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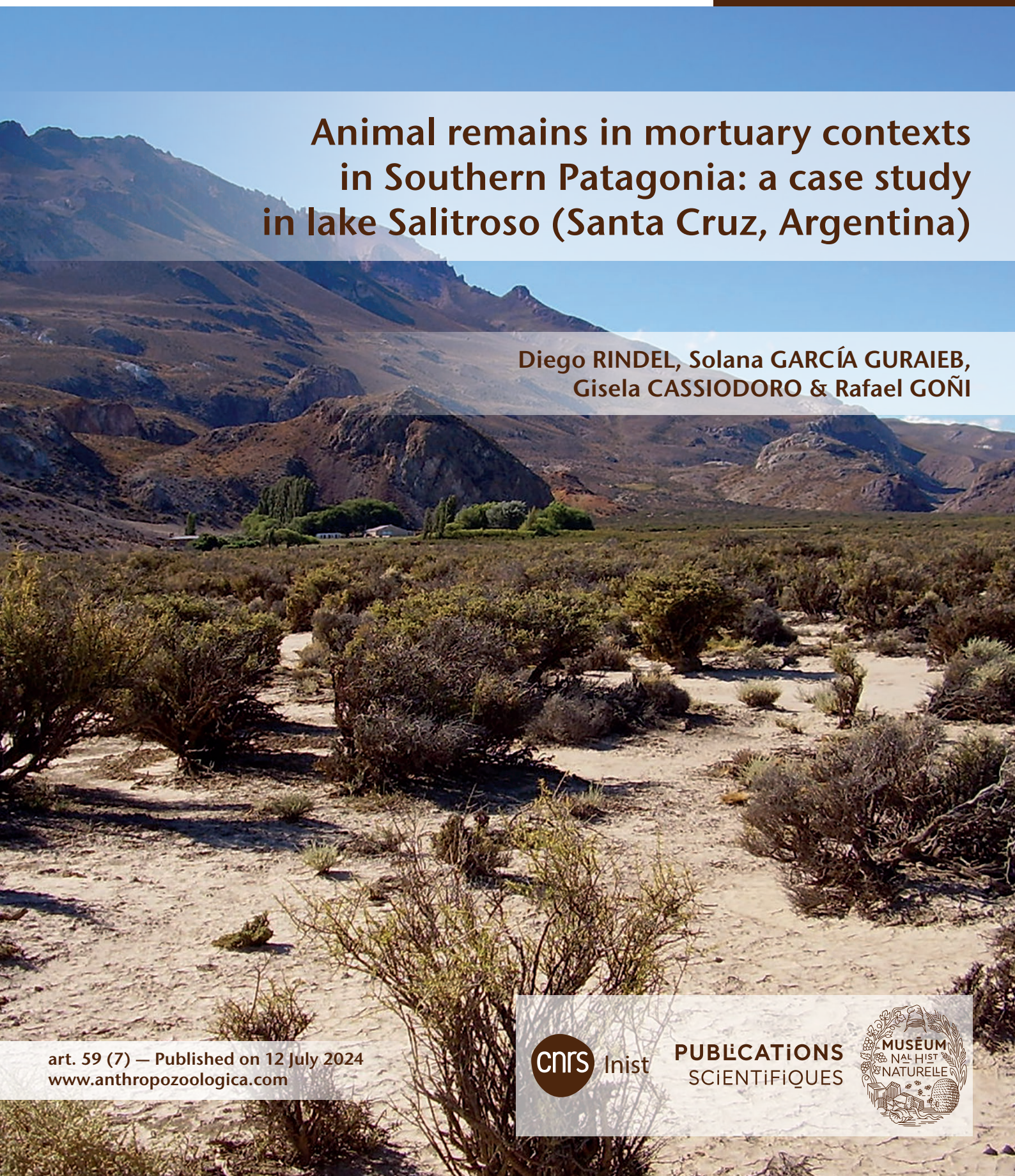

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Bassin du lac Salitroso, province de Santa Cruz, Argentine, Patagonie. Crédit : Les auteurs / *Salitroso Lake Basin, Santa Cruz Province, Argentina, Patagonia. Credit: The authors.*

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Animal remains in mortuary contexts in Southern Patagonia: a case study in lake Salitroso (Santa Cruz, Argentina)

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ABSTRACT
The aim of this paper is to discuss the role of faunal remains in funerary contexts from Southern Patagonia. We will particularly emphasize the information obtained in mortuary contexts from Lake Salitroso (Santa Cruz Province, Argentina). In this area a total of 37 burials of different types, such as *chenques* (i.e. artificial rock burial mounds), burial under blocks and niches, have been studied. Results indicate low frequency of animal remains, mostly corresponding to fox (*Lycalopex* Burmeister, 1856) and guanaco (*Lama guanicoe* Müller, 1776). Additionally, certain variability in skeletal part representation has been detected. These characteristics are not reflected in the documentary sources of first European explorers in Patagonia, but are common in the regional archaeological record. Finally, another outcome of interest is the presence of animal remains deposited by natural processes (rodents, edentates and carnivores). The results are contextualized with available regional ethnohistoric and archaeological information to discuss the role of animal species in the funerary practices of hunter-gatherer populations in southern Patagonia.

KEY WORDS
Mortuary context,
animal remains,
Southern Patagonia,
hunter-gatherers.

RÉSUMÉ

Restes animaux dans les contextes mortuaires en Patagonie méridionale : une étude de cas au lac Salitroso (Santa Cruz, Argentine).

L'objectif de cet article est de discuter du rôle des restes fauniques dans les contextes funéraires de la Patagonie méridionale. Nous soulignerons en particulier les informations obtenues dans les contextes mortuaires du lac Salitroso (Province de Santa Cruz, Argentine). Dans cette zone, un total de 37 sépultures de différents types, tels que les *chenques* (tumulus artificiels en roche), les sépultures sous blocs et les niches, ont été étudiées. Les résultats indiquent une faible fréquence de restes d'animaux, correspondant principalement au renard (*Lycalopex* Burmeister, 1856) et au guanaco (*Lama guanicoe* Müller, 1776). De plus, une certaine variabilité dans la représentation des parties squelettiques a été détectée. Ces caractéristiques ne se retrouvent pas dans les sources documentaires des premiers explorateurs européens en Patagonie, mais sont communes dans les archives archéologiques régionales. Enfin, un autre résultat d'intérêt est la présence de restes d'animaux déposés par des processus naturels (rongeurs, édentés et carnivores). Les résultats sont contextualisés avec les informations ethno-historiques et archéologiques régionales disponibles pour discuter du rôle des espèces animales dans les pratiques funéraires des populations de chasseurs-cueilleurs du sud de la Patagonie.

KEY WORDS
Contexte mortuaire, restes d'animaux, Patagonie méridionale, chasseurs-cueilleurs.

INTRODUCTION

The study of animal remains in funerary contexts has shown the versatility of animal use in different mortuary practices throughout human history. Animals can appear in a grave as food for the afterlife (e.g., Grant 1989; Parker Pearson 1999; Weissbrod & Bar-Oz 2004; Bond & Worley 2006; Arbogast 2013), as the remains of sacrifices, funerary rituals and festivities (Crabtree 1995, 2004; Stanc & Bejenaru 2004), as part of clothing, costumes, body accessories or other paraphernalia, or as symbols of "hunting activities" or representations of wilderness, among others (Russell 2012). The inclusion of animal remains in human burials appears to be independent of the type of society under study, as they have been found both in hunter-gatherer groups and food-producing societies, although the latter are more likely to engage in this kind of funerary practice (Russell 2012).

In Patagonia, the ethnohistorical record has frequent mentions of funerary rituals that include the burial of carcasses or body parts of animals – especially domesticated animals such as horses and dogs –, along with the human bodies (Appendix 1). Many local chronicles report the inclusion of animals as grave goods, as part of the earthly possessions of the deceased placed with them in their tomb at the time of burial (e.g., Guinnard 1961; Musters 1998; Prichard 2003; De la Vaulx 2008). On the other hand, the archaeological literature shows few reports of animal remains in archaeological funerary contexts compared to the relative abundance of data on archaeological human burials in the region. In addition, there is a marked contrast between Northern and Southern Patagonia in the number and chronology of human burials with animal remains as well as the taxa present.

For Northern Patagonia, one noticeable pre-Columbian case is Aquihuecó site (Neuquén Province). Along with the human remains, this multiple burial site yielded both grave goods such as a Pacific shell bead necklace, a bone awl and a possible musical instrument, and animal bones which have been interpreted as food remains offered to the deceased (Della Negra *et al.* 2009). During historical times, references to faunal remains as mortuary offerings are more common. For this period, Caepe Malal 1 (Neuquén Province; Fig. 1) is one important site where the presence of faunal remains of European origin has been interpreted as animal sacrifices during mortuary rites (Hajduk *et al.* 2000). In other sites from Neuquén, such as Rebolledo Arriba (Hajduk 1982), Andacollo (Della Negra, pers. comm.), El Panteón (Navarro 2016) and Remeco (Béguelin *et al.* 2017; Fig. 1) the presence of horse remains in human burials has been repeatedly recorded.

In Southern Patagonia, reports of animal remains in funerary contexts are less abundant. For instance, there is no associated fauna in *chenque* burials (i.e. artificial mortuary low rock mounds typical of Patagonia) in the northern coast of Santa Cruz Province (Zilio *et al.* 2013) or Cerro Guido in Chile (Büchner *et al.* 2009), whereas faunal remains are very scarce in *chenque* burials of Ingeniero Ibáñez in Chile (Reyes 2002). In these burials, faunal remains tend to be scarce and of wild animals (despite the historical chronology of some *chenques*); for instance, *chenques* of Puerto Ingeniero Ibáñez and *chenque* Juni 6 (Aguilera & Grendi 1996; Reyes 2002). There are reports of historic archaeological sites with abundant grave goods belonging to the mid-19th century, such as Laguna Soto (Prieto Iglesias & Schidlowsky 1992) and San Gregorio 4 (Massone *et al.* 1985), but no faunal remains were reported in the offerings. When faunal remains are present, certain variability emerges. In this regard, faunal remains are reported in burials as grave goods for the deceased, as part of burial structures or as burnt remains of hearths lit within the burial (Appendix 2). Notwithstanding these examples, archaeological studies of funerary practices in the region tend to overlook the presence, association and meaning of animal remains in mortuary contexts. In consequence, the nature of these practices in prehistoric times as well as their temporal

FIG. 1. — Location of Lake Salitroso and all other archaeological burial sites mentioned in this article: **1**, Aquihuecó; **2**, Caepe Malal 1; **3**, Rebolledo Arriba; **4**, Quilachanquil; **5**, Chimpay; **6**, Puesto El Rodeo 17; **7**, Heupel 1; **8**, Puerto Ing. Ibáñez 11; **9**, Juni Aike 6; **10**, San Gregorio 11. Credit: The authors.

depth, regional variation and changes caused by European contact are yet to be fully assessed.

Building on these previous works, this paper aims to explore the zooarchaeological record in funerary contexts in Southern continental Patagonia, to discuss the practices associated with the presence of animal remains in human burials. To achieve this general goal we present the zooarchaeological analysis of the faunal remains recovered in Lake Salitroso human burials (Santa Cruz Province, Argentina; Fig. 1). This mortuary record of Late Holocene Patagonian hunter-gatherers offers the unusual opportunity to assess and discuss the issue of animal remains in mortuary sites in a case study with abundant bioarchaeological and archaeological background. In the last decades, a total of 37 funerary structures corresponding to different types of burials, dated between 2600 and 350 years BP, have been recorded. A skeletal series of nearly a hundred individuals of different

sexes and ages was recovered and studied using multiple lines of archaeological and bioarchaeological evidence (e.g., Goñi 2000a, 2010; Goñi & Barrientos 2000, 2004; Goñi *et al.* 2000; García Guraieb *et al.* 2007a, b; 2015; Cassiodoro & García Guraieb 2009; Cassiodoro 2011; Guichón Fernández 2017; Morlesín 2019). First, we assess the natural and cultural processes involved in the formation of the faunal assemblages present in the mortuary structures. Then, we analyze the association of faunal remains to the sex-age composition of the burials and to the presence of other mortuary grave goods in them. These analyses take into account and evaluate the chronological trends of the sample. Finally, we discuss the differences and similarities between the zooarchaeological record of Lake Salitroso funerary sites and the regional zooarcheological record in non-mortuary sites. We argue that this multidimensional perspective can lead to improving knowledge of the elusive meaning of faunal remains in hunter-gatherer mortuary sites in Late Holocene Southern Patagonia, contributing in turn to gain a better understanding of the mortuary practices of these societies.

THE CASE STUDY: LAKE SALITROSO HUMAN BURIALS

Lake Salitroso Basin is located in Northwestern Santa Cruz Province in a shrub steppe environment, at 260 m.a.s.l. (Fig. 1). The basin presents abundant resources and good conditions for human occupation such as permanent water –a particularly critic resource in this part of Patagonia–, wood, shelter, comparatively benign winters, animal prey and lithic resources.

Archaeological research in Lake Salitroso has focused on the analyses of human burials and superficial sites with stone artifacts, pottery and scarce animal remains (Cassiodoro *et al.* 2004). To date, 19 of these sites have been recorded and 37 burial structures, corresponding to different types of burial (niches, burials under blocks, and *chenques*), have been excavated with positive results (e.g., Goñi 2000b, 2010; Goñi *et al.* 2000; Cassiodoro *et al.* 2004; García Guraieb *et al.* 2007a, b; Cassiodoro & García Guraieb 2009; García Guraieb 2010; Cassiodoro 2011; Guichón Fernandez 2017; Morlesín 2019).

Radiocarbon dates obtained in Lake Salitroso show that human occupations in the basin correspond to the Late Holocene and overlap with early European contact times. Superficial sites have yielded dates between 1600 ± 110 BP and 750 ± 60 BP, whereas human burials have been dated from 2607 ± 41 BP to 352 ± 40 BP (Goñi 2000b; García Guraieb *et al.* 2015). This range coincides with a period of increasing dryness that, at a regional level, begins to show at *c.* 2500 BP (Stine & Stine 1990) and reaches its driest phases at *c.* 900 BP, during the Medieval Climatic Anomaly (MCA), between *c.* 1600 and 900 BP (Stine 1994). The impact of the environmental changes on the human peopling of this sector of Patagonia has been discussed in a model posed by Goñi and colleagues (Goñi 2000a, 2010; Goñi *et al.* 2000, 2019). The model states that the progressive environmental desiccation caused hunter-gatherers to reduce their residential mobility and cluster their settlements in particular low altitude spaces with hydric resources and good conditions for year-round human occupations, such as Lake Salitroso Basin. From these residential spaces, groups took logistic seasonal trips to high altitude basins, the western forests or the high plateaus to obtain particular resources (e.g., lithic raw materials, wood) (Goñi 2000a, 2010).

General characteristics of Lake Salitroso human burials

The Salitroso lake basin has been proposed as a mortuary formal disposal area *sensu* Pardoe (Pardoe 1988; Goñi & Barrientos 2000; Goñi *et al.* 2000). Human burials have been thoroughly characterized in previous works so only their main features will be mentioned here (e.g., Goñi *et al.* 2000; Bernal *et al.* 2004; Goñi & Barrientos 2004; Cassiodoro & García Guraieb 2009; Cassiodoro 2011; García Guraieb *et al.* 2015). Three different funerary types have been identified: niches, *chenques*, and burials under rock blocks or boulders (BUB) (Fig. 2). Niches are natural shallow hollows in the rock of a particular natural outcrop, where bodies were laid and covered with the natural sedimentation. Five niches with a total of eight individuals have been recovered: six adults and two subadults (García Guraieb *et al.* 2015). Burials under blocks use some natural feature of the terrain, such as a boulder or a rock outcrop, to become part of an artificial funerary rock structure, similar to *chenques* (Goñi *et al.* 2000). Five BUB have been identified with a total of 13 individuals (two subadults, and 11 male adults) (García Guraieb *et al.* 2015). These two funerary types have yielded dates between 2700 and 2200 BP (Goñi *et al.* 2000). Finally, *chenques* are completely artificial rock structures, approximately five meters in diameter and less than a meter in height, where bodies were placed directly on the ground and then covered with locally available stones. They appear forming clusters of several structures in the high landforms that surround Lake Salitroso Basin. Twenty-seven *chenques* have been excavated with positive results and two groups can be recognized: Initial *chenques* (n = 2), dated between 1600 and 1200 BP, and Late *chenques* (n = 25), dated between 800 and 350 BP (García Guraieb *et al.* 2015). The latest *chenques* of this group correspond to the early phases of European contact. Most *chenques* are multiple, primary, extended burials (Fig. 2). Five adults were recovered in Initial *chenques*, whereas the skeletal series of Late *chenques* is composed of 71 individuals of both sexes and virtually a continuous distribution of ages, with more than 50 % of the series composed of subadults under 20 years (García Guraieb *et al.* 2015). These characteristics of *chenques* have been linked to changes in the land use of Lake Salitroso Basin, particularly as markers of a more residential and stable use of this space, particularly during the last millennium (Goñi *et al.* 2000; Bernal *et al.* 2004; García Guraieb *et al.* 2015).

Different items such as lithic and metal artifacts, pottery sherds, shell and glass beads have been recovered in low frequencies within the human burials (Cassiodoro 2011). Previous analysis of the association of different technological aspects of these

grave goods and the sex and age composition of the burials led to the identification of certain patterns in their occurrence (Cassiodoro & García Guraieb 2009). First, the frequency of items was higher within *chenque* burials than in niches or BUBs. Second, a strong association between grave goods and burials with subadults under 10 years of age was identified. Third, the frequency and variety of types of artifacts and their raw material increased significantly in burials with dates posterior to 400 years BP. It is worth noting that most grave goods were found inside the burials, but in very few cases a direct association between an item and a particular individual could be established (Cassiodoro & García Guraieb 2009).

Finally, stable isotope analyses of carbon and nitrogen in human bone samples show a paleodietary signal consistent with a continental diet, mainly composed of steppe resources – such as guanaco (*Lama guanicoe* Müller, 1776) and lesser rhea (*Rhea pennata* d'Orbigny, 1834) –, which does not vary through time (Tessone *et al.* 2009; Tessone 2010). A similar tendency was identified in the zooarchaeological record, both in a regional and local scale (Mengoni Goñalons 1999; De Nigris 2004; Cassiodoro *et al.* 2004; Rindel 2009). In relation to this, few faunal remains were detected in only two open-air sites in two sites in the Salitroso basin, SAC 3 (Sierra Colorada 3; hereafter SAC) and SAC 5 (Cassiodoro *et al.* 2004). The results of the analysis indicate the predominance of guanaco, followed by remains of lesser rheas, dasipodids and the finding of a shell of an oceanic mollusk (*Patinigera magallanica* Gmelin, 1791).

MATERIALS AND METHODS

This study entailed the analysis of zooarcheological variables of the faunal remains of each grave as well as the statistic assessment of the associations between the animal bones, the human remains and the other artifacts found in the burial structures. Of the 37 burials of Lake Salitroso, only 30 were included in the analyses (Appendix 3), as cases where evidence of vandalism was observed were excluded. Ten of the 30 burials correspond to the earliest burial types – niches and BUB –, two correspond to Initial *chenques* and 18 to Late *chenques*. As previous work has shown (Bernal *et al.* 2004; García Guraieb *et al.* 2007a, 2015), there are consistent differences in the sex and age composition of burials pre-dating and post-dating the maximum drought periods of the MCA (i.e. *c.* 900 BP) 1. Thus, two groups of burials were defined: pre-MCA burials, consisting of niches, BUBs and Initial *chenques* (n = 12), and post-MCA burials, consisting of Late *chenques* (n = 18).

The first step of the zooarchaeological research was the taxonomic and anatomical identification of the bone elements. The taxonomic determination was carried out on the basis of comparisons with skeletal material of species from the study area deposited in the Instituto Nacional de Antropología y Pensamiento Latinoamericano. Likewise, reference manuals were also used (Pacheco Torres *et al.* 1986; Sierpe 2015). In order to proceed to the anatomical identification, diagnostic zones defined by Mengoni Goñalons (1999) were considered for each element of the skeleton.

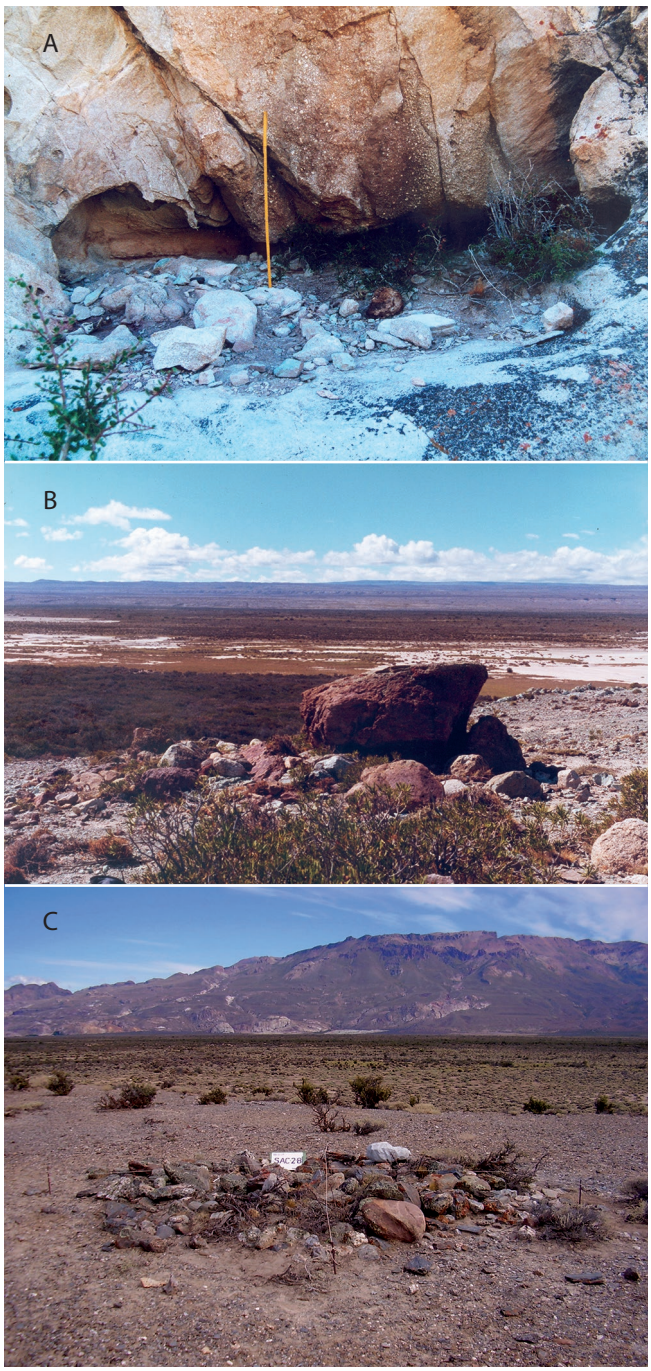

Fig. 2. — Burial types of Lake Salitroso Basin: **A**, niches; **B**, burials under blocks; **C**, *chenques*. Photos credits: The authors.

The portion, laterality and fusion state of the bone represented were also considered (Kaufmann 2009). Secondly, we collected taphonomic information, given that an important aspect of our analysis was to detect which agents had intervened in the formation of the faunal assemblages. Zooarchaeological analysis included the following variables: weathering *(sensu* Behrensmeyer 1978), rodents and carnivore action, manganese deposits, root marks, axial/appendicular ratio for each taxon, evidence of thermoalteration and processing (*sensu* Mengoni Goñalons 1999). The Number

TABLE 1. — General taxonomic structure (**NISP t** and **% NISP t**) and taxa with evidence of cultural/anthropic processing (**NISP p** and **% NISP p**). ***,** plus 33 choique (*Rhea pennata* d'Orbigny, 1834) eggshell fragments. Abbreviations: **indet.**, indetermined; **NISP**, number of identified specimens.

Taxa*	NISP t	% NISP t	NISP p	% NISP p
Lama guanicoe Müller, 1776	48	2.48	13	27.08
Lycalopex Burmeister, 1856	160	8.27	6	3.75
Conepatus humboldtii Gray, 1837	14	0.72	1	7.14
Rhea pennata d'Orbigny, 1834*	12	0.62	4	33.33
Hippocamelus bisulcus Molina, 1782	17	0.87	2	11.76
Bird indet.	21	1.08	3	14.28
Sub total (processed)	272	14.07	29	10.66
Lepus europaeus Pallas, 1778	65	3.36	–	–
Ovis aries Linnaeus, 1758	14	0.72	–	–
Zaedyus pichiy Desmarest, 1804	10	0.51	–	–
Rodentia indet.	1147	59.33	–	–
Reptilia	7	0.36	–	–
Indetermined	338	17.48	–	–
Big mammal	69	3.56	–	–
Medium mammal	2	0.1	–	–
Small mammal	9	0.46	–	–
Total	**1933**	**100**	**29**	**10.66**

of Identified Specimens (NISP; Lyman 1994) was the unit for analysis and quantification for all variables. Results are presented for the total faunal assemblage (the summed data of all burials) and for each burial in particular. Except for the specific cases where bone remains were identified in clear direct association to a particular individual, bone remains tend to appear scattered in the burial structure, mixed in the sediment matrix.

In order to analyze how the zooarchaeological record from *chenques* differs from that of residential campsites in the study area, we compared taphonomic variables and evidence of anthropic processing. For this comparative analysis, published data from ten open-air sites located in Perito Moreno National Park, Cerro Pampa and Lago Cardiel were considered (Appendix 4; Fig. 1). All these faunal assemblages have large sample sizes and correspond to late Holocene open-air sites of neighboring areas (Bourlot 2009; Rindel 2009).

The statistical analysis to assess patterns of association between grave elements and individuals within burials considered the link between the total number of individuals in a grave, their sex and age, the amount of animal taxa present in a burial as well as the variety of raw materials used in the manufacture of technology items (lithics, pottery, glass, metal, etc.). As they are variables with non-parametric distribution, the Spearman's r of correlation was calculated along with the probability of no correlation between two variables, using the PAST 3.07 software (Hammer *et al.* 2001). Only statistically significant correlations were discussed. These statistical tests also distinguished pre-MCA and post-MCA burials.

NOTES

Age groups used in the analysis of the age composition of the burials were taken (and slightly modified) from Buikstra & Ubelaker 1994 (infants: 0-2.9 years, children: 3-11.9 years, adolescents: 12-19.9 years; young adults: 20-34.9 years, middle adults: 35-49.9 years; older adults: 50 + years). In addition, statistical analyses in this paper used broad age categories such as "subadults" (i.e. under 20 years) and "young subadults" (i.e. under 10 years).

RESULTS

FAUNAL REMAINS IN BURIALS

As we mentioned previously, 30 burials were included in the analysis. Sixty percent of those burials had bone animals within the mortuary structure. No temporal differences were identified in this regard as 66 % (8/12) of the early burial types, pre-MCA, have associated fauna remains, whereas 56 % (10/18) of the post-MCA burials present fauna as well within the funerary structure (Fisher Exact Test, p: 0.70859).

ZOOARCHAEOLOGICAL ANALYSIS OF THE FAUNAL ASSEMBLAGES

In total, the number of identified specimens was 1933, 1515 of which could be identified to a species/gender level. Table 1 presents the taxonomic structure of the whole faunal assemblage. Rodent remains are the most abundant, and we also record remains of reptiles and dasipodids. Neither of these species showed any signs of processing and their occurrence in the funerary contexts can respond to many factors, including taphonomic processes. Species of European origin, such as sheep (*Ovis aries* Linnaeus, 1758) and common hare (*Lepus europaeus* Pallas, 1778) bones, were also identified, but do not belong to the chronology of these burials. In this regard, some of the burials in the sample correspond to the earliest European Contact period (16th century), but these species were not introduced in the region until the late 19th century (Barbería 1996). In addition, these animals also show no evidence of consumption. Also, taphonomic analysis shows higher carnivore and rodent tooth marks frequencies and conspicuous differential weathering with the rest of the faunal component of the burial sites. Based on this taphonomic data, as well as on the absence of processing marks and European origin, faunal remains of rodents, reptiles, dasypodids, sheep and hares were excluded from the subsequent analyses. In consequence, the taxonomic structure of the faunal assemblage considered genuinely associated to the funerary structures includes guanaco, fox (*Lycalopex* Burmeister, 1856), Humboldt's hog-nosed skunk (*Conepatus humboldtii* Gray, 1837), huemul (*Hippocamelus bisulcus* Molina, 1782), lesser rhea (*Pterocnemia pennata* d'Orbigny, 1834) and other birds (Table 1). The dominant species are foxes, followed by guanaco, birds and huemul.

In addition, it is worth noting the presence of shells, in burials SAC 1-8 (n = 4) and SAC 3 (n = 2), with no evidence of use as artifacts. In the case of *chenque* SAC 1-8, they correspond to the species *Diplodon chilensis patagonicus*

TABLE 2. — Taphonomic variables, skeletal (axial/appendicular) parts ratios and processing evidence per taxa (% NISP). Abbreviation: **NISP**, number of identified specimens.

TAXA	Guanaco *Lama guanicoe* Müller, 1776	Fox *Lycalopex* Burmeister, 1856	Skunk *Mustela putorius* Linnaeus, 1758	Choique *Rhea pennata* d'Orbigny, 1834	Huemul *Hippocamelus bisulcus* Molina, 1782	Birds
NISP	48	160	14	12	17	21
Weathering 0	31.91 (N = 15)	83.96 (N = 110)	53.33 (N = 8)	0	81.25 (N = 13)	71.42 (N = 15)
Weathering 1	25.53 (N = 12)	4.13 (N = 15)	33.33 (N = 5)	33.33 (N = 4)	18.75 (N = 3)	4.76 (N = 1)
Weathering 2	21.27 (N = 10)	3.3 (N = 4)	13.33 (N = 2)	8.33 (N = 1)	0	19.04 (N = 4)
Weathering 3	17.02 (N = 8)	0	0	58.33 (N = 7)	0	4.76 (N = 1)
Weathering 4	2.12 (N = 1)	1.65 (N = 2)	0	0	0	0
Weathering 5	2.12 (N = 1)	0	0	0	0	0
Carnivore marks	2.08 (N = 1)	3.06 (N = 5)	0	8.33 (N = 1)	0	9.52 (N = 2)
Rodent marks	22.91 (N = 11)	9.81 (N = 16)	0	16.66 (N = 2)	11.76 (N = 2)	23.8 (N = 5)
Roots	27.08 (N = 13)	12.88 (N = 21)	20 (N = 3)	16.66 (N = 2)	29.41 (N = 5)	9.52 (N = 2)
Manganese	37.5 (N = 18)	22.69 (N = 37)	6.66 (N = 1)	16.66 (N = 2)	11.76 (N = 2)	4.76 (N = 1)
Axial (NISP)	29.16 (N = 14)	50 (N = 80)	64.28 (N = 9)	16.66 (N = 2)	41.17 (N = 7)	23.8 (N = 5)
Appendicular (NISP)	70.83 (N = 34)	50 (N = 80)	35.71 (N = 5)	83.33 (N = 10)	58.82 (N = 10)	76.19 (N = 16)
NISP cut	10.41 (N = 5)	3.75 (N = 6)	7.14 (N = 1)	8.33 (N = 1)	0	14.28 (N = 3)
NISP percussion	10.41 (N = 5)	0	0	16.66 (N = 2)	5.88 (N = 1)	0
NISP cut+percussion	6.25 (N = 3)	0	0	8.33 (N = 1)	5.88 (N = 1)	0
NISP processing (total)	13/48 (27 %)	6/160 (3.75 %)	1/14 (7.14 %)	4/12 (33.3 %)	2/17 (11.64 %)	3/21 (14.28 %)
NISP /burning	2.08 (N = 1)	22.58 (N = 36)	0	0	5.88 (N = 1)	0

(d'Orbigny, 1835), a fresh water bivalve present in rivers and lakes of the Andean Range area. In *chenque* SAC 3-1, it has not been possible to identify the genus/species of the shells (Cassiodoro 2005). It is important to note that there are not any conspicuous evidence of their consumption either (burning), so they seem to have been placed as ornaments and not in the same way as the other faunal remains.

Table 2 presents the results of the taphonomic variables and skeletal parts ratios recorded in the subsample of the main species described above. Regarding weathering, most specimens were scored as a stage 2, suggesting a good preservation of the sample. Only lesser rhea showed a poorer preservation, with most specimens showing a stage 3 score, probably due the higher velocity at which bird bones weather compared to mammal bones (Cruz 2008). Carnivore action does not appear to have impacted heavily on the faunal assemblage of burials (less than 10 % for all taxa). Rodent marks are more frequent, though, with guanaco and birds showing the highest percentages of specimens with marks. It is possible that this reflects the attraction and shelter created for rodents of burials made up of piles of rocks, such as *chenques* and BUBs. Root marks are also high in frequency, and here the rock structure also could have played an important role, as sediments filled the space between rocks creating a propitious place in a generally arid environment for plants and shrubs to fix their roots and grow. The proportion of animal bone specimens affected by manganese is more variable, reflecting the variation between burials in relation to very local humidity conditions. These general trends in the intensity and variation in the action of these different agents have also been observed in the taphonomic analyses of the human skeletal series of Lake Salitroso (Zangrando *et al.* 2004; Barrientos *et al.* 2007; Guichón Fernández 2017). Table 2 also shows the relative frequency of appendicular and axial skeletal parts for each taxon of the assemblage. A high frequency of elements of the appendicular skeleton is observed in most species, a trend also noticed in many archaeofaunistical assemblages of Patagonia (e.g., Mengoni Goñalons 1999; De Nigris 2004; Rindel 2009).

Finally, evidence of processing (Table 2; Fig. 3) was found in all taxa, with a high frequency of specimens with cut and percussion marks, particularly on guanaco and lesser rhea. This has also been observed in the regional zooarcheological assemblages of domestic contexts with clear evidences of processing and consumption (Mengoni Goñalons 1999; De Nigris 2004; Rindel 2009). Moreover, three species show bones with evidence of thermoalteration.

Zooarchaeological analysis per burial

When faunal remains are considered and analyzed per burial (Fig. 4, Appendix 5), several points are worth noting.

First, some funerary structures are more varied in animal species than others. That is the case of SAC 4-2, SAC 1-7, SAC 1-1, SAC 1-4 and SAC 20-3. These burials have four taxa present each. They belong to different periods, which indicates that there is no time trend in this regard. Of the 18 structures with positive faunal findings (valves excluded), guanaco appears in the majority of them (77 %), followed by birds (50 %), and foxes (38.8 %).

Second, huemul bones found in one *chenque*, with a late chronology (*c.* 700-350 BP; Goñi *et al.* 2000), seem clearly associated to a particular skeleton (see "Associations between individuals and faunal remains" section). A relatively high frequency of remains of this species (n = 17) were found, 12 % of which showed processing marks (Fig. 4).

Third, some burials show some species with particularly high representation. For instance, guanacos appear highly represented in SAC 4-2 and SAC 20-3, and in both cases some specimens show evidences of processing. Foxes appear in high frequency in SAC 8-3 and SAC 20-3, but, whereas the

Fig. 3. — **A**, Bone retoucher from Lake Salitroso burial; **B**, huemul (*Hippocamelus bisulcus* Molina, 1782) distal metapodials with percussion marks; **C**, choique (*Rhea* Brisson, 1760) distal tibiatarsal with percussion marks. Scale bars: 1 cm. Photos credits: The authors.

majority of the guanaco specimens have evidence of burning and cut marks, fox bones show no evidence of processing. Lesser rhea bones appear in high numbers in SAC 1-7.

Regarding the frequency of skeletal parts, Appendix 6 shows a relatively uniformity in representation. In guanacos, most bones are vertebrae and autopodial (i.e. metapodials and phalanges) elements, followed by long bone fragments; rib and pelvis fragments were recorded in lower frequencies. Similar trends were identified in the fox and huemul remains identified in burial SAC 1-1. Flying birds show high numbers of tibiotarsal bones; so do lesser rhea, followed by spine and long bones. The remains of Humboldt's hog-nosed skunks identified in SAC 1-4, SAC 1-7 and SAC 20-3 are dominated by cranial elements, with ribs, scapulae and autopodial specimens in low frequencies. In general, these trends indicate the presence of low nutritional value body parts, with little meat attached to them.

Comparison with other zooarchaeological contexts in the study area

The correspondence analysis reveals that *chenques* do not differ from open-air sites in most variables. *Chenques* generally reveal lower stages of weathering, which can be attributed to intentional burial conditions, but some open-air sites show comparable stages, such as MS1M4 (Fig. 5). A similar situation is observed when comparing the percentages of manganese staining and root marks, which present frequencies that fall within those observed in open-air sites. The number of species (NTAXA) with evidence of processing in the *chenques*, in turn, falls within the upper range observed in open-air sites. Something similar occurs with the percentages of carnivore and rodent marks, which underlines the role of these agents in the transformation of the assemblages present in the *chenques*. On the other hand, the percentages of processing marks (cutmarks and percussion marks) do not show differences with respect to the values observed in the assemblages corresponding to open-air residential bases either. In this sense, they are within the range observed in residential sites, although they are slightly lower than the percentages recorded in various open-air sites.

Important differences between *chenques* and the open-air sites, are only observable in the percentage of the sample that corresponds to guanaco and in the frequency of thermally altered elements. The open air sites show a clear predominance of guanaco, which in most of the sites exceeds 90 % of the assemblages, while in the *chenques* it does not exceed 20 %. Likewise, *chenques* present a high frequency of elements with evidence of burning compared to the open-air residential bases.

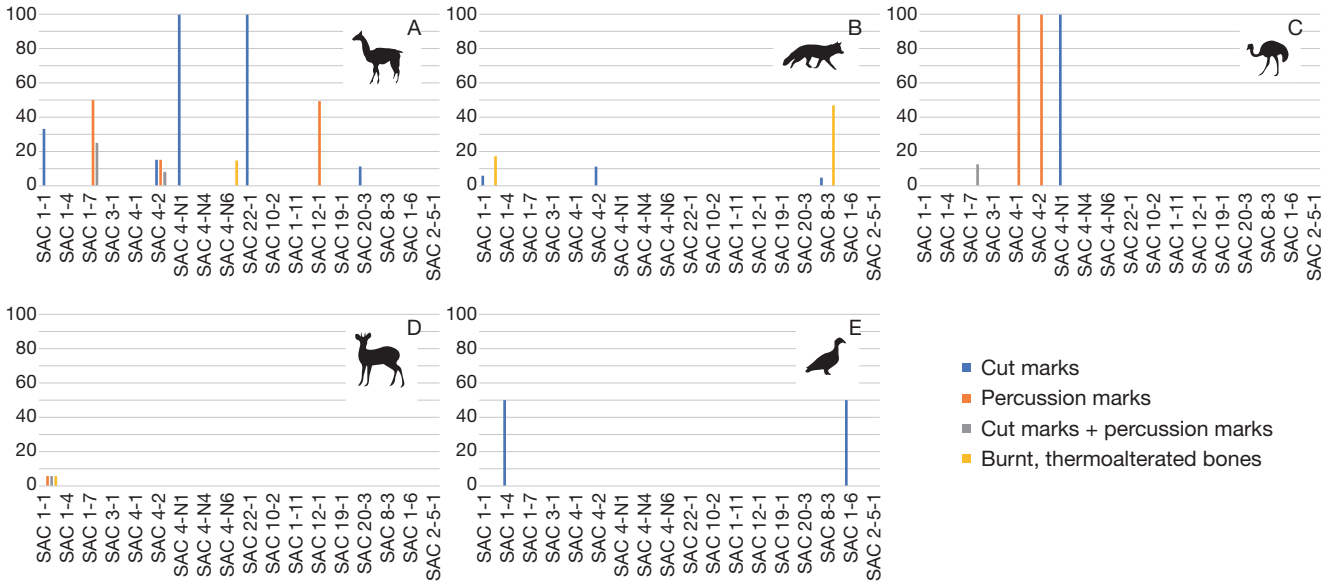

FIG. 4. — Evidence of processing per taxa per burial (% NISP [number of identified specimens] with human modifications): **A**, guanaco *Lama guanicoe* Müller, 1776; **B**, fox *Lycalopex* Burmeister, 1856; **C**, lesser rhea *Rhea pennata* d'Orbigny, 1837; **D**, huemul *Hippocamelus bisulcus* Molina, 1782; **E**, Magellan goose *Chloephaga picta* (Gmelin, 1789). Abbreviation: **SAC**, Sierra Colorada sites.

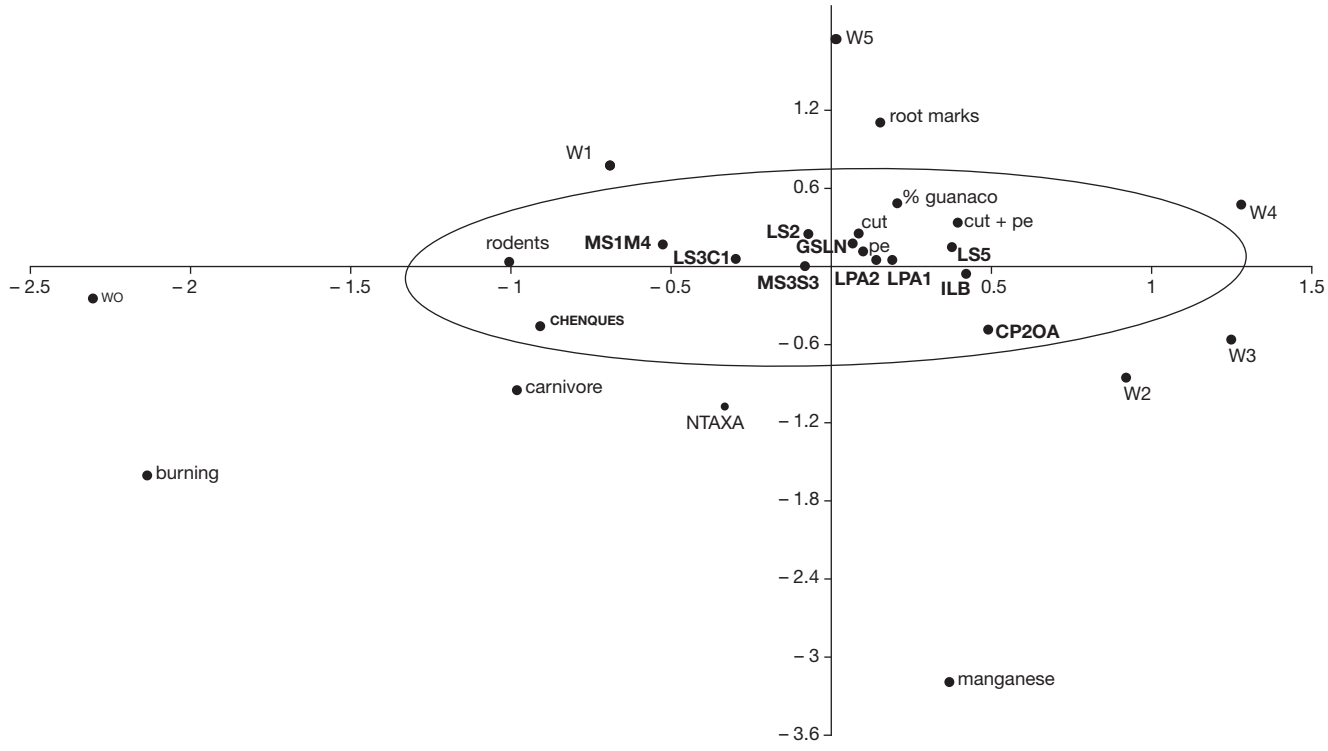

FIG. 5. — Correspondence analysis of taphonomic and processing mark variables in chenques and domestic open-air sites in northwest Santa Cruz. References: **CHENQUES**, this paper; **CP2OA**, **ILB,** Rindel 2009; **GSLN**, **LPA1**, **LPA2**, **LS2**, **LS3C1**, **LS5**, **MS1M4**, **MS3S3**, Bourlot 2009. Abbreviations: **CP2OA**, Cerro Pampa 2 Ojo de Agua; **cut**, cutmarks; **GSLN**, Grippa Sí Litto No; **ILB**, Istmo Lago Belgrano; **LPA1**, La Primera Argentina 1; **LPA2**, La Primera Argentina 2; **LS2**, La Siberia 2; **LS3C1**, La Siberia 3 concentración 1; **LS5**, La Siberia 5; **MS1M3**, Médanos Sur 1 sondeo 3; **MS1M4**, Médanos Sur 1 muestreo 4; **MS3S3**, Médanos Sur 3 sondeo 3; **NTAXA**, number of species; **pe**, percussion; **W0-5**, wheathering stages.

ASSOCIATIONS BETWEEN INDIVIDUALS AND FAUNAL REMAINS

We also analyzed the cases where associations between faunal remains and particular individuals were identified (Fig. 6). In *chenque* SAC 1-1, individual 4 (SAC 1-1-4), a child of approximately seven years of age at death (possibly male; Bernal *et al.* 2004) had by the side of his skull, the only huemul bones recorded in Lake Salitroso, and some glass beads. On the one hand, the glass beads are relevant as chronological markers, as they

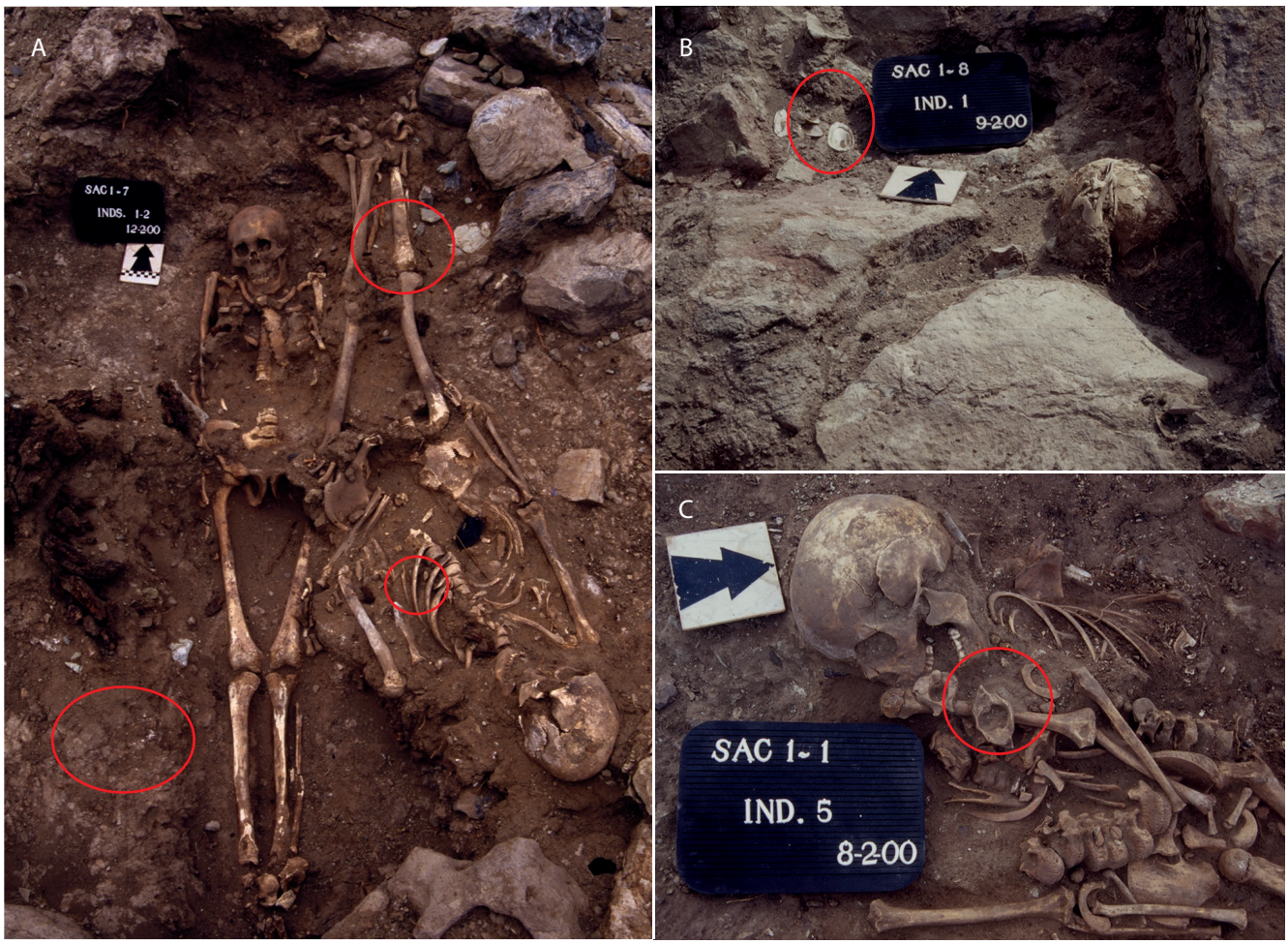

Fig. 6. — Cases with faunal associations. Circle mark faunal remains: **A**, SAC 1-7, Individual 1 with guanaco (*Lama guanicoe* Müller, 1776) bone on his chest and guanaco and lesser rhea (*Rhea pennata* d'Orbigny, 1834) bones by his knees; **B**, SAC 1-8, Individual 1 with associated *Diplodon chilensis* (J.E. Gray, 1828) valves; **C**, SAC 1-1, Individual 5 with huemul (*Hippocamelus bisulcus* Molina, 1782) bones in his mouth.Photos credits: The authors.

belong to the earliest European Contact period (16th century), and suggest interactions with the Atlantic coast (Cassiodoro & García Guraieb 2009). On the other hand, the presence in these steppe burials of huemul, a native cervid of the western forests, indicates the broad action range of human populations, which included both environments. Another case is *chenque* SAC 1-7, which has two male adults with practically the same radiocarbon date of *c.* 1150 BP (Goñi *et al.* 2000). Individual SAC 1-7-1, a male older adult who had a black obsidian bifacial knife placed on his sternum, had also a guanaco bone on his chest and some guanaco and lesser rhea bones by his knees. The rest of the faunal elements found in this *chenque* were placed by the eastern side of Individual SAC 1-7-2, a male young adult. *Chenque* SAC 1-8 presents two secondary adult burials with clear associations of valves. Valves were also found in association to individual 2 of *chenque* SAC 3-1. Under the hand bones of individual SAC 4-N4-1, an adult male, a fragment of guanaco long bone was found. Another case is SAC 1-6, where two young female adults, and two young children, one of which (individual SAC 1-6-1, of 5 ± 1 years of age), showed an association with bird bones. Next to this individual a native metal plaque was also recovered. In *chenque* SAC 8-3, the burial of one middle adult and three subadults (one adolescent and two children), the metapodial bone of a guanaco was found next to individual 2 (SAC 8-3-2, of approximately 10 ± 2.5 years of age). This burial is also noticeable due to the finding of the bones of at least four foxes, with burnt and cut marks that suggest they were skinned. It is also important to point out the presence of a retoucher made on a guanaco radioulna diaphysis fragment, recovered in BUB SAC 4-2. This bone also shows processing marks (cutmarks and scraping marks) (Fig. 5A).

Combined analysis of the archaeological record of the burial structures

To assess patterns in the placement of technological and faunal items in the burials, we tested their relationship with age and sex composition of the funerary structures (Table 3). The correlation between the number of individuals buried in each structure and the richness of grave goods, measured as the variety of raw materials used in technological items and the variety of animal taxa present in a burial, was evaluated. First, it is worth to mention that a moderate and positive

TABLE 3. — Correlations and p values between sex and age groups and types of faunal remains and technological items as grave goods (valves are included as taxa). Abbreviation: **MCA**, Medieval climatic anomaly.

		Number of raw materials in technological items		Number of taxa		Number of taxa and raw materials in technological items	
Chronology	**Individuals per structure**	**r Spearman**	**Valor- p**	**r Spearman**	**Valor- p**	**r Spearman**	**Valor- p**
TOTAL	Total	0.64	< 0.01	0.2	> 0.01	0.52	< 0.01
	Subadults < 20	0.55	< 0.01	– 0.08	> 0.01	0.31	> 0.01
	Subadults < 10	0.56	< 0.01	– 0.09	> 0.01	0.31	> 0.01
	Adults	0.1	> 0.01	0.52	< 0.01	0.31	> 0.01
	Female Adults	0.24	> 0.01	0.46	< 0.01	0.51	< 0.01
	Male Adults	– 0.08	> 0.01	0.25	> 0.01	0.03	> 0.01
Pre-MCA	Total	0.77	< 0.01	0.48	> 0.01	0.65	> 0.01
	Subadults < 20	– 0.002	> 0.01	0.11	> 0.01	0.09	> 0.01
	Subadults < 10	– 0.002	> 0.01	0.11	> 0.01	0.09	> 0.01
	Adults	0.86	< 0.01	0.47	> 0.01	0.67	< 0.01
	Female Adults	0.54	> 0.01	0.59	> 0.01	0.69	< 0.01
	Male Adults	0.41	> 0.01	0.52	> 0.01	0.53	> 0.01
Post-MCA	Total	0.52	> 0.01	0.11	> 0.01	0.44	> 0.01
	Subadults < 20	0.7	< 0.01	– 0.08	> 0.01	0.44	> 0.01
	Subadults < 10	0.7	< 0.01	– 0.12	> 0.01	0.45	> 0.01
	Adults	– 0.23	> 0.01	0.56	< 0.01	0.13	> 0.01
	Female adults	0.09	> 0.01	0.43	> 0.01	0.38	> 0.01
	Male adults	– 0.3	> 0.01	0.04	> 0.01	– 0.27	> 0.01

association is observed between the number of individuals buried and the richness of grave goods (rs: 0.52; $p < 0.01$). This pattern remains unchanged when only the number of female adults is considered (rs: 0.51; $p < 0.01$).

Second, when considering the technological grave goods and the faunal remains separately, different patterns emerge. Regarding the technological grave goods, the emerging pattern is the one identified in previous studies (Cassiodoro & García Guraieb 2009): a moderate correlation between the variety of grave goods and the frequency of subadults present in the burials (rs: 0.56; $p < 0.01$). On the contrary, the variety of taxa present shows a moderate correlation (rs: 0.52; $p < 0.01$) only with the number of adult individuals.

Third, when the chronology of burials is considered, pre-MCA burials show a strong positive association between technological grave goods and the number of adults in the burials (rs: 0.86; $p < 0.01$). Considering the variety of taxa and of technological items, this relationship is less strong (rs: 0.67; $p < 0.01$). In post-MCA times, a similar positive association was seen between subadults and grave goods, particularly technological ones (rs: 0.7; $p < 0.01$). A moderate positive association between adults in burials and faunal remains is also apparent for this period (rs: 0.56; $p < 0.01$).

DISCUSSION

The aim of this paper has been to discuss the role of faunal remains in funerary contexts using as a case study the burials of Lake Salitroso, one of the largest and best known concentrations of human burials of hunter-gatherers in Southern Patagonia. As mentioned, these burials have all been recovered in recent years during systematic regional archaeological surveys in the study area and have one of the most detailed chronologies available for the human burials in the region. With this regard, it is worth noting that Lake Salitroso human burials have a long chronology corresponding to the Late Holocene, including the early historical times. Thus, they record mortuary practices through time and changes brought upon them with the early phases of contacts with European population.

One of the most important results obtained in this work is related to the fact that not all the fauna deposited in the *chenques* is linked to the mortuary practices. In this sense, the analysis carried out in the faunal sample allowed for the identification of taphonomic patterns of occurrence of animal remains in association with human burials. Far from being "pristine" depositional environments, these anthropic structures are spaces where naturally deposited fauna is concentrated, and the detection of this non-anthropic component can be investigated using different criteria. Thus, it was possible to discriminate between intrusive animal remains and those most likely to have been placed "intentionally" in the funerary structures. For instance, fossorial taxa as rodents and dasypodidae were observed both inside and on the surface of some burial structure. Faunal remains of european origin were also detected. Those species were introduced in southern Patagonia much later than the moments when the *chenques* were constructed. We also detected in these taxa higher weathering stages and higher frequency of carnivore marks, and an absence of cut marks, percussion marks and thermal alteration. So, the combination of taphonomic, ethological and chronological criteria, added to the absence of anthropic of processing evidence suggested their taphonomic and intrusive origin in the burials, allowing for the exclusion of subsequent analyses of species of rodents, dasypodids, sheep and European hares.

The rest of the sample was a product of the anthropic action as suggested by:

– the direct association in some cases of bones with the buried individuals;

– the evidence of anthropic processing;

– the low action of natural agents and processes;

– the frequency of taxa and skeletal parts, which are in consonance with their observed frequency in domestic sites.

Once the anthropic character of the sample was established, a series of patterns emerged from the analyses of the faunal assemblages of human burials that contribute to the discussion of mortuary practices.

First, on the whole the faunal record associated to mortuary contexts in Lake Salitroso is not abundant. This is consistent with what has been observed in the technological record. The low frequency is indicative of unusual behavior.

Second, the most represented species are the ones that also appear in non-burial sites, i.e. guanaco, huemul, lesser rhea and fox. Notwithstanding, birds and skunks have also been found in these funerary contexts. That is, in *chenques* there is a wider variety of species than in domestic contexts, where the predominance of guanaco is characteristic (i.e. Mengoni Goñalons 1999; Cassiodoro *et al.* 2004; De Nigris 2004; Rindel 2009). In this regard, in terms of NISP the most abundant taxa in *chenques* are foxes, followed by guanacos, in second place. However, whereas foxes appear in greater numbers in specific structures, guanacos are present in more burial structures.

Third, the presence of animals from other ecological areas, such as huemul from the neighboring western mountain forests, is also noticeable and suggests patterns of mobility and resource circulation that go beyond the immediate local area. As previously mentioned, this has also been noted for the technological record associated with the burials (Cassiodoro & García Guraieb 2009) and the human stable isotope record (Tessone 2010).

Fourth, the animals found in the burial contexts seem to have been subject to processing activities and consumption. In this regard, a high proportion of the animal bones recovered in burial sites show signs of processing such as cut mark, percussion marks and thermal alteration, all of them in similar frequencies than those recorded in archaeofaunal assemblages found in domestic sites of the study area (e.g., Mengoni Goñalons 1999; De Nigris 2004; Rindel 2009). Similarly to other depositional contexts, guanaco and lesser rhea are the only species that show all types of processing, i.e. cutting, percussion and burning. Other species, such as foxes and skunks, also show processing marks, which is unusual in other domestic sites. On these grounds, we suggest that the bones found in the burial structures were previously consumed.

Fifth, as repeatedly highlighted in previous work, the human burials of Lake Salitroso show great variability in sex and age composition as well as in their associated grave goods (Cassiodoro & García Guraieb 2009; García Guraieb 2010). When the faunal data is added to this picture, this variability continues to be evident. Similarly to grave goods, considering the whole sample, faunal remains in burial contexts are not abundant. The cases identified show variability in the ages of individuals with faunal remains associated to them, as both adults (e.g., both individuals of SAC 1-7) and subadults (i.e. the child, SAC 1-1-4) were recovered with animal bones. When the relationship between grave goods and sex and age composition of the burial is considered, subadult individuals are those with more abundant technological items as grave goods, mainly ornaments in post-MCA burials (Cassiodoro & García Guraieb 2009). On the contrary, faunal remains in burials tend to be more frequently associated to adults in this period. That is, the more adult individuals buried in one structure, the more taxa represented. Based on ethnographic information, several authors have suggested that subadult burials present more grave goods (Saxe 1970; Binford 1971; MacDonald 2001). It has been suggested that this is linked to differences in status, wealth, or simply the fact that children possess more items and are buried with them (Saxe 1970; Binford 1971; Cassiodoro & García Guraieb 2009). Lake Salitroso burials seem to provide support for these notions in relation to technological mortuary accompaniment, especially the latter, given that the egalitarian nature of the Patagonian hunter-gatherers would largely prevent the generation of differences in wealth and status. The faunal remains, however, are found more frequently associated with adult individuals, suggesting that their function in the burials might have been different from that of technological items. Nevertheless, the small sample size can lead to erroneous interpretations, so we suggest that these findings should be confirmed by analyzing other funerary contexts.

On the whole, faunal remains in these burial contexts is scarce, variable in taxa and in the type of associations, and related to the processing and consumption of animals. The absence of complete carcasses does not support the idea of animal sacrifices during the mortuary rites. Thus, two possibilities difficult to differentiate archaeologically would explain the presence of these animal bone remains: either the animals were consumed by the mourners and then left to the dead, or the animals were directly left as "food" for the dead in the "afterlife". The clearest association between one specific individual and faunal remains, the case of the huemul bone placed in the mouth of individual SAC 1-1-4, renders stronger support to the second possibility.

This discussion gains in depth when the mortuary record from other areas of Patagonia is considered. A precise comparison with Lake Salitroso case is difficult to establish due to the small sample of cases available for comparison. Likewise, the few cases that exist present high variability, which makes it difficult to establish analogies. The few mentions of faunal remains available in funerary contexts show great variability of behaviors associated to their occurence. In this regard, animal bones may appear as part of a funerary structure (as it is the case of whale bones found in coastal burials) (Salceda *et al.* 2001; Zubimendi *et al.* 2011). In other cases, animal bones can be found in hearths inside the burials, or directly associated to the dead body (Gradín & Aguerre 1994; Patti de Martínez Soler & López 1994). Thus, the role of fauna in funerary contexts is not only variable on a local, but also on a regional scale (Appendix 2). However, it is necessary to pin point that zooarcheological analyses of animal remains in funerary contexts are still scarce and it is possible that the presence of faunal bones in human burials has not been reported or described thoroughly in many areas.

It is interesting to note that during historical times in southern Patagonia there are no mentions to fauna in funerary contexts either, although there is evidence of European technological

elements in both early contact (e.g., SAC) and later contact periods burials (e.g., San Gregorio; Martinic 1995). In Pampa and northern Patagonia, some prehistoric burials with faunal remains have been observed (Acosta & Mazza 2016). The species involved are varied, but canids are consistently recovered, possibly domestic (Berón 2010; Prates *et al.* 2010; González Venanzi 2022). However, it is the post contact burials that appear more consistently associated with abundant mortuary offerings, involving both technological and faunal items. In fact, archaeological reports of domestic animals in burials (dogs, ovicaprids, and particularly horses) became more frequent. The differential presence of domestic animals in northern and southern Patagonia in historical times exceeds the objectives of this work (Rindel *et al.* 2024). However, it is worth noting that its appearance in the northern mortuary register is linked to the appearance of more complete, articulated carcasses. In the ethnohistoric sources of the region, this is associated with practices of animal sacrifice in the mortuary practices and the destruction of belongings of the deceased. Those sacrificed animals placed within the tombs might be linked as markers of the status acquired by the dead in their lifetime. In any case, this is not the situation seen in Lake Salitroso, neither before nor after European contact. This also shows a macro-regional and temporal variability in the role of fauna in mortuary contexts.

However, some sources (e.g., Schmid & Vignati 1964; Havestadt 1988; Musters 1998) mention evidence of animal consumption during funerary rituals or as food consumed by the mourners during the funerary ritual or as food left in the burial for the dead for the afterlife. As mentioned before, this interpretation is consistent with the evidence presented for Lake Salitroso area. In that case, it would indicate the idea of some continuity between archaeological and historical funerary rituals, although in the historical contexts these practices seem to have been more important or emphasized.

CONCLUSIONS

The question about the role of animals in mortuary practices of human populations in Patagonia has been scarcely explored in the archaeological record though frequently mentioned in the ethnohistorical sources available for the region. The exceptional characteristics of the mortuary record of Lake Salitroso have allowed us to undertake this first overview of the problem of faunal remains as grave goods in human burials. Although the frequency of faunal elements per burial is low in itself, it is relevant due to the large number of burials. Comparing different sources of information and considering wide scales, both in time and space, an important variability can be identified in the role played by animals in mortuary practices in Patagonia. In a smaller scale, the case of Lake Salitroso also shows an important internal variability. The exact meaning of the variability of taxa present in these burials is elusive but our results suggest that such variability is not taphonomic in origin but behavioral, i.e. the product of a deliberate selection of certain species to include in the burial and that it includes taxa and processing marks that suggest consumption activities. Furthermore, the idea of faunal remains in the burials as "food for the afterlife" is supported by the direct presence of animal remains in the mouth of one of the buried individuals. To test this hypothesis, in the future, it might be necessary to articulate this analysis with that of rock art motives of fauna, and known Patagonian myths and legends as a way to deepen our understanding of the role of animals in the cosmovision of the Patagonian people in the past.

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APPENDICES

Appendix 1. — Patagonian historical sources data on animals in mortuary practices, human burials and grave goods.

Reference	Area	Animals	Disposition in the burial	Consumption	Technological grave goods
D'Orbigny (1999)	Northern Patagonia: Southern Buenos Aires; Northern Rio Negro	Horses (*Equus caballus* Linnaeus, 1758), dogs (*Canis lupus familiaris* Linnaeus, 1758), cows (*Bos taurus* Linnaeus, 1758)	Horses outside the burial	No	Yes
Lista (1998)	Northern Patagonia: valley of Río Negro	Shellfish valves, guanaco (*Lama guanicoe* Müller, 1776), deer, fox (*Lycalopex* Burmeister, 1856), ostrich (choique) (*Rhea pennata* d'Orbigny, 1834)	–	–	Yes
Havestadt (1988)	Northern Patagonia: Neuquén	Horses	Dead and their hides placed on poles near the tomb	Yes	No
Hux (1999)	Northern Patagonia: La Pampa	5 horses and sheep (*Ovis aries* Linnaeus, 1758).	Dead at the feet of the tomb	–	–
De la Vaulx (2008)	Northern Patagonia: Chubut	Patagonian hare (mara) (*Dolichotis patagonum* (Zimmermann, 17801)), horses and dogs	Horses outside the burials and dogs inside	–	Yes
Guinnard (1961)	Northern Patagonia: La Pampa, Buenos Aires	Horses and rams	Inside the burial	–	Yes
Furlong (1943)	Southern Patagonia: Santa Cruz	Horses	Intentionally killed, outside the burial placed on poles	–	Yes
Musters (1998)	Southern Patagonia: Santa Cruz, Chubut, Río Negro	Horses, dogs, and other animals of the deceased	Intentionally killed, no reference to the place of deposition	Yes	Yes
King (1839)	Southern Patagonia: Santa Cruz	Horses	Intentionally killed, outside the burials placed on poles	–	–
Coan (2007)	Southern Patagonia: Santa Cruz	Horses and dogs	Intentionally killed no reference to their place of deposition	–	Yes
Schmid & Vignati (1964)	Southern Patagonia: Santa Cruz	1 horse	Intentionally killed, no reference to their place of deposition	Yes	Yes
Childs (1936)	Southern Patagonia: Santa Cruz	Horses	Intentionally killed, eaten by dogs	–	Yes
Martinic (1995)	Southern Patagonia: Strait of Magellan (Puerto Peckett)	Horses and dog	Intentionally killed, no reference to their place of deposition	–	Unspecified
Dumont d'Urville (1841)	Southern Patagonia: Strait of Magellan	Horses and dogs	Intentionally killed, no reference to their place of deposition	–	Unspecified
Gardiner (1842)	Southern Patagonia: Strait of Magellan (Puerto Oazy)	Horses and dogs	Skinned, and hanged up on poles around the tomb	–	Unspecified
Roncagli (1884)	Southern Patagonia: Santa Cruz	Horses and dogs	Intentionally killed, no reference to their place of deposition	–	–
Williams (1913)	Southern Patagonia: Santa Cruz	Horses	–	–	–
Borgatello (1924)	Southern Patagonia: Santa Cruz	1 horse	Intentionally killed, placed in line along the valley	–	–
Childs (1936)	Southern Patagonia: Santa Cruz	1 horse	Intentionally killed	–	Yes
Lista (1998)	Southern Patagonia: Santa Cruz	Horses and dogs	–	–	Yes
Prichard (2003)	Southern Patagonia: Santa Cruz	Horses, dogs and dead prey	Preys inside the burial	–	–
Onelli (1998)	Southern Patagonia: Santa Cruz	Horses	Intentionally killed, no reference to their place of deposition	–	Yes
Fitz Roy (1933)	Unspecified	1 horse	Skinned and hanged up on poles around the tomb	–	–
Lista (1998: 36)	Unspecified	1 horse	–	–	–

Appendix 2. —Archaeological mortuary contexts in Patagonia with asociated fauna.

Region: study area	Site	Burial type	Chronology	Sex and age composition	Grave goods	Associated faunal remains	Sources
Northern Patagonia: Northwestern Neuquén	Aquihuecó	Primary and secondary multiple burials	3650 BP	30 male and female adults, 26 subadults	Lithic materials, grinding artifacts, ocre	Pacific Ocean valves in necklaces, bone instruments of unspecified taxa with evidence of processing	Della Negra & Novellino 2005; Della Negra *et al*. 2009
Northern Patagonia: Northern Neuquén	Caepe Malal 1	Primary and secondary multiple burials	18th century	12 individuals (mostly female, adults)	Pottery, metal artifacts, pottery, beads	Ovicaprids: quarters of carcasses still articulated to scapulas or pelvis; skulls, rib cages, vertebrae associated to particular individuals Horses (*Equus caballus* Linnaeus, 1758): disarticulated remains in sediments and a scapula associated directly to one individual Dog (*Canis lupus familiaris* Linnaeus, 1758): complete; associated to an individual; valves: associated to a particular individual Unidentified mammal and horse long bone: associated to an individual	Hajduk & Biset 1996; Hajduk *et al*. 2000
Northern Patagonia: Neuquén	Rebolledo Arriba	Individual primary burial	1670-1760 AD	Female adult	Cupper ear rings, pottery, tupu, textiles; on top of the burial: a pipe and pottery; European artifacts	On top of the burial: horse bone fragments	Hajduk 1982
Northern Patagonia: Neuquén	Quila-Chanquil	Unspecified	Historical	Unspecified	European artifacts	Horses	San Martín 1930; Hajduk 1982
Northern Patagonia: Río Negro	Chimpay	Primary burial	Late 19th century	1 male adult, 1 female adult	Male individual: metal artifacts, glass bottle; Female individual: metal artifacts, LOZA (crockery/ earthenware) glass beads, cupper, lithic spinning whorls (*tortera lítica*) and textile fragments	Male individual: articulated sheep (*Ovis aries* Linnaeus, 1758) rack Female individual: bone fragments of river weasel of Río Negro (*Thylamys pallidior* Thomas, 1902) and bird remains (*Veniliornis* sp)	Prates *et al*. 2016
Southern Patagonia: Northwestern Santa Cruz	Puesto El Rodeo 17	*Chenque*: multiple, primary burials	1380 ± 90 BP; 4800 ± 150 BP	1 older male adult; 1 young male adult; 1 indeterminate adult	A hearth with lithic debris for each individual	Faunal remains in every hearth; older male adult: guanaco (*Lama guanicoe* Müller, 1776) and huemul (*Hippocamelus bisulcus* Molina, 1782) hide fragments	Gradín & Aguerre 1994; Patti de Martínez Soler & López 1994
Southern Patagonia: Northeastern Santa Cruz	Heupel 1	*Chenque*: multiple, primary burials	730 ± 60 BP	1 older male adult, 2 subadults	Adult: bird bone awls and whale bones; subadults: cupper plates	Whale bones as part of the funerary structure associated to the adult	Salceda *et al*. 2001; Zubimendi *et al*. 2011
Southern Patagonia: Río Ibañez (Chile)	Puerto Ingeniero Ibáñez 11	*Chenque*: individual primary burial	570 ± 40 BP	Young female adult	Grinding artifact, lithic core	A few, scattered bird bones	Reyes 2002

Appendix 2. — Continuation.

Region: study area	Site	Burial type	Chronology	Sex and age composition	Grave goods	Associated faunal remains	Sources
Southern Patagonia: Campo Volcánico Pali Aike (Chile)	Juni Aike 6	*Chenque*	–	Young male adults	Lithic artifacts: stemmed lithic point, boleadora, side scraper, flake	Bone mammals (probably guanaco) to the individual	Aguilera & Grendi 1996
Southern Patagonia: Magallanes San Gregorio (Chile)	San Gregorio 11	Burial on marine terrace, marked by rock blocks	–	Adult	Flaking debris, snail shell with ocre	Isolated valves (*Mytilus chilensis* Hupé, 1854; *Nacella magellanica* (Gmelin, 1791)), bird bone fragment	Massone *et al*. 1985

APPENDIX 3. — Sex and age composition of burials and grave goods. Abbreviations: **BUB**, Burials Under Blocks (*c*. 2600-2200 BP); **I. CH**, Initial *chenques* (*c*. 1500-1200 BP); **L. CH**, Late *chenques* (*c*. 800-350 BP); **MCA**, Medieval climatic anomaly.

Burial type	Site – Burial	Number of Individuals	Number of Adults	Number of subadults (under 20 years)	Number of subadults (under 10 years)	Lithic artifacts	Pottery	Shell beads	Glass beads	Metallic artifacts	Bone artifacts	Fauna
Niches/BUB (Pre-MCA)	SAC 1-8	3	3	–	–	–	–	4	–	–	–	Yes
	SAC 1-11	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 4-2	6	6	–	–	10	–	–	–	–	2	Yes
	SAC 4-N1	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 4-N2	1	1	–	–	–	–	–	–	–	–	No
	SAC 4-N3	1	1	–	–	1	–	–	–	–	–	No
	SAC 4-N4	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 4-N6	4	2	2	2	3	–	–	–	–	–	Yes
	SAC 19-1	2	1	1	1	–	–	–	–	–	–	Yes
	SAC 30-2	1	1	–	–	–	–	–	–	–	–	No
I. CH (Pre-MCA)	SAC 1-7	2	2	–	–	1	–	–	–	–	–	Yes
	SAC 3-1	3	3	–	–	1	–	–	–	–	–	Yes
L. CH (Post-MCA)	SAC 1-1	9	3	6	5	4	–	51	41	–	–	Yes
	SAC 1-2	6	1	5	5	11	18	508	–	–	–	No
	SAC 1-3	1	1	–	–	2	–	–	–	–	–	No
	SAC 1-4	6	3	3	3	23	–	–	–	–	–	Yes
	SAC 1-5	3	–	3	3	–	–	–	1	1	–	No
	SAC 1-6	4	2	2	2	–	–	–	–	1	–	No
	SAC 2-4	2	–	2	2	1	–	1	–	1	–	Yes
	SAC 2-5	4	3	1	1	2	–	–	–	–	–	Yes
	SAC 4-1	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 8-3	4	2	2	1	–	–	–	–	–	–	Yes
	SAC10-1	5	–	5	3	1	–	347	–	3	–	No
	SAC 10-2	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 10-3	1	1	–	–	1	–	–	–	–	–	No
	SAC 10-4	3	2	1	1	–	–	–	–	–	–	No
	SAC 12-1	1	1	–	–	–	–	–	–	–	–	Yes
	SAC 20-3	2	2	–	–	5	–	–	–	–	–	Yes
	SAC 22-1	3	1	2	1	2	–	–	–	–	–	Yes
	SAC 30-1	4	2	2	2	–	–	–	–	2	–	No

Appendix 4. — Taphonomic and processing mark comparison between chenques and domestic open-air sites in northwest Santa Cruz. References: *Chenques*, this paper; ILB, CP2 OA: Rindel 2009; GSLN, LPA1, LPA2, LS2, LS3c1, LS5, MS3S3, MS1M4: Bourlot 2009. Abbreviations: **Cut + Pe**, cut marks + percussion mark; **CP2 OA**, Cerro Pampa 2 Ojo de Agua; **GSLN**, Grippa Sí Litto No; **ILB**, Istmo Lago Belgrano; **LPA1,** La Primera Argentina 1; **LPA2**, La Primera Argentina 2; **LS2**, La Siberia 2; **LS3c1**, La Siberia 3 concentración 1; **LS5**, La Siberia 5; **MS3S3**, Médanos Sur 3 sondeo 3; **MS1M4**, Médanos Sur 1 muestreo 4; **W0-5**, wheathering stages.

Modification	Chenques	ILB	CP2 OA	GSLN	LS2	LS3c1	LS5	LPA1	LPA2	MS3S3	MS1M4
W 0	68.8	1.09	0.17	22.68	28.77	49.29	4.95	14.57	20	34.55	69.11
W 1	13.24	8.32	5.33	16.94	18.7	23.75	12.37	11.33	11.87	11.76	19.11
W 2	8.97	30.14	40.96	15.68	23.74	9.92	21.78	28.74	15.31	17.4	8.82
W 3	7.26	36.89	40.96	17.92	17.26	10.28	36.13	32.79	26.25	18.62	2.94
W 4	1.28	23.57	12.04	18.06	10.07	3.54	24.25	12.14	22.5	15.19	0
W 5	0.42	–	0.51	8.68	1.43	3.19	0.49	0.4	4.06	2.45	0
Manganese	22.1	25.26	41.82	11.04	0	18.49	9.38	0.4	14.06	13.93	3.68
Root marks	16.66	37.67	11.01	35.77	38.96	39.04	61.97	10.4	17.18	25.18	23.36
Rodents	13.04	3.61	1.89	2.4	22.72	1.36	4.22	1.6	6.56	1.46	0.81
Carnivore	3.26	0.62	1.37	1.56	1.94	2.73	2.34	0.4	0.31	0.48	0.81
% Guanaco *Lama guanicoe* Müller, 1776	17.39	97.01	86.84	91.53	96.15	93.29	46.31	98.31	100	99.03	99.59
NTAXA	6	3	4	6	3	2	1	6	3	2	2
Cutmarks	5.79	14.91	9.82	7.84	11.76	16.76	8.54	15.78	17.81	15.68	11.76
Percussion marks	2.89	23.39	8.62	10.36	3.67	6.62	4.02	2.02	2.5	5.63	19.74
Cut + Pe	1.81	14.12	7.06	4.76	12.5	7.66	3.05	5.66	2.81	3.67	5.88
Burning	16.66	–	0.34	1.7	2.4	8.5	1.4	7.6	3.4	11	5.6

Appendix 5. — Evidence of processing per burial. Abbreviations: **Burnt**, thermoaltered bones; **Cut**, cut marks; **Perc**, percussion marks; **SAC**, Sierra Colorada sites.

Taxa		SAC 1-1	SAC 1-4	SAC 1-7	SAC 3-1	SAC 4-1	SAC 4-2	SAC 4-N1	SAC 4-N4	SAC 4-N6	SAC 22-1	SAC 10-2	SAC 1-11	SAC 12-1	SAC 19-1	SAC 20-3	SAC 8-3	SAC 1-6	SAC 2-5-1
Guanaco	NISP	3	2	4	1	–	13	1	2	7	1	1	1	2	–	9	–	–	1
Lama guanicoe	Cut	1	0	0	0	–	2	1	0	0	1	0	0	0	–	1	–	–	0
Müller, 1776	Perc	0	0	2	0	–	2	0	0	0	0	0	0	1	–	0	–	–	0
	Cut + Perc	0	0	1	0	–	1	0	0	0	0	0	0	0	–	0	–	–	0
	Burnt	0	0	0	0	–	0	0	0	1	0	0	0	0	–	0	–	–	0
Fox	NISP	18	2	1	–	–	18	–	–	2	–	–	–	–	–	48	71	–	–
Lycalopex	Cut	1	0	0	–	–	2	–	–	0	–	–	–	–	–	0	3	–	–
Burmeister, 1856	Perc	0	0	0	–	–	0	–	–	0	–	–	–	–	–	0	0	–	–
	Cut + Perc	0	0	0	–	–	0	–	–	0	–	–	–	–	–	0	0	–	–
	Burnt	3	0	0	–	–	0	–	–	0	–	–	–	–	–	0	33	–	–
Lesser rhea	NISP	–	–	8	–	1	1	1	–	–	–	1	–	–	–	–	–	–	–
Rhea pennata	Cut	–	–	0	–	0	0	1	–	–	–	0	–	–	–	–	–	–	–
d'Orbigny, 1834	Perc	–	–	0	–	1	1	0	–	–	–	0	–	–	–	–	–	–	–
	Cut + Perc	–	–	1	–	0	0	0	–	–	–	0	–	–	–	–	–	–	–
	Burnt	–	–	0	–	0	0	0	–	–	–	0	–	–	–	–	–	–	–
Huemul	NISP	17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hippocamelus	Cut	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
bisulcus Molina, 1782	Perc	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Cut + Perc	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Burnt	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Skunk	NISP	–	1	5	–	–	–	–	–	–	–	–	–	–	–	8	–	–	–
Conepatus	Cut	–	0	0	–	–	–	–	–	–	–	–	–	–	–	0	–	–	–
humboldtii Gray, 1837	Perc	–	0	0	–	–	–	–	–	–	–	–	–	–	–	0	–	–	–
	Cut + Perc	–	0	0	–	–	–	–	–	–	–	–	–	–	–	0	–	–	–
	Burnt	–	0	0	–	–	–	–	–	–	–	–	–	–	–	0	–	–	–
Birds	NISP	2	2	–	–	–	2	1	–	–	–	2	–	1	1	6	–	4	–
	Cut	0	1	–	–	–	0	0	–	–	–	0	–	0	0	0	–	2	–
	Perc	0	0	–	–	–	0	0	–	–	–	0	–	0	0	0	–	0	–
	Cut + Perc	0	0	–	–	–	0	0	–	–	–	0	–	0	0	0	–	0	–
	Burnt	0	0	–	–	–	0	0	–	–	–	0	–	0	0	0	–	0	–

Appendix 6. — Bone assemblage composition per burial and taxa. Abbreviations: **MCA**, Medieval climatic anomaly; **SAC**, Sierra Colorada sites.

Burial Type	Site-Burial	Guanaco *Lama guanicoe* Müller, 1776	Fox *Lycalopex* Burmeister, 1856	Skunk *Conepatus humboldtii* Gray, 1837	Choique *Rhea pennata* Brisson, 1760	Bird	Huemul *Hippocamelus bisulcus* Molina, 1782
	SAC 1-11	1 cervical vertebra	–	–	–	–	–
	SAC 4-2	1 thoracic vertebra; 1 pelvis; 2 ribs; 1 humerus shaft; 3 radiulna shaft; 1 calcaneus; 2 metapodial shafts; 2 proximal phalanges	1 pelvis fragment; 2 radioulna shafts; 1 distal femur; 1 distal tibia; 1 calcaneous; 1 talus; 6 distal metapodials; 4 proximal phalanges	–	–	2 distal tibiatarsal	–
	SAC 4-N1	1 femur shaft	–	–	1 cervical	1 radioulna shaft	–
	SAC 4-N4	1 femur shaft; 1 metapodial shaft	–	–	–	–	–
	SAC 4-N6	1 mandibule fragment; 1 thoracic vertebra; 1 pelvis fragment; 1 rib fragment; 1 sternebra; 1 proximal first phalange; 1 second phalange	2 distal metapodials	–	–	–	–
	SAC 19-1	–	–	–	–	1 tibiatarsal	–
Initial *chenques* (Pre-MCA)	SAC 1-7	1 femur shaft; 1 tibial shaft; 2 distal metapodials	1 proximal radioulna	3 skull fragment; 2 mandibules	1 radioulna shaft; 2 femur shafts; 1 proximal tibia; 4 tibial shafts	–	–
	SAC 3-1	1 distal metapodial	–	–	–	–	–
Late *chenques* (Post-MCA)	SAC 1-1	1 incisive; 1 proximal first phalange; 1 second phalange	1 rib fragment; 1 radioulna shaft; 1 distal femur; 1 tarsian; 1 talus; 1 calcaneous; 4 distal metapodials; 7 first phalanges; 1 third distal phalanx	–	–	2 tibiatarsal	1 axis; 7 cervical vertebras; 5 distal metapodials; 2 proximal first phalanges; 1 second phalange; 1 third phalange
	SAC 1-4	1 tarsal; 1 second phalange	1 proximal humerus; 1 second phalange	1 carnasial	–	1 skull fragment; 1 distal femur	–
	SAC 4-1	–	–	–	1 distal tibiatarsal	–	–
	SAC 8-3	–	6 teeth; 28 skull fragments; 20 rib fragments; 3 scapulas; 4 proximal humerus; 3 proximal radioulnas	–	–	–	–
	SAC 10-2	1 third phalange	–	–	1 cervical vertebra	1 proximal humerus; 1 proximal tibia	–
	SAC 12-1	1 tympanic bula; 1 proximal metacarpal	–	–	–	1 tibiatarsal	–
	SAC 20-3	2 skull fragments; 1 rib fragment; 1 scapula fragment; 1 distal humerus; 1 proximal metacarpal	17 vertebrae; 1 scapula fragment; 1 humerus shaft; 19 distal metapodials; 6 first phalanges; 4 second phalanges	2 skull fragments; 1 rib fragment; 2 scapula fragments; 2 talus; 1 calcaneus	–	1 pelvis fragment; 1 carp/ metacarpal; 2 femur shafts; 1 second phalange	–
	SAC 22-1	1 proximal phalange	–	–	–	–	–