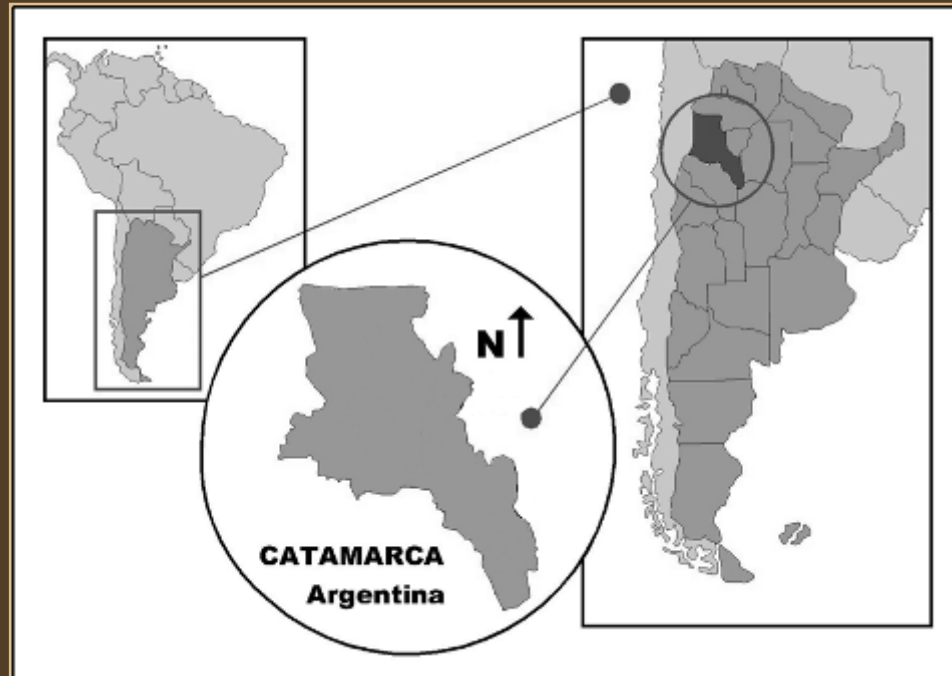


Holocene hunter-gatherers in the Puna.

Integrating zooarchaeological
evidence in Antofagasta de la
Sierra (Argentina).

María del Carmen Reigadas (UNJU, INAPL) &
Mariana Mondini (CONICET-UBA-UNC)

The area

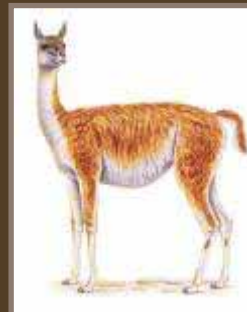


- Antofagasta de la Sierra is in Catamarca Province, Argentina



- over the Andes (over 3450 m.a.s.l.)
- in a high altitude desert
- increased aridity after 8500 BP, esp. from 6300-3900 BP

guanaco
(*Lama guanicoe*)
(taken from Redford and Eisenberg 1992)

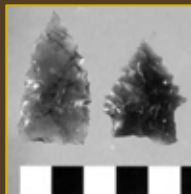


vicuña
(*Vicugna vicugna*)
(taken from Redford and Eisenberg 1992)



Aims

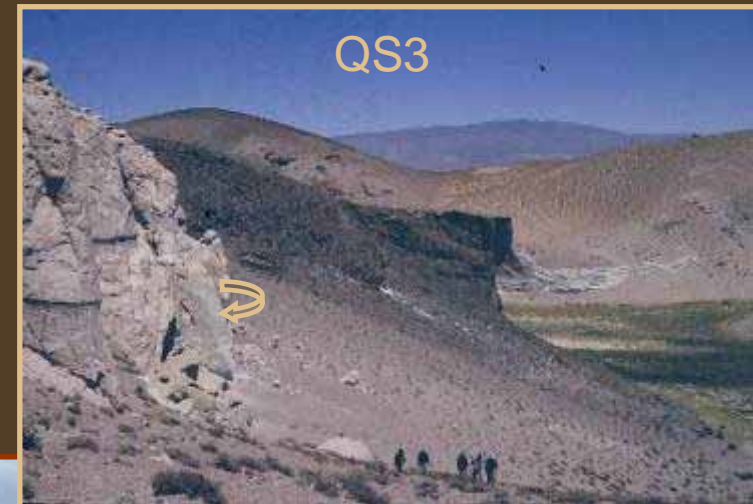
- Holocene archaeofaunal assemblages from Antofagasta de la Sierra
- understanding human/animal interactions
- integrating different taphonomic and zooarchaeological approaches:
 - bones + hair + other faunal remains
 - macroscopic + microscopic + biogeochemical + non-faunal lines of evidence



The archaeological occupations

Above 4000 m.a.s.l.:

- Quebrada Seca 3 (QS3)
 - ✓ ca. 9800 - 2500 BP



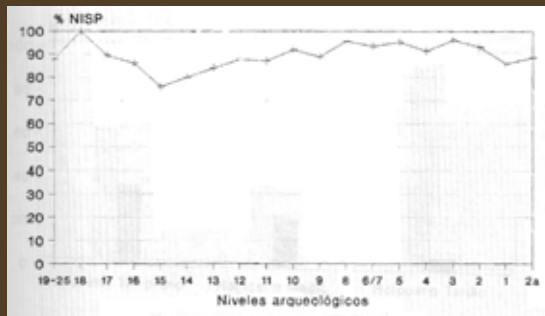
About 3600 m.a.s.l.:

- Cueva Salamanca 1 (CS1)
 - ✓ ca. 8100 - 6250 & ca. 3500 BP
- Peñas de la Cruz 1 (PCz1)
 - ✓ ca. 8900 - 7200 BP
- Peñas de las Trampas 1.1 (PT1.1)
 - ✓ ca. 10200 - 7800 BP

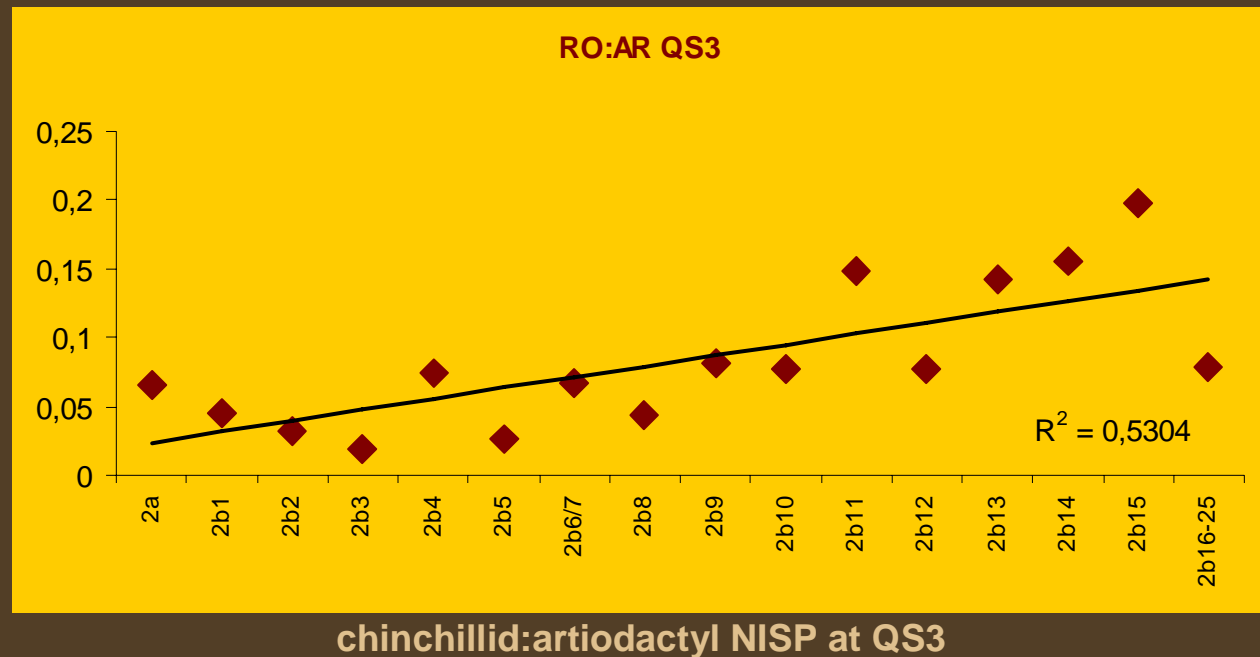


The archaeofaunal record

taxa exploited		early Holocene	middle Holocene	late Holocene
herbivores	camelids	X	X	X
	cervids	X		
rodents	chinchillids	X	X	X
birds	flamingo			X
insects	locusts	X	X	X



camelid NISP at QS3
(from Elkin 1996)



chinchillid:artiodactyl NISP at QS3

Camelid taxa

time range	taxon	skeletal method (1)	fiber method (2)
late Holocene	vicuña guanaco "llama pattern"	osteometry + dental morphology osteometry + dental morphology -	morphological properties morphological properties morphological properties
mid-Holocene	vicuña guanaco "llama pattern"	osteometry + dental morphology osteometry -	morphological properties morphological properties + cortex morphological properties
late Holocene	vicuña guanaco "llama pattern"	osteometry + dental morphology osteometry osteometry	morphological properties morphological properties morphological properties + cortex

(1): based on Elkin (1996) and one of the authors' (MM) analyses; (2): based on one of the authors' (MCR) analyses



incisive morphology of guanacos and llamas



camelid bone osteometry



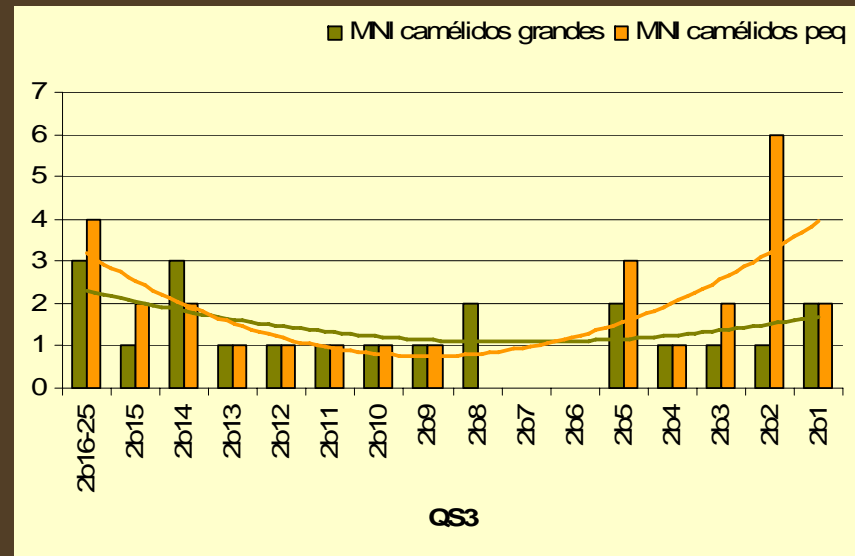
vicuña fibers



guanaco fibers



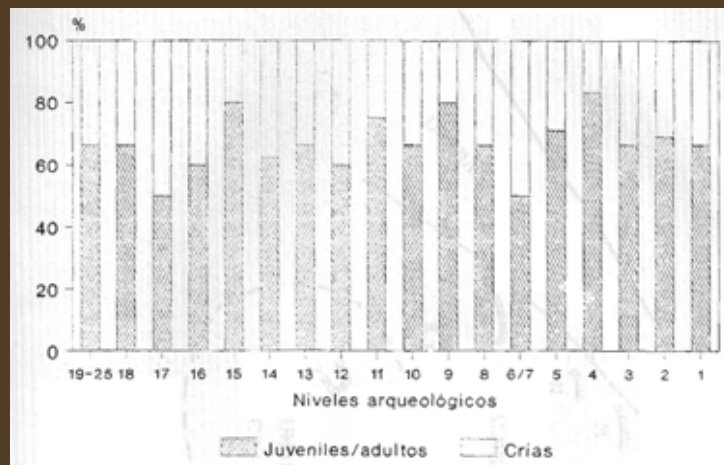
"llama pattern" fibers



based on Elkin (1996)

Camelid exploitation patterns

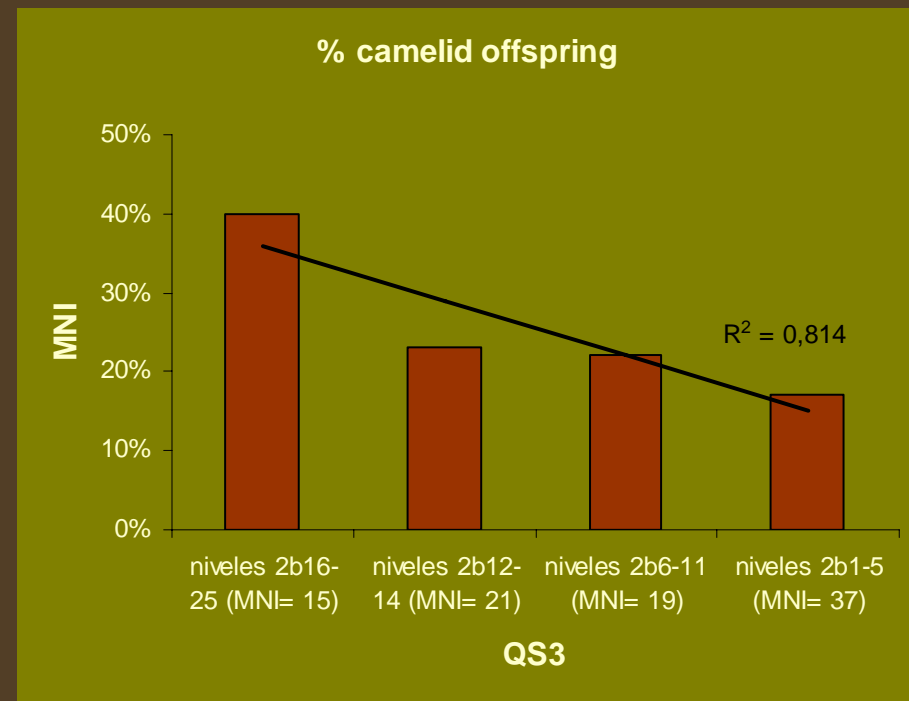
- More offspring exploited in early occupations



camelid NISP at QS3:
juvenile/adult (dark) vs. offspring (light)
(from Elkin 1996)



- All anatomical parts
- High fragmentation



Camelid exploitation patterns

- Hunting technologies

(Aschero & Martínez 2001, Martínez 2007)

- ✓ early atlatl
- ✓ later diversification
 - spear
 - collective hunting



Figura 6. Puntas enteras y fragmentadas correspondientes a los Tipos Morfológicos QSA, QSB, QSC y PCzA (de izquierda a derecha)

	Tipos Morfológicos	QSA	QSB	QSC	QSD	PCzA	Sin TM
	Sist. de arma	Propulsor	Propulsor	Lanza	Propulsor	Propulsor	
Capa	Fechados						
2b9	7220 ± 60 AP			▲	▲	▲	↑
2b10	6080 ± 70 AP			▲	▲	▲	↑
2b11	7130 ± 110 AP 6490 ± 100 AP			▲	▲	▲	↑
2b12	-		▲	▲		▲	↑
2b13	7760 ± 80 AP			▲		▲	↑
2b14	7350 ± 80 AP 8670 ± 350 AP		▲			▲	↑
2b15	-		▲			▲	
2b16	8330 ± 110 AP		▲				
2b17	8660 ± 80 AP	▲					↑
2b18	8640 ± 80 AP	▲					
2b19	9790 ± 50 AP		▲				
2b20	-	▲					
2b21	-						
2b22	9050 ± 90 AP						
2b23	-						↑
2b24	-						
2b25	9250 ± 100 AP 9410 ± 120 AP						

hunting technologies in time
(from Martínez 2007)

Camelid secondary products

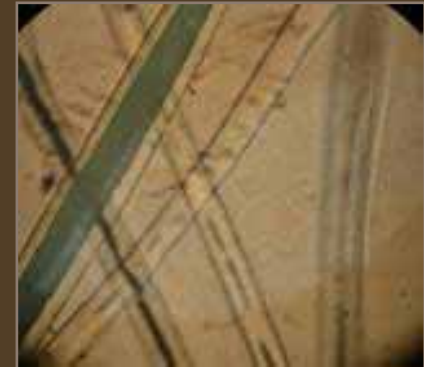
- **bone artifacts**

- ✓ early and middle Holocene

- **fiber and skin manufactures**

- ✓ dyed vicuña fibers in early Holocene
- ✓ cords of “llama pattern” fibers and, to a lesser extent, vicuñas in late Holocene
- ✓ dyed “llama pattern” fibers in late Holocene
- ✓ funerary pack of painted and sewed camelid skin + vicuña fleeces with thick hair removed (4900 BP)

llama pattern cord
(QS3 – 2b4)



llama pattern fleece
(QS3 – 2b4)

Early occupations at PT1.1



PT1.1 human bones
with (a) carnivore and (b) rodent modifications

- **ca. 19700 - 12700 BP**

- ✓ megafauna
- ✓ no human occupations

- **ca. 10200-10000 BP**

- ✓ hearths with burnt, fragmented bones

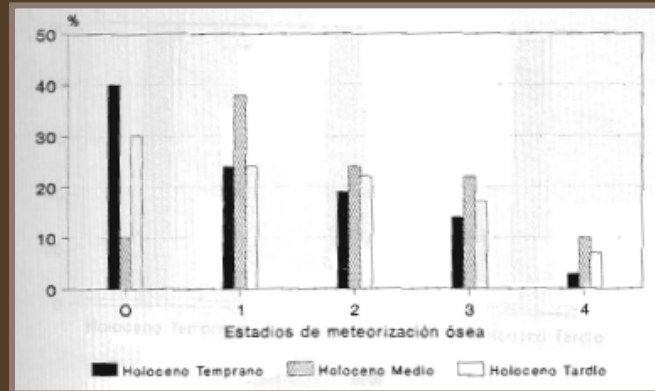
- **ca. 8200-8000 BP**

- ✓ two burial structures with 6 individuals
- ✓ taphonomic interest

Sources: Martínez et al. 2004, 2010; pers. obs.

Taphonomy

- weathering
 - ✓ mid-Holocene



weathering at QS3:
grey bars = mid-Holocene
(from Elkin 1996)

- rodents
 - ✓ up to 35% NISP
- carnivores
 - ✓ generally less than 2% NISP
 - ✓ commensalism



bones from modern carnivore dens
in Antofagasta de la Sierra

Hunter-gatherers in Antofagasta de la Sierra

- Final Pleistocene / early Holocene occupations
 - ✓ exploration / early colonization
 - ✓ exploitation of modern fauna, especially camelids
 - ✓ low / null competitive stress
- Mid-Holocene occupations
 - ✓ more occupations at 8.5-7000 BP, especially in intermediate sectors
 - diversification and intensification of hunting techniques
 - more camelids, more guanacoes, more adults
 - ✓ after 7000 BP lower occupation intensity
- Late Holocene occupations
 - ✓ intensification in camelid exploitation continues

Camelid exploitation

- Progressive control on segments of camelid populations
 - ✓ protection practice
 - ✓ reduced mobility
 - ✓ accumulation of phenotypic variations in hair and bones
- Increasingly pastoral communities
 - ✓ since ca. 4500 BP
 - ✓ established by 3000 BP
 - ✓ importance of fiber manufactures

Artiodactyl biodiversity

- Camelids
 - ✓ non-extant wild form
 - ✓ guanaco
- Cervids
 - ✓ earliest record in Argentinean Puna (ca. 8700-8300 BP)

General scenario

(based on Muñoz & Mondini 2008)

- When humans entered area, ***r* selection**
 - ✓ unstable / unpredictable environments
 - ✓ unsaturation of large herbívoros and carnívoros
 - ✓ areas not previously occupied by humans or other large social predators
 - ✓ importance of physical environment
 - ✓ reproductive efficiency favoured
 - ✓ wide niche favoured
- After the mid-Holocene, ***K* selection**
 - ✓ higher demographic densities
 - ✓ density-dependent mechanisms
 - ✓ importance of biotic interactions
 - ✓ competitive efficiency favoured
 - ✓ lower niche breadth favoured
 - ✓ intensification of food procurement favoured

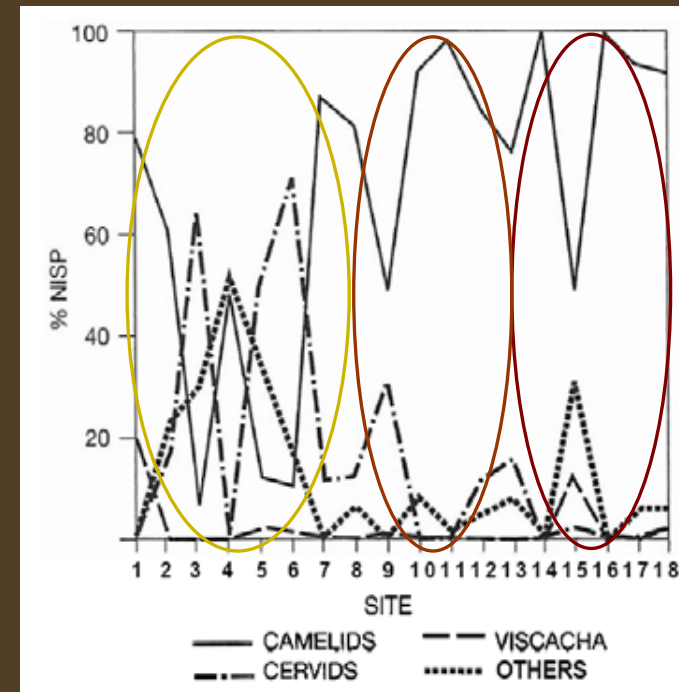


Fig. 16.4 en Mengoni Goñalons y Yacobaccio (2006)

Acknowledgements

- We are very grateful to Elizabeth Pintar, Jorge Martínez and Carlos Aschero, who have directed the excavations at Antofagasta de la Sierra, and to Dolores Elkin, who did most of the osteological QS3 analyses.
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