Filloy and Gil, 2000: 237, nº 189). In the *castro* of Las Rabas (Cantabria), which is situated next to the small Marlantes stream, a tributary of the Izarilla river, at least one hook was recovered dated to between the 4th/3rd and 1st centuries BC (Bolado *et al.*, 2010: 89).

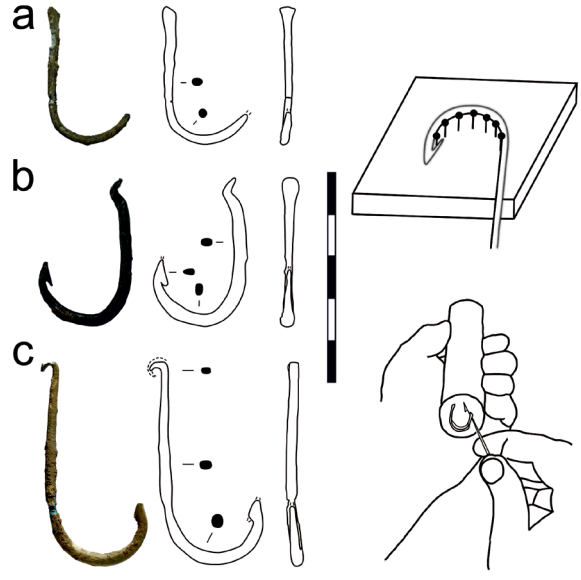

Fig.3. Hooks retrieved from *Lucus Augusti*: a. Roman Terms; b. *Domus* with the mosaic of Daedalus and Pasiphae; c. Rúa do Teatro / Schematic drawing of ways to model a metal hook (Cleyet-Merle, 1990: 149). / Anzuelos procedentes de *Lucus Augusti*: a. Termas Romanas; b. *Domus* del mosaico de Dédalo y Pasifae; c. Rúa do Teatro / Dibujo esquemático del proceso de incurvado de un anzuelo metálico (Cleyet-Merle, 1990: 149).

Lugo plot / campaign	Chronology	Length (cm)	Gape (cm)	Weight (g)	Barb	Deposit details
Domus with the mosaic of Daedalus and Pasiphae / 1986	Low Roman Empire	3.55	1.65	1.95	X	"Porta Miñá" Room (Lugo Council) - LU86/AR
Rúa do Teatro s/n / 1997	1st AD - 4th AD	4.9	1.6	1.75	X	Provincial Museum of Lugo (MPL) - GT97 Reg. nº 2000/89
Roman Terms / 1997	First half of the 1st AD	3.3	1.65	0.61	?	Lugo Council - LU97/BAL nº 152

Table 1: Hooks. Record of items collected and studied. / Anzuelos. Registro de ejemplares recopilados y estudiados.

3.2. Lead weights

Most of the lead weights that have been recorded to date in the Miño river basin correspond to a type of hollow or tubular cylindrical weights (54%), obtained by wrapping a metal plate around the fishing line or rig (Fig. 4 a). They are very similar to the rolled-plate or folded weights (15%) that give rise to a U or V-shaped cross-section (Fig. 4 b), making them difficult to distinguish at times, especially because of the frequent partial unfolding of the original plate due to the low mechanical resistance of lead. It is precisely the high degree of ductility, together with its corrosion-resistant properties and its high specific weight that make it an ideal material for making small fishing weights. These have been documented in the Eastern Mediterranean since the Late Bronze Age with a growing extension towards the Western Mediterranean and Atlantic regions until Late Antiquity (Vargas, 2020: 104-108). Other types of lead items such as perforated disc-shaped (Fig. 4 c) and cone-shaped/truncated cone-shaped weights (Fig. 4 d) (Table 2) have been documented in Galicia, albeit in far smaller numbers than the two basic types mentioned.

The record of lead weights from certain sites located inland on Gallic territory proves the existence of fishing activities during Antiquity and has allowed its detailed study in several of its river valleys. The Roman *villa* of Burgille, situated in the Le Doubs river valley, has produced a set of at least ten different-sized rolled-plate weights shaped like hollow cylinders, as well as a hoop with a flat cross-section, dated to the 4th century AD and interpreted as net sinkers (Fort *et al*., 2010: fig. 2 a-k). At the *Vindinum* site, on the banks of the Sarthe river, a significant group of lead artefacts dated between the 1st century BC and the 4th/5th centuries AD was excavated, including a large collection of rolled-plate and folded weights of varying sizes (weighing between 3 and 49 grams) which have been identified as sinkers for the depth-adjustment of rigs comprising lines and hooks in the case of the smaller items, and fishing nets in the case of the largest specimens (Chevet *et al*., 2014:138-140, fig. 18 nº 63-75). Other disc-like, flat-shaped or flat-convex specimens with a central hole have also been attributed to fishing practices. However, other possible uses cannot be ruled out, for example in textiles, as a spindle whorl, or for building, as a pivoting part of an axis functioning as a hinge (*ibid*.: 140, fig. 14 nº 76, 137-138, fig. 14 nº 44 and 51). Another group consisting of nine small disc-like items with a truncated cone shape originating from the *villa* of Grigy (late 1st century BC - early 5th century AD) in the Moselle basin was defined as a set of spindle whorls, while not dismissing other functional interpretations, for example as weights for scales; fishing weights; or even small ingots (Brkojewitsch *et al*., 2014: 289-291, fig. 21).

A work that stands out among all the studies mentioned is that of T. Mauduit (2012) on river fishing on L'Isle-Saint-Georges, close to the Garonne estuary where there is evidence of a small-scale commercial conglomerate from the 2nd/1st century BC which was occupied until the 4th century AD. Mauduit describes the massive presence of two basic types of lead weights: oblong, quadrangular rolled plates and oblong plates folded longitudinally (Mauduit, 2012: 28, fig. 8-11, 13 nº 1-3). The variety of sizes, with lengths ranging from 0.9 to 7 cm and weights from 4.5 to 70 g, seems to point to arrays of fishing rigs of varying types and sizes. In addition, other categories of lead artefacts have been documented that have also been interpreted as weights, including disc-like items with a flat cross-section and chiefly items shaped like a truncated cone, perforated along their longitudinal axis and varying in size (7.6 to 49.1 g). These have been interpreted as fishing implements on the basis of their ability to retain the knot of the line at their base, especially in the case of the items that are shaped like truncated cones (*ibid*.: 29, fig. 15).

In the context of the Iberian Peninsula the use of lead-based fishing implements for river fishing is supported by a limited but nonetheless relevant number of finds. At the Roman military camp of Atxa (Álava), next to the Zadorra river, at least three cylindrical weights were extracted dated to between the last third of the 1st century AD and the early 2nd century AD. They were found in a waste dump associated to the *principia* or headquarters of the military camp (Filloy and Gil, 2000: 236 nº 185-187). However, an unequivocal functional attribution of these metal items to fishing remains controversial. A good example is the group of ninety-four rolled and folded plates defined as counterweights for clothes found in Roman contexts at the fortified settlement of Cabeça de Vaiamonte (Portalegre)[1], located in the Portuguese region of Alentejo. Some of the smaller rolled-plate weights found at Cancho Roano (Badajoz), dated around the 5th century BC, have been attributed the same function (*apud* Mayoral *et al*., 2000: 192), while another set of items of similar shape but larger size recovered at the same site have been identified as weights for nets (Celestino, 1996: 86). The study on river fishing in the Guadiana Menor river during the Late Iberian period is of particular interest. This was based on the discovery of a set of forty-four plate weights with a more or less uniform weight of 25 to 30 g as well as the remnants of another twenty partially molten items in the settlement of Los Castellones de Céal (Jaén) (Mayoral *et al*., 2000).

[1] http://www.matriznet.dgpc.pt/MatrizNet/Objectos/ObjectosConsultar.aspx?IdReg=142765 [accessed 23 June 2022].

Miño basin	Achaeological site	Campaigns	Chronology	Hollow cylindrical			Rolled plate U/V- shaped			Cone/Truncated cone			Pear shaped			Ring shaped		Deposit details
				Lengh	Perf. Ø	Weight	Lengh	Width	Weight	Height	Perf. Ø	Weight	Lengh	Perf. Ø	Weight	Int. Ø	Weight	
Upper Miño basin	Viladonga	1970s 1971-76 2008	3rd AD - 5th AD	1.3	± 0.40	11.34				≥ 1.8	± 0.6-0.8	12.77				0.55	26.85	Castro of Viladonga Museum Reg. nº: 1970/13, 1970/32947, 1976/8-12, 2008/chumbo.65
				1.6	± 0.35	12.93												
				1.5	± 0.45	13.47												
				1.45	± 0.40	13.56				> 2	-	27.28						
				1.7	± 0.35	17.79												
				1.65	± 0.40	21.36												
	Lucus Augusti	Roman Terms/1998	1st AD - 3th AD													0.45	15.17	Lugo Council - BAL98A040097
	Agra dos Castros	2007	2nd BC - 1st AD													0.55	>17.6	Particular collection
	Castromaior	2007	4th BC-1st BC/1st AD										4.6	0.2	54	0.6	21	Castro of Viladonga Museum. External warehouse
	Santomé	1983 1987 1988 2003	1st BC - 5th AD	3.5	± 0.50	25.83												MAPO (Provincial Archaeological Museum of Ourense) Reg. nº: CE5227/60 (5), CE5227/147, CE5270/18, DX0012/134, DX1028/119-123, DX1028/205, Santomé I/87
				3.3	± 0.40	24.80												
				3.2	± 0.45	27.38	2.8	1.7	21.06	1.6	± 0.65	29.54						
				3.2	± 0.45	26.40												
				3.1	± 0.40	26.30												
				2.2	± 0.45	17.36												
				3.05	± 0.40	29.59												
				4.4	± 0.30	36.01*	1	> 2	> 3.06	1.45	± 0.90	16.45				± 0.6	19.22*	
				2.6	± 0.35	12.80*												
				1.8	± 0.20	7.29												
	O Coto do Mosteiro	1984	1st BC - 1st AD	3.1	± 0.35	19.53												MAPO - Reg. nº: CE5230/526 (2)
				3.3	± 0.4	> 23.55												
	San Cibrao de Lás	2004	2nd BC - 2nd AD				1.7	1.2	4.18							0.45	45.25*	MAPO - Reg. nº: DX0898/183 (2)
	Sta. Lucía de Astariz	2017; 2020	2nd AD - 4th AD	3.1	± 0.30	21.24*	± 2,6	± 2,9	> 21.26									UVigo - AST17/11134, AST20/1829
Lower Miño basin (Galician shore)	Sta. Trega	Exc. from the past; 1986; 2015	2nd BC - 2nd AD	1.5	0.60	12.95	> 2.2	± 2.1	> 7.35	4.2	± 0.6-0.8	105.58						Provincial Museum of Pontevedra Reg. nº: 10067(2); MASAT (Santa Trega Archaeological Museum) Reg. nº: M/005, ST15.2408, ST15. 16404
				3.2	± 0.50	≥ 9.83	1.2	2.65	10.18									
TOTAL * With internal deposit				21			6			5			1			6		

Table 2: Lead weights. Record of items collected and studied (measurements in cm and g). / Lastres plúmbeos. Registro de ejemplares recopilados y estudiados (medidas en cm y g).

Fig.4. Lead weights from the Miño river basin archaeological record: a. Hollow cylindrical (Viladonga; Santomé; Sta. Lucía de Astariz; Sta. Trega); b. Rolled plate U/V-shaped (Santomé; S.Cibrao de Lás); c. c. Perforated disc-shaped (*Lucus Augusti*; Santomé); d. Truncated cone (Santomé; Sta. Trega). / Lastres plúmbeos procedentes del registro arqueológico de la cuenca del río Miño: a. Cilíndricos huecos (Viladonga; Santomé; Sta. Lucía de Astariz; Sta. Trega); b. Laminares enrollados con perfiles en forma de U/V (Santomé; S.Cibrao de Lás); c. Discoidales perforados (*Lucus Augusti*; Santomé); d. Cónicos truncados (Santomé; Sta. Trega).

3.3. Stone weights

The record of stone weights from sites around the Miño basin corresponds to the two basic types of weights which are determined by the system employed for fastening: perforated with one or two holes; or with lateral notches. The Miño estuary is noteworthy for the presence of specimens with a double perforation that follow a clearly-defined model consisting of a near-oval shale base with a length of between 7 and 10 cm with two relatively centred holes positioned more or less symmetrically (Fig. 5 a). Portuguese archaeological historiography likens this kind of artefacts to weights for nets, which were found on sites in the northernmost part of modern-day Portugal, for example at the *castro* of São Lourenço (Esposende) or the Roman *villa* of Alto de Martim Vaz (Póvoa de Varzim) (Gomes and Carneiro, 2005: fig. 3). The wear traces observed on the specimens from Galicia, especially around the edges of the holes and on the outer edges, would seem to support this functional hypothesis which is also endorsed by ethnographic documents (Rodríguez, 1923; Lorenzo, 1962; 1982).

The massive presence of weights made from pebbles with lateral notches in enclaves along the lower course of the Miño river (87%) (Table 3), some of which even bear the traces of the lines they were tied to (Fig. 5 c), confirms the concentration of this category of artefacts in a geographical area clearly distributed across the north-western tip of the Portuguese territory, defined by the basin of the Douro river, the south of the current province of Pontevedra and the western part of the province of Ourense, and covering a period spanning the Late Bronze/Early Iron Age into the Roman period. Indeed, this stone industry which is associated to the *castro*'s culture, is also apparent in other settlements in the interior of current-day northern Portugal such as the *castro* of Sabroso (Guimarães) (Sarmento, 1907: 115), the *citânia* of Briteiros (Guimarães) (Cardozo, 1956: 45), the *castro* of São Julião (Vila Verde) (Freitas, 1971: 138; Martins, 1985: 214, Est. XVIII nº 48), the *castro* of Barbudo (Vila Verde) (Martins, 1989) or the settlement of Santinha (Amares) (Bettencourt, 2001: 26, 29, 31, 34, Est. XXXVI nº 1-5). This does not preclude their documented presence in enclaves located further south of the Beira Interior subregion, such as Moreirinha, Alegrios, Monte do Frade and Castelejo (Vilaça, 1995: 111, 140, 195, Est. LII, LIII, CIII and CLXXXIV) or Cabeço do Castro de São Romão (Viseu) (Senna-Martínez y Pedro, 2000: 140), and even sites further north in the north-western tip of the Iberian Peninsula, such as the valley of the Navia river (Rodríguez and Villa, 2013: 216-217, fig. 12) or of the Nalón river (López *et al.,* 1999: 247, Lám. IX nº 8-10).

Miño basin	Site	Campaign or superficial retrieve	Chronology	Perforated						With lateral notches			Deposit details
				Mono-perforated			Double-perforated			Simple			
				No.	Perf. Ø (min.-max.)	Weight (min.-max.)	No.	Perfs. Ø (min.-max.)	Weight (min.-max.)	No.	Length (min.-max.)	Weight (min.-max.)	
Upper Miño basin	Vixil	1970s-1990s	2nd BC - 1st AD	2	0.9 - 0.95	51.24 - 57.71							Museum of Prehistory and Archeology of Vilalba (MUPAV) - Reg. 1992-23
	Viladonga	1970s; 1983-84; 1988; 1996; 1998; 2003; 2007-08; 2016-17	3rd - 5th AD	51	0.3 - 2.7	4.96 - 558.8	1	0.9	> 133.32				Castro of Viladonga Museum
	Castromaior	2006-09	6th BC-1st BC/1st AD	17	0.3 - 1.6	17.83 - 441.8							Castro of Viladonga Museum External warehouse
	Coto do Mosteiro	1984-85	4th BC - 1st AD	13	0.6 - 1.7	49.39 - 494.75							MAPO - Reg. nº: CE005230
	Sta. Catalina de Reza Vella	2010-11	1st - 6th AD							1	15.6	644	MAPO - Reg. nº: DX1040
	Auria	Cervantes 11 / 2006	1st - 3rd AD							1	6.6	71.85	MAPO - Reg. nº: DX1003
	S. Cibrao de Lás	2000-01; 2003-04	1st BC - 2nd AD	1	0.7	> 341.34				49	3.6 - 8.4	21.07 - 124.84	MAPO - Reg. nº: DX0895, DX0896, DX0897, DX0898
	"O Montiño" de Ourantes	2004	4th BC - 3rd AD							1	7.7	163.32	MAPO - Reg. nº: DX1215-10
	"O Castelo" de Laias	1997	4th BC - 2nd AD							276	2.9 - 10.9	21.54 - 385.48	MAPO - Reg. nº: DX1029
	Sta. Lucía de Astariz	2016-17; 2020	1st - 4th AD	1	0.7	97.04	1	0.6	> 543,2	23	4.2 - 10.1	37.39 - 295.75	UVigo
Lower Miño basin (Galician shore)	Troña	1927-30; 1982; 1985-91	4th BC - 1st AD	1	1.4	55.95				26	4.3 - 7.9	22.65 - 91.13	MAPO; Provincial Museum of Pontevedra Reg. nº: 8762; Municipal Museum of Vigo "Quiñones de León"; Municipal Museum of Ponteareas
	O Coto do Santo	1992	Iron Age II - Roman times							1	4.9	56.54	Municipal Museum of Ponteareas - R.1250
	Codesás	1980s - 1990s	Iron Age II - Roman times							1	5.3	51.72	Municipal Museum of Ponteareas Permanent exhibition
	Fornelos	1980s - 1990s	Iron Age II - Roman times							4	4.55 - 8.3	17.98 - 150.83	Municipal Museum of Ponteareas Permanent exhibition
	Lourido	1980s - 1990s	Iron Age II - Roman times							3	4.9 - 5.5	32.5 - 66.47	Municipal Museum of Ponteareas Permanent exhibition
	Torroso	1990	7th BC							1	5.2	35	Provincial Museum of Pontevedra Reg. nº: 13056-159
	Sta. Trega	Exc. from the past; 1979; 1981; 1983; 1984; 1985; 1986; 1986-87; 1988; 1992; 1995; 2007; 2015; 2018; unknown	2nd BC - 2nd AD	41	0.2 - 2.05	7.78 - 2139.3	13	0.35 - 0.6	50.71 - 111.93	102	3.35 - 17.5	17.74 - 3204	Archaeological and Historical Museum "Castelo de San Antón"; MPL; MASAT; Provincial Museum of Pontevedra - Reg. nº: 10067
	A Forca	1981; 1984	4th BC - 1st AD							4	5.1 - 7.25	51.74 - 149.7	MASAT; Provincial Museum of Pontevedra Reg. nº: 10183
	Saa	Plot B12, 2003; Plots B31 and B32, 2003; 2009	2nd BC - 4th AD	2	±0.5-±1.2	> 310.74 - > 1022				3	5 - 7.3	37.93 - 59.38	Provincial Museum of Pontevedra Reg. nº: 16492, 17180
	Zamar	1991; 1993; 1998; 2000; 2016; unknown	2nd BC - 4th AD	1	?	> 518				10	5 - 9.3	50.94 - 660.8	MASAT; Provincial Museum of Pontevedra Reg. nº: 14830, 15111, 15460, 18545
Total				**130**			**15**			**506**			

Table 3: Stone weights. Record of items collected and studied (measurements in cm and g). / Pesas líticas. Registro de ejemplares recopilados y estudiados (medidas en cm y g).

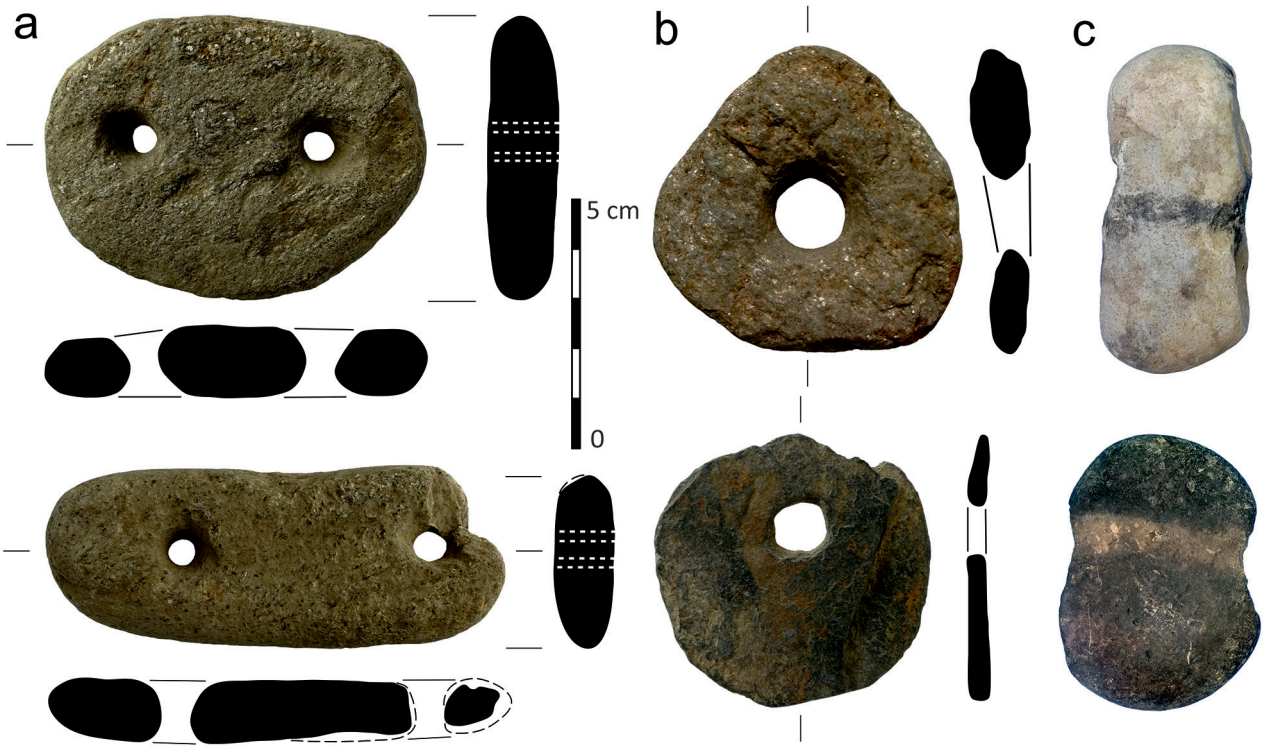

Fig.5. Stone weights from the Miño river basin archaeological record: a. Shale plates with two perforations (Sta. Trega); b. Mono-perforated weights (Troña); c. Pebbles with lateral notches ("O Castelo" de Laias). / Pesas líticas procedentes del registro arqueológico de la cuenca del río Miño: a. Placas de esquisto con doble perforación (Sta. Trega); b. Pesas mono-perforadas (Troña); c. Cantos rodados con entalles laterales ("O Castelo" de Laias).

4. DISCUSSION

4.1. Hooks

Lugo hooks make reference to the practice of hook-and-line fishing in the old capital of the *Conventus Lucensis* administrative area. The record, which includes different domestic contexts and the Roman Terms located next to the Miño river, suggests a more or less continued fishing in *Lucus Augusti* from its foundation to at least the 4th century AD. The fact that each of the three finds was isolated, i.e. without other nearby evidence of fishing, supports the hypothesis of a link to angling using a reed (traditionally replaced by a thin rod of green wood) from the banks or from a boat, as part of a recreational activity without any major repercussions on the domestic or community economy (Fig. 6 a). However, the possible use of multiple-line rigs should not be ruled out, especially in light of related ethnographic documents from Galicia (López *et al.*, 1936: 147-148, fig. 119; Lorenzo, 1962: 423; 1966: 294-295; 1982: 137; Pérez, 1975: 187-188). This would have been achieved—given the Miño river's width—by tying the rig from one of the banks to a protruding stone or rock in the river bed, adjusting the height by means of stone weights. In smaller streams or narrower tributaries the fishing rigs would have spanned the river, often without need for using weights (Fig. 6 b). According to the studies on regional traditional fishing (López *et al.*, 1936: 147; Lorenzo, 1962: 435; 1982: 156; Pérez, 1975: 182) and to classical sources (Aelian, NA XIV.22), the hooks would have been baited in accordance with the target catch. In the Miño river, this would mainly be trout (*Salmo fario*), salmon (*Salmo salar*), the Northern Iberian chub (*Squalius carolitertii*) or the European eel (*Anguilla anguilla*). As a matter of fact, the remains of fish fauna recovered at *Lucus Augusti* (Casal, 2020: 143-144), which are in themselves exceptional, endorse the consumption of inland water species (probably trout) and migratory species (possibly salmon or allis shad) between the 1st/2nd and the 4th centuries AD. These catches presumably originated from the city's nearby surroundings.

The apparent absence of hooks from the record relating to indigenous sites (*castros*) and even newly-established Roman settlements along the Miño basin—leaving aside the specimens found in Lugo—needs to be seen from a perspective informed by two factors: the fragility of these sorts of artefacts which consist of a thin metal shank and are moreover exposed to the high acidity of the soils typical of the north-western reaches of the Peninsula that make their preservation difficult; and the ethnographic documents relating to the use of simple pins folded back on themselves and hooks made of wood (Fig. 6 c, d), most notably common hawthorn (*Crataegus oxyacantha*), which used to be very common across the Ourense province until the middle of the past century (Lorenzo, 1962: 422; 1966: 294; 1982: 137; Pérez, 1975: 187).

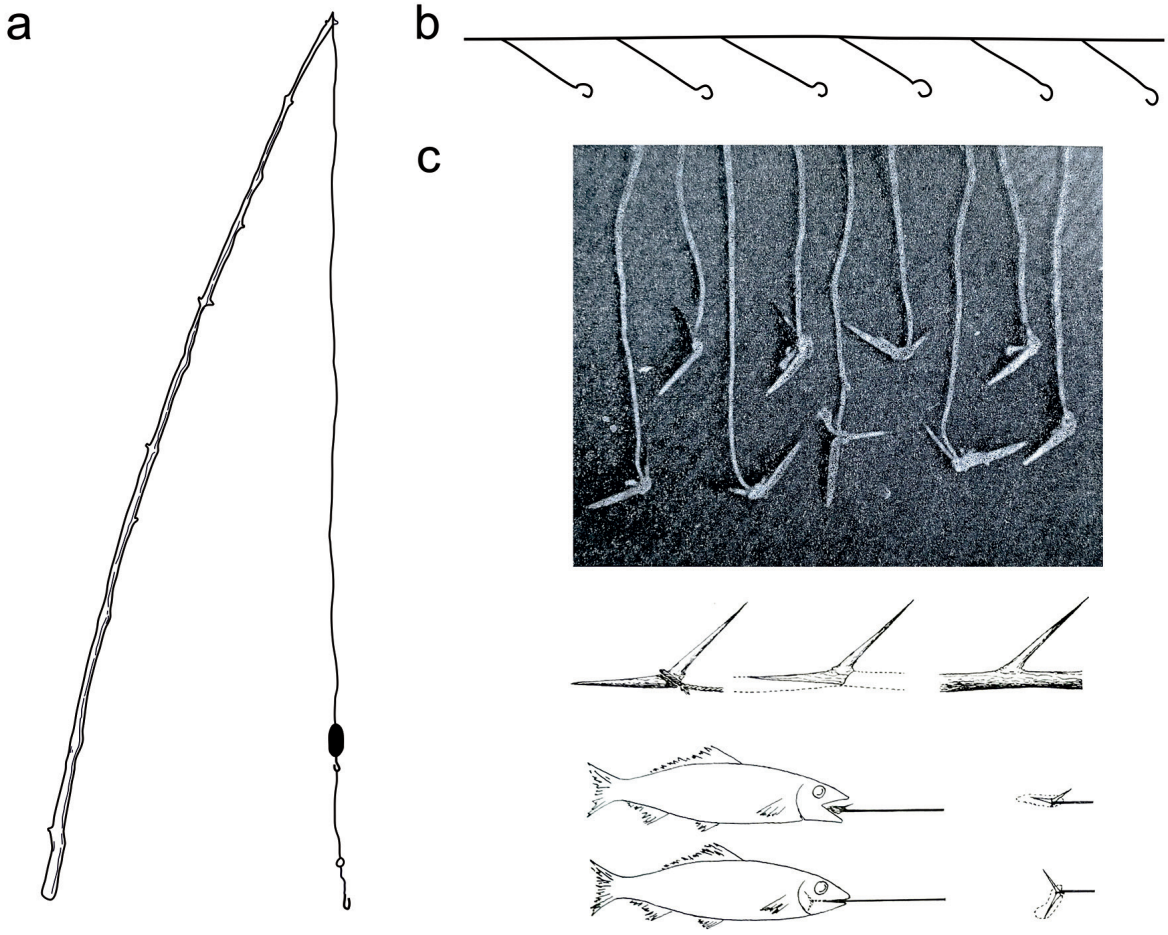

Fig.6. Line and hook fishing: a. Rod fishing (Lorenzo, 1982: 155); b. Multiple-line rig (López *et al*., 1936: fig. 119); c. Traditional wooden hooks for European eel fishing in Ourense. Schematic drawing of the behaviour of a hawthorn wooden hook (Lorenzo, 1962: fig. 316; 1966: fig. 4). / Pesca con línea y anzuelo: a. Pesca con caña (Lorenzo, 1982: 155); Aparejo de líneas múltiples (López *et al*., 1936: fig. 119); Anzuelos de madera empleados tradicionalmente en Ourense para la pesca de la anguila. Dibujo esquemático del comportamiento de un anzuelo de madera de espino (Lorenzo, 1962: fig. 316; 1966: fig. 4).

4.2. Lead weights

The discovery of cylindrical and rolled-plate lead weights quickly tends to be associated with fishing. However, although the relationship between nets and fishing is of course well-established in the collective mind, the use of such utensils in hunting during Antiquity has also been attested through the works of the classic authors (Oppian, Cynegetica I.148-158) and through iconographic sources.

Interpreting the lead weights recovered from sites along the Miño river as fishing implements suggests fishing practices relying on diverse types of fishing gear, especially if regional ethnographic documents are taken into account. Fastened to a line, cylindrical weights are used as sinkers for rod fishing and also for gear designed to catch mullet (of the *Mugil* species) and other fish species. This is used in certain Galician estuaries and consists of an upper first rope around which a lead plate is wrapped and from which two additional lines or cords hang, each with a hook at its end (Fig. 7 a). In the lower Miño basin three or four cylindrical lead weights were used for the depth-adjustment of a bag-shaped net that was fastened to two wooden poles joined in scissor-like fashion (Fig. 7 c). This was targeted at fish such as trout or barbel (*Barbus bocagei*) and is to be found under the entry “spoon” in B. Rodríguez Santamaría’s dictionary of fishing gear (1923: 304-306). One of the most popular fishing nets in the Miño river was the *chumbeira* (*chumbo* meaning lead) (Fig. 7 d), which is very similar to cast nets used in sea fishing. It is a small circular net handled by one person which is thrown from the bank (or shore in the case of sea fishing) or from an anchored boat. However, documents show that in the northernmost part of the current-day Portuguese coast the *chumbeira* was depth-adjusted with small-sized stone weights bearing lateral notches (Paço, 1970: 54) (Fig. 8 d), which are cheaper and more easily accessible than lead. Other traditional rectangular nets such as the *trallo* or *barredeira* were depth-adjusted by wrapping lead plates around the footrope. In the Miño river on its course through the current province of Ourense, the *trallo* net was placed across the river or between one bank and a sizeable stone or rock for fastening. It was

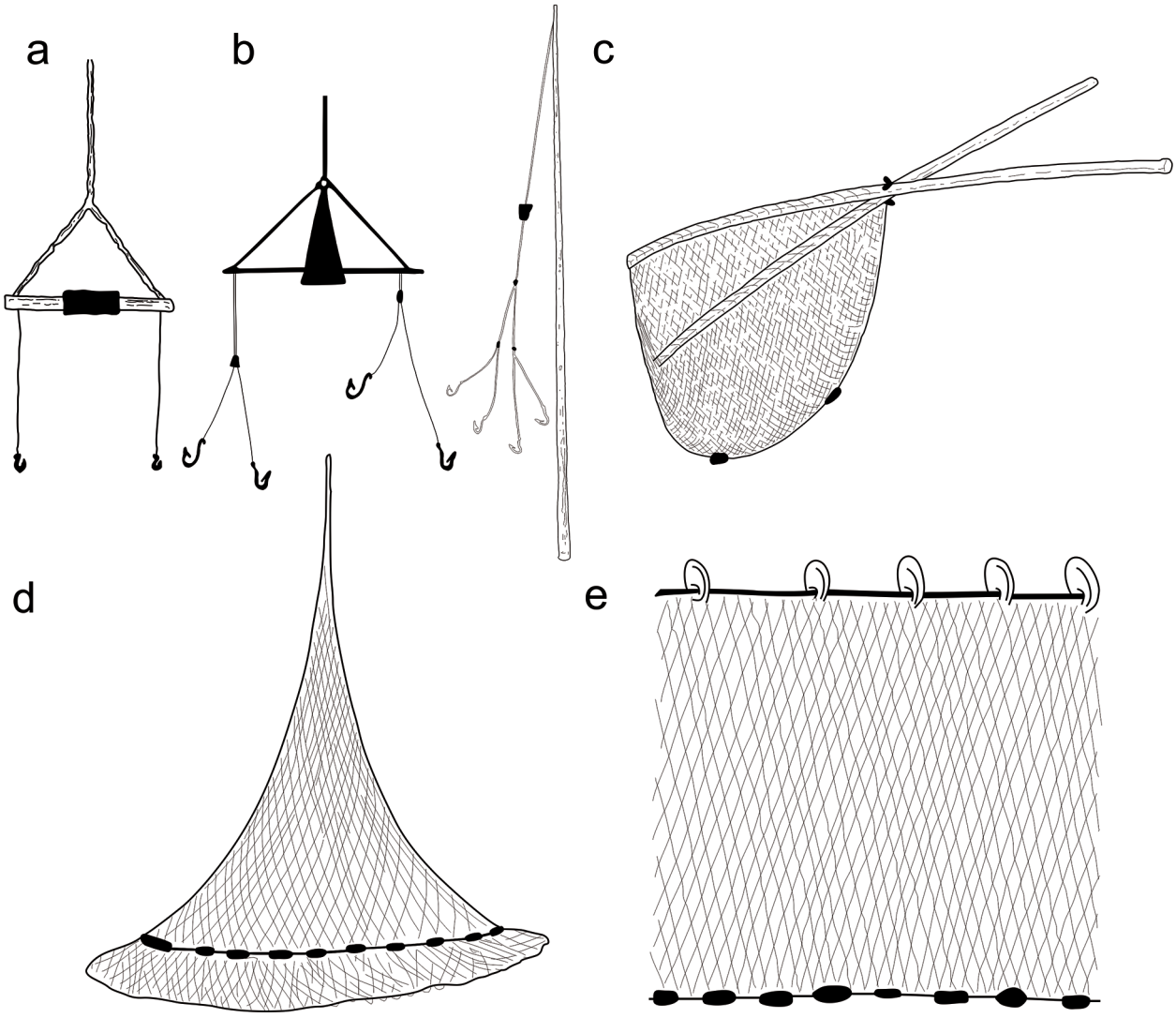

Fig.7. Lead weights used in traditional fishing rigs and nets: a. Rig for mullet (Lorenzo, 1982: 148); b. Other line and hook rigs (Rodríguez, 1923: 88-90 cutout); c. Bag-shaped net (Lorenzo, 1982: 139); d. *Chumbeira* net (López *et al.,* 1936: fig. 122); e. *Trallo* net (*ibid.*: fig. 120). / Lastres plúmbeos empleados en aparejos y redes de pesca tradicional: a. Aparejo para el mújol (Lorenzo, 1982: 148); b. Otros aparejos de líneas y anzuelos (Rodríguez, 1923: 88-90 recortado); c. Red en forma de bolsa (Lorenzo, 1982: 139); d. *Chumbeira* (López *et al.,* 1936: fig. 122); e. *Trallo* (*ibid.*: fig. 120).

used to catch fish such as the Northern Iberian chub or the European eel among others (Fig. 7 e). The *barredeira* net, which is a dragnet placed across the river from both banks or from one bank to a vessel, achieved substantial catches of various fish species such as allis shad, salmon, trout or mullet. This technique, which was employed near the final stretch of the river, involved a proper "sweeping" procedure (López *et al.,* 1936: 148-151; Lorenzo, 1962: 422-435; 1982: 137-138, 147-156; Pérez, 1975: 185-187).

4.3. Stone weights

The archaeological record from the Miño basin shows a clear predominance of stone as the material of choice for making weights. Plainly this responds to its ease of access and the free availability of this raw material, as well as the independence it offers by eluding the need to keep stocks of lead.

Galician ethnographic historiography associates the use of double-perforated shale plates with the depth-adjustment of *salmoeira* nets, i.e. rectangular nets with a mesh-size targeted mainly at salmon but also other species and which were cast across the mouth of the Miño river (Lorenzo, 1982: 139-141) as well as other rivers belonging to the Galician water network, for example the rivers Tambre and Mandeo (Rodríguez, 1923: 714). The net either reached across the whole river or from one bank to a vessel navigating so as to form a fence (Fig. 8 a). The stone weights with lateral notches, commonly known in Galicia as *poutadas* or *pandullos*, were traditionally used near the mouths of

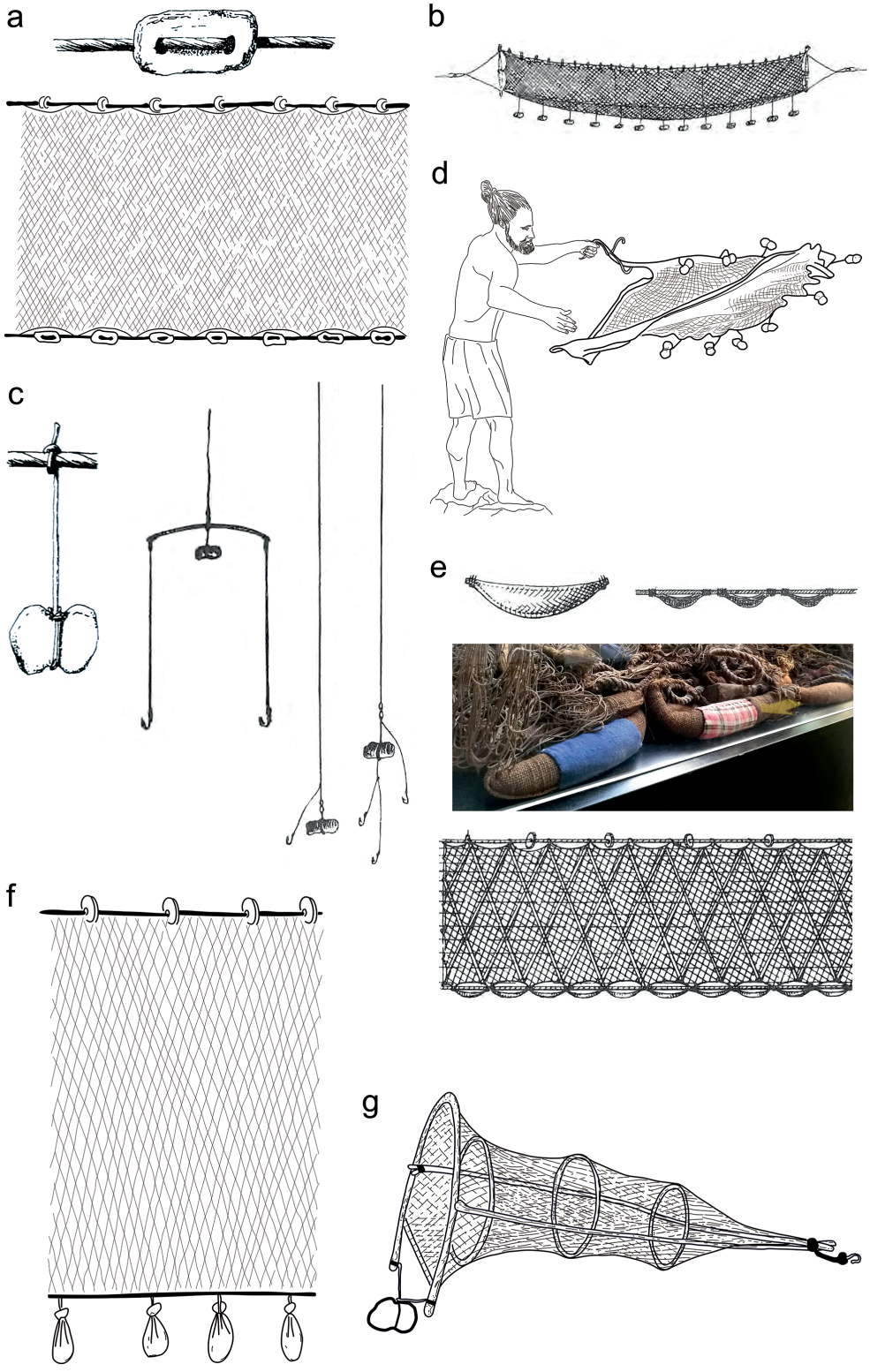

Fig.8. Stone weights used in traditional fishing rigs and nets: a. *Salmoeira* net (Lorenzo, 1962: fig. 411 cutout; 1982: 141); b. *Rapeta* net (Rodríguez, 1923: fig. 139 cutout); c. Line and hook rigs (Lorenzo, 1962: fig. 411 cutout; Rodríguez, 1923: 88-90 cutout); d. *Chumbeira* or casting net (Casa dos Nichos - Viana do Castelo, permanent exhibition); e. *Pandulleiras* (sand bags) and *lampreeira* net (Rodríguez, 1923: fig. 439 and 574 cutout; Aquamuseu - Vilanova de Cerveira, permanent exhibition); f. Bagged stones in a *sabaleira* net (Lorenzo, 1982: 149); g. *Buitrón* (Lorenzo, 1982: 130). / Pesas líticas empleadas en aparejos y redes de pesca tradicional: a. *Salmoeira* (Lorenzo, 1962: fig. 411 recortado; 1982: 141); b. *Rapeta* (Rodríguez, 1923: fig. 139 recortado); c. Aparejos de líneas y anzuelos (Lorenzo, 1962: fig. 411 recortado; Rodríguez, 1923: 88-90 recortado); d. *Chumbeira* o esparavel (Casa dos Nichos - Viana do Castelo, exposición permanente); e. *Pandulleiras* (arena embolsada) y *lampreeira* (Rodríguez, 1923: fig. 439 y 574 recortado; Aquamuseu - Vilanova de Cerveira, exposición permanente); f. Piedras embolsadas en una *sabaleira* (Lorenzo, 1982: 149); g. *Buitrón* (Lorenzo, 1982: 130).

rivers to adjust the depth of dragnets known as *rapetas* (Fig. 8 b) thus preventing the footrope from touching the bottom and stirring up sand (Rodríguez, 1923: 674-676; Lorenzo, 1982: 142-143). In any case, in the absence of lead, any stone can function as a weight for a fishing rig or line (Fig. 8 c), as is shown for instance by the rigging of cast nets with laterally notched stone weights (Fig. 8 d). At any rate, even unnotched stones can be used as weights for fishing, if appropriately tied (bagged or not) onto a line (Fig. 8 f) (López *et al*., 1936: 151; Lorenzo, 1982: 148-149). Of course, this also leaves far fewer archaeological traces to work on. Another cheap and popular solution among the fishermen of the Miño river consisted in using cloth bags filled with sand (the cloth and the sand acquiring a considerable weight on becoming wet). This system is known as *pandulleiras* (Fig. 8 e) and is used for the depth-adjustment of different purse seines and dragnets, such as the *alxerife* or the *sacada*, or passive systems such as gillnets, for example the *lampreeira* or the *trasmallo* (Rodríguez, 1923: 18, 501, 701; Lorenzo, 1982: 141-149).

Other fishing gear such as the *buitrón* and the *cabeceira*, i.e. cone or funnel-shaped nets that act as traps for catching species such as the allis shad, salmon or the European eel, were depth-adjusted using stone weights with lateral notches or perimeter grooves (Fig. 8 g). Similarly, wicker creels or rods made of green wood and other vegetable fibres could be depth-adjusted in the riverbed with stone weights or they could be seized between stones in rocky stretches of the river (Rodríguez, 1923: 151-152, 198-199; López *et al.,* 1936: 148-149; Pérez, 1975: 182-184).

5. GENERAL CONSIDERATIONS

The discovery of hooks and folded cylindrical and rolled-plate lead weights reveals the existence of fishing activity on the Miño river during Antiquity and as such warrants the study of a subject generally overlooked by archaeological research, possibly on account of the limited and ambiguous nature of the material record on hand. This research gap could be significantly reduced if attention was more specifically paid to the study of lead, a metal generally used for making objects of little aesthetic value and eminently practical use. While the presence of hooks and lead cylinders in the archaeological record serves as unequivocal proof of fishing, other artefacts are more controversial and complex in terms of their functional definition, such as the stone weights with lateral notches, which are strongly represented on sites along the banks of the Miño river. The context of each find is likely to prove crucial in identifying its function despite the fact that items are often found grouped together inside dwellings, which makes the interpretation of these multipurpose instruments more difficult.

With regard to the raw material chosen for making weights, which constitute the most common type of fishing utensil, so far the research on the Miño basin has not reported any clay weights deliberately designed for and directly linked to fishing. This is in contrast to results obtained from research carried out in other river environments, such as the Loire valley where several specimens of cylindrical net weights made of clay have been reported, dated to between the 5th and 3rd centuries BC (Dubuis *et al.,* 2012). To date, cylindrical clay weights or spherical-globular and grooved disc-like weights are missing from the record of the Miño basin. The only specimen belonging to the latter category was found at the *castro* of Sta. Trega, and this might well have been used in sea fishing, given the location of the settlement and comparable cases involving this type of fishing instruments (Bernal, 2010: 100-101). In addition, the absence of harpoons from the Galician archaeological record is similarly conspicuous, especially considering the relevance of this type of instrument in traditional fishing along the final stretch of the Miño river (Lorenzo, 1962: 416-417; Pérez, 1975: 184).

Unlike maritime fishing, river fishing has traditionally been considered a secondary and subordinated occupation within the scope of food-related human activities. However, like in later historical periods, river fishing during Antiquity must have represented a guaranteed food source for the riverine communities in Galicia, and even a source of income when supported by the presence of fresh or processed fish markets, although these are difficult to prove archaeologically. This role as a food back-up would have been particularly relevant during times of need in a basin notorious for its wealth of fish.

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