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Human subsistence and environmental stability during the last 2200 years in Epullán Chica cave (northwestern Patagonia, Argentina): A perspective from the zooarchaeological record



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ABSTRACT

The faunal content from Epullán Chica archaeological site (ECh, thereafter), a small cave located in northwestern Patagonia, Argentina, was studied from taphonomic and paleoenvironmental points of view. This cave is placed in the ecotone between Monte desert and the Patagonian steppe, in the middle Limay River basin, was occupied since the end of the Late Holocene. Zooarchaeological evidence retrieved from ECh is diverse, including fresh-water mollusk shells (*Diplodon chilensis*), eggshell and bone fragments of Rheidae, bones and teeth of large (*Lama guanicoe*), medium (e.g., *Chaetophractus villosus*, *Conepatus chinga*), and micro-sized (several species of sigmodontine and caviomorph rodents) mammals. Most of the recorded taxa were the result of human exploitation. However, owl pellets preserved in the sediments, and other taphonomic signatures, clearly indicate that avian predators are responsible for part of the micromammal record. Micromammal abundances during the last 2.2 ka BP are suggestive of a relative environmental stability around ECh, at least until the beginning of the last century. In this sense, Late Holocene landscapes were dominated by open steppe areas and large rocky outcrops, with minor changes in humidity and temperature during this period.

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1. Introduction

In general, zooarchaeologists study the past interaction between fauna and humans on the base of the faunal remains recovered from archaeological sites (Lyman, 1994). This interaction may have taken place in different types of hunting or fishing and domestication processes, as well as in rituals, taboos, totems, symbols, and arts (Binford, 1981; Lyman, 1994; Russell, 2011, and references therein). Nevertheless, some faunal remains could have been naturally (i.e., without human participation) incorporated in the archaeological record by its own deaths *in situ*, by predators and/or by post-depositional agents such as running water and strong

winds (e.g., Andrews, 1990; Lyman, 1994). Taphonomy is the discipline which study the processes involved in the transition of the organisms from the biosphere into the lithosphere, providing crucial data on the depositional and post-depositional agents that have participated in the formation of the assemblages (Andrews, 1990; Lyman, 1994). Distinguishing faunal remains accumulated by birds of prey, carnivore mammals, and humans are essential to envisage reliable paleoenvironmental models and evaluate natural action vs. human subsistence (Andrews, 1990; Pardiñas, 1999a,b). In this sense, jointly zooarchaeology, taphonomy, and paleoecology can shed light on the subsistence patterns of the hunter–gatherers and their relationships with the landscape (Lyman, 1994; Pardiñas, 1999a,b).

The archaeological researches in northwestern Patagonia have integrated different kinds of analysis (e.g., geoarchaeological,

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chronostratigraphical, paleoecological, zooarchaeological and taphonomical) from numerous archaeological sites with Late Pleistocene and Holocene sequences, mostly located through the main hydric basins such as the Colorado, Neuquén and Limay Rivers (Barberena et al., 2015, and references therein). One of this archaeological sites, Epullán Grande cave [LL], with an entire Holocene sequence and located in the middle Limay River basin, has been studied from archaeological, geological, biological, zooarchaeological and paleoecological perspectives (e.g., Crivelli Montero and Fernández, 1996; Prieto and Stutz, 1996; Crivelli Montero et al., 1996a,b; Pardiñas, 1999a,b; Palacios, 2005, 2008; Villarosa et al., 2006; Fernández, 2007; Cordero, 2009, 2010; Pardiñas and Teta, 2013). Zooarchaeological studies of the early strata of LL revealed a human subsistence mostly focused on the consumption of large-sized mammals (*Lama guanicoe* [guanaco]), complemented by large-sized birds (*Rhea pennata* [lesser rhea]), medium (*Lycalopex griseus* [South American grey fox] and *Lycalopex culpaeus* [culpeo]), *Conepatus chinga* [Molina's hog-nosed skunk] and *Chaetophractus villosus* [hairy armadillo]) and micro-sized mammals (*Ctenomys* spp. [tuco-tucos], and the cavies *Galea leucoblephara* [common yellow-toothed cavy] and *Microcavia australis* [southern mountain cavy]) (Crivelli Montero et al., 1996a; Pardiñas, 1999a,b; Cordero, 2009, 2010; Pardiñas and Teta, 2013). On the other hand, the paleoecological contributions from LL depicted by the micromammal record pointed out a marked stability with some minor changes through the entire Holocene sequence (Crivelli Montero et al., 1996a; Pardiñas, 1999a; Pardiñas and Teta, 2013).

Nonetheless, a smaller archaeological cave site, Epullán Chica (ECh, thereafter), with a rich zooarchaeological record of Late Holocene, located about 100 m east from LL and excavated in 1989/1992, remained unstudied until recently. The present zooarchaeological study focuses on the taxonomic identification and taphonomic analysis of faunal remains recovered from ECh, in order to assess the main agents responsible of the bone accumulations, distinguishing both natural and anthropic processes. In addition, a paleoenvironmental analysis is presented based on the micromammal record retrieved from this cave site. We consider this task as a first step to understand the role of fauna of ECh from a zooarchaeological point of view, the importance of the use of this cave regarding LL, and a better knowledge of the paleoenvironmental conditions at the time of its deposition, providing data about the subsistence patterns of the Late Holocene hunter-gatherers of the middle Limay River basin.

2. Regional setting

ECh (40°23'10"S, 70°11'44"W, 680 m asl) is an archaeological site located in the Cañadón del Tordillo. It was ~5 km north of the Limay River (Collón Curá Department, southern Neuquén Province, Argentina) (Fig. 1); nowadays, it is ~2 km north of the Piedra del Águila reservoir. It opens to the north in a rocky outcrop of volcanic tuffs of the Collón Curá Formation. From a phytogeographic point of view, ECh is located in the Monte-Patagonian Ecotone and near the Occidental District of the Patagonian Phytogeographic Province at the middle part of the Limay River basin (sensu León et al., 1998). Annual precipitation is around 180 mm, and consequently the environment is semiarid. Its plant composition includes Monte shrubs such as *Prosopis*, *Schinus*, and *Larrea*, and Patagonian shrubs such as *Mulinum*, *Senecio*, *Chuquiraga*, and herbs such as *Distichlis*, *Stipa*, *Poa* and *Cortaderia selloana* (Schult. and Schult. f.) Asch. and Graebn that mostly grow in humid locally areas known as "mal-lines" (León et al., 1998). Several volcanoes in the north Patagonia Andean cordillera have produced explosive eruptions during the Quaternary (e.g., Villarosa et al., 2006). The volcanic materials form thick tephra deposits, which have been recorded in the

archaeological sites located in the upper and middle Limay River basin, such as Trafal I, LL and ECh, and that were associated with the Nahuel Huapi white tephra, an event with radiocarbon dates ranging ca. 1950–2500 cal BP (Villarosa et al., 2006).

3. Materials and methods

3.1. Archaeological site, stratigraphy, and chronology

ECh is about 5 m wide at the mouth, 3.5 m long and covers ~11 m²; maximum depth of the fill was 1.40 m. Twenty archaeological 1 m × 1 m squares, covering the entire surface of the cave, were dug, although not all of them reached bedrock. The excavated volume was about 13 m³ and the sediments were sieved through 3 mm-sized mesh.

Each stratum was described, given a unique number in a continuous sequence beginning with 1, and its stratigraphic position recorded by noting its physical relationship with the adjacent strata (Harris, 1989). Because the sediments of ECh were extremely friable, what made it risky to cut successive sections, only one profile, limited to the lower half of the sedimentary deposit, was exposed (Fig. 1). In addition, many burrows were spotted and, whenever possible, they were excavated separately, but contamination cannot be discounted. In consequence, it was considered safer to organize the data horizontally, according to levels below datum, each 5 cm thick. These levels were grouped in four temporal units according to depth, differences sediment, and radiocarbon dates (Fig. 1). The latter were obtained from charcoal samples processed at the Laboratorio de Tritio y Radiocarbono (LATYR), Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata (LP) and Beta Analytic (Beta). Calibration for the Southern Hemisphere was made through SHCal04 14c using CALIB 6.0.1 program, in conjunction with Stuiver and Reimer (1993). The basic fill of the cave is a pale yellowish sand derived from the weathering of the tuff forming the ceiling and walls and eolic sand of the same nature, since bedrock outcrops in the vicinity are also of tuffs of the Collón Curá Formation. In spite of this apparently homogeneous sediment, each unit ("U") presented particular characteristics: UI = comprised between bedrock (–175 cm) to –125 cm from datum. Bedrock was covered by tobaceous sand, the characteristic sediment of the rock shelter. A pit in the rock floor was partly filled by a hearth, which burnt sediments and clasts. A charcoal sample taken from this hearth indicated 2220 ± 50 ¹⁴C BP (357–284 cal. BC; Lab-code Beta 54772). A later patch of charcoals and burnt sediment was identified as a hearth of which a charcoal sample was dated to 2200 ± 60 ¹⁴C BP (211–91 cal. BC; Lab-code Beta 54771). Subsequently, a conspicuous tephra stratum some 18 cm thick was deposited, which was partially covered by a hearth dated 1980 ± 50 ¹⁴C BP (17–132 cal. AD; Lab-code LP 2881). A significant burrow beginning in UII reached bedrock (see Fig. 1). UII = ranging from –125 to –80 cm. Most of the fill of this unit consists of the characteristic sediment and sand mixed with grass remains and some tephra. A thick, stratified hearth ~1 m wide oxidized the sediment on which it rested, was dated on 1740 ± 60 ¹⁴C BP (318–423 cal. AD; Lab-code LP 2870). Some vegetable lenses were identified and the aforementioned burrow cut across the sediments. UIII = comprised between –80 and –60 cm. Most of the fill of this unit consists of the characteristic sediment. A group of charcoals, which did not form a combustion feature, was dated to 1510 ± 80 ¹⁴C BP (534–664 cal. AD; Lab-code LP 2903). A hearth indicated 1680 ± 80 ¹⁴C BP (376–539 cal. AD; Lab-code LP 2904). Another hearth was poorly defined and scarce in charcoal. Other strata contain tephra and vegetal remains, lens of grass, and were

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