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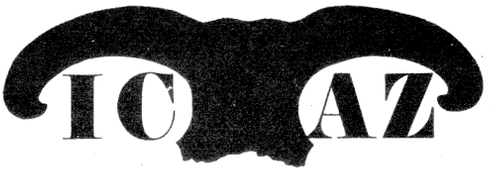

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PREHISTORIC UTILIZATION OF FAUNAL RESOURCES IN ARID ARGENTINA

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INTRODUCTION

This paper presents faunal information from archaeological sites in continental arid southern Patagonia excavated during the last two decades (see Figure 1). We were able to build up a chronological framework based on all the radiocarbon dates available for layers with archaeofaunal data.

Only the presence or absence of taxa was recorded. We believe that presence does not necessarily mean human utilization, other agents besides man can contribute to the processes of formation of an archaeological deposit. But the importance of the taxa present still remains, mainly in its inferential and interpretative potential. Criteria for distinguishing between cultural and natural bone deposits (following Thomas, 1971) were: body parts present, spatial distribution, evidence of butchery such as fractures and cut marks, alteration by burning, modification of bones for use as artefacts, owl pellets and post-depositional factors operating in site formation such as burrows. Due to the scanty information published it was not possible to use these criteria for Los Toldos.

We have established a series of periods which not only have chronological meaning but also inform us about human adaptative behaviour.

FIRST PERIOD (12,600 - 8,500 BP)

The information comes from several sites in southern Patagonia (see Table 1 & Figure 1).

At Los Toldos one of several caves was excavated by Menghin (1952) in the early 1950's obtaining the first stratigraphic sequence for Argentine southern Patagonia. Cardich et al (1973) published a report of their excavations in another sector of Cave No.3. As this site has no published faunal report, this information must be gleaned from several publications (Cardich, 1977; 1978; Cardich et al, 1973; 1977). A recent report on the bone material from Menghin's excavations at Los Toldos Cave No.2 adds some information but has no radiocarbon dates (Mengoni Goñalons, 1976-80). The correlation of this material with the dated cultural layers of Cave No.3. has not been reexamined since Menghin's papers.

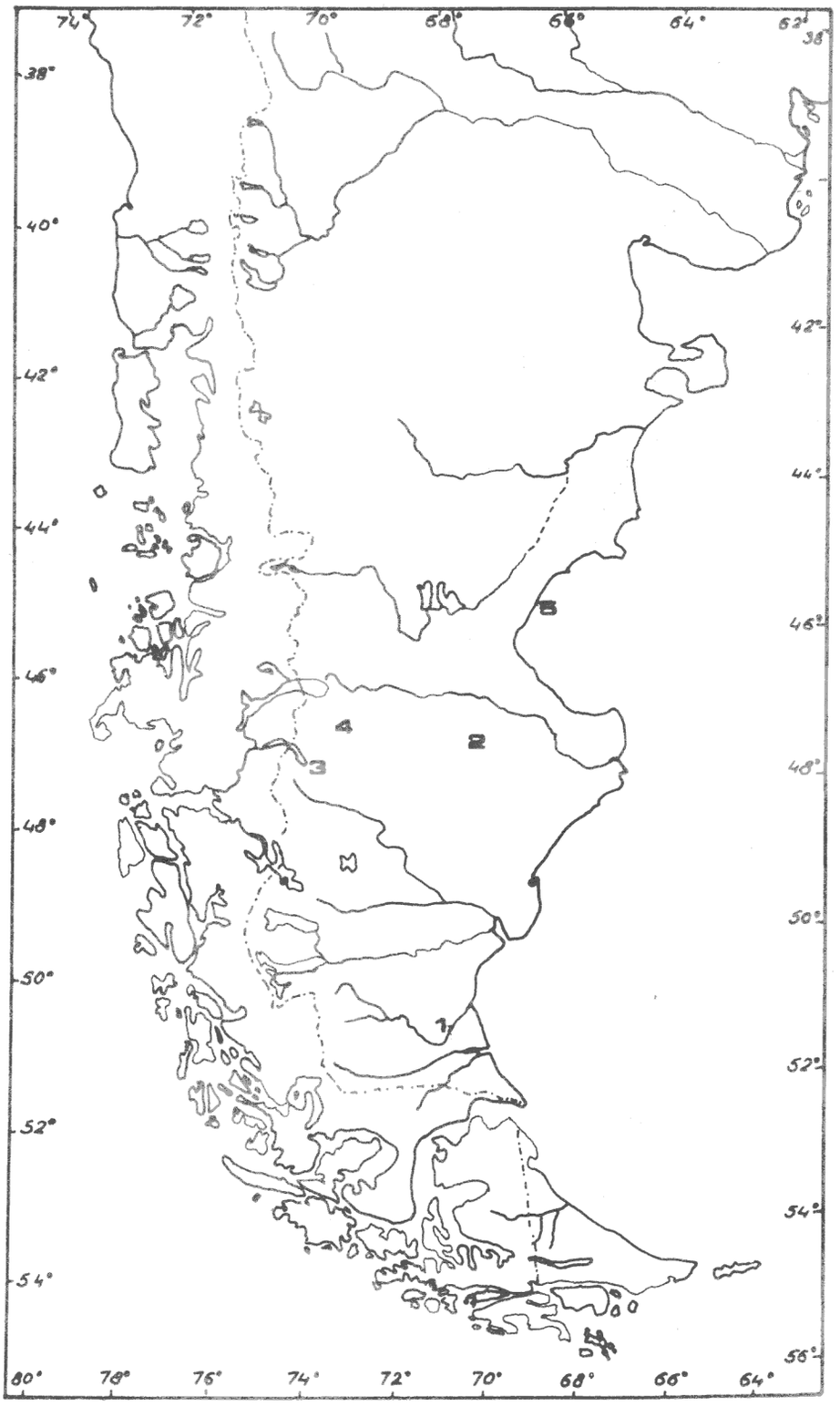

FIGURE 1: Southern South America to show the locations of sites mentioned in the text. 1 Las Buitreras 2 Los Toldos 3 Cerro de los Indios 4 Cuevo Grande del Arroyo Feo, Cuevo de las Manos 5 Bahía Solano

Taxa present belong to extinct mammals such as a horse (Hippidion - Onnohippidion s.l.), and a small camelid (cf. Lama gracilis), and to modern animals such as guanaco (Lama glama guanicoe) and rodents (see Table 1). This material came from layer 11 which is dated c. 12,6000 BP.

At Las Buitreras, a cave site, layers 7 and 8, which still has no radiocarbon date, yielded bones of mylodon (Mylodon (?) listai), horse (Hippidion - Onohippidion s.l.), an extinct fox (Dusicyon avus), guanaco, cetacean (Delphinidae), tucu-tucu (Ctenomys sp.) and birds. (Sanguinetti de Bórmida, 1976; Caviglia & Figuerero Torres, 1976; Caviglia, in press; Caviglia et al, 1981).

Overlying layer 6 is a volcanic ash layer which can be locally correlated with Auer´s Tephra I dated c. 9,100 BP (Auer, 1974). This provides a minimum date for the layers mentioned above (Sanguinetti de Bórmida & Borrero, 1977).

In northwest southern Patagonia, in the Río Pinturas area, we have two cave sites with faunal reports.

Layers 6 "base" and 6 "media" of Cueva de las Manos are dated c. 9,300 BP (see Table 1) and show the presence of guanaco, fox (Dusicyon sp.), puma (Felis concolor), chinchillón (Lagidium sp.), ñandú (Rheidae), waterfowl (Fulica sp.) and fish (cf. Percichtys sp., a native trout). (Gradin et al, 1976; Mengoni Gonalons & Silveira, 1976.

At Cueva Grande del Arroy Feo layer 11 dated to c. 9.300 BP gave guanaco, ñandú (Rheidae), tucu-tucu, chinchillón, grey fox (Dusicyon griseus), and birds, and fragments of ñandú eggshell. (Gradin et al, 1979; Silveira, 1979).

Back again at Los Toldos Cueva No. 3, layers 9 and 10 gave horse (only layer 10), possibly Lama gracilis, guanaco, fox (Dusicyon sp), felid (Felis sp.), ñandú (Rheidae), partridge (Eudromia sp.), and birds of prey. Unfortunately there is no definite date for the persistence of horse as it is present up to layer 10 and the radiocarbon date of c. 8,700 BP comes from the upper part of overlying layer 9 (see Table 1).

This period shows evidence of the arrival of man in Patagonia, as well as association of man with extinct and modern fauna.

Early human adaptive behaviour in southern Patagonia points towards generalization. Extinct herbivores such as horse, mylodon, and camelids are present, but the utilization of faunal resources included ñandú, carnivores, rodents, waterfowl and other birds, and fish.

The change from a generalized strategy that included extinct species to a generalized strategy with no extinct fauna was gradual as was the disappearance of the megafauna. This process may also have had regional significance if we compare sites from the Río Pinturas area with Los Toldos and Las Buitreras.

Pianka (1978: 265) states that "a low expectation of finding prey, or a high mean search time per item, demands generalization". This low expectation and generalization evidenced by our data corresponds, for us, to

the existence of a young ecosystem in southern Patagonia at this early date. Pisano (1975) studied the Magellanic biota, analyzing its structure, distribution of ecosystems, and the taxonomic composition of plant and animal communities. In summary he concludes that after the retreat of the Patagonian glaciers after c. 13,000 BP (Mercer, 1976) the southward migration of plants and animals was a highly selective process. This can be seen in the present ecosystem where there is a low diversity and scarce endemism of plants, low diversity and low population density of the terrestrial mammals, and a high percentage of migratory or non-resident birds that occupy many possible niches of other consumers. Finally he states that there exists a series of historically young ecosystems with a low degree of homeostasis. The extinction of the large herbivores in a short lapse of time did not affect this situation of a young ecosystem with a low species diversity and low biomass.

For this period we can distinguish between main, complementary and occasional resources according to their economic importance measured by two variables: predictability and abundance in the ecosystem (Dyson-Hudson & Smith, 1978).

resources	spatial predictability	temporal predictability	abundance	economic importance
horse	+	+	?	C to O
mylodon	+	+	?	C to O
guanoco	+	+	+	M
rodents	+	+	+	C
ñandú	+	+	?	O to C
waterfowl	+	+	+	C
carnivores	-	-	+	O

+ = high, - = low
M = main, C = complementary, O = occasional

The question that remains is why there is no evidence of early exploitation of marine resources, except for the solitary presence of Delphinidae in Las Buitreras. A probable answer is that at the end of the Pleistocene and beginning of the Holocene the coastline of Patagonia was very different from what it is now. At the beginning of the 1960's research on the Atlantic continental shelf of Patagonia was carried out by Richards & Craig (1963) on marine molluscs and by Boltovskoy (1973) on foraminifera. Fray & Ewing (1963) using the study by Richards & Craig and several radiocarbon dates on shell material from deep sea cores showed that 11,000 to 12,000 years ago the coastline was well to the east of its present position and was 110 metres lower. In the modelling of the south Atlantic coast isostatic, eustatic and epirogenic episodes and processes took place. An example of this is a raised beach, 9 metres above sea level, near Comodoro Rivadavia (Golfo San Jorge) dated in 5,350 ± 200 BP (Richards, 1971).

Therefore, several coastal characteristics such as sea-level, topography and probably bathymetry changed during late Pleistocene and early Holocene times. This lack of stability caused fluctuations in the distributions of coastal resources and in their availability. Finally we may conclude that early coastal sites are now submerged under the sea.

Second period (8,500 - 4,500 BP)

The information comes from several sites. Layer 6 "cumbre" of Cueva de las Manos dated c. 7,300 BP (see Table 1) gave guanaco and fish (probably native trout) (Mengoni Goñalons & Silveira, 1976). At Los Toldos Cueva No. 3 layers 6 and 7 (its lower part dated in c. 7,260 BP) yielded guanaco, dog (Canis familiaris) and birds (see Table 1 Cardich, 1977, 1978; Cardich et al, 1973, 1977). Cardich et al (1977) determined the presence of domestic dog based on a fragment of a lower mandible classified as belonging to C. familiaris and some foot bones that could be cf. C. familiaris. Caviglia (1978) who studied the remains of Dusicyon avus from Las Buitreras layer 8 judges that the Los Toldos mandible is of Dusicyon cf. avus. Hopefully this difference in the authors' opinions will promote further research and discussion on one of the most interesting points of archaeozoological studies, the relationship of man and dog. For layer 5 "cumbre" and "base" of Las Buitreras (see Table 1) we have several taxa present: guanaco, rodents, Rheidae eggshell, and birds of prey (Caviglia & Figuerero Torres, 1976). Layer 9 of Cueva Grande del Arroyo Feo dated to c. 4,900 BP shows the presence of guanaco, ñandu, piche? (Dasipodiae) and Rheidae eggshell (Silveira, 1979) (see Table 1).

This period showed the utilization of modern fauna only in a generalized way, a tendency already perceived during the first period. From this period on the guanaco is the only terrestrial big game herbivore available with the exception of the huemul (Hippocamelus sp.) which appears late in the archaeological record of arid Patagonia. This is probably due to two factors: (1) a late Holocene expansion of this species to an arid environment different from its present subantarctic forest habitat, (2) the evidence yielded by sites in the ecotonal zone (forest/steppe) closer to the Andes and still not dated.

Tentatively we assign economic importance to the species mentioned above in the following way:

resource	spatial predictability	temporal predictability	abundance	economic importance
guanaco	+	+	+	M
ñandú	+	+	+	C to M
egg (Rheidae)	-	+	+	O to C
tucu-tucu	+	+	+	C
birds (of prey)	+	-	-	O
fish	-	-	?	O

+ = high, - = low,
M = main, C = complementary, O = occasional

TABLE 1: Faunal data for sites in the hinterland of continental southern Patagonia

Fish	Birds indet.	Birds of prey	Waterfowl	Eudromia sp.	Rheidae	Rodents (mainly Cricetidae)	Ctenomys sp.	Lagidium sp.	Dasipodidae	Delphinidae	Felis sp.	Canis familiaris	Dusicyon sp.	Cervidae	L.g.guanicoe	L. gracilis	Hippidion-Onohippidion s.l.	Mylodon (?) listai	C14 yrs. bp	lab. sample number	site	layer capa
					×		×						×		×				1,610± 60	NOVA-115	Las Manos	4c
		×			×	×	×							×	×				1,660± 50	CSIC-399	Arroyo Feo	R III
		×	×		×	×	×	×	×				×		×				3,320± 50	CSIC-395	C.Los Indios	3e
					×	×	×						×		×				3,330± 50	CSIC-398	Arroyo Feo	6b
					×		×								×				3,380± 90	NOVA-116	Las Manos	5
					×	×	×		×						×				4,900± 50	CSIC-397	Arroyo Feo	9
	×	×			×	×									×				4,310± 110	Gak-6051	Las Buitreras	5 cumbre *
		?										×			×				7,670± 70	CSIC-372	Las Buitreras	5 base
																			no date		Los Toldos	6 *
×															×				7,260± 350	BVA-Arsenal	Los Toldos	7
															×				7,280± 60	NOVA-117	Las Manos	6 cumbre
		×		×	×						×		×		×	?			8,750± 480	BVA-Arsenal	Los Toldos	9
																	×		no date		Los Toldos	10 *
	×					×	×			×					×		×	×	9,100 min.		Las Buitreras	7
	×					×							×		×			×			Las Buitreras	8
×			×		×	×		×			×		×		×				9,320± 90	CSIC-138	Las Manos	6 media
	×				×	×	×	×					×		×				9,330± 80	CSIC-396	Arroyo Feo	11 base
						×									×	×	×		12,600± 600	BVA-Arsenal	Los Toldos	11b

* taxa assigned an intermediate position between layers; authors do not specify layer provenance.

Third period (4500 - ? BP)

The information for this period comes from two different areas.

In the northwest of southern Patagonia, layer 5 of Cueva de las Manos gave guanaco, tucu-tucu, and Rheidae (Mengoni Goñalons & Silveira, 1976). At Cueva Grande del Arroyo Feo, layer 6 includes guanaco, red fox (Dusicyon culpaeus, tucu-tucu and Rheidae plus eggshell (Silveira, 1979). (See Table 1).

To the west, layer 3e of Cerro de los Indios, a rock-shelter near Lago Posadas, dated c. 3,3000 BP yielded guanaco, fox, piche (Dasiposidae), chinchillon (Lagidium sp.), tucu-tucu, Rheidae, waterfowl (Anatinae) and birds of prey. (See Table 1) (Mengoni Goñalons, n.d.).

The sequence of Arroyo Feo continues with layer R III dated to c. 1,650 BP with more guanaco, tucu-tucu, Rheidae, eggshell, birds of prey and with the appearance of cervid (cf. Hippocamelus sp.) (Silveira, 1979) (see Table 1). In the same area at Cueva de las Manos, layer 4c dated to c. 1,600 BP, we have the presence of guanaco, fox (Dusicyon sp.), tucu-tucu and Rheidae (Mengoni Goñalons & Silveira, 1976) (see Table 1).

For this area northwestern Patagonia, we suggest that there was a generalized hunting strategy with a high dependence on guanaco, complemented with Rheidae, tucu-tucu, birds of prey and waterfowl.

Research conducted on the coast of Golfo San Jorge, more precisely in Bahía Solano (see Figure 1), revealed evidence of the utilization of marine resources. These sites were sampled: BS 1 (on the terrace of 3 m above sea level), BS 3 trenches T1 and T2 (on the 9 - 10 m terrace) and BS 14 (on the 6 m terrace). Although these sites are not dated they can be placed in this period by comparing their lithic assemblages with similar dated layers in the hinterland (Borrero & Caviglia, in press; Caviglia & Borrero, in press).

BS 1 showed in its four layers a preponderance of Mytilus and few Patinigera. Among the vertebrates: sea lion (Otaria sp.), cuis (Microcavia sp.), Dasipodidae and fish (see Table 2).

BS 14 yielded a similar picture to BS 1 a high percentage of Mytilus and a low quantity of Patinigera. Only three of its five layers showed the presence of vertebrates (see Table 2). Among the mammals were: guanaco, fur seal (Arctocephalus sp.) and Dasipodidae. Fish bones were also found.

The three layers of BS 3 trench T1 showed a high percentage of Aulacomya, but few Mytilus and Brachiodontes. And among the vertebrates: guanaco, Pinnipedia, Dasipodidae, fish and Rheidae eggshell.

At the BS 3 trench T2 the more abundant species were Chione, Mytilus, Aulacomya and Balanus. Among the mammals were: cuis, tucu-tucu, Dasipodidae and dolphin (Cephalorhynchus sp.). Additionally there were penguin (Spheniscus sp.) and fish bones.

Most of the layers include other species of molluscs as well, but those which have contributed to the diet are mentioned above (Caviglia & Borrero, in press). Brachiodontes did not show evidence of consumption but may have

TABLE 2: Faunal data for sites at Bahia Solano

Fish	Birds indet.	Spheniscus sp.	Rheidae (including egg)	Dasipodidae	Cephalorhynchus sp.	Pinnipedia indet.	Otaria sp.	Arctocephalus sp.	L. g. guanicoe	Ctenomys sp.	Microcavia sp.	Balanus sp.	Chione sp.	Patinigera sp.	Aulacomya sp.	Mytilus sp.	layers	site
X			X	X					X		X			X		X	II	BS 1
X				X					X					X		X	IV	
														X		X	VI	
X			X	X			X		X		X			X		X	VII	
X			X	X					X						X	X	I	BS 3 T 1
X			X	X		X			X						X	X	III	
X				X		X			?		X				X		V	
X		X		X	X					X	X	X	X		X	X	I	BS 3 T 2
								X	X					X		X	I	BS 14
														X		X	III	
														X		X	V	
X														X		X	VII	
				X		X								X	X	X	IX	

x = presence. Relative importance for molluscs is discussed in the text. Mollusc data is presented abridged (species with less than 2% were omitted from the table).

been collected together with the edible mussels Mytilus and Aulacomya.

Probably the incorporation of coastal resources was correlated with the stabilization of the sea level and other geomorphological processes. It is important to note that although molluscs were exploited, marine mammals are also incorporated besides terrestrial resources such as guanaco and Rheidae. Therefore, we think that molluscs were not an important source of calories compared with pinnipedes or guanaco. Adaptatively the exploitation of sedentary molluscs and colonial marine mammals is relevant because they are highly predictable resources.

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