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Zooarchaeology of flight: Avifauna resource from the Southern Argentine Puna

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ABSTRACT

Birds remains recovered from archaeological contexts may or may not to be the product of human activities. No matter how they reached the site, such record provides valuable information. If bird remains are product of human activities, provide information such as diet and economic, symbolic and/or ideological activities. If this record is result of a non-human process, provides also useful data such environmental conditions or seasonal abandonment of sites. On the basis of the analysis of bird remains -feathers and bones- we explore here the use of the avifaunal resource in hunter-gatherer (*ca.* 8480 BP), agro-pastoral (*ca.* 1270–220 BP) and Historical Period contexts, from a high altitude desert in the southern Puna region of Argentina. Bird remains were recovered from open-air and overhang archaeological sites. An important aspect of the zooarchaeological record is the poor representation of bird bones in relation to feathers for both types of sites. The different human groups that inhabited this area of the Puna over time used feathers (Anatidae, Phoenicopteridae, Strigidae, Passeriformes and Rheidae), for paraphernalia and manufacturing weapons. Some passerines feathers, pellets and dung of carnivores containing feathers are linked with moments of site abandonment. Birds were a reliable resource in this high desert from Archaic through Colonial times.

1. Introduction

Bird remains in archaeological contexts can provide a range of useful data, such as economic, ideological, taphonomic, seasonal and/or ecological information (Bishop, 2014; Bochenski et al., 1999, 2017; Cruz, 2008, 2011; Denys et al., 2017; Fiore et al., 2013; Grimm, 2010; Lefèvre, 1997, 2010; Lefèvre et al., 2003; Marciniak, 2005; Serjeantson, 1997, 1998; Tivoli, 2013; among others). Other researches combine archaeology and ethnography, as is the case of the use of feathers related to birds extinction (McGovern-Wilson, 2005).

Feathers have always been an important part of human activities. Their main use is as arrow fletching, but they are also used for other practical, decorative and ritual purposes, in particular colored feathers. This may be the reason why wing bones have been recovered in a greater percentage than other bones (Bovy, 2002).

In general sense, the small amount of bird bones found in some archaeological sites may be due to different factors such as environment, fragments passing through screen mesh sizes, differential preservation, parts being selected or discarded for eating or for use as artifacts (Gál, 2005; Gifford, 1981; Behrensmeyer et al., 2003; Mameli, 2002, 2003; Stewart, 1996; Tivoli, 2013, among others). Their preservation may depend on various factors such as low temperatures delaying the action of microorganisms, acidic sedimentary contexts, drainage, feather fat and oil, and above all, microbiological activity (Mameli, 2003; Nicholson, 1996) such as that of soil bacteria that degrade feather color and integrity, particularly in moist tropical environments (Grande et al., 2004). Lefèvre and Laroulandie (2014:262) mentioned that the less pneumatised bones of diving birds being are more likely to survive that pneumatised bones of strong fliers, which explains the best representation of bird remains of coastal sites.

Moreover, hunters may have left behind parts of waterfowl on their way to their final place of use or when they carved them up at hunting sites (Bovy, 2002) such as lakes or high Andean vegas (meadows) in the Puna. In addition is useful to consider the bird bone weight (Dirrigl, 2001) and the fact that if the deposition area were temporarily flooded, bird bones could float and be re-deposited over mammal bones (Mameli, 2003:210).

Zooarchaeological research in Argentina has focused mainly on mammals, and less on birds, which have been dealt with mainly in the fields of ethnoarchaeology, economy and taphonomy of bone remains

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at archaeological sites in Patagonia, Pampa and Cuyo (Camarós et al., 2010; Cruz, 2005, 2006, 2007, 2008; Estévez et al., 2002; Fernández et al., 2009; Giardina, 2006, 2012; Lanata et al., 1992; Lefèvre, 1997, 2010; Mameli, 2002, 2003; Mameli and Estévez Escalera, 2004; Prates and Acosta Hospitaleche, 2010; Savanti, 1994; Scheinsohn et al., 1992; Scheinsohn, 2010; Tivoli, 2010, 2012, 2014; among others) and in Valle Calchaquí (Rodríguez Loredo 1997–1998). This is the same situation for the background of the Argentinean Puna. Several papers mention bird remains without including in-depth discussion, perhaps because there were fewer bird remains than Camelids remains. Some records from the northern Puna correspond to the site Inca Cueva 4 (ICC-4), were bone remains of *Nothura* sp. were identified (Mengoni 1982 in Aschero, 1984:54; Yacobacccio, 1991) in a stratigraphic level dated 9900 ± 200 to 9230 ± 70 BP (Aschero, 2010), and white Rheidae feathers and red feathers of exotic birds bound together with cords (Aschero, 1979). The human remains found in ICC-4, dated 4140 to 4020 cal. BCE (Aschero, 1994) present feathers of tropical birds (Yacobaccio, 2004), and the Torres Aparicio (Jujuy) archaeological collection presents macaw feathers (Fernández Distel, 2001). Pérez de Micou (2009) mentions a diadem made of feathers at burial site No. 26 of the collection Doncellas, and Fernández Distel (1983) mentions rock art with characters wearing feathers at Coctaca.

Particularly for southern Puna, the presence of feathers in archaeological and ethno-historical references indicates their possible use as ornaments of different kinds: headdresses, headbands, necklaces, loincloths, garments or camouflage, among others. There is evidence of feather headdresses in Inca sanctuaries in the high Andean peaks (Dransart, 2000). The Cueva Inca Viejo site (860 ± 60 BP) has been inferred as a macroregional transit site due to the presence of exotic elements such as the feathers of *Amazona aestiva*, *Primolius auricollis*, *Buteo magnirostris* and *Phoenicopterus* sp. (López et al., 2018). In Antofagasta de la Sierra, at the site Peñas de las Trampas 1.1, two funereal structures dated *ca.* 8400–8210 BP were found, from which an ornament made from *Rhea pennata* feathers was recovered (Martínez, 2014). Cueva Cacao 1-A (CC1A) presents a pair of sandals, each with a *Rhea pennata* feather attached, dated 2870 ± 40 BP (Olivera et al., 2003). For rock art during the Formative period, Martel (2004) mentions anthropomorphic figures with feathered headdresses at the sites Peñas Chicas 3 (PCh3), Campo de las Tobas (CT) and Curuto 5 (Cu5), and suggests they indicate hierarchy of the person depicted. No mobile bone art or rock representation of waterfowl was found in this part of the Puna. At Peñas Chicas 3 (PCh3) and Peñas Coloradas (PC2.5) some etchings of wading birds with large knee joints may represent flamingos (Á. Martel personal communication). At the site Punta de la Peña 9-I (Structure 4), a medium sized bird pelvis was recovered (Urquiza, 2013) from a funereal context (1388 ± 45 BP) (Gonzalez Baroni, 2013). Also for *ca.* 1200 to 600 BP at the site Punta de la Peña 9-III (Structure 2), fragments of feathers split transversally along their mid shaft associated to fletching were recorded around along with broken arrowheads and tendon ties (López Campeny, 2001). At Real Grande 9 (RG9), on the upper course of river Las Pitas, Falconidae feathers were found embedded in the sand around a basket without any contextual associations (Podestá, 1989, 1991). At the overhang site Quebrada Seca 3 (QS3), Elkin (1994) recovered part of a postcranial skeleton of a large bird and grey feathers (early Holocene); later, for *ca.* 6100–7200 BP, no bird is recorded, and for the late Holocene, bone remains of *Phoenicopterus andinus* (*Phoenicoparrus andinus* sensu Elkin, 1994) are identified. In northern Chile, feather diadems of pelican (*Pelecanus thagus*) were found at the Playa Miller 3 cemetery at Arica (1000–1470 CE) (Horta Tricallotis, 2000). Standen (2003) suggests intensive capture of pelicans. Pelican bones, hides and feathers are associated to blankets and head covers or "caps" made of pelican hide on naturally mummified bodies in a Chinchorro cemetery (5400–3700 BP), the exception being an artificially mummified body wrapped in the hide of a *Rhea*, a bird from the Andean highlands. For Puna de Atacama, Peña-Villalobos et al. (2015) identified the feathers and bone remains of birds at the site Tulán-122 dated 2740 ± 40 BP and 2510 ± 40 BP as Passeriformes: *Sicalis* sp., and infers according to the number of down and contour feathers that these must have arrived complete to the site. And from Tulan-85 site (3000–2200 BP), with an economy based mainly on the camelid exploitation, were recovered flamingos (*P. chilensis* and *P. andinus*) bones and eggshells. These records suggest hunting events and recurrent egg collecting activities, and the lack of wings and crania is indicating a standardized butchering in order to obtain the wings (Cartajena et al., 2010). In prehispanic caravan routes that connect the Atacama desert with pacific coast were found human burials containing clothes and blankets made using seabirds (Briones et al., 2005; Torres-Rouff et al., 2012). Briones et al. (2005) analyzed transitory camp sites along these caravan routes that are associated with sites exhibiting avian seabirds geoglyphs such the Cerro Mono 2 site. These authors found in the site Cerro Mono 1 two female funerary bundles (3370–3320 BP cal 1 sigma), with bodies covered by seabird skin with feathers in outside, and in the site Campamento Soronal 3 (S-3) were found bones and feathers of seabirds (1360–1300 BP cal. 1 sigma).

Regarding this state of knowledge, this paper presents and discusses the remains of bird bones and feathers recovered from archaeological sites of the Southern Argentine Puna: Punta de la Peña 4 (PP4) and Piedra Horadada 2 (PH2) (Fig. 1). Our main goal is to assess the use of birds in these contexts, comparing bones and feathers data in order to understand information that can be missed in sites where only bones are preserved. Results are discussed using ethnographic/ethnohistoric background, approaching the ancient uses of birds. Also, taphonomic aspects are briefly revisited, remarking the good preservation of the feather structures and colors.

2. Geographical setting and study area

The study area is located in the ecoregion Desert Puna or Salt Puna in northwest Argentina, characterized by marked aridity and large daily temperature range. This area belongs to the southern part of the central Andes (south of 24°S) at an elevation of 3500–5000 m above sea level. Encompasses the arid highlands with snow-capped peaks, volcanoes, salt flats, lakes and high plateaus. Characterized by a dry climate, high solar radiation, with broad daily and seasonal thermal range, low atmospheric pressure, scarce precipitation 100 mm/yr, and endemic species. Predominant vegetation types are shrub-steppe, halophile, herbaceous and sammophile steppes, and high Andean vegas (wetlands) (Cabrera, 1976; Cabrera and Willink, 1980; Troll, 1958).

Sites are located in the so-called Intermediate Sector (Olivera, 1992) according to resource availability and Vega Intermedia (intermediate meadow) according to topography and plant resources (Aschero, 2006), at elevation is 3550 to 3900 m above sea level. This intermediate location is currently a route between Fondo de Cuenca (3400 to 3550 msnm) and the Vega in Quebradas de Altura (3800 to 4600 msnm) (Cohen, 2014; Olivera, 1992; Podestá, 1989).

Current autochthonous fauna in the area includes Camelidae (*Vicugna vicugna*, *Lama glama*), carnivores (*Puma concolor*, *Galicitis cuja*, *Oreailurus jacobita* and *Lycalopex culpaeus andinus*, among others), Rodentia (e.g. *Chinchilla brevicaudata*) and Aves (Barquez et al., 2006; Ojeda et al., 2002; Redford and Eisenberg, 1992). Exotic fauna includes species such as Caprinae, *Equus africanus asinus*, among others. Some current autochthonous Aves are Rheidae: *Rhea pennata* (Lesser rhea); Phoenicopteridae: *Phoenicopterus chilensis* (Chilean flamingo), *Phoenicoparrus andinus* (Andean flamingo), *Phoenicoparrus jamesi* (Puna flamingo); Anatidae: *Anas flavirostris* (Speckled teal), *Oressochen melanopterus* (Andean goose); Laridae: *Chroicocephalus serranus* (Andean gull); Strigidae: *Athene cunicularia* (Burrowing owl); Cathartidae: *Vultur gryphus* (Andean condor); Falconidae: *Phalcoboenus megalopterus* (Mountain caracara); *Accipitridae*: *Geranoaetus melanoleucus* (Black-chested buzzard-eagle); Columbidae: *Columbina picui* (Picui ground-dove), *Metriopelia melanoptera* (Black-winged ground-dove); and Passeriformes such as Hirundinidae: *Orochelidon andecola* (Andean