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Multiproxy study of plant remains from Cerro Casa de Piedra 7 (Patagonia, Argentina)

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ABSTRACT

The objective of this work is to carry out an integral study of macro and microbotanical remains with the aim of providing information to the palaeoenvironmental reconstruction and understanding the different practices employed in the acquisition of woody material used by hunter-gatherer societies from the northwestern region of the Santa Cruz Province, Argentine Patagonia, during the early and middle Holocene. For this purpose, we study macrobotanical remains (carbonized and non-carbonized wood) recovered from different combustion structures and from the sediment of the three stratigraphic levels dated by ¹⁴C and resulting in ages of 9640 ± 190 years BP; 8380 ± 120 years BP and 6150 ± 105 years BP, of the Cerro Casa de Piedra 7 site. Also, pollen and small plant fragments of human and camelid coprolites were studied. The analysis conducted show differences in the taxonomic resolution obtained by each one of the proxies. The marked representation of *Nothofagus pumilio* among charcoal and wood makes clear that the forest was an environment recurrently used by hunter-gatherers occupying CCP7. The study of pollen and plant fragments coming from coprolites, allowed the identification of grass species typical of the steppe environments and forest-steppe ecotonal areas. In this way, plant fragments provide higher level of taxonomic resolution and a greater diversity for paleoenvironmental reconstruction. The results obtained by means of the multi-proxy analysis allowed us not only to enlarge the reconstruction of the hunter-gatherers livable environment, but also to recognize the availability and use of the plant resources in the Early-Mid-Holocene in the region.

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1. Introduction

In order to meet a variety of needs plant environments have been fully exploited through time by all types of societies. The use of plants has been crucial to their survival, leading to the implementation of subsistence strategies aiming at exploiting the resource (Aceituno and Loaiza, 2015). These strategies have been changing over history, according to the landscape characteristics and transformations, the technology changes, and also the social needs. Hence the continuous exploitation of the plant environment

makes it difficult to understand its evolution, apart from the management that human groups have made over it. Both humans and environment have co-evolved for thousand of years (Barberena et al., 2015; Uzquiano, 2014). The recovered plant remains of archaeological sites are, first of all, the result of social activities, but they also relate to the natural environment where a particular group develops its activities. The explored and occupied environments form the territory of a society. Thus, the study of plant remains allows obtaining information both palaeoenvironmental and of management of plant resources by past societies.

The study of macro- and micro-plant remains found in archaeological contexts allows making inferences on where the plant formations come from, knowing the function that plant resources played within the society, and evaluating the impact that social operations had on the surroundings. However, even though the

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plant record is abundant in the archaeological sets, an integral study of the macro- and micro-plant remains is still infrequent or inexistent in archaeological researches on Patagonian hunter-gatherer societies.

The palynological studies of diverse deposits done to date in Patagonia (Bamonte and Mancini, 2011; Brook et al., 2013; Burry et al., 2006; Mancini, 2007, 2009; Mancini et al., 2002; Trivi de Mandri et al., 2006) aimed to reconstruct Late Pleistocene and Holocene palaeoenvironments, while the palynological and microhistological analyses of coprolites of different zoological origin provided information on diet, seasonality in the site use, and also contributed new taxa to the reconstruction of past vegetations (Martínez Tosto et al., 2012; Velázquez et al., 2010, 2014, 2015). On the other hand, the archaeobotanical analysis of charcoal and woods permitted obtaining information on the operation of plant resources by the Patagonian hunter-gatherer societies (Caruso Fermé, 2008, 2010, 2012, 2013, 2015; Ciampagna and Capparelli, 2012; Ortega and Marconetto, 2011; Martínez Tosto et al., 2012; etc.).

The exceptional preservation of plant material registered at Cerro Casa de Piedra 7 site (CCP7) and its long sequence of human occupation (Aschero, 1996; De Nigris, 2004; etc.) are ideal both to study the role of plant resources in the Patagonian hunter-gatherers economy and to complement the palaeoenvironmental studies already done in the region (Mancini et al., 2002; Mancini, 2007). The general objective of this work is to carry out an integral study of macro- and micro-plants with the aim of: i) providing information to the palaeoenvironmental reconstruction of the Early-Mid - Holocene of the CCP7 area, and ii) understanding the ways of acquiring wood resources in a high residential motility context.

2. The site Cerro Casa de Piedra 7

2.1. Geographical location, climate and current context

Cerro Casa de Piedra (CCP) - 47°57'S, 72°05'W- is a small elevation of volcanic origin, located south of the Perito Moreno National Park (PMNP), province of Santa Cruz, Argentina (Fig. 1). It is located at 900 m asl and at a distance approximately 500 m from the south side of the river Roble, a forest-steppe ecotonal area close to lake Burmeister. In the northern slope of CCP, a series of caves and overhangs open; the archaeological evidence of caves 5 (CCP5)

and 7 (CCP7) are considered the most fruitful (Aschero et al., 2005).

Cerro Casa de Piedra 7 was initially a large overhang with an extensive living area that offered good shelter conditions, having suffered modifications through time and collapse events. The CCP7 stratigraphic sequence is composed of 19 layers radiocarbon-dated between ca. 10,690 ± 120 and 3400 years BP (Aschero, 1996; Aschero et al., 2008; Civalero and Aschero, 2003) (Fig. 2). Until now, the archaeological studies suggest that CCP7 would have been recurrently used by hunter-gatherer groups for at least the first Holocene 5000 years, and abandoned little before 3500 BP. The collapse of big blocks that divided CCP7 in two and the almost null posterior archaeological evidence suggest that this episode could have determined the cave abandonment. A recent wood charcoal dating gave 1927 ± 41 years BP $\delta^{13}\text{C} = -26.69$ (UGA 868, corrected date) (Civalero et al., 2006–2007), which suggest an occasional and brief occupation in the late Holocene, different to that of previous times where the space use was effective and recurrent (Civalero et al., 2006–2007).

The archaeological record of CCP7 suggests a settlement-motility pattern of the residential type, evidenced by a pronounced space-structuration and a redundant site occupation (Aschero et al., 1992–93; Aschero et al., 2005).

2.2. Present-day vegetation

In the slopes of the Andes mountain ranges, between 1200 and 850 m asl, the *Nothofagus pumilio* (Poepp. & Endl.) Kkrasser and *Nothofagus antarctica* (G. Forst.) Oerst forest develops nowadays; *N. antarctica* and *Nothofagus betuloides* (Mirb.) Oerst., and shrubby, and herbaceous vegetation associated to the *Nothofagus* sp. forest, such as *Escallonia* sp., *Berberis* sp., *Fuchsia magellanica* Lam. and species belonging to the genera *Osmorrhiza* sp., *Acaena* sp. and *Perezia* sp. are also present.

Towards the east, at approximately 800 m asl, the *Verbena tridens* Lag., *Berberis* sp., *Mulinum spinosum* Pers. and *Chiliodendron* sp. shrubby steppe grows; the *Nardophyllum obtusifolium* Hook. & Arn. steppe with *Festuca pallescens* (St.-Yves) Parodi, accompanied by *Stipa ibari* Philippi, *Poa ligularis* Nees ex Steud., *Carex* sp., *Cerastium arvense* Cham. & Schltld., *Adesmia lotoides* Hook.f., *Nassauvia darwinii* (Hook. & Arn.) Dusén & Dusén, *Acaena pinnatifida* Ruiz et Pavón and *Mulinum spinosum* also develops. At 300 m asl is present the *Festuca pallescens* steppe with *Poa ligularis*, *Rytidosperma picta* (Nees et Meyen) Nicora, *Stipa* sp., *Carex* sp.,

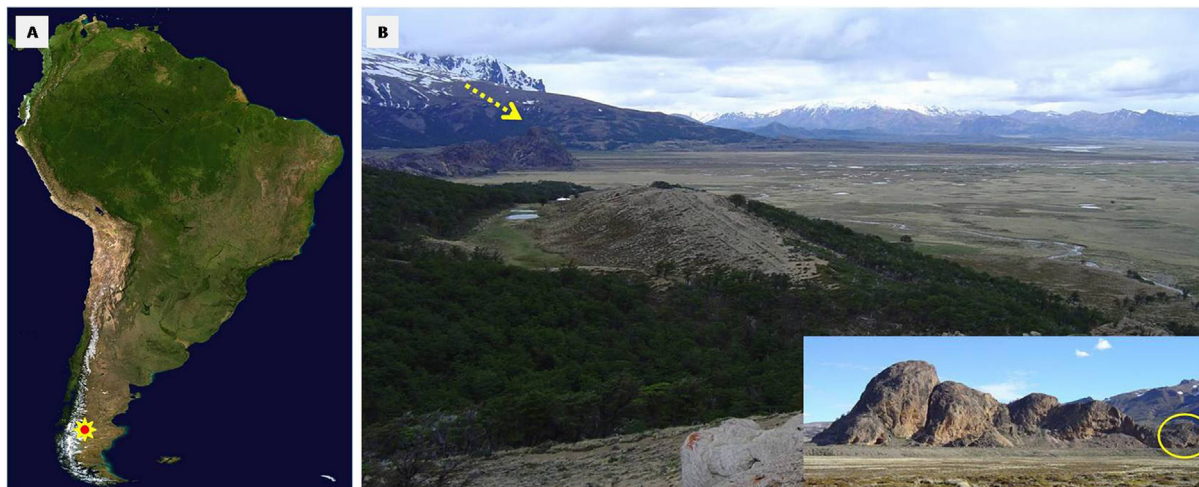


Fig. 1. a) Location of Cerro Casa de Piedra in South America. b) Cerro Casa de Piedra and location of Cerro Casa de Piedra 7 site (CCP7) (Caruso Fermé and Civalero, 2014).

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