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## A HOOK ON PATAGONIA: SPEARTHROWERS, BONE HOOKS, AND GRIPS FROM PATAGONIA

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### ABSTRACT

The present paper will evaluate the available evidence for the use of spearthrowers or atlatls in Patagonia based on the presence of a specific part of the equipment: the spearthrower hook or grip. This evidence will be contextualized through the review of the distribution and characteristics of spearthrower parts made from bone in the Southern Cone region of South America. The paper takes as its starting point a model created to define and identify the reasons behind the exploitation of osseous raw materials in Tierra del Fuego (Scheinsohn 1997, 2010). The model defined a period of experimentation, exploitation, and abandonment. Here, I will evaluate whether Patagonian bone spearthrower hooks and grips fit this model.

**KEYWORDS:** Spearthrower, Patagonia, arrow and dart, hook, grips, bone technology.

### RESUMEN

Este trabajo evaluará la evidencia actualmente disponible de propulsores o atlatls en Patagonia, partiendo de la presencia de una parte específica del sistema, los ganchos o mangos. Esta evidencia será contextualizada al ubicarla en el marco de la distribución y características de este sistema de arma en el Cono Sur de Sudamérica. Además, partiendo del modelo que explica la explotación de las materias primas óseas en Tierra del Fuego (Scheinsohn 1997, 2010) que define y permite identificar un momento de experimentación, de explotación y de abandono, se evaluará si la evidencia de los ganchos y mangos de propulsor de hueso de Patagonia se ajusta a este modelo.

**PALABRAS CLAVE:** Propulsor, Patagonia, arco y flecha, gancho, mango, tecnología ósea.

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### INTRODUCTION

Stone projectile points have acquired an extraordinary reputation in terms of what they can reveal about weapon systems. This reputation is firmly based on their better preservation. In a recent example, Rots and Plisson argued that “weapon delivery systems themselves rarely survive archaeologically due to the organic nature of their components; therefore, only the stone armatures can inform us about past technologies” (Rots and Plisson 2014:155). Nevertheless, when trying to identify a weapon delivery system (such as bows

and arrows, spearthrowers and hand held spears) stone projectile points are not a straightforward proxy. The many proposals posited to differentiate them (Churchill 1993; Hildebrant and King 2012; Morrisey 2009; Ratto 1993, 2003; Rorabaugh and Fulkerson 2015; Rots and Plisson 2014; Shott 1993, 1997; Thomas 1978; Walde 2014 among others) evidence a lack of consensus and they are still debated (see for instance Rorabaugh and Fulkerson 2015: 25-26). When considering size, for instance, it is logical to suggest that small projectile points are used as arrows. But being small is a necessary but not sufficient condition to

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define when a projectile point belongs to an arrow or a dart. Also, big projectile points could be used in arrows, darts and spears (Thomas 1978). In addition, size in darts could be relativized since projectile and shaft mass can be reduced in atlatls that are fletched (Hughes 1998).

When comparing spearthrowers around the world, its parts design variation is so high (grip, hook and shaft or body) that it becomes difficult to positively identify a certain piece as a spearthrower hook, grip or body, especially, when ethnographic analogies are not known. The main problem seems to be that faced with the lack of the rest of the system, it is quite a difficult task to identify whether a projectile point belongs to a dart or an arrow. Since we can only evaluate parts of the weapon system, given that apart from particular specific contexts, few specimens are preserved as a whole we also need to consider other proxies.

The presence of foreshafts at a certain site is not a fixed identifier since they can be used either in darts as well as in hand held spears. Iconography (on pottery and in rock art) allowed recognition of this weapon system in certain cases (as in Aguada pottery in NW Argentina see Vignati 1936 Figure 1). But they are not always easy to interpret. This work will evaluate the presence of spearthrowers in Patagonia based on yet another proxy: the presence of spearthrower hooks/grips (as we will argue below they are frequently mixed in the Southern Cone Spanish literature so we prefer identify them in this way).

Until Mena et al. (2000) proposed that a certain bone artifact found in Baño Nuevo 1 site (Chilean Patagonia) was a spearthrower, the use of this system was more assumed than recorded. Since then I have identified a particular bone tool as a spearthrower hook/grip (following a suggestion from Aschero com. pers.) and have compared it with another bone spearthrower hook/grip also proposed in Patagonian bone tool materials (Scheinsohn 2010b, see also Scheinsohn 2014). This was reinforced when Buc and Cruz (2012 and 2015) and Beretta et al. (2013) proposed that other kind of bone tool found along the coast of Santa Cruz Province (Argentinean Patagonia) represented another design of spearthrower hook.

In this work, I will review when and where spearthrower hooks/grips were recorded in Patagonia. In order to contextualize the presence of spearthrowers in Patagonia I will first review its distribution and characteristics in the Southern Cone region of South America in order to establish the characteristics of the “outgroup” (defined in cladistics as any taxon which is hypothesized to be less closely related to each of the taxa under consideration than any of them are to each other. See <http://www.ucmp.berkeley.edu/glossary/gloss1phylo.html>).

Patagonian spearthrower hooks/grips recorded to date in Patagonia have been made out of bone, a situation that is probably related to issues of preservation since spearthrower bodies were likely made out of wood so that only the most durable parts survived.

#### THE SPEARTHROWER DELIVERY SYSTEM

The spearthrower was defined as follows: “Bras de levier, tenu à la main, destiné à augmenter la force de propulsion lors du lancer d’armes de jet” (Julien 1988). Usually it consists of a wood or cane rod with a groove on the upper surface and a hook at the rear end. Sometimes there is a grip. It was first recorded in the Upper Paleolithic of Europe at a date of  $17,470 \pm 249$  years BP (Knecht 1997:11) and from then on, it has been recorded in many places around the world. It is known by many different names in English (atlatl, throwing-stick, sling) but in Spanish this multiplicity amplifies (propulsor, estólica, tiradera, lanzadera, amiento, atlatl). This fact speaks to its wide distribution in Latin and South America, well documented mainly in the Andean region and the Amazonian Basin at the time of the Spanish Conquest. As Fernández Distel (1979, 1989-90) pointed out, there is confusion in the literature about hooks (*gancho*, *gancho posterior*, *de lanzamiento* in Spanish, the distal end of a spearthrower) and grips (also referred in Spanish as *gancho*, *gancho anterior*, *gancho de sostenimiento* etc, the proximal end of a spearthrower). Normally most authors refer to the presence of *ganchos de propulsor* without any further clarification if they



*Figure 1. Areas and site mentioned in the text. 1)Huachichocana, Inca Cueva Cueva 7, Doncellas, Pintoscayoc, 2) Antofagasta de la Sierra 3) Intihuasi 4) Cueva Piuquenes 5) Los Morrillos, 6) Atuel, 7) Sarandí, Anahí, Garín 8) Chenque Haichol 9) Los carneros 10) Cerro Casa de Piedra 11) Cueva del Negro, 12) Punta Entrada, 13) Fell. Red dots: complete spearthrowers; Blue dots: bone hooks and grips; Green dots: stone hooks and grips*

are dealing with hooks/ grips. Hence, I decided to record both (and this is the reason I call them bone spearthrower hooks/grips, BSHG from now on) since, whether they are grips or hooks, they signal the spearthrower presence.

#### THEORETICAL FRAMEWORK

I have developed a model for explaining osseous raw material exploitation in Tierra del Fuego (Scheinsohn 1997, 2010a) which permitted me to define and identify different moments of experimentation, exploitation, and abandonment. The expectations when osseous raw materials were being experimented with were:

- a) Variability in osseous raw materials.
- b) Design variability;
- c) Lack of standardization

While for the moment of exploitation I expected to find:

- a) Reduced types of raw materials
- b) No design variability;
- c) Standardization.

Here, I will evaluate whether the Patagonian BSHG identified so far follow this model.

#### *The Southern Cone region context*

The Southern Cone region is the geographic area comprising the southernmost areas of South America (covering Argentina, Chile and Uruguay, for regions and sites mentioned in the text see Figure 1). The presence of bone hooks/grips was recorded from the Early Holocene to Late Holocene times. In addition to this wide time range there is also a correlated spatial dispersion. Throughout the Southern Cone region there is great variability



Figure 2. Complete Spearthrower, Doncellas site, originally published by Casanova (1944). Stored at Museo Etnográfico “Juan Bautista Ambrosetti”, Facultad de Filosofía y Letras, Universidad de Buenos Aires, Inventory number -39442- (42-978). Top: the complete spearthrower. Below: detail of the bone hook. Photo taken by V. Scheinsohn.

in the raw materials used to produce spearthrower parts, especially in the Andes where wood, stone, bone and even metal were recorded for making them (see Figure 1). In a review of the findings the following areas can be mentioned:

#### *Northern Chile and Northwestern Argentina*

There are many spearthrower parts recorded in high frequencies in Northern Chile Puna (highlands), from 8500 AP onwards (for instance at the Tambillo site, Nuñez 1983, 1992 where bone hooks were identified). Later, in Chinchorro contexts (7000 – 1500 BC), complete *estólicas* (Arriaza 2003) as long as spearthrower hooks, (i.e. at Cerro El Morro I site there is a bone hook dated around 5500 BP see Standen 2003) were found. A good number of spearthrower hooks/grips were recorded in Archaic and Early ceramic (200 to

1.000/ 1.200 AD) contexts (Rivera and Zlatar 1982). It has been argued that many of those late spearthrowers had a ritual function given their complex decoration and the introduction of bow and arrow around 500-1500 AD (Rivera and Zlatar 1982, although bow and arrow introduction may have occurred earlier, see De Souza 2004). *Estólicas* also were identified in rock art (Montt Schroeder 2004) and on pot decoration (Aguada context pots in North Western Argentina see Vignati 1936 and Barrionuevo 1970).

In Northwestern Argentina, as a part of the Southern Andes, spearthrowers hooks/grips were recorded in many sites. This evidence was reviewed in detail by Fernández Distel (1979, 1989-90) so I will only mention here those cases related with bone hooks/grips:

1) Fernández Distel (1979, 1989-90) reports finding two complete estólicas at the Huachichocana site (Jujuy Puna, Figure 1, 1) in a burial dated 1450 BC. Also a hook found in very bad shape, could have been associated with a series of fragments found in the same burial. One of these pieces was made out of bone carved the form of an avian head (Fernández Distel 1979, Fig. 9). She also records the presence of a complete spearthrower in Inca Cueva Cueva 7 site (Jujuy Puna, Figure 1, 1) dated to 2130 BC and made out of wood.

2) A complete spearthrower found in the Doncellas area (Jujuy Province Figure 1, 1) by Eduardo Casanova (1944, also cited in Fernández Distel 1979, 1989-90) is now stored at the Museo Etnográfico “Juan Bautista Ambrosetti”, Facultad de Filosofía y Letras, Universidad de Buenos Aires (Figure 2). The shaft or body of this spearthrower was made out of wood while the hook was made out of the epiphysis of a fox tibia, taking advantage of its natural form. It dated to 1300 AD (Fernández Distel 1979, 1989-90)

3) Finally, at the Pintoscayoc 1 site in Jujuy Puna (Figure 1, 1), Hernández Llosas (1998) reports a triangular piece identified as a spearthrower hook dating near 9000 BP.

#### *Central Chile, Cuyo and Sierra Centrales*

A certain number of stone hooks/grips are mentioned (for instance Gambier 1985, Fig. 105) in association with agricultural contexts but only three are made out of bone:

1) A complete spearthrower found at Los Morrillos site (San Juan Province, Argentina, Figure 1, 5) accompanied burial 3 and dated to  $4410 \pm 150$  BP. Fernández Distel (1979, 1989-90) claim that its hook was made out of a puma claw although in the original publication Gambier said that it was made from a “soft stone” (see Gambier 1985:99). A personal examination of the artifact will be required to resolve this discrepancy.

2) González (1960) mentions four hooks, three of them made out of stone and

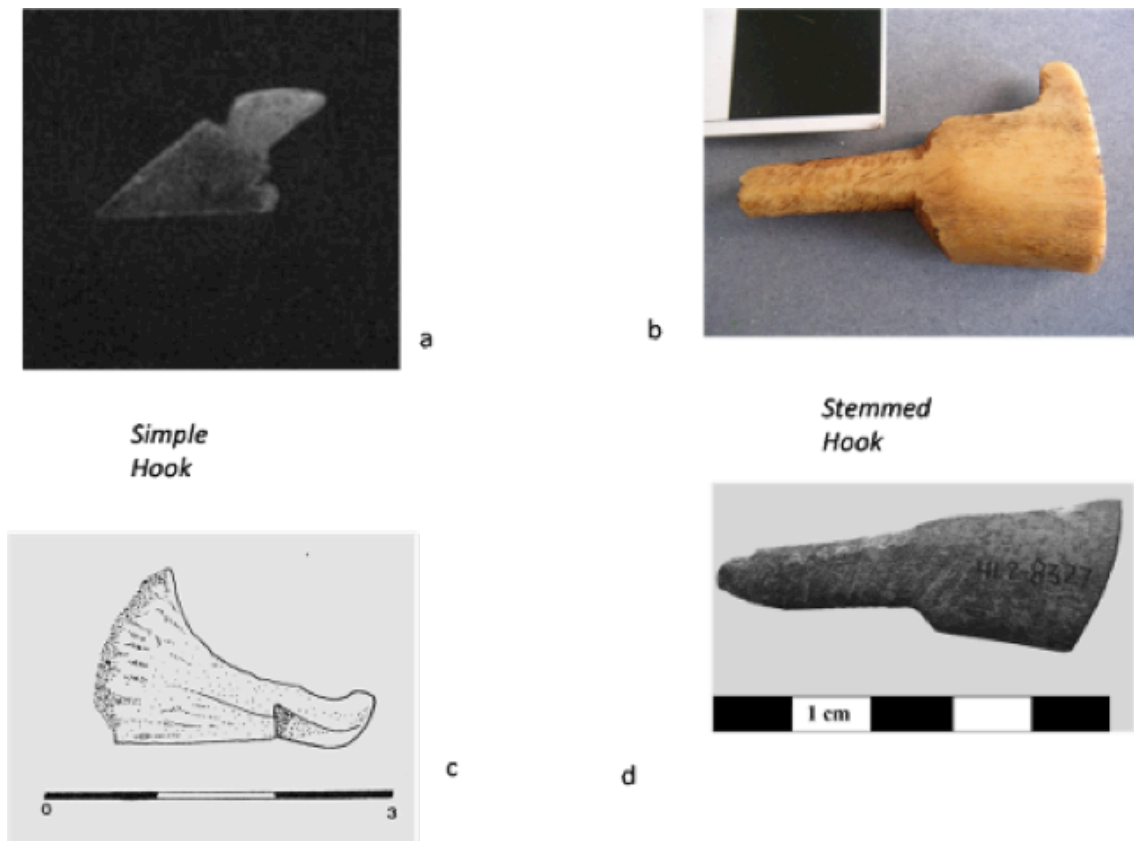
one from bone (González 1960, Lámina XXXVII, 2, page. 273) at the Intihuasi site (San Luis Province, Argentina, Figure 1, 3).

3) In Central Chile (Figure 1, 4), at the site of Caverna Piuquenes, component 1 (dated to between 11,670 to 10,240 cal BP) there is a bone object that was considered to be an estólica hook (Stehberg et al. 2012, Figure 54 a: 95)

#### *Paraná Wetlands*

Many bone spearthrowers hooks/grips were recovered in the Paraná lowlands (Buenos Aires Province, Argentina, Figure 1, 7). Torres (1931:104) and Lothrop (1932) published two specimens recovered at the site of Arroyo Sarandí (recently revised by Bonomo 2013). Buc (2010: 188-190) reported a total of 5 spearthrower hooks/grips in the area: 3 were recovered at the Anahí site and 2 at the Garín site, all of them made from a cervid astragalus (*Blastocerus dichotomus*) and dated to around 1500-554 cal years BP (Loponte 2008). As Buc (2010) noted, they are also found in Cerro Lutz (Entre Ríos Province, Argentina) and in Río Uruguay (La Blanqueada, Uruguay, Suárez Sainz 2000 cited in Buc 2010). Although Buc signaled differences among all these hooks/grips, they are remarkably alike, with minor variations from a very standardized design (see also Loponte 2008).

The varieties of hooks/grips recorded in the Southern Cone region, especially in ancient times, could be connected to a moment of experimentation (Scheinsonn 1997, 2010a, see below) since they show high variation in design and raw material. Why are the hooks/grips not carved out directly from the woody spearthrower body? Although this is actually a possibility, due to preservation issues, we have no evidence of its presence in the archaeological record. Anyway, at least, some of the hooks/grips are made out of diverse raw materials other than and those are the ones we have recovered in archaeological sites. In those cases, the reduced durability of hooks/grips carved from wood would be the reason of the use of composite spearthrowers. A broken hook or grip would mean the whole piece would have to



*Figure 3. Early/Middle Holocene Patagonian Bone Spearthrower Hooks/grips. a) Fell, reproduced from Bird 1988, b) CCP7 photo by Vivian Scheinsohn, c) Baño Nuevo I reproduced from Mena et al. 2000, d) Fell, American Museum of Natural History, New York, photo by V. Scheinsohn.*

be discarded or, at least, the need to rework the broken part (with great risk of another breakage or reducing the effectiveness of the whole design). A hook/grip made from a more resistant material guarantees increased durability and rapid and easy replacement when the hook/grip breaks.

Designs of hooks/grips are also variable although that, more than with an experimental moment, this could be related with the fact that, as stated above, it is difficult to distinguish in the published literature whether some of these artifacts are actually hooks or grips. The older BSHGs seem very variable in design (see Cueva Piuquenes and Pintoscayoc) while the recent ones seem more standardized (see Paraná wetlands). In Northwest Argentina, most spearthrower hooks/grips are produced from stone and only rarely from bone.

The only exception to this raw material and design variability is the Paraná wetlands with a restricted variety of hooks/grips which may mean they were used during a period of exploitation and/or they

were used over a time span.

#### PATAGONIA AND ITS BONE TECHNOLOGY

Bone technology appeared relatively early in the Patagonian archeological record. It is found in two contrasting contexts. In the insular area (Magellanic channels and Tierra del Fuego) it is found in association with maritime littoral adaptations. In this environment it is very abundant and displays a high variability in the bone raw materials used (different species/bones) and designs (Scheinsohn 1997; 2010a). In continental Patagonia, in contrast, bone objects are rare but nevertheless recorded at every site (Scheinsohn 1997; 2010a, 2010b).

In later work, I compared Southern Patagonia with Tierra del Fuego (Scheinsohn 2014) and argued the existence of an early moment, chronologically related to the Pleistocene/ Early Holocene, in which bone was an important raw material used by hunter-gatherers that lived in Southern Patagonia

when it was first settled. Although this early moment could not be defined as experimental but as a time of exploitation. The importance of tools connected with atlatl weaponry in this initial settlement time is notable in the assemblage. After 7000 BP, bone technology lost its edge in Continental Patagonia although it became broadly developed in Tierra del Fuego, presenting new designs and use of new raw materials (Scheinsohn 2010a, 2014). The decrease in bone tool variability in more recent times signals the moment when bone tools are only related to lithic manufacturing and the processing of other materials rather than to weaponry.

#### PATAGONIAN SPEARTHROWERS BONE HOOKS/GRIPS

Apart of some rock art motifs found at Cueva de las Manos, which appear to indicate its presence (Podestá et al. 2005), the archaeological record for hooks/grips is limited to:

1) The Baño Nuevo 1 site, a cave located in Aisén (Chile) at 80 km Northwest of Coyhaique City, near the border with Argentina, where a supposed BSHG (Figure 7, Mena et al. 2000 reproduced here in Figure 3 c) was associated with occupations dated to around 9000 years BP.

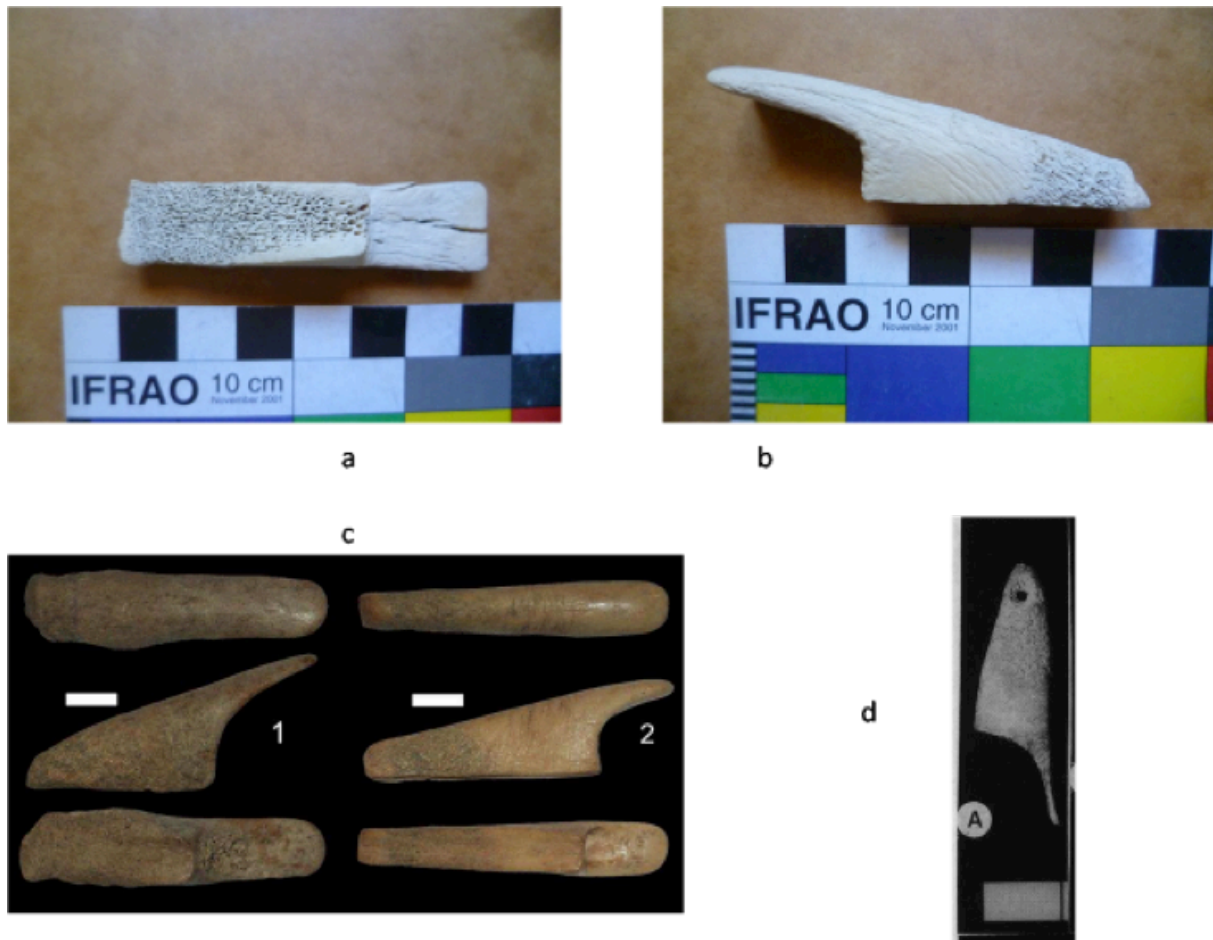
2) The Fell Cave site, a small rock shelter lying by the right bank of the Chico River in the Pali Aike Volcanic Field (Figure 1, 13). It was one of the regions where early Patagonian archaeological research began following Junius B. Bird's excavations at Fell Cave, Pali Aike, and Cañadón Leona (Chilean territory) in the 1930s. He reprised the excavations in Fell Cave in 1970 when he found a BSHG (Bird 1988, Fig.74: 183) from layer 12 (dated to ca 8500 BP uncalibrated see Bird 1988, Table 17, and p.187). This kind of tool is mentioned in the book compiled by John Hyslop (Bird 1988) on Bird's travels in Chile. In the figure, the caption identified this bone artifact as a "spear thrower contact point" (reproduced here in Figure 3 a). But actually, there is another spearthrower hook/grip in that very same figure in

the first row to the right described as a "flaking tool base" from layer 11 (reproduced here in Figure 3 d). Layer 11 it is not dated but is no older than layer 10 (dated ca 8200, Bird 1988, Table 17, p.187). I have had the opportunity to analyze these bone objects at the American Museum of Natural History (New York, USA) and could identify this last one object as a BSHG given its similarity to the hook/grip from CCP7(see below) although the size is different and its tip is broken (Scheinsohn 2010b, see Figure 3 b and d).

3) The Cerro Casa de Piedra 7 site, located within Perito Moreno National Park, Northwest of Santa Cruz Province, Argentina. A BSHG (Figure 3 b), similar to the one recorded at Fell Cave but considerably smaller (see below and Scheinsohn 2010b and 2014), was found here so perhaps the two objects had different functions or the smaller one is a toy or model. This BSHG was dated ca. 7900 to 7700 BP.

4) The Cueva Del Negro site, a rockshelter located north from the Santa Cruz Province coast (Figure 1, 11). At that site, two BSHG (Figure 4 c) were found associated with dates running between  $1220 \pm 80$  years BP and  $1340 \pm 60$  years BP (Beretta et al. 2013). The authors managed to identify that these BSHG were made from the metapodial of a pinniped. They were associated with bone harpoons and with a high availability of pinniped bones in the archaeofaunal record. Given this situation, the authors posited that spearthrowers were used for darts with harpoon points to hunt pinnipeds swimming near the coast (Beretta et al. 2013).

5) Punta Entrada (Figure 1, 12) is a site located in the coast of Santa Cruz Province (Buc and Cruz 2012, 2015) with occupations dated to ca. 2000 BP. Buc and Cruz (2012, 2015) identified a BSHG (Figure 4 a and b) at this site. Although the authors identified the raw material as coming from mammalian bone its similarities with the one from Cueva del Negro (see below) permit it to be confidently identified as a pinniped metapodial.



*Figure 4. Late Holocene Patagonian bone spearthrower hooks/grips. a) and b) Punta Entrada, base and lateral view, photo taken by N.Buc and I. Cruz; c) Cueva Del Negro, two Bone Spearthrower hooks/grips reproduced from Beretta et al. 2013; d) Cueva Haichol, reproduced from Fernández 1988-90.*

6) The Cueva Haichol site is situated in Neuquén Province far from the Atlantic coast (Figure 1, 8) near the Cordillera de los Andes. In his excavation report, Fernandez shows what he terms a “complicated tool” (Fernández 1988-90, Figure 60 a). I have not yet had the opportunity to personally examine this artifact but from the figure (reproduced here in Figure 4 d) it could be said that the design of this tool is similar the BSHG found in Punta Entrada and Cueva del Negro although this specimen appears to have been broken or reworked.

7) The site of Cueva Los Carneros, located in Alto Chacabuco (Aisén, Chile) has been partially published (Mena Larrain and López Mendoza 2014). Mena has informed me that a BSHG, similar to the one from Chenque Haichol, was found and dated ca.  $1490 \pm 50$  BP (Prieto y Mena 2016).

## DISCUSSION

Although the sample is very small (9 BSHG in total), we can say that BSHGs from Early/Middle Holocene times (9000-7700 BP) appear to be somewhat varied and, after a gap in the Patagonian record, they reappear in Late Holocene times (from 2000 BP on) but with a more standardized design. The question arises whether this time gap has to do with a) a sampling problem, b) inadequate recognition of BSHG forms, c) BSHG made out from different, perishable raw materials at that time period or d.) a change in hunting methods and weapon delivery technology. If this latter was the case, it is interesting to note that Aschero (2000) has proposed that hunting in the Patagonian Middle Holocene was collective and carried out using bola stones (Aschero 2000). But then, the question arises why and how spearthrowers



reappear in the Patagonian Late Holocene. This issue is particularly interesting since the Late Holocene Patagonian BSHG have no design relationship with the coeval specimens recorded in the Southern Cone region (Northwestern Argentina) with similar dates. This discussion should also be related to the presence of bows and arrows in Patagonia. The existence of bow and arrow technology in Late Holocene times suggests there was an overlap in time and space between both weapon delivery systems. So we can argue a long term coexistence. It may also be that bows and arrows entered Patagonia later than presently thought.

#### DISCUSSING SPEARTHROWERS AND BOW AND ARROWS FROM THE LITHIC PATAGONIAN RECORD

In North America there is widespread evidence for the coexistence between bows and arrows and darts (Angelbeck and Cameron 2014; VanPool 2006, Rorabaugh and Fulkerson 2015; Walde 2014) although Bettinger (2013) proposes that bow and arrow technology was rapidly accepted. More than a sharp break in the archaeological record, the adoption of bow and arrow technology seems to have been a prolonged process. Bow and arrow and dart technologies seemed to fill different functions (prey animals?) and social ends as “darts and arrows often serving as complementary technologies” (Rorabaugh and Fulkerson 2015:35). But it is not clear what happens with bow and arrow versus darts in Patagonia. If we look to the archaeological literature, Bird type V projectile points are considered to be parts of arrows given their small size. If they are parts of arrows, this type is first recorded at El Volcán Cave 4 (Santa Cruz) and dated to ca. 3600 BP (Sanguinetti de Bórmida 1984). Gómez Otero (1986–1987), however, debated the previous assumption that Bird V projectile points were indicators of bow and arrow hunting, holding that the smaller, earlier and lighter Magallanes IV projectile points could also have been hafted in arrows. Ratto (1994) particularly studied this topic with regard to Bird IV–V projectile points

weapons system. She analyzed many design variables including aerodynamics, haft type, surface reinforcement, and tip angle and thickness (following similar analyses where developed by Hughes 1998; Thomas 1978 and Thomas 1978). On the basis of these variables, she managed to discriminate between three technical systems within these point types: a throwing spear (dart), bow and arrow, and thrusting spear, in order of abundance. She notes their coexistence in space and time, at least between 3600 and 740 BP, showing that projectile point size differences are neither cultural nor temporal, but functional. Palacios (2007) considers that a foreshaft found in Epullán Grande (Neuquén Province) is a part of an arrow. He therefore dates bow and arrow use in that area at  $2190 \pm 60$  years BP. This technical identification is based only on the size of the arrow and the fact that he considers that foreshafts can only be parts of arrows (and not of darts or spears). In any case, he also supports the idea that spears, darts and arrows must have coexisted for a while. A more sophisticated analysis, that also agrees with the idea of a prolonged coexistence of darts and bow and arrow technology was also carried out by Cardillo and Alberti (2015). They carried out a phylogenetic analysis of projectile points dating from the Middle-Late Holocene recovered from different sites along the coast of the Gulf of San Matías (Río Negro Province, Argentina). In order to study the evolution of weapon systems they have used maximum parsimony phylogenetic reconstruction and tree-based methods. Their results suggest the existence of a robust phylogenetic signal that gradually evolved into at least two technical systems but also they found evidence of a certain morphological continuity which might suggest that, “rather than a direct replacement, there was an adaptation of propellant-type weapons towards the bow and arrow” (Cardillo and Alberti 2015: 612). They have found that “designs potentially apt for use in different technical systems (particularly bow and arrow systems) might have been available before the actual appearance of these technologies. That is to say that a given technical system might not have required substantial design modification of

the projectile points, at least not at the beginning” (Cardillo and Alberti 2015: 620). So there is a “high degree of similarity between the bow and arrow and spear-thrower technical systems, at least in respect to some classes, that could be classified in one way or another depending on what weight range was adopted” (Cardillo and Alberti 2015: 621).

In a more recent work with a wider geographical range, Charlin and Cardillo (2016) modeled patterns of morphological variation in Middle-Late Holocene stemmed projectile points from Patagonia using geometric morphometry. Phylogenetic and spatial variations were used to model patterns on different scales and their results suggest that historical patterns of shape-change are channeled through the spatial dimension: more elongated blades and contracted stems appear in one clade (Northern Patagonia), and more expanded blades with wider stems in the other (Southern Patagonia). They considered that this separation happened early in the evolutionary history of the projectile point populations. They suggest that the ecological dimension (environment and diet) and geographical space could explain the differences between human groups in the studied area but says nothing about delivery systems. In fact, they always refer to their study objects as “projectile points”. The words “arrow” and “dart” are not mentioned in this paper.

## CONCLUSIONS

Patagonian Late Holocene BSHG are more standardized and widely distributed (found along the Atlantic coast for as long as at sites in the interior such as Haichol). This picture fits with an moment of exploitation (Scheinsohn 2010a). It is worth noting that coastal artifacts are made from pinniped bone (Punta Entrada and Cueva del Negro) although the raw material the BSHGs from Las Carneras and Haichol were made from cannot be identified. There is some variation however between the objects from Las Carneras and Haichol versus those from the sites of Punta Entrada and Cueva del Negro which might account for differences in the raw materials used (blanks

made from pinniped, available on the maritime coast, as opposed to guanaco bones, available in the interior of Patagonia). Although the sample is small, older BSHG (CCP7, Baño Nuevo, Fell Cave) are different in design (three objects, two designs) and closer, in terms of geographical distribution, that the Late Holocene case so they fit with an experimental moment.

But why are there so few BSHG in Patagonia? There relative paucity could be connected to issues of preservation as well as a lack of recognition of this design form. In this latter case, it can be expected that a revision of the archaeofaunal record together with bone tool assemblages in Patagonian sites will result in recognition of more BSHG specimens.

More research is needed. On the one hand, it is necessary to carry out more bibliographic reviews of old articles: as in the case of Haichol, BSHG could went unrecognized by the authors of those papers. Such a review will be possible only when illustrations and photos are available in publications. A review of collections will also be needed since metric data analysis and experimental work should facilitate BSHG identification. It is probable that some forms currently identified as harpoon heads are actually BSHGs. Finally, other raw materials such as wood or cane, where archaeologically available, should be reviewed. An interesting result of this work is the development of the hypothesis that bow and arrow technology coexisted for a prolonged period with spearthrower delivery systems. This hypothesis is also supported by results from the archaeological literature on lithics and should be tested using other lines of evidences.

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