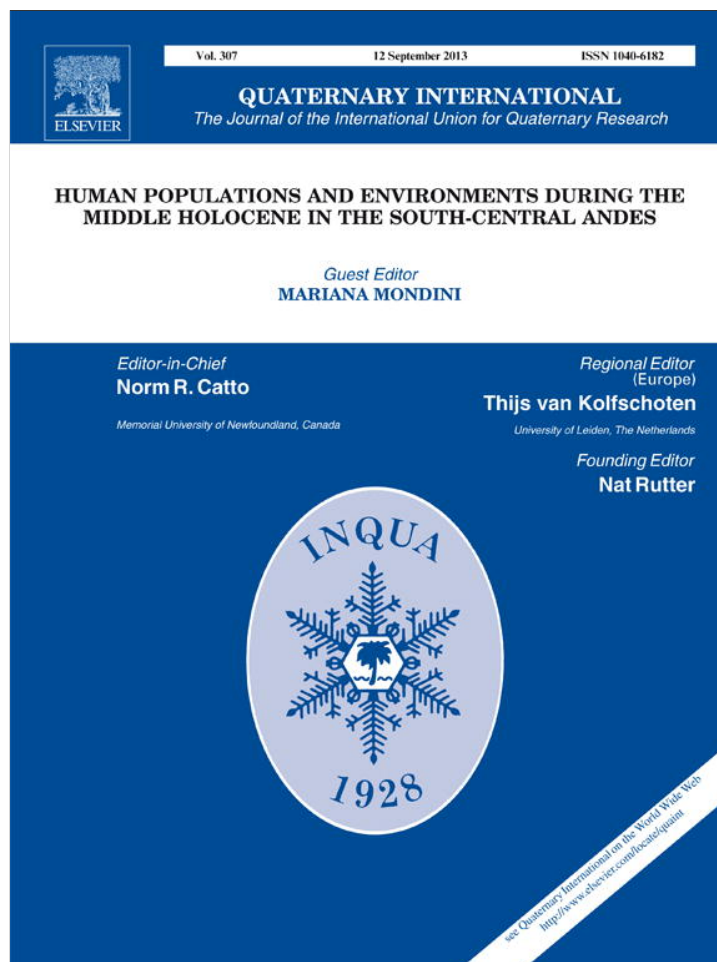


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Middle Holocene foraging, mobility and landscape use in the southern Argentinean Puna: Hunter–gatherers from Antofagasta de la Sierra, Catamarca, Argentina



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ABSTRACT

This work addresses the issue of interactions between human populations and the environment in Argentina's southern Puna region during the middle Holocene, a time period when significant changes took place at the macro-regional scale. This issue is addressed through the analysis of various lines of evidence recovered from archaeological sites in Antofagasta de la Sierra, in the province of Catamarca, Argentina. The influence of environmental changes on organizational aspects of the human populations is evaluated, particularly in regard to mobility and foraging during the early-to-middle Holocene transition that took place around 8500 BP, with a focus on the middle Holocene time span from 8000 to 6000 BP. Emphasis is placed on interactions between hunter–gatherers and their prey, as well as the origins of particular non-local elements recorded in the Puna environments and their implications in terms of mobility and possible social mechanisms involved in the circulation of these objects.

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1. Introduction

Landscape use patterns, including mobility and foraging, by hunter–gatherer groups in the Puna have been closely linked to climatic and environmental changes that took place during the middle Holocene. Near the beginning of this time period (c. 8500 BP), the increased temperatures and aridity of the Altithermal caused significant changes in the characteristics of the landscape, including changes in the size and distribution of lakes, ponds, springs, and associated wetlands. This trend would have increased between c. 6300 and 3900 BP (e.g., Tchilinguirian et al., 2007; Tchilinguirian and Morales, 2013), and would have resulted in decreased environmental productivity along with increased heterogeneity and unpredictability.

This paper is focused on these aspects, based upon an integrated analysis of various analytical approaches from zooarchaeology, lithic studies, and sourcing analyses for mineral and biotic resources,

among others. The evidence comes from archaeological sites dated to the early and middle Holocene in Antofagasta de la Sierra (Catamarca, Argentina), in the Salt Puna (the southernmost part of the Puna), where the history of human occupations reaches to at least 10,200 BP (see Martínez et al., 2010, and references cited therein). Given the focus of this project in the early-to-middle Holocene transition, the focus is mainly on the beginning of the middle Holocene (c. 8000–6000 BP). This paper synthesizes information that has generally been provided previously for each archaeological site separately, although some new data are presented as well.

The archaeological sites involved in this work are: Quebrada Seca 3 (QS3), Cueva Salamanca 1 (CS1), Peñas de las Trampas 1.1 (PT1.1), and Peñas de la Cruz 1.1 (PCz1.1) (Fig. 1). E. Pintar has directed the excavations at CS1, and J. Martínez has directed excavations at PT1.1 and PCz1.1, while most of the authors have participated in the excavations of QS3, led by Carlos A. Aschero. The most thoroughly studied site is QS3, located in a high-altitude ravine (4050 masl), which presents an extensive stratified sequence dated to between c. 9800 and 2500 BP (Aschero et al., 1991; Elkin, 1996; among others). Sites CS1 and PT1.1 are located near QS3, but at an intermediate altitude range (3565 and 3582 masl, respectively), in the central course of the Las Pitas river, while PCz1.1 is located at 3665 masl in the middle course of the

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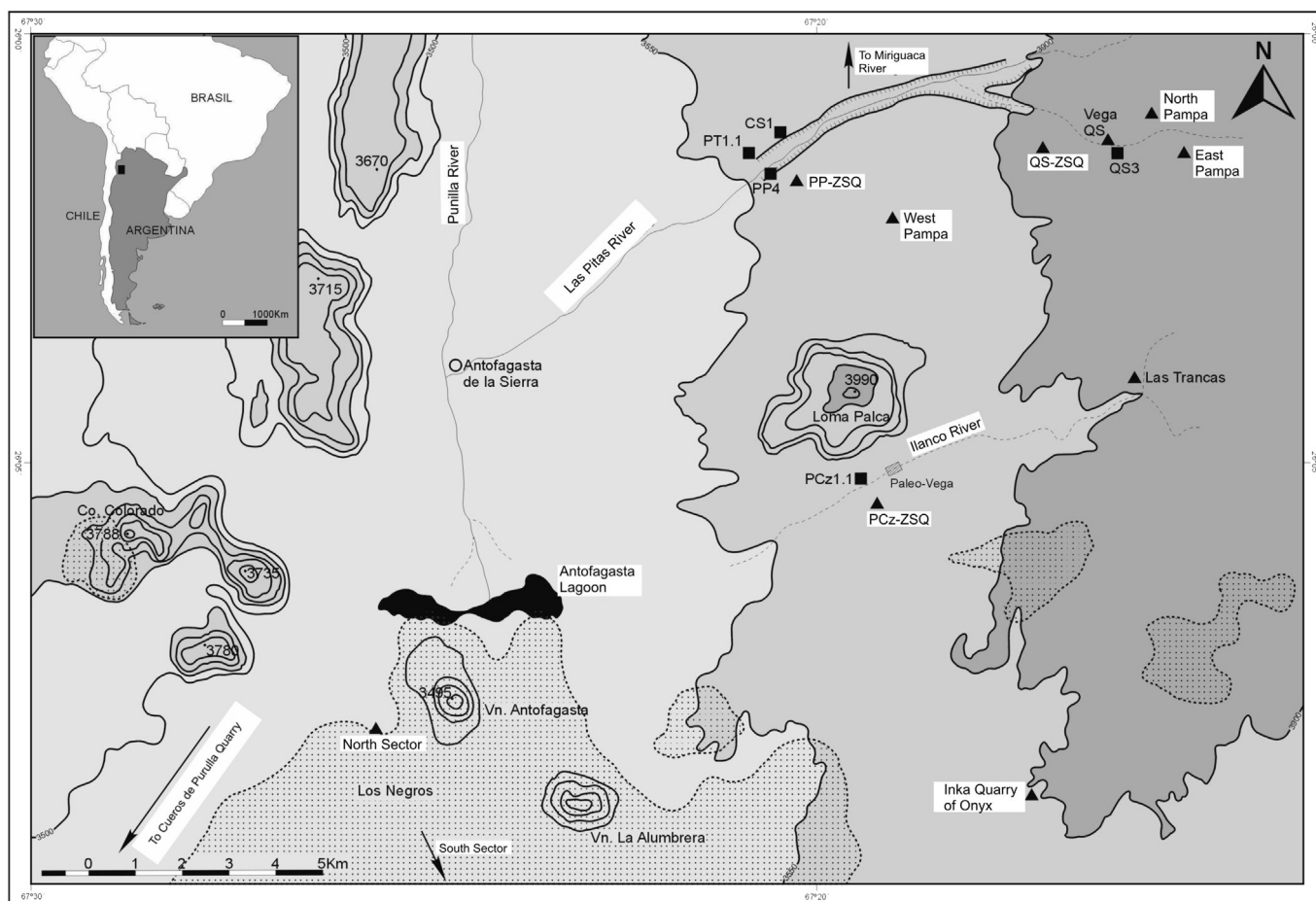


Fig. 1. Location of the study area and the archaeological sites analyzed here in central-western Antofagasta de la Sierra (Catamarca), southern Argentinean Puna (modified from Aschero et al., 2002–2004).

Ilanco river. Dates associated with CS1 range between c. 8100 BP and 4460 BP, those from PT1.1, between 10,190 and 8000 BP, and those from PCz1.1 between c. 7900 and 7200 BP (Pintar, 2009; Martínez et al., 2010, and references cited therein) (Fig. 2). All of

these are rockshelter habitation sites, mainly occupied during the warm season and possibly at other times during the year.

According to the evidence recovered at these sites and based upon an analysis of the intensity of flintknapping activities and the

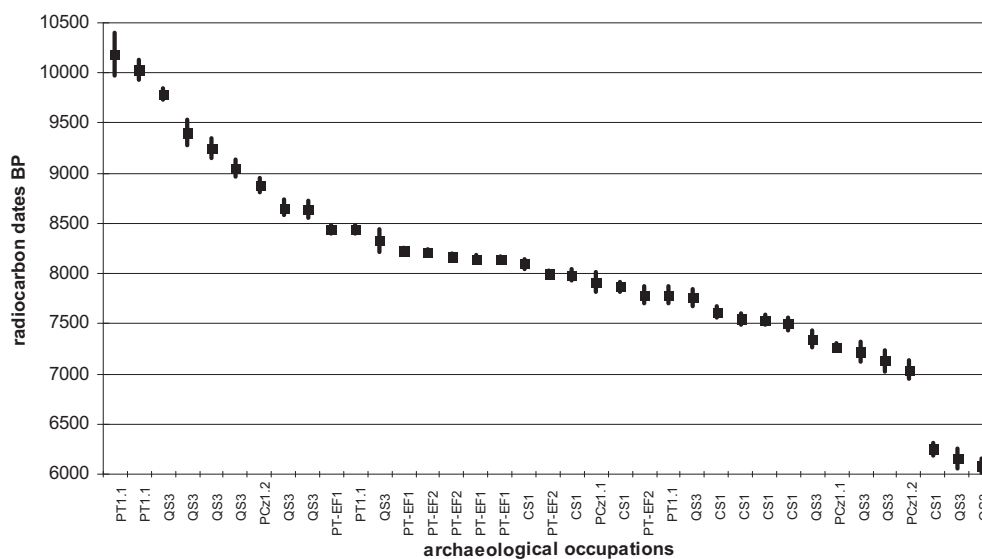


Fig. 2. Radiocarbon datings (years BP) of the analyzed early and middle Holocene archaeological sites in Antofagasta de la Sierra (see Martínez et al., 2010, and references therein).

density of waste and raw materials, among others, occupations are inferred linked mainly to the manufacturing and maintenance of artifacts, camelid carcass processing (meat and hide processing, as well as manufacturing of products from other camelid parts), and grinding activities. In comparison to the early Holocene, there is a greater intensity of workshop activities, as lithic assemblages are denser, with a greater emphasis on the production of bifacial artifacts (Pintar, 1996, 2009; Aschero et al., 2002–2004). A synthesis of results based upon the lines of analyses used in this work is presented below.

2. Hunters and their prey: interactions between humans and animals

In all of the sites analyzed, wild camelid remains are dominant by far, while rodents from the Chinchillidae family are the second most widely utilized taxon in the middle Holocene (Elkin, 1996; Reigadas and Mondini, 2010; Mondini and Elkin, 2013; Reigadas, 2013; and references cited in these). The camelid remains identified in the middle Holocene occupations belong to vicuñas (*Vicugna vicugna*) and guanacos (*Lama guanicoe*), with vicuñas continuing to dominate the zooarchaeological record, as in the early Holocene. Guanaco remains represent about 25% in terms of the number of identified specimens (NISP), somewhat less than in earlier stratigraphic levels, although in terms of the minimum number of individuals (MNI), the relative importance of large camelids – which would correspond to guanacos – increases. This pattern is seen at QS3, the site with the largest bone sample studied (Fig. 3). Guanaco fibers are more abundant at mid-Holocene site CS1 than at other sites. Exploratory isotopic studies on camelid bones from site CS1 suggest that the guanacos may have come from lower-altitude areas (Mondini et al., 2010), and further studies are in progress to test this.

In addition to these, a camelid with a coat pattern that differs from the extant wild variants is represented since the onset of the early Holocene at QS3, PCz1.1 and PT1.1 sites. This coat pattern is homologous to the one currently recorded for domestic llamas (*Lama glama*) (Reigadas, 1992, 2003, 2008, 2011, 2013). These fibers might represent a wild form lacking a modern analogue or early morphological variations resulting from natural selection.

Although occurring in low frequencies, the use of rodents, in general, seems to have been more important in the early Holocene than at later times, as suggested by bone remains from QS3 site (Fig. 4) (Elkin, 1996; Mondini and Elkin, 2013). A couple of possibly cervid bone fragments have also been identified at CS1 (Levels 4 and

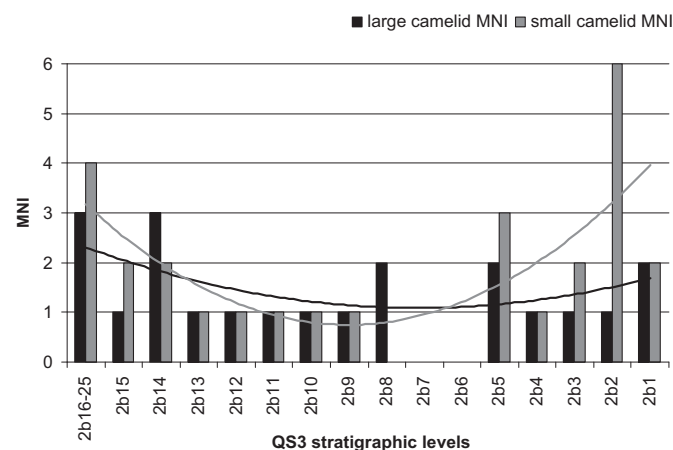


Fig. 3. Large versus small camelid minimum number of individuals (MNI) at site QS3 through time, with earlier occupations to the left (after Elkin, 1996; Mondini and Elkin, 2013).

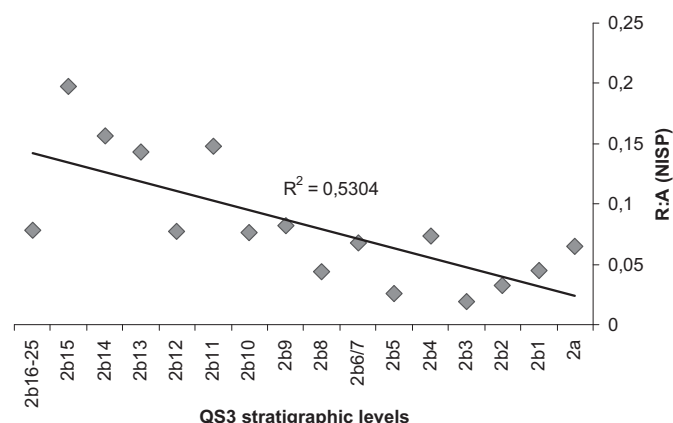


Fig. 4. Ratio of rodents to artiodactyls (NISP) throughout the stratigraphic sequence at site QS3 through time, with earlier occupations to the left (after Elkin, 1996; Mondini and Elkin, 2013).

8, c. 7500 and 7870 BP, respectively) (Mondini and Elkin, 2013), and fiber analysis also reveals the presence of cervids in level 2b16 at QS3 (8330 BP), with species-level identification still pending (Reigadas, 2013). Although these Cervidae remains bear no human modifications, it is probable that they were anthropically introduced, since the Andean taruca deer (*Hippocamelus antisensis*) tends to inhabit wetter, lower altitude areas. Also, in middle Holocene levels from CS1, as well as at different times in the QS3 sequence, there are remains of locusts that were presumably eaten (Elkin, 1996).

This taxonomic diversity is considered to be quite representative of the animal diet of these hunter–gatherers, as no significant taphonomic biases have been identified in these samples, which generally display excellent preservation (Elkin, 1996; Mondini, 2003; Marozzi, 2012). In general, then, the exploitation of camelids seems to have gained importance during the middle Holocene, with artiodactyls being more important at site CS1 than at QS3. Based upon the faunal bone record, the exploitation of family groups can be inferred throughout the Holocene, with the proportion of immature specimens being 15–50% NISP at QS3 and ~22% NISP at CS1. Although the analysis of the zooarchaeological record from PCz1.1 is only preliminary, it can be inferred that family groups were also exploited there. Camelid offspring frequency is lower at QS3 since the middle Holocene, reaching ~20% MNI at the time, while in most of the stratigraphic levels at CS1 they reach about 50% MNI (Elkin, 1996; Reigadas and Mondini, 2010; Mondini and Elkin, 2013).

Most camelid anatomical parts are represented, suggesting that whole carcasses were transported to these caves (Elkin, 1996; Reigadas and Mondini, 2010; Mondini and Elkin, 2013). In the case of the guanaco remains from middle Holocene levels at QS3, fewer body parts per individual were transported. This is consistent with a drier environment and the need for expanded home ranges inferred for those times. In addition to the meat, fat and bone marrow were important for these groups from the early Holocene onwards (Elkin, 1996; Mohn, 2010; Mondini and Elkin, 2013). Faunal remains were also used for the secondary production of goods: bone artifacts are recorded from early and middle Holocene occupations at QS3 and from the middle Holocene at CS1 and PCz1.1, and fiber manufactures are also present, mostly corresponding to the “llama pattern” mentioned above, as well as hides (Reigadas and Mondini, 2010; Mondini and Elkin, 2013; Reigadas, 2013; and references cited therein).

In terms of hunting techniques, a greater variability in projectile point morphology (types QSC, QSD, PCzA, and others with no

specific types assigned) is seen after c. 7900 BP, along with greater diversity in hunting techniques involving the use of atlatls and spears (Aschero and Martínez, 2001; Martínez, 2007; Pintar, 2008a). It is proposed that the atlatl-based system would have been used for hunting in open environments, while throwing spears would have been used in situations where there was closer proximity to camelid herds. This diversification in hunting techniques would have favored the use of compound shafts made of canes and wood (*Chusquea lorentziana* and *Salix humboldtiana*, respectively), both for atlatl-propelled projectiles and spears. Whether an association exists between raw materials used for the manufacture of projectile points, projectile point morphology and weaponry systems still needs to be determined, given the degree of intra- and inter-site variability recorded.

Based on weaponry, topography, prey ethology and known hunters' organization, a significant change has been inferred around 7700 BP, with the introduction of camelid collective hunting, probably with the use of parapet-like blinds (Martínez, 2003). This kind of intensification would have resulted from an increased demand for meat and fat, and/or for other camelid-derived resources such as wool, hides, tendons, and bones for consumption of marrow or production of artifacts, derived from an inferred growth of social units (Aschero and Martínez, 2001; Martínez, 2003, 2006). The increased number of dated occupations in that period (see Fig. 2) is probably related to this.

3. Resource procurement, landscape use, and mobility

3.1. Lithic raw materials

Lithic assemblages from middle Holocene sites in Antofagasta de la Sierra reveal the predominant use of "local" raw materials (7 volcanic varieties and several quartzites) found at outcrops and quarries within a 25 km radius of the studied sites (Pintar, 1996, 2009; Aschero et al., 2002–2004). These raw materials were used for the manufacture of unifacial and bifacial artifacts. Obsidian, a "non-local" raw material, was used for manufacturing projectile points, which were recycled into small scrapers. Recent analysis performed on lithic waste from CS1 lithic assemblages reveals significantly higher frequencies of obsidian flakes than in the mid-Holocene assemblages at QS3 (Pintar, 2013). These proportions are equivalent to those found in the early Holocene assemblages at QS3.

The use of five different obsidian sources has been established for the time period from 8000 to 6000 BP on the basis of geochemical analysis (XRF, at MURR) performed recently on 25

obsidian samples from CS1 and PCz1.1 (Pintar et al., 2012; Pintar and Pessarossi, 2013). These sources were preferentially exploited for the manufacture of lanceolate projectile points. The geochemical identifications show the use of the Ona, Archibarca, Cueros de Purulla, Salar de Hombre Muerto, and Laguna Cavi sources. The first four ones are located in the area of salt flats, at elevations higher than 3500 masl, and between 65 and 120 km from the sites discussed, whereas Laguna Cavi is located near a high elevation lagoon, at 4500 masl, and is only 35–40 km distant. Further, the sources located around salt flats were identified in projectile point fragments and flakes from CS1 site, and all five sources were identified from debitage remains at PCz1.1 (Pintar et al., 2012).

These new studies are stimulating the reevaluation of earlier models (based on a single site, QS3) that proposed a decrease in territorial range and mobility during the Middle Holocene as compared to the Early Holocene (Pintar, 2009). The high representation of obsidian in middle Holocene contexts at CS1 is significant when the paleoenvironmental conditions are considered. The results of the XRF analyses suggest a continued access during the middle Holocene to the obsidian source areas located in salt flats, despite the environmental deterioration that led to lagoon recession and salt flat formation. The use of these distant source areas during the Altithermal suggests their access through logistical mobility, rather than residential mobility. Moreover, while obsidian source use during the early Holocene was limited to Laguna Cavi (per macroscopic identification, given that geochemical studies have not been performed yet) as the sole source for manufacturing tools, the greater number of sources used during the middle Holocene, as well as their distance to the study sites, suggests a higher territorial range than previously proposed.

3.2. Biotic resources

The conditions of extreme aridity found in Puna environments played a fundamental role in allowing all types of organic remains to be preserved up until the present. In order to evaluate aspects of the mobility and interactions of these hunter–gatherer groups, this section lists all of the biotic materials coming from areas out of the Puna that were preserved in the sites being analyzed (Table 1). Their areas of natural distribution are also included, along with the average distances to these locations from Antofagasta de la Sierra (Table 2). As evident from this and contextual information, although lithic and animal resources were locally abundant, many botanical resources necessary for critical artifacts such as weaponry parts are not available in Puna environments.

Table 1

Non-local biotic resources recovered from early mid-Holocene (c. 8000–6000 BP) contexts in Antofagasta de la Sierra.

Site	Layer/level	¹⁴ C dates in years BP	Non-local biotic remains	Natural distribution
Quebrada Seca 3 (QS3)	2b11	7130 ± 110	Mid-shaft of <i>Chusquea lorentziana</i> solid cane	Yungas (Mountain forest)
			Two needles made of <i>Trichocereus pasacana</i> spines	Valleys and gorges (Pre-puna)
			Cordage made from <i>Acrocomia</i> sp.	Chaco plains
	2b12	c. 7130–7350	Shaft fragment and indeterminate fragment, both from <i>Chusquea lorentziana</i> solid cane	Yungas (Mountain forest)
	2b14	7350 ± 80	Fragment of worked wood from <i>Prosopis torquata</i>	Valleys and gorges
	2b15	c. 7350–8330	Three shaft fragments of <i>Salix humboldtiana</i> (native willow) wood	Valleys and gorges
	2b16	8330 ± 110	Cervidae fibers	Border of Puna - Valleys and gorges
	2b17	8660 ± 80	Decorated hollow cane fragment of <i>Rhipidocladum neumannii</i>	Yungas (Mountain forest)
	2b18	8640 ± 80	Wooden fire-starting tool (active) from <i>Prosopis torquata</i>	Valleys and gorges
	2b19	c. 8640–9050	Shaft fragment of <i>Salix humboldtiana</i> (native willow)	Valleys and
			Hollow cane fragment of <i>Rhipidocladum neumannii</i>	Yungas (Mountain forest)
			Shaft fragment from <i>Salix humboldtiana</i> (native willow)	Valleys and gorges

(continued on next page)

Table 1 (continued)

Site	Layer/level	¹⁴ C dates in years BP	Non-local biotic remains	Natural distribution
Peñas de la Cruz 1.1 (PCz1.1)	0c	c. 7270 ± 40	Mid-shaft fragment of cane identified as <i>Chusquea lorentziana</i> by similar external appearance	Yungas (Mountain forest)
	1	c. 7270 ± 40	Mid-shaft fragment of cane identified as <i>Chusquea lorentziana</i> by similar external appearance	Yungas (Mountain forest)
	2 (1)	7270 ± 40	Mid-shaft fragment of cane identified as <i>Chusquea lorentziana</i> by similar external appearance	Yungas (Mountain forest)
	2(2)	7270 ± 40–7910 ± 100	Beads made from marine bivalve shell	Pacific Ocean
	2(3)	7270 ± 40–7910 ± 100	Mid-shaft fragment of cane identified as <i>Chusquea lorentziana</i> by similar external appearance Beads made from marine bivalve shell	Yungas (Mountain forest) Pacific Ocean
			Worn cactus spine from <i>Trichocereus pasacana</i> <i>Amaranthus hybridus</i> ("ataco")	Valleys and gorges Valleys and gorges
	2(4)	7270 ± 40–7910 ± 100	Mid-shaft fragment identified as <i>Salix humboldtiana</i> by similar external appearance (native willow)	Valleys and gorges
	2(5)	7270 ± 40–7910 ± 100	Mid-shaft fragment identified as <i>Chusquea lorentziana</i> by similar external appearance, with wood-burning decoration	Yungas (Mountain forest)
			Two mid-shaft fragments of cane identified as <i>Chusquea lorentziana</i> by similar external appearance	Yungas (Mountain forest)
			Mid-shaft fragment identified as <i>Salix humboldtiana</i> by similar external appearance (native willow)	Valleys and gorges
Cueva Salamanca 1 (CS1)	2(2) to 2(9), except 2(6)	6250 ± 60–7990 ± 60	Fragments of solid <i>Chusquea lorentziana</i> cane	Yungas (Mountain forest)
	2(3)	7410 ± 100	Silica phytoliths from the rind of the <i>Lagenaria siceraria</i> gourd and leaf of <i>Arecaceae</i> cf. <i>Acrocomia</i> sp.	Chaco plains
	2(4)	7500 ± 60	Cervidae bone (tibia frag.)	Border of Puna – Valleys and gorges
	2(5)	7550 ± 60	Worn spine of <i>Trichocereus pasacana</i> cactus	Valleys and gorges
	2(7)	7620 ± 60	Possible marine shell bead	Pacific Ocean?
			Plant fiber cord (<i>Acrocomia chunta</i>)	Chaco plains
	2(8)	7870 ± 50	Cervidae bone (basioccipital frag.)	Border of Puna – Valleys and gorges
	2(9)	7990 ± 60	Beads made from unidentified fruits/seeds	Chaco plains (?)
	2(10)	8100 ± 50	Possible <i>Salix humboldtiana</i>	Valleys and gorges?
	Peñas de las Trampas 1.1 (PT1.1)	Funerary structure 1 (EF1)	8440 ± 40–8140 ± 30	Plant fiber cordage (<i>Acrocomia chunta</i>)
Funerary structure 2 (EF2)		8210 ± 25–8000 ± 30	Beads made from unidentified fruits/seeds Bead made from marine bivalve	Chaco plains (?) Pacific Ocean

Sources: Aschero et al. (1991), Rodríguez (1999, 2003), Rodríguez and Martínez (2001), Martínez (2003, 2005, 2012), Pintar (2004, 2008a), Rodríguez and Aschero (2005), Babot (2011), and Mondini and Elkin (2013).

Table 2

Current distribution areas of the non-local biotic resources recorded at the archaeological sites studied (see Table 1), and distance from Antofagasta de la Sierra.

Eco-regions	Valleys and gorges	Yunga forests	Chaco plains	Pacific Ocean coast
Minimum linear distance from Antofagasta de la Sierra	130 km	180 km	190 km	340 km
Botanical resources	- <i>Salix humboldtiana</i> (native willow) wood - <i>Trichocereus pasacana</i> cactus spines - <i>Prosopis torquata</i> wood - <i>Amaranthus hybridus</i> ("ataco")	- <i>Chusquea lorentziana</i> solid cane - <i>Salix humboldtiana</i> (native willow) wood - <i>Rhipidocladum neumannii</i> hollow cane	- <i>Acrocomia</i> sp. palm - Beads made from unidentified fruits/seeds?	None
Faunal resources	- Cervidae (gen. et sp. indet.) ^a	None	None	- Beads made from unidentified marine shell
No. of taxa	5	2–3 ^b	2 (or more?) ^c	At least 1

^a Were these fragmentary cervid remains of taruca (*Hippocamelus antisensis*), they might have had a range closer to these Antofagasta de la Sierra sites in the past.

^b Three, if *Salix* came from Yungas and not just the adjacent valleys and gorges area.

^c More than two, if the fruits and seeds are confirmed to come from this area.

The information available from these archaeological contexts reflects the use of more non-local plant taxa (at least seven have been identified) and, to a lesser extent, non-local animal resources (at least two). Many more exotic plant taxa are recorded than local taxa at the macroremain level. For the sites being analyzed, the only local plants used during this time interval are woody shrubs used as fuel and grasses used as coverings for various surfaces, such as bedding or floor coverings for structures within rockshelters. Although flotation studies have not yet been conducted, a grinding

mano found in level 2(3) at site CS1 was studied microscopically and some possibly local remains were present (starch from unidentified tubers and/or roots, pollen, and silica phytoliths from grasses and from seeds or fruits of some Fabaceae), as well as non-local remains (the *Lagenaria* gourd and *Arecaceae* silica phytoliths listed in Table 1) (Pintar, 2004; Babot, 2011).

Differences are inferred in terms of the procurement of botanical resources versus lithic materials, given the temporally discontinuous availability of some plant species. In terms of faunal taxa,

although beads made from marine shells occur with low frequency, they are highly relevant in terms of logistics and interaction networks since they would come from the Pacific coast, the most distant source region from the study area (at least 340 linear km).

The most frequent use of non-local taxa was utilitarian (36.4% of the total), involving mainly canes and woods employed in the manufacture of projectile fore- and mid-shafts used for hunting. The next most common type of resources are those linked to luxury items or personal adornment, including the Pacific shell beads, bead necklaces made from seeds of two non-local species from the Chaco plains, and abundant remains of cordage presumably used for such purposes made from *Acrocomia chunta*.

4. Final considerations

The patterns of landscape use, mobility, and foraging of the hunter–gatherer groups that inhabited Antofagasta de la Sierra, in the Salt Puna of Argentina, during the middle Holocene are closely linked to the climatic and environmental changes taking place at the time. These changes are characterized by increased aridity, which resulted in decreased environmental productivity and increased heterogeneity and unpredictability, from c. 8500 BP and especially after c. 7900 BP (see Tchilinguirian and Morales, 2013, and references cited therein).

Although the earliest archaeological occupations in Antofagasta de la Sierra have been dated to 10,200 BP, some of the oldest in the Argentinean Puna, an increase in occupation has been inferred in the area after c. 9000 BP. After c. 7000 BP, a decline in hunting activities can be inferred at site QS3, along with a general decrease in the intensity of occupation of the area (Martínez et al., 2010; Reigadas and Mondini, 2010; Mondini and Elkin, 2013). The strongest signal of archaeological occupation during the interval of 9000–7000 BP is found especially in mid-altitude areas (e.g., CS1, PCz1.1), where access to water and a broad range of resources would have been more reliable. Pit features that suggest storage have even been found at site CS1. After 7000 BP, occupations seem to be concentrated especially around QS3, at a higher altitude, although temporally discontinuous occupations have also been recorded at CS1 after c. 6300 BP, coinciding with a period when new pulses of wetter conditions have been recorded at the bottom of the basin (Tchilinguirian and Morales, 2013).

At the onset of the middle Holocene, an increased focus in the exploitation of camelids is inferred, and possibly also one in the hunting of the less predictable groups of male camelids or solitary males (Reigadas and Mondini, 2010). However, it remains debatable whether the inferred decrease in the exploitation of young animals is due instead to increased foraging efficiency through a greater emphasis on the higher-yielding prey individuals, either within family groups or others (Mondini and Elkin, 2013). This interpretation, alternative to the more traditional one that proposed a shift in exploitation away from just family groups of camelids to target other individuals as well across broader ranges, seems to agree better with other indications of an increase in foraging efficiency and with the general scenario inferred.

Similarly, after at least 7700 BP, a diversification and intensification of hunting techniques can be inferred, with the initiation of collective hunting practices and eventually the use of parapets (Aschero and Martínez, 2001; Martínez, 2007; Pintar, 2008a). This represents a substantial change in the social and technological spheres, which could be linked to the beginning of the substantial retraction of lakes and wetlands recorded at the macro- and micro-regional scale after c. 7900 BP (Tchilinguirian, 2009; Tchilinguirian and Morales, 2013).

This scenario is consistent with that proposed for hunter–gatherers in arid Neotropical areas generally, where it has been

suggested that after an initial period dominated by *r* strategies, *K* strategies became more important during the middle Holocene (Muñoz and Mondini, 2007, 2008). This implies a growing emphasis on camelids, and a reorganization of human populations during the driest periods of the middle Holocene, rather than full abandonment of certain areas (see Núñez et al., 2002, 2013).

Regarding the use of space during the middle Holocene, the five different obsidian sources of identified at the Antofagasta de la Sierra sites suggest a wide area of resource circulation between the Laguna de Antofagasta basin and the Salar del Hombre Muerto and the ends of the Salar de Antofalla, as well as Laguna Cavi, ranging up to 120 km (Pintar et al., 2012). Biotic resources, on the other hand, come from locations up to 340 linear km distant, as in the case of Pacific coast marine shells.

During c. 8000–6000 BP, hunter–gatherer groups from Antofagasta de la Sierra would have maintained a highly flexible mobility strategy, which articulated various hunting territories and source areas, incorporating distinct localities and resource patches according to localized environmental conditions. In this sense, it is worth noting that the Andean region contains not only the broken topography of mountains, where subsistence tends to be costly (Gamble, 1993), but also the wide Puna *altiplano* towards the east of the range, where the study area discussed here is located. In this area, the effects of altitude occur without the high degree of habitat fragmentation so characteristic of the steeper slopes (Muñoz and Mondini, 2008).

It is feasible that under less stable local conditions there would have been greater mobility and fissioning of groups, while during more favorable local conditions there would have been less mobility to and from other areas and more group fusion (Pintar, 2008b, 2009), even if aggregation of a significant magnitude does not seem to have taken place within Antofagasta de la Sierra, as resulting sites have not been found in the area (Aschero and Martínez, 2001). This type of flexible mobility would have been coupled with similarly wide and flexible social networks, which from the early Holocene would have allowed for the exchange of information and resources, including very critical ones such as the canes used for the shafts that formed part of the hunting weaponry technology (e.g., Rodríguez and Martínez, 2001; Martínez, 2005).

Regarding this issue, based upon the remains of fore- and mid-shafts found in archaeological contexts in Antofagasta de la Sierra, all of the canes and woods are of non-local origin, indicating that the Puna environment did not allow for self-sufficiency in terms of such resources. The botanical raw materials came from lower-altitude ecosystems to the east (Yunga forest or Valleys), currently located at a linear distance of c. 100 km, and even if this distance would have varied in the past, the magnitude of such variation would not have been as important as to overlap with the study area (e.g., Schäbitz et al., 2001). Without access to these critical resources, hunting of camelids using the known atlatl- and spear-based systems would simply not have been possible. This is one of the aspects that render the “Puna-only” perspective commonly found in the literature (e.g., Rick, 1980; Lavalleé, 1985) as inconsistent with this study.

The question raised at this point is whether these more distant areas were part of the home range of these foragers, or whether at least some of these resources were integrated indirectly through exchange with other groups inhabiting the lower areas. Pintar (2009) has proposed a model where under environmental conditions such as those found in Antofagasta de la Sierra during the middle Holocene, it is conceivable from a “Puna-plus” perspective a seasonal mobility of these hunter–gatherer groups involving a much larger territory than traditionally thought, with this territory including extra-Puna areas where resources such as canes and woods could be accessed directly. At any rate, a current void of

archaeological information outside of the Puna area for this period, as well as a scarcity of paleoenvironmental data at this scale, continue to represent a major obstacle in terms of the proposal and its fine-grained evaluation. However, recent discoveries outside of the Puna, in the meso-thermal valleys to the east, have provided archaeological evidence dated to c. 7420 BP. These dates come from site TPV1, located in the northern sector of the Aconquija system (Quebrada de Los Corrales, Tucumán province) (Martínez et al., 2013), and open up a new panorama in this regard as they may allow filling in and integrating the various components of the framework of early social relationships in northwestern Argentina.

In any event, after c. 6000 BP the structure of the archaeological record changes in the Antofagasta de la Sierra area, suggesting that the accumulated effects of the environmental changes recorded in the area and beyond somehow affected these hunter–gatherer groups, who underwent social, technological, and other types of reorganization that led to the concentration of less intense occupations in specific areas of the landscape (e.g., QS3, which has an uninterrupted occupational sequence throughout the entire Holocene), and only sporadic occupations in mid-altitude sectors (e.g., CS1), possibly associated with the pulses of wetter climatic conditions recorded for this period. Anyway, large scale interactions continued to take place (see, for instance, Aschero and Hocsman, 2011).

Although clearly some questions remain open, this work has tried to integrate various lines of evidence from specific archaeological sites in the Antofagasta de la Sierra area during the 8000–6000 BP period, which had previously been studied mostly in isolation. Above all, it provides a general archaeological perspective on the hunter–gatherer groups that inhabited this portion of the Salt Puna during a highly critical time period of the Holocene, at the onset of the Altithermal. This region at the southern end of the Puna, although often little accounted for in general scenarios modeled for the Archaic period of the south-central Andes (e.g., Aldenderfer, 2008), can provide valuable information regarding human adaptations in desert and high-altitude environments.

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