Levallois technology in southern Patagonia (Argentina and Chile): current knowledge and future perspectives

María Cecilia Pallo [1]

1. IMHICIHU (CONICET) and University of Buenos Aires (Faculty of Philosophy and Letters, FFyL). Saavedra 15, 5th floor, Buenos Aires, CP C1083ACA, Argentina. Email: ceciliapallo@gmail.com

Abstract:

Situated on the extreme point of South America, southern Patagonia has yielded the southernmost evidence of Levallois lithic technology. There, enough evidence of the use of a method of core preparation for production of predefined flakes similarly structured to the known Levallois technology (LT) in the Old World is present. An overview of the currently available information (distribution, chronology, frequency, artifact classes, raw materials and techno-morphological attributes) on Levallois technology in southern continental Patagonia and on the Isla Grande of Tierra del Fuego (Argentina and Chile) is presented here in order to discuss its place in the shared technological background of local hunter-gatherers during the Holocene.

The analysis of the information shows that the LT occurs at very low frequency, mainly involving cores, knives and sidescrapers on local raw materials but encompassing a high diversity in terms of ecological contexts and human subsistence. These findings are an indicator that several populations were simultaneously familiar with this technology, possibly through long-distance movements of individuals or social networks to share ideas and information on how to make and use these artifacts. In this regard, the middle Holocene was an important period when the LT became a shared technological phenomenon on a macro-regional scale. However, the evidence on LT is still scarce in Patagonian contexts and emphasizes possible linkages with other reduction strategies, especially the Discoid flaking method, the search for maximize lithic raw material exploitation and even the need to produce versatile tools to deal with a diversity of tasks. It is still unclear therefore whether the LT reflects a truly method to get predetermined flakes with specific morphological features or it mainly attended to other circumstances due to the influence of environment, the spatial organization of human groups or the lithic reduction systems. This issue probably requires an exhaustive study of Levallois cores, specially their own particular sequential development of reduction, frequency and relationship with other knapping techniques recorded in the Patagonian lithic assemblages.

Keywords: Lithic technology; Levallois method; Terrestrial hunter-gatherers; Patagonia; Holocene.

1. Introduction

The Levallois technology (LT) appeared at the end of the Lower Palaeolithic in Europe and Africa (Breuil & Kelley 1956; Leakey 1955), but became especially widespread in the Middle

Journal of Lithic Studies (2022) vol. 9, nr. 1, p. 1-19 DOI: https://doi.org/10.2218/jls.6449

Published by the School of History, Classics and Archaeology, University of Edinburgh
ISSN: 2055-0472. URL: http://journals.ed.ac.uk/lithicstudies/

Palaeolithic of Europe, North Africa and Near East (van Peer 1992: 113-118). It was initially defined for the European Middle Palaeolithic to characterize the production of relatively large flakes which shape is predetermined by preparation of cores' lateral and distal convexity and which are removed from hierarchically situated core's edges, where one functioned as a flaking surface and the other was a prepared striking platform (Bordes 1961: 14-18, 1980: 45). Their core volume tends to be bifacial and the platform face is usually more convex than the flaking face. The production of predetermined flakes requires the maintenance of core proportions and convexities on both core faces, involving the detached of distal or lateral removals on the flaking surface, or short and lateral removals on the platform face by using a hard-hammer direct percussion technique (*e.g.,* Boëda 1988, 1995; van Peer 1992, 1995; see also Bar-Yosef & Dibble 1995 and references therein). Abundant evidence of the use of the LT was later recorded in several archaeological sites from Africa (*e.g*., Van Riet Lowe 1945; Tixier *et al*. 1980), Australia (*e.g.,* Dortch & Bordes 1977), Central Asia (*e.g*., Derevianko & Petrin 1995; Rybin & Khatsenovich 2020) and southern Patagonia, among other parts of the world. Some of these sites include important Levallois findings, both late (*e.g*., Richter *et al*. 2017 and Scerri *et al*. 2021 for Africa) and early artifacts (Akhilesh *et al*. 2018 for India), that reconsider the chronology of the Middle Paleolithic culture (*ca.* 300,000 - 30,000 years BP) in the Old World.

Southern Patagonia is the southernmost region of South America, including Argentina and Chile (Figure 1). The region presents the Andean mountain rage and *Nothofagu*s forests at the west and a semiarid steppe at the east, plus an intermediate transition zone (forest-steppe ecotone) dominated by patches of *Nothofagus* trees mixed with steppe communities. While the early human settlement of continental Patagonia occured sometime *ca.* 11,000 years BP (Bird 1988: 2; Waters *et al*. 2015; see also Martin & Borrero 2017 and references therein), Tierra del Fuego was firstly explored by humans *ca.* 10,500 years BP (Massone & Prieto 2004), before both territories and their respective populations were isolated by the formation of the Strait of Magellan *ca.* 8,000 years BP (McCulloch *et al*. 1997, 2005). Since then, the region was inhabited by hunter-gatherer populations, with high mobility systems centered in the local availability of reliable water sources, high quality raw materials for knapping tools and guanaco (*Lama guanicoe*), a medium-sized camelid which was their most important prey (Borrero 1994). The arrival of Spanish in 1520 CE (Pigafetta 2001: 19) and the subsequent colonial expansion caused drastic changes to indigenous ways of life adopted by the different southern Patagonia groups (*e.g*., Borrero 1994; Martinic 1995).

The LT was recognized, for the first time in southern Patagonia, at the Rancho Donata site, located at the southwest coast of the Isla Grande of Tierra del Fuego (Nami 1992). There, Hugo Nami (1992) identified a flake production method by means of cores exhibiting centripetal preparation, similar to the known LT in the Old World. Indeed, two types of Levallois cores were recorded, the typical Levallois cores known as a tortoise cores and other core variants (*sensu* Bordes 1980). After that, a few Levallois products continued to be found in several middle and late Holocene assemblages toward becoming part of the technological framework known for southern Patagonia hunter-gatherers (*e.g.,* Nami 1992, 1997). The initial published data on LT mentions that angular flakes used to be common products, due to centripetal removals detached from the core's lateral edges, and in some cases flakes are very thin and can retain remnants of prepared Levallois core surfaces. The method stands out for allowing to get blanks of excellent attributes to make long-edged stone tools, such as sidescrapers and knives, and to maximize raw material exploitation, by promoting the production of flakes almost as large as the size of the core from which they are removed (Nami 1997).

In this paper, we present an overview of the currently available information on the LT (distribution, chronology, frequency, artifact classes, raw material type and techno-morphological characteristics) among terrestrial hunter-gatherers of southern continental Patagonia, south of the Santa Cruz River, and of the Isla Grande of Tierra del Fuego (Figure 1).

By doing a literature review, we discussed the current state of the art and future research perspectives on Levallois products within the shared technological background of local hunter-gatherers during the Holocene.

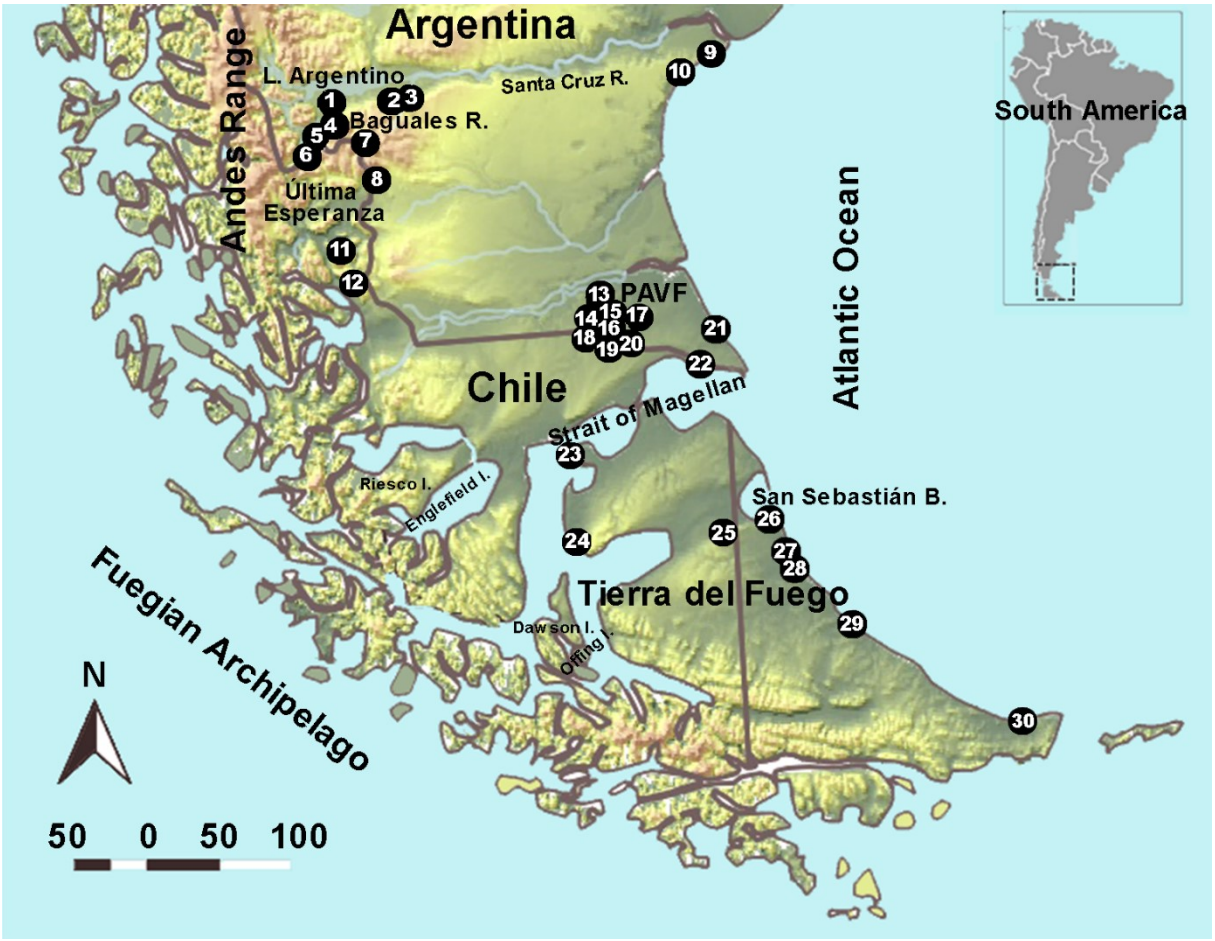

Figure 1. Southern Patagonia: main places, water courses and lakes mentioned in the text. References: 1. Laguna Nimez, 2. Arroyo de los Perros, 3. Río Bote, 4. Chorrillo Malo 2, 5. Alero del Bosque, 6. Laguna 3 de Abril, 7. Cerro Verlika 1, 8. Cerro León 3, 9. Cañadón de los Mejillones, 10. Monte León National Park; 11. Cerro Castillo 1, 12. Cueva del Medio, 13. Laguna Otern Aike 2, 14. Laguna Ea. Tres Lagunas, 15. Cerro Mackenzie, 16. Cueva Don Ariel, 17. El Volcán, 18. Cueva Fell, 19. Laguna Tom Gould, 20. Laguna Pali Aike, 21. Cañadón Gap/Cabo Vírgenes, 22. Bahía San Gregorio, 23. San Vicente 1, 24. Cabo Monmouth 20, 25. Tres Arroyos 1, 26. San Genaro 4, 27. La Arcillosa 2, 28. Río Chico 1, 29. Ea. Viamonte, 30. Rancho Donata.

2. Levallois technology in southern Patagonia

The earliest dates for the LT in southern Patagonia was registered in Chorrillo Malo 2 (Franco *et al*. 1999), a rock shelter located in the forest-steppe ecotone of the Upper Santa Cruz River Basin, near the Andes range of southern continental Patagonia (see Supplementary Materials. Table 1). The site yielded a stratified sequence of layers between 9,700- and 1,000 years BP (Franco *et al*. 1999, 2011; Franco & Borrero 2003), with a small series of Levallois cores and knifes made on local high-quality basalt raw material recorded in the strata dated between 4,300 and 2,800 years BP (Franco 2004; Franco *et al*. 2007, 2011). A relatively contemporaneous Levallois component is present at Río Bote 1, a rock shelter located 80 km northeast of Chorrillo Malo 2. Situated on the steppes of the Upper Santa Cruz Basin, Río Bote 1 is a multiple burial site dated to the late Holocene, where a Levallois tool constitute part of the burial event dated to *ca.* 3.750 years BP (Franco *et al*. 2017). Levallois products were also found in other undated layers, which chronology is probably quite similar to Río Bote 1 artifacts

(Franco *et al*. 2011). A unique Levallois core on local raw material was also found next to Los Perros stream valley, near to the Río Bote 1 site (Carballo Marina *et al*. 1999; Nami 1997).

The open-air site of Laguna Nimez, located on the south margin of Lago Argentino, has yielded the youngest example of Levallois tools made on local raw material dated to *ca.* 1,900 years BP (Franco 2008). The use of LT is also known in the current forest area south of Lago Argentino. There, Alero del Bosque is a rock shelter located near the southeast margin of Lago Roca and dated to approximately 3,100 years BP, where a few Levallois products (flakes and knife) made of local dacite and opal raw materials were recorded. Next to Alero del Bosque, the open-air site of Laguna 3 de abril contains Levallois cores, flakes and long-edged tools made of the same local dacite. Regarding land-use patterns, both sites were low intensity used by humans, probably due to individuals entering to the forest with previously manufactured tools, most likely being part of the transported, mobile tool kit of hunter-gatherers (Franco *et al*. 1999; Franco 2004).

Situated on the Baguales range at *ca.* 1,000 m.a.s.l., Cerro Verlika 1, a rock shelter sporadically visited by humans between 3,800 and 1,600 years BP, has yielded the highest known evidence of LT, which is green dacite sidescraper (Franco 2004; Franco *et al*. 1999). About 30 km further south, Cerro León 3 is a rock shelter located southeast of the Baguales range, which was first occupied *ca.* 8,800 years BP and reused over time (Borrero & Borrazzo 2011). The layer 2 of the site, dated to *ca.* 1,700 years BP, contains a dacite end and sidescraper fabricated from a Levallois flake (Borrazzo 2006).

In the context of an expeditive rock exploitation strategy, two localities south of the Lower Santa Cruz River Basin contain Levallois products possibly related to the coastal land-use pattern (Borrero *et al*. 2006a; Franco *et al*. 2010). At Cañadón de los Mejillones locality (Figure 2a), Levallois cores, flakes and tools were found in an exposed lithic assemblage in the current beach and inside a shell midden, located on a relict sea cliff and dated to the late Holocene (*ca.* 1,200 years BP, Franco *et al*. 2010). Besides, a Levallois tool on dacite raw material was identified in a surface deposit inside the Monte León National Park locality (Borrero *et al*. 2006a).

Abundant Levallois products made of local lutite raw material, such as cores, large and thin flakes, sidescrapers fabricated on thicker flakes and blanks exhibiting cortex on their dorsal face, were found in layers at Cerro Castillo 1, a rock shelter occupied around 4,500 years BP in Última Esperanza (Chile), next to the Andean range (Langlais & Morello 2009). About 25 km south of Cerro Castillo 1, the earliest known human occupation (*ca.* 11,500 to 9,500 years BP) at Cueva del Medio (Nami 1987) possess an uncertain Levallois component made of local raw materials (*e.g.,* vulcanites, tuffs and rhyolites), within a stone-tool production and maintenance context. Huidobro (2016) mentions the presence of some flakes with centripetal removals and facetted or dihedral platforms, plus a core exhibiting centripetal and parallel preparation. However, she also points out that the core is part of the artifacts recovered from a looted sector with unclear stratigraphic assignation, and its shape features poorly diagnose the LT. Moreover, there are some types of projectile points that might imply a longer duration of the earliest occupation at Cueva del Medio to which these artifacts were assigned (*ca.,* 11,500 to 9,500 years BP).

In the eastern continental steppe, the Pali Aike volcanic field (PAVF) contains a few late Holocene assemblages with a Levallois component (Figure 2b and c). Among surface assemblages, the Laguna Otern Aike 2 site yields two Levallois cores in a locally available black dacite and the Laguna Ea. Tres Lagunas sites contains a non-local black shale sidescraper produced by this technology (Borrazzo & Cirigliano 2020). The authors emphasize that the use of the LT allowed to obtain the largest size product from relatively small nodules locally available, while the black shale would not be local given that the tool sizes do not fit well with the scarce availability and small sizes of shale nodules in the area. Also, in the PAVF, the LT

was identified at the open-air sites of Laguna del Cerro Mackenzie, Laguna Pali Aike (a flake and a possible core) and Laguna Tom Gould (a flake and tools), as well as at the caves El Volcán (tools) and Don Ariel (tools), which is dated between 6,900 and 100 years BP (Nami 1997). Nami (2009) argues that the Levallois flakes were used as blanks for tool making (*e.g.,* those sidescrapers found along with pedunculated projectile points and small endscrapers).

According to the partial data published on the final-Pleistocene deposits at Fell Cave (Bird 1988: 134-201; Emperaire *et al*. 1963; Nami 1998) and the observation of archaeological materials recovered by John Fell, Huidobro (2016) estimates an early appearance of LT in the southern sector of the PAVF, since at least six lithic pieces, which could be both cores and tools, were manufactured by bifacial knapping guided by a secant axis, similar to the possible Levallois core found at Cueva del Medio. Next to the PAVF, a few Levallois products were recorded in the Cañadón Gap-Cabo Vírgenes sector, located on the Atlantic coast (Franco 2008), and in the San Gregorio Bay, on the northeast coast of the Strait of Magellan (Nami 1997), both localities linked to late Holocene human occupation dates (Borrero *et al*. 2006b; Massone 1979).

In the Isla Grande of Tierra del Fuego (see Suplementary Materials. Table 2), two defined "linear" and "recurrent" Levallois core methods elaborated on high-quality raw material locally available were identified in Cabo San Vicente 1, an open-air site on the north coast (Morello 2005). The analysis of technological chain and volume management shows a quite rigidly structured knapping to get a functional versatile design of cores and large blank sizes in the context of an expeditive strategy (Morello 2005), probably for late Holocene times according to a shell midden dated to about 800 years BP in the close area (Massone & Morello 2007). On the northwest coast, Cabo Monmouth 20 is an extensive surface assemblage which includes a "simplified" type of Levallois core (*sensu* Pigeot 2003) recorded in a stratified layer dated to about 5,500 years BP and at least two "recurrent" types of Levallois core on the surface deposits (Morello *et al*. 2009). A Levallois component was also identified in the San Genaro 4 site (Franco 2008), a coastal locality highly used by human over the last 1,000 years BP, located on the southern Atlantic coast of San Sebastián Bay (Borrazzo *et al*. 2008).

Additional evidence of LT, including cores, was found at Estancia Viamonte (Vallin 1992) and Rancho Donata (Nami 1992), two ancient workshops located on the forest coast of southern Tierra del Fuego. Rancho Donata stands for the presence of typical "Levallois" cores and other core variants (*sensu* Bordes 1980) as well as the production of predefined flakes used as blanks for knives, sidescrapers and endscrapers made of local high-quality rhyolite, tuff and rhyolitic porphyry raw materials (Nami 1992). These technologies could have been used during later times, according to the date *ca.* 1,300 years BP for the Rancho Donata locality (Lanata 1993).

An earlier evidence for the appearance of the LT by using local raw materials during the middle Holocene is characterized by two lithic assemblages relatively contemporaneous and close to each other, located on a relict sea cliff at *ca.* 2 km to the Atlantic coast. The open-air site of Laguna La Arcillosa 2 (LA 2) has yielded a Levallois core in a shell midden layer dated between 5,500 and 3,600 years BP (Salemme *et al*. 2007), while the Río Chico 1 site (Figure 2d) contains other two Levallois cores (Salemme *et al*. 2014) inside a buried shell midden dated between 5,900 and 4,500 years BP (Salemme *et al*. 2007). It is important to mention that the sea level was above the current level during the Middle Holocene, therefore, the Río Chico 1 site was close to the coastline during its occupation (Santiago 2013: 186). Also, Huidobro (2016) mentions that the flaking surfaces of a core for the production of predefined flakes with little prior preparation (Jackson 1987), was recognized in the final-Pleistocene layers at Tres Arroyos 1, a rock shelter located in the steppe zone of Tierra del Fuego.

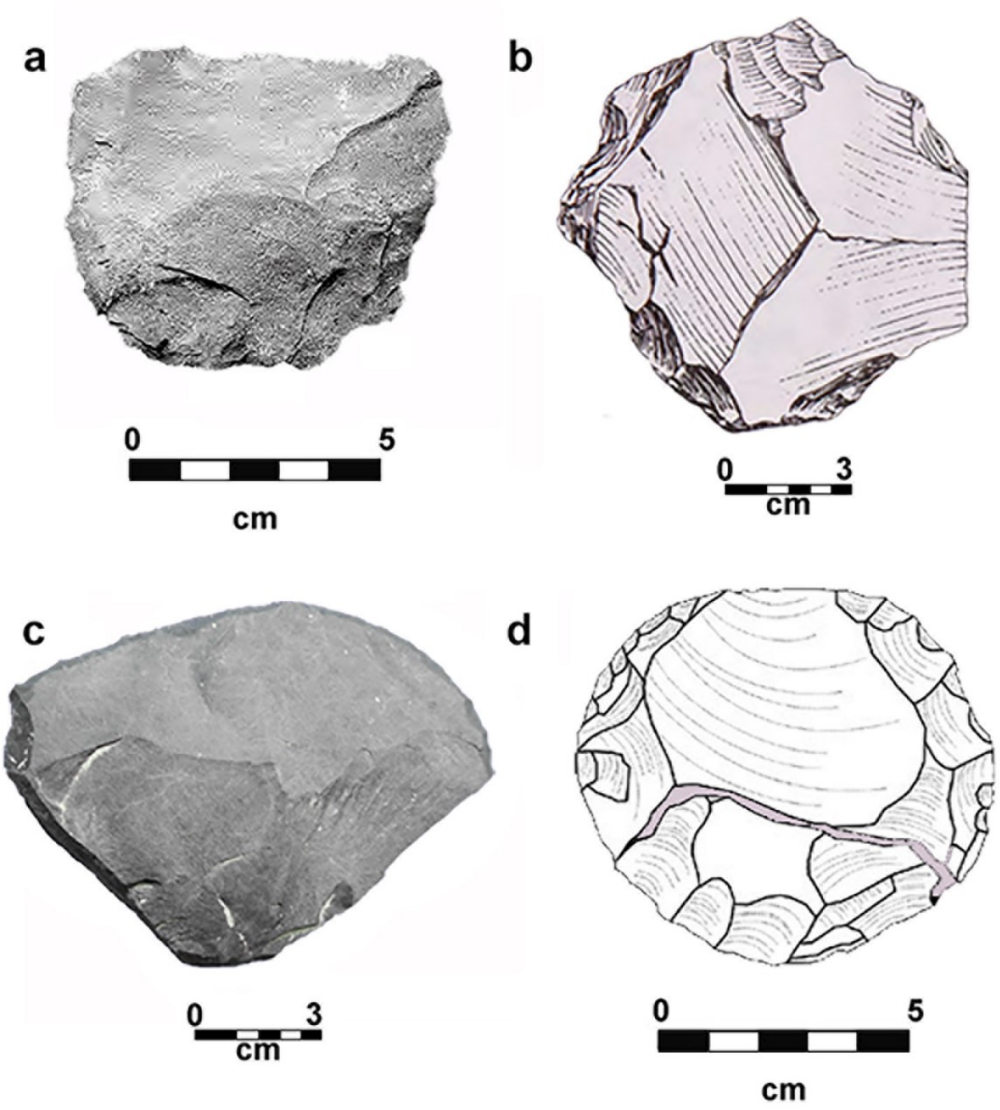

Figure 2. Examples of Levallois products. References: a) Levallois flake removed from a core exhibiting centripetal extractions and prepared platforms from the locality of Cañadón de los Mejillones (modified from Franco et al. 2010: fig. 2), b) possible Levallois core from the site of Laguna Pali Aike (modified from Nami 1997: fig. 2), c) sidescraper manufactured on a Levallois flake from the site of Laguna Ea. Tres Lagunas (modified from Borrazzo & Cirigliano 2020: fig. 4), d) Levallois core from the site of Río Chico (modified from Salemme et al. 2014: fig. 3).

3. Conclusions and future perspectives

In southern Patagonia, the study of LT and the methods used to manufacture it faces problems in its identification because the complete lithic assemblage from several sites have been published differentially and Levallois products were poorly recorded or not identified at all due to the methodological approaches employed in research projects. Therefore, this search was oriented towards Levallois products confidently determined based upon morphologically consistent shape of artifacts or a series of identified methods, in a few cases derived from analysis of entire technological sequences. On this basis, the LT reveal its scarcity south of the Santa Cruz River Basin. These artifacts are usually a minor proportion (less than 5%) in each

separate lithic assemblage, probably concerning to a secondary flaking method in core reduction strategies of local populations. Some circumstances may explain this issue. Firstly, certain artifacts, such as Levallois sidescrapers, may have functioned as multifunctional cutting tools due to their morphology (Franco 2004; Morello 2005; Nami 1988) and could be most likely part of the transported, mobile tool kit of hunter-gatherers, explaining why finding such tool types in residential site assemblages is diminished. Secondly, the use of high quality rocks for flaking explains that the Levallois cores are rare findings in southern Patagonia sites, since once exhausted, they would have been used as blanks for tool making, especially bifacial artifacts (Nami 1997). Experimental studies show that the size and shape of Levallois cores make them very appropriate for knapping projectile points (Nami 1988). Thirdly, the use of centripetal flaking Discoid method could be regarded to, at least in some cases of small cores, an evidence of the final reduction stage of a bigger Levallois core, which accounts the low proportion of these latter cores in southern Patagonia (Langlais & Morello 2009; see also Moncel 1998). As a whole, the studies shown point out that Levallois cores might have been heavily exploited by switching the knapping method to other reduction strategies, reinforcing that the use of LT among terrestrial hunter-gatherers could have been more frequent than the current evidence shows. In particular, an underrepresentation of Levallois cores seems very possible due to Discoid cores, or even projectile points, are more usually recorded artifacts in southern Patagonia sites. Certainly, the discrete typological differences observed in Patagonian contexts may actually represent a continuum of transformation produced by retouching and reduction, such as Dibble (1995) has already identified on Levallois cores of a Mousterian industry in northern France. Overall, there is not greater evidence of how the shape of the Levallois cores varies as reduction progresses in the archaeological record of Patagonia (Langlais & Morello 2009; Morello 2005), but to resolve this problem may be a key function for amplify our abilities to accurately detect them.

Among cores recorded in southern Patagonia, a few main variants of Levallois reduction strategies can be distinguished, which attributes are related to platforms and lateral edges of flakes and tools (Morello 2005; Morello *et al*. 2009; Nami 1992), and to the size of tool blanks and flakes, since they are almost as large as the core from which they are removed while maximizing raw material exploitation (Langlais & Morello 2009; Nami 1997; Borrazzo & Cirigliano 2020). Also, similar frequencies of site assemblages with one or two artifact classes (especially cores or tools, or both cores and tools) are observed, explaining why Levallois products were mainly used for manufacturing tools, in some cases by using blanks produced in situ. Most Levallois blanks have been used to make long-edges stone tools, mainly sidescrapers and knives, while in the sites of Cerro León 3 (Borrazzo 2006) and Rancho Donata (Nami 1992) two endscrapers (short-edges stone tools) were found. Functional analysis carried out on the lateral edges of archaeological sidescrapers of late Holocene assemblages from the PAVF showed that these tools were used for cutting and scraping both hard and soft materials (Nami 2009). This data, plus the high diversity of environments in which Levallois tools were found, suggest that they are versatile tool types probably used for a huge variety of tasks (Franco 2004).

Both southern continental Patagonia and Tierra del Fuego yield similar trends in LT regarding the use of good quality raw materials locally available, such as rhyolites, tuff and dacites. Dacites, in particular, are the most exploited rocks in the continental sector, presenting a high regional availability and varying in quality and frequency throughout such areas where they occur (*e.g.*, Charlin & Pallo 2015; Franco 2004). However, the evidence is not yet enough to establish whether spatial variations in raw materials availability could affect the development of the LT. In this regard, observations carried out by local researchers show that the method promotes the economy of raw material by producing flakes almost as large as the size of the core from which they are removed (Borrazzo & Cirigliano 2020; Nami 1997). The use of black shale in the PAVF is the only known case of an exotic raw material chosen to produce Levallois

products in southern Patagonia assemblages, which adds to the evidence of long-edged stone tools (sidescrapers and knives) on shale blades recorded at low frequency in the same area (Borrazzo & Cirigliano 2020; see also Pallo *et al*. 2020, 2022). The morphology and size of these artifacts and the availability of black shale, whose main sources are located in the western area (*e.g*., Borrazzo 2006, 2008; Charlin *et al*. 2011; Langlais & Morello 2009) stand out the role of LT in the connections between eastern (PAVF) and western areas in southern continental Patagonia.

The upper temporal limit of the LT in southern Patagonia can be estimated based upon three coastal sites, the first one located on the Strait of Magellan (Morello *et al.* 2009) and the other two sites on the Atlantic Ocean (Salemme *et al*. 2014), in the north part of Tierra del Fuego, not earlier than the middle Holocene (*ca.* 5,500 years BP). About one millennium later, the method appeared for the first time in continental Patagonia, according to dates derived from western sites, next to the Andes range (Franco 2004; Langlais & Morello 2009). The current dates from terrestrial hunter-gatherer contexts fit well with the age of lithic assemblages recovered in the southern Chilean archipelago, with a clear Levallois component on locally available rocks date to *ca.* 4,400 - 3,000 years BP (Huidobro 2018; Legoupil *et al*. 2011; Pigeot 2003). Thus, the chronology of the LT in southern Patagonia shows that the middle Holocene was an important period when this reduction method became a shared technological phenomenon on a macro-regional scale. By that time, canoe people from the southern Chilean archipelago have most likely played a key role in the flow of LT information between populations of continental Patagonia and Tierra del Fuego. On the other hand, while the evidence of LT derived from final-Pleistocene sites (Huidobro 2016) is still poor and not conclusive, the geographical distribution of LT (coast, steppe, forest, mountain range) and the variability of Levallois methods towards the late Holocene (Nami 1992; 1997), are clearly established.

In summary, the LT, mainly involving cores, knives and sidescrapers in southern Patagonia assemblages, does not seem to be a random fact, but a product of the flow of ideas on how to make and use these artifacts (Langlais & Morello 2009; Nami 1997), either through migration or movement of individuals through visits, marital networks, or participation in social networks to share ideas and information, among other things (Borrazzo *et al*. 2019; Borrero *et al*. 2011; Pallo & Borrero 2015). This knowledge flows included a high diversity in terms of spatial distribution (forest, steppe, ecotone forest-steppe and mountain range), means of transport (on foot or canoe) and human subsistence (*e.g*., terrestrial, mixed or marine diets). These products were also identified in a few sites north of the Santa Cruz River with late Holocene chronology and technological characteristics that resemble them to the sites south of the river (Cirigliano 2016: 394; Franco 2008), and marine sites of the southern Chilean archipelago (*e.g*., Riesco islands, Dawson, Englefield and Offing). Thus, findings of LT should be regarded as evidence of the distribution of a specific specialized technology and as an indication that several populations were familiar with this technology in the past. However, and as mentioned above, the evidence on LT is still scarce in Patagonian contexts and emphasizes possible linkages with other reduction strategies, the search for maximize lithic raw material exploitation and even the need to produce versatile tools to deal with a diversity of tasks (Borrazzo & Cirigliano 2020; Franco 2004; Langlais & Morello 2009; Morello 2005; Nami 1997). It is still unclear therefore whether the LT reflects a truly method to get predetermined flakes with specific morphological features or it mainly attended to other circumstances due to the influence of environment (*e.g*., availability and quality of lithic raw materials), human behavior (*e.g*., settlement and mobility patterns) or lithic reduction systems (*e.g.,* knapper skills, the use of blanks) (*e.g.,* Dibble 1995; Jaubert & Farizy 1995; Mourre 2003; Rolland & Dibble 1990; Terradas 2003). This issue probably requires an exhaustive study of Levallois cores (*e.g*., Boëda 1988, 1995; Franco 2008: 138; Lombao Vázquez 2021), specially their own particular sequential development of

reduction, frequency and relationship with other knapping techniques recorded in the lithic assemblages, as well as comparing the products of all these different systems identified in each Patagonian assemblage to solve it successfully. The problem of LT in southern Patagonia remains open for future research to deepen the understanding of that variability, including more chronological, technological, functional and experimental analyses on lithic assemblages.

Acknowledgements

I am very grateful to Judith Charlin, Natalia Cirigliano, María Isabel Márquez, the editor and anonymous reviewers. Their thorough reading and insightful comments improve the final version of this paper. This research was funded by ANPCyT (Agencia Nacional de Promoción Científica y Tecnológica): PICT 2019- 01356 *Explotación y uso de materias primas líticas en el sector centro-oeste del campo volcánico Pali Aike (Provincia de Santa Cruz, Argentina),* led by Dr. Natalia A. Cirigliano.

Data accessibility statement

The author confirms that the data supporting this study are available within the article and its supplementary files.

List of supplementary files

Supplementary file 1
"Pallo, Cecilia- supplementary file 1- Levallois technology in southern Patagonia.xls"
Summary data on Levallois products (frequency, artifact classes, raw material type and chronology), found in archaeological sites of southern continental Patagonia.

Supplementary file 2
"Pallo, Cecilia- supplementary file 2- Levallois technology in Tierra del Fuego.xls"
Summary data on Levallois products (frequency, artifact classes, raw material type and chronology) found in archaeological sites of the Isla Grande of Tierra del Fuego.

References

Akhilesh, K., Pappu, S., Rajapara, H., Gunnell Y., Shukla, A.D. & Singhvi, A.K. 2018, Early Middle Palaeolithic culture in India around 385-172 ka reframes Out of Africa models. *Nature*, 554: 97-101. DOI: https://doi.org/10.1038/nature25444

Bar-Yosef, O. & Dibble, H. L. (Eds.) 1995, *The definition and interpretation of Levallois technology*. Monographs in World Archaeology Vol. 23, Prehistory Press, Madison, Wisconsin, 502 p.

Bird, J.B. 1988, *Travels and archaeology in South Chile* (Hyslop, J., Ed.). University of Iowa Press, Iowa, 246 p.

Boëda, E. 1988, Le Concept Levallois et evaluation de son champ d'application. In: *L´homme de Neandertal*; *Actes du colloque international de Liège*, *4-7 décembre 1986, Liège* (Otte, M., Ed.), Vol. 4. La technique. L. Binford et J.-Ph. Rigaud coord. Service de Préhistoire, Université de Liège, Liège: p. 13-26. (in French) ("The Levallois Concept and evaluation of its scope")

Boëda, E. 1995, Levallois: a volumetric construction, methods, a technique. In: *The Definition and Interpretation of Levallois Technology* (Dibble, H.L. & Bar-Yosef, O., Eds.),

Monographs in World Archaeology Vol. 23. Prehistory Press, Madison, Wisconsin: p. 41-68.

Bordes, F. 1961, *Typologie du Paléolithique ancien et moyen*. Delmas, Bordeaux. (in French) ("Early and Middle Palaeolithic Typology"), 85 p.

Bordes F. 1980, Le débitage Levallois et ses variantes. *Bulletin de la Société Préhistorique Francaise*, 77(2): 45-49. (in French) ("Levallois debitage and its variants") DOI; https://doi.org/10.3406/bspf.1980.5242

Borrazzo, Karen 2004. *Hacia una tafonomía lítica: el análisis tafonómico y tecnológico de los conjuntos artefactuales líticos de superficie provenientes de los loci San Genaro 3 y 4 (Bahía San Sebastián - Tierra del Fuego, Argentina)*. BA thesis at the Facultad de Filosofía y Letras, Universidad de Buenos Aires, Buenos Aires, p. 118. (in Spanish) ("Towards a lithic taphonomy: the taphonomic and technological analysis of surface lithic assemblages from the loci of San Genaro 3 and 4 (San Sebastián Bay - Tierra del Fuego, Argentina)")

Borrazzo, K. 2006, Tecnología lítica del Alero Cerro León 3 (Santa Cruz, Argentina). *Magallania*, 34(2): 53-74. (in Spanish) ("Lithic technology at Cerro León 3 rockshelter (Santa Cruz, Argentina)") DOI: http://dx.doi.org/10.4067/S0718-22442006000200007

Borrazzo, K. 2008, Análisis tecnológico de distribuciones artefactuales en la periferia sudeste de la sierra Baguales (Santa Cruz, Argentina). *Magallania*, 36(1): 103-116. (in Spanish) ("Technological analysis of surface artifact distributions in the southeastern end of Baguales range (Santa Cruz, Argentina)") DOI: http://dx.doi.org/10.4067/S0718-22442008000100008

Borrazzo, K., Borrero, L.A. & Pallo, M.C. 2019, Exploring lithic transport in Tierra del Fuego (Southern South America). *Journal of Archaeological Science: Reports*, 24: 220-230. DOI: https://doi.org/10.1016/j.jasrep.2019.01.002

Borrazzo K. & Cirigliano, N.A. 2020, La organización de la tecnología lítica en el interfluvio gallegos-chico (Santa Cruz, Argentina): una meso-transecta a los 070° en el campo volcánico Pali Aike. *Relaciones de la Sociedad Argentina de Antropología*, XLV(1): 175-199. (in Spanish) ("The organization of lithic technology in the Gallegos-Chico interfluve (Santa Cruz, Argentina): a meso-transect at w70° in the Pali Aike volcanic field") URL: http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S1852-14792020000100007

Borrazzo, K., Martin, F., Barberena, R. & Borrero, L.A. 2008, Geografía cultural y circulación humana en el norte de Tierra del Fuego. In: *Arqueología del extremo sur del continente americano* (Borrero, L.A. & Franco, N.V., Comp.), Consejo Nacional de Investigaciones Científicas y Técnicas - Instituto Multidisciplinario de Historia y Ciencias Humanas, Buenos Aires: p. 227-249. (in Spanish) ("Cultural geography and human mobility in the north of Tierra del Fuego")

Borrero, L.A. 1994, The extermination of the Selk'nam. In: *Key issues in hunter-gatherer research* (Burch Jr., E.S. & Ellanna, L. Ed.), Berg Publishers, Oxford: p. 247-61.

Borrero, L.A. 1994, Arqueología de la Patagonia. *Palimpsesto*, 4: 9-96. (in Spanish) ("Archaeology of Patagonia")

Borrero, L.A. & Borrazzo, K. 2011, La geografía cultural del sudoeste de Patagonia Continental. In: *Bosques, Montañas y Cazadores: Investigaciones Arqueológicas en Patagonia Meridional* (Borrero, L. A. & Borrazzo, K., Eds.), Dunken, Buenos Aires: p.

7-36. (in Spanish) (“The cultural geography of the southwestern part of mainland Patagonia”)

Borrero, L.A., Barberena, R., Franco, N.F., Martín, F., Caracotche, S., Manzi, L., Charlin, J. & Borrazzo, K. 2006a, Plan de monitoreo del Parque Nacional Monte León. La información de superficie. In: *Arqueología de la Costa Patagónica. Perspectivas Para La Conservación* (Cruz, I. & Caracotche, M., Eds.), UNPA, Río Gallegos: p. 213-228. (in Spanish) (“Monitoring plan of the Monte León National Park”)

Borrero, L. A., Franco, N.V., Barberena, R., Borella, F., Campan, P., Carballo Marina, F., Cruz, I., Favier Dubois, C., Guichon, R., L’heureux, L., Mancini, M., & Martin, F. 2006b, Arqueología en Cabo Vírgenes y Cañadón Gap. In: *Arqueología de la Costa Patagónica. Perspectivas Para La Conservación* (Cruz, I. & Caracotche, M., Eds.), UNPA, Río Gallegos: p. 213-228. (in Spanish) (“Archaeology of Cabo Vírgenes and Cañadón Gap”)

Borrero, L.A., Martin, F. & Barberena, R. 2011, Visits, “Fuegians”, and Information Networks. In: *Information and its role in hunter-gatherer bands* (Whallon, R., Lovis, W. & Hitchcock, R. Eds), University of California, California: p. 249-296.

Breuil, H. & Kelley, H. 1956. Les éclats Acheuléens à plans de frappe à facettes de Cagny-la-Garenne. *Bulletin de la Société Préhistorique Française*, 53(3–4): 174–191. (in French) (“Acheulean flakes with faceted striking platforms from Cagny-la-Garenne”) DOI: https://doi.org/10.3406/bspf.1956.3320

Carballo Marina, F., Borrero, L. A., Franco, N., Belardi, J. B., Horwitz, V., Muñoz, A., Campan, P., Martin, F., Borella, F., García, M., Muñoz, F., Savanti, F. & Lanata, J. 1999, Arqueología de la costa del lago Argentino, río Leona y pampas altas intermedias (provincia de Santa Cruz, Argentina). *Prœhistoria*, 3: 13-33. (in Spanish) (“Archaeology of the coast of Lake Argentino, Leona River and intermediate high pampas (Santa Cruz province, Argentina)”)

Charlin, J., Borrero, L.A. & Pallo, M.C. 2011, Ocupaciones humanas en el área noroccidental del río Gallegos (Santa Cruz, Argentina). In: *Bosques, montañas y cazadores: investigaciones arqueológicas en Patagonia Meridional* (Borrero, L.A & Borrazo, K., Eds.), Dunken, Buenos Aires: p. 179-210. (in Spanish) (“Human occupations in the northwestern area of the río Gallegos (Santa Cruz, Argentina)”)

Charlin, J. & Pallo, M.C. 2015, Disponibilidad de rocas y costos de aprovisionamiento en el extremo austral de Patagonia meridional: integración de resultados en una escala regional. *Intersecciones en Antropología*, 2: 125-138. (in Spanish) (“Rocks availability and provisioning cost in Southernmost Patagonia: results integration on a regional scale”) Accessed: January 2nd, 2021.
URL: http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S1850-373X2015000300011&lng=es&tlng=es.

Cirigliano, N.A. 2016, *Movilidad de grupos indígenas y aprovechamiento de materias primas entre el extremo sur del Macizo del Deseado y la cuenca del Río Santa Cruz durante los últimos 2000 años (provincia de Santa Cruz, Argentina).* Ph.D. thesis no. 3627 at the Facultad de Filosofía y Letras, Universidad de Buenos Aires, Buenos Aires, p. 662. (in Spanish) (“Indigenous peoples' mobility and raw material use between the southern end of the Deseado Massif and the Santa Cruz River Basin during the last 2000 years (Santa Cruz province, Argentina)”). http://repositorio.filo.uba.ar/handle/filodigital/4601

Derevianko, A.P. & Petrin, V.T. 1995, The Levallois of Mongolia. In: *The Definition and Interpretation of Levallois Technology, Monographs in World Archaeology* Vol. 23 (Dibble, H.L., Bar-Yosef, O., Eds.), Prehistory Press, Madison, Wisconsin: p. 455-471.

Dibble, H.L. 1995, Biache Saint-Vaast, Level IIA: A Comparison of Analytical Approaches. In: *The Definition and Interpretation of Levallois Technology* (Dibble, H.L. & Bar-Yosef, O., Eds.), Monographs in World Archaeology Vol. 23. Prehistory Press, Madison, Wisconsin: p. 93-116.

Dortch, C. & Bordes, F. 1977, Blade and Levallois technology in western Australian prehistory. *Quartär,* 27-28: 1-19. DOI: https://doi.org/10.7485/QU27_01

Emperaire, J., Laming-Emperaire, A., Reichlen, H. & Poulain-Josien, T. 1963, La grotte Fell et d'autres sites de la Patagonie chilienne. *Journal de la Société des Américanistes*, 52: 167-254. (in French) ("Fell Cave and other sites in Chilean Patagonia") DOI: https://doi.org/10.3406/jsa.1963.1996

Franco, N.V. 2004, La organización tecnológica y el uso de escalas espaciales amplias. El caso del sur y oeste de lago Argentino. In: *Temas de Arqueología. Análisis lítico* (Acosta, A., Loponte D. & Ramos, M. Comp.), Universidad Nacional de Luján, Luján: p. 101-144. (in Spanish) ("Technological organization and the use of large spatial scales. The case of the south and west of Lake Argentino")

Franco, N.V. 2008, La estructura tecnológica regional y la comprensión de la movilidad humana: tendencias para la cuenca del río Santa Cruz. In: *Arqueología del extremo sur del continente americano. Resultados de nuevos proyectos* (Borrero, L. A. & Franco, N. V., Comp.), Consejo Nacional de Investigaciones Científicas y Técnicas - Instituto Multidisciplinario de Historia y Ciencias Humanas, Buenos Aires: p. 119-154. (in Spanish) ("The regional technological structure and the understanding of human mobility: trends for the Santa Cruz River Basin")

Franco, N.V. & Borrero, L.A. 2003, Chorrillo Malo 2: initial peopling of the Upper Santa Cruz Basin, Argentina. In: *Where the South winds Blow. Ancient evidence of Paleo South Americans* (Miotti, L., Salemme, M. & Flegenheimer, N., Eds.), Center for the study of the first Americans and Texas A & M University Press, Texas: p. 149-52.

Franco, N.V., Borrero, L.A., Belardi, J.B., Carballo Marina, F., Martin, F., Campan, P., Favier Dubois, C., Stadler, N., Hernández Llosas, M., Cepeda, H., Muñoz, A., Borella, F., Muñoz, F. & Cruz, I. 1999, Arqueología del cordón baguales y sistema lacustre al sur del lago Argentino (provincia de Santa Cruz). *Prœhistoria*, 3, 65-86. (in Spanish) ("Archaeology of the Baguales range and lacustrine system south of Lake Argentino (Santa Cruz province)")

Franco, N.V., Brook, G.A., García Guraieb, S., Mancini, M. V., Guarido, A. L., Mehl, A. & Montenegro, T. 2017, Reuse of burial sites during the Late Holocene: evidence from multiple human burials at the Río Bote 1 rockshelter, Upper Santa Cruz river basin (Southern Patagonia Argentina). *Latin American Antiquity*, 28(4): 476-494. DOI: https://doi.org/10.1017/laq.2017.35

Franco, N.V., Cirigliano, N.A. & Ambrústolo, P. 2011, Semejanzas en tecnologías, diseños y prácticas funerarias al sur de la cuenca superior del río Santa Cruz: algunos ejemplos correspondientes al Holoceno tardío. In: *Bosques, montañas y cazadores: investigaciones arqueológicas en Patagonia Meridional* (Borrero, L. A. & Borrazo, K., Eds.), Dunken, Buenos Aires: p.155-178. (in Spanish) ("Similarities in technologies,

designs and funerary practices south of the upper Santa Cruz River Basin: some examples from the late Holocene")

Franco, N.V., Mehl, A & Otaola, C. 2007, Chorrillo Malo 2 (Upper Santa Cruz Basin, Patagonia, Argentina): new data on its stratigraphic sequence. In: *Proceedings of the XV World Congress*, *4-9 September 2006, Lisbon: On Shelter's Ledge: Histories Theories and Methods of Rockshelter Research*: Session C54 (Kornfeld, M., Vasil'ev, S. & Miotti, L., Eds.), Bar International Series Vol S1655, Bar Publishing, Oxford: p. 141-145.

Franco, N.V., Zubimendi, M.A., Cardillo, M. & Guarido, A.L. 2010, Relevamiento arqueológico en Cañadón de los Mejillones (sur de la desembocadura del río Santa Cruz, Argentina): primeros resultados. *Magallania*, 38(1): 269-280. (in Spanish) ("Archaeological researches at "Cañadón de los Mejillones" (south of the Santa Cruz River Mouth, Argentina): first results") DOI: http://dx.doi.org/10.4067/S0718-22442010000100016

Huidobro, C. 2016, Fabricación de instrumentos líticos en Cueva del Medio, Última Esperanza, Patagonia Austral. In: *Arqueología de la Patagonia. De mar a mar* (Mena, F., Ed.), Ñire negro, Coyhaique: p. 189-199. (in Spanish) ("Stone tool Manufacture at Cueva del Medio, Última Esperanza, Southern Patagonia)

Huidobro, C. 2018, Perspectiva funcional del equipamiento lítico tallado de las sociedades canoeras de Magallanes entre los ca. 4.400 - 3.000 años AP. Nuevos resultados a partir del análisis traceológico de Pizzulic 3 y Offing 2 - locus 1 (componente inferior). *Magallania*, 46(2): 203-230. (in Spanish) ("Functional perspective of the flaked lithic equipment of the canoe societies of magellan between the ca. 4.400 - 3.000 years BP. New results from the traceological analysis of Pizzulic 3 and Offing 2 - locus 1 (lower component") DOI: http://dx.doi.org/10.4067/S0718-22442018000200203

Jackson, D. 1987, Componente lítico del sitio arqueológico Tres Arroyos. Anales del Instituto de la Patagonia, 17: 67-72. (in Spanish) ("Lithic assemblage from the archaeological site of Tres Arroyos") URL: https://repositorio.uchile.cl/handle/2250/122059

Jaubert, J. & Farizy, C. 1995, Levallois Debitage: Exclusivity, Absence or Coexistence with Other Operative Schemes (Garonne Basin, SW France). In: *The Definition and Interpretation of Levallois Technology* (Dibble, H.L. & Bar-Yosef, O., Eds.), Monographs in World Archaeology Vol. 23, Prehistory Press, Madison, Wisconsin: p. 227-248.

Lanata, J. L. 1993, Estados alterados: procesos de formación y conjuntos arqueológicos de Rancho Donata, Tierra del Fuego. In: Explotación de recursos faunísticos en sistemas adaptativos americanos, *Arqueología Contemporánea*, 4:163-176. (in Spanish) ("Altered conditions: formation processes and archaeological sites of Rancho Donata, Tierra del Fuego")

Langlais, M. & Morello, F. 2009, Estudio tecno-económico de la industria lítica de Cerro Castillo (Última Esperanza, Chile). *Magallania*, 37(1): 61-84. (in Spanish) ("Techno-economic study of Cerro Castillo lithic industry (Última Esperanza, Chile)") DOI: http://dx.doi.org/10.4067/S0718-22442009000100006

Leakey, L. S. B. 1955, Working stone, bone, and wood. In: *A History of Technology* (Singer, C., Holmyard, E. J. & Hall, A. R., Eds.). From Early Times to Fall of Ancient Empires Vol.1, Oxford University Press, London: p.128-143.

Legoupil, D., Christensen, M. & Morello, F. 2011, Una encrucijada de caminos: el poblamiento de la Isla Dawson (estrecho de Magallanes). *Magallania*, 39(2): 137-152. (in Spanish) ("A crossroad: the peopling of Dawson Island (Magellan Strait)") DOI: http://dx.doi.org/10.4067/S0718-22442011000200010

Lombao Vázquez, D. 2021, *Reducción y gestión volumétrica: aproximación a la variabilidad y evolución de las dinámicas de explotación durante el Pleistoceno inferior y medio europeo, a través de los conjuntos de Gran Dolina y Galería (Sierra de Atapuerca, Burgos) y de El Barranc de la Boella (La Canonja, Tarragona).* Ph.D. thesis no. 185 at the Departament d'Història i Història de l'Art, Universitat Rovira i Virgili, Tarragona, p. 672. (in Spanish) ("Reduction and volumetric management: approach to the variability and evolution of the exploitation dynamics during the European Middle and Lower Pleistocene, through the assemblages of Gran Dolina and Galería (Atapuerca Range, Burgos) and The Barranc of the Boella (The Canonja, Tarragona") https://www.tdx.cat/handle/10803/673185

Martinic, M. 1995, *Los Aónikenk, historia y cultura*. Universidad de Magallanes, Punta Arenas, 387 p. (in Spanish) ("The Aónikenk, history and culture")

Martin, F. & Borrero, L.A. 2017, Climate change, availability of territory, and Late Pleistocene human exploration of Ultima Esperanza, South Chile. *Quaternary International*, 428(Part B): 86-95. DOI: https://doi.org/10.1016/j.quaint.2015.06.023

Massone, M. 1979, Panorama etnohistórico y arqueológico de la ocupación Tehuelche y Prototehuelche en la costa norte del estrecho de Magallanes. *Anales del Instituto de la Patagonia*, 10: 63-108. (in Spanish) ("Ethnohistorical and archaeological overview of the Tehuelche and Proto-Tehuelche occupation on the north coast of the Magellan Strait") URL: http://www.bibliotecadigital.umag.cl/handle/20.500.11893/684

Massone, M. & Prieto, A. 2004, Evaluación de la modalidad cultural Fell 1 en Magallanes, *Chungara*, 36(Supl. espect1): 303-315. (in Spanish) ("Evaluation of the Fell 1 cultural modality in Magallanes") DOI: http://dx.doi.org/10.4067/S0717-73562004000300033

Massone, M. & Morello, F. 2007, Los cetáceos en el mundo Selk´nam: una evaluación arqueológica. In: *Arqueología de Fuego-Patagonia: levantando piedras, desenterrando huesos… y develando arcanos* (Morello, F., Martinic, M., Prieto, A. & Bahamonde, G., Eds.), Ediciones CeQua, Punta Arenas: p. 709-721. (in Spanish) ("Cetaceans in the Selk'nam world: an archaeological evaluation")

McCulloch, R., Bentley, M., Tipping, R., Clapperton, C. 2005, Evidence for late-glacial ice dammed lakes in the central Strait of Magellan, southern Chile. *Geografiska Annaler*, 87: 335-362. DOI: https://www.jstor.org/stable/3554242

McCulloch, R., Clapperton, C., Rabassa, J. & Currant, A. 1997, The glacial and postglacial environmental history of Fuego-Patagonia. In: *Patagonia. Natural History, Prehistory, and Ethnography at the Uttermost End of the Earth* (McEwan, C., Borrero, L.A. & Prieto, A. Eds.), British Museum Press, London: p. 12-31.

Moncel, M.H. 1998, Le Paléolithique moyen dans la moyenne vallée du Rhône en France: la question de la variabilité des assemblages lithiques des stades isotopiques 9 à 3. *Anthropologie,* 36: 181-199. (in French) ("The Middle Palaeolithic in the Middle Rhone Valley in France: the question of the variability of lithic assemblages from Marine Isotopic Stages 9 to 3") DOI: https://www.jstor.org/stable/26295821

Morello, F. 2005, Tecnología y métodos para el desbaste de lascas en el norte de Tierra del Fuego: los núcleos del sitio cabo San Vicente 1. *Magallania*, 33(2): 29-56. (in Spanish) ("Technology and flake knapping methods in the north of Tierra del Fuego: the cores of the Cabo San Vicente site") DOI: http://dx.doi.org/10.4067/S0718-22442005000200004

Morello F., Arroyo, M., Borrero, L.A., Torres, J., Massone, M., Cárdenas P. & Bahamonde, G. 2009, Nuevas evidencias de cazadores recolectores terrestres del Holoceno Medio y Tardío en Tierra del Fuego: El sitio Cabo Monmouth 20. *Magallania*, 37(2): 193-205. (in Spanish) ("New evidence of middle and late Holocene terrestrial hunter gatherers in Tierra del Fuego: 20th Cabo Monmouth Site") DOI: http://dx.doi.org/10.4067/S0718-22442009000200012

Mourre, V. 2003, Discoïde ou pas Discoïde? Réflexions sur la pertinence des critères techniques définissant le débitage Discoïde. In: *Discoid Lithic Technology. Advances and Implications* (Peresani, M., Ed.), British Archaeological Reports International Series Vol. 1120, Bar Publishing, Oxford: p. 1-18. (in French) ("Discoid or not Discoid? Reflections on the relevance of the technical criteria defining Discoid debitage")

Nami, H. 1987, Cueva del Medio: Perspectivas arqueológicas para la Patagonia Austral. *Anales del instituto de la Patagonia*, 17: 73-106. (in Spanish) ("Cueva del Medio: Archaeological Perspectives for Southern Patagonia")
URL: http://www.bibliotecadigital.umag.cl/handle/20.500.11893/1482

Nami, H. 1988. Arqueología experimental, tecnología, artefactos bifaciales y modelos. Estado actual del conocimiento en Patagonia y Tierra del Fuego. *Anales del Instituto de la Patagonia*, 18: 157-176. (in Spanish) ("Experimental archaeology, technology, bifacial artifacts and models. Current state of knowledge in Patagonia and Tierra del Fuego")
URL: http://www.bibliotecadigital.umag.cl/handle/20.500.11893/1489

Nami, H. 1992, Noticia sobre la existencia de técnica "Levallois" en península Mitre, extremo sudoriental de Tierra del Fuego. *Anales del Instituto de la Patagonia*, 21: 73-80. (in Spanish) ("News about the existence of the "Levallois" technology in the Mitre peninsula, extreme southeast of Tierra del Fuego")
URL: http://www.bibliotecadigital.umag.cl/handle/20.500.11893/997

Nami, H. 1997, Más datos sobre la existencia de núcleos preparados y lascas predeterminadas en la Patagonia Austral. *Anales del Instituto de la Patagonia*, 25: 223-227. (in Spanish) ("More data on the existence of prepared cores and predetermined flakes in Southern Patagonia") URL: http://www.bibliotecadigital.umag.cl/handle/20.500.11893/1510

Nami, H. 1998, Technological observations on the Paleoindian artifacts from Fell's Cave, Magallanes, Chile. *Current Research in the Pleistocene*, 15: 81-83.

Nami, H. 2009, Avances de las investigaciones arqueológicas en la localidad arqueológica de Pali Aike, extremo sur de la provincia de Santa Cruz. In: *Estado actual de las investigaciones realizadas sobre patrimonio cultural en Santa Cruz*, Subsecretaría de Cultura de Santa Cruz, Río Gallegos: p. 235-241. (in Spanish) ("Advances of archaeological research in the Pali Aike archaeological locality, extreme south of the province of Santa Cruz")

Pallo, M.C. & Borrero, L.A., 2015 ¿Intercambio o movilidad?: una evaluación sobre el uso de escalas de análisis espaciales y curvas de declinación en Patagonia centro-meridional (Argentina). *Latin American Antiquity*, 26(3): 287-303. (in Spanish) ("Exchange or mobility?: An evaluation of the use of spatial analysis scales and fall-off curves in

central-southern Patagonia (Argentina)")
DOI: https://doi.org/10.7183/1045-6635.26.3.287

Pallo, M.C., Charlin, J., Cardillo, M. & Borrero, L.A. 2022, La tecnología laminar en el extremo sur de Patagonia meridional: Un análisis de la variación morfológica en instrumentos de filo largo mediante morfometría geométrica. *Latin American Antiquity,* First View: 1-18. (in Spanish) ("Laminar technology in southern Patagonia: An Analysis of morphological variation in long-edged stone tools by using geometric morphometrics") DOI: https://doi.org/10.1017/laq.2022.20

Pallo, M.C. Cirigliano, N.A., Charlin, J. & Borrazzo, K. 2020 Una aproximación a la distribución de la producción laminar en Patagonia meridional. *Revista del Museo de Antropología*, 13(1): 217-222. (in Spanish) ("An approach to the distribution of blade production in southern Patagonia")
DOI: https://doi.org/10.31048/1852.4826.v13.n1.23481

van Peer, P. 1992, *The Levallois Reduction Strategy. Monographs in World Archaeology* Vol. 13, Prehistory Press, Madison, Wisconsin, 150 p.

van Peer, P. 1995, Current Issues in the Levallois Problem. In: *The Definition and Interpretation of Levallois Technology* (Dibble, H.L. & Bar-Yosef, O., Eds.), Monographs in World Archaeology Vol. 23, Prehistory Press, Madison, Wisconsin: p. 1-9.

Pigafetta, A. 2001 [1899], *Primer Viaje alrededor del Mundo* (1st ed). El Elefante Blanco, Buenos Aires, 229 p. (in Spanish) ("First Voyage around the World")

Pigeot, N. 2003, L'économie de la taille de la pierre. In: Les chasseurs-cueilleurs de Ponsonby (Patagonie Australe) et leur environnement du VIeme au IIIeme mill. av. J.C. (Legoupil, D., Ed.), *Magallania*, 31: 117-164. Special Edition. (in French) ("The economy of knapped stone")

Richter, D., Grün, R., Joannes-Boyau, R. Steele, T., Amani, F., Rué, M., Fernandes, P., Raynal, J.-P., Geraads, D., Ben-Ncer, A., Hublin, J.-J. & McPherron, S. P., 2017, The age of the hominin fossils from Jebel Irhoud, Morocco, and the origins of the Middle Stone Age. *Nature,* 546: 293-296. DOI: https://doi.org/10.1038/nature22335

van Riet Lowe, C. 1945, The evolution of the Levallois technique in South Africa. *Man*, 45: 49-59. DOI: https://www.jstor.org/stable/i329867

Rolland, N. & Dibble, H.L. 1990, A new synthesis of Middle Palaeolithic variability. *American Antiquity*, 55: 480-499. DOI: https://doi.org/10.2307/281279

Rybin, E. & Khatsenovich, A. 2020, Middle and Upper Paleolithic Levallois technology in eastern Central Asia. *Quaternary International*, 535: 117-138. DOI: https://doi.org/10.1016/j.quaint.2018.10.042

Salemme, M., Bujalesky, G. & Santiago, F. 2007, La Arcillosa 2: la ocupación humana durante el Holoceno medio en el Río Chico, Tierra del Fuego, Argentina. In: *Arqueología de Fuego-Patagonia: levantando piedras, desenterrando huesos… y develando arcanos* (Morello, F., Martinic, M., Prieto, A. & Bahamonde, G., Eds.), Ediciones CeQua, Punta Arenas: p.723-736. (in Spanish) ("La Arillosa 2: Human occupation during the middle Holocene in the Río Chico, Tierra del Fuego, Argentina")

Salemme, M., Oría, J., Tunes, L. & Santiago, F. 2014, Caracterización tecnomorfológica de dos conjuntos líticos del Holoceno medio en la Estepa Fueguina: La Arcillosa 2 y Río Chico 1. *Revista del Museo de Antropología*, 7(1): 39-54. (in Spanish)

("Technomorphological characterization of two middle Holocene lithic assemblages in the Fuegian Steppe: La Arcillosa 2 and Río Chico 1") DOI: https://doi.org/10.31048/1852.4826.v7.n1.9091

Santiago, F. 2013, *La ocupación humana en el norte de Tierra del Fuego durante el Holoceno medio y tardío. Su vinculación con el paisaje*. Editora Cultural Tierra del Fuego, Ushuaia, 460 p. (in Spanish) ("Human occupation in northern Tierra del Fuego during the middle and late Holocene. Its connection with the landscape")

Scerri, E.M.L., Niang, K., Candy, I., Blinkhorn, J., Mills, W., Cerasoni, J., Bateman, M., Crowther, A. & Groucutt, H. 2021, Continuity of the Middle Stone Age into the Holocene. *Scientific Reports,* 11(1): 70. DOI: https://doi.org/10.1038/s41598-020-79418-4

Terradas, X. 2003, Discoid flaking method: conception and technological variability. In: *Discoid Lithic Technology. Advances and Implications* (Peresani, M., Ed.), British Archaeological Reports International Series Vol. 1120, Bar Publishing, Oxford: p. 19-32.

Tixier, J., Inizian, M.L. & Roche, H. 1980, *Prehistoire de la pietre Taillée. 1. Terminologie et technologie*. Cercle de reserches et d' études préhistonques, Valbonne Cedex, 120 p. (in French) ("Prehistory of the knapped stone. 1. Terminology and technology")

Vallin, L. 1988, Le site Moustérien D' Houpper- ville (Seine-Maritime) Remontages et étude technologique. *Revue Archeólogique di Picardie*, 1-2: 163-174. (in French) ("The Mousterian site of Houpperville (Seine-Maritime) Refitting and technological study") DOI: https://doi.org/10.3406/pica.1988.1588

Waters, M., Amorosi, T., & Stafford, T. 2015, Redating Fell's Cave, Chile and the Chronological Placement of the Fishtail Projectile Point. *American Antiquity*, 80(2): 376-386. DOI: https://doi.org/10.7183/0002-7316.80.2.376

Tecnología Levallois en Patagonia meridional (Argentina y Chile): conocimiento actual y perspectivas de futuro

María Cecilia Pallo [1]

1. IMHICIHU (CONICET) and University of Buenos Aires (FFyL, Faculty of Philosophy and Letters). Saavedra 15, 5th floor, Buenos Aires, CP C1083ACA, Argentina. Email: ceciliapallo@gmail.com

Resumen:

La tecnología Levallois (TL) apareció a finales del Paleolítico Inferior en Europa y África pero se generalizó especialmente en el Paleolítico Medio de Europa, Norte de África y Cercano Oriente. Inicialmente se definió para el Paleolítico Medio Europeo (ca. 300,000 - 30,000 años AP) para caracterizar un proceso de manufactura lítica en el que por medio de la especial preparación de la plataforma de percusión del núcleo se extraían lascas de morfología predefinida. Con posterioridad, comenzó a registrarse abundante evidencia del uso de la TL en numerosos sitios arqueológicos de África, Australia, Asia Central e incluso Patagonia meridional, entre otras partes del mundo. Algunos de estos sitios comprenden importantes hallazgos, cuyas edades más tempranas y tardías permiten reconsiderar la cronología de la cultura del Paleolítico Medio en el Viejo Mundo.

En Patagonia meridional, la TL fue reconocida por primera vez por Hugo Nami en el sitio Rancho Donata, ubicado en la costa suroeste de la Isla Grande de Tierra del Fuego. Allí, la identificación de un método de producción de lascas obtenidas a partir de núcleos con preparación centrípeta, similar al conocido método del Viejo Mundo, llevó a Nami a denominarlo "Levallois". A estos hallazgos, continuó el registro de otros productos Levallois en varios otros sitios de cazadores-recolectores terrestres de la Isla Grande y la porción sur del continente (Argentina y Chile), haciendo de la TL parte del acervo tecnológico de las poblaciones locales.

El objetivo de este trabajo es presentar la información actualmente disponible sobre la TL (distribución, cronología, frecuencia, clases de artefactos, tipo de materia prima y características tecno-morfológicas) entre los cazadores-recolectores terrestres que ocuparon los espacios al sur de río Santa Cruz en el sur continental y aquellos asentados en Tierra del Fuego, incluyendo sectores de Chile y Argentina. A partir de la revisión de la literatura arqueológica, se discute el estado actual del conocimiento y las perspectivas de futuro en los estudios líticos sobre el método Levallois como parte de las estrategias de talla desarrolladas por las poblaciones humanas en Patagonia meridional durante el Holoceno.

El análisis de la información ha mostrado que la TL ocurre en muy baja frecuencia, principalmente en forma de núcleos, cuchillos y raspadores elaborados en materias primas locales, pero abarcando una gran diversidad de contextos ecológicos y modos de subsistencia. Al respecto, la TL se reconoce más allá del área de este estudio, en algunos pocos sitios tardíos al norte del río Santa Cruz y en contextos de grupos canoeros del archipiélago chileno sur con cronología del Holoceno medio (e.g. islas Riesco, Dawson, Englefield y Offing), cuyas características tecnológicas los asemejan a los sitios del sur continental y Tierra del Fuego datados para estos momentos. Esta información lleva a pensar que varias poblaciones estaban familiarizadas con esta tecnología de manera simultánea, posiblemente a través de amplios movimientos de individuos o redes sociales que compartían ideas sobre cómo hacer y usar estos artefactos. En consecuencia, la información cronológica muestra que el Holoceno medio fue un período importante en el que este método de reducción se convirtió en un fenómeno tecnológico compartido a escala macrorregional. Sin embargo, la evidencia sobre TL es aún escasa en los contextos patagónicos y enfatiza posibles vínculos con otras estrategias de reducción, particularmente el método discoidal, la

búsqueda de maximizar la explotación de rocas locales e incluso la necesidad de producir herramientas de diseño versátil para hacer frente a una diversidad de tareas. Por lo tanto, aún no está claro si la TL refleja un verdadero método para obtener lascas predeterminadas con características morfológicas específicas o atiende principalmente a otras circunstancias, debido a la influencia del medio ambiente, la organización espacial de los grupos humanos o el sistema de reducción lítica. Este tema probablemente requiera un estudio exhaustivo de los núcleos Levallois para resolverlo con éxito, atendiendo especialmente al desarrollo de las secuencias de reducción particulares, la frecuencia en la que se presentan y la relación con otras técnicas de talla registradas en los contextos patagónicos, junto con comparar los productos de todos estos diferentes métodos al interior de cada conjunto lítico.

Palabras clave: tecnología lítica; método Levallois; cazadores-recolectores terrestres; Patagonia; Holoceno.