



Rodent consumption by hunter-gatherers in north Patagonian Andean forests (Argentina): Insights from the small vertebrate taphonomic analysis of two late Holocene archaeological sites



Analia Andrade ^{a,*}, Pablo Marcelo Fernández ^b

^a Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) - Instituto Patagónico de Ciencias Sociales y Humanas (IPCSH-CCT CONICET-CENPAT), Boulevard Almirante Brown 2915, U9120ACD Puerto Madryn, Chubut, Argentina

^b Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) - Instituto Nacional de Antropología y Pensamiento Latinoamericano (INAPL), 3 de febrero 1370, C1426BJN Ciudad Autónoma de Buenos Aires, Argentina

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ABSTRACT

Modern taphonomic studies carried out upon small rodent assemblages from arid Patagonia demonstrates rodent consumption in several late Holocene archaeological sites. Conversely, very little is known about the exploitation of these small mammals by hunter-gatherers that inhabited the North Patagonia Andean forest (NPAF). Human occupation in forests dates back to late Pleistocene – early Holocene but its use was non-existent until the late Holocene (1700 years BP), when a more recurrent and/or more extended stays in the forest took place. In order to advance in the understanding of the subsistence strategies displayed by hunter-gatherers in Patagonian forests, human involvement in the accumulation of rodent bones was evaluated from two archaeological sites located in the NPAF: Paredón Lanfré (SW Río Negro) and Risco de Azócar 1 (NW Chubut). The taphonomic analysis included the estimation of the MNE and MNI, the relative abundance, and the representation of skeletal elements. Heat alteration of bone surface and the presence of cut marks and digestion traces were also evaluated. Caviomorpha rodents dominate the small vertebrate's assemblages. Thermal alteration and differential representation of skeletal pieces –over-representation of skulls and distal elements of the limbs– suggest that human consumption was the main cause of accumulation of these rodents. The consumed species were *Galea leucoblephara*, *Microcavia australis*, *Ctenomys haigi* and possibly also *C. sociabilis*. We concluded that this consumption seems to reflect the exploitation of low ranked prey individuals in a low productive environment.

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1. Introduction

In previous decades, the exploitation of small animals has been a key issue in the zooarchaeological research, since these animals are sensitive indicators of human density-related processes, e.g. human population growth, sedentarization, and increasing environmental impact (Hockett and Haws, 2005; Janetsky, 1997; Munro, 2004; Steele and Klein, 2009; Stiner et al., 1999, 2000; Weissbrod et al., 2012). The range of small vertebrates exploited was varied, and includes lagomorphs, tortoises, birds and rodents and their relative importance was variable. While the first three were central at Mediterranean Basin and South Africa (Munro, 2004; Steele and Klein, 2009; Stiner et al., 1999, 2000), rodents were comparatively less relevant in these regions

(Weissbrod et al., 2012). In the Americas, a region characterized by a low diversity of mammals, rodents represent an important proportion of the native land-mammal species (Patton et al., 2015; Wilson and Reeder, 2005) and they were a common staple at varied places and periods (Hesse, 1985; Labarca, 2005; Nelson et al., 2006; Reinhard et al., 2007; Rosenfeld, 2008; Shaffer, 1992; Simonetti and Cornejo, 1991; Yohe et al., 1991, among others). Even in the Central Andes, one of the caviomorpha species was domesticated (Spotorno et al., 2006; Wing, 1986) and is included in ritual ceremonies (Bolton, 1979; Sandweiss and Wing, 1997, among others).

In Northwestern Patagonia, at the east side of the Andes, the possibility that small rodents (<260 g live weight) had been consumed by human populations was a topic of debate since the first systematic faunal analysis. The remarkable abundance of rodent remains in many archaeological sites has prompted some authors to conclude that the exploitation of certain species could be possible (Bond et al., 1981; Ceballos, 1982, 1987; Fernández, 1988–1990; Hajduk and Albornoz, 1999; Sanguinetti de Bórmida and Curzio, 1996; Silveira and Massoia, 1996). Mainly based upon the differential representation of the larger

* Corresponding author at: Instituto Patagónico de Ciencias Sociales y Humanas (IPCSH-CCT CONICET-CENPAT), Boulevard Almirante Brown 2915, U9120ACD Puerto Madryn, Chubut, Argentina.

E-mail addresses: andrade@cenpat-conicet.gob.ar (A. Andrade), pablomarcelofermand@gmail.com (P.M. Fernández).

species (e.g. Caviomorpha, Bond et al., 1981) and the cranial fracture pattern (Fernández, 1988–1990), previous analyses did not advance on the evaluation of other indicators to distinguish cultural from natural depositional agents. Also, the absence of specific evidences (like cut marks) that could associate them with consumption practices as was observed in other regions (Fernández-Jalvo et al. 1999; Medina et al., 2011; Quintana 2005; Quintana et al., 2002) maintained the uncertainty about human agency.

Nowadays, modern taphonomic studies carried out upon small rodent assemblages from arid Patagonia demonstrates rodent consumption in several Late Holocene archaeological sites. Based upon the presence of cut marks, tools manufactured on rodent bones, and thermal alteration, it was concluded that the cricetid *Holochilus brasiliensis* and Caviidae rodents were a complementary component of the diet of hunter-gatherers in two sites in the middle and lower Negro River valley (Fernández et al., 2011; Mange et al., 2016). The over-representation of skull bones and distal elements of the limbs, the high degree of fragmentation, and a defined pattern of thermal alteration observed on the small mammal assemblages from the Cueva y Paredón Loncomán archaeological site (Río Negro province) were evidences that the species *Ctenomys* sp. and *Microcavia australis* (and possibly also *Galea leucoblephara*) were exploited by hunter-gatherers since at least 2000 years BP (Andrade, 2015). The combination of taphonomic, historical and ethnographical studies allowed us to propose that rodents were intensively exploited and this practice continued in Patagonian populations until the last century (Andrade and Boschín, 2015). Although no specific taphonomic studies were performed on the small mammal fauna, consumption of Caviidae rodents was also proposed for Epullán Grande (Pardiñas and Teta, 2013); Epullán Chica (Fernández et al., 2016); Casa de Piedra de Ortega, Cueva Sarita IV (Pardiñas, 1999; Teta et al., 2005), and Campo Cerda 1 sites (Pardiñas, 1999) taking into account taxonomic representation, differential burning and breakage pattern.

Contrasting the increasing evidence of rodent consumption along arid Patagonia, very little is known about the exploitation of these small mammals by hunter-gatherers that inhabited North Patagonia Andean forest. In spite of the high frequency of rodents in several archaeological sites from this biome, until now no taphonomic analyses were carried out to determine the actors involved in those rodent accumulations. Availability of faunal resources in North Patagonian Andean forest is limited to two ungulates (pudú, *Pudu puda* and huemul, *Hippocamelus bisulcus*), a few carnivores (Puma, *Puma concolor*, Gray fox *Lycalopex griseus* and Culpeo fox *L. culpaeus*), and a high diversity of small vertebrates, especially rodents and birds. Indeed, ungulates are small (10–12 kg), solitary, and cryptic (*P. puda*, Meier and Merino, 2007) or, as *H. bisulcus*, establish small social groups (male, female and yearling, Vila et al., 2010). Otherwise, human occupation of northern Patagonian forest dates back to the Late Pleistocene–Early Holocene (Bellelli et al., 2013; Hajduk et al., 2006), but with a discontinuous temporal sequence; relatively continuous signals start after 3500 years BP, and increase their intensity after 1700 years BP (Fernández et al., 2013). Since this date, a more recurrent and/or more extended stays in the forest are suggested by archaeological and isotopic evidences (Fernández et al., 2013; Fernández and Tessone, 2014). Under these conditions, and taking into account the faunal resource structure, it is expected to see an increase in the hunting pressure on the huemul, intensifying their use, and/or the inclusion of small preys into the diet.

This paper is product of a research program that aims to reconstruct the taphonomic and paleoecological histories of small mammals from Northern Patagonia, comparing two particular habits: the humid forests and the arid steppe. Investigations were initiated in the steppe and first results were recently obtained (Andrade, 2015; Andrade and Boschín, 2015). The main objective in this case is to present a detailed taphonomic analysis performed on the small mammal assemblages from two archaeological sites located in North Patagonia Andean forests: Risco de Azócar 1 (RA1) and Paredón Lanfré (PL). Particularly, the main agents

of deposition are evaluated and the possibility of human contribution in the deposition of caviomorph rodents is discussed.

2. The archaeological sites: stratigraphy and chronology

Archaeological sites RA1 and PL are located at the North Patagonian Andean forest, in the SW Río Negro and NW Chubut provinces, respectively (Fig. 1). The landscape in the area is characterized by mountain ranges (up to 2000–2500 m asl) and glaciofluvial valleys, covered by different forest types mainly related to the altitude and the deep rainfall gradient (Pereyra, 2003). *Nothofagus* spp. – *Austrocedrus chilensis* mixed forest is the dominant type when precipitation declines, and can be found around both sites. High-resolution pollen and charcoal records from Cándor, Mosquito, and Huala Hué lakes, located between 45 and 11 km of RA1 and PL sites show that this forest type was already established at the time when sites were first occupied, ca. 1500 years BP (Iglesias et al. 2012a, 2012b). Nowadays, the steppe is about 20 km east of RA1 and 40 km from PL. The access to the steppe is easier from RA1 than from PL because of the presence of the Serrucho Norte mountain range (2100 m asl). Paleoenvironmental studies show that variable fire-regimes affected this forested area since the Pleistocene–Holocene transition (Iglesias et al., 2012a, 2012b). Coincidentally, lithic and pot sherds affected by fire were observed in both sites.

Small vertebrates were the dominant faunal remains in both sites. Other taxa represented in the bone assemblages (excluding intrusive specimens) were -in order of importance- *Hippocamelus bisulcus* (huemul), *Pudu puda* (pudú), and *Lama guanicoe* (guanaco), the two last species only recovered in PL (Fernández and Andrade, in elaboration, Podestá et al., 2007).

2.1. Risco de Azócar 1 (RA1)

RA1 (42° 05' S; 71° 21' W, 240 m asl) is a rock shelter located in the floodplain of the Epuyén river, at the base of the Pirque Mountain. This river has recurrent floods that cover much of the floodplain. While there are no accurate records that the site would have been under water, it cannot be discarded due to possible flooding product of normal and extraordinary seasonal floods. The site measures 78 m of total length and extends over a rocky wall of granite porphyry. RA1 contain two sectors, differentiated by the presence of a rock collapse: Alero A (in the left), with rock art motifs, and two adjacent rock shelters, Alero B and C, both without rock art motifs. Archaeological materials were recovered in the three rock shelters (Table 1). Alero A (RA1A): Under the rock art motifs, three grids of 1 m × 1.5 m were excavated, with a maximum of 2.3 m depth. Archaeological evidences came from the first stratigraphic unit (Unit 1), which extends from the surface to ca. 1.1 m depth. It is characterized by sandy sediment with large amounts of organic matter, volcanic ashes, rock shelter blocks, and colluviums. This deposit was excavated by 10 cm artificial layers because no discontinuities were identified inside this unit. Unit 1 has low resolution, resulting of the combined effects of root growth, caves of fossorial animal, and earthworm activities (Podestá et al., 2007). Six samples of small charcoal concentrations were dated, giving ages between 820 ± 60 years (LP 1665) and 1690 ± 60 years BP (LP 1575). These charcoal samples could be product of background noise due to the frequent forest fires in the area; no hearth structures were identified. This makes it difficult to interpret the dates in terms of human presence at the site. So we considered these dates as Unit 1 sedimentary deposition rates (Podestá et al., 2007). Few archaeological materials were found in RA1A, among them animal bones, lithics -mainly (98%) debitage-, small pottery sherds -maximum length of 40 mm-, and pigments probably related to the rock art production (Table 1). Rodent remains were associated, spatial and vertically, with the archaeological materials. In the first 10 cm below the surface, modern bone material that belongs to *Ovis* sp. and *Lepus* sp. was also recovered, not related to the prehistoric occupation of the site (Podestá et al., 2007). Alero B (RA1B): One 1 × 1 m grid

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