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Blade and bifacial technology in Mid-Holocene occupations at Deseado Massif, Santa Cruz province, Argentina

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ABSTRACT

In the Deseado Massif there are many stratified archaeological sites located in caves and rockshelters. The cultural sequences, proposed in the past century, include an occupational hiatus and cultural changes that were developed on the basis of large tools from archaeological sites, without debitage analysis. The aim of this paper is to review the current debate on lithic technology and human occupations of this area during the Mid-Holocene, integrating new data, as well as the latest environmental interpretations. The contribution of new information from blade and bifacial technologies is central to discussion of the models proposed by other authors. The new baseline information generated in the last decade, allow original interpretations. The evidence of coexistence between blade and bifacial technologies during the Mid-Holocene constitutes the main contribution of this paper.

1. Introduction

This paper reviews the current debate on lithic technology at the Deseado Massif during the Mid-Holocene, and updates it by integrating new information from Cueva Maripe and other archaeological sites located in this area, as well as the current environmental data.

The Deseado Massif is a geological province located in northern Santa Cruz, Argentina (De Giusto et al., 1980; Ramos, 1999) (Fig. 1). This geological structure is characterized by a wide distribution of rocks useful for knapping, and a great availability of rockshelters, which in many cases content archaeological evidence. Climatically, this area is characterized as template-cold arid, with mean annual temperatures between 8 and 10 °C. Precipitation is generally lower than 200 mm a year and occurs mainly in winter (Soto and Vázquez, 2000).

This paper discusses the changes and continuities in material culture to get an updated look on the social and technological processes occurring in the Mid-Holocene. It also suggests future lines of research.

2. Palaeo-environmental characterization of the Mid-Holocene

During the Mid-Holocene (*ca.* 8000–3000 BP, Zárate et al., 2005), climatic and environmental fluctuations and geologic events were registered at a global level through a great variability of proxy data (ice cores, lake cores, fluvial sequences and eolian deposits, among others). Although the climatic fluctuations were varied in nature, distribution and magnitude, the period can be characterized as warmer than the previous one, with a variable effective humidity (Tonni et al., 1999; Gil et al., 2005, Salemme and Miotti, 2008).

In Patagonia, the Mid-Holocene has been delimited between 7500 and 3000 BP (Miotti and Salemme, 2004). The environmental conditions were described as generally dry (Mancini et al., 2005), with elevation of temperature and sea level rise with concomitant changes in continentality and biota (Miotti and Salemme, 2004: 178).

In accordance to the general trend, in Atacama Desert (Núñez et al., 2001 in Gil et al., 2005), Southern Pampa (Muhs and Zárate, 2001; Zárate et al., 2005), Northern Patagonia and Southern Mendoza (Gil et al., 2005), arid intervals have been proposed for the Mid-Holocene. However, the duration and timing of these intervals do not coincide in each area. According to Gil et al. (2005), this could indicate diachronous environmental responses, although another explanation for these disagreements "might be related to the nature of the proxy records examined and the still deficient chronological framework" (Gil et al., 2005).

In the Deseado Massif, the vegetation evidence shows an increase of shrub steppes between 10,000 and 6000 BP in Los Toldos, and between 8000 and 6000 BP in La Martita. This could be related to a rise in temperature with unchanged precipitation regimes (Mancini, 1998). By 6500 BP, the records show aridity

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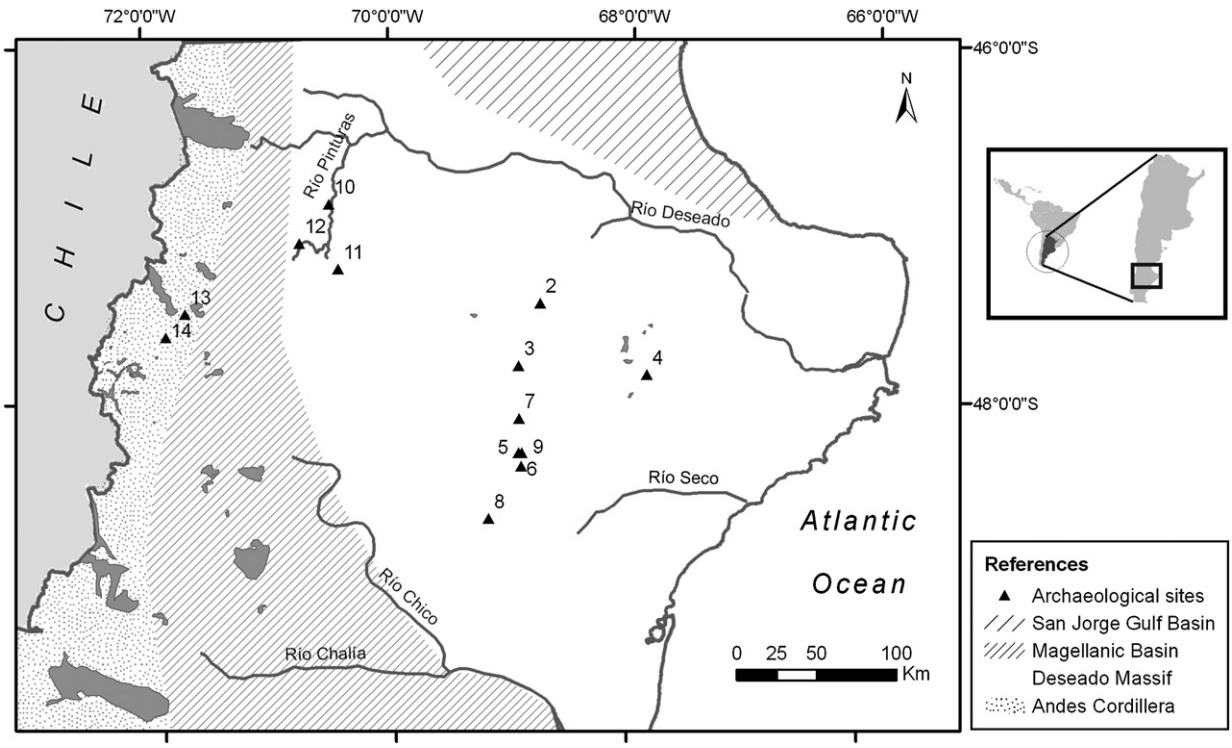

Fig. 1. Study area covering the north of Santa Cruz province. The different textures in the map represent the geological provinces (after Ramos, 1999). The archaeological sites represented are 1) La Martita, 2) Los Toldos, 3) Cueva Maripe, 4) Piedra Museo, 5) Cueva de La Ventana, 6) Casa del Minero 1, 7) Cerro Tres Tetas, 8) El Verano, 9) La Mesada, 10) Arroyo Feo, 11) Alero Cárdenas, 12) Cueva de las Manos, 13) Cerro de los Indios, 14) Cerro Casa de Piedra 7.

leading to the present day conditions (Markgraf, 1983, 1989; Mancini, 1998). The main vegetation change in Los Toldos *cañadón* occurred at *ca.* 3750 BP, when colder and drier conditions than today changed (De Porras et al., 2009). This tendency has been confirmed by pollen records from La Martita and Alero Cárdenas (Mancini, 1998), and by zooarchaeological studies from Cave 13 at Los Toldos (Miotti, [1989] 1998).

Another factor that could contribute to the progressive aridity during the studied period is the volcanic activity of Hudson Volcano. Naranjo and Stern (1998) recognized two prehistoric eruptions (H1 and H2) dated in 6700 and 3600 BP respectively. The first has been recognized at Los Toldos, Cave 3, corresponding to the sedimentary layer which covers the *Casapedrense* archaeological level (Cardich et al., 1973; Naranjo and Stern, 1998).

3. The archaeological record at Deseado Massif

In addition to the highly variable climate, it has been proposed that this period is characterized by profound cultural changes. A lack of archaeological findings has been noted in several areas of southern South America between 8000 and 4000 BP (Gil et al., 2005; Zárate et al., 2005). Therefore, the current investigations have considered explanations involving human decision-making in relation to environmental changes, along with hypotheses concerning low visibility and lack of systematic surveys (see Gil et al., 2005; Zárate et al., 2005). Atacama Desert (Northern Chile), Susques area (Northern Argentina) and Mendoza (Argentina) show an increase in aridity that coincides with the decrease in the archaeological signals with simultaneous occupation of new spaces (Núñez et al., 2002; Gil et al. 2005; Yacobaccio and Morales, 2005).

Similarly, in the Deseado Massif area, Salemme and Miotti (2008) have detected an archaeological hiatus between *ca.* 7000 and 5500 BP (see Fig. 9a in Salemme and Miotti, 2008: 462). Following these authors, beyond taphonomic preservation problems and research bias, this hiatus could be explained by population movements to the Atlantic coast and the Cordillera, in response to environmental stress in the area (Miotti and Salemme, 2003, 2004). The presence of obsidian from the Andean Cordillera foothills and fragments of marine mollusc valves supports the human movements (see Cardich et al., 1994; Miotti, [1989] 1998; Miotti and Salemme, 2004; Hermo, 2008). This evidence allowed Miotti and Salemme (1999, 2004) to propose an extension and consolidation of the social networks for the populations inhabiting the Deseado Massif area during this period.

4. Technological characterization of lithic assemblages at the Deseado Massif

The study of lithic technology, through the products of knapped tools and debitage, is crucial at the Deseado Massif area. It has been the object of archaeological research during the last 60 years from different theoretical perspectives, and conducted to non-uniform interpretations. The first approach to the occupational sequence of northern Santa Cruz was that of Menghin (1952), a researcher who belonged to the cultural historical school of Vienna. In relation to the lithic assemblages from Caves 2 and 3 of Los Toldos corresponding to the Mid-Holocene, Menghin (1952) defined the "*Casapedrense* Industry". Following this author, "the main types are blades with or without marginal retouch" (our translation), scrapers of diverse morphology, and blades (Menghin, 1952: 40). He highlighted the absence of bifacially retouched artefacts, such as the triangular points belonging to the "*Toldense* Industry", which are present in the underlying stratigraphic layers. Later, Cardich restarted the excavations at Cave 3 (Cardich et al., 1973), and dated the *Casapedrense* tradition to 7260 ± 350 BP. The most important characteristics of this lithic assemblage from layers 6 and 7 are the great predominance of blades, the absence of projectile points and the presence of bolas. The *Casapedrense* is sealed by volcanic ash

layers which Cardich related to the eruption II of the Hudson volcano, dated to 5500 BP (Auer, 1949; Cardich et al., 1973). In a later paper, the end of the *Casapedrense* was set at 4850 ± 90 BP after the dating of a sample extracted from a charcoal lens located at the top of layer 4 (Cardich, 1984–1985).

These studies focused on tools and other large artefacts, while the debitage was not taken into consideration. Consequently, no data on these knapping products were presented. Although the presence of blade technology in archaeological assemblages from Patagonia has been the focus of different debates during the 1980s and 1990s (Gradín, 1980; Orquera, 1984–85, 1999; Aschero, 1987; Cardich, 1987; Borrero, 1989; Yacobaccio and Guráieb, 1994, 1999), the concept of a *Casapedrense* tradition or the idea of a typological characterization of such assemblages remains in the archaeological literature. Table 1 shows some archaeological assemblages from other archaeological sites at the Deseado Massif which were assigned to the *Casapedrense* tradition. Furthermore, in the Río Pinturas Area, to the west of the Deseado Massif, Gradín (1980) defined an archaeological level called Río Pinturas II, which would have extended from *ca.* 7000 to 3400 BP. This cultural entity showed "coexistence between both industries of Toldense and Casapedrense tradition" (Gradín, 1980: 185; translated by the authors).

All these sites share at least three characteristics which are relevant for this discussion: 1) they are stratigraphic sites in caves and rockshelters; 2) they are close to sources of lithic raw materials frequently employed; 3) the assemblages have a high artefact density (Aschero, 1987).

4.1. New evidence and studies

Research developed in recent years at two archaeological localities, La Primavera and La María, provide new important evidence for Mid-Holocene archaeology in the Deseado area.

4.1.1. Cueva Maripe, La Primavera archaeological locality

Cueva Maripe is located in the middle course of La Primavera *cañadón* (Figs. 1 and 2). The cave is divided in two chambers, north and south, which differ in the presence of roof collapses, infiltration of water, and exposure to wind (Miotti et al., 2004, 2007). These differences affected the rates of accumulation of sediments in each chamber, resulting in a thicker sediments accumulation in the north chamber (Magnín, 2010). In addition, cultural differences were registered. The variation in frequencies and diversity of artefacts between chambers was interpreted as the result of the difference in the activities performed in each (Hermo, 2008). This idea is concordant with interpretations achieved through other lines of evidence, such as the rock art (Carden, 2008) and faunal data (Marchionni, 2009; Miotti and Marchionni, 2009).

Chronological variation in the lithic assemblages of the cave was also studied in a previous work (Hermo, 2008). Due to the sediment matrix homogeneity, it was difficult to distinguish natural levels during the excavation (Miotti et al., 2007). Therefore, artificial levels were set, and the sub-assemblages of lithic artefacts corresponding to the time period of interest here, were defined on the base of the relative position of the samples taken for radiocarbon dating. In the north chamber, the artefacts corresponding to the Mid-Holocene are enclosed in sediments dated between 5084 ± 49 BP (AA65173) and 3210 ± 60 BP (LP1497). In the south chamber, a similar procedure was employed to define the artefact sample using the radiocarbon dates of 7703 ± 47 BP (AA65177) and 4113 ± 39 BP (AA65181) (Fig. 3).

The samples were classified using the analytical categories: unretouched artefacts, retouched tools, and cores. Inside the first category, the proportions of blades and flakes resulting from bifacial knapping were documented in order to evaluate the technological tendencies in the assemblage (Table 2; see Hermo, 2008).

The total lithic assemblage analyzed included 3220 elements (2974 unretouched artefacts and 246 retouched tools) (Hermo, 2008). Based on the analysis of that sample, Hermo (2008) made the following characterization: 1 – Blades are present as unretouched artefacts (nearly 15%), and also as blanks for retouched tools (30% in the north chamber, and 50% in the south chamber). Therefore, the lithic assemblage at Cueva Maripe assignable to the Mid-Holocene clearly shows the presence of a blade technology. A great number of unretouched artefacts are evaluated as subproducts of the extraction of blades from cores. 2 – Bifacial flakes are present among the unretouched artefacts (15.76% and 10.38% in north and south chamber respectively), and there are also retouched artefacts elaborated by bifacial thinning and/or through marginal bifacial knapping. 3 – The retouched tools are mainly unifacial, elaborated by ultramarginal microretouch and with a wide predominance of scrapers, being the most represented type the endscrapers. 4 – Bola stones, known as "boleadoras", manufactured by a very different technology based on picking and polishing, are also present.

Fig. 3 presents the frequencies of different classes of artefacts in the excavation layers. The vertical distribution of the artefacts shows a clear association between blades and bifacial products in the considered period. This coexistence is observed principally in the debitage. The presence of blades as blanks as well as bifacial flakes is observed along almost the complete stratigraphic sequence. The frequencies of blades and bifacial flakes vary in a non-systematic way between the excavation levels and also between chambers. Therefore, a clear tendency about changes in those frequencies over time cannot be proposed. In addition, in blade assemblages, "*a substantial majority of the other flaked artifacts were produced at some stage of the process that led to blade, whereas blades represent less than 15 percent of flaked artefacts*" (Davis, 1993: 689).

Another important technological data is the presence of three fragments of bolas at levels assignable to the Mid- and Late-Holocene (Hermo, 2008). Only one represents more than half of the original tool, while the other two are smaller fragments.

Table 1
Mid-Holocene archaeological contexts which provided technological and chronological data for Fig. 4.

Site number at Figs. 1 and 4	Archaeological context	Reference
1	La Martita, Cave 4, layer 5b	Gradín et al. (1987)
2	Los Toldos, Cave 3, levels 6 and 7	Cardich (1987, 1984–1985)
3	Cueva Maripe, Mid-Holocene context	Hermo (2008)
4	Piedra Museo, AEP1, unit 2	Miotti and Salemme (1999), Cattáneo (2002)
5	Cueva de La Ventana, unit 4	Paunero (2000), Paunero et al. (2004)
6	Casa del Minero 1, unit 3A	Paunero et al. (2007a)
7	Cerro Tres Tetas, Cave 1, layer 4	Paunero et al. (2007b)
8	El Verano, component 3	Durán (1986–1987)
9	La Mesada, Unit 6	Skarbun (2010)
10	Arroyo Feo 1, layers 6b, 7b, 8, 9 and 10	Gradín (1980), Gradín et al. (1987, 1979)
11	Alero Cárdenas, layer 5	Aschero (1981–1982), Gradín (1980), Gradín et al. (1987, 1979)
12	Cueva de las Manos, layer 5	Aschero (1981–1982), Gradín et al. (1987, 1979)
13	Cerro de los Indios, layer 3e	Aschero (1981–1982)
14	Cerro Casa de Piedra 7, from layer 3 on	Aschero et al. (2007)

Fig. 2. Cueva Maripe site, located in the La Primavera *cañadón*; and blades from the Mid-Holocene context.

The presence of blades and bolas places the archaeological context of Cueva Maripe in technological agreement with the other assemblages that belong to Mid-Holocene contexts and come from sites at the Deseado Massif discussed here. However, the presence of bifacial flakes is a distinctive feature in relation to the contexts assigned to the *Casapedrense*.

4.1.2. Surface archaeological distributions

In this locality, a surface survey has been performed using transects spaced at 1-km intervals to cover a 100 km^2 area around Cueva Maripe (Magnín, 2010). As a result, a total of 200 artefact assemblages were registered and more than 6000 artefacts were recovered and analyzed. The lithic and spatial analysis performed allowed a series of observations that are relevant to the issue addressed here. For instance, 23.5% of the assemblages ($n = 47$) include bifacial tools (mainly arrowheads and hand axes), and 21% ($n = 42$) have tools manufactured on blades. Both bifacial tools and tools manufactured on blades are simultaneously present at 5.5% ($n = 11$) of the assemblages. These have been assigned to diverse functions (i.e. loci of multiple activities, hunting sites, hunting blinds, temporary camps, quarries, workshops and funeral structures), showing that both technologies are present at different open air archaeological contexts, and not only in stratigraphic contexts at caves.

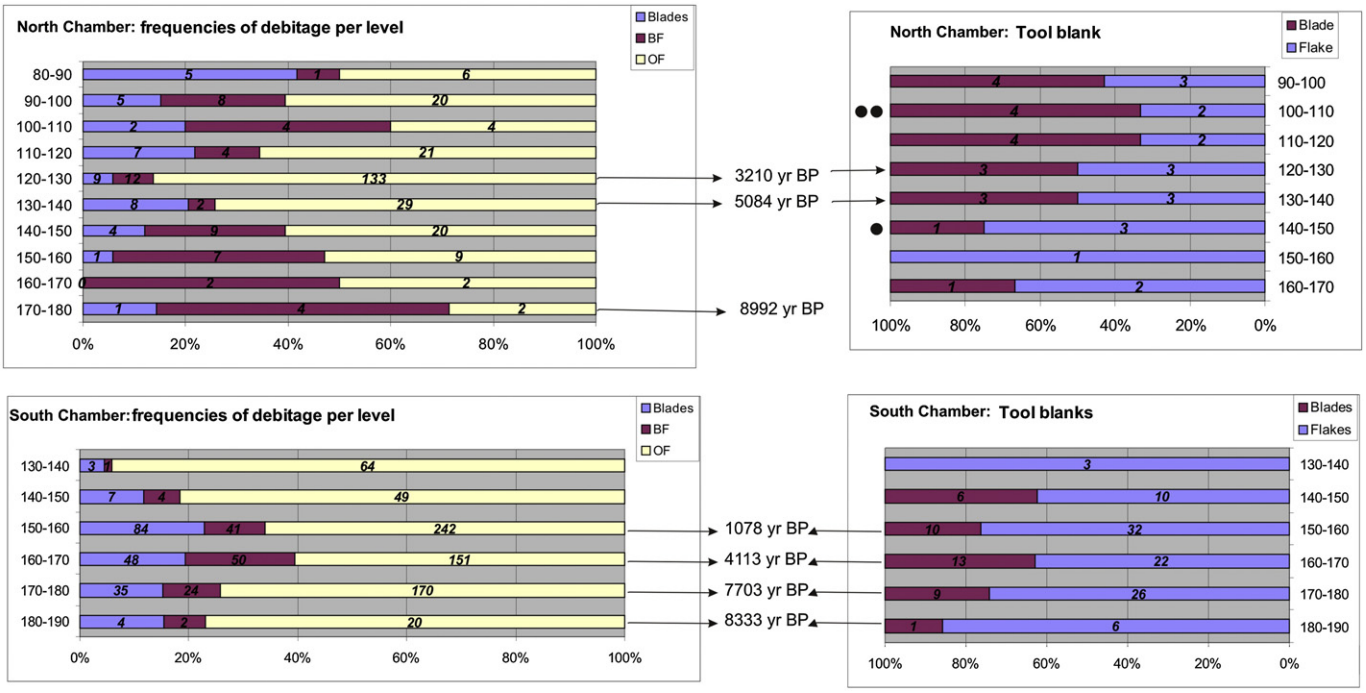

Fig. 3. Distribution of debitage (only unbroken and proximal fragments) in the stratigraphy. Blades, bifacial flakes (BF), other types of flakes (OF). X axis: depth values in cm. Y axis: percent values. Relative position of radiocarbon dates is indicated. Black circles show the relative position of bolas fragments.

Table 2
Absolute and relative frequencies of unretouched artefacts, blades, bifacial knapping flakes, retouched tools, and retouched tools on blades as blanks.

	North chamber	South chamber	Total	%
Unretouched artefacts	1028	1946	2974	100
Blades	109	355	464	15.6
Bifacial knapping flakes	162	202	364	12.24
Retouched tools	41	205	246	100
Retouched tools manufactured on blades as blanks	20	63	83	33.74

Although chronology cannot be assigned to these assemblages, they can provide a spatial perspective to the use of technology. The increasing inclusion of a variety of archaeological contexts in the technological discussion, as well as the progress in the analysis of debitage will represent an important contribution in this direction.

4.1.3. Cueva de la Ventana, La Mesada and Casa del Minero; La María archaeological locality

Investigations at La Ventana and La Mesada included debitage analysis that permitted detection of some technological commonalities with Cueva Maripe. Cueva de la Ventana has "a dense occupation, with clear predominance of scrapers, blades used as main blanks, and diagnostic laminarity rates" dating between 7970 ± 40 BP and 7665 ± 75 BP (Paunero, 2000; Paunero et al., 2004: 152–153). The typological list published in Paunero (2000), includes two tools and 51 knapping sub-products (including a bifacial retouch flake).

Other studied sites at this locality, La Mesada (*ca.* 4500 BP) and Casa del Minero (*ca.* 5190 BP), were defined as loci where multiple activities, such as primary and secondary processing and consumption of prey were carried out. From the analysis of the middle component of La Mesada, Skarbun (2010) inferred that "throughout the knapping and the extraction of blanks on most raw materials, a large number of blades and laminar flakes were obtained, (…) in the case of xilopal (petrified wood) mainly blades were obtained, [and] in the shaping process of flint artefacts, there is little evidence of bifacial knapping" (our translation) (Skarbun, 2010: 199; translated by authors). The high presence of blades is remarkable, and also the fact that chalcedony is the exclusive raw material used to produce bifacial pieces. Finally, the cores show both blades and flake extractions (Skarbun, 2010: 200).

4.2. Blade and bifacial flaking technology in the regional context

The presence of blade and/or bifacial technology in Mid-Holocene archaeological contexts on the basis of published descriptions of the lithic assemblages from 14 archaeological contexts (see Table 1) is summarized and compared in Fig. 4 and Table 1. The sites are also arranged geographically in the Deseado Massif and the Andean Cordillera foothill areas.

The main ideas that emerge from the analysis of this figure are: 1) The distribution of radiocarbon dates shows a gap between *ca.* 6000 and 7000 BP (Salemme and Miotti, 2008) in the area. This gap seems to be prolonged until *ca.* 5200 BP in the Deseado Massif; 2) Blade and bifacial technologies are present along the complete area and period under study. Most of the analyzed contexts show the coexistence of both technologies. These observations are suggestive and affirm the need of rethinking the lithic technology from different perspectives that include detailed debitage analysis applied to stratigraphic and surface contexts.

5. Discussion

Until the 1990s, it was widely accepted the idea that the archaeological sites of the Deseado Massif were characterized by a strong presence of blade technology, the emergence of bolas, and the absence of bifaces. However, there are exceptions, such as the works in the Río Pinturas area and in the south Deseado Massif (Gradín, 1980; Aguerre 1987; Gradín et al., 1987; Orquera, 1999) where it has been sustained that the blade technology "co-existed" with bifaces technology. New investigations at the Deseado Massif, which includes the analysis of debitage, suggest that blade and bifacial technologies were integrated during a long temporal period, characterized by a broad variability of environmental events. The data sets considered in this work contribute to generate expectations on various topics.

1. Although proxy data show general tendencies indicating increases in temperature peaking at the Hypsithermal (Clapperton, 1993), the environmental variations during the Mid-Holocene was not coincident in the different sectors of the region, encompassing, for example, the effects produced by volcanism and humidity on vegetation, fauna and other resources. However, to date, there is no sufficiently detailed radiocarbon date synchronization to relate Mid-Holocene occupational pulses in the caves of the region with each of

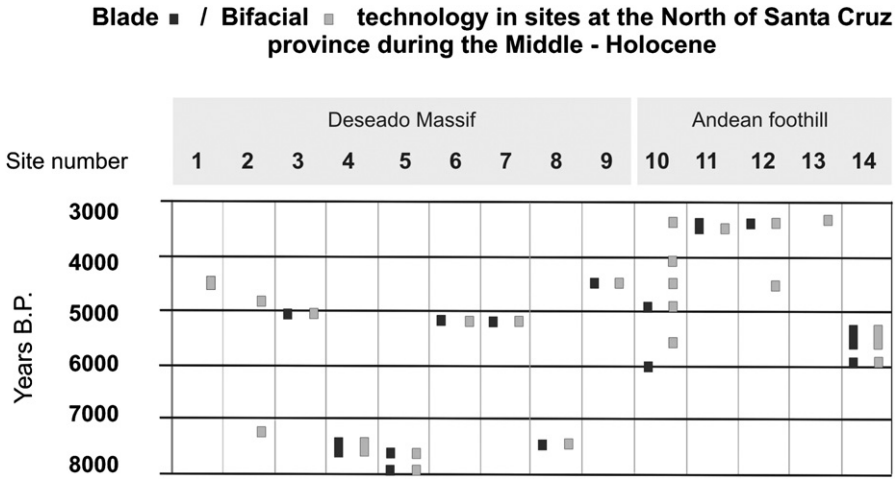

Fig. 4. Distribution of blade and bifacial technologies in the region (see Table 1 and Fig. 1).

the different environmental events. For example, although volcanic ash layers attributable to the activity of Hudson volcano have been found in various places such as Los Toldos Cave 3, Cerro Tres Tetas Cave 1, and La Mesada, in other locations at the Deseado Massif, such as Cueva Maripe, Casa del Minero, and even different sites in the same locality, as in Los Toldos Cave 2; this kind of evidence was not detected. The same concerns can be postulated to changes in climate (temperature and humidity), because there are still no suitable micro-local sequences of proxy data for the Deseado Massif to diagnose the incidence of these phenomena on human populations at the appropriate timescale.

2. The presence of an "archaeological silence" in different areas and chronologies in the Mid-Holocene can be interpreted as a partial depopulation of the space due to changes in the mobility patterns at the regional level. In turn, the relatively high density of archaeological material from the assemblages corresponding to this period (Cardich et al., 1973; Aschero, 1987) could indicate a higher concentration of people at specific places by a reduction in residential mobility. Another alternative is that this gap represents a bias in the available data, as there are only 12 radiocarbon dates of the Mid-Holocene. Furthermore, the evidence of higher artefactual densities in the Mid-Holocene at the Deseado Massif, need to be verified with more detailed studies, properly controlling the timing and deposition rates represented in each period.
3. The presence of allochthonous materials (marine species of snails, limpets and mussels, and obsidian from the Cordillera) indicates contacts between distant areas which were not so intense before the Mid-Holocene (Miotti and Salemme, 2004; Miotti, 2006; Salemme and Miotti, 2008). This could point to the existence of extensive social networks during the Mid-Holocene, connecting distant and diverse places, facilitating the movement of goods and information between people inhabiting different environments (Miotti, 2006; Carden et al., 2009; Hermo and Miotti, 2011).
4. The evidence presented here for Cueva Maripe and other sites of the north of Santa Cruz, shows a clear association between bifacial and blade technologies. In the rest of Deseado Massif, there is not enough material evidence to sustain the technological discontinuity proposed between the Toldense (characterized by bifacial technology), the Casapedrense (with blade technology), and the Patagoniense, (also characterized by bifacial technology) (i.e. Menghin, 1952; Cardich et al., 1973; Cardich, 1987). The low frequency of bifacial artefacts during the Mid-Holocene could be related to differential discard of these artefacts because of changes in the use of space. For instance, caves could have been used for activities other than those carried out during other times of prehistory (Miotti, 2006; Hermo, 2008). In this sense, bifacial tools could have been discarded mainly outside the caves, although part of the production process took place inside them (Hermo, 2008; Skarbun, 2010).

On the other side, the appearance of bolas, a remarkable technological innovation of the Mid-Holocene, imply a different production processes and use of weapons compared to knapped points. This technological change would have produced a change in the organization of hunting groups (i.e. it could have leaden to different raw materials procurement, and it probably involved other hunting strategies).

Finally, the present study sought to provide an overview of the discussions about human occupations in the Deseado Massif during the Mid-Holocene. The evidence presented from Cueva Maripe and other published information for the Deseado Massif shows that blade and bifacial technologies co-existed over much of the Mid-Holocene. This result indicates that technological changes in the archaeological sites were not abrupt, except by the appearance of bolas. On the other side, the implications of these technological trajectories are dependent on the theoretic reference framework employed. From the study of lithic production systems, a difficulty observed to arrive to sound interpretations, is that there are not enough published studies focused on different types of *debitage* associated to the technologies discussed here (Hermo, 2008; Skarbun, 2010).

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References

Aguerre, A.M., 1987. Investigaciones arqueológicas en el área de La Martita, Dto. De Magallanes, pcia. De Santa Cruz. In: Comunicaciones – Primeras Jornadas de Arqueología de la Patagonia. Gobierno de la Provincia del Chubut – Serie Humanidades 2. Dirección de Impresiones Oficiales, Rawson, pp. 11–16.

Aschero, C.A., 1981–1982. Nuevos datos sobre la arqueología del Cerro Casa de Piedra, sitio CCP5 (Parque Nacional Perito Moreno; Santa Cruz, Argentina). Relaciones de la Sociedad Argentina de Antropología XIV, 267–284.

Aschero, C., 1987. Tradiciones culturales en la Patagonia Central – una perspectiva arqueológica. In: Comunicaciones 1ras. Jornadas de Arqueología de la Patagonia. Gobierno del Chubut – Serie Humanidades 2. Rawson, pp. 17–33.

Aschero, C., Bozzuto, D., Civalero, T., De Nigris, M., Di Vruno, A., Dolce, V., Fernandez, N., Gonzalez, L., Sacchi, M., 2007. Nuevas evidencias sobre las ocupaciones tempranas en Cerro Casa de Piedra 7. In: Morello, F., Martinic, M., Prieto, A., Bahamonde, G. (Eds.), Arqueología de Fuego-Patagonia. Levantando piedras, desenterrando huesos y develando arcanos. CEQUA, Punta Arenas, pp. 569–576.

Auer, V., 1949. Las capas volcánicas como base de la cronología postglacial de Fuegopatagonia. In: Revista de Investigaciones Agrícolas. Ministerio de Agricultura y Ganadería, t. III, Buenos Aires, pp. 49–208.

Borrero, L.A., 1989. Replanteo de la arqueología patagónica. Interciencia 14 (3), 127–135.

Carden, N., 2008. Imágenes a través del tiempo. Arte rupestre y construcción social del paisaje en la Meseta Central de Santa Cruz. Sociedad Argentina de Antropología, Buenos Aires.

Carden, N., Magnín, L., Miotti, L., 2009. Distribución de figuras animales y dinámica poblacional: un estudio comparativo en Patagonia (provincia de Santa Cruz). In: Sepúlveda, M., Briones, L., Chacama, J. (Eds.), Crónicas sobre la Piedra. Arte rupestre de las Américas…. Ediciones Universidad de Tarapacá, Arica, pp. 153–174.

Cardich, A., 1987. Arqueología de Los Toldos y El Ceibo (Provincia de Santa Cruz, Argentina). Investigaciones Paleoindias al Sur de la línea ecuatorial. Estudios Atacameños 8, 98–117.

Cardich, A., Cardich, L., Hadjuk, A., 1973. Secuencia arqueológica y cronología radiocarbónica de la Cueva 3 de Los Toldos (Santa Cruz, Argentina). Relaciones de la Sociedad Argentina de Antropología VII, 87–122.

Cardich, A., 1984–1985. Una fecha radiocarbónica más de la Cueva 3 de Los Toldos (Santa Cruz, Argentina). Relaciones de la Sociedad Argentina de Antropología XVI, 269–273.

Cardich, A., Paunero, R.S., Castro, A., 1994. Análisis de los conjuntos líticos de la Cueva 2 de Los Toldos (Santa Cruz, Argentina). Anales del Instituto de la Patagonia 22, 149–173. Punta Arenas, Chile.

Cattáneo, G., 2002. Una aproximación a la organización de la tecnología lítica entre los cazadores recolectores del Holoceno Medio/Pleistoceno Final en la Patagonia Austral, Argentina. Ph.D. thesis, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata.

Clapperton, C., 1993. Quaternary Geology and Geomorphology of South America. Elsevier Science Publishers.

Davis, D.D., 1993. Archaic blade production on Antigua, West Indies. American Antiquity 58, 688–697.

De Giusto, J.M., Di Persia, C. and Pezzi, E., 1980. Nesocratón del Deseado. In: Geología Regional Argentina t. II. Córdoba, pp. 1389–1462.

De Porras, M.E., Mancini, M.V., Prieto, A.R., 2009. Vegetation changes and human occupation in the Patagonian steppe, Argentina, during the late Holocene. Vegetation History and Archaeobotany 18, 235–244.

Durán, V., 1986–1987. Estudio tecno-tipológico de los raspadores de El Verano-Cueva 1 (Área de La Martita) Santa Cruz. Anales de Arqueología y Etnología Tomo 41/42, 129–163. Mendoza.

Gil, A., Zárate, M., Neme, G., 2005. Mid-Holocene paleoenvironments and the archeological record of southern Mendoza, Argentina. Quaternary International 132, 81–94.
Gradín, C., 1980. Secuencias radiocarbónicas del sur de la Patagonia Argentina. Relaciones de la Sociedad Argentina de Antropología XI, 177–194.
Gradín, C., Aschero, C., Aguerre, A.M., 1979. Arqueología del Área Río Pinturas (provincia de Santa Cruz). Relaciones de la Sociedad Argentina de Antropología XIII, 183–227.
Gradín, C., Aschero, C., Aguerre, A.M., 1987. Primeros niveles culturales en el área del río Pinturas. Estudios Atacameños 8, 118–141.
Hermo, D., 2008. Los cambios en la circulación de las materias primas líticas en ambientes mesetarios de Patagonia. Una aproximación para la construcción de los paisajes arqueológicos de las sociedades cazadoras-recolectoras. Ph.D. thesis, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata.
Hermo, D., Miotti, L., 2011. La obsidiana en el Nesocratón del Deseado (Santa Cruz, Argentina): extractos de una oscura biografía. In: Hermo, D., Miotti, L. (Eds.), Biografías de paisajes y seres: visiones desde la arqueología sudamericana. Encuentro Grupo Editor. Facultad de Humanidades, Universidad Nacional de Catamarca, pp. 111–131.
Magnín, L., 2010. Distribuciones arqueológicas en la Meseta Central de Santa Cruz. Implicancias para los estudios de uso del espacio y movilidad de sociedades cazadoras recolectoras. Ph.D. thesis, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata.
Mancini, M.V., 1998. Vegetational changes during the Holocene in Extra-Andean Patagonia, Santa Cruz Province, Argentina. Palaeogeography, Palaeoclimatology, Palaeoecology 138, 207–219.
Mancini, M.V., Paez, M., Prieto, A., Stutz, S., Tonello, M., Vilanova, I., 2005. Mid-Holocene climatic variability reconstruction from pollen records (32°–52° Argentina). Quaternary International 132, 47–59.
Marchionni, L., 2009. Zooarqueología de Cueva Maripe (Santa Cruz): primeros resultados. Resúmenes de las III Jornadas de Jóvenes Investigadores de la FCNyM. UNLP, La Plata, Bs. As., pp. 34.
Markgraf, V., 1983. Late and postglacial vegetational and paleoclimatic changes in subantarctic, temperate, and arid environments in Argentina. Palynology 7, 43–70.
Markgraf, V., 1989. Palaeoclimates in central and south America since 18,000 BP based on pollen and lake-level records. Quaternary Science Reviews 8, 1–24.
Menghin, O., 1952. Fundamentos cronológicos de la prehistoria de Patagonia. Runa V, 23–43.
Miotti, L., 1998. Zooarqueología de la meseta central y la costa de la Provincia de Santa Cruz. Un enfoque de las estrategias adaptativas y los paleoambientes. Ediciones del Museo de Historia Natural de San Rafael, Mendoza [1989].
Miotti, L., 2006. Paisajes domésticos y sagrados desde la arqueología de los cazadores-recolectores en el Macizo del Deseado, provincia de Santa Cruz. Cazadores Recolectores Del Cono Sur. Revista de Arqueología 1, 13–42. UNMDP.
Miotti, L., Marchionni, L., 2009. Procesando Huesos: entre la Arqueología y la Etnografía. In: Salemme, M., Santiago, F., Álvarez, M., Piana, E., Vázquez, M., Mansur, M.E. (Eds.), Arqueología de la Patagonia. Una mirada desde el último confín, pp. 787–798. Ushuaia, Utopías.
Miotti, L., Salemme, M., 1999. Biodiversity, taxonomic richness and specialists-generalists during Late Pleistocene/Early Holocene times in Pampa and Patagonia (Argentina, Southern South America). Quaternary International 53/54, 53–68.
Miotti, L., Salemme, M., 2003. When Patagonia was colonized: people mobility in high latitudes by Pleistocene/Holocene times. In: Miotti, L., Salemme, M. (Eds.), South America, Long And Winding Roads For The First Americans At The Pleistocene/Holocene Transition. Quaternary International, 95–112. Canadá.
Miotti, L., Salemme, M., 2004. Poblamiento, movilidad y territorios entre las sociedades cazadoras recolectoras de Patagonia. Complutum 15, 177–206.
Miotti, L., Hermo, D., Salemme, M., Magnín, L. and Marchionni, L., 2004. Cueva Maripe y su excavación. Implicancias en los estudios regionales del Macizo del Deseado. In: Ponencia presentada al XV Congreso Nacional de Arqueología. Río Cuarto.
Miotti, L., Salemme, M., Hermo, D., Magnín, L., Carden, N., Mosquera, B., Terranova, E., Marchionni, L., 2007. Resolución e integridad arqueológica en la Cueva Maripe (Santa Cruz, Argentina). In: Morello, F., Martinic, M., Prieto, A., Bahamonde, G. (Eds.), Arqueología de Fuego-Patagonia. Levantando piedras, desenterrando huesos… y develando arcanos. Ed. CEQUA, Pta. Arenas, Chile, pp. 555–569.
Muhs, D., Zárate, M., 2001. Late Quaternary eolian records of the Americas and their paleoclimatic significance. In: Markgraf, V. (Ed.), Interhemispheric Climate Linkages. Academic Press, pp. 183–215.
Naranjo, J., Stern, C., 1998. Holocene explosive activity of Hudson Volcano, southern Andes. Bulletin of Volcanology 59, 291–306.
Núñez, L., Grosjean, M., Cartajena, I., 2002. Human occupations and climate change in the Puna de Atacama, Chile. Science 298, 821–824.
Orquera, L., 1984–85. Tradiciones culturales y evolución en Patagonia. Relaciones de la Sociedad Argentina de Antropología 16, 249–267. Buenos Aires.
Orquera, L., 1999. Acerca de tendencias temporales en la arqueología de Patagonia. In: Soplando en el viento… Actas de las III Jornadas de Arqueología de Patagonia, pp. 515–522.
Paunero, R., 2000. Localidad arqueológica Cerro Tres Tetas. In: Miotti, L., Paunero, R., Salemme, M., Cattáneo, R. (Eds.), Guía de campo a la visita de las localidades arqueológicas Taller Internacional del INQUA. La Colonización del Sur de América durante la Transición Pleistoceno/Holoceno. Servicoop, La Plata, pp. 89–100.
Paunero, R.S., Cueto, M., Frank, A., Ghidini, G., Rosales, G., Skarbun, F., 2004. Comunicación sobre la campaña arqueológica 2002 en Localidad La María, Santa Cruz. In: Civalero, M.T., Fernández, P., Guráieb, G. (Eds.), Contra viento y marea. Arqueología de Patagonia. INAPL-SAA, Buenos Aires, pp. 797–808.
Paunero, R., Albertengo, P., Cueto, M., Dávila, A., Frank, A., Olivera, A., 2007a. Sitio Casa del Minero 1, localidad arqueológica La María: nuevas evidencias sobre ocupación humana pleistocénica en Santa Cruz. In: Arqueología Argentina en los inicios de un nuevo siglo. Laborde Editor, Rosario, pp. 337–344.
Paunero, R.S., Castro, A., Reyes, M., 2007b. Estudios líticos del componente medio del sitio Cueva 1 de Cerro Tres Tetas, Santa Cruz, Argentina: Implicaciones para construir patrones de distribución artefactual y uso del microespacio. In: Morello, F., Martinic, M., Prieto, A., Bahamonde, G. (Eds.), Arqueología de Fuego-Patagonia. Levantando piedras, desenterrando huesos… y develando arcanos. Ediciones CEQUA, Punta Arenas, Chile, pp. 613–622.
Ramos, V., 1999. Las Provincias Geológicas del Territorio Argentino. Geología Argentina, Instituto de Geología y Recursos Minerales, Anales 29 (3), 41–96.
Salemme, M., Miotti, L., 2008. Archaeological hunter-gatherer landscapes since the latest Pleistocene in Fuego-Patagonia. In: Rabassa, J. (Ed.), The Late Cenozoic of Patagonia and Tierra del Fuego. Elsevier, Nueva York, pp. 437–483.
Skarbun, F., 2010. La organización tecnológica en grupos cazadores recolectores desde las ocupaciones del Pleistoceno final al Holoceno tardío, en la meseta central de Santa Cruz. Ph.D. thesis, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata.
Soto, J., Vázquez, M., 2000. Las condiciones climáticas de la provincia de Santa Cruz. In: Manríquez, Godoy (Ed.), El gran libro de la Provincia de Santa Cruz. Milenio Ediciones – ALFA.
Tonni, E., Cione, A., Figini, A., 1999. Predominance of arid climates indicated by the mammals in the pampas of Argentina during the late Pleistocene and Holocene. Palaeogeography, Palaeoclimatology, Palaeoecology 147, 257–281.
Yacobaccio, H., Guráieb, G., 1994. Tendencia temporal de contextos arqueológicos: Área del Río Pinturas y zonas vecinas. In: Gradín, C., Aguerre, A. (Eds.), Contribución a la Arqueología del Río Pinturas. Provincia de Santa Cruz. Ediciones Búsqueda de Ayllu, Concepción del Uruguay, pp. 13–28.
Yacobaccio, H., Guráieb, G., 1999. Tendencias temporales en el Río Pinturas: una respuesta a Orquera. Soplando en el viento. Editorial de la Universidad del Comahue, Neuquen – Buenos Aires, pp. 625–628.
Yacobaccio, H.D., Morales, M., 2005. Mid-Holocene environment and human occupation of the Puna (Susques, Argentina). Quaternary International 132, 5–14.
Zárate, M., Neme, G., Gil, A., 2005. Mid-Holocene paleoenvironments and human occupation in southern South America. Quaternary International 132, 1–3.