EARLY PATAGONIAN HUNTER-GATHERERS: SUBSISTENCE AND TECHNOLOGY[1]

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The process of the initial human exploration and colonization of Fuego-Patagonia was probably one of a slow filling in of empty spaces. The available information, coming mostly from caves and rockshelters, is sufficient to initiate a discussion on the subsistence and technology of the early Patagonian hunter-gatherers. All the evidence points toward a generalized diet. Opportunistic use of Pleistocene mammals, together with a more systematic use of guanaco, is indicated. A redundant pattern of association of artifacts with ground sloth, horse, and guanaco is evident. Lithic artifacts were routinely and expediently made on rocks available in the immediate vicinity, with an emphasis on the transport of bifacial artifacts and/or preforms, adequate for situations of high mobility. Local raw material was used predominately. Human populations were living at low densities, and space, as well as other resources, was probably abundant in relation to human needs. Density-independent adaptations are thus indicated. Under these conditions, no major need for niche differentiation existed, and it is not necessary to postulate specialized use of parts of the ecosystem.

USING ALL THE AVAILABLE evidence, this article discusses the conditions under which human populations initially explored the region of Fuego-Patagonia. To achieve this aim, technological and subsistence data from different sites widely distributed in the region are analyzed.

Patagonia is a very large territory of more than 900,000 km^2 located between 39° and 55° south latitude in southern South America. Rainfall is quite variable, reaching more than 5,000 mm of annual precipitation in the west, near the Andes, but averaging only 200 mm in the east. Accordingly, extensive forests border both sides of the Andean Cordillera, while dry steppe with patches of gramineous steppe is predominant in the east (Papadakis 1974).

Late Pleistocene times in Fuego-Patagonia were marked by the retreat of the cordilleran glaciers, a process that was well under way ca. 14 ka B.P. (Clapperton 1993) and that was accompanied by an amelioration of climate, punctuated by short cold pulses. Palynological (Heusser and Rabassa 1987) and geological data (Marden 1993) have been used to identify the Younger Dryas chron in Patagonia, but this evidence is contested by some researchers (Ashworth and Markgraf 1989; Markgraf 1991). Nevertheless, the existence of short cold pulses between 14 and 10 ka B.P. is widely accepted (Markgraf 1991; Heusser 1993; Clapperton 1993). In addition, there are indications of atmospheric circulation patterns different than those of today (Kutzbach and Guetter 1986), as well as major volcanic activity around the end of the Pleisto-

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cene (Stern 1990). Significant geomorphological changes are also indicated, principally the lowering of the sea during Pleistocene glaciation, which exposed lands that are now under water.

It is important to take into account the available information on climatic change, since some of the indicated changes made Fuego-Patagonia difficult to colonize. For example, if the existence of a cold event equivalent to the Younger Dryas is accepted, then we must assume that climatic conditions were much colder than those recorded during the Holocene, implying low-productivity environments during a crucial moment of human exploration of the region.

Available information comes from sites located both west and east of the Andean Cordillera and from Tierra del Fuego (Table 1), and it may be important to treat these regions separately in the future. The main difference among them is related to the specific habitats in which the various sites are located. The sites on the Pacific slope are concentrated in a narrow band between 55° and 52° south latitude which, during the Pleistocene-Holocene Transition, was characterized by treeless Magellanic tundra (Heusser, Borrero, and Lanata 1993). The sites on the Atlantic slope are more widely distributed and during the Transition were located in steppe habitats (Markgraf 1988) (see Figure 1).

The main subsistence resource in Fuego-Patagonia, the guanaco (*Lama guanicoe*), is widely distributed in the steppe, and only in Tierra del Fuego does it inhabit the forest. Not much is known about the distribution of Pleistocene mammals, but it is clear that ground sloth (*Mylodon* sp.) and horse (*Hippidion saldiasi*) were living in open habitats.

TABLE 1
Archaeological Sites Radiocarbon Dated between 13 and 8 ka B.P.

Sites	Temporal Span (ka)	Number of Dates
Pacific Slope		
Cueva del Medio	12.3–9.5	14
Cueva Lago Sofía	11.5	3
Atlantic Slope		
Los Toldos 3	12.6–8.7	2
Cueva Fell	11.0–8.1	7
Piedra Museo	10.4	1
Arroyo Feo	9.4–8.4	4
Cueva de las Manos	9.3	2
Pali Aike	8.6[a]	1
El Ceibo	n.d.	n.d.
Las Buitreras	n.d.	n.d.
Los Toldos 2	n.d.	n.d.
Tierra del Fuego		
Tres Arroyos	11.8–10.2	3

a. minimum age
n.d. = no data

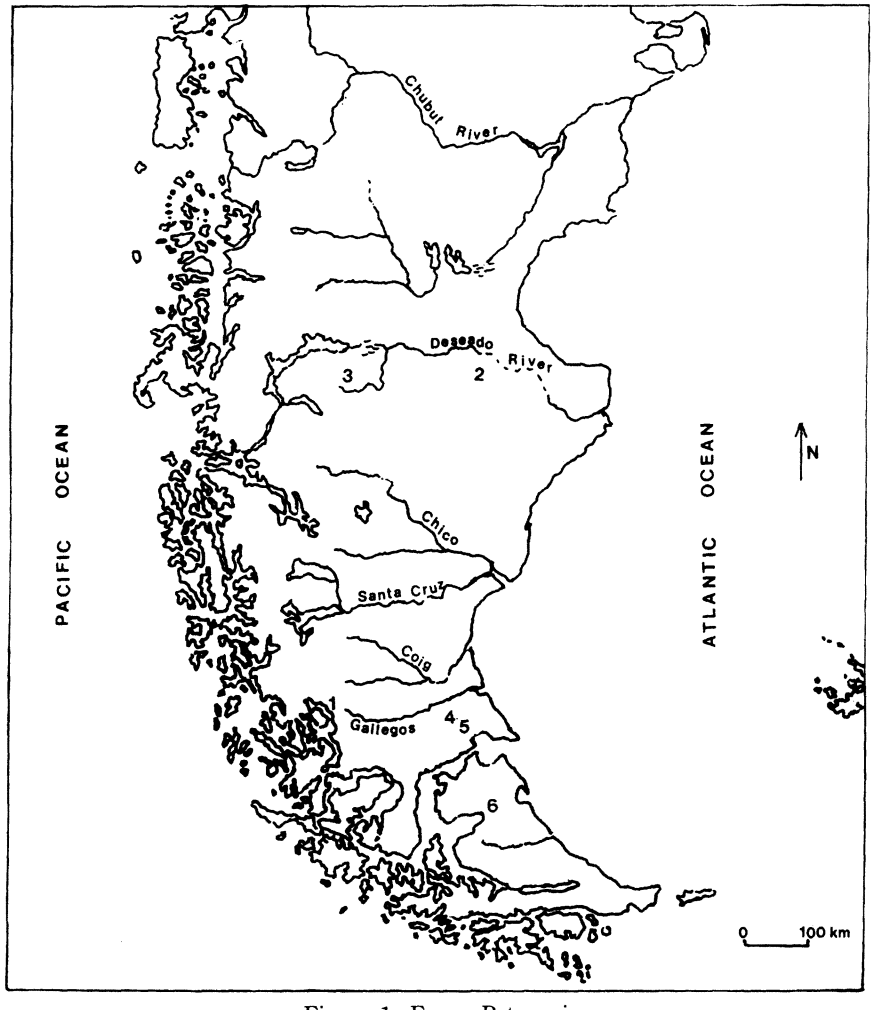

Figure 1. Fuego-Patagonia
Showing Major Early Man Sites

1. Cueva del Medio, Dos Herraduras 3, Cueva Lago Sofía 1, and Cueva Lago Sofía 4
2. Los Toldos 2 and 3, El Ceibo, Piedra Museo
3. Cueva de las Manos and Arroyo Feo
4. Las Buitreras
5. Cueva Fell and Pali Aike
6. Tres Arroyos

All the evidence relevant to the discussion of the early exploration and colonization of Fuego-Patagonia has been obtained in caves and rockshelters. Even when there are differences in location of the sites, any complete understanding of regional land-use patterns at that time is precluded, since only activities performed under rock roofs have been sampled. Nonetheless, the available

information is adequate to initiate a discussion of the subsistence and technology of early Patagonian hunter-gatherers.

CHRONOLOGY

A radiocarbon chronology is available for Fuego-Patagonia, which for the earliest Fuego-Patagonian sites ranges approximately between 12.6 and 10 ka B.P. The oldest radiocarbon datings are, however, not without problems (see Table 1).

Los Toldos 3 and Cueva del Medio have each produced a single date older than 12 ka B.P. The former is a determination without a lab number made on dispersed pieces of charcoal, whose interpretation is plagued by lack of clear provenance references (Cardich, Cardich, and Hajduk 1973). It should not be used until more analyses from the level in question are performed. As concerns the "old" date from Cueva del Medio, the sample had been extracted from the same hearth that also produced a date of 10,500 ± 120 yr. B.P. (Nami 1987), so it might be advisable at least to average both results. However, additional AMS dates confirm an age around 10.5 to 11.0 ka B.P. (Nami and Nakamura 1995). For the rest of the sites, datings between 11 and 10 ka B.P. are common (Borrero 1996). In sum, a dating of around 11 ka B.P. is acceptable for the initial human exploration of Fuego-Patagonia. The main evidence comes from the sites of Cueva del Medio, Cueva Lago Sofía 1, Piedra Museo, Tres Arroyos, and Cueva Fell. Around 10 ka B.P., evidence of widespread human presence is coincident with a warming trend that peaked between 9 and 6 ka B.P. (Markgraf 1989:19). Indications of some demographic success may be inferred from certain properties of the archaeological record, in particular, evidence for more continuous or redundant occupations.

HUMAN REMAINS

The human remains of Cerro Sota, recovered by Junius Bird in the 1930s (Bird 1988), have traditionally been considered to be representative of the initial colonizing populations of Late Pleistocene times. In this light, Turner (1992:15) recently wrote that "these specimens are probably the most securely dated of all presumed Paleoindian teeth from South America." The mistake of ignoring the obvious fact that only the deposits were dated was also made by Soto-Heim (1994), who uncritically accepts the Cerro Sota, Pali Aike, and Lago Sofía materials as representing "Paleo-Indian human remains." The fact is that when three samples of human bones from Cerro Sota were submitted for AMS radiocarbon analysis, a dating of around 3.9 ka B.P. was indicated (Hedges et al. 1992), and the Lago Sofía sample has recently been dated to around 4.0 ka B.P. (Prieto 1991). Claims were made for Late Pleistocene antiquity at Mata-Molle in northern Patagonia (Vignati 1957–1959), but those human remains were dated to ca. 4.5 ka B.P. (Fernández 1983). Thus, all that is left as potential evidence of the first populations are the undated

remains from Pali Aike, also excavated by Bird in the 1930s. These bones should be dated before putting them to any use. In sum, nothing is really known concerning the anatomy of the early settlers of Fuego-Patagonia.

EXPLORATION

The initial human exploration of Fuego-Patagonia implies movements into unfamiliar territory, probably following routes of least effort and with a nonoptimal use of places (Borrero 1989). Such an exploration suggests the existence of occupational discontinuities at the local and regional scales. In other words, sparse populations were distributed over large territories. Expectations for the discovery of sites and artifacts (*sensu* Aschero 1983) representing this exploratory phase are low since they should be deeply buried in contexts which were more exposed to perturbation than later deposits have been. Alternation in the use of places by carnivores and humans was probably frequent, thus further reducing the possibility of recognizing the first occupations. Low visibility and low density combine to make sites representing the earliest inhabitants of Fuego-Patagonia difficult to discover. This is probably one of the reasons behind a heavy bias toward caves when dealing with Late Pleistocene sites.

LITHICS

What is expected in the way of lithic repertoires? Following principles associated with the design of tools relative to abundance or lack of appropriate raw material (see Franco and Borrero 1995, 1996a, 1996b and references therein), basically these expectations include: (1) an abundance of expediently shaped artifacts, adequate for immediate use; (2) curated artifacts in lower frequencies, mostly broken or discarded when exhausted; and (3) the presence of resharpening debitage or debitage associated with the final shaping of transported artifacts, such as bifacial preforms.

These considerations lead us to expect high frequencies of local rocks and low frequencies of exotic rocks.[2] For exotic rocks, we expect the transport of finished tools or preforms and perhaps cores. Using Nelson's (1991) concepts, reliability is not expected to characterize the tools. Except when high-quality rocks are abundant and very visible in the immediate vicinity (e.g., at El Ceibo [V. Duran, personal communication]), the artifacts should generally be made of materials whose qualities, in terms of knapping potential and suitability for specific functions, are below those of the best rocks regionally available.

If our scenario is correct, then one expectation is that for the exploratory phase, many similarities in selected rocks and prioritized strategies should be evident. In order to assess these expectations, we analyze existing data pertaining to the earliest occupations in Fuego-Patagonia.

Available, published information on lithics is scanty, with only a few cases of quantitative data (Aguerre 1977; Aguerre 1981–1982; Cardich and Flegen-

heimer 1978; Cardich and Paunero 1991–1992; Cardich, Paunero, and Castro 1993–1994; Gradin, Aschero, and Aguerre 1976; Jackson 1987; Mansur-Franchomme 1983; Massone 1987; Miotti 1996; Nami 1985–1986; Nami 1994). However, this information is adequate to assess the situation in Fuego-Patagonia. We will summarize the data for both slopes of the Andean Cordillera and for Tierra del Fuego at the southern tip of the continent (Table 2).

Atlantic Slope

Sites on the Atlantic slope are located principally in the basins of two major rivers, the Deseado and the Chico. Most of the available information comes from the former. Near the Chico River are located the famous Fell and Pali Aike sites, for both of which quantitative data are lacking. El Ceibo, Los Toldos, and Piedra Museo are located in the central Patagonian plateaus immediately south of the Deseado River, while Arroyo Feo and Cueva de las Manos are near the Pinturas River in the headwaters of the Deseado hydrographic system.

In El Ceibo, level 12, most of the raw materials, including basalt, opal, chalcedony, porphyritic rocks, fossil wood, chert, ignimbrite, and lutite, come from within a radius of about 8 km from the cave, and the only exotic artifact is a flake made on obsidian (Mansur-Franchomme 1983).

TABLE 2
Raw Material Provenance

Site	Raw Material		Total
	Local	Nonlocal	
Atlantic Slope			
El Ceibo, level 12	907 (99.89%)[a]	1 obsidian flake (0.12%)[a]	908
Los Toldos, Cave 3, level 11	mostly local	a few obsidian flakes	473
Piedra Museo, lower level	mostly local	n.d.	n.d.
Arroyo Feo 1, level 11	n.d.	10 obsidian flakes (2.38%)[a]	421
Cueva de las Manos, level 6 base and intermediate section[b]	no provenance data	obsidian (17.1%[c] of intermediate section. No data for base section.)	1,005
Pacific Slope			
Cueva del Medio	mostly local	chalcedony not available in the immediate vicinity	n.d. (partial description)
Cueva Lago Sofía 1	37 (100%)[a]	0	37

a. Percentage of total sample.
b. Partial data based on 1973–1974 field seasons. No percentages for 1977 field season.
c. Percentage of tool sample.
n.d. = no data

In Los Toldos Cave 3, level 11, raw materials are mostly local. Siliceous rocks, fossil wood, and a few exotic obsidians are present. There are no quantitative data to assess the presence of local versus exotic raw material for Los Toldos Cave 2, level 10 (Cardich and Paunero 1991–1992; Cardich, Paunero, and Castro 1993–1994).

Most of the raw material used in Piedra Museo comes from an area within 3 km of the site (Miotti 1996).

In Arroyo Feo, level 11, chert was the most utilized rock. Only ten obsidian flakes were recovered. There is no information on the local availability of rocks. However, on the basis of geological information, we assume that obsidian is not local. The only known source in the region is in Pampa del Asador, located some 40 km west of Arroyo Feo (Civalero 1996).

The situation is similar for Cueva de las Manos, located in the same region. There is no information on locally available rocks. Again, we can assume obsidian is not local. In level 6, lower zone, most of the raw material is chert (Aguerre 1977). In the intermediate zone of level 6, artifacts are mostly made of chert, obsidian, basalt, and rhyolite. Obsidian artifacts constitute 17.1 percent of the tool sample from this intermediate zone (Aguerre 1977; Gradin, Aschero, and Aguerre 1976). Both zones are dated to c. 9.3 ka B.P.

Pacific Slope

Both sites mentioned here—Cueva del Medio and Cueva Lago Sofía 1—are located along Ultima Esperanza Sound, never farther than 10 km from the seacoast. These sites are located near the ancient shoreline of a Late Pleistocene proglacial lake, of which only remnants exist today (Prieto 1991). No complete descriptions of artifacts or lithic materials exist for Cueva del Medio. However, the most commonly used rock is a local black tuff of excellent quality (Nami 1987, 1994). Nami (1987) mentions the presence of chalcedony not available in the immediate vicinity. In Cueva Lago Sofía 1, lutite was prevalent, and no exotic rocks were found. However, it must be stated that the sample size for Cueva Sofía is very small.

Tierra del Fuego

The single Late Pleistocene site known for Tierra del Fuego is Tres Arroyos Cave. It is located close to the Strait of Magellan in northern Tierra del Fuego. There is no available information on the relative importance of local versus exotic rocks at this site (cf. Jackson 1987; Massone 1987).

Discussion

We argue that the distribution of local versus exotic rocks in the lower levels of Los Toldos, El Ceibo, Piedra Museo, Cueva de las Manos, Cueva del Medio, and Cueva Lago Sofía 1 generally conforms to our expectations, with a majority of local rocks. Obsidian in the form of flakes or other debris is the most frequent exotic rock recovered. In younger deposits, either the frequency of exotic rocks is higher (as in the case of Arroyo Feo and Cueva de las Manos)

or the artifacts made from these rocks are more varied (including bifacial preforms and projectile points, as in the cases of Arroyo Feo and Los Toldos Cave 3). Material of excellent quality is abundant near El Ceibo and Los Toldos, and there is a high-quality tuff near Cueva del Medio. These immediately available rocks have been selected since the initial occupations of these sites.

In addition, humans locally produced and discarded tools. We can assume that this behavior was a response to immediate needs. Accordingly, we found that the most abundant artifacts in the earliest levels were made expediently. We base our conclusion on:

1. The abundance of prominent bulbs of percussion in Los Toldos and El Ceibo, suggesting initial stages of manufacture. This is not the case for Tres Arroyos. Data are lacking for the other sites (Table 3).

2. Evidence from the refitting of flakes and cores in Los Toldos 3, El Ceibo, Piedra Museo, Arroyo Feo, and Tres Arroyos. In the latter site, three of the refitted flakes show traces of wear, suggesting use immediately after their extraction (Jackson 1987) (Table 3).

3. The presence of higher percentages of unbroken sidescrapers made on local rocks in the lower levels of Los Toldos 3 and Cueva de las Manos than in the upper levels (Table 4), suggesting manufacture and immediate discard.

4. The presence of large, thick flakes in Los Toldos 3, El Ceibo, and Cueva Fell (Cardich and Flegenheimer 1978; Mansur-Franchomme 1983; Bird 1988; Miotti 1996) suggesting initial stages of manufacture. Such flakes tend to disappear in the upper levels of Los Toldos 3 (information is lacking for the other samples) (Table 3).

5. The large size and thickness of sidescrapers in Los Toldos Cave 3, El Ceibo, Piedra Museo, Arroyo Feo (Aguerre 1981–1982), Cueva de las Manos (Gradin, Aschero, and Aguerre 1976), and Cueva Fell (Bird 1988) (Table 5). In Los Toldos 3 and Cueva de las Manos, there is a reduction in the size of this kind of tool in the upper levels. There is no information for the other sites. The size of the tools suggests local manufacture and discard.

6. The large size and thickness of some endscrapers in Los Toldos Cave 3, El Ceibo, Piedra Museo, Cueva de las Manos, Arroyo Feo, and Cueva Fell (Table 5). In Arroyo Feo and Cueva de las Manos, some of them were made on nodules, cores, and/or primary flakes. The trend for these endscrapers is to disappear in the Middle Holocene.

7. The large size of cores, which is probably related to their low exploitation. There are mentions of the presence of cores with few blows and of nonexhausted cores for El Ceibo and Arroyo Feo (Table 3). However, caution is required, due to the existence of abundant high-quality rocks in the area and the lack of information about the size of cores for the upper levels.

8. The presence of tools made on cores and primary flakes for all the sites where there are available data.

9. The presence of hammerstones in El Ceibo, Cueva de las Manos, and Arroyo Feo, suggesting local manufacture of tools. No data are available for Piedra Museo and Cueva del Medio (Table 3).

TABLE 3
Indicators of Artifact Expediency in Early Archaeological Levels

Indicators	Atlantic Slope					Pacific Slope	Tierra del Fuego
	Los Toldos, Cave 3, level 11	El Ceibo	Piedra Museo	Cueva de las Manos	Arroyo Feo, level 11	Cueva Lago Sofía 1	Tres Arroyos
Prominent bulbs of percussion	high	61.45%	n.d.	n.d.	n.d.	n.d.	no
Cores and conjoinable flakes	1[a]	1 (25%)[b]	1	n.d.	3 (60%)[b]	no	1 (100%)[b]
Nonexhausted cores	n.d.	3 (75%)[b]	n.d.	n.d.	5 (100%)	no cores	n.d.
Presence of large, thick flakes	yes	yes	n.d.	n.d.	n.d.	no	no
Tools on cores	1 (2.08%)[c]	1 (2.12%)[c]	n.d.	presence	5 (14.28%)[d]	no	0
Presence of hammerstones	no	yes	n.d.	yes	yes	no	no
Tool reuse	n.d.	no	n.d.	yes	n.d.	no	no

a. Flakes from this level refit with one of the cores from levels 10 and 9.
b. Percentage of core sample.
c. Percentage of tool sample.
d. Percentage of identifiable sample.
n.d. = no data

TABLE 4
Comparison between Lower and Upper Levels of Los Toldos and Cueva de las Manos (Atlantic Slope)

	Los Toldos 3, level 11	Los Toldos 3, levels 9 and 10	Cueva de las Manos, level 6, base and intermediate sections	Cueva de las Manos, level 5	Cueva de las Manos, level 3a
Fragmentation index: sidescrapers	11.11%	36.36%	46.67%	53.57%	90.90%

TABLE 5
Technological Properties of Artifacts from Early Archaeological Levels

	Atlantic Slope						Pacific Slope	Tierra del Fuego
	Los Toldos 3	El Ceibo	Cueva de las Manos	Piedra Museo, lower level	Arroyo Feo, level 11	Cueva Fell	Cueva Lago Sofía 1	Tres Arroyos
Endscrapers	n = 12	n = 4	n = 10[a]	presence of	large and	presence of	no	n = 1
Length	30–106	42–67	31–119	large	thick	large		26
Width	24–68	44–57	66–88	endscrapers	endscrapers	endscrapers		37
Thickness	6–24	10–18	17–44					6
Simple sidescrapers	n = 4	n = 9	length mainly	large and	large and	presence of	n = 2	n = 2[c]
Length	58–70	53–69	from 80 to	thick	thick	large	77	66–67
Width	31–75	36–72	120 mm	sidescrapers[b]	sidescrapers[b]	sidescrapers	56	19–50
Thickness	9–20	10–23					n.d.	11–21
Transverse sidescrapers	n = 4	n = 3			large and		n = 1	n = 0
Length	55–61	79–94			thick		71	
Width	78–91	53–65			sidescrapers[b]		73	
Thickness	7–17	11–23					13	
Double sidescrapers	n = 2	n = 5			large and		n = 1	n = 0
Length	87–92	84–107			thick		113	
Width	65–66	80–86			sidescrapers[b]		43	
Thickness	12–14	19–21					21	
Cores	n = 4	n = 4	n.d. about	n.d.	n = 5	n.d.	n = 0	n = 1
Length	42–106	68–103	size of		51–115			47
Width	38–85	63–84	cores		31–65			31
Thickness	24–75	31–56			18–60			n.d.

Note: All measurements in millimeters.

a. Intermediate zone; only large endscrapers.

b. No reference is made to types of sidescrapers present in the sample.

c. A lateral endscraper was included with the sidescrapers.

n.d. = no data

10. With the exception of Cueva de las Manos, there is no evidence for tool reuse (Table 3). Although reuse is difficult to identify archaeologically, sometimes differences in patina can be used to suggest it in long-exposed contexts and depending on the properties of the specific raw materials.

In sum, the frequency of curated artifacts appears to be generally low. With the exception of Los Toldos, there is always evidence for the existence of bifacial reduction and for the transport of bifacial artifact preforms (see Nami 1993–1994) (Table 6). The evidence from Cueva Fell is also concordant with this observation (Bird 1988). Obsidian artifacts appear to have been heavily curated, since only small flakes and debris are usually recovered. In addition, blades are already present in the lower levels of the Deseado sites on the Atlantic slope, although in small numbers.

Configuration of the transported tool kit should be related to clear priorities of design (Nelson 1991) and to the encounter rates for different prey. The tool kit should be responsive to the minimal subsistence necessities of a human group. In that sense we do not believe that exploration can be accomplished in short periods, say days or even weeks (Nami 1994), unless the geology and biota of the new region are not substantially different from those left behind. If we are not wrong, then versatility should have been given priority in technology, due to the requirements of transportability in an unfamiliar territory. Bifacial artifacts are especially suitable for transport when high mobility is required (Johnson 1987:5; Morrow 1987:141).

TABLE 6
Evidence for Bifacial Reduction

Site	Bifacial Preforms	Bifacial Reduction Flakes	Bifacial Projectile Points
Atlantic Slope			
Los Toldos, Cave 3, level 11	no	n.d.	no
Los Toldos, Cave 2, level 10	no	n.d.	no
El Ceibo	no	1 (0.2%)[a]	no
Piedra Museo	n.d.	n.d.	1[b]
Cueva de las Manos, base and intermediate section	1 (0.82%)[c]	n.d.	2 (1.65%)[c]
Arroyo Feo, level 11	1 (2.85%)[c]	n.d.	no
Cueva Fell	n.d.	n.d.	yes
Pacific Slope			
Cueva del Medio	1[b]	yes[d]	yes[d]
Lago Sofía 1	1 (16.67%)[c]	3 (13.4%)[a]	no
Tierra del Fuego			
Tres Arroyos	no	yes[d]	2 (18.18%)[c]

a. Percentage of flake sample.
b. No data on total sample.
c. Percentage of tool sample.
d. Nonquantified data.
n.d. = no data

FAUNAS

Pleistocene faunal remains are widespread in the early archaeological contexts of Fuego-Patagonia (Miotti, Salemme, and Menegaz 1988) (Table 7) and on many occasions were considered to have been deposited by human consumers. But caution should be used in interpreting this evidence, since an ambiguous origin of the faunal remains can often be postulated. One case involves the horse remains from the lower levels of Cueva Fell, some of which display many large carnivore puncture marks (Borrero and Martin 1996). However, other evidence at Cueva Fell, including horse bones with cut marks, clearly demonstrates human presence (Bird 1988). It is clear that more than one agent was involved in the deposition of these remains. One of the faunal analysts of Cueva Fell wrote, "It is assumed that the deposition of the remains of the carnivores is due to the agency of man" (Saxon 1979:338). We can no longer accept this assumption. Instead, we take the alternative position, arguing that some of the ungulate remains may have been deposited by the carnivores themselves. In this light, it is interesting to consider that in some of the early deposits of Cueva Fell, coincident with the so-called Period II, 68.4 percent of the identified bones derive from hawks, falcons, and terrestrial carnivores (Saxon 1979:340). Instead of viewing this figure as a reflection of predator consumption by humans, we use it as part of an argument for natural deposition.

In some cases a reevaluation of the faunal remains leads to elimination of a site's archaeological status, as in the case of Cueva del Mylodon, which for years had been interpreted as a site where the killing and/or processing of Pleistocene megafauna took place. It is now clear, based on the degree of articulation, lack of cut marks, and nature of the deposits, that the abundant remains of *Mylodon darwini* were naturally deposited (Borrero, Lanata, and Borella 1988). Even though most of the early sites include remains of extinct animals, the bones of an *extant* species, the guanaco, predominate (Table 8). Perhaps the case of Cueva del Medio can be argued to be an exception, since (extinct) horse remains appear to be important (Nami and Menegaz 1991). Bones of the lower legs appear to be most abundant, together with head parts. However, evidence in the form of cut marks on horse bones has not yet been presented for this site. Nevertheless, camelid remains are still more abundant than those of horse at Cueva del Medio (Tables 8 and 9).

After the disappearance of the megafauna, one recorded trend continued to be the absolute dominance of the guanaco. Variations in the composition of guanaco bone assemblages are observed, including cases of sites like Arroyo Feo which can be explained as the result of discard of low economic value parts (Borrero 1989), Tres Arroyos where only a few bones are present (Mengoni Goñalons 1987), or Los Toldos 3 where many high economic value parts are recorded (Cardich and Miotti 1983).

The roles of small birds, small mammals, and plants in human subsistence in Fuego-Patagonia are not well understood. Bones of small mammals were

TABLE 7
Faunal Remains Associated with Early Deposits in Fuego-Patagonia

Site	*Lama guanicoe* (guanaco)	*Hippidion saldiasi* (horse)	*Lama sp.*	*Lama gracilis*	*Mylodon sp.* (ground sloth)	*Panthera onca mesembrina* (jaguar)	Cervidae	*Dusicyon avus*	*Macrauchenia sp.*	*Smilodon sp.* (saber-toothed cat)
Cueva del Medio[a]	x	x	x	x	x	x	x	x		
Cueva Lago Sofía 1	x	x			x					
Cueva Fell	x	x			x			x		
Cueva Los Toldos	x	x		x				x		
Piedra Museo		x		x	x					
Cueva Las Buitreras	x	x			x			x		
Tres Arroyos[b]	x	x	x		x			x		
Dos Herraduras 3[c]		x			x					
Cueva Lago Sofía 4[c]	x	x			x					x
Pali Aike	x	x			x			x		
Cueva Mylodon	x	x			x	x		x	x	
El Ceibo	x	x		x						

a. Bones assigned to Cervidae and to *Panthera onca mesembrina* were recovered below the dated deposits.
b. Bones assigned to *Hippidion sp.* were recovered below the dated deposits.
c. Palentological deposits.

TABLE 8
Minimum Numbers of Individuals for Guanaco and Fossil Horse

Site	Guanaco	Fossil Horse
Los Toldos 3, level 11	4	1
Los Toldos 3, levels 9–10	7	1
Piedra Museo, lower levels	4	1
Cueva del Medio	3[a]	2

Sources: Cardich and Miotti 1983, Miotti 1996, Nami and Menegaz 1991
a. *Lama sp.* and *Lama guanicoe*

TABLE 9
Faunal Remains at Cueva del Medio

	Lama sp. (NISP)	*Hippidion* (NISP)	*Mylodon* (NISP)
Skull		1	
Maxillae		1	
Mandibles	1		
Teeth	12	10	1
Articulations	9	5	
Metapodials	7		
Cervical vertebrae	2	1	
Lumbar vertebrae			2
Ribs	3		
Scapulae		1	
Tibiae	8	1	
Patellae		1	
Phalanges	21		
Sesamoids	6		
Dermal ossicles			1

Source: Namie and Menegaz 1991
NISP = number of identified specimens

recovered at a number of sites, but their status as prey is dubious in most cases. Birds were identified at some of the sites and were even moderately abundant in some places (Humphrey, Péfaur, and Rasmussen 1993; Table 10), but that is not usually the case. Again, the status of some bird remains is not clear (see Lefèvre and Pasquet 1994). *Attagis malovinus* (seedsnipe), which is recorded only in the lower levels of Cueva Fell, is a nonbreeding visitor which is only expected to be present in winter (Humphrey, Péfaur, and Rasmussen 1993:22), and cultural deposition is not required for its presence in the cave. The same is true for the raptors (Table 10).

At sites located in the Deseado Basin, the presence of two large flightless birds, the greater rhea and lesser rhea (*Rhea americana* and *Pterocnemia pennata*), is recorded. In Piedra Museo, both species, which today are allopatric, are present in the same deposit associated with a radiocarbon date of 10.5 ka B.P. (Miotti and Tonni 1996). It is pertinent to ask if this situation can be

TABLE 10
Bird Remains Recovered at Cueva Fell

Species	Period I	Period II	Period III
Geese			
Chloephaga picta	1/1	2/1	8/8
Chloephaga rubidiceps	1/1	2/1	1/1
Grebe			
Podiceps cf. P. occipitalis	1/1	2/1	—
Ibis			
Theristicus melanopsis	—	2/1	1/1
Ducks			
Anas sibilatrix	1/1	1/1	—
Anas cf. A. flavirostris	—	—	1/1
Anas sp.	2/1	—	1/1
Tachyeres patachonicus	1/1	—	—
Hawks			
Buteo polyosoma	5/2	1/1	11/5
Buteo ventralis	8/3	1/1	8/3
Buteo sp.	2/1	—	3/1
Eagle			
Geranoaetus melanoleucus	—	—	1/1
Coot			
Fulica armillata	—	—	2/2
Seedsnipe			
Attagis malovinus	1/1	—	—

Source: Humphrey, Péfaur, and Rasmussen 1993:26
#/# = total number of bones/minimum number of individuals

considered evidence for the existence of disharmonious faunas in the past (see Graham and Lundelius 1984), but the case for averaged samples should be dismissed first (Borrero 1995). Dating of the bones themselves should clarify the issue.

As for plants, the only available evidence is the presence of plant remains (which were *not* identified within a human coprolite) recovered at Las Buitreras Cave in a Late Pleistocene deposit (Figuerero Torres 1986).

CONCLUSION

Clark (1994) recently revised definitions and applications of the concept of "migration," which has regularly been used to explain the colonization of empty lands. He appropriately considered migration to be dependent on the existence of large populations, in other words a density-dependent phenomenon. As already mentioned, this was not a property of the early populations of Fuego-Patagonia, which were sparsely distributed over the landscape. This situation suggests that most movements of people in the region could not be accounted for by migration.

The process of human exploitation and colonization of Fuego-Patagonia was

probably one of the slow filling in of empty spaces, with settlement being discontinuous in time and space (Borrero 1989). In Los Toldos 3, on average, about 0.06 retouched artifacts were deposited every hundred years per square meter (see Cardich and Flegenheimer 1978), and similarly low inputs of retouched artifacts were recorded at Cueva de las Manos (Borrero 1993) and Arroyo Feo (Table 11). Environments were in early successional stages, implying a low degree of homeostasis over geologically young substrates. Scarcity of ecological niches was a result of this situation (see Pisano 1975), meaning that the conditions for human dispersion were difficult.

A changing climate, including very cold pulses characteristic of the Late Pleistocene, probably made it difficult to explore and settle some regions (i.e., the plateaus, which are xeric deserts located 500–800 m above sea level). Discontinuity of occupation is probably one of the results of changes in the direction of colder climates. The formation of new biogeographical barriers during the crucial time of initial installation of human populations contributed to isolation of portions of those populations. These factors should be considered in conjunction with the above-mentioned evidence for early successional stages, volcanic activity, and cold pulses. In sum, those environments can be characterized as risky for human populations. Expected trajectories for tool kits, then, are divergent. Under these conditions, wide diet breadth and variations in technology attending to very local conditions probably were crucial factors for the survival of spreading populations.

Even when treeless habitats are indicated everywhere for the Late Pleistocene, variations between Magellanic tundra and cold steppe are observed. This evidence can be combined with that for variation in the location of caves and used to explain differences in faunal composition. Even when records exist for ground sloth in the Deseado Basin or farther north, it is clear that this animal was particularly available on the Pacific slope and south of the Santa Cruz River, where the Magellanic tundra biome was more extensive. More tolerant species, such as guanaco and horse, were more widely available.

Different industries, phases, and traditions have been proposed by several authors (e.g., Menghin 1952; Orquera 1987), but they lack any explanatory value (Borrero 1989). However, a redundant pattern of association of artifacts with ground sloth, horse, and guanaco bones, some of them with cut marks and burning, is evident. In addition, we have stressed that lithic artifacts are

TABLE 11
Artifact Deposition Rates

Site	Retouched Artifacts/ 100 Years/ Square Meter
LosToldos 3	0.06
Arroyo Feo	0.1
Cueva de las Manos	0.52

routinely and expediently made on rocks available in the immediate vicinity of sites, with an emphasis on the transport of bifacial artifacts and/or preforms, adequate for situations of high mobility. Sidescrapers are common artifacts, perhaps reflecting the minimally necessary activities carried out during the exploration of new lands. Local raw materials were predominantly used, with obsidian being the exotic rock present in small amounts in almost all the samples. It was probably highly curated.

All the evidence points toward a generalized diet. Opportunistic use of Pleistocene mammals is indicated. They constituted a rapidly dwindling resource, one that was probably known to only a few of the earliest inhabitants of the region. Analysis of the anatomical parts that dominate the lower levels of different sites shows differences in the tactics used to obtain and process prey. The notion of specialization, technological or dietary, as envisioned by some (e.g., Orquera 1987:347), appears difficult to sustain. Only ecological specialization, in the almost trivial sense that the resources used were obtained in different patches (Pianka 1983), can be sustained.

Low-productivity environments, together with climatic instability, preclude large populations. It can be argued that human populations in Fuego-Patagonia were living in low densities, and space, as well as other resources, was probably abundant relative to human needs. Density-independent adaptations (Pianka 1983) are thus indicated. Under these conditions, no major need for niche differentiation existed, and it is not necessary to postulate specialized use of parts of the ecosystem. The situation was going to change later during the Late Holocene, but that is another story.

NOTES

1. A preliminary version of this paper was presented to the Sixtieth Annual Meeting of the Society for American Archaeology, Minneapolis. Our thanks go to Mateo Martinic, Alfredo Prieto, and Pedro Cárdenas Soto, Instituto de la Patagonia, Chile, for making available for study the artifacts recovered at Sofía; to Dan Amick for his support; and to George Odell and two anonymous reviewers for their suggestions. Our research was conducted under the auspices of Consejo Nacional de Investigaciones Científicas y Técnicas and the Antorchas Foundation. The University of Buenos Aires gave financial support for the trip to Minneapolis. The manuscript was extensively edited by *JAR*'s Editor and Copy Editor.

2. In distinguishing local from exotic raw materials, we are following Meltzer (1989), who finds ethnographic support for using a distance of 40 km to distinguish local from nonlocal stone use.

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