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Peopling of the high Andes of northwestern Argentina

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ABSTRACT

The goal of this presentation is to review the current evidence in order to model the early peopling of the highlands of Northwestern Argentina. Paleoenvironmental evidence of the late Pleistocene and early Holocene is thoroughly reviewed in order to set the stage of the process of human settlement of the Puna region of Argentina. I will analyze chronological evidence and the archaeological record —especially the archaeofaunas- of early hunter-gatherer occupations dated between 10,500 and 9000 BP (12,500 to 10,000 cal. BP). Finally, I discuss specific cultural and environmental aspects related to the dispersion and human colonization of the highland plateau.

1. Introduction

The peopling of the high Andes is undeniably linked to the major process of hunter-gatherer dispersal into the Americas. Nevertheless, several questions concerning the timing and pathways of migration remain to be answered. Some time ago, M. Aldenderfer (1998) described the challenges hunter-gatherers had to face for colonizing high altitude environments, and for that reason the installations of human groups in the highlands had been later than that in lower lands. But, recently, data from the Pucuncho Basin in southern Peru would suggest that "Pleistocene humans lived successfully at extreme high altitude" (Rademaker et al., 2014:469). As the puna or altiplano is not homogeneous, the initial human settlement could have been quite complex. Regional studies could add evidence of this complexity because they allow generation of more detailed data on local and regional scales, thus giving the opportunity to view variability in hunter-gatherer displacement and colonization of new lands at the Pleistocene/Holocene boundary.

In this paper I will examine the environmental, chronological, and archaeofaunal evidence from the highlands of Northwestern Argentina in order to clarify some of the problems surrounding the initial peopling of this land. I will use two operative concepts that allow disentangling the peopling process in two steps: dispersal and colonization. Dispersal is filling up the available habitat, reaching an area not previously inhabited by the human group; meanwhile, colonization is an extension of the habitat to include established occupation (Gamble, 1993:7). Established occupation is by no means sedentary, but a recurrent use of the same area in the long-term, beyond seasonal rounds.

2. Regional setting

The Puna region of Argentina comprises the arid highlands situated between 19° and 27° S latitude and between 3000 and 4500 m above sea level. This area is defined as a highland desert or semi-desert dissected by several mountain chains oriented NE-SW. It is characterized by high solar radiation due to its altitude, wide daily thermal amplitude (up to 30°), marked seasonality in rainfall (it rains only in summer), and low atmospheric pressure.

The Puna exhibits a latitudinal gradient in aridity that determines two sub-regions: (1) the Dry Puna located north of 24°S, with a mean annual precipitation of 340 mm/yr (reaching even 400–500 mm/yr in some localities of the northern-western corner), and (2) the Salt Puna, located south of 24°S, in which precipitation barely reaches an average of 100 mm/yr, and salt-lakes and saline soils are dominant features of the landscape (Morales, 2011). These overall conditions set a patchy distribution of vegetation and animal resources.

The wide altitudinal range produces strong variability in plant assemblages from 'tolar' (shrub steppe) to 'pajonal' communities (herbaceous grasslands), along with wetlands, locally known as 'vegas', situated in both of these main vegetation communities. Four main plant communities can be identified in the Puna (Cabrera, 1976; Arzamendia et al., 2006; Borgnia et al., 2006):

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1. Shrub steppe (tolar), dominated by *Parastrephia lepidophylla* and *Fabiana densa,* has a low proportion of herbs (5%) and is the most extensive pasture area of the zone, located between 3500 and 3900 m asl.
2. Herbaceous steppe (pajonal), dominated by *Festuca* spp. and other grasses like *Poa* spp. and *Stipa* spp., can be found between 4100 and 4700 m.asl. It is important to highlight that above 4300 m asl, shrub presence diminishes almost completely.
3. Wetlands (vegas) represent restricted swamp areas composed of short grasses. These dense grasslands of *Deyeuxia* spp. and *Mulembergia* spp are distributed in both altitudinal settings from 3500 to 4700 m asl (Ruthsatz and Movia, 1975).
4. Mixed steppes of Gramineae and Compositae (only eight genera are present) can be found between 3900/4100 m asl, and can be defined as a transitional zone or ecotone between the shrub steppe and the herbaceous grasslands.

3. Materials and methods

3.1. The past environment

The initial human dispersal in the highlands of northwestern Argentina and northern Chile seems to have occurred in an environmental scenario characterized by moister, but very cold conditions (Yacobaccio and Morales, 2013). These conditions fostered the downslope displacement of herbaceous steppe that currently is located above 4000 m asl (Fernández et al., 1991) and a generalized overflowing stage in the lakes of the region (Sylvestre et al., 1996, 1999; Geyh et al., 1999; Baker et al., 2001; Bradbury et al., 2001; Abbott et al., 2003). Particularly, and in terms of the classic Andean lake-level phases (Sylvestre et al., 1999), initial human dispersal seems to have occurred after the Ticaña "dry" (and probably warmer) event ca. 12,800 cal. BP.

The occupation of the area, according to radiocarbon dates, seems to have been accomplished during the Pleistocene/Holocene boundary, during the moist Coipasa event that started ca. 11,045 cal. BP (Sylvestre et al., 1999). Broadly speaking, the environmental conditions during the Early Holocene in the South Andes were moister and more homogeneous than present (Thompson et al., 1995, 1998, 2006; Bradbury et al., 2001; Ramirez et al., 2003), also showing a weaker seasonality in rainfall and a weak to moderate frequency in short term climatic variability, due to atmospheric circulation patterns less influenced by the South Atlantic Anticyclone (Villagrán, 1993) and the virtual absence or reduced intensity and frequency of short term climatic oscillations, like ENSO (El Niño-Southern Oscillation) (Villagrán, 1993; Bradley, 2000) or PDO (Pacific Decadal Oscillation) (Mantua et al., 1997; see review in Morales, 2011). The ecological impact of these changes in moisture amount and distribution −spatial and temporal- allowed herbaceous steppe to grow in lower altitudes −below 3800 m-, thus replacing current shrub steppe (Markgraf, 1985; Oxman, 2015; Tchilinguirian et al., 2013). Also, the regional abundance of pack rat middens (Latorre et al., 2003, 2006) and paleosols (Morales, 2011) clearly shows more stable and moister conditions during this period. This wet phase was recorded in a large number of records from both the Dry and Salt Puna, with a chronology between 12,600 and 7800 cal BP (Morales, 2011; Tchilinguirián and Olivera, 2014).

The end of Early Holocene characteristics has non-synchronous dates, being somewhat later (ca. 7800 cal. BP or even later) in the southern part of the Central Andean region (Northern Chile and NW Argentina). This late chronology is mainly evidenced in water bodies with broad moisture catchment areas and in those located at higher altitudes above 4000 m asl (Morales, 2011).

3.2. Chronology of human dispersal

The paleoenvironmental studies indicate areas with high productivity during the Early Holocene in the Dry Puna. These areas particularly are in the north-central region, between the hills of Rinconada and Zenta-Santa Victoria in the Dry Puna (Morales, 2011: 166) (Figs. 1 and 2). The gradient of the radiocarbon dates suggests that these sectors could have formed the paths of the first human groups into the region. The areas above 4000 m, under periglacial conditions, could only have been occupied and/or visited seasonally during the summer, suggested by the use of certain raw materials, particularly obsidians from sources like Zapaleri/Laguna Blanca or Caldera Vilama, both above 4000 masl. These obsidians have been found in Hornillos 2 and Alero Cuevas. Nevertheless, human colonization of the sectors above 4000 m should have been somewhat later, as indicated by the radiocarbon dates from sites located at that altitude (Table 1).

In the southern Salt Puna the only places with such antiquity (i.e. Pleistocene/Holocene boundary) detected so far are Quebrada Seca 3 and Peña de las Trampas. Quebrada Seca 3 has similar artifact types as those of the Dry Puna and the Salar de Atacama region of northern Chile. Thus, in this case a human dispersal from the northwest cannot be ruled out, as can been observed by the similarities in the morphology of the projectile points with the already mentioned areas, and with the upper Loa river. On the other hand, the occupation at Peña de las Trampas is spatially restricted and is composed by a few flakes and tools.

The earliest radiocarbon dates from human occupation sites are from the end of the Pleistocene, about 13,000 cal BP. This evidence is still scarce but allows some inferences. If we arrange the oldest dates according to the altitude above sea level a gradient can be observed in which the earliest dates are below 3800 m. These dates have a range between 12,958 and 12,363 cal. BP, whereas the sites located above 4000 masl have a range of 11,279 to 11,124 cal BP. The difference between these dates is about 1450 years and is statistically significant ($t = 34.5$, $p = 0.05$). The implication of this analysis is that the peopling of the Puna proceeds from lower environments. Also, we can see that the sites that have these early occupations are located on the periphery of the Puna, close to the mesothermal valleys and the mountain forest, locally known as yungas (Fig. 2).

There is a high quantity of plant species coming from the lowlands recovered from these early sites, and it is worth noting the lack of obsidian in Inca Cueva 4, Huachochocana III, and Pintoscayoc 1 (Yacobaccio, 1994; Yacobaccio et al., 2008).

From 10,682−10,566 cal BP all the areas of the Puna have evidence of human occupation; this is coincident with the appearance of the first open-air sites located on the margin of ancient wetlands, like Lapao 5 and 11 near Hornillos 2, dated between 10,871−10,275 cal. BP (Table 1).

3.3. Utilization of animal resources

The Puna is an environment with low ungulate diversity. Only three species are found: two wild camelids (guanaco and vicuña) and taruca deer (*Hippocamelus antisensis*). Guanacos (*Lama guanicoe*) are spread throughout the Andean range from Peru to Tierra del Fuego. Their social structure in the breeding season comprises three basic social units: territorial family groups; male groups (non territorial), and solitary males (Franklin, 1982). Family groups' territoriality is directly correlated with stable food supply. When a severe drop in food availability occurs, usually in winter, guanaco populations displace, losing territory and forming mixed herds, breaking apart family groups (Cajal, 1985). According to the archaeological record, in the past, guanacos inhabited the Puna in montane grasslands and also in the meso- and micro-thermic

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