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PETROBRAS

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EDITORIAL

O Museu de Arqueologia de Xingó, continuando a desempenhar seu papel de estimulador e de difusor da cultura arqueológica em sua região e no país, lança o segundo número de sua revista CANINDÉ.

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Revista do Museu de Arqueologia de Xingó

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ARTIGOS

HUNTER-GATHERER ARCHAEOLOGY IN SOUTH AMERICA

VIVIAN SCHEINSOHN*

ABSTRACT

A general overview of hunter-gatherer archaeology in South America is given by recognizing the main problems in a South American context. Environmental framework and Paleoecological changes are summarized. Pleistocene and Holocene archaeology is reviewed in terms of these particularities. With respect to the Pleistocene, I review Pre-Clovis human presence in South America, technological differences between North and South America, variability in South American subsistence strategy, colonization and demographic models, and migratory routes. The Holocene archaeology is divided into Early and Late. For the former, I consider establishment of adaptive strategies (as marine adaptations), new artifact designs, and mortuary behaviors. For the latter, I consider exchange networks, emergence of complex hunter gatherers, mortuary behavior, origins of food production, and the contact with European populations.

Key Words Pleistocene, Holocene, Pre-Clovis, adaptive strategies

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INTRODUCTION

South American hunter-gatherer archaeology has been strongly influenced by North American archaeology. Automatic application of North American models in South America and a tendency to overemphasize similitude on both continents were the consequences (see discussions in Anderson & Gilliam 2000; Borrero 1997b, 1999, 2001; Dillehay 2000; Gnecco 1990; Muñoz & Mondini 2002; Pineau et al. 2000; Politis 1999, 2002). In the North American sequence, the first colonizers, “Paleoindian,” were big game hunters, and more generalized “Archaic” hunter gatherers followed. I intend to show that the North American Paleoindian and Archaic labels mask the diversity of South American hunter gatherers. Many South American archaeologists have been criticizing this sequence with little impact on their North American counterparts. In addition, most North American archaeologists have discussed South American archaeology as it appears in Englishlanguage publications. Because South American archaeologists have investigated much of the record of South American hunter gatherers and most of their papers are written in Spanish, the North American view is at best partial (Ardila & Politis 1989).

The recognition of these problems has guided me in writing this paper. It would be vain to present a detailed inventory of hunter-gatherer archaeology. Several books deal with this subject (e.g., Dillehay 2000, Fiedel 1992, Sanders & Marino 1970, and Schobinger 1969 among others). Two excellent works also deal with research history, sociopolitical factors, and theoretical frameworks (Politis 2002, Politis & Alberti 1999). I have decided to describe the main trends and subjects that have arisen when discussing hunter-gatherer archaeology in South America. I establish three criteria for review. First, I assess South American particularities (cf. Pineau et al. 2000) in order to evaluate the challenges and opportunities that South America posed to humans. Second, I abandon traditional archaeological periodifications made on the basis of North American archaeology (see Gnecco 2000) and use only a chronological separation between Pleistocene and Holocene. And third, I focus this review on general trends and more recent works.

The New Archaeology has relied heavily on the concept of hunter gatherer. In spite of the current criticisms, some authors still consider the term to be useful (e.g., Dunnell 1994, Kelly 1995). Then, for practical

purposes and following Kelly (1995), I consider hunter gatherers to be those groups who procure most of their food from hunting, gathering, and fishing, even while growing some food, trading with agriculturists, or participating in cash economies as complementary activities.

HISTORY OF RESEARCH

Archaeological research in South America began almost contemporaneously with the development of scientific archaeology in the Old World, but only at the middle of the twentieth century was it included as a subject in university studies (Politis 2002). This research has been characterized as empiricist (Politis 2002). The main theoretical frameworks were North American culture history, German *kulturkreise* (Politis 2002), and the French school (López Mazz 1999). Social Archaeology was the only theoretical development originated locally (Arenas & Sanoja 1999, Bate 1977, Lumbreras 1974), which achieved only a limited repercussion. Processualism arrived at the beginning of the 1980s and became especially strong in the Southern Cone. Postprocessualism arrived at the beginning of the 1990s and slowly began to add more proponents. Today, in spite of a still-dominant empiricism, some theoretical variability exists among South American archaeologists, but serious pitfalls also prevented the development of original elaborations. First, publications in South America often take a long time. Some papers are published long after they were written, which renders their content old even before they are read. Second, little information flows between South American researchers. At the present time, some researchers are trying to avert this tendency. Several countries have organized many meetings jointly, and researchers from different countries attend national congresses held in neighboring countries.

THE SOUTH AMERICANWAY: ENVIRONMENTAL FRAMEWORK

South America (Figure 1) lies mainly in the Southern Hemisphere, stretching from $12\pm$ N to $55\pm$ S (Morello 1984), and shows high latitudinal variation, going from tropics to subpolar regions. More than half

the surface is located between intertropics; its maximum W-E width is located over the Equator (Morello 1984). Its main characteristics are:

- 1) Three great river basins (Orinoco, Amazonas, and Paraná) covering 10,000,000 km² (Clapperton 1993) presenting then the biggest hyperhumid space in the world, provided by the Orinoco and Amazonas basins (Morello 1984).
- 2) A large arid and semiarid surface that goes from Caribbean Coast to Caatinga on the NE and the Diagonal Arreica de América del Sur (South American Arid Diagonal) stretching N-S, from the Equator to 54± S (Morello 1984).
- 3) The Cordillera de Los Andes organizing the South American space. The Andes create, in a short distance, mosaics of different ecosystems at different altitudes (Morello 1984). Also there are other more ancient and lower highlands (Brasilia, Guyana, Tandilia, Ventania, and Southern and Northern Patagonian) with lesser effects on the continent (Clapperton 1993).
- 4) A great oceanic influence in the Southern Cone: The shape of the continent presents a narrowing. This coincides with the more temperate and colder latitudes, where marine influence is stronger, thus moderating summer and winter extreme temperatures. This results in environments that are less harsh than expected by latitude alone. Thus we can find gradients of increasing oceanicity, decreasing interoceanic distances, and a more ecosystemic and morphostructural simplicity in the southern portion (Morello 1984). This explains the lack of subpolar conditions and the current lack of tundra and permafrost in ice-free zones (Morello 1984).
- 5) Existence of unexpected natural phenomena derived from climatic anomalies (e.g., ENSO; see below) or unpredictable events (e.g., volcanic activity).

Phytogeographically we can define three main zones (Clapperton 1993):

- 1) East of Andes:
 - a) Tropical vegetation: as Caatinga (low arboreal deciduous scrubland, NE of Brazil), Cerrado (savanna grassland and forest, around Amazon rainforest and Brazilian planalto), Transition forests (belt



Figure 1 Map of South America showing regions mentioned in the text.

- between rainforest and Cerrado), Inundated and Terra rainforest
 - b) Subtropical vegetation: palm trees, parkland, and savanna, Pantanal (SW Brazil)
 - c) Temperate vegetation: Pampas and Chaco (grasslands and thorn forest)
 - d) Patagonian steppe: semidesert with dry resistant grasses and shrubs
-
- 2) West of Andes (from North to South):
 - a) Tropical rainforest in NW coast
 - b) Tropical desert from South Ecuador to Northern Chile
 - c) Evergreen broadleaf forest and maquis from Central Chilean Valley to 38±
 - d) Valdivian rainforest and deciduous forest in Southern Andes
 - e) Magellanic moorland in Southern Chile
-
- 3) Mountain vegetation:
 - a) Páramo: high-altitude grassland in Northern Andes
 - b) Puna: high-altitude grassland in Central South Andes
 - c) Andean and subandean forest belt in Southern Andes
 - d) Planalto (Brazilian Highlands): Tropical and subtropical forest and grasslands

PALEOECOLOGY

During the Pleistocene, South American glaciations were milder and more restricted than in the Northern Hemisphere and occurred only in the Southern Andes (Clapperton 1993).

The Late Glacial Stage began between 19,000 and 14,000 BP and ended between 11,000 and 10,000 BP (Dillehay 2000). Paleoforms suggest that the climate was drier, cooler, and windier than at present. The most important influences attributed to glaciations were:

- 1) in the Lowlands: There is persuasive evidence of aridity in the Orinoco savannas, western Amazonia, and wide areas of the Chaco-pampas plains. The presence of rainforest in Amazonia during glacial times is still under discussion. Some researchers argued that wet tropical lowlands could be transformed into dry

savannas and that the rainforest receded to isolated refugia. Others concluded that, although tropical rainforest underwent change during the glaciations, no data demonstrate aridity. Clapperton (1993) considers both perspectives and proposes a substantial rainforest reduction in transitional zones with preservation of coverage in zones with high precipitation.

- 2) in the Uplands/Highlands: Glaciations were denoted by geocryogenic, solifluction, and rock-wasting processes. Southern Patagonian Highlands show eolian relic features that suggest dryness, stronger and persistent winds, and less effective evaporation. Permafrost occurred south of $51 \pm S$ (Clapperton 1993).
- 3) in the Andean cordillera: Features related to glacial activity and geocryogenic processes exist in periglacial zones. Icefields were created as a result of glaciations

For the Late Pleistocene, Clapperton (1993) differentiates the following glacial cycles:

- 1) Early Late-Glacial Interval: Full glacial conditions returned worldwide between 15,000 and 14,000 BP.
- 2) Termination 1: Temperate conditions existed in southern South America between 14,000 and 12,000 BP.
- 3) Late-Glacial Interval (12,500–10,000 BP) equivalent to Younger Dryas from NW Europe. Most scientists continue to argue about the existence of this deterioration in South America. There is an extensive debate about the effects on the vegetation. According to Clapperton (1993), if a Late-Glacial cooling occurred in South America, it did not reach more than $2 \pm$ below current temperatures.

During the Holocene a wide record of fluctuations occurred that should have influenced human populations. A thermally optimum climate is implied at most sites for the Middle Holocene centered around 8500–5500 BP, warmer and drier than at present (Clapperton 1993). Three neoglacier advances have been modeled, following a scheme similar to the one suggested for the Northern Hemisphere, but new research suggests additional events. Re-advances were dated between 4700 and 4200 BP, 2700 and 2000 BP, and the last, known as the Little Ice Age, between 1340 and ca. 1850 AD (see Clapperton 1993, Villalba 1994). In

spite of the poor resolution of polinic records (Clapperton 1993), there is a broad agreement from different sources (Rabassa 1987, Villalba 1994) to confirm this model. The effects of the global warming event known as the Medieval Warm Epoch were recognized in South America and dated between 1080 and 1250 AD.

Also, after 5800 BP, with the return to Neoglacial conditions, the phenomenon called El Niño Southern Oscillation (ENSO) was onset first less frequent and weak, then increased in frequency and intensity around 3200–2800 BP (Sandweiss et al. 2001).

LIVING IN THE FRONTLINE: LATE PLEISTOCENE ARCHAEOLOGY

A set of main subjects could be followed in the available literature about this period.

Pre-Clovis Human Presence in South America

Currently, an intense debate exists regarding when and how South America was peopled. Once determined, the evaluation of South America's first settlement would directly impact the evaluation of North America's first settlement, given the current view of America's human peopling that sustains an entry from Beringia, going from North to South. At present, more pre-Clovis sites exist in South America than in North America, which challenges the view that Clovis was among the first settlers of North America (Clovis First Model). Thus, South American sites that are contemporaneous with or pre-dating Clovis have been subjected to intense scrutiny (Politis 2002). This scrutiny explains the interest and direct participation of some North American researchers in early site research in South America, though from different positions [e.g., Bryan 1973; Bryan & Gruhn 1992; Lynch 1974, 1990a,b; Roosevelt (see Roosevelt et al. 1996), and others]. Because a detailed account of these early sites can be found in Dillehay (2000), I use only two of the best known cases to show different appreciation: Monte Verde and Pedra Furada.

The 12,500 BP component of Monte Verde, situated in Central Chile, represents a forest-adapted economy, based on the collection of plants

and hunting. Evidence indicates a low-density colonizing population, adapted to cool temperate wetland and forest environment with a unifacial industry, bipointed projectile points, and bola stones. A wide variety of plants remains and wooden objects were recovered, along with features that were interpreted as tent structures (see Dillehay 1997, among others). After initial rejection followed by a long debate (e.g., Borrero 2001, Politis 2002), archaeologists finally accepted Monte Verde as pre-Clovis. This site also presents a deeper component dated to 33,000 BP, but even Dillehay doubts its anthropogenic nature (Dillehay 2000).

The situation in Pedra Furada, located in NE Brazil, is different and has been severely criticized. The sociopolitical aspects of these critics were detailed in Politis (2002). The fact that artifacts are made from quartzite obtained on a gravel bar situated 100 m above the site is among the more important of the scientific criticism. The chutes from this gravel bar could be seen from either side of the site, which renders it difficult to distinguish geofacts from artifacts (Dillehay 2000, Politis 2002). There is no megafauna or conclusive evidence of human activity at this site before 11,500 BP (Dillehay 2000).

Despite the rejection of other sites (e.g., Alice Boer, Toca da Esperanza), many are now accepted, and a growing record provides firm evidence of pre-Clovis sites. These are very different from what should be expected under the Paleoindian label. Even in Amazonia, where old models assumed that the lack of resources made life difficult for foragers (Politis 2002), early sites are being recovered (Roosvelt et al. 1996). Today, some researchers support the idea that, during the Pleistocene, people created their own patches of resources in order to increase their effectiveness in that environment (Gnecco 2000, Politis 2002).

TECHNOLOGICAL DIFFERENCES BETWEEN NORTH AND SOUTH AMERICA

Unifaciality and bifaciality Traditionally, the absence of bifacial artifacts (Pre-Projectile Point Stage formulated by Krieger, see Gnecco 1990) identified sites as early, but currently strong evidence exists of early bifacial artifacts. Debitage analysis documents the presence of bifacial reduction in southern South America (Nami 1993) and contemporaneous bifacial and unifacial industries (Dillehay 2000; see Ardila &

Politis 1989, Aschero 2000, Borrero 2001), with one predominating over the other according to necessity. The presence of one or the other could be related to site function, transportability (*sensu* Nelson 1991), and raw material availability (see Kuhn 1994).

Projectile points Early sites include a variety of projectile points, such as El Jobo, Pajján, triangular, willow, and fishtail points (Gnecco 1990), albeit their sequence is still unclear (Dillehay 2000).

Lanceolate El Jobo points show a limited distribution (northern South America) with the exception of those registered in Monte Verde, Argentinean Northwest, and Northern Chile (Bryan 1999). However, a case of convergence could be argued based on the generality of its design (Borrero 2001).

Fishtail points or *cola de pescado* are stemmed points with an end similar to a fish tail. Between 11,600 and 10,200 BP, they were widespread in South America from Southern Patagonia to the Pampas and Central Chile. They were discovered for the first time in the Cueva Fell site, in the southern tip of the continent, and characterized the first archaeological period termed Bird or Magallanes I (see Aschero 2000, Bryan 1999). Since many of them present fluting, some investigators have linked them with Clovis points (i.e., Morrow & Morrow 1999), regardless of differences in their morphology (Politis 1991) and reduction sequences that suggest separate origins (Nami 1996). Other researchers interpreted the dispersion of fishtail points as the result of functional effectiveness and a shared technology among different highly mobile populations, in which circulation of information played an important role (Aschero 2000, Politis 2000).

Bryan (1999) postulated a model explaining the dispersal of these points. Whereas Clovis projectile points thrived in North America (10,900–11,200 BP) and then spread to the South, fishtail, almost contemporaneously, dispersed to the North from the Magallanes Strait. Both traditions converged in Ecuador and Central America around 9000 BP. In contrast, Dillehay (2000) considers that El Jobo points and unifacial industries were developed between 13,000 and 11,000 BP and that regional cultural variation was in place between 11,000 and 10,500 BP, resulting in the use of fishtail, Restrepo, willowleaf (a kind of projectile point with a willowleaf-like morphology), and triangular projectile points. Politis (1999) has questioned such models considering it risky to

propose relationships or connections between different sites based on similar traits of only one class of artifacts. Cultural transmission models could help explain the dispersion of such artifact types, as Cardillo (2002) had proposed to do with lanceolate forms in the Puna.

VARIABILITY IN SUBSISTENCE STRATEGIES

Although guanaco is the main prey species in many contexts, humans were developing several subsistence strategies from the very beginning.

Beside the sea Current evidence supports an early exploitation of marine resources on the Pacific Coast (Bryan 1999, Richardson 1998), as shown by Peruvian sites (e.g., Talara, Quebrada Tacahuay, Pampa de los Fósiles, and Quebrada Jaguay). Some sites have evidence of transhumance between the coast and the interior (Richardson 1998). They include a unifacial industry (Amotope), as well as Paján and fishtail points. Paján developed as an adaptation to a grassy coastal plain. Lizards, snails, deer, birds, and fish were recorded in these sites, but not marine mammals (Chauchat 1988). In contrast, Southern Peruvian and Northern Chilean sites represent seasonal coastal exploitation. Fish remains suggest net fishing, given the lack of other specialized equipment (Dillehay 2000, Llagostera Martínez 1999).

The beast must die? Megafauna role In spite of the reliable association between artifacts and megafauna at many sites (e.g., Tibitó, Tagua-Tagua, Piedra Museo, Cueva del Medio, Cueva Lago Sofía), the place of these fauna remains in the early hunter-gatherer diet is still unclear. Megafauna presence could merely indicate contemporaneity between humans and large animals (as in Gruta del Indio, Argentina, Aschero 2000), or human bone exploitation (as Borrero 2001 suggested for Monte Verde). In any case, it is not the same kind of exploitation argued for the Clovis case.

In those sites where evidence of consumption is clear, megafauna is an opportunistic resource not highly ranked and may have been obtained by scavenging or hunting (Borrero 2001, Mengoni 1988). For

instance early sites in Patagonia with megafauna—Los Toldos Cueva 7 and AEP1 at Piedra Museo are among the best known, the latter presenting the most ancient occupation of Patagonia at almost 13,000 BP (see Miotti et al. 1999)—present those remains in the context of a hunting strategy that preferred camelids (Aschero 2000). Also, some authors explain megafauna extinction through multicausality instead of human pressure alone (Borrero 1984, 1997a; Mengoni 1988; among others). In any case, most agree that hunting was an additional but not definitive factor.

Between a Rock and a Hard Place: Altitude adaptation

Highlands occupation appears after 10,500 BP, although Lauricocha, Guitarrero, and Pachamachay have questionable evidence of earlier occupation (Dillehay 2000). In these regions, the physiological adaptation to hypoxia (low oxygen density) was critical and probably took some time (Bonavía & Monge 1999). Aschero (2000) suggests that people in Argentinean and Chilean Puna may have optimized the use of resources from three environments (Puna, quebradas, and valleys), located at different altitudes. Resources from valleys and forests were recorded in various archaeological Puna sites, in spite of the lack of sites in those areas where these resources came from (Aschero 2000). Puna exploration and later colonization are characterized by: (a) lack of unifacial or core flake tradition; (b) triangular and later willow-shaped projectile points; (c) camelid remains dominating the archaeofaunal record but with the important presence of rodents and Cervidae; and (d) lack of megafauna consumption (Aschero 2000).

The Secret Garden: Importance Of Plant Resources

Colombian La Elvira and San Isidro sites (Gnecco 2000) were located in the tropical forest. Gnecco (2000) believes these sites date back to the end of the Pleistocene, and exploitation or perhaps early manipulation of plant resources has been interpreted from evidence of tree clearance and artificial concentration of useful plants in certain areas. Lithic raw material was locally available in all of these early sites. Some Colombian early sites indicate sporadic and specialized use (Tibitó), but others, such as San Isidro, show non-specialized occupations and a wide variety of activities (Gnecco 2000).

COLONIZATION AND DEMOGRAPHIC MODELS

Dillehay (2000) developed a model considering different stages of human dispersion, migration, and colonization. At least three different populations may have existed: (a) populations equipped with a bifacial stone tool technology adapted to hunting in multiple habitats—their archaeological traces are El Jobo, fishtail, and Paiján projectile points, and they fed on megafauna and camelids; (b) populations possessing unifacial and bifacial technologies, adapted to multiple resources in specific habitats—they exploited environmental boundaries such as ecotones; and (c) populations with unifacial and curated bifacial technologies, who adapted to one environment and curated technology for specialized tasks with intensively occupied sites.

Borrero (2001) developed expectations for the Patagonian case, though they could be applicable to the entire continent for the same time period. Assuming that all exploring groups need to maintain contact with their groups of origin, he proposed that it takes time to successfully colonize a continent and that some failed attempts must have occurred. Low population density may have resulted from environmental instability in Patagonia in the Late Pleistocene and caused a discontinuous distribution of settlement and artifacts (Borrero 2001).

In sum, population density was probably low in Pleistocene times. Neighbors would have been few or none, but relationships with the original group would need to have been maintained, in order to ensure the group's survival. Therefore, the expected archaeological record should be scattered and hard to locate but should present some common characteristics in distant places.

MIGRATORY ROUTES: THE SOUTHERN HIGHWAY

Migratory routes may be recognized by knowing site distribution (Dillehay 2000). Bonavia & Monge (1999) proposed an oriental migratory route into Amazonia and another that followed the Cauca and Magdalena river valleys into other Andean valleys and further south. But this model assumes such a pace that the route should have remained as part of an intergenerational memory by oral tradition (Bonavia &

Monge 1999, p. 347). Because “first human populations moved along the Pacific and Atlantic coasts” (Dillehay 2000, p. 63), this situation should have determined a genetic isolation that could have caused differences between eastern and western cultures. This isolation ended when the glaciers receded, thus establishing the first horizon trait, namely the fishtail point (see above).

These models are hard to test archaeologically. Factors such as site visibility are not contemplated, and the “routes” are not stated from chronological gradients or technological sequence but by diffusionist mechanisms (Politis 1999). Currently new models, postulated from an ecological perspective (i.e., Anderson & Gilliam 2000, Steele et al. 1998, see below), are testable. Also, instead of considering migratory routes, it would be more fruitful to consider increases in range size predicted by biogeographical models (see Ruggiero et al. 1998), which should result in testable archaeological predictions.

WARMING UP: THE HOLOCENE

Following the Pleistocene patterns, the beginning of the Holocene presents a wide diversity of hunter-gatherer adaptations in South America. After 10,000 BP the archaeological signal becomes so intense that it is difficult to talk about hunter-gatherers on a continental scale because of the record richness that is generated. The Pleistocene/Holocene transition should not have made an important impact on human populations because they were in the process of adjusting to new environments (Borrero 2001). In fact, human populations thrived. From the Middle Holocene onward, humans had acquired a certain sedentarism and had developed complex hunter-gatherer societies (see below), had given place to a new way of life based on food production and, finally, had developed chiefdoms and states. This process changed the hunter-gatherers' social environment. Their neighbors were not solely hunter-gatherers anymore. Given this varied social environment, most of this section focuses on two regions where hunter-gatherers remained until historic times, notably the Southern Cone and Brazil.

The richness of the archaeological record has resulted in the use of various periodifications, most of them revolving around the term archaic or preceramic and based on regional idiosyncrasies. Industries,

traditions, and phases flourished in the literature. Most of them departed from an essentialist and/or cultural-historical perspective. Following Borrero (2001), I divide the Holocene into Early (10,000–5000 BP) and Late (5000 BP to present).

GETTING BETTER: EARLY HOLOCENE

By 9000 BP, the marked increase in temperature that started the Holocene was clear. This climatic amelioration prompted many researchers to postulate a demographic increase and resource exploitation intensification. Thus, a steady proliferation of industries and a faster rate of culture change, along with increases both in size and complexity of settlement growth and overall population levels, took place, especially in the coastal zones and arid grasslands (Dillehay 1993). In Patagonia, this intensification was expressed as changes in mobility, with less extensive circuits that would, in turn, take advantage of strategic sites for guanaco hunting, coupled with the emergence of blade technology, saving raw material and standardizing production (Aschero 2000). We should expect decreasing home ranges as well as founder effects and a high rate of innovation (Borrero 2001).

Although population expansion was taking place in some areas, the increasing temperatures showed different effects in other areas. For example, in the Chilean Puna (Atacama), a *silencio arqueológico* (archaeological silence) (see Nuñez et al. 2002) is postulated. This archaeological silence refers to the lack of human occupation between 8000 and 5500 BP, when aridity increased. Some authors (e.g., Aschero 2000, Nuñez et al. 1999) maintain that this *silencio arqueológico* should not be attributed to the abandonment of the region but instead to a retreat to strategic sites with concentrated resources. Seasonal programming, transhumant mobility with complementary resource use between high and low areas, information flow in wide ranges, and symbolic systems followed (Aschero 2000, Nuñez et al. 2002).

At a continental level, the most outstanding characteristics of this period are:

- 1) Establishment of adaptive strategies. Certain dominant adaptive strategies began to delineate. The most outstanding are the maritime coastal adaptations and some of them would set the

foundations for the ulterior appearance of complexity and sedentarism (see below). Three main areas show this adaptation:

- a) Peru, Ecuador, and Northern Chile: Marine hunter gatherers were established by 9700 BP (see above); they started exploiting deep sea resources, at first with simple hooks made of shell and then with composite hooks (shell and Cactacea thorn), nets, and harpoons. The traditional literature suggests that these resources allowed the development of complexity, as in the Complejo Chinchorro (Northern Chile, see below). The Peruvian Coast shows this adaptation represented in Las Vegas (9700–8000 BP) and Nanchoc, among others (Dillehay 2000).
- b) The Brazilian Atlantic Coast: *Sambaquí* is the term that describes the shell mounds that proliferated here from 6500 BP. People living there were specialized gatherers and fishers (see below).
- c) Southern South America: According to Orquera & Piana (1999, 2000), specialized gatherers and fishers existed from 6000 BP at many sites of the southern tip of Patagonia (Túnel I, Grandi I, Englefield, etc.). Their main staples were pinnipeds, albeit included in shell mounds (Orquera & Piana 2000). A characteristic of this kind of adaptation was the abundance of bone tools (Scheinsohn 1997).

Other hunter gatherers, especially those living in the Andean Highlands and Patagonia, focused on camelids, particularly guanaco (*Lama guanicoe*). Since then, coevolutionary relationships developed between humans and camelids, first as wild prey (guanacos, see L'Heureux 2002) and eventually as domesticated camelids (llama) in the Andean region. The guanaco is one of the biggest herbivores in South America and was commonly available in various environments (Borrero 2001, Muñoz & Mondini 2002). Thus, in some South American sites (e.g., Pampas and Patagonia) faunal diversity decreased, reflecting megafauna extinction and a concomitant increase of guanaco exploitation (i.e., Miotti et al. 1988).

- 2) A great variety of new artifact designs. In Patagonia, fishtail points were apparently replaced by bola stones, which were found in many grassland sites and even recorded in rock art at Cueva de las Manos.

Hunting strategies probably changed (i.e., collective versus individual) and explain the lack of projectile points in open environments, though projectile points should be expected in forested environments (Aschero 2000). Also, on the whole continent plant-processing tools increased in frequency and variety. They are associated with both wild plant exploitation and the development of the first cultigens. For instance, in Central Chile, the lithic polyhedron or indented circular cogged stones are conspicuously as long as *piedras de tacita*, interpreted as mortars (Mostny 1971). Also, in northern South America unifacial technology is associated with plant resource exploitation (Correal Urrego 1990, Uribe 1999). As mentioned for Patagonia, in terms of lithic production, behaviors tending to save and standardize lithic artifacts, such as blade production, also emerged (Borrero 2001). Finally, related to marine adaptations, new bone tools and special techniques adapted to this raw material were developed (Scheinsohn 1997, 2002).

- 3) Emergence of complex mortuary behavior, in contrast with the scarcity of human burials in Late Pleistocenic times (for an explanation on this last subject, see Barrientos 2002). Climax was reached with artificial mummification in Complejo Chinchorro. This practice started around 7000 BP. Individuals were skinned, butchered, eviscerated, dried, and then reconstructed, stuffed with wool and plant fibers, and modeled with clay forming a complex *fardo funerario* or funerary bundle (Mostny 1971, Llagostera Martínez 1999). These techniques allowed the conservation of bodies, which were accompanied by abundant offerings such as textiles, mats, and feather bundles. *Fardos funerarios* are also recorded in the Puna (Incacueva and Huachichocana) and Northern Argentina (Tarragó 1999), albeit without artificial mummification.

HERE, THERE, AND EVERYWHERE: LATE HOLOCENE

Increased density of sites and intensification of resource exploitation characterize the Late Holocene period. The increased density is evident, for instance, in Patagonia, where some sites are constantly re-occupied [e.g., Cerro de los Indios I (Aschero 2000)]. Humans were irregularly distributed not only along rivers and lakes but also in lowlands,

exploiting the highlands (Borrero 2001) and forests (Bellelli et al. 2000). Few places remained without human populations.

The intensification process was accompanied by the development of sedentarism based in pastoralism and agriculture. One debated issue is why humans in certain places developed agriculture or domestication, whereas in other places they remained as hunter gatherers. Food production arose within a narrow time range in many parts of the world and in different environments. Many have sought to explain this phenomenon (see, among the classics, Binford 1968, Braidwood 1960, Childe 1952, Cohen 1977, Rindos 1980), but there is no single answer. Environmental changes or population pressure are not the only factors. It should be taken into account that the hunter-gatherer intensification affects the impact of the changes in the resource through time on the human population (Winterhalder & Goland 1993). Clearly, in South America, as in other parts of the world, post-Pleistocene environmental changes were influential. For instance, the confluence of humans and animals at certain favorable points [ecorefugia (sensu Nuñez et al. 1999)] during the arid interval, which caused *silencio arqueológico* in the rest of the Puna, could lead to a logistic strategy, which in turn stimulated animal domestication, as was registered in Puripica-1 and other Puna sites (Nuñez et al. 1999, Yacobaccio et al. 1994).

However, environmental factors will not lead all human populations into food production. As mentioned earlier, increasing temperature produced different effects in other areas. Also, the human answer was variable. In any case, domestication started at the beginning of the Holocene and gradually increased but did not initially produce important changes (Politis 2002, see below). Because these developments took place in non-hunter-gatherer societies they are reviewed only in terms of their influence on hunter-gatherer societies, since many of them incorporated some agricultural products. In Figure 2, which corresponds to ca. 1000 BP, the areas with hunter gatherers (<20% food production), mixed hunter gatherers and horticulturists (20%–80% food production), and agriculturalists and pastoralists (>80% food production) are presented (specific zones of complex hunter gatherers are omitted).

Main characteristics for this time period are:

- 1) Wide exchange networks. A study where obsidian artifacts from Chubut (Patagonia) were chemically analyzed (Stern et al. 2000) established that obsidian was transported from different sources

located at moderate distances (200 km); however, at least in the case of one artifact, the source was located 800 km away from the site of discovery. In one burial site from Rawson (Patagonian Atlantic Coast), dating back to the Spanish arrival in this area, a bronze ax similar to those produced in northwestern Argentina was found about 2000 km away (Gómez Otero & Dahinten 1997–1998). Exchange took place between hunter-gatherer populations and their nonhunter-gatherer neighbors. The relationships between them should take the form not only of interchanges but also of oscillations between foraging and production, symbiosis and dependence (Layton 2001), and those options should be explored archaeologically. For instance, the process called *arauca-nización* (the cultural expansion of Chilean Mapuches over Pampas and Patagonian populations initiated around the sixteenth century), documented ethnohistorically, should express some of those relationships and deserves archaeological treatment (for an example see Be'ón 1999).

- 2) Cultural complexity among hunter gatherers became widespread after the Pleistocene (Dillehay 2000). Recent studies suggest the development of complexity with dense settlements and earthworks in Amazonia, Venezuela Llanos, Upper Magdalena River, Sierras de Tairona, and southern *cerritos* [SE Brazil and E Uruguay (Politis 2002)]. Also, after 1000 BP, earthen burial mounds and small hamlets or agricultural villages appeared in the cool temperate rainforests of the Central Chilean region (Dillehay 1993). But this complexity is related to sedentarism (which takes place first in coastal areas) and food production (Politis 2002). In the northern Pacific Coast, Preceramic Ceremonial Centers developed and were related to the climatic change that took place between 8000 and 5000 BP, which resulted in coastal desertification and increasing use of oceanic resources (Richardson 1998). In the Central Andes and toward 3000 BP, the sedentary centers were followed by Chavin, the first Pan-Andean Horizon, Tiawanaku-Wari Horizon (400 AD to 1000 AD), and finally the Inca State (1470 to 1536 AD).
- 3) In the Brazilian Atlantic Coast, *sambaqui* sites are conspicuous, and in the South they rise up to 30 m. These mounds were built

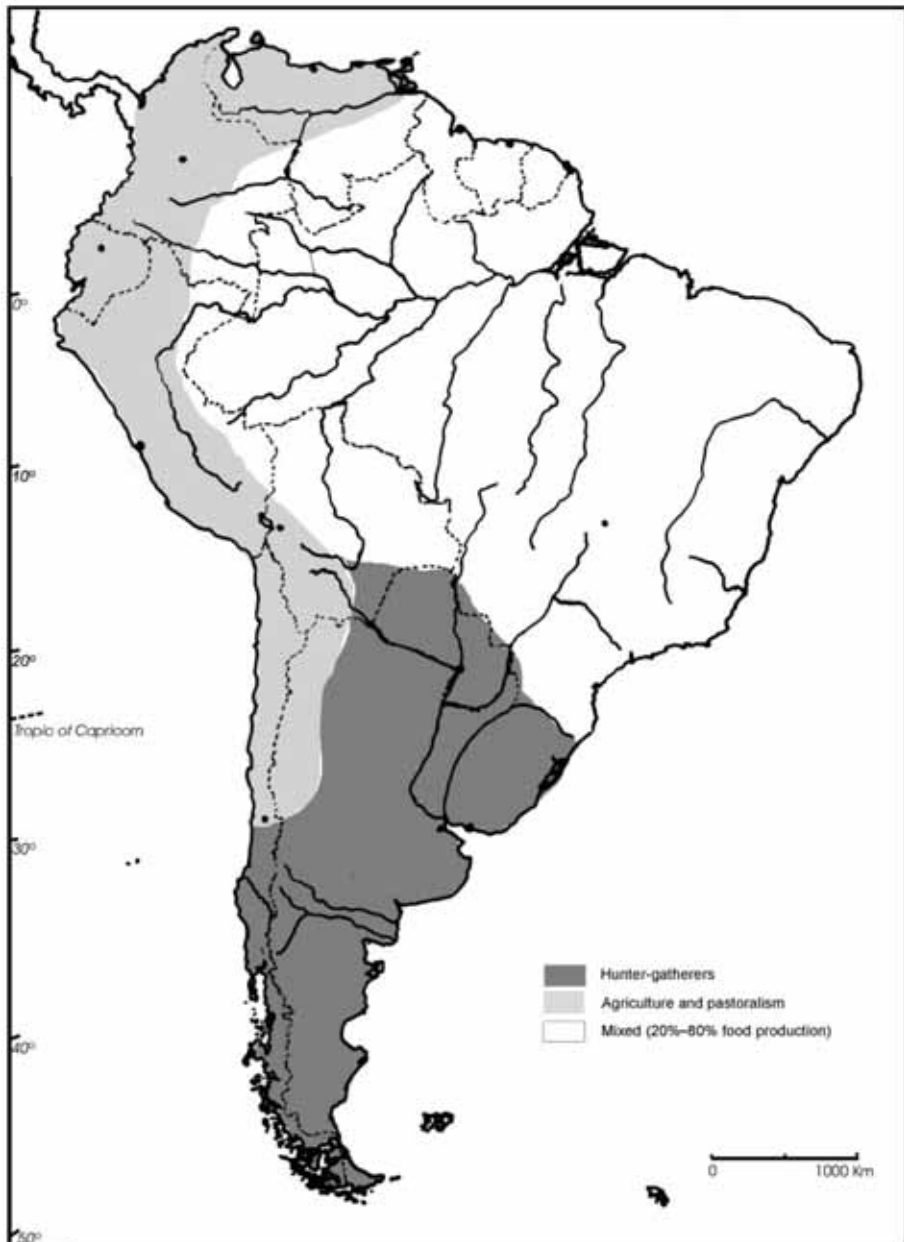


Figure 2 Estimated distribution of South American hunter gatherers, agriculturalists, pastoralists, and horticulturalists in the late Holocene.

by complex hunter gatherers and date back to between 6000 and 1000 BP. Many were interpreted as burial structures but others were semi- or permanently residential. Larger mounds could indicate the emergence of territorial circumscription (De Blasis et al. 1998).

- 4) Complex burial practices became widespread. In Patagonia, for instance, *chenques* (i.e., stone mounds marking single or multiple burials) were constructed and cemeteries can even be found (see Berón et al. 2000, Castro & Moreno 2000, Goñi & Barrientos 2000).
- 5) Food production. In Central Andes, people handled early forms of cultigens at least by 8000 BP. In other areas, early cultigens also appeared in a huntergatherer context (e.g., Huachichocana, in Argentinean Puna). By 4500 BP, cultigens were widespread. Camelid domestication took place in Central Andes between 6000 and 5000 BP. Also Puna de Atacama has been proposed as a peripheral center of domestication by 4300 BP (Llagostera Martínez 1999, Nuñez 1982). But even herding control did not imply abandoning hunting. In sites where food was abundant wild camelids were still present during this period. Thus, hunter-gatherer societies did not end; instead forager and production practices complemented each other (Yacobaccio et al. 1994).
- 6) European contact. European presence affected hunter gatherers in many ways, some of which had an archaeological expression. Before direct domination occurred, European presence was felt as a scarcity of traditional prey [as in the southern tip of South America owing to European whaling and pinniped overexploitation (see Orquera & Piana 1999, 2000)] and the appearance of new prey (European livestock). Originally, Spanish settlers in the Pampas did not thrive and they returned home, abandoning their livestock to become *cimarrón* (wild). By the sixteenth century, wild cattle became so widespread that native populations, and later new Spanish settlers, adopted them as their main staple, hunting them intensively in what was called *vaquerías*. Between the eighteenth and nineteenth centuries, when this

wild cattle population began to dwindle, native populations took their prey from the growing *estancias* (ranches) by means of *malones* [Indian raids (Palermo 2000)]. They kept some and sold the rest in Chile to acquire new products (see below). The archaeological signal of this commercial circuit was found by Goñi (1986–1987) in Malleo River Valley (Northern Patagonia). The evidence consists of a chain of stone constructions, which can be seen one to the next, as geared to territorial surveillance.

Among the European livestock, which was quickly incorporated by native populations (Politis 2000), the horse was critical. What North American anthropologists called the “horse complex” also appeared in South America, owing to the introduction of European habits related to the horse, coupled with the development of new inventions. Goñi (2000) studied the archaeological signal of the horse incorporation. Because horses require special care (constant access to grasslands and water), according to Goñi, human population home ranges increased, but in what Binford (cited in Goñi 2000) has called extensification. This term refers to an intense use of wide home ranges out from more permanent settlements. Thus, while home ranges were widening, a certain degree of sedentarism was developing.

The exchange of foreign goods generated a dependence (among hunter gatherers) on European settlers and promoted changes in local technologies. For instance, in comparing Tierra del Fuego bone tool samples obtained by nineteenth-century travelers and from archaeological excavations, important differences are observed. The nineteenth-century sample presented raw material and design impoverishment. The sample was composed almost exclusively of harpoon heads, which exhibited larger sizes than the archaeological ones. This increase must have negatively affected their effectiveness. Thus, some tools may no longer have served a technological function but instead as a commodity to obtain European goods. The increase in size may have made those harpoons more attractive to European travelers (Scheinsohn 1993).

When Europeans settled, hunter gatherers reacted in different ways. Some in need of the new European goods (weapons, iron, alcohol, etc.) were attracted by these first settlements, and they made long trips to reach them (see Musters 1997). Others, like Fuegian Selk’nam, avoided contact (Borrero 2001). European appropriation saturated the

available spaces (sensu Borrero 2001) and, along with the spread of new illnesses, resulted in the disappearance of hunter gatherers. Currently their descendants are trying to recover their ethnic identity. Most are rural wage workers, but some still practice hunting and gathering.

CONCLUSION

South America presents particular characteristics that make difficult the application of concepts and models created for North American archaeology. For instance, South America is a more oceanic continent, presenting more variety of biomes and milder Pleistocene glaciations. It is not that comparisons are useless but rather that cultural sequences may not be the correct basis for them. Archaeological comparison would be more fruitful in areas that were ecologically similar, as for example Great Basin and Patagonia (Morello 1984).

Additionally, new theory is needed. As Politis notes in *South American Archaeology*, "There is a technical and methodological progress unaccompanied by a parallel theoretical development" (Politis 1999, p. 45). South American huntergatherer archaeology could and should contribute to hunter-gatherer archaeology in general. In this sense, I wish to mention some interesting results obtained by applying ecological models. Among them, the peopling model put forward by Borrero (Borrero 1989–1990) has been regularly applied in Patagonia (Borrero 1994–1995), and much work has been developed from it. On a continental scale, other interesting proposals based in ecology are those of Steele et al. (1998) and Anderson & Gilliam (2000). In the latter case, the results are of particular interest because the peopling model proposes that the main path into South America leads through the central part of the continent, east of the Andes, a region that has received minimal archaeological attention (Anderson & Gilliam 2000).

However, much ecological and biogeographical work is waiting to be applied. For instance, Ruggiero et al. (1998) have modeled an environmental resistance index (used to infer the effects of physical and biological barriers on the size of the geographical distributions) and an anisotropy index (which quantifies the extent to which the perimeter:area ratios of geographical ranges depart from a circle) for South American mammals. Their results could generate some archaeological expectations for hunter

gatherers on a continental scale. For instance, the following could be expected: (a) smaller home ranges for human populations in the tropics; (b) fewer differences in a N-S direction (especially along the Andes) than E-W; and (c) a wider dispersal in environments that have less variation in their environmental resistance index. Thus, dispersal could be modeled in neighboring environments with equal or similar environmental resistance [Steele et al. (1998) had proposed something similar]. These research fields should provide new insight. In spite of the challenges that still remain, a lot of work has been done, elaborated on by many archaeologists for more than a century. New perspectives arising in South American archeology will profit from it, under the insight of more and better theory.

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