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Small mammal remains recovered from two archaeological sites in northwestern Mendoza (Late Holocene, Argentina): Taxonomic composition, taphonomic issues and paleoenvironmental implications

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ABSTRACT

We present the results of the extensive analysis on the taxonomic composition, the taphonomic characteristics, and the possible paleoenvironmental implications of the small mammal assemblages in two archaeological sites located in northwestern Mendoza, Argentina: Vaquería Gruta 1 and Rincón de los Helados. Such sites have been radiocarbon dated for the Late Holocene. The taphonomic characteristics of these remains, which were accumulated in VQG1 and RH by raptor Strigiformes and Falconiformes birds respectively, were analyzed by means of digestive corrosion on the bones, breakage patterns and relative abundances. In order to evaluate the changes in the composition between past and current assemblages, zooarchaeological and current small mammal assemblages were compared. The taxonomic composition and abundance of small mammals in archaeological assemblages suggest the existence of greater environmental heterogeneity than the current during the Late Holocene, as would suggest the presence of *Reithrodon auritus* and *Octomys mimax*, currently extinct species in the region. The co-occurrence of these species currently with allopatric distributions, lead us to consider these archaeological sets as non-analogue communities. In relation with the changes detected between past and current assemblages, some factors need to be considered. Among them, the relevance of the anthropic activities that have negatively affected the diversity, richness and abundance of flora and fauna since the XVI century, and the possible mixture of taxa due to the predation by owls in different altitudinal levels of vegetation.

1. Introduction

The small mammals archaeological record (<1 kg) has been overlooked in regional archaeological studies due to different reasons. Among them are the difficulties associated with the taxonomic determination of such remains, the deficiencies present in the recovery of the samples, and the lack of a coherent theoretical-methodological model applied to the study of such zooarchaeological remains (Pardiñas, 1999a; Fernández et al., 2011a; Fernández, 2012).

The composition and abundance of small mammals is important in dealing with the archaeological record in general and the estimations of the prehistoric diversity (Stahl, 1995, 1996). In general, this fauna has narrow ecological requirements, and its remains offer the possibility of performing ecological inferences over past environments (See also Andrews, 1990, 1995; Fernández-Jalvo and Andrews, 1992).

In Argentina, most research on the archaeological small mammal assemblages are mainly centered in the Pampean, Northern Patagonia, and Northwestern regions. Most show the potential of such remains to improve our comprehension of the

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human systems and past environments (e.g., Pardiñas, 1999a, 1999b; Teta and Ortiz, 2002; Teta et al., 2005; Fernández et al., 2009, 2011a, 2011c; Fernández, 2012; Fernández et al., 2012; Medina et al., 2012; Ortiz and Jayat, 2012; Ortiz et al., 2012; Scheifler et al., 2012; Teta et al., 2013).

In Mendoza province, defined studies on archaeological small mammals focused in the southern area (e.g., Gasco et al., 2006; Fernández, 2010, 2012; Fernández and De Santis, 2013; Fernández et al., 2015a, 2015b). However, despite the growing rate of the microvertebrates as paleoenvironmental fluctuation indicators, there is no research devoted specifically to the zooarcheological study of small mammals in northern Mendoza. This information has generally been considered within the general zooarchaeological record (García Llorca and Cahiza, 2007; Chiavazza, 2010b, 2012), not focused on taphonomic, taxonomic or paleoenvironmental subjects.

Numerous biological or ecological researches on current small mammals have been performed in this region (Gonnet and Ojeda, 1998; Rosi et al., 2000, 2003; Braun and Mares, 2002; Pardiñas et al., 2010; Novillo, 2011; Rodríguez, 2011; Sassi et al., 2011; Taraborelli et al., 2011; Novillo and Ojeda, 2014; among others). These contributions provide information about different species concerning their distribution, physiological and behavioral aspects, and habitat and food preferences, essential knowledge for the analysis of paleoenvironmental aspects linked to the assemblages under study.

This research presents extensive analysis on the taxonomic composition and the relative abundances of small mammals in two archaeological sites in Northwestern Mendoza (Argentina) for the Late Holocene: Vaquería Gruta 1 (VQG1, thereafter) and Rincón de los Helados (RH, thereafter). The taphonomic analysis of the recovered bone remains is performed in order to evaluate the origin of each archaeological set. Moreover, with the intention of contributing to the paleoenvironmental studies of the region, these assemblages were compared with sets of modern small mammals.

2. Study area and archaeological contexts

Both archaeological sites are located within the Villavicencio Natural Reserve (32° 35′ S 69° 02′ W, 620 km^2, Mendoza, Argentina) in the southernmost part of the Andean Precordillera (Dalmasso et al., 1999). The environment is characterized by cold and dry climate, with temperature highly variable, scarce rainfall (from 100 to 300 mm per year) mostly in summer, and seasonal climate differences. The immature surface soils and highly infiltrated, along with a high evapotranspiration, also contribute to the existence of an Andean desert environment. A great heliophany and the föhen type warm dry winds add to this arid configuration (Capitanelli, 1971; Dalmasso et al., 1999).

In this reserve, three phytogeographic provinces can be identified (Ambrosetti et al., 1986; Dalmasso et al., 1999): the Puna, the Cardonal and the Monte. The first, between 2700 and 3000 masl approximately, is represented by xeric grasslands of low vegetation cover with prevalence of grasses of genus *Stipa*, accompanied by low bushes such as *Adesmia*, *Junellia* and *Baccharis* (Roig and Martínez Carretero, 1998). The second, an intermediate floor between the Puna and the Monte, is located approximately between 1700 and 2800 masl and it is not widely extended in our region. The vegetation is characterized by columnar cacti, bromeliads, and marginal components of the Puna as well as of Monte (Roig, 1994; Dalmasso et al., 1999). The third, spread over the Piedmont of Precordillera, covers altitudes between 750 and 1700 masl. The prevailing vegetation is a xeric scrubland mostly dominated by *Larrea*, *Acantholippia* and *Junellia* bushes, together with *Stipa* grass (Roig, 1976; Ambrosetti et al., 1986).

The VQG1 site (32°31′ S; 69° 0′ W; Fig. 1) is a cave located in the Quebrada de Villavicencio, in the high Piedmont of the Andean Precordillera, at 1650 masl approximately. The area belongs to the Monte-Cardonal ecotone and shows more benign climate conditions than those in RH, with annual average temperature and rainfall of 10.5 °C and 324.5 mm, respectively. The vegetation represented by a bi- or tri-stratified thick scrubland is marked by denser plant cover and floral richness compared to RH (Ambrosetti et al., 1986). Archaeological researches in this cave identified human occupations between ca. 3100–380 BP (Chiavazza and Mansegosa, 2008; Chiavazza, 2010a). This cave, located in an environmental transition area, has been considered as a key place for human mobility strategies in the past, connecting high (Puna) to low (Monte) lands.

The RH site (32° 37′ S; 69° 6′ W; Fig. 1) is a rocky shelter placed at 2900 masl, located within the Puna phytogeographic province (Chiavazza, 1995), and 16 km to the southwest of the VQG1 site. The area is exposed to scarce rainfall (147 mm year average), with snow from July to September and with frozen soils during the winter (Dalmasso et al., 1999). Chiavazza (1995) proposes the presence in the site of Pre-Potter and Early, Medium and Late Potter hunter-gatherers, together with Spanish occupations dated between ca. 1800–600 BP.

The area where these archaeological sites are located (Villavicencio Natural Reserve) has undergone a relatively important anthropic impact since the arrival of the European conquerors in the XVI century. The royal road to Chile went through it during more than 300 years, and mining developed in areas from 2800 masl approximately, together with land clearing and goat grazing in the lower lands (Dalmasso et al., 1999; Chiavazza and Prieto Olavarría, 2008, 2012; Sironi, 2013).

3. Materials and methods

The zooarchaeological samples of small mammals were recovered in archaeological excavations between 1994 and 2004 in VQG1 (eight grids – 8 m^2) and between 1991 and 1993 in RH (four grids – 4 m^2). A 2 mm screen mesh was used for the recovery of the remains.

In VQG1 site, 250 cm deep were excavated and arbitrarily divided into grids. The soils varied from silty, sandy, and clayey. The sedimentary process seems to have covered the remains rapidly. Although three looting holes, 28% of the total surface in the cave, were identified, the unaltered components could be clearly delimited (Chiavazza and Mansegosa, 2008; Chiavazza, 2010a). A total of 9979 small mammal remains were analyzed through a complete stratigraphic sequence of the site, corresponding 4364 to cranial and dental elements while the rest was identified as postcranial elements. These last were part of a representative sample of the complete stratigraphic sequence in two of the grids, from where the radiocarbon dating as well as the largest and most relevant amount of materials comes from. Three radiocarbon samples were dated at 380 ± 65 BP, 1290 ± 60 BP and 3100 ± 80 BP (Samples URU 0093, URU0153 and URU 0443, respectively).

In RH the soils are sandy with low saline indexes, showing minor or nonexistent pedogenic or similar perturbation processes. The geomorphologic and sedimentologic context indicates that, after deposition, the remains were naturally covered by a sediment layer that preserved their integrity (Chiavazza, 1995). A total of 220 small mammal remains were recovered in 135 cm of excavation (divided in arbitrary layers of 5 cm), from which 101 corresponded to cranial and dental remains, whereas the rest were postcranial elements. Four radiocarbon samples were dated at 610 ± 80 BP, 790 ± 90 BP, 1580 ± 50 BP and 1720 ± 50 BP (Samples LP 642, LP 443, URU 0062 and LP 496, respectively).