Archaeofauna 22 (2013): 37-49

Sant'Antioco (SW Sardinia, Italy): Fish and Fishery Resource Exploitation in a Western Phoenician Colony

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(Received *6 May 2012*; Revised *19 February 2013*; Accepted *12 June 2013*)

ABSTRACT: Archaeozoological studies at Iron Age Sant'Antioco provide evidence for the exploitation of marine resources in the region of Sulcis. This paper presents the results of the analysis of fish remains from urban contexts at *Sulky*, an ancient town inhabited during the Phoenician, Punic and Roman periods. The existence of a small-scale fishery developed on a household subsistence basis appears evident. This fishery was combined with larger-scale commercial activities that dealt with fishing and trade at a trans-Mediterranean level.

KEYWORDS: SANT'ANTIOCO, PHOENICIAN-PUNIC ARCHAEOLOGY, ZOOARCHAEOLOGY, FISH REMAINS, FISHERIES

RESUMEN: Investigaciones arqueozoológicas en el yacimiento de la Edad del Hierro de Sant'Antioco evidencian la explotación de los recursos marinos en la región de Sulcis. Este trabajo presenta los resultados de los análisis ictioarqueológicos en contextos urbanos de *Sulky*, la antigua ciudad habitada por fenicios, púnicos y romanos. La existencia de una pesquería a pequeña escala, desarrollada a un nivel de subsistencia, parece evidente. Esta pesquería se conjuntaba con una actividad comercial a mayor escala que implicaba pesca y comercio a un nivel transmediterráneo.

PALABRAS CLAVE: SANT'ANTIOCO, ARQUEOLOGÍA FENICIO-PÚNICA, ARQUEOZOOLOGÍA, RESTOS DE PECES, PESQUERÍAS

INTRODUCTION

The results presented in this paper are derived from the 2005-2011 excavation campaign conducted in the Cronicario area of Sant'Antioco, in SW Sardinia (Figure 1), under the direction of Prof. Piero Bartoloni from the University of Sassari. This site is stratigraphically complex with layers that date from the earliest phases of the Phoenician colonization in the first half of the 8th c. B.C. to contemporary times (Bartoloni *et al*., 1988; Bartoloni, 2005; Campanella, 2008; Pompianu, 2010b). The bone remains were excavated by Antonella Unali and Elisa Pompianu and date to the archaic Phoenician and the first Roman Imperial periods.

The archaeological research focussed on the interior of two adjacent rooms (Figure 2). The structures that surrounded these rooms were built during an architectural phase dated the 2nd c. A.D., when the city became a *municipium* under Emperor Claudius (Bartoloni *et al*., 1988: 116). The excavated area is located in a central zone of the city, close to the forum lying to the west (Bartoloni *et al.,* 1988: 113) and a temple area that has not been identified with certainty[1].

The excavation of rooms IIG (Unali, 2011a, 2011b) and IIE (Pompianu, 2008, 2010a) provided a great deal of information concerning the periods preceding the Roman conquest of Sardinia. The earliest layers date to the 8th c. B.C. During this phase, the two rooms were part of a single structure that, from the end of the 8th to the middle of the 7th c. B.C., was converted into a furnace that forged various kinds of objects including work tools (Pompianu, 2010b). Neither the last phase of the Phoenician Era, ranging from the 7th - 6th c. B.C., nor the Punic (6th - 4th c. BC) and Hellenistic (3rd - 2nd c. BC) occupations have undergone in-depth analysis due to the absence of architectural traces in them. Such evidence was apparently destroyed in later Roman Imperial Era (Unali, 2010: 1227). Nevertheless, some scant traces of these phases have been recovered in Room IIG where some floors and robber pits have been reported whose pottery is suggestive of use by a family unit (Unali, 2010: 1235-36, 2011a). Evidences from the beginning of the Roman Imperial Era (1st c. A.D.) are present both in Room IIE (Pompianu, 2008) and Room IIG which indicate that this site became a productive area, probably for the making of wine (Unali, 2010: 1235).

[1] Sacred objects and decorations were commonly found in these excavations, along with large quantities of terra-cotta molds for the creation of figurines representing divinities (Campanella, 2005: 33; Pompianu, 2008: 267; Unali, 2011a: 12). These signs might lead us to think of a market for *ex-voto* items in the vicinity of a temple lying under the current urban settlement of Sant'Antioco. Nevertheless, traces of these activities are present from the Phoenician period onwards.

MATERIAL AND METHODS

The faunal remains were recovered in a number of ways. In Room IIE, which was excavated between 2005 and 2006 without any archaeozoologist present, all materials were collected by hand. In Room IIG, an attempt was made to organize a sieving strategy. Selected samples that were to be sieved were judged to be of little use due to the non-homogeneous distribution of fish remains noted in the field during a preliminary examination. By directly examining each stratigraphic unit for the potential presence of fish remains, only those sediments that were apparently rich were sieved in their entirety using a 2 mm mesh size sieve. The contexts that were preferentially sieved were either those of small accumulations found above floors or else layers filling certain holes.

The material was subdivided into six different archaeological phases. The three earliest ones (i.e. F1, F2, and F3) date to the Phoenician era. These are followed by: (a) a phase from the Punic era (P) that covers the Carthaginian occupation and the Roman conquest; a late Punic phase during the Roman Republican era (R1); and finally phase R2 from the Roman Imperial era.

Archaeozoological identifications were carried out using Barbara Wilkens' comparative reference collection. Remains of mammals, birds, and marine molluscs were identified and analyzed. Most of the latter represented marine species from both rocky and sandy environments. Among birds were species such as cormorant from marine environments and others such as ducks and flamingos from coastal lagoon environments.

For taxonomic identification of cranial fish remains, the reference collection and CD of Wilkens (2003) were used. Some shark vertebrae were identified with the aid of Desse & Du Buit (1971). Bone nomenclature followed Lepiksaar (1981-1983). Bone measurements followed Desse *et al*. (1987) for Mugilidae, Sternberg (1992) for

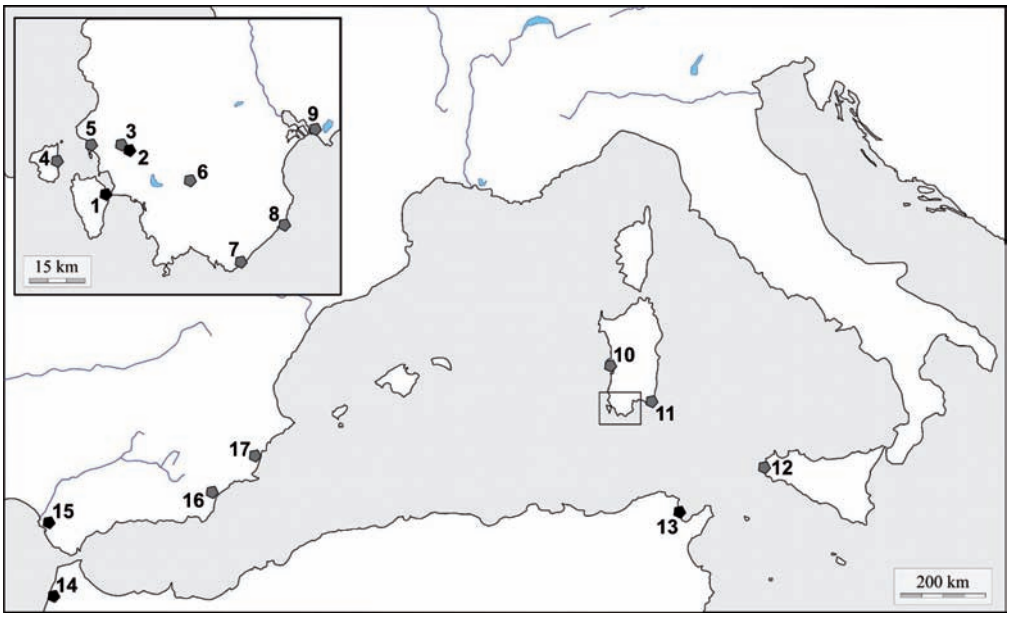

FIGURE 1

Western Mediterranean and south-western Sardinia: some of the principal Phoenician and Punic colonies. In black are highlighted the sites with studied fish remains. (1) *Sulky*, Sant'Antioco; (2) Nuraghe Sirai, Carbonia; (3) Monte Sirai, Carbonia; (4) *Inosim*, Carloforte; (5) San Giorgio, Portoscuso; (6) Paniloriga, Santadi; (7) Bitia, Domus de Maria; (8) Nora, Pula; (9) Cagliari; (10) Tharros, Cabras; (11) Cuccureddus, Villasimius; (12) Mozia, Marsala; (13) Carthage, Tunis; (14) Lixus, Morocco; (15) Castillo de Doña Blanca, Cádiz; (16) Villaricos, Almería; (17) La Fonteta, Alicante (Maps modified from www.d-maps.com).

FIGURE 2

Picture of the Cronicario of Sant'Antioco with the highlighted context under examination: from left to right we have the IIF, IIG and IIE rooms.

Serranidae, Desse & Desse-Berset (1996) for Sparidae, and Morales & Rosenlund (1979) for the remaining families and skeletal elements not included in the previous texts (i.e. epihyale and keratohyale).

The Minimum Number of Individuals (MNI) was calculated by pooling the data from all the stratigraphic units belonging to an archaeological phase. Estimates were based on the most frequent element of each taxon from each phase. In the case of the gilthead (*Sparus aurata*), the count took into consideration the size of the individuals, which were assigned to 10 cm interval's size classes. This method increased the MNIs considerably, while also taking into account the multi-layered nature of the site.

TAPHONOMIC ANALYSIS

The fish bone remains that could be identified included elements from the vertebral column, which will be shortly undergoing x-ray analysis to allow species identification following the method of Desse & Desse (1983), and cranial bones that were taxonomically identified (Tables 1 and 2).

Cronicario IIG ROOM												
Archaeological phases	**TOTAL**		**F1**		**F2**		**F3**		**P**		**R1**	
Date			**8th c. BC**		**8th - 7th c. BC**		**7th - 6th c. BC**		**6th - 4th c. BC**		**3rd - 2nd c. BC**	
Taxa	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Chondrichthyes	4				1	[1]			1	[1]	2	[1]
Sphyrna zygaena	1	1									1	1
Squalus acanthias	2	2			2	2						
Rajiformes	1								1	[1]		
Sardina pilchardus	2	2							2	2		
Mugilidae	10				5	[2]	4	[2]			1	[1]
Liza ramada	1	1			1	1						
Liza aurata	5	3			1	1	3	1	1	1		
Oedalechilus labeo	4	2			2	1			2	1		
Dicentrarchus labrax	7	4			5	2			1	1	1	1
Dicentrarchus punctatus	1	1					1	1				
Serranidae	1								1	[1]		
cf. *Serranus scriba*	95	1									95	1
Serranus scriba	36	1									36	1
Epinephelus sp.	1	1							1	1		
Sparidae	55				24	[8]	13	[2]	18	[3]		
Dentex sp.	5	2			5	2						
Dentex dentex	2	1			2	1						
Sparus aurata	111	45	10	6	66	19	20	11	10	6	5	3
Pagrus sp.	1	1					1	1				
Pagrus pagrus	1	1			1	1						
Pagrus auriga	1	1			1	1						
Pagrus caeruleostictus	1	1			1	1						
Pagellus sp.	6	3			1	1			5	2		
Pagellus erythrinus	9	5			5	2	2	1	1	1	1	1
Pagellus bogaraveo	19	7			9	4	6	2	4	1		
Pagellus acarne	2	2							1	1	1	1
Lithognathus mormyrus	24	8			12	3	1	1	11	4		
Diplodus sp.	22	8			5	2	4	2	13	4		
Diplodus sargus	8	4			6	2			1	1	1	1
Diplodus cf. *vulgaris*	33	14			20	7	6	4	7	3		
Sarpa salpa	5	2			1	1			4	1		
Spondyliosoma cantharus	3	2			2	1			1	1		
Centracanthidae	1	1							1	1		
Spicara maena	8	4			2	1	3	2	3	1		
cf. *Spicara smaris*	2	1							2	1		
Spicara smaris	23	5					14	1	5	2	4	2
Mullus surmuletus	1	1					1	1				
Labrus sp.	1	1									1	1
Labrus merula	1	1							1	1		
Symphodus tinca	27	3					1	1			26	2
Coris julis	1	1							1	1		
Trachinus radiatus	1	1							1	1		
Scomber sp.	1	1			1	1						
Thunnus sp.	1	1									1	1
Gobiidae	2										2	[1]
Gobius sp.	3	1									3	1
Gobius niger	15	6			3	1	2	1	8	3	2	1
Zosterisessor ophiocephalus	2	2							1	1	1	1
Scorpaena porcus	5	3			1	1			3	1	1	1
ΣNISP / ΣMNI	574	159	10	6	185	59	82	30	112	44	185	20

TABLE 1

Number of Identified Specimens and Minimum Number of Individuals divided into the different archaeological phases of the IIG room.

Cronicario IIE ROOM								
Archaeological phase	**TOTAL**		**F1**		**F2**		**R2**	
Date			**8th c. BC**		**8th - 7th c. BC**		**1st c. AD**	
Taxa	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Conger conger	1	1			1	1		
Serranidae	1						1	[1]
Sparidae	7	2			3	2	4	[1]
Sparus aurata	18	9	2	1	15	7	1	1
Pagellus bogaraveo	1	1			1	1		
Pagellus acarne	1	1					1	1
Diplodus sargus	1	1			1	1		
Diplodus cf. *vulgaris*	1	1					1	1
Trachinotus ovatus	1	1					1	1
Labrus merula	2	1					2	1
Symphodus tinca	1	1					1	1
Scombridae	1		1	[1]				
ΣNISP / ΣMNI	36	19	3	1	21	12	12	6

TABLE 2

Number of Identified Specimens and Minimum Number of Individuals divided into the different archaeological phases of the IIE room.

Because of the poor condition of preservation, many bone elements were corroded and fragmented and therefore could not be identified. Numerically, the vast majority of the sample was composed of unidentifiable fragments from the post-cranial skeleton, including ribs and fin rays (Figure 3). The lack of preservation appeared to be connected with post-depositional activities and chemical processes associated with the composition of the layers. While there were some signs of human intervention, evidence of rodent gnawing was almost completely absent from all the bone remains. In some cases, evidence of the chewing of fish vertebrae was noted and some of these elements occasionally bore traces of burning.

The few signs of human activity recorded included butchering as evidenced by a clean cutting of a fish body (Figure 4). On small and medium-sized examples the cuts represented cases of be-heading and dividing the body into transversal or horizontal segments both at the level of the thoracic and caudal vertebrae. In some cases, the removal of the muzzle appeared to be connected with some type of storage and preservation of the fish[2].

The consumption of fish *in situ* was attested by the finding of two articulated specimens, a painted comber (*Serranus scriba*) and a peacock wrasse (*Symphodus tinca*), that were apparently the contents of a pot with which these remains appeared associated (Figure 5) (Unali, 2010: 1238, fig. 7; Unali, 2011a: 9, fig. 15b).

TAXONOMIC AND ENVIRONMENTAL ANALYSIS

A total of 36 taxa of bony and cartilaginous fish were identified. The latter group was far more rare, whereas bony fish taxa were more frequent and thus regularly consumed. Sparids, represented by at least 13 different species and 308 identified fragments, constituted the main group. Of lesser importance in terms of variety and number of identified remains were the picarel (Centracanthidae), wrasses (Labridae), gobids (Gobiidae), and grey mullets (Mugilidae). Of marginal presence, albeit of high dietary esteem, were sea basses (Moronidae), groupers (Serranidae), red mullets (Mullidae), and scorpionfishes (Scorpaenidae).

The identified species inhabit diverse marine environments (Figure 6)[3]. The gilthead and the

[2] Whole fish were also noted at Sant'Antioco by Wilkens (2005), whereas be-heading has been documented also at Elba (Bruschi & Wilkens, 1996: 166, fig. 2) and Corsica (Desse-Berset, 1993: 343). In these cases, the reason was probably not due to simple storage or consumption as the removal of the entrails implies some kind of fermentation (Wilkens, 2005: 63).

[3] Data on the biology of the species and fishing are provided by Bini (1967) and, for the Sardinian Sea, by Pirino (1988).

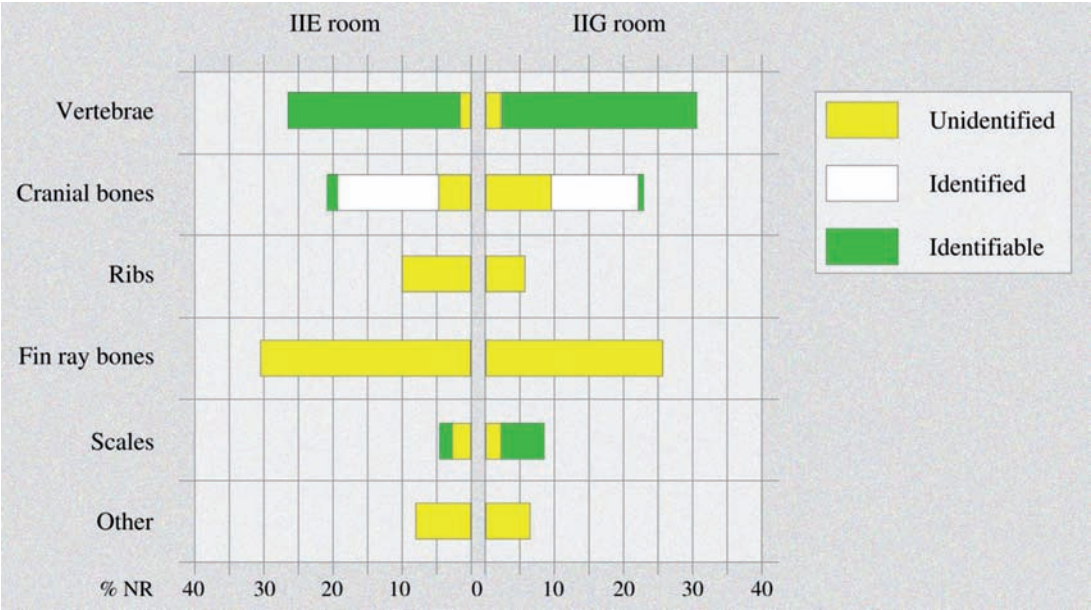

FIGURE 3

Sample composition: percentage of unidentified, identified and identifiable number of remains (NR) in the archaeological contexts.

FIGURE 4

Butchering marks on the cranial bones (left) and some butchered vertebrae and cranial fragments from the IIG room excavation: (1) US 3524 (F2: 8th-7th c. BC), neurocranium of *Diplodus* sp.; (2) operculare of Mugilidae, US 3417 (F3: 7th-6th c. BC); (3) urohyale of Pisces unidentified, US 3385 (F3: 7th c. BC); (4) caudal vertebra of Pisces unidentified, US 3378 (P: 4th c. BC); (5) caudal vertebra of Pisces unidentified, US 3418 (F3: 7th c. BC). Picture modified from Gregory (1933: 238, fig. 113).

Mugilids thrive in brackish waters, such as those found in the coastal lagoons currently dotting Sant'Antioco. Strictly marine environments, inferred from the habits of the species present, vary from rocky to sandy bottoms with a widespread presence of *Posidonia*, upon which some of the identified species feed. All these environments are still found along the coasts of the island today.

FIGURE 5

A painted comber *Serranus scriba* and a peacock wrasse *Symphodus tinca* in articulation: detail from the IIG room excavation (US 3294: R1, 3rd-2nd c. BC).

Among the pelagic species we noted the presence of some examples of Thunnidae (Figure 7) and Scombridae that we were unable to identify more specifically. We also observed the presence of the European pilchard (*Sardina pilchardus*) and two cartilaginous fish, the spiny dogfish (*Squalus acanthias*) (Figure 8.1, 8.2) and the common hammerhead (*Sphyrna zygaena*). Both are pelagic but have behavior patterns that often lead them to approach the coasts. The latter species was represented by a perforated vertebra used as a pendant (Figure 8.3), probably a trophy to recall its capture (Unali, 2008: 8, fig. 14a; Carenti, 2009: 127).

An initial analysis of the growth rings in the centrum of the fish vertebrae has provided information concerning the season of capture of the fish. We surmise that fishing took place throughout the year though more intensely in the warmer seasons.

FIGURE 7

Tuna vertebra from the IIG room excavation (US 3110: R1, 3rd-2nd c. BC).

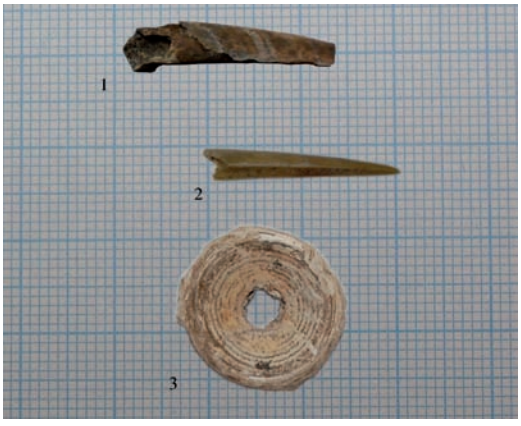

FIGURE 8

Fin spines of *Squalus acanthias* (1, US 3524; 2, US 3528: F2, 8th-7th c. BC) and perforated vertebra of common hammerhead *Sphyrna zygaena* (3, US 3294: R1, 3rd-2nd c. BC).

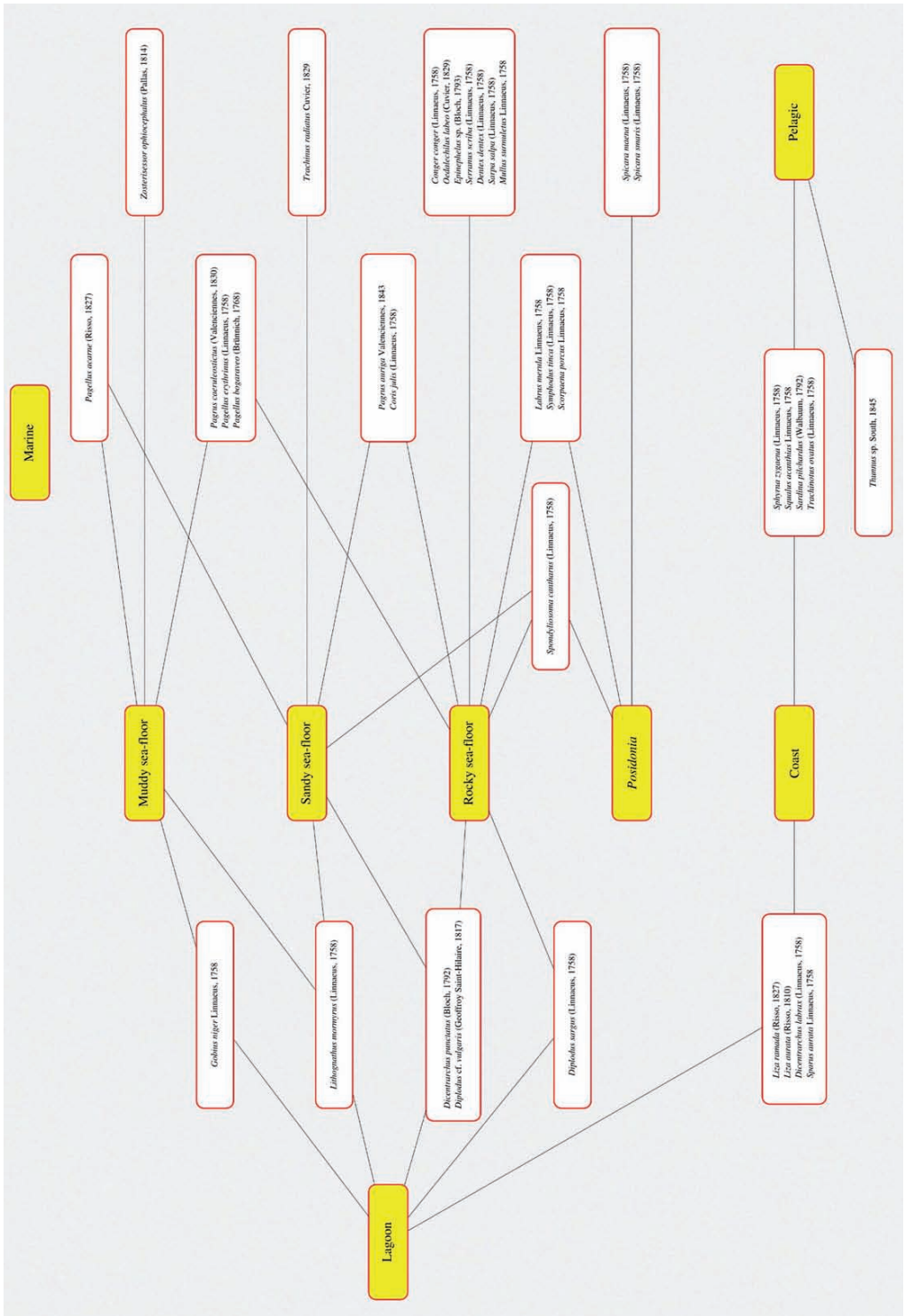

FIGURE 6
Diagram with species analysed and marine environments. Data on the biology of the identified species has been provided by Bini (1967).

OSTEOMETRY

The species of greatest dietary importance was the gilthead (*Sparus aurata*), which was well represented in all the occupation periods considered here. Like other Sparidae, its importance is also due to the specificities in skeletal structure, that allow for a better bone preservation and easier identification. This species was the only one identified in the earliest archaeological levels and was the most frequent species represented in terms of the number of remains and MNI, in all the successive periods. By way of osteometrical measurements of the different bones of the cranium, it was possible to estimate the dimensions of these fish. The curves of linear regression published by Desse & Desse-Berset (1996) were used. The results of this analysis showed the presence of individuals of very different sizes.

Figure 9 is subdivided into size ranges of 10 cm intervals in which one can observe how most of the giltheads ranged in size from 20 to 40 cm, though there were also specimens representing all other sizes, from 14.4[4] to 60.5[5] cm total length. Substantial differences of this pattern were not noted in the different historical phases.

DISCUSSION

In the archaeological research conducted thus far on sites within the Sulcis area, several clues point toward intensive and complex exploitation of marine resources. The presence of pelagic species in the archaeological contexts is the first suggestion of deep-sea fishing directed towards species of dietary and commercial interest. In this case we have the presence of European pilchard, some examples of Thunnidae, and cartilaginous fish of notable dimensions[6]. Another example from the hinterland is the presence in the Phoenician era levels of a swordfish (*Xiphias gladius*) vertebral centrum in Nuraghe Sirai (Carenti, 2005: 222). This could have been from a fish captured during an organized deep-sea fishing expedition. In this period, tuna fishing must have been a widespread activity. Indeed, Phoenician-era settlements have

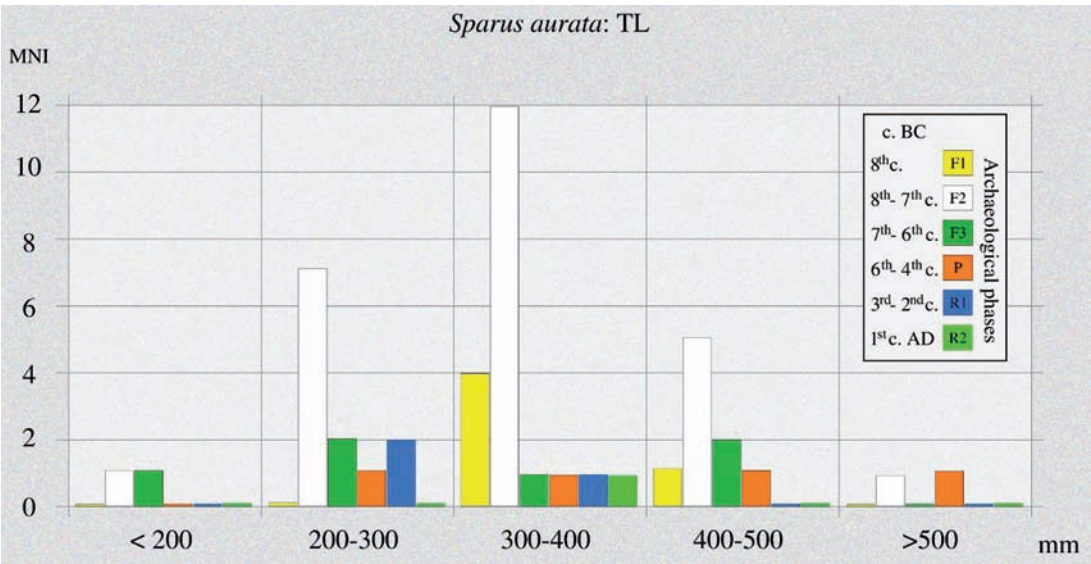

FIGURE 9

Gilthead: total length and size classes. Data from IIG room (MNI = 36) and IIE room (MNI = 9) excavations.

[4] Measurement M2 of a *Maxillare* from US 3493 (phase F2) in Room IIG.

[5] Measurement M3 of a *Praemaxillare* from US 3201 (phase F2) in Room IIE.

[6] Association of Squaliformes with Thunnidae of great dimensions are known in Spanish Phoenician and Punic archaeological assemblages (Campanella, 2008: 74): cf. analysis of fish remains from Cabezo de San Pedro (Roselló & Morales, 1988), Calle del Puerto (Morales & Roselló, 1988; Roselló

already been correlated with places in which tuna fishing took place in Sardinia in the historical and contemporary periods (Bartoloni, 1991: 9, 1997: 40). Further archaeological evidence is available from several Mediterranean sites with the same cultural horizons[7].

A room in the same context in the Cronicario of Sant'Antioco that was adjacent to those under examination has already been analyzed (IIF: fig. 2; Campanella, 2005). This room was used as a storeroom for food and amphorae were found which contained fish remains. The context, which was dated to the Roman Imperial era, has been interpreted as a room for the conservation of food products (Campanella, 2005: 43-53). The terra-cotta containers indicated an Iberian and North African provenance and were normally used for the transport of oil, sauce, and preserved fish products. The study of the fish remains allowed us to hypothesize the preservation of whole fish with salt (Wilkens, 2005). Even though the context was rather late, it was indicative of trade of fish products on a large scale that, bearing in mind that ceramic production in the preceding periods must have been developed also in an earlier epoch. In several stratigraphic units, we found the remains of a great number of small seabreams (Figure 10.1, Table 3, Figure 11). The 3479 stratigraphic unit was the filling of a pit dating to the 4th c. B.C. and the others (3493 and 3524) were little mounds on top of different floors dating from the 8th and the early 7th c. B.C. in Room IIG. These could be the remains of some preserved fish. The fact that this type of find was distributed over such a wide chronological framework would lead one to think of continuity and development of the fish preserve activity from the Archaic Era onwards. Furthermore, the pottery in Room IIG was evidence of direct trade between Sant'Antioco and other parts of the Mediterranean, especially the Iberian Peninsula, Tyrrhenian coast, and North Africa (Unali, 2011a).

FIGURE 10

Examples of fish remains: (1) Sparidae; (2) *Diplodus sargus* and (3) *Sparus aurata*. Taxa from the 3524 stratigraphic unit of the IIG room (F2, 8th-7th c. BC).

CONCLUSIONS

The analysis of the fragments of cranial and post-cranial fish bones has highlighted several details useful for the interpretation of the material in a historical and archaeological context. Of greatest importance were some considerations regarding the natural environments. The species identified live in very diverse coastal environments that may be marine or brackish (Figure 6). A diachronic analysis of the material would lead us to think that, in an initial stage, the lagoon areas

& Morales, 1990), La Tiñosa (Morales, 1978) and Castillo de Doña Blanca (Roselló & Morales, 1994).

[7] For example the so-called *Círculo del Estrecho* in Spain with several archaeological examples of production of fish preserves and sauces in specialized establishments during the Phoenician, Punic and Roman eras. In the area of Cádiz there is ample archaeological (i. e. García Vargas, 2001: 63, fig. 12), and archaeozoological evidence for the consumption of fishes (Morales & Roselló, 1990; Roselló & Morales, 1990, 1994; Morales *et al*., 1994).

Species	Sparidae Praemaxillare			*Diplodus* sp. Praemaxillare			*Diplodus* cf. *vulgaris* Praemaxillare			*Sparus aurata* Praemaxillare		
Bone												
Archaeological phase	US	M1	M3	US	M1	M3	US	M1	M3	US	M1	M3
F1										3571	29,24	11,62
										3574	29,36	11,53
										3574	30,75	12,03
										3574	30,07	12,1
										3574	22,06	8,5
F2	3493	8,65	2,74				3493	11,51		3543	32,4	13,62
	3493	8,89	2,75				3493	9,72	2,92	3544	35,59	14,88
	3493	6,18	2,06				3493	8,81	2,87	3494	24,1	8,42
	3493	7,95	2,6				3493	7,84	2,63	3501	31,7	14,47
	3493	7,65	2,31				3493	8,81	3,01	3548	30,16	11,37
	3493	6,84	1,84				3493	8,38		3496	26,9	10,95
	3524	7,94	2,6				3493	7,55	2,46	3540	26,85	10,39
	3524	8,8	2,39				3493	10,76	3,47	3524	18,38	6,39
	3524	6,98	1,99				3493	13,2	3,19	3524	20,26	6,88
	3524	5,61	1,65				3493	11,36	3,06	3555	26,89	10,06
	3524	5,72	1,65				3493	9,02	2,75	3493	11,55	4,12
										3493	11,54	4,27
										3506	24,42	8,9
										3524	15,23	5,58
										3524	19,86	7,4
										3524	15,74	6,01
F3				3430	6,59		3418	9,66	2,62	3418	23,94	9,27
				3446	9,4	2,54	3430	9,19	2,86	3452	33,4	14,14
							3430	6,46	2,69	3456	20,37	7,27
							3458	9,49	2,5	3461	21,38	8,28
P				3479	7,77	2,61	3441	8,6	2,77	3442	36,69	
				3479	8,25	2,47	3479	9,38	2,42	3479	23,56	9,25
				3479	6,27		3479	6,56				
				3441	8,63	2,8						
R2	3164 IIE	6,48					3024 IIE	9,67	3,3			
NR		12	11		6	4		19	16		27	26
MIN		5,61	1,65		6,27	2,47		6,46	2,42		11,54	4,12
MAX		8,89	2,75		9,4	2,8		13,2	3,47		36,69	14,88
MEDIA		7,31	2,23		7,82	2,61		9,26	2,85		24,90	9,53
DEV.ST.		1,17	0,42		1,20	0,14		1,66	0,30		6,89	3,06

TABLE 3

Sample measurements of premaxillary bones. All the stratigraphic units are from the IIG room except when indicated otherwise.

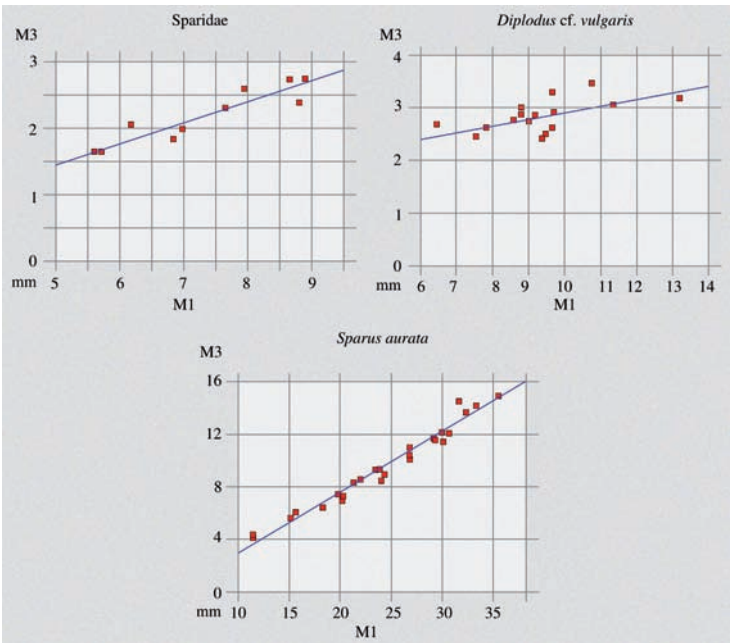

FIGURE 11

Relationship between M1 and M2 of the premaxillary bone of Sparidae (R^2=0,84), *Diplodus* cf. *vulgaris* (R^2=0,34) and *Sparus aurata* (R^2=0,97). Data are listed in Table 3.

were more exploited, given the sole presence of gilthead seabreams (*Sparus aurata*) in the earliest phases of the occupation (Tables 1 and 2).

Other interesting evidence, only in F1 and F2 archaeological phases, was the presence of the Mediterranean mussel (*Mytilus galloprovincialis*): 96.4% of the total remains of this species appeared in these phases. Mediterranean mussels prefer low-salinity environments, like estuaries and lagoons, and are consumed by the gilthead. The exploitation of rocky and sandy coastal environments throughout the year was also evidenced by the presence of molluscs and a great variety of fish species in later archaeological phases. Perhaps the reason had to do with the greater presence of lagoon environments in the earlier phases or the cultural preferences of the colony's earliest inhabitants living around the lagoon.

Size dimensions of individual fish varied somewhat, though they were typically small to medium. Presumably, fishing was practized in shallow waters. Deep-sea fishing, however, was also practiced. The pelagic species must have been marketed commercially but could have been occasionally consumed at the site. Osteometric analysis of the gilthead displayed a great range of sizes that might indicate a specific targetting of prey (Fi-gure 9).

The species represented could have been caught with simple means, and these techniques have been confirmed by the finding of other types of cultural materials such as bronze hooks and numerous bone needles used to sew the fishing nets, which are present in Roman Era layers all over the Cronicario area (i. e. Pomiianu, 2008: 274, fig. 9).

Evidence concerning the consumption and utilization of fish resources was demonstrated by the presence of all parts of the skeleton and by cut marks indicating butchering (Figure 4). The fish arrived whole in Rooms IIG and IIE, which were located in the center of the settlement, and were processed and consumed on the site.

In conclusion, the rooms examined provided evidence on food consumption typical of a household unit and on small-scale exploitation of fishing as a subsistence activity among family groups within the town. Fishing was probably carried out on the margins of more complex commercial fishery and international fish trade.

ACKNOWLEDGEMENTS

I would to thank Prof. Piero Bartoloni and Dott.ssa Barbara Wilkens as well as Michele Guirguis, Elisa Pompianu, Antonella Unali, Sara Muscuso, and all the workers of Sant'Antioco. Thanks also go to Irit Zohar, and all the organizers and participants of the 16th FRWG conference.

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