Part I - Parasites, Human Hosts, and the Environment

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5

Human Occupation of Patagonia

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The archaeology and ethnography of Patagonia can be characterized by analyzing the local social contexts and scientific communities in relation to events at each successive moment in the international context. This perspective allows conceiving of a “past” mutable sociocultural variability and another “current” mutable sociocultural (scientific) variability.

Many bioanthropologists consider Patagonia a peripheral area. It was one of the last regions on the planet to be occupied by humans. To a major extent, the study of Patagonia has adopted theoretical models proposed elsewhere but applied differently to analyze the local record.

The southernmost tip of South America boasts a rich history of research conducted by Chilean and Argentine scientists¹ as well as by international missions (especially French, north American, British, and Spanish),² in some of the latter cases fostering cooperative projects with local scientists.

Studies on the paleoenvironment in Patagonia began in the extreme south with Von Post (1929) and Auer (1933, 1952, 1958, 1965) in Tierra del Fuego, with pollen analyses in turf bogs before the beginning of radiocarbon dating.

This chapter aims to summarize some currently discussed aspects of interethnic contact and the peopling of Patagonia. The Patagonian environment can be viewed as a series of scenarios with restrictions and facilities. In these scenarios, which varied over time, human populations developed various ways of life, and it is necessary to describe their general characteristics, both current and past. We thus analyze the variation in the environment in the last 13,000 years (up to the present) and in the evidence of human occupations before and after interethnic contact in Patagonia.

¹ Ortiz Troncoso (1971a, 1971b, 1972, 1980/81); Munizaga (1978); Orquera *et al.* (1978); Orquera & Piana (1990); Borrero (1979, 1983, 1989/90); Borrero & Casiraghi (1980); Borrero, Casiraghi & Hernández Llosas (1981); Massone (1982, 1983); Martinic (1982); Prieto (1984).

² Hyades & Deniker (1891); Vignati (1927); Bird (1938, 1946); Emperaire (1963); Laming-Emperaire (1968a, 1968b, 1968c); Laming-Emperaire, Lavallée & Humbert (1972); Saxon (1976); Hernandez, Lalueza Fox & García-Moro (1997).

THE CURRENT ENVIRONMENT

South America can be viewed as a wedge between the Atlantic and Pacific oceans, with a backbone – the Andes Mountain Range or Cordillera – close to the Pacific coast, running from north to south until Tierra del Fuego, where it changes direction from west to east. These geographic characteristics help partially understand the variety of environments in the region. One example of such variation is Patagonia, located in the extreme south, with approximately one million square kilometers. In territorial terms, the area belongs to Chile and Argentina.

The Argentine portion of Patagonia extends from the Rio Colorado, at approximately 37°S, to the southernmost tip of the continent, at 55°S, and between 63° and 74°W. Patagonia consists of two geomorphological regions: the Andes or Cordillera region, circumscribed by the western border to the southern tip of Tierra del Fuego and adjacent islands, and the extra-Andean territory, which includes the rest of the Patagonian territory. The latter features a landscape of broken *mesetas* that slope down towards the river valleys, accompanied by the low Cordilleras and some sharp depressions partially covered by volcanic (pyroclastic) gravel and sand. The most important climatic characteristics of the extra-Andean region are the sparse precipitation and strong winds, which cause high evaporation rates (Walter & Box, 1983) and thus an arid environment (Beeskow, Del Valle & Rostagno, 1987). From the ecological point of view, it can be considered a cold semidesert (Soriano, 1983). Due to the extreme latitude of southern Patagonia (more than 48°S), the length of days varies greatly between the summer and winter months.

Most of Patagonia receives air masses from the Pacific. The region is located between the permanent anticyclones of the Pacific and Atlantic (30°S) and the sub-polar low-pressure belt (60°S) (Prohaska, 1976), so that seasonal trends in the low and high pressure systems and the marine currents determine the precipitation patterns (higher in the winter). The Andes also play an important role in determining the climate, since their north-south direction poses a barrier to the humid air masses from the Pacific (Paruelo, Beltran & Jobbagy, 1998). The region is commanded by the winds from the west, or westerlies, which extend from 30° to 60°S. Gusts greater than 100 km/h are common.

Temperature in the region is temperate to cold-temperate (Paruelo, Beltran & Jobbagy, 1998), varying according to the relief (Beeskow, Del Valle & Rostagno, 1987) and distance from the sea. There is an important west-to-east temperature increase. Thus, the decrease in altitude and proximity to the coast lead to a gradual warming and narrower thermal variation, or degree of continentality. The El Niño phenomenon is one of the main sources of inter-annual variability in meteorological variables; summer temperatures tend to be higher than average in El Niño years (Kiladis & Diaz, 1989).

As for precipitation, the overall circulation pattern of the atmosphere, the influence of Pacific air masses, and the Andes Cordillera jointly cause a strong west-to-east rain gradient (Barros, Sian & Mattio, 1979). The Cordillera prevents the passage of moist winds from the Pacific, causing the humid air masses to rise and therefore cool. This phenomenon leads to unloading of moisture in the form of heavy rain or snow in the narrow hollow of the Cordillera environment, concentrated on the western slopes.

On the eastern slopes, the air masses drop to warmer lands, becoming extremely dry (Walter & Box, 1983). Thus, in the western area of extra-Andean Patagonia, the precipitation drops rapidly from 600 to 200 mm, remaining below this level (100-200 mm) in the central region and producing the area's driest environment.

This rapid transition involves an abrupt change of vegetation and a clear limit between the Patagonian forests and the steppe. Meanwhile, precipitations in the extra-Andean environments are related contributions of moisture from the Atlantic (Barros, 1976).

The diversity of altitudes in the Cordillera at these latitudes also influences the climatic conditions. The climate is temperate and humid in the north, and cold and humid in the south. Mean temperature ranges from 9.5°C in the north to 5.4°C in the south. Annual precipitation ranges from 800 to 4000 mm in the north and decreases to 500 mm in the south.

The Chilean portion of Patagonia has a peculiar geography, consisting of a highly fragmented section of islands, channels, gulfs, peninsulas, archipelagos, estuaries, and fiords, which result from tectonic processes of sinking, action by glaciers, and the sea's penetration through the western valleys. The coastal zone is the largest in the Southern Cone. These geographic conditions and the great north-south extension of Chilean Patagonia result in a wide variety of climates: semiarid cold steppe, high-altitude cold, cold temperate and humid tundra, and cold ocean climates (Paskoff, 1996).

The diversity of climates is associated with a wide variety of soils, which sustain distinct types of plant formations. The soils in the extra-Andean region are mostly poor in organic matter. The strong winds lead to erosion and consequently the turnover, transportation, and deposition of materials, giving the pedogenic processes a continuous embryonic state (Scoppa, 1998). In the Andean region, the mountainous relief is impacted by glaciers, and the original lithological composition was altered through rejuvenation of the relief by the last glaciation and later filling with pyroclastic deposits (Figure 1).

The soils in the archipelago zone are swampy, with abundant organic matter and moisture content. These soils favor the formation of turf bogs and are mainly found in depressions in the terrain. The more exposed zones have rocky tundra soils, heavily eroded by the ice and climate, reaching a situation in which rock is found on the surface. The area also has highly fertile soils originating from volcanic ash. Finally, the Isla Grande de Tierra del Fuego, shared by the two countries, is the largest island in South America. It is covered by broad pampas that originated from glacial erosion. Erosion was extensive in some areas, to the point of forming impressive geomorphic landscapes like the Strait of Magellan (Scoppa, 1998; Soriano, 1983).

Figure 1 – Perito Moreno Glacier (A) and Patagonian shrub steppe (B)

Finally, the types of vegetation in Patagonia (Figure 2) show a clear division between the Andean area (mainly forests) and the extra-Andean area (characterized by shrub and grassy steppes) (Soriano, 1956; Dimitri, 1972; Hueck & Seibert, 1981; Cabrera, 1976; León et al., 1998).

The forest composition changes along the Andes, from north to south and from west to east. The peaks have high-altitude Andean vegetation, and to the southwest are the *ventisqueros* (subject to rain, sleet, and snow) and snowfields. The extra-Andean area features the mountainous shrub steppe to the north and the Patagonian steppes and semideserts to the south, including distinct sectors running from west to east, the Sub-Andean and Western and Central and San Jorge sectors, and towards the south the Magellan and Tierra del Fuego sectors, with different landscapes associated with diverse conditions of temperature and humidity (Hueck & Seibert, 1981).

Figure 2 – Types of Vegetation in Patagonia

PALEOENVIRONMENTS

Since the transition from the last glacial period, the high latitudes of South America generally underwent changes in vegetation, the volume of ice masses, and sea surface conditions. This period of drastic environmental variations also witnessed the extinction of the Pleistocene megafauna.

Studies of the paleoenvironment show changes in the size of the various units of vegetation in Patagonia: forest, grassy steppe, and shrub steppe, associated with variations in temperature and/or humidity during the Holocene.

It is now known that during the Holocene, the ice masses in the Southern Hemisphere underwent fluctuations and changes, but it has not been possible to group many of these oscillations through radiocarbon dating. Clapperton (1992) elaborated a preliminary sequence based on his work and studies by Gellatly, Chin, and Rothlisberger (1988), establishing the principal intervals in climate changes in the Holocene, based on glacial fluctuations and environmental indicators. Thus, in the Southern Hemisphere, cold and humid intervals with glacier advance occurred as follows: ca. 8,400-7,500 (?) BP (before present); ca. 6,300-6,000 BP; ca. 5,200-5,000 BP; ca. 4,700-3,800 BP; ca. 3,500-2,900 BP; ca. 2,700-2,000 BP; and from 1250 to 1930 AD. Clapperton (1990) associates hot and dry periods (with glacier retreat) as follows: ca. 9,700-8,600 BP and after 6,500 BP. However, this classification is based on the currently available data and is subject to change based on future studies (Clapperton, 1990).

Pollen studies in archaeological sites from the Patagonian steppe in Santa Cruz and Chubut provided the basis for determining alternating dry and humid periods (D'Antoni, 1978; Burry & D'Antoni, 2001; Paez, Prieto & Mancini, 1999; Trivi, 2003).

Pendall et al (2001), based on variations observed in the pollen sets and analysis of stable hydrogen isotopes in a turf bog in the Beagle Channel, found that ca. 2000 BP there was a period of intense cold that lasted approximately 200 years. Meanwhile, Myoral, D'Antoni & Daleo (1991) studied the paleotemperatures using racemization analyses of amino acids from proteins in fossil plants, suggesting a temperature elevation between 2,600 and 1,500 BP. More recently, Huber, Markgraf & Schäbitz (2004) studied the post-glacial history of Tierra del Fuego along transects in southern Patagonia and Tierra del Fuego, showing considerable variations in humidity.

Lakes also serve as a source of information on continental climates, and fluctuation in their water levels is an indicator of climatic variations, especially in closed valleys. Thus, during the Holocene, various lakes in extra-Andean Patagonia recorded alternating events of moisture and drought (Mayr et al., 2005; Stine & Stine, 1990; Stine, 1994; Markgraf et al., 2003). The so-called "medieval climate anomaly" corresponds to a temperature rise and/or decrease in precipitation around 700 to 450 years BP (Haberzettl et al., 2005). According to Stine (1994), in America the anomaly began around 1,080 years BP. For periods between ca. 900 and 700 years BP, in the lower-latitude lakes of Patagonia, and between 450 and 300 years BP at the higher latitudes, it is possible to detect the start of an increase in the water levels, indicating a decrease in temperature and consequently a decrease in evaporation, probably related to the "Little Ice Age". Finally, the last century witnessed a decrease in the water levels in all the lakes studied in extra-Andean Patagonia.

Added to the instability described in the previous paragraphs were stochastic events such as the deposition of ash from volcanic activity since the Quaternary (Stern & Naranjo, 1998), which must have impacted resources and the human population.

CONTACT, EUROPEANS, INDIGENOUS PEOPLES, AND FRONTIERS

In the broad and varied Patagonian environments, the first travelers, public servants, missionaries, and ethnographers that reached Patagonia (from the 16th century onward) established knowledge on the groups inhabiting the region, identified as “uncivilized” and associated with “barbarianism”.

According to the traditional model for Patagonia: 1) the nomadic groups were exclusively hunter-gatherers (their main activity was hunting large prey, complemented by gathering); 2) their movements (and life) were not programmed, since they were conditioned by the environment; 3) they limited their economic activities to subsistence; and 4) they were “savages” because they did not practice agriculture or form villages. However, in later periods (from the 15th to the 19th centuries, approximately), in northern Patagonia, more sedentary groups with agricultural practices (the Mapuche) interacted with the nomadic groups (Tehuelche) (Nacuzzi, Lucaioli & Nesis, 2008).

The indigenous peoples in northern Patagonia received different names: Günü küne, Gününa këna, or Gününa küne ou Tehuelche. Those in the south were called Aóeni kénk Aônükün’k (Nacuzzi, Lucaoli & Nesis, 2008).

Concerning the heterogeneity of environments on Isla Grande de Tierra del Fuego, the first Europeans that reached the region found populations of hunter-gatherers mainly using continental resources, the Selk’nam, and populations specialized in exploring marine resources: Yámana and lup. The relationship between the languages spoken by the latter two is subject to debate (Canals Frau, 1953).

According to Viegas Barros (1990), there was a kinship between the canoe peoples of the western Patagonian channels and those of the Beagle Channel. Meanwhile the Selk’nam language has been associated with that of the Tehuelche continental hunters (Canals Frau, 1953; Gusinde, 1982; Viegas Barros, 1990). At least one study has discussed the presence of another group, the Haush, in the southeasternmost part of Isla Grande (Gusinde, 1982).

Importantly, evidence points to cultural changes both before and after the Europeans’ arrival in the region.³ Patagonia can be viewed overall as a very large space with difficult access that was incorporated late into the Spanish domain, where the frontier between indigenous peoples and Europeans did not act as a boundary. As shown in situations of contact, these frontiers constituted spaces of interaction that allowed the indigenous groups to exert strategies aimed at maintaining their autonomy through political and economic adaptations, biological miscegenation and cultural admixture, and ethnic reconfigurations. In practice, relations with the Europeans occurred through chiefs, whose roles did not fit the European model, in which economic and political power were related to leadership (Nacuzzi, Lucaioli & Nesis, 2008).

The first European settlements in Patagonia date to the late 18th century (Nuestra Señora de Patagones, Florida Blanca). With the first contacts, a variety of resources arrived and dispersed across Patagonia: cattle, sheep, and horses. Thus, the indigenous peoples, in addition to their autochthonous resources such as large prey (guanacos, deer, rheas) and plant species such as *calafate* or Magellan barberries, *Schinus molle* wood, reeds, and grasses, among others, rapidly incorporated the new resources both into their diet and for trade among themselves and with the Europeans (Nacuzzi, Lucaioli & Nesis, 2008).

Based on the archaeological and ethnographic evidence, both before and after the arrival of the Europeans, the territories and categories of actions by human populations varied in time and space (Barberena, 2008).

³ We will refer to this point later in the chapter.

Nacuzzi, Lucaioli & Nesis (2008:65) highlight the importance of bartering surpluses as currency:

“The indigenous peoples of northern Patagonia sold cattle and horses stolen from the fields of Buenos Aires (AGN IX 16-3-10) to the Spanish at Rio Negro Fort in exchange for flour, tobacco, liquor, cloth, hats, and *maté*. In Valdivia, Chile, these same Indians received bridles, knives, and spears in exchange for horses and ponchos (Villarino [1782-83], 1972), which they must have received in turn from other groups, the Aucas and Mapuches from the Pampa. In addition, for horses and guanaco hides they could obtain piñon seeds and sheep raised by more sedentary groups like the Pehuenches of Neuquén (Villarino [1782-83] 1972). The Tehuelche groups farther to the south gave guanaco hides (often guanaco fetuses) to those from the north in exchange for horses, so highly prized, but used by so few of themselves (A. de Viedma [1780-83], 1972).”

In Tierra del Fuego, territorial occupation by each of the indigenous groups and mobility within each territory and interaction with neighboring groups were not a static phenomenon. For example, Manzi (1991) suggests that substantial changes occurred after 1880, with the introduction of the haciendas and the Salesian Mission in Rio Grande. The author proposes two ethnographic models of mobility for the region of the “pedestrian hunter-gatherers”, one for 1520 to 1880 and the other for 1880 to 1931. It is possible to suggest that the canoe peoples’ habitat also changed through phenomena such as interaction with European navigators and the founding of Punta Arenas (officially in 1848) and the Anglican Mission (now Ushuaia) in the Beagle Channel, in 1869 (Emperaire, 1963).

THE PEOPLING OF PATAGONIA

Until the 1970s, research in the archaeology and physical anthropology of Argentine Patagonia was largely influenced by the “historical-cultural” school. This meant maintaining a highly coherent fit (with a similar basis in both specialties) sustained by an emphasis on diffusion (the arrival in Patagonia of other peoples and other cultural traditions), miscegenation as a factor for change, and an intimate relationship between a given biological morphology and a way of life (Guichón, 1994).

However, since the 1970s, some of the questions in archaeology that are currently under discussion concerning the peopling of Patagonia are partially a product of the mixture of the Historical Cultural School with new approaches. This happens with: a) continuity beginning with the first occupations; b) relative uniformity in the use of space; c) continuity since the first occupations until the historical populations; d) intimate relationship between biology and culture (examples: terrestrial hunters associated with a more robust and relatively tall physical build, and canoe peoples associated with a robust but shorter build); e) continuity in the canoe groups from the first occupations until historical times in the Beagle Channel; and f) the Andes Cordillera and river valleys considered geographic barriers to human populations (Borrero, 1995).

Around the late 1970s and early 80s, the physical anthropology⁴ of Patagonia began to incorporate some ideas outlined by the synthetic theory of evolution from the 1950s. This means the concept of population more than race, and change as a constant in time associated with evolutionary factors (drift, migration, selection, and mutation). By considering the idea of multiple paths in the evolution of populations, and rejecting the relationship between morphology and culture, the field incorporated an interest in representing “variability”. These ideas began to be applied through univariate and multivariate statistical designs, analyzing the variation in skull morphology

⁴ In the mid-1980s, it began to be known in Argentina as biological anthropology, with the work of Cocilovo, Carnese, and Pucciarelli (Carnese, Cocilovo & Goichoechea, 1991-1992).

in materials from Patagonian collections deposited in museums in Chile and Argentina (Guichón, 1994). One limitation to these studies, probably applicable to all studies of the past, involves problems related to the quality of samples. Any definition of population assumes the control of what we could call coordinates of variation in “time” and “space”. For the case of Patagonia, as in other regions, such information is not always available. Thus, operationally, the units of analysis function in many cases as “data clusters”⁵, used to study the behavior of phenotypic variables.

For example, Guichón et al (1989-90) used a data cluster attributed to six regions of Patagonia (in Chile: Guaitecas Archipelago, Última Esperanza Magallanes, San Gregorio and in Argentina: Deseado, in northern Santa Cruz, northern Tierra del Fuego, and Beagle Channel). Based on this information, they studied the biological relations and affinities using morphometric data.⁶ Their study provided evidence for the possible existence of two biological stocks, one “Atlantic” and the other “Pacific”, involved in the peopling of Tierra del Fuego (Guichón et al., 1989-90). The validity of the inferences is based on the assumption that the samples are representative of the populations. In general, for Patagonia, the majority of studies that have used collections have assumed that most of the samples probably correspond to late or post-contact moments (Cocilovo & Guichón, 1985-86, 1999-2000; Guichón et al., 1989-1990; Hernández, Lalueza Fox & García-Moro, 1997). On this basis, the samples that were studied received the names of the ethnographic group inhabiting the respective area, and it was not totally clear whether the samples corresponded to individuals of these ethnic groups or to the areas they came from. Considering this situation, we have insisted on using geographic rather than ethnographic location (Cocilovo & Guichón, 1985-86, 1999-2000; Guichón et al., 1989-1990).

In 1989, Borrero proposed a general model for the peopling of Tierra del Fuego, oriented towards presenting phases rather than chronological stages.⁷ This scheme assumes a slow dispersal and proposes a non-linear process:⁸ “a) exploration, or initial dispersal to an empty zone, b) colonization, or consolidation of human groups in given sectors in space, with a specific area of action, and c) effective occupation, or the moment in which the entire desirable space is being used” (Borrero, 1989-1990: 134).

As the author points out, the incorporation of ecological references establishes:

- a) a separation between the cultural and the biological (similar to that proposed by biological anthropology);
- b) the possibility of local extinctions of human populations;
- c) that the indigenous peoples from historical periods do not descend from others that occupied the region in more ancient times; and

⁵ What we refer to as “clusters” are normally sets of skull morphology data which in some cases come from systematic archaeological excavations and which generally allow a spatial identification with a site or location (in the best of cases), or else a region in the other case.

⁶ When studying biological relations and affinities between populations based on phenotypic (morphological) variables, some of the differences or similarities relate to problems in the environment (diet, health, physical activity). Lifestyle studies in Patagonia in the 1990s began to focus on these aspects (see below in this chapter).

⁷ From other perspectives, the terms “exploration” and “colonization” have been used again to discuss the peopling of Patagonia, but referring to chronological stages (Barrientos & Pérez, 2004; Miotti & Salemme, 2004).

⁸ The proposal does not assume a progressive adaptation in the sense that a population in a colonization stage does not necessarily function less efficiently than in later stages.

- d) that the environment's heterogeneity generates expectations on the differential use of spaces, the existence of more or less translucent barriers or filters, and thus discontinuous human distributions.⁹

Borrero (2001) highlights two characteristics of the environment's heterogeneity, namely glacier retreat and the possible significance of the river valleys. In the first case, from the biogeographical perspective, the author highlights the opposing effect of glacier retreat on one part of what is now continental Patagonia,¹⁰ producing "an increase in the conditions for contact, an increase in opportunities for territorial expansion, and conditions for the formation of social networks" (Borrero, 2001: 820). Meanwhile, isolation of populations occurred in Tierra del Fuego due to the Strait of Magellan. The river valleys and coast of the Strait of Magellan are considered possible organizing circuits for human populations, while the *mesetas* between the rivers acted as filters or intermediate spaces (Borrero, 2001).

In the far north of Patagonia, the lack of abrupt changes in the archaeological record and in the environment (see the description of the environment in this chapter) allowed suggesting the existence of an extensive region of transition and interaction. Specifically, recent studies have developed the hypothesis of a late population expansion from northeastern Patagonia to the southeastern Pampas and southern Cuyo region (Barrientos & Pérez, 2004). The coastline of northern Patagonia shows evidence of human occupations since 5,000 BP. Barrientos & Pérez (2004) have studied the large number and diversity of sites with human burials (one of the region's archaeological characteristics) in relation to the reduction in mobility and the population growth, as well as the increase in social tension¹¹ (clashes within and between groups) in hunter-gatherer populations in conjunction with the so-called "medieval climatic anomaly"¹² (800-1320 AD).

In this new context, and from the perspective of biological anthropology, various possible scenarios are considered for the peopling of Patagonia and interaction between different potential microevolutionary factors (González et al., 2004). Specifically: a) genetic drift in Fuegian groups soon after the formation of the Strait of Magellan; b) evolution of different adaptive strategies (marine versus terrestrial hunting and gathering), and c) the effect of gene flow from groups coming from central Chile that expanded to eastern Patagonia in historical times (Araucanization). In relation to the latter, a question is whether Araucanization was limited to a process of cultural diffusion or it produced a displacement of populations and gene flow as a consequence. The discussion includes various models (adaptive isolation, geographic isolation, attenuated geographic isolation) and different degrees of Araucanization.¹³ Craniofacial

⁹ This context incorporates the discussion on the concept of meta-populations associated with complex interactions and population substitutions in the region (Borrero, 2001).

¹⁰ On continental Patagonia there was circulation between the two sides of the Cordillera in various areas. At 41°S and to the south, at 51°30'S. Monte Verde (41°30'S, in Chile) is the site in Patagonia with the oldest dates. The southernmost part of the continent has several ancient sites, such as Cuevas Fell (Bird, 1983, 1988), Medio (Nami, 1987; Nami & Nakamura, 1995), and Sofia Lake (Prieto, 1991). In more recent times, the sites recorded between 46°S and 46°20'S (Ibáñez River Valley, General Carrera Lake-Buenos Aires Lake) are part of a probable corridor (Borrero, 2001).

¹¹ Vignati (1947) and Gómez Otero & Dahinten (1997-1998) report evidence of traumatic lesions, especially projectile heads embedded in bones in at least 14 bones (em Barrientos & Pérez, 2004)

¹² In Patagonia, this event is associated with the increase in temperature and prolonged droughts (Barrientos & Pérez, 2004).

¹³ González et al. (2004) analyzed 230 skulls from collections in various institutions in Argentina, Chile, France, Italy, and Switzerland, considering only the individuals without cranial deformation. Methodologically, they numerically classified three models for the Tierra del Fuego-Patagonia area and subsequently assessed the degree of association between the biological variability and the models' predictions.

variables were used to estimate biological variability, represented in the form of a distance matrix, applying matrix correlation tests (González et al., 2004).

Based on this analysis, and drawing on archaeological, ethnographic, and linguistic models, the authors propose a model for the peopling of Patagonia which considers the following:

1. The Fuegian and Patagonian groups share a common ancestor who led the ancient peopling of the region.
2. Tierra del Fuego was initially peopled by groups with an undifferentiated economy, at some time between 12,000 and 10,000 BP.
3. The Fuegian populations remained isolated from the continent during the last 8,000 years, except for a hypothetical connection between canoe-faring groups from the Chilean archipelago and from the south of the continent.
4. The Fuegian populations maintained high levels of gene flow, limited by the geographic distance in the center of Patagonia, probably between the Gallegos river basin and the Negro and Colorado rivers.
5. The important Araucanian migration from beyond the Andes modified the pattern of distances and internal variability of the Patagonian groups that received the impact of this flow for a long period of time: the groups from the northern pre-Cordillera and the Pampas. (González et al., 2004: 93)

Thus far, this study by González et al. (2004) is the one that best portrays the complexity in the problem of the peopling of Patagonia, using morphological data. As we also highlighted in Guichón et al (1989-1990), these important efforts at unveiling the variability of the human populations and their changes over time also had to approach the problems of the samples' location in time and space. New designs are needed to improve the degree of resolution of the available samples and thereby test various hypotheses, for example, the possibility of local extinctions of human populations, or that current indigenous peoples did not necessarily descend from earlier groups in the same territory (as proposed by archaeology).

Research work in archaeology, biological anthropology, and paleoenvironmental is not distributed homogeneously in Patagonia. The far south of Patagonia, including Tierra del Fuego, probably concentrates more than 50% of the above-mentioned research projects. This produces a bias that has still not been resolved. The human bone record is larger on the Patagonian coast than in the interior (Guichón, Barberena & Borrero, 2001). In recent years, radiocarbon dates have been obtained from skeletons with different types of cranial deformations, allowing a first chronological scheme for these important practices of skull-binding in Patagonia. The data suggest a probable time link with an important set of remains (round cranial deformation from 8,000 to 3,000 BP, oblique flat 3,000-2,000 BP, and straight flat 652-285 BP) (Barrientos & Pérez, 2004).

In the 1980s, the academic scenario of biological anthropology in Patagonia, in Argentina, promoted interest in studies on interaction between human populations and the environment in the past.¹⁴ The first studies focused

¹⁴ On the one hand, the projects involving scientific collaboration in biological anthropology between Chile, Brazil, Uruguay, and Argentina, launched in the mid- 1980s, stimulated the incorporation of new lines of research in Argentina. Thus, under the framework of the project on Genetics and Microevolution of South American Indigenous Populations, the course on Biology and Culture, Functional Anatomy, and Lifestyle was given by Walter Neves (from Brazil) in 1987 in Buenos Aires. This course helped promote studies on subsistence, organization of work, and social tension. Thus, the experimental research lines developed by Pucciarelli beginning in the 1970s provided the basis for morphological studies such as the importance of environmental factors that affect phenotype (Carnese, Cocilovo & Goicoechea, 1991/1992). In archaeology, the interaction between hunter-gatherers and their environment provided fertile ground for fomenting such studies.

on biological indicators of quality of life (following the work of Wing, Antoinette & Brown, 1979; Huss-Ashmore, Goodman & Armelagos, 1982; Larsen, 1987; Powell, 1985, 1988). Research basically began to focus on the remains used in studies on biological distance, but which had skeletal remains in addition to skulls to explore the variety of diet (e.g., with an emphasis on the presence of caries, tooth wear) and health of populations (studies on hypoplasia lines and porotic hyperostosis, among others). The archaeological and ethnographic information produced some alternative hypotheses for the existence of differences between the regions (Pérez-Pérez & Lalueza-Fox, 1992; Guichón, 1994).

Meanwhile, archaeology developed a special interest in human remains for performing studies of stable isotopes and thus evaluating the dietary consumption of marine and land resources in Tierra del Fuego (Yesner et al., 1991, 2003; Guichón et al., 2001; Schinder et al., 2003; Schinder & Guichón, 2003). The same occurred with studies on lifestyle and stable isotopes, allowing the discussion of the populations (based on direct evidence of the consumption of such resources) of the traditional dichotomy between marine and terrestrial adaptations in Southern Patagonia.¹⁵ Thus, the dispersal of isotope values allowed analyzing some aspects of mobility¹⁶ (Borrero & Barberena, 2006).

In the 1990s, molecular studies were performed on the bone remains from Southern Patagonia (Lalueza-Fox et al., 1993-1994; Lalueza-Fox, 1995; García-Bour et al., 1998) confirming the hypothesis that at least two haplotypes, C and D, were present in Patagonia. Added to these findings was the presence of haplotype B at the Baño Nuevo site in Chilean Patagonia (Moraga et al., 1999). Some samples studied by Lalueza-Fox and the remains found at Baño Nuevo have associated radiocarbon dates, which allowed proposing the existence of haplotypic and dietary variability from the Middle Holocene in Southern Patagonia (Borrero et al., 2001).

Despite the important contributions of these study designs, some authors have suggested that the complexity of the so-called health-disease process requires a dialectic methodology, with the convergence of detailed descriptions, formulation of diagnostic hypotheses, and multi-causality (Buikstra & Cook, 1980). This perspective began to develop in Argentina in recent years, led by forensic physicians such Bosio et al. and colleagues from Brazil like Araújo and Mendonça de Souza and from Spain, like Rodríguez Martín. More than specific diseases, these diagnostic hypotheses emphasized the assignment to major etiological categories of lesions, such as infectious, nutritional and metabolic, musculoskeletal, traumatic, and vascular. From a broader perspective, the complexity is related to the “ecology of diseases” as a way of understanding aspects of the context and proposing probable paleoepidemiological scenarios (Greenblatt & Spigelman, 2003).

Several projects with this paleopathological perspective have been launched in Patagonia: Guraieb (northern Santa Cruz Province), Luna (southern Pampa), Flengobord (northeast of the Rio Negro). In Southern Patagonia, Fugassa, Suby, Burry, Casali, Palacio, and Guichón are producing information on the health of human populations at the

¹⁵ There are two important aspects to highlight in relation to stable isotopes. First, the virtual absence of C4 plants in southern Patagonia, which allows a clearer discrimination between land and marine diets. Added to this is the relatively good preservation of bones in cold, dry areas such as extra-Andean Patagonia.

¹⁶ If populations are moving constantly along the coast and across the interior, their diets should not vary on average. The results of stable isotopes do not support this hypothesis (Borrero & Barberena, 2006). The use of marine resources is acknowledged on the Pacific Coast, or the so-called Wet Coast, while the Atlantic Coast, or Dry Coast, displays a wide variety of cases that have been the object of study in recent years.

following moments: (a) prior to contact between indigenous peoples and Europeans,¹⁷ (b) initial contact ¹⁸, and (c) final contact between indigenous peoples and Europeans.¹⁹

FINAL REMARKS

The development of anthropological research in Patagonia apparently does not respond to a model of paradigms and crises, as proposed by Kuhn (1991) and used by one of us to explain the history of such research in the region (Guichón, 1994). Rather, this complex history gradual appears to be better explained by changes, mixtures, diversity, and the undermining of perspectives.

Archaeology, social anthropology (or ethnography, for some), biological anthropology, and studies in environmental reconstruction appear to have followed parallel paths in Patagonia. From the 1970s to date, the fusion of perspectives appears to have been a constant, with greater emphasis on the study of variability and changes at all levels.

As mentioned, an important climatic division exists between the western and eastern watersheds of the Cordillera. The former has high precipitation and narrow temperature variations, while the latter has low precipitation and a wider temperature range. The western watershed shows a west-to-east gradient in which precipitation and moisture decrease, with related changes in vegetation. Importantly, the arid environment characteristic of extra-Andean Patagonia offers excellent conditions for the preservation of fossils, whether bone, pollen, or plant remains. The same is not true for the Cordillera zone or for the western watershed of the Andes, with much higher humidity.

We have presented an overview of current discussions ranging in time from the ancient peopling of Patagonia to the process of interethnic contact. It is difficult to sustain that such a large and varied territory as Patagonia provided only few forms of exploration of ecosystems, since “it does not require spears and canoes to explore the sea, or bows and arrows and slings to hunt guanacos” (Borrero, 2001: 830). Considering that the human species has the capacity to respond to the same problem in different ways, then as Borrero states (2001), we should remain alert to unforeseen forms of such responses.

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¹⁷ Fugassa (2006); Suby (2007).

¹⁸ Based on the study of skeletons recovered from the first Spanish settlement in southern Patagonia, Nombre de Jesús, 1584 (Guichón et al., 2006; Suby et al., 2006; Senatore et al., 2005; Suby, 2007; Fugassa, Araújo & Guichón, 2006).

¹⁹ Casali, Fugassa & Guichón (2006); Casali (2008).

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