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Exploring the role of otariids in the subsistence of hunter gatherers from Pampean archaeological sites at the Late Holocene (Argentina)

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ABSTRACT

New taxonomical, anatomical, taphonomic and chronological information about archaeological remains of otariids from Puente de Fierro site (Pampean region, Argentina) is presented. Two species, *Arctocephalus australis* and *Otaria flavescens,* were identified. Fragmentation and traces of roots were the predominant taphonomic effects; also slight weathering stages were recognized and scarce gnawing marks of carnivora were identified. Frequencies of skeletal parts suggest that only certain anatomical pieces, especially limbs, entered the site or were preserved. We propose that hunter-gatherers occasionally obtained otariids from the Atlantic coast (transported them 7 km away to the residential camp) or some individuals that enter freshwaters in the fluvial environment near the site. Puente de Fierro record stands out from regional Late Holocene inland sites, because otariids NISP and MNI are notably higher than in similar and synchronic assemblages.

1. Introduction

The use of marine resources was significant from the end of the Early Holocene and the beginning of the Middle Holocene at the Pampean plains, Argentina (Bayón and Politis, 2014; Blasi et al., 2013; Leon and Gutiérrez, 2011; Martínez et al., 2009, 2015; Orquera and Gómez Otero, 2007). Two independent lines of evidence, the archaeofaunistic record and stable isotope analyses, indicate that the predominant exploitation of marine resources in coastal sites took place at 7400–5700 ^{14}C YBP (Bayón and Politis, 1996, 2014; Bayón et al., 2012; Bonomo and Leon, 2010; Gutiérrez and Leon 2011; Vecchi et al., 2014). In addition, δ^{13}C and δ^{15}N stable isotope analyses on human remains yielded marine and mixed diets with marine components dated from ca. 7870 ^{14}C YBP (Bonomo et al., 2013; Politis et al., 2009; Scabuzzo, 2010).

However, presence of otariids remains in the archaeological records decreased notably during the Late Holocene (from ca. 3000 ^{14}C YBP) as far as it can be judged from the scarce remains recovered at only three inland sites in the Pampean Region (Table 1) (Acosta and Loponte, 2013; Bonomo, 2005). There are also mentions of its presence in two additional contexts: in the Paraná Delta, identified by Bonomo and collaborators in the Antonio Castro collection deposited in the La Plata Museum (Bonomo et al., 2009: appendix 1:95); and in the superficial collection from Claromecó (Bonomo, 2004:142), Miramar and meseta Chocorí (Bonomo et al., 2013:131).

Conversely, pinnipeds dominate among the identified faunal remains from several coastal sites dated from the Middle to the Late Holocene in North Patagonia; otariids were exploited all along this period (Table 1) (Eugenio and Aldazabal, 2004; Sanguinetti de Bórmida, 1999). Besides, in sites located inland from Colorado River, isotopic analyses0 on human remains from the Middle Holocene yielded a marine component in the diet (Martínez et al., 2009); and the zooarchaeological record from the Late Holocene includes especially marine fish but very scarce or rare otariid remains (Martínez, 2008–Martínez et al., 2009; Stoessel, 2012; Stoessel and Alcaráz, 2015).

The aims of this paper are to report taxonomic identification of otariids remains from the archaeological site of Puente de Fierro, to assess the taphonomic history of the otariids assemblage and to discuss the role of otariids in the subsistence of Pampean hunter-gatherers during Late Holocene at local and regional scales. Two taxon radiocarbon dates provide new chronological evidence of two otariid species that were present in the Atlantic coast in this latitude at the Late Holocene.

Table 1

2. Geographical and environmental context

The Humid Pampean region is a flat grassland interrupted by the Sierras Septentrionales and Sierras Australes hilly systems, which are not

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Table 1
Archaeological sites with Otariid remains in the Humid Pampas and North Patagonia. References: ND = No data available.

Archaeological site	Location	Km from current coast	Species	^{14}C Dates (years BP)	NISP/MNI	References
La Olla 1	Pampean region	0	*Arctocephalus australis* & *Otaria flavescens*	ca. 7900–6900	300/41	Bayón and Politis, 2014:122
La Olla 3	Pampean region	0	*Arctocephalus australis* & *Otaria flavescens*	ca.7900–6900	77/ 7	Bayón and Politis, 2014: 122
La Olla 4	Pampean region	0	*Arctocephalus australis* & *Otaria flavescens*	ca.7900–6900	156/19	Bayón and Politis, 2014: 123
Monte Hermoso 1- Sector Oeste	Pampean region	0	Otariidae	ca. 7900–6600	5/ND	Bayón and Politis, 1996: 86 Manera et al., 2007
Barrio Las Dunas	Pampean region	0	*Arctocephalus australis* & *Otaria flavescens*	ca. 6900	95/6	Bayón et al., 2012:56
Alfar	Pampean region	0.6	*Arctocephalus australis* & *Otaria flavescens*	ca. 5700	257/9	Bonomo and Leon, 2010: 35
Nutria Mansa 1	Pampean region	3.5	Otariidae	ca 3000	5/1	Bonomo, 2005
Punta Canal	Pampean region	13	*Arctocephalus australis* & *Otaria flavescens*	900 ± 80	1/1	Acosta and Loponte, 2013:364
La Bellaca 2	Pampean region	13	*Arctocephalus australis* & *Otaria flavescens*	680 ± 80	3/1	Acosta and Loponte, 2013:364
Ea. La Serranita (sector 2)	North Patagonia	0	Otariidae	3690 ± 50	1/1	Eugenio and Aldazabal, 2004:696
Conchero El Lobito	North Patagonia	0	Otariidae	3210 ± 60	18/2	Eugenio and Aldazabal, 2004:696
El Haras sitio 1	North Patagonia	0	Otariidae	3070 ± 70	80/4	Eugenio and Aldazabal, 2004:696
Ea. Olas (Conchero 11)	North Patagonia	0	*Otaria flavescens*	2810 ± 50	327/4	Eugenio and Aldazabal, 2004:696
Ea. Olas (Conchero 1)	North Patagonia	0	Otariidae	1960 ± 50	10/1	Eugenio and Aldazabal, 2004:696
Conchero el Piche 1	North Patagonia	0	Otariidae	1500 ± 40	99/2	Eugenio and Aldazabal, 2004:696
San Antonio 1	North Patagonia	5	Otariidae	773 ± 44	2/1	Stoessel and Alcaráz, 2015: 165; Martínez, 2008–2009
Ea. Olas (Conchero 5) Sur Ax.	North Patagonia	0	Otariidae	570 ± 40	2/1	Eugenio and Aldazabal, 2004:696

higher than 1300 m a.s.l. (Fig. 1). To the South, it borders with the northeastern Patagonia sub-region, at the lower Colorado river. The lower course is an ecotone of the Pampean-Patagonian transition and part of the Arid Diagonal (Martínez et al., 2009). To the eastern border of the area is the Argentine Sea, southwestern Atlantic Ocean, with an extensive seashore that stretches over 1200 km (Cavallotto, 2008). The coasts present a gentle slope and extended low beaches interrupted by low cliffs, like those in the southeast, Miramar and Monte Hermoso. The area of Mar del Plata presents high cliffs, that are part of the rocky extension of the Tandilia ranges (Cavallotto, 2008). Changes in sea level affected the Atlantic littoral during the Late Pleistocene and Holocene, while the characteristics of the current coast were established in the end of Middle Holocene and the beginning of the Late Holocene (Isla et al., 2001; Quattrocchio et al., 2008).

The study area is located in the grassland between the Sierras Australes and the sea. Several streams, such as Sauce Grande river, Napostá Grande and Napostá Chico creeks, flow from the Sierras Australes to the Atlantic Ocean (Fig. 1). From an environmental viewpoint, the area is a broad transitional zone where ecotonal flora and fauna from the Pampas and the North Patagonian regions converge (Cabrera, 1968; Ringuelet, 1961).

Otariids show a great development of social composition, polygyny and sexual dimorphism. They are philopatric to their rookeries, then their geographic distributions are concentrated near selected haul-out areas. They gather at the breeding season in large aggregations ashore and dispersed during their feeding phase. At present there are two resident otariids in the southwestern South Atlantic Ocean: the South American sea lion (*Otaria flavescens*) and the South American fur seal (*Arctocephalus australis*). Both species have similar ecological requirements, and today they have the same distribution, from Mar del Plata to Tierra del Fuego, in the farther south (Bastida and Rodríguez, 2003). However, *Otaria flavescens* has a higher concentration of reproductive colonies with remarkable differences in their abundance, and their haul-outs (resting areas) are more frequent and continuous with a higher concentration of animals than *Arctocephalus australis* (Crespo et al., 2007, 2015) (Fig. 1). Some authors stated that the Uruguayan populations of *Arctocephalus australis* were not migratory; others suggested that part of the populations migrates from Islas Malvinas to Uruguay during the winter. Anyway there are records of seasonal movement that indicate that young individuals of this species travel for more than 1000 km (see Crespo et al., 2015 and reference therein). Regarding *Otaria flavescens*, reproductive males move from colonies located along the coast of Buenos Aires to breeding colonies in northern Patagonia (Giardino 2006, in Grandi et al. 2008). In synthesis, movements of individual among local populations for both species of otariids there are registred, showing they forage over a wide area in the South of Atlantic coast.

Today along the Pampean coast, there is only one haul-out location of South American fur seal, located near Mar del Plata, while there are four South American sea lion haul-outs, two of which are natural (Isla Trinidad and Banco Culebra) and the other two are port colonies formed recently (Mar del Plata and Quequén) (Fidalgo, 2004; Petracci et al., 2010). Is interesting to point out that there are several historical records from XVIth century to the beginning of the XIXth century that describe seal rookeries (of either species) in the rocky shores between Punta Iglesias and Cabo Corrientes, in Mar del Plata (Rodríguez and Bastida, 1998:725).

Particularly, the study area is home to a colony of a hundred South American sea lions, located in Punta Lobos (southeast of Isla Trinidad), where these animals usually stay on the sandy beach (Petracci et al., 2010). Thus, they can often be seen in the entire system of Bahia Blanca estuary and at its neighboring shore.

Likewise, the presence of pinnipeds on the coast is confirmed by the record of *A. australis*, *O. flavescens*, *Arctocephalus tropicalis* and *Mirounga leonina* at "Reserva Geológica, Paleontológica y Arqueológica Provincial Pehuen Co-Monte Hermoso". The sighting of living pinnipeds, mainly juvenile individuals, is more common in the austral winter (from June to August). The record of *A. australis* is more numerous in relation to the other species mentioned. The record of dead individuals on the coast denotes that juveniles of *A. australis* are predominant, with the number of dead individuals of this species reaching 32 in one year (on August 2015) (Technical Report, 2015). This data may provide an estimation about the current availability of these animals in these area of the coast, pointing the frequent occurrence as well.