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Archaelogy, Paleoindian Research and Lithic Technology in the Middle Negro River, Central Uruguay

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The Negro river is the most important inner fluvial course in Uruguay. Its basin, mainly the middle portion, has produced an unusual archaeological record characterized by a significant evidence of Paleoindian remains. Systematic archaeological research allowed conducting a number of field and laboratory activities. The identification of Paleoindian vestiges and buried sites was a significant focus of this investigation. The advances on surveys and excavations in Los Molles and Minas de Callorda sites are reported. Different dating methods yielded the first dates in the area and diverse technological analyses on lithic artifacts allow recognizing the existence of unreported techniques and reduction strategies. Functional studies with special attention to Paleo-South American vestiges permitted to identify diverse micro-wear clues. Finally, the role of river basins in the peopling of the eastern part of the southern cone and the hypothesis about the origin of the fishtail pattern is discussed.

Keywords: Paleoindian; Lithic Technology; Fishtail Points; South America; Southern Cone; Uruguay

Introduction

One of the most intriguing topics of the archeology of the New World is the human colonization and spread through the continent. This subject has been the focus of interest since very early in the archaeology of the Americas. In this sense, archaeologists frequently speak of the "First Americans", "Early Man", "Paleo Americans" and, "Paleoindian" as the earliest stage in the socio-cultural history of the Americas in which the hunter-gatherer societies lived during the Late Wisconsin Ice Age.

In the history of the field of the First Americans studies, the southern cone (Republics of Argentina, Uruguay, Chile and south of Brazil) of South America has played an important role since the end and early XIX and XX centuries respectively (e.g. Ameghino, 1918; Bird, 1938, 1946; among others). One of the historical landmarks occurred just after the Clovis and Folsom finds in North America. In fact, in southern Chile, during the 1930s Junius Bird discovered in the Fell and Pali Aike's caves "fishtail" or Fell projectile points associated with the remains of Pleistocene fauna. Furthermore, Paleo-South American sites with "fishtail" points were dated at ca. 11.000 - 10.000 uncalibrated radiocarbon years before present (~11 - 10 kya hereafter, Nami, 2007; Politis et al., 2008, Steele & Politis, 2009).

A number of investigations in South America reported similar Paleoindian artefacts in different places, mainly in the southern cone. In the Republic of Uruguay, "fishtail" points were reported since the end of the XIX century. Recent investigations on Paleoindian lithic assemblages from this country show many similarities with other places in Central and South America (Nami, 2007, 2010a).

In the eastern part of the southern cone, dividing the south from the north of the country, the Negro River is the most important inner fluvial course of the Uruguay Republic. Originated north of Bage city at about 70 km from the boundary of Uruguay and Brazil, it flows west across its entire width to the Uruguay River, the natural western border with Argentina. In Uruguayan territory, its drainage basin size is 70.714 km^2 with a total length of 750 km. In its middle basin, the river is dammed near Paso de los Toros city, creating the Rincón del Bonete dam—also called the Gabriel Terra—that, with a surface of about 1500 km^2, is one of the largest reservoirs in South America (**Figure 1**).

The archaeology of the Negro River has produced an unusual record. Particularly, Paleo-South American remains were recovered as isolated finds or in archaeological sites. Thus, this region becomes a very important locale to perform systematic research. Despite its richness and significance, is little known archaeologically and there is notable lack of methodical excavations and laboratory research to clarify the peopling, archaeological process, and chronology of this important area.

Systematic Paleoindian investigations by the author began in Uruguay at the end of the 1990s; since then various activities have been conducted and reported on terminal Pleistocene topics (López et al., 2001; Nami, 2001a, 2001b, 2001c, 2008, 2010a; Cavalloto et al., 2002). The identification of Paleoindian sites with stratigraphic evidence has been a significant focus of the research goals. Therefore, a long-term project was started in the basin of the Rio Negro (Nami 2007, 2009, 2010a; Nami &

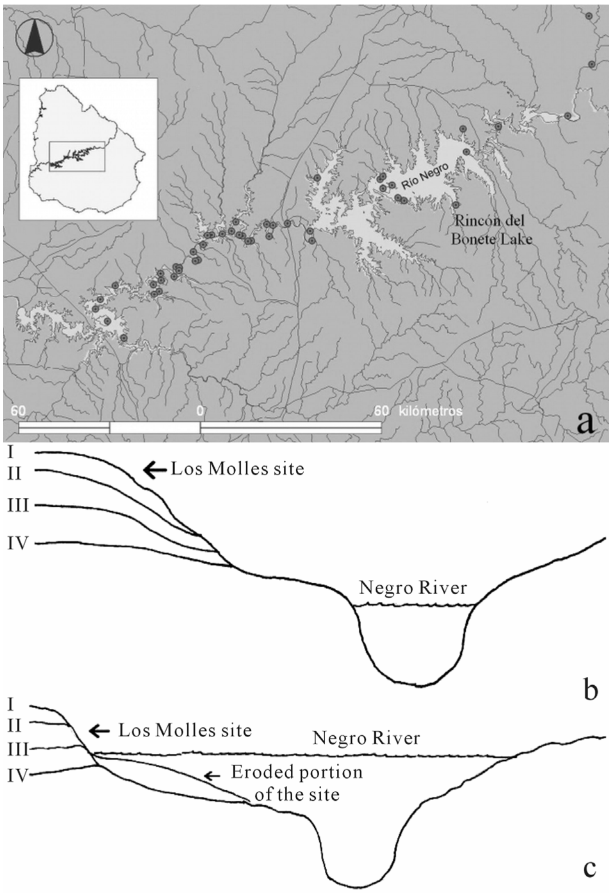

Figure 1.
(a) Map of the Negro River basin and location of recorded sites (after Femenías et al., 2011). (b), (c) Schematic section, stratigraphy and hypothetical development of LM site related with the Negro River level fluctuation due to the Gabriel Terra dam construction, (b) Site location in relation with the pre-dam Negro River, (c) Current level of the river and remaining LM site after partially destroyed by the alluvial erosive process (except when is clearly expressed all the photographs and drawings are by the author).

Castro, 2010, 2012; Femenías et al., 2011), which had been the focus of archaeological interest during previous years (e.g. Taddei, 1969, 1980; Baeza et al., 2001; Baeza, 2005). The evidence in the Negro River basin is highly important to deepen our knowledge of several archaeological issues. Research in this area is vital to understand the Uruguayan socio-cultural history, and particularly its relationships with other areas of South America. It also permits discussion of major theoretical and analytical issues in the human colonization, archaeological process, chronology and paleoenvironment of this part of the New World. Hence, this paper reports varied recent investigations performed in Uruguay, and mainly in the middle Negro River, focusing diverse archaeological topics with special attention on Paleo-South Americans hunter-gatherers, mostly from the technological perspective.

Archaeological Field Work

Exploration, Surveys and Site Record

The Gabriel Terra dam, which was inaugurated in 1945, raised the river level ~15 - 20 m (**Figure 1(a)**). As shown in historical images from the first decades of XX century, the river was characterized by the existence of riverbanks of varied thickness, sand dunes and wide beaches along the shores (**Figure 2**). Despite the width of the river, during the pre-dam times, certain places were not deep and used as *pasos* to cross it (**Figures 2(a)** and **(b)**). Currently, sand dunes are consolidated mainly by eucalyptus forest, and due to from the formation of Rincón del Bonete Lake (RBL), the original landscape was strongly modified; hills became islands and a number of small like fiords, bays and inlets were formed.

A large amount of modest permanent or intermittent water courses also characterize the region. An active fluvial erosive process is currently disturbing the buried sites existing in the highest river terrace and hills along its old course. Hence, a number of sites are impacted and destroyed by the water action and continuously revealing archaeological artefacts (e.g. **Figure 1(c)**). These finds in old sand dunes and in the post-dam eroded deposits has caused the proliferation of different kind of collectors. Some of them, who are aware of their scientific value, carry out surface collections when the water level falls in the river and lake. When they look for archaeological remains, they carefully record their finds and allow professional archaeologists to study them. In this physiographically complex area, they have been helpful in identifying Paleoindian surfaces and stratigraphic sites. Also, the lithic artefacts collected by them are useful for discussing diverse regional typological and technological topics.

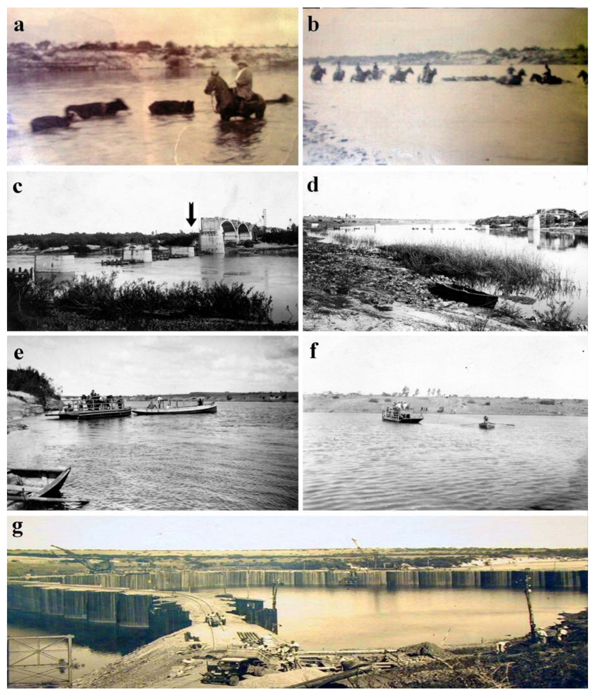

Figure 2.
Historic photographs showing diverse images of the Negro River before dam construction, (a), (b) natural *paso* (pass) of the river near de Paso de los Toros, ca. 1920, (c), (d) Riverbanks and beaches during the bridge construction on Route 5 in 1927. The arrow points the location of EP site, (e), (f) ferry crossing the river before the bridge, (g) construction of the G. Terra dam and the river coast with sand dunes and plains observed in the landscape, ca. 1935-1940. Photographs: (a), (b): L. Laurenti, (g) unknown author.

Despite the rich archaeological record, the archaeology of the Negro River basin was mainly constructed from a traditional perspective and surface evidence. Hence, it was imperative to search for sites with stratigraphic deposits that allowed to understand the regional archaeological process from a contemporary viewpoint. With this goal, surveys and explorations were carried out. Geographical information system was used to produce a regional site record along its basin. The documentation was performed on the basis of our own work, and was augmented by data from field notes by the amateur Uruguayan archaeologist Antonio Taddei and information provided by collectors living in the region (Femenías et al., 2011). Most of the sites show vestiges of Holocene occupations, but indubitable Paleoindian remains were encountered on the surface of pre-dam sand dunes and eroded deposits along the post-dam basin (Taddei, 1980; Nami; 2001a, 2007; Nami & Castro, 2010, 2012; Femenías et al., 2011).

Fieldwork was mainly performed in the middle Negro River area at Tacuarembó and Durazno departments. As seen in the following sections, detailed studies on lithic artifacts curated at museums and private collections across the country were also performed. In the case of latest Pleistocene finds, once the origin of the artifact was documented the sites were visited and explored to evaluate their potential to provide stratified material. Because of the lack of careful archaeological research in the region, it was crucial to perform in-depth excavations at the sites that showed buried remains. This activity was imperative because they are disappearing due to the fluvial erosion and the surviving sites on the riverbanks are continuously affected by water level fluctuations. Several localities and sites yielded diverse kinds of Paleoindian surface finds. They were visited and after evaluation, Minas de Callorda (MC) and Los Molles (LM) showed stratigraphic sections with intact deposits despite alluvial erosion, with potential to discover Paleoindian levels. Consequently, they are in the process of systematic excavation. Both are large sites, about 1 km long, located on the current shoreline of the river. Due to the intensive erosive process, hundreds of archaeological artifacts from sedimentary deposits are exposed on the surface during the river's ebb. The most notable finds are projectile points, including Paleoindian fishtail, pisciform, Fell's cave or just Fell specimens, and other significant vestiges that deserve attention. Pleistocene faunal remains were also collected in several places of the Negro River basin. They were carefully studied and significant results from the activities are reported in the following sections.

Geo-Archaeological Considerations

A large uninterrupted grassland extends from southern Brazil, through Uruguay and Argentina. Despite regional variations, there are major physiographical features, plants and animals. Two main recognized sub-regions are respectively located at northeast and south of La Plata River: the fields of southern Brazil and Uruguay, and the Argentinean Pampas (Politis, 2002: 33). The Uruguayan territory is a typical peneplain with complex undulations. The bedrock consisting of old rocks of diverse origin, is exposed among undulated sediments, and covers the central and southern part of the country. In this scenario, the area under study is characterized by hills of Mesozoic basalts of the Arapey formation ([**Figure 2(d)**], Bossi, 1966; Bossi & Navarro, 1998). There, the river develops a meandering system, and the fluvial valleys are covered by variable thickness of terminal Pleistocene-Holocene alluvium.

Continental floodplain alluvial depositions in Uruguay were studied by several authors (e.g. Antón, 1975; Bossi, 1966, Ubilla, 1996, 1999; Ubilla et al., 2011; Martínez & Ubilla, 2004). They reported extensive sedimentary silty deposits with different brown and green tonalities called Sopas-Dolores (Panario & Gutiérrez, 1999), or Dolores Formations (Martínez & Ubilla, 2004) characterizing the terminal Pleistocene sections in the country. By comparison with similar deposits in southern Brazil, Antón (1975) suggested that Sopas might be dated at ~12.8 - 15.0 kya. Radiocarbon dates from bone and wood samples belonging from Sopas-Dolores yielded dates of ~11.6 - 10 kya in southern and midwestern Uruguay (Ubilla, 1996, 1999; Martínez & Ubilla, 2004; López Mazz et al., 2003-2004). This geological unit shows some similarities to the *Lujanense*, a useful horizon marker for the Late Pleistocene and Early Holocene of the Buenos Aires province, Argentina (Tonni et al., 2003; Toledo, 2011). From paleoecological, chronological and stratigraphical perspectives, the megamamals appearing in Sopas-Dolores show similarities with southern Brazil and the Argentinean Pampas, which exhibit great extensions with biomes of open vegetation (Bombín, 1975). Sopas-Dolores is highly interesting from an archaeological viewpoint because it contains evidence of Pleistocene fauna and potential about the earliest settlers. Overlying this formation, there are Holocene deposits that generally were referred to recent alluvium (Antón, 1975; Bossi, 1966; Bossi & Navarro, 1998). Therefore, this regional sequence must be characterized in detail from a sedimentary and chronological viewpoint. Hence, data presented here becomes an initial attempt to build a chrono-stratigraphy in the area.

Most exposures along the Negro River show both formations. However, at the railway bridge on the river, a section of about 2-3 m thick shows the described brown clay and a gray sandy alluvium deposit. However, overlying the lower level, there is a black clay layer that might be comparable to a "black mat" (Haynes, 1968). In some localities (e.g. Larraechea, Colares) this dark deposit overlies the basalt bedrock[1]. It is worth mentioning that eastern Uruguay, between 10 - 6.6 kya, was characterized by the establishment of wetlands that formed black peats (Iriarte, 2006). Also, in the southern cone this sort of very dark layer was observed in a number of locations, especially in the Lujanense-Platense transition dated at ~12 - 10 kya (Tonni et al., 2003; Toledo, 2005, 2011). The presence of these black levels with high organic content suggests a climatic change to humid conditions (Iriarte, 2006; Toledo, 2011). In southern Brazil and southeastern Uruguay this is suggested by several lines of evidence including pollen (Behling et al., 2002; Iriarte, 2006), diatoms (Moro et al., 2004) and phytoliths (Iriarte, 2006).

Excavations and Chronology

As previously stated, MC and LM are currently being excavated. MC is located on the riverbank at Durazno department (32˚51.90'S, 56˚25.30'W), 400 m south of the mouth of its homonymous creek. This site is continuously yielding artefacts from the sedimentary deposits exposed on the surface in the course of the river's ebb. More than one hundred projectile points; among them four Paleoindian specimens were recovered

[1]A similar situation was recently observed at Lavalleja Department in southern Uruguay.

(**Figures 3(c)-(f)**). During the 1990s, Baeza and associates (2001) carried out an excavation identifying a single Holocene archaeological component. The newly excavated area is located on the highest terrace of the river, about 70 m west of it, and has slightly different stratigraphy. Excavations were carried out by following the natural strata and using artificial 5 cm levels. Every artifact was plotted along its horizontal coordinates, and given a depth measurement below datum. Short profiles were drawn along each grids line.

At MC the upper archaeological component was found at the transition between levels I and II, the second component in the lower portion of level III, and the lower at the top of level IV. The upper component showed scattered lithic artifacts, mainly debitage. The middle one is characterized by the presence of diverse types of end scrapers, among them an unusual bifacially flaked piece and others made on short blades used as blanks, along with microblade cores, early stages of biface manufacture, and stemmed projectile points (Nami, 2007: Figure 3(a)) that may belong to an archaeological component similar to that identified by Baeza and associates (2001). Remains from the lower archaeological level exhibited sharp technological differences from those of the upper ones. A remarkable broken fluted base was found in this level (Nami, 2007: Figure 3(c)). It is made on a red silicified limestone by pressure flaking that left parallel flake scars on one face; on the other face there is a sort of flute obtained from its basal portion. As it will seen below, in the region there are excellent examples of fluted projectile points. The majority of the remains from the top of level IV exhibited strong weathering, differing in this respect from the artifacts from the lower portion of layer III. This level probably is a Late Pleistocene/Early Holocene occupation (Nami, 2007).

LM (32˚48.32'S. Lat. 56˚33.45'W. Long.) is located on the mouth of Los Molles creek in the Negro River at Tacuarembó department. Thought the years, hundreds of flaked stone artifacts from the eroded deposit were recovered along the shore and the river that destroyed part of the site and the riverbanks (**Figures 1(b)**, **(c)**). Among them, more than one hundred projectile points including fishtail pieces (n = 2, **Figures 3(a)**, **(b)**) were found. In the excavated surface, the deposit thickness varies between a few cm to about 1.5 m. Despite that there are finds in layer II, archaeological levels with abundant remains start at ~0.90 - 1.00 m from datum. The more notable one is the one from located at ~1.15/1.20 m at the base of level III and the other in the upper part of level IV at ~1.25/1.30 m from datum. From a technological viewpoint there are notably differences between them. Actually, lithic remains in level III show unifacial tools (end and lateral scrapers) roughly made on white chalcedony available in the site and diverse kinds of denticulates. Instead the lower level displays delicate side scrapers and bifacial reduction strategies manufactured on highly selected cherts. Hence, it is likely that they represent different pre-ceramic hunter-gatherers.

A similar stratigraphy with four levels has been identified at both sites: I, the present vegetal humus surface; II, a gray sandy layer; III, a mottled sandy-loamy to loamy gray mottled deposit; and IV, a hard brown clay overlying basalt bedrock that may be comparable to Dolores-Sopas Formation (**Figures 1(b)**, **(c)**). In the excavated area of MC, the bedrock lies ~0.60 - 0.70 m below the current soil surface while in LM, the deposit is thicker, ranging from ~1 to ≥2 m depth. Level IV also represents the relict of a fully developed soil that suggests a period of non-

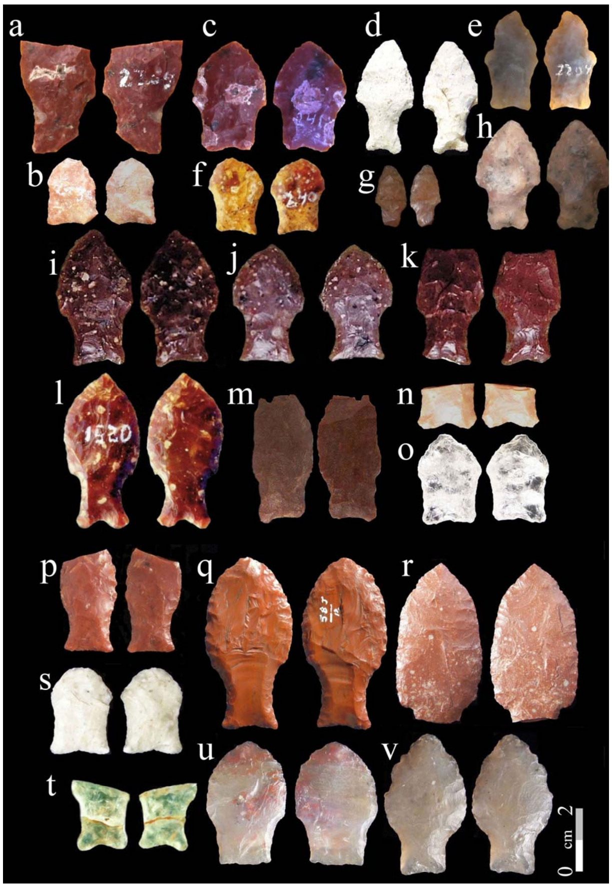

Figure 3.
Fishtail projectile points found in different locales in the middle Negro River. (a), (b) LM, (c)-(f) MC, (g)-(o) AC, (p) EP, (q)-(r) RBL, (s) Los Espinillos, (t)-(v) Colares. (q) Photo by U. Meneghin.

deposition and landscape stability (Holliday, 1985). Level II and III looks like the gray Holocene Platense litho-stratigraphic unit observed in the Argentinean pampas (Ameghino, 1918; Tonni et al., 2003; Toledo, 2011).

The age of the LM deposit was determined by varied methods. Different materials were used to perform radiocarbon dating. Level II under the present vegetal humus yielded two small samples of charcoal from H3 and I3 squares. They were submitted for standard radiocarbon dating at *Gliwice Radiocarbon Laboratory*, *Institute of Physics* (Silesian University of Technology, Poland). Both samples (Gd-30118 and Gd-3020) indicated that the charcoal was “modern”. The measured radiocarbon concentration in percent of modern carbon shows relatively high value (133.97 ± 0.61 and 136.5 ± 1.2) of the so called “bomb effect”. Therefore, using the CALIBomb program (Reimer et al., 2004a, 2004b) both samples may be dated on 1962 A.D. or 1976-1978 A.D. Then, they are useful to know that in the thinnest part of the sedimentary deposit, level II was affected by the incorporation of modern material in the upper archaeological deposit.

Despite the above mentioned samples, a characteristic of MC and LM is that neither contains old bone nor charcoal for radiocarbon essays. Instead, a sample of sediment belonging from the upper part of level IV at 1.10/1.11 m deep was submitted for AMS dating. Its analysis yielded a 4650 ± 30 B.P.

(KI-5081) or 3525 - 3355 CAL B.C. (Reimer et al., 2004a, 2004b). It also was calibrated using the CalPal-2007$_{HULU}$ (Weninger et al., 2010; Weninger & Jöris, 2008) program available on the web. The following calibrated dates were obtained: 3442 ± 54 CAL B.C., 5392 ± 54 CAL B.P., and 68% range 5338 - 5446 CAL B.P. Such date was obtained from the humic acid fraction of the sediment, which tends to provide more reliable ages for this kind of material (Pessenda et al., 2001). However, this date yielded the apparent mean residence time (MRT) of the soil (Scharpenseel, 1971; Scharpenseel & Schiffmann, 1977) which is the mixing of the young organic carbon with the oldest from earlier stages of pedogenesis (Stein, 1992). Consequently, the MRT indicates that the deposit was open to organic material deposition during ~5 kya. This date may be considered as a minimum age, because MRT is a significant factor that must be taken into account when dating soil organic matter (Schapenseel, 1971; Scharpenseel & Schiffmann, 1977; Stein, 1992; Wang & Amundson, 1996).

Additionally, sediments were also dated with optically stimulated luminiscence (OSL) method (Feathers, 1997, 2003). For this purpose, one sample was taken in the transition between the lower and upper parts of level III and IV respectively. A 10 cm long and 5 cm diameter cylindrical plastic container was carefully pushed vertically into the sediment. The sample was submitted and processed at the Luminiscence Dating Archaeology (University of Washington). The sample is mixed, having some younger grains and some older grains. At any rate the younger and the older grains give ages of 4.9 ± 0.5 kya and 9.1 ± 0.8 kya respectively (Feathers & Nami, 2012). The latter one confirms that level IV belongs to the terminal Pleistocene/Early Holocene deposit. The age of level III agrees with the AMS results, meaning that the archaeological component from that horizon belongs to the Middle Holocene. On the other side, the archaeological vestiges embedded in the transition of level III-IV and upper part of IV is an early Holocene occupation that used stemmed projectile points in the weaponry (Nami, 2007: Figure 3(a)).

Paleomagnetism was also employed to establish a relative chronology of the stratigraphic sections (Barendrest, 1984). Two vertical paleomagnetic samplings were performed to study the geomagnetic field (GMF) directions in MC and LM. To collect samples, cylindrical containers (2.5 cm long and 2.0 cm diameter) overlapping each other by about 50 percent were carefully pushed into the sections (see Nami, 2012a: Figure 2(b)). Their strike and dip were measured using a Brunton compass and inclinometer; they were consolidated with sodium silicate after removal and numbered from top to bottom. Despite that paleomagnetic analysis is in progress, preliminary observations may be reported. Actually, some samples from MC and LM show normal and intermediate polarity directions far from the present dipolar field, suggesting the presence of the anomalous GMF behaviour observed across the southern cone during the terminal Pleistocene and early, middle and late Holocene (Nami, 2012a, 2012b). In other words, anomalous GMF directions in the sampled sites suggest that they were recorded during the early and middle Holocene (Nami, 2012a, 2012b). Therefore, they reinforce the ages reported above with AMS and OSL dating.

Sites of Paleoindian Interest

In addition to LM and MC that yielded fishtail points (**Figures 3(a)-(f)**) in the area there are a number of localities (e.g. Colares, Riachos de Corrrea, El Tala, among others) where Paleoindian artifacs were found (**Figures 3(t)-(v)**, **4(j)**). After evaluation, the following are those sites considered the most significant because they recently yielded new data on the topic.

Arroyo Cacique (AC, Tacuarembó Department), is currently submerged beneath the Rincón del Bonete Lake. When the water level falls, however, a small island about 200 by 800 m with archaeological remains emerges. When these episodes happen, it is visited by collectors and relic hunters. Among many remains, AC yielded diverse terminal Paleoindian finds that were partially reported (Nami, 2007: Figure 4; 2009; Nami & Castro, 2010). This site produced a significant number of fishtail projectile points. The totality of the studied sample (n = 10) is depicted in **Figures 3(g)-(o)**, 9h and the following sections. The broken and extremely resharpened points suggest that they were probably brought to the site on foreshafts, and that repair of weapons was one of the activities performed there (Nami, 2009). An interesting find in AC is a stemmed point with a straight blade and stem borders (Nami, 2012c: Figure 22e) that resembles the El Inga variant observed in Ecuador (Mayer-Oakes, 1986a, 1986b). Surprisingly, fishtail contexts from the southern cone also enclose other forms of lithic heads resembling El Inga points (Nami, 2012d). As seen above, this site yielded a number of unifacial tools (n = 5) that by virtue of strong typological and technological features are attributed to the Paleoindian tool kit (Nami, 2007). Bones remains are rare in the archaeological sites from the middle Negro River; however, some dental pieces of a camelid (probably *Lama guanicoe*) were found at AC.

El Puente (EP, Durazno Department) is located on the riverbanks of the Negro River at about 100 m east from the Route 5 bridge where there is a small portion of described latest Pleistocene/Holocene deposit. Currently, buried artifacts were observed in a small area, probably the relict of a larger site situated in the ancient banks of the river that, as illustrated was different than today (**Figures 2(c)-(d)**). Like LM, it is affected by the river's fluctuations and archaeological remains are continuously eroded. There, lithic debitage and stone tools were exposed; among them, a clear fishtail projectile point (**Figure 3(p)**). No significant archaeological deposit was identified for excavation.

Los Espinillos (LE, Tacuarembó department) located on the riverbank of the Negro River at about 20 km Paso de los Toros city. This site provided artifacts probably belonging to the eroded alluvial deposit. Lithic debitage and a few shaped implements were found, among them a highly resharpened fishtail point and a non-used biface (**Figures 3(s)** and **4(p)**), probably an early stage of the manufacturing sequence of this sort of projectile point (Nami, 1997a, 2003, 2010a).

Jorge O. Femenías (JOF, Tacuarembó department) is located on the riberbanks of the Cañada del Estado creek near San Gregorio de Polanco village. There, a Paleoindian lithic assemblage consisting in three fishtail specimens (**Figures 5(a)-(c)**), unifacial tools (n = 3, **Figures 5(d)-(f)**), and remains of extinct fauna were found, among them *Glyptodon sp*., ground sloths and other Pleistocene animals. As seen in **Figure 5(g)**, remarkably is a bone with scratches that preliminary might be comparable with cut marks (Lupo, 1994; Todd et al., 1997; among others). As a part of the Paleoindian archaeological research performed in Uruguay (Nami & Florines, 2012), this is a highly promising site concerning Paleoindian occupations in stratigraphy, and

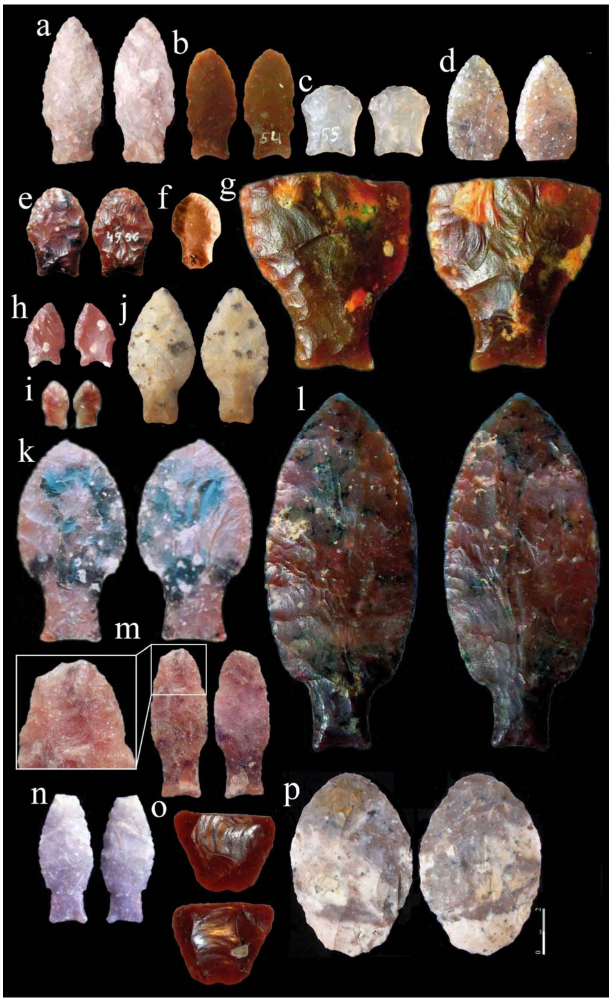

Figure 4.
Fell points and early stages of manufacture from the middle Negro River and other Uruguayan locales. (a)-(c) Carpintería creek, (d) unknown origin, (e) Laguna Blanca, (f) Paso Talavera (Photo E. Meneghin), (g) Vejigas Creek, (h) Cacique Grande creek, (i) San Gregorio de Polanco beach, (j) El Tala, (k) Tres Arboles creek, (l) Unknown origin, (m) Durazno (close-up of the impact fracture in the rectangle, Photo J. Femenías), (n) Arenera Ferrando (Colonia), (o) Yi river (Photo U. Meneghin), (p) Los Espinillos.

is currently in the process of field research by archaeologists Florines, Toscano and the author.

Investigations on Stone Tool Technology

The area under study shows an abundant and remarkable lithic record of flaked and ground stone remains traditionally classified in terms of intuitive morphological typologies. Despite the important quantity and quality of stone tools existing in the region is the notable lack of in-depth studies from a contemporary viewpoint; hence, this kind of artifacts deserves analysis from new methodological perspectives developed during the last decades. These tools were left by the different hunter-gatherers living in the area during the last 11 kya. An important number of artifacts may be used to discuss some issues of archeological relevance from the technological and functional viewpoints. Consequently, in order to deepen our

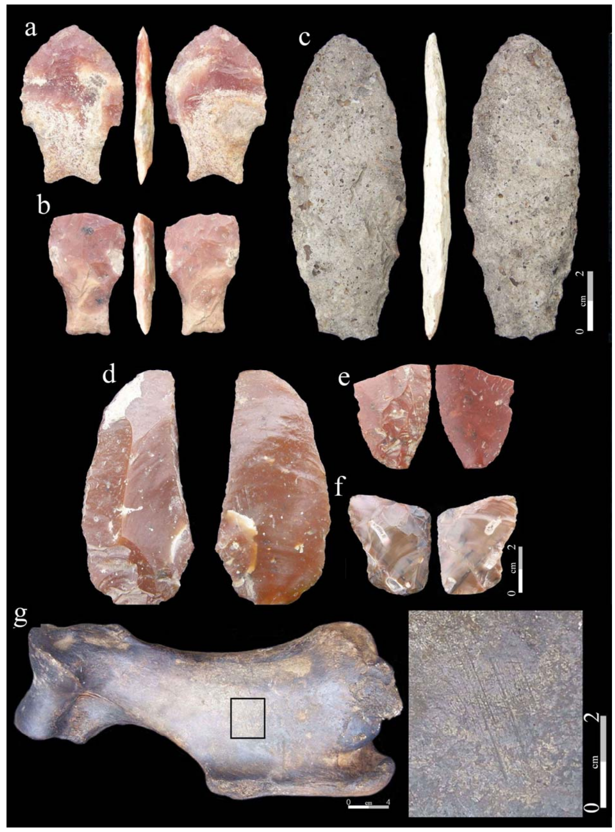

Figure 5.
Paleoindian lithic remains and extinct fauna bones from JOF site. (a)-(b) Fishtail points, (c) possible fisthail preform, (d)-(f) unifacial tools, (g) extinct fauna bone showing the detail of the probably cut mark in the rectangle.

understanding of these topics, detailed observations on remarkable terminal Pleistocene and Holocene artifacts performed are given as follows.

Paleoindian Remains

1) *Fishtail points*. In Central and South America, the most conspicuous Paleoindian find is the "fishtail points (Bird, 1969; Bird & Cooke, 1979; Mayer-Oakes, 1963, 1986a, 1986b; Ranere & Cooke, 1995; Nami, 2010a, 2012c, 2012d). Traditionally the "stereotype" (sensu Mayer-Oakes, 1986b: Figure 2) of a fishtail point is a shouldered stem piece with broad traingular or lanceolate blade of convex edges; the stem usually shows concave edges and base (e.g. **Figures 3(d)-(e)**, **(i)-(j)**, **(q)**, **4(k)-(l)**). However, the advancement of research reveals that, as showed in **Figures 3-5**, they were accompanied by a significant dimensional and morphological variability, involving both "classic" specimens and other forms (Nami, 2012c, 2012d).

Terminal Pleistocene archaeological remains are abundant in Uruguay, among them unequivocal Fell points that are wide-spread in comparison to other parts of South America. They were encountered since the end of the XIX century (Figueira, 1892) and currently, more than 120 specimens were recorded and photographed by Jorge Femenías. Additionally, new specimens were found and identified by the author in the last years (e.g. **Figures 3(b)**, **(d)**, **(g)-(h)**, **(m)-(p)**, **(r)-(s)**, **4(a)**,

(d), **(h)**, **(i)**, **(k)**, **(n)**, **9(i)-(j)**). In the Southern Cone of South America, they were systematically dated at ca. 11 - 10 kya (Nami, 2007; Steele & Politis, 2009). This diagnostic artefact has been recovered on surface sites all across Uruguay, but the main concentration is in its central part, especially in the Negro River basin. Their study has allowed advancing in the knowledge of its morphological variability, technology and function (Nami, 2009, 2010a, 2011a; Nami & Castro, 2010, 2012). Paleoindian specimens have been found by collectors along the deposits eroded by the river and RBL, but in many cases their precise location was not registered so their interpretation must be used with caution. Despite of recovery by non-professionals, this sort of data may be used to gather valuable technological information from several viewpoints (Femenías et al., 2011). These kinds of finds are useful to discuss technological and functional topics; some of them allow knowing the original Fell point form. Actually, entire pieces with little or no resharpening allow knowing their range of variation and original morphology which is very rare in Central and South America (Nami, 2010a: Lam. I-II; 2012c: Figures 19, 20). Actually, most fishthail points across South America are resharpened pieces (Nami, 1998; 2000; 2012d). In this sense, a remarkable piece (**Figure 4(k)**) was found in an unknown place at the Tres Arboles creek basin and sold in early 2007 to its current possessor, Mr. S. Bálsamo. Due to its exceptional condition it was carefully studied from a technological perspective. In this way, it was observed that before the final pressure shaping that left short retouches was made, it was nicely thinned by soft percussion flaking until an advance stage preform with a non-patterned flake removal sequence (Callahan, 2010). In South America these sorts of pieces with broad blade were found at El Inga (Bell, 1965: Figures 10(d)-(e), 11(l)-(m); Nami, 2012d: Figures 16(b)), 17(b)), La Crucesita (Schobinger, 1971), Fell's cave (Bird & Cooke, 1979: Figure 12H; Emperaire et al., 1963: Figure 21, 3-4, Pl. VI: 1, 3), among others. The fishtail original morphology is also visible in other specimens found in the RBL area. One of them is a remarkable specimen made on a very fine reddish chert (**Figure 3(q)**). It shows details of the final shaping by short pressure retouches after a careful bifacial flaking by soft percussion. Morphologically, they are similar to several specimens found in Uruguayan locales, such as Boicuá creek (Cordero, 1960: Figure 45), middle Negro River (Bosch et al., 1980: #1; Nami, 2010a: Lam. II: g, l). Another piece from the same area that apparently does not show resharpening is illustrated in **Figure 3(r)**. Made on a very fine red chert, it is a broken lanceolate blade lacking the stem and shows that it was bifacially thinned by soft percussion flaking previous to the final shaping by pressure. A number of pieces with lanceolate narrow blades came from EP, AC, Carpintería creek, Durazno department, Arenera Ferrando in Colonia and JOF (**Figures 3(m)**, **(p)**, **4(b)**, **(m)-(n)**, **5(c)**). They display a remarkably similarity with those found at Fell's cave, Cueva del Medio and Tagua Tagua, Chile (Bird, 1969: Figure 5(d), (o)-(p); Nami, 1985-1986: Figure 6; 1987: Figure 16(a); Nuñez et al., 1994: Figure 5(b)); Estancia La Suiza 1, San Luis (Laguens et al., 2007); Los Cobres, Salta (Patané Aráoz & Nami, 2012) in Argentina; Montenegro, south Brazil (da Silva Lopes & Nami, 2011); Pikimachay cave (Mac Neish et al., 1980: Figures 2, 3 upper row right), PV23-130 site (Briceño Rosario, 1999: Figure 17, 21-22), Je996L9 site (Maggard and Dillehay, 2011: Figure 4.5 left) in Perú; Ilaló region, Ecuador (Bell, 1965: Figures 10(a)-(c); Nami, 2012d: Figure 19b), among others. Finally, during the last few years it was possible to confirm that aside from convex forms, variation in Fell blade borders also enclose straight forms (Figures 3(k), 9(h); Nami, 2012c: Figure 24(i)). In this sense, remarkably is a small exemplar from AC with a well-made fishtailed stem, but with straight borders blade (**Figure 9(h)**).

Research advances on pisciforms from Uruguay allowed identifying exceptional pieces. Until recently, the largest known complete points with no or little resharpening barely exceeded 6 - 8 cm long (Nami, 2011a). Recent explorations at Arroyo Vejigas, a tributary of the Santa Lucía River in south Uruguay, allowed finding an exceptional broken fishtail point suggesting the original length may have been 13 - 15 cm (**Figure 4(g)**). Another specimen that it is also among the largest Fell points known from South America is complete without indications of resharpening is illustrated in **Figure 4(l)**. Both pieces have rounded shoulders, a morphological variant among fishtail specimens. They exhibit symmetrical and longitudinal biconvex cross-sections and bifacial flake scars produced by soft percussion flaking up to a very advanced perform stage to thin the blank, a strategy often used in the production of large fishtails (Nami, 2010a: Figures 3(q), 4(g), (j)-(l), 5(a)). The process was finished using short retouch no deeper than 1 cm from the edges that regularized the preform. This manner of obtaining the final form by using short retouches on thin flakes or biface performs might be considered a Fell stylistic feature (Bird & Cooke, 1979; Nami, 1997a, 2003, 2010a). Both edges of the stem show strong abrasion, a common attribute of pisciform heads. Another outstanding piece is the fishtail miniature recently recovered south of San Gregorio de Polanco beach (**Figure 4(i)**), which was studied before it was sold to a collector. It is made on a very thin flake with very small retouch (~1 - 2 mm) that regularize the form. Similar exemplars that match with mini Fells were recently identified and found in the AC area. One of them was found in the AC site (**Figure 3(g)**) while another one belongs to Cacique Grande creek site located at about 2 km from AC site (**Figure 4(h)**). Both are also tiny points made with short pressure retouch on very thin flakes, probably the waste of bifacial flaking. Miniatures were probably used as toys (Dawe, 1997; Politis, 1998) and, like other ones from South America, several of them show abrasion around their perimeter, likely to avoid injuries in the children (Nami, 2007). Then, based on specimens previously described, **Figures 4(i)**, **(g)** and **(l)** depict one of the smallest and largest Fell specimens known in the continent. Worth mentioning are other small sized fishtail points that may have other functions than children toys are exhibited in **Figures 9(h)**, **(i)**.

As expected, the original form observed in **Figures 3(q)**-**(r)** and **4(k)**-**(l)** varies very much due to resharpening (Goodyear, 1974; Callahan, 1981: Figures 17, 18; Bradley & Stanford, 1987). As previously reported, it was a recurrent behavior among early foragers (Nami, 1998, 2000, 2009, 2012c, 2012d). Like many fishtails from Central and South America, pieces found in the region shows diverse degree of this behavior allowing to know their "life story" from the unused finished product to its rejection (e.g. LM, AC, Los Espinillos, **Figure 3(b)**, **(f)**, **(o)**). Resharpening is detectable when the blade form and symmetry is highly modified (**Figures 4(c)** and **(e)**, **(f)**); retouch does not follow the remaining original pattern that finished the product and/or the borders are strongly rounded or do not have enough mass to continue the task (3(b), (f), (o)). Here, according to the lack of mass in the blade that allows continuing the resharpening may be catalogued as: 1) low or minimum, when the blade was a little modified in its symmetry (**Figure 4(j)**); 2) medium, when despite the blade modification there is some mass to continue the tool's useful life (**Figures 3(c)**, **(i)**, **(j)**, **4(e)**, **(f)**); finally, 3) intense, maximum or saturated, when the blade does not have enough mass to bear continued resharpening, this being the reason many pieces were discarded **(Figures 3(b)**, **(f)**, **(o)**, **4(c)**); Nami, 2012d). Like in other sites of South America, beyond the Negro River, resharpened pieces are widespread in Uruguay, such as those near Balneario La Tuna (Canelones department) and Paso Talavera on the Negro River (**Figures 4(e)**, **(f)**). Similar resharpening behavior is visible in other Fell specimens in Central and South America, such as Belize (Lohse et al., 2006: Figure 4(b)), Panama (Bird & Cooke, 1978: Figures 4(a), (b)), Ecuador (Nami, 2012d: Figure 24), Argentina (Nami, 2007: Figure 1(b), (c)), and Chile (Bird & Cooke, 1979: Figure 12(e); Nuñez et al., 1994; Figure 5(a)). As suggested in the previous paragraph, resharpening was an important phenomenon in fishtail point curation. However, its dimensional and morphological variations (mainly the lanceolate variety) are not only a result of this practice such has been suggested by some authors (e.g. Suárez, 2003, 2009). Morphological variability in Fell points may be due to different uses in social and subsistence strategies employed by the foragers who produced them. It is also worth mentioning that fishtailed lithic points are just parts or "tecno-units" (as defined by Oswalt, 1976: 38) of a more complex hafted system. Curation of this kind of implements (e.g. projectile tips, knives and other tools) is a generalized behavior in traditional technologies, particularly among *Homo sapiens* hunter-gatherer societies where lithic tools are parts of a highly valuable hafted implement (Keeley, 1982). Hence, resharpening is not only caused by the risk and uncertainty of not finding raw materials in unexplored and unknown territories (e. g. Franco, 2002; Castiñeira et al., 2011). This strategy may be caused by multiple social and cultural variables that involve saving time and energy in obtaining raw materials, investing work in manufacture and preservation of valuable goods, among others.

The majority of pisciform finds in the region were discarded by diverse causes. In addition to extremely resharpened pieces, many displays fractures occurred by use, mainly by impact. Despite the fact that from the functional perspective fishtail points are versatile artifacts that might have been employed in different ways, this fact indicates that several of them were used as projectile tips. Actually, the impact fractures are notorious (Raup, 1976; Newcomer, 1980; Bergman & Newcomer, 1983; Frison, 1989; Dockall, 1997; Dumbar, 2012; among others). By this manner, some exhibit deep flake scars originated in the tip, such as visible specimens depicted in **Figure 4(m)**; sometimes, they have fractures in *coup de burin* in the blade and the edges, respectively originated in the tip and base; caused by the action of bipolar forces during the collision (Newcomer, 1980; Witthoftt, 1968; Lavallée et al., 1985: Pl. 13-14). These sorts of fractures are observable in the specimens found at MC and AC (**Figures 3(e)**, **(m)**). As experimentally observed in fishtailed pieces and, displayed in **Figures 3(a)**, **(k)**, **(n)**, and **(p)**, transversal fractures in different blade and stems locations are also provoked by impact (Dumbar, 2012: Figure 8.7).

Considerable efforts have been made to understand the fishtail manufacturing process from archaeological and experimental perspectives (Nami, 1997a, 2001a, 2003, 2010a, 2010b, 2011b). Like many other South American Fell points, a number of analyzed specimens were manufactured on thin flakes used as blanks (i.e. **Figures 3(p)**, **4(b)**, **(d)**). Some specimens seem to be flaked entirely by pressure flaking (e.g. **Figures 4(b)**, **(d)**, **(h)**); others, were mostly flaked on one face by percussion and with short pressure retouches on the other one (Bosch et al., 1980: #17); while, others were partially thinned by careful bifacial soft percussion flaking (**Figures 3(q)-(r)**, **4(k)**) or, such as the larger ones, using bifacial reduction stages of manufacture before the final shaping (**Figures 3(q)**, **(r)**, **4(g)**, **l**, **5(a)**). These observations are supported by early stages of biface manufacture finds in Paleoindian contexts in Uruguay (Nami, 2001a). Bifaces that show the fishtail point reduction sequence are rare in South America (Briceño Rosario, 1999; Nami, 1998, 2001a, 2012d). However, in Uruguay there is important data allowing to understand different steps of this process. South of the country, in Maldonado department, Cerro los Burros locality provided clues on early stages of biface reduction, preforms and fishtail points (Meneghin, 1977; Nami, 2001b). Also, Paso del Puerto site in the Negro River basin (Taddei, 1980) have yielded data on this topic (Nami, 2001a). Despite that in the area under study there are very many early stage bifaces showing bifacial reduction strategies employed during the Holocene, some biface finds along with fisthtail points might probably be early stages of their manufacture. This is the case of a non-used stage 4 (in the sense of Callahan, 1979) biface found at Los Espinillos site (Figure 4(p); Nami & Castro, 2012). Nearby the Negro River, recent finds on the Yi River, allowed to recognize a fluted perform that fit in the Fell reduction sequence as identified by archaeological and experimental data (Nami, 1997a, 2001b, 2003, 2010a, 2011a, 2012d; among others). As depicted in **Figure 4(o)**, it was made on a very fine red chert that exhibits a bevelled platform prepared for fluting after being bifacially thinned by soft percussion flaking. Further, preforms showing variation of platform preparation for fluting were found at Paso del Puerto and Cerro los Burros (Nami, 2001a: Figures 1(c)-(e), 2001b: Figure 6(a)). In this case, it was performed by bevelling the basal edge, or by isolating a nipple in the middle of the bevel (Nami, 2001a: Figure 1(c)). Remarkably, fluting preparation has a strong similarity with other fisthail preforms from South America, mainly from Ecuador (Nami, 2003, 2012d: Figures 12-15), and also, with other Paleoindian fluted points from North America (Callahan, 1979; Frison & Bradley, 1980; Nami et al., 1996; Nami, 1999).

A few finished products display excellent examples of true fluting. Actually, a number of Uruguayan specimens show flutes nicely obtained on both faces of the stem (**Figure 3(q)**). The above mentioned piece from RBL has two long flutes reaching almost the middle of the artifact. Another piece fluted on both faces is the highly resharpened specimen found by Taddei on the Negro River at Paso Talavera (**Figure 4(f)**; Bosch et al., 1980: #17). In this case the longest flute was invaded by the retouch resulting from reshaperning. Despite that is a rare phenomenon, there is a fluted point that does not fit within fishtail morphology. It is an exceptional stemmed shouldered point with straight stem and blade edges belonging from RBL (**Figure 9(g)**). It might probably be considered as a medium resharpened Fell point and/or one of its variations, a fact that was also observed in other South American regions (Nami 2012c, 2012d). Out of Uruguay, among other examples of fluting in fishtail points were observed in Belize (Lohse et al., 2006: Figures 3(a), (d); Pearson & Bostrom, 1998; Nami, 2010a: Lam. I a); Ecuador, at El Inga (Bell, 1965: Figures

10(d)-(e), (h), 11(b), (e)-(h), j; Mayer-Oakes, 1986a: Figures 37, 38, 41, 43; Nami, 2010a: Lam. I h-i; 2012d: Figures 16, 18, 25); Perú, PV-23-130 site (Briceño Rosario, 1999: Figure 17, lower row right); central Brazil (Nami, 2010a: Lam. I k; 2011: Figure 1(c)); Argentina, at Cerro El Sombrero (Flegenheimer & Zarate, 1990; Nami, 2010a: Lam. II ll); Colipilli (Nami, 1992a, 1997a: Figure 6(C)); Piedra Museo rockshelter (Nami, 1997: Figure 6(A)); and Chile, at Fell's cave (Emperaire et al., 1963: Figure 21: 1-2, Pl. VI: 2, 4) and Quebrada Santa Julia (Jackson et al., 2007: Figure 5).

Finally, Paleoindians used diverse rocks for manufacturing Fell points, mainly sandstone, quartzite, rhyolite, quartz, and flint-like materials. Particularly, colorful cherts, especially reddish stones, suggest that they were highly selective with colours for making their lithic assemblage (Flegenheimer & Bayón, 1999). In fact, a high number (n = 23, 54.76%) of the fishtail sample (n = 42) reported here are made with rocks of reddish tones (**Figures 3(a)-(c)**, **(g)-(l)**, **(n)**, **(p)-(q)**, **4(a)**, **(b)**, **(e)**, **(k)-(m)**, **5(a)**, **(b)**). A similar fact that occurred with the unifacial tools depicted in **Table 2** and **Figures 5(d)-(e)** and **6(a)-(d)**. Despite its varied degrees of workability, Paleo-South Americans also used crystal quartz for making Fell points (**Figures 3(o)**, **(t)**). Beyond flaking qualities, early hunter-gatherers were probably visually attracted by the tones and translucently of certain stones of their landscape. **Table 1** depicts salient information concerning origin, raw materials, condition and significant technological and dimensional data of the fishtail points reported in this paper.

2) *Unifacial stone tools.* In the Southern Cone, lithic assemblages accompanying fishtail points were produced using bifacial, unifacial, bipolar, and prepared-core techniques, a fact probably related with raw-material availability and technological organization (Andrefsky, 1994). While the assemblages from sites located far from high-quality sources are characterized by bipolar flaking and small stone tools, those from sites in areas where raw materials were available such as those from Patagonia have large unifacial tools (Nami, 2007). This fact occurred at Piedra Museo, Cueva del Medio and Fell's cave (**Figures 6(k)-(l)**; Bird, 1946, 1988; Nami, 1987a, 1994, 2012a; Miotti & Cattáneo, 1997). By virtue of striking technological and typological similarities, several pieces found at fishtail sites in the Negro River might also be considered part of the Paleoindian lithic assemblage. Remarkable unifacial implements (knives and side-scrapers) have been found at AC, JOF and Vejigas-Pilatos creeks in the Canelones department (**Figures 6(g)-(j)** Meneghin & Sánchez, 2009, pers. obs., 2009). Like many fishtail points, they are also manufactured on highly selected red chert, a stone commonly used by early hunter-atherers in this part of the continent. Flake-blanks of these tools show careful platform preparation with diffuse bulbs and lips (e.g. **Figure 5(d)**, **6(a)-(d)**, **(f)-(l)**), suggesting the use of some kind of strategy for preparing cores and detaching flakes using a variation of soft percussion flaking (Nami, 2006). Depictions of some of these tools are illustrated in **Figure 6**. Also **Table 2** describes relevant attributes concerning origin, raw materials and dimension of each artifact showed in this paper.

3) *Discoidal stones.* This is another diagnostic Paleo-South American artifact. They were firstly found at Pali Aike, Fell and Los Toldos caves in southern Patagonia (Bird, 1938: Figure 27, 28; 1946, 1970). Specifically in Uruguay, the area under research contributes with additional data regarding the artefactual similarities shared by Late Pleistocene foragers living in the southern cone of South America. During the last decades, discoidal stones were found in a number of sites in Argentina and Chile. Artifacts clearly matching these kinds of remains are found in the RBL area and other localities of Uruguay. They have strong morphological and technical similarities with those specimens reported from Pali Aike, Fell and Los Toldos caves

Table 1.
Salient morphological and technological attributes of the Fell points reported in this paper. Note: All the measurements are given in mm, *: Not given, /: Separates the maximum thickness present in a minor portion of the piece and the minimum that prevail in the totality of the artifact, S/L: Site/Locality, L: Lengh, W: Width, T: Thickness, (): indicates fractured piece, †: Not observable, ††: Not measurable. The blank was only reported when was clearly observed. Measurements of pieces 18, 28 and 29 were taken from Bosch et al. (1980).

Count	S/L	Origin	Condition	Raw Material	L	W	T	Stem lenght	Stem width	Resharpening	Blank	Figure
1	LM	Known	Fractured	Red Chert	40.9	27.7	9.6	22.0	16.8	—	Flake	3a
2	"	"	Entire	"	24.5	18.6	7.6	16.8	18.7	Maximum	†	3b
3	MC	"	"	"	39.9	27.3	7.2	16.0	19.9	Medium	†	3c
4	"	"	"	Altered chert	43.3	21.8	7.6	18.7	13.3	—	†	3d
5	"	"	Fractured	Gray chert	(36.2)	20.0	7.7	(18.0)	—	—	†	3e
6	"	"	Entire	Yellow chert	26.7	19.3	4.8	15.0	14.3	Maximum	†	3f
7	AC	"	"	Pale red chert	23.4	11.9	2.6	7.6	7.1	—	Flake	3g
8	"	"	"	"	40.1	23.8	6.0/7.5	15.2	(15.7)	—	Flake	3h
9	"	"	"	Red chert	50.3	28.0	6.7	19.4	19.2	Medium?	†	3i
10	"	"	"	"	43.9	26.8	6.6	19.8	19.9	Medium	Biface	3j
11	"	"	Fractured	"	(43.8)	23.8	7.2	19.2	(17.4)	—	†	3k
12	"	"	Entire	"	56.2	28.4	5.7/6.5	20.2	20.2	Low	Flake	3l

Continued

13	"	"	Fractured	Brown sandstone	(42.1)	(19.0)	8.6	††	††	—	†	3m
14	"	"	"	Red Chert	(17.0)	21.9	6.2	††	21.9	—	†	3n
15	"	"	Entire	Cristal quartz	27.5	18.8	7.8	14.2	13.9	Maximum	†	3o
16	"	"	Fractured	Brown chert	(42.3)	17.4	6.2	13.8	11.0	—	†	9h
17	El Puente	"	"	Chert	(35.8)	19.9	5.6	14.9	16.9	—	†	3p
18	RBL	Unknown	Entire	Pale red chert	62	31	6	*	*	None	Biface	3q
19	"	"	Fractured	Red Chert	(57.3)	31.3	5.4	††	††	—	Biface	3r
20	Los Espinillos	Known	Entire	Pale brown chert	30.5	20.9	7.2	20.3	19.8	Maximum	†	3s
21	Colares	"	Fractured	Crystal quartz	(22.1)	(19.1)	6.6	19.2	17.2	—	†	3t
22	"	"	Entire	Gray chert	44.4	28.7	5.1	16.1	18.6	None	Thin flake	3u
23	"	"	"	White chert	51.0	29.8	7.2/8.1	15.3	16.5	Low	Biface	3v
24	Arroyo Carpintería	Unknown	"	Pink chert	58.1	24.4	8.7	16.2	16.7	—	†	4a
25	"	"	"	Red Chert	47.5	21.6	6.1	17.6	16.0	None	Thin flake	4b
26	"	"	"	Traslucent white chalcedony	30.1	26.4	6.5	21.6	21.2	Maximum	†	4c
27	Unknown	"	Fractured	Reddish brown chert	(45.6)	26.4	5.2	††	††	None	Thin flake	4d
28	Laguna Blanca	*	Entire	Reddish chert	40	28	4.5	*	*	Medium	†	4e
29	Paso Talavera	*	"	Pale brown chert	32	22	5	*	*	Maximum	†	4f
30	Arroyo Vejigas	Known	Fractured	Brown chert	(76.1)	66.3	9.6/10.6	26.4	30.4	—	†	4g
31	AC2	"	Entire	Red chert	26.8	17.6	4.5	11.4	14.0	—	Thin flake	4h
32	San Gregorio de Polanco beach	Unknown	"	Reddish chert	19.8	13.2	4.5	6.8	8.5	—	Thin flake	4i
33	Boca del Tala	Known	Fractured	Chert	59.0	29.4	8.3/9.5	15.8	15.2	Low	Biface	4j
34	Tres Arboles	Unknown	Entire	Red and black chert	65.3	36.3	8.2	21.0	20.6	—	Biface on flake	4k
35	Negro River?	"	"	Red chert	138	58	8	25	21	—	Biface	4l
36	Durazno	"	"	Reddish chert	60	23	6	20r	16	—	†	4m
37	Arenera Ferrando	Known	"	Pale red chert	55	23	5.5	13.5	14.0	None	†	4n
38	JOF	"	"	Reddish chert	57.6	37.3	6.6/7.2	22.6	20.4	Medium?	Biface	5a
39	"	"	Fractured	Red chert	(43.1)	27.1	8.2	20.0	—	—	†	5b
40	"	"	"	Gray chert	(104.9)	39.3	8.7/9.2	—	—	—	Biface	5c
41	Palmar de Porrúa	Unknown	Entire	Yellow chert	33.7	18.1	7.4	15.0	11.9	—	†	9i
42	"	"	"	"	39.6	20.6	6.4	13.6	14.0	—	†	9j

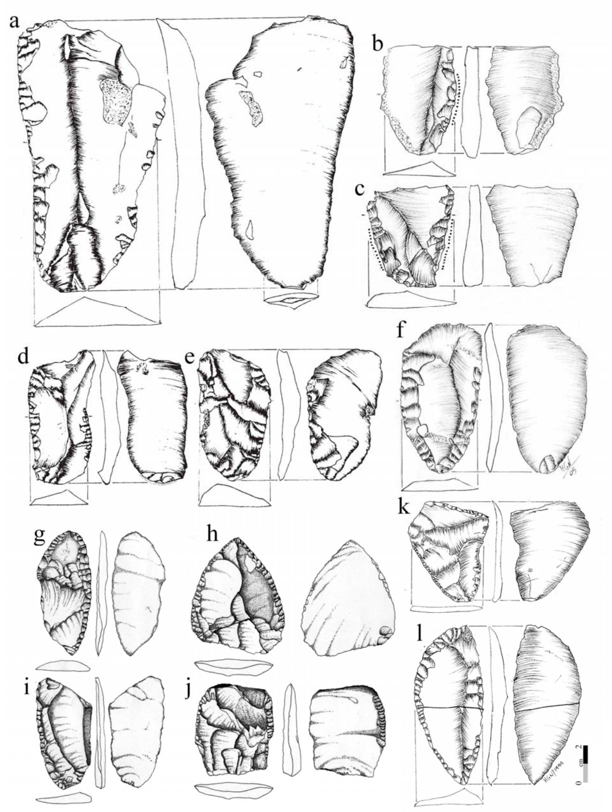

Figure 6.
Samples of unifacial tools found in sites with fishtail projectile points in the southern cone. (a)-(f) AC site in the Negro River basin, (g)-(j) Arroyo Vejigas in the Santa Lucia River basin (slightly modified after Meneghin and Sánchez 2009: Plates VII and IX, k-l) Fell's cave (Chile).

as well as the Dos Amigos open air site in Patagonia and Cerro El Sombrero in the Argentinean Pampas (Bird, 1970; Flegenheimer & Zárate, 1990; Miotti, 2010; Miotti et al., 2010). Notorious pieces were found across Uruguay (Meneghin, 2011) which are illustrated in **Figures 7(d)-(g)**. They were found at Cerro Los Burros archaeological locality (Meneghin, 2000: Fig. VI-VII: 2011: Lams. III-IV), Lopeteguy I and II (Tacuarembó River), Talavera Island (Negro River), La Palomita (Yi River) and Los Ciervos (Santa Lucía River). The latter one was found embedded in a stratigraphic level dated at 10.140 ± 50 year BP (Beta-301006, López Romanelli 2012: 7). The finds from the Negro River are depicted in **Figure 7** and **Table 2**. They belong to RBL and one of them exhibits pecking around its perimeter and some flake-scars that originated from the edge of one face (**Figure 7(a)**); they were probably caused by the pecking process during manufacture. Similar attributes are observed in the discoidal from Cerro El Sombrero that shows a small concavity of ~19 mm wide in the center of the flat surfaces (Flengeheimer & Zárate, 1990: **Figure 1**). The discoidal from Los Ciervos also shows some pecking in the center of the flat surfaces. Flake-scars are also present on some pieces across the southern cone, such is the case in the Lopeteguy I specimen and the one from Los Toldos. It is worth mentioning that the flakes observed in the latter were detached after the final shaping (Bird, 1970: Figure 1(a)). A second specimen from the Negro River basin, illustrated in **Figure 7(b)**, was carefully pecked in its

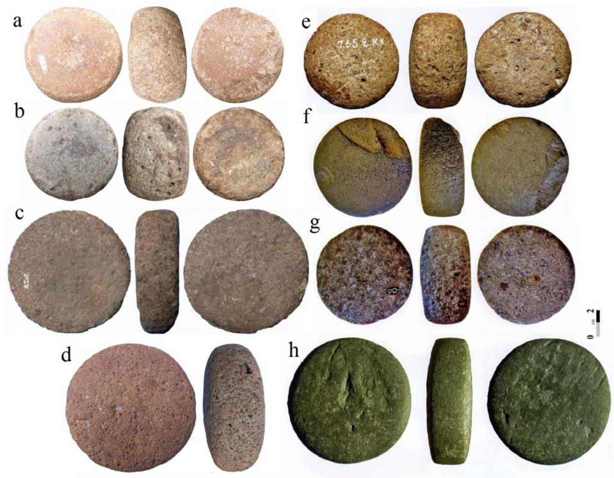

Figure 7.
Discoidal stones from Uruguay. (a)-(b) RBL, (c) unknown origin, (d) La Palomita, (f) Lopeteguy I, (g) Lopeteguy II, (h) Los Ciervos, (a)-(c): Same scale. (c), (e)-(h) photo U. Meneghin.

perimeter and both faces. Near the study area, a number of Paleoindian vestiges were found in the La Palomita site in Yi River basin: one of them is another discoidal stone (**Figure 7(d)**) which was found along with a Fell point. Remarkably, this piece was made with alveolar basalt, the rock employed to produce the discoidal stones from Dos Amigos site and Fell's cave (Bird, 1970; Miotti et al., 2010; pers. obs., 1997, 2009). By courtesy of avocacional archaeologist U. Meneghin, **Figure 7(c)** exhibits another specimen found in an unknown place in Uruguay. Interestingly enough, in early 1970s, a similar specimen made of sandstone (~80 by 25 mm wide and thickness) was found by Mr. Tabaré Flangini on the shores of La Plata River at Playa Verde beach, located at the foot of Cerro los Burros and close to Urupez Paleoindian site (Flangini, 1972; Meneghin pers. com., 2008, 2012).

From the manufacturing perspective, based on available evidence, personal observations and information provided by other scholars on different reduction sequences of pecked, ground and polished artefacts (e.g. Olausson, 1982-1983), it is possible to hypothesize that this sort of discoidal stones might have been made with previous stages of percussion flaking. Furthermore, the flaked surfaces were pecked and finally, grinding was performed on some pieces. Its function is unknown and subject to speculation (Jackson & Méndez, 2007). It is worth noting that these kinds of artifacts are very rare in humankind history. However, in the southeast of the United States; there were discoidal stones of diverse morphology from archaeological and ethno-historical contexts, specifically the biscuit and barrel style that resemble the Paleoindian finds were used as a game artifact "chungke" or "chunkey" (DeBoer, 1993; Anonymous, 2006).

Post-Paleoindian Technology

1) *Prepared Flake Cores.* In South America, artefacts showing evidence of Levallois-like core preparation and its variations have been reported in several localities across the southern cone (Nami, 1992b, 1997b; Morelo, 2005; among others), very near Uruguay, in Misiones province, NE Argentina (Nami, 1995). Interestly, in the middle Negro River there are also these

Table 2.
Salient morphological and technological attributes of the Holocene lithic artifacts from the middle Negro river area reported in this paper. Note: All the measurements are given in mm, L: Length, W: Width, T: Thickness, (): indicates fractured piece.

		Paleoindian artifacts				
Origin	Artifact	Raw Material	L	W	T	Figure
JOF	Unifacial tool	Red chert	108.3	39.3	9.2	5d
JOF	"	Red chert	48.7	25.8	5.8	5e
AC	"	"	157.3	83.2	14.8	6a
AC	"	"	(53.2)	25.8	8.9	6b
AC	"	"	(46.3)	39.5	8.2	6c
AC	"	"	83.1	39.7	10.1	6d
AC		"	73.3	40.5	11.1	6e
MC	"	Weathered chert	88.2	45.1	7.9/6.7	6f
RBL	Discoidal Stone	Sandstone	74.2	71.0	35.7	7a
RBL	"	Basalt	65.5	66.9	42.0	7b
		Holocene artifacts				
Colares	Core	Yellow chert	101.1	91.1	58.4	8a
Hirulegui	"	Gray chert	87.2	85.9	42.5	8b
RBL	"	Yellow/gray chert	60.7	46.4	58.4	8c
RBL	"	Gray chert	103.6	83.9	47.1	8d
MC	Unifacial tool	Red chert	77.7	41.0	10.1	8e
RBL	Unretouched flake	Brown chert	85.0	78.5	21.0	8f
AC3	Unifacial tool	Pale brown chert	71.8	29.9	9.6	8g
Baygorria area	"	Brown chert	68.5	56.0	11.4	8h
AC	"	Silicified sandstone	72.3	35.6	12.1	8i
Arroyo Ramírez	"	Gray chert	84.6	32.3	7.3	8j
LM	Unretouched blade	Red chert	45.4	24.5	7.0	9k
LM	Knife	Redish chert	103.8	78.0	12.4	9a
AC	"	Black chert	122.5	48.7	10.8	9b
MC	"	White quartzite	121.2	56.5	12.3	9c
Riachos de Correa	"	Weathered chert	105.4	67.8	10.0	9d
Arenal Taján	Beveled point	Petrified wood	69.1	33.2	7.7	9e
Arenal Taján	"	Red chert	54.2	28.8	8.0	9f
RB site	Stemmed point	"	50.5	25.3	7.7	9g
Cerro Cardozo	Beveled point	"	62.4	26.5	7.1	9k
AC	Bola Stone	Basalt	63.6	63.3	62.3	10a
Mercedes area	"	Marble	65.7	62.4	62.1	10b
RBL	"	Basalt	58.5	56.7	54.8	10c
Boca del Tala	Bristling stone	"	72.9	70.2	58.7	10d
Arenal Taján	"	"	65.7	57.7	55.7	10e
Tambores area	"	"	98.8	(93.1)	30.3	10f
Hernandorena	"	"	57.0	56.7	49.5	10g
RBL	Lenticular Stone	Granite	74.1	73.8	34.9	10h
RBL	"	Basalt	74.2	73.2	46.7	10i

kinds of prepared cores. They are morphologically similar being plano-convex in longitudinal and transversal sections with striking platforms in the perimeter. Partial or total unifacial and bifacial flake removal is also a common feature. As depicted in **Figure 8** and **Table 2**, prepared core variability encloses those resembling a classic Levallois-like and centripetal, bifacial and unifacial discoidal forms (e. g. van Peer, 1992; Dibble & Bar-Yosef, 1995). Most of them were rejected by diverse causes. **Figure 8(a)** illustrates a turtle back core in early preparation stage that shows raw material flaws (change of texture and alveolus) making further flake detachment impossible. This fact is also visible in the specimen illustrated in **Figure 8(b**), showing very many impurities consisting in inclusions of soft material in the chert. Another rejected core exhibits fissures across its volume (**Figure 8(d)**). The specimen illustrated in **Figure 8(c)** shows the scar of a detached flake after preparation. A clear product obtained from these cores shows the flake scars resulting from the preparation of a plane striking platform which is displayed in **Figure 8(f)**. The ventral face exhibits a pronounced bulb and a large eraillure flake, suggesting the use of hard percussion flaking (**Figure 8(f)**). Tools made with these blanks are diverse kinds of side-scrapers and knives (**Figures 8(e)-(i)**). They show uniform thickness and were very nicely made by a careful flaking that regularized the useful edge.

2) *Blade technology.* At MC tools made on blade-like blanks and cores resulting from their detachment were identified in the middle archaeological level (Nami, 2007). Similar artifacts were also found in other sites of the area and places in Uruguay (Figures 8(j)-(m); Meneghin, 1977). In fact, at the Vejigas-Pilatos creek in the Santa Lucía river basin there are patches with surface archaeological finds alternating Paleoindian contexts with fishtail points and large unifacial tools as well stemmed Holocene projectile points and blade-tools (Figures 8(l)-(m)); Meneghin & Sánchez, 2009: Figure VIII). Preliminary, and from a technical viewpoint by comparison with other blade and micro-blade assemblages from other parts of the southern cone, these artifacts may be obtained using direct percussion flaking (Nami & Bellelli, 1994; Nami, 1996a). Blades were employed as blanks for manufacturing diverse unifacial tools (**Figures 8(j)**, **(l)-(m)**).

3) *Bifacial knives.* Along with the described cores and unifacial tools, hunter-gatherers living in the study area during early and middle Holocene had a highly developed lithic technology. In fact, besides the prepared core techniques, they used careful bifacial thinning strategies for manufacturing stone implements. In the region there are delicate finished products-projectile points, knives and other tools-reduced by excellent bifacial flaking. Notably there are large bifacial knives that, after being thinned by soft percussion flaking, were finished by short pressure retouch. Depictions of this kind of tool are given in **Figure 9** and **Table 2**. A remarkable piece belongs to the eroded deposits of LM site, probably bearing from the archaeological component found in the transition between levels III and IV. It was made on a flake-blank of reddish chert with yellow tones. Close-ups in **Figure 9(a)** show that it was made employing a non-patterned flake removal sequence (Callahan, 2010: Table 1) with flake-scars that reach the centre of both faces. Bifacial thinning flakes recovered in the lower level at LM site show that Early Holocene knappers performed a careful bifacial flaking by isolating platforms and using soft percussors. A similar technique of manufacture is visible in other pieces from the same locale which are illustrated in **Figures 9(b)-(d)**; one of

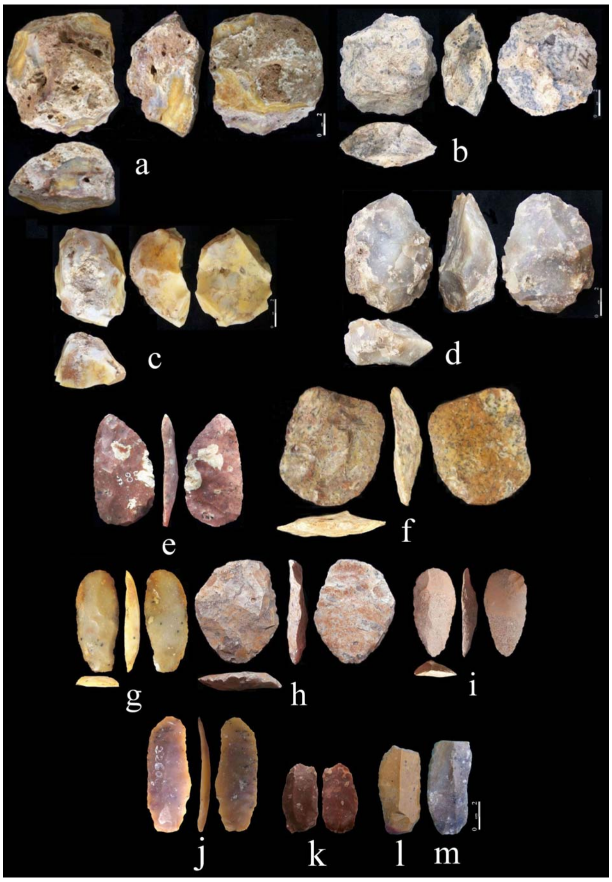

Figure 8.
Examples of core and blade strategies used in some places of Uruguay during the Holocene. (a)-(d) Prepared cores, (e)-(i) flakes and unifacial stone tools made on flake-blanks detached from this sort of cores, (j)-(m) Blades found on different lithic assemblages from Uruguay. (j)-(k) middle Negro River, (l)-(m) Santa Lucía River basin. (e)-(m): Same scale.

them displays a double beveled cross section (**Figure 9(b)**), probably a sub-product of resharpening (Sollberger, 1971; Creel, 1991: 44). Another hypothesis is that in the bifacial knives, bevelling may be intended to obtain an asymmetrical edge with lower values and sharper penetrating angles. Beveled edges were observed on Holocene stemmed projectile points whose morphological variability must be investigated in detail (**Figures 9(e)-(f)**, **(k)**). Despite that beveled points were identified outside Uruguay in Península Mitre (Tierra del Fuego) and Piedra del Aguila (Neuquén) in Argentina (Nami, 1986, 1987b), this kind of edge treatment is a rare feature in South America. Finally, similar bifacial knives belong to other neighbor localities, for example, southern Brazil (Miller, 1987: Figure 11(c); Schmitz, 1987: Figures 16(c), (d)). Interestingly, the beveled knife depicted in **Figure 9(b)** shows that it was bifacially thinned by using edge-to-edge and/or overshot thinning strategy previously identified in Solutrean and Clovis assemblages by Stanford and Bradley (2012).

4) *Ground implements.* The eastern and southern part of the Southern Cone is characterized by the use of a very distinctive hunting weapon called *boleadora* or bola stone. In certain places, it was still in use when the Europeans arrived, and furthermore by the *gauchos* during historical times. The *boleadora*

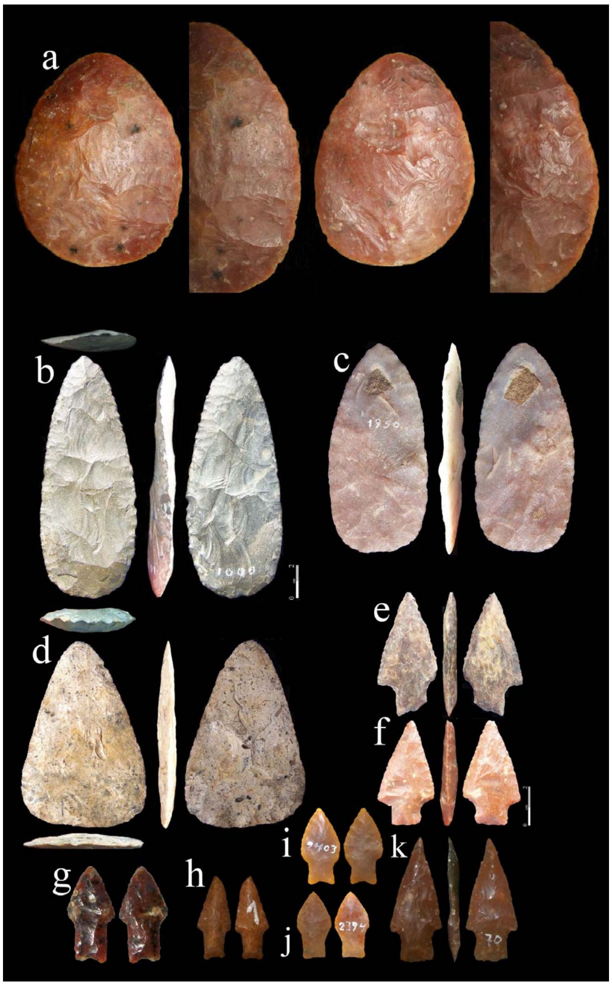

Figure 9.
Bifacial Holocene artifacts from the study area. (a)-(d) Knives, (e)-(j) Remarkable projectile points. (e)-(f) and (k) Beveled, (g)-(h) Stemmed with bodies of straight borders, (i) (j) Small Fell. (a)-(d) and (e)-(i): Same scale.

is a thrown weapon consisting in one to three cords tied to rounded stones in their extremes; although there are a number of shape variations (Métraux, 1949; González, 1953).

Archaeological evidence shows that this artifact was broadly used from southern Brazil and NE Argentina to Tierra del Fuego since the early Holocene to historical times. Bolas stones are widespread through the Uruguayan territory, crossing the northern frontier in south Brazil. In the middle Negro River, lithic assemblages with *boleadoras* were not dated. However, by comparison with dated contexts from NE Argentina and southern Brazil (Rodríguez, 1998; Rodríguez & Cerutti, 1999; Schmitz, 1987, 1990) they were likely used during the middle/late Holocene, when occurred the intensification of pecking and ground techniques[2]. Their presence is a significant technological addition, reflecting changes of hunting strategies in the region. Some specimens are illustrated in **Figures 10(a)-(c)** showing delicacy in manufacture by pecking and grinding applied on soft to hard stones, such as sandstone, basalts and granite (**Figures 10(a)-(c)**) and sometimes on marble (**Figure 10(b)**), a stone with quarries present in this country, mainly in the south at Maldonado department. Further, if this rock came from Europe, it implies that bolas belong to the post European conquest, probably during the XVII to XIX centuries. Among the *bolas* stones there is a special variation mostly consisting of round objects with a varied number of protrusions in their perimeter, and for this reason they were commonly called *rompecabezas* (Cordero, 1960) or *bolas erizadas* (bristling balls, [Baeza et al., 1980]). Like the round *bolas* many also display a channel called "waist" around their perimeter which was used to bind the *bola* in the cord (**Figures 10(a)-(c)**, **(e)**). Some of them show the striae left by the abrasive process used in this procedure (**Figure 10(d)**) while others exhibit polishing (**Figure 10(f)**). This sort of artifact is widespread from Salto Grande, in the Uruguay River to the west (Cordero, 1960: Figure 30), to the Atlantic coast in the east (Baeza et al., 1980). Crossing the northern border there are bristling pieces in the state of Rio Grande do Sul in southern Brazil (Schmitz et al., 1971) reaching the Maldonado department in southern Uruguay (Cordero, 1960: Figure 34). An interesting functional topic arises from these artifacts concerning their use just as a hunting weapon or some kind of prestigious object that played some social role among their owners. Likely, by the invested work in the manufacture and their rarity in the archaeological record, their function was related with the second alternative.

Lenticular stones are another remarkable ground implement which are widespread in the area (**Figures 10(h)-(i)**). These

Figure 10.
Examples of pecking and ground Holocene artifacts. (a)-(c) *Bola* stones, (d)-(g) Bristling stones, (h)-(i) Lenticular stones. (a)-(c) and (h)-(i): Same scale.

[2]The Urupez archaeological site, located in Maldonado, yielded an archaeological component with bolas stones recently dated at 2.9 kya (Meneghin, pers. comm. 2013).

artifacts of unknown function, have circular forms with biconvex cross sections. In general, their sizes are about 60 - 70 mm and 20 - 40 mm width and thickness respectively. In their early manufacture stages, percussion flaking was used, such as at Hernandorena archaeological locality. Percussion marks around the perimeter and surfaces suggest that some of them were probably recycled or occasionally used as hammer-stones (**Figure 10(h)**). These kinds of pieces were recorded all across Uruguay and the Entre Ríos province in northeastern Argentina (Serrano, 1932).

5) *Raw material sources.* Regionally, there are diverse raw material sources which are available as primary and secondary sources (Luedtke, 1979). About 2 km to the north of MC, around Rincón del Bonete dam two quarry sites were identified. They were named Rincon del Bonete 1 (RB1) and 2 (RB2) respectively (Nami, 2007). RB1 shows extensive secondary deposits of pebbles of diverse petrography and colors, ranging from 5 to 20 cm in diameter, among them ordinary-to-very-high-quality cherts. RB2 is a primary source characterized by exposures of tabular nodules of silicified limestone. Similar stones are found through Uruguay and also in Entre Ríos province in Argentina. Diverse experiments (Nami, 2010a, 2013) using this kind of rock showed that they have good to-very-good flaking qualities, ranking 3.5 on Callahan's (1979) lithic grade scale (see also Luedtke, 1994: 86-87) and their flaking quality also improves with heat treatment (Nami, 2010a). Isolated exposures of small crystal quartz were observed in some places, such as Colares and Cacique creek area (Nami, 2009). Primary sources of small nodules of about 5 - 10 cm of white chalcedony are embedded in the basalt bedrock located in the sites of the region, particularly in MC and LM. This shows bad to regular flaking qualities due to the change of texture, fissures and cleavage planes running through the nodules (Nami, 2013).

Microwear Analysis

In order to determine the precise nature of some artefacts and to deepen our understanding of the stone tool function at the Negro River, systematic microwear analysis using microscopes is being performed on the lithic assemblages (Nami & Castro, 2010, 2012). A significant number of artefacts are being analyzed using this methodology. However, in this paper some preliminary observations on certain pieces are reported. In this endeavor, a careful examination with the naked eye to identify the morphology of the macro-technological attributes produced by manufacture was firstly performed; furthermore, the morphological damage on the edges was identified using a 80x triocular stereoscopic magnifying glass with a zoom lens. Finally, use-wear analysis was done using the "high power" approach following the methodology developed by Keeley (1980). Polishing intensity and striations were analyzed with a UNION metallographic microscope with magnification between 100× and 300×. Paleoindian unifacial tools from AC (**Figures 6(b)**, **(c)**) show that in spite that these artifacts came from an underwater site, their edges and ridges do not show water alterations such as rounding by water abrasion, salt deposit, or an opaque patina (Nami & Castro, 2010). The generalized luster, however, suggests some wind polishing with sand. The tool exhibited in **Figure 6(b)** shows non-intensive generalized luster on the entire surface and small striations with perpendicular orientation to the functional edges, indicate that it was used to scrape an unidentified hard substance (Nami & Castro, 2010: Figure 1(f)). Both edges of the implement observed in **Figure 6(c)** have polishing striations and a few semi-lunar flakes that suggest the tool was used with a longitudinal action for cutting a hard substance, probably bone (Nami & Castro, 2010: Figures 1(g)-(h)).

A microwear study on fishtail points is in progress (Nami & Castro, 2012). Preliminary results indicate that some of them, in parts of the shoulder and the stem, show microscopic leather-like polishing that might be attributed to leather or a similar substance, probably the cord or sinew used to bind the points into the foreshaft. Their position suggests that the binding was made where the polishing is observed, in other words, up to blade-stem junction and shoulder. This fact, reinforces previous assessments based on macroscopic observations that edge abrasion on the stems edges imply that hafting was made to the blade-stem intersection (Nami, 1985-1987). The surface of the stem shows a coarse micro-topography and has patches of black residues. The coarse micro-topography suggests the use of an adhesive substance covering the whole stem, while the black patches are probably the residue used to glue the points in the foreshafts. Another likely Paleoindian artifact analyzed is a biface found near a fishtail point at Los Espinillos (**Figures 3(s)**, **4(p)**) that exhibits natural edges and only remnants of platform preparation by abrasion; hence, it was not used. By it size, this piece perfectly fits within an early stage 4 of manufacture of fishtail projectile points, such as has been observed archaeologically and experimentally proposed (Nami, 2001b, 2003, 2010a, 2012d).

Discussion

In summary, investigations in Uruguay are yielding new data on several topics related with the regional and continental archaeological process occurred during the last 11 ky. In this way, excavations at LM and MC are providing evidence to understand the chronology and archaeology in the middle Negro River, and the morphological and functional differences between the Early and Middle Holocene lithic assemblages. Additionally, studies on private collections allow to discover previously unidentified fishtail pieces and flaking strategies, besides also going into depth in diverse aspects of the regional lithic technology since the terminal Pleistocene. In this sense, highlights of lithic strategies and techniques involve prepared flake-core and blade technology, refined bifacial thinning and well-made flaked and ground implements. Bolas stones, mainly the bristly pieces, biconvex discoids and projectile points are a technological link with other surrounding areas, mainly with southern Brazil and Northeastern Argentina.

A remarkable feature is that most sites are located near the mouths of small creeks, such as the AC, MC and LM, a fact that agrees with previous observations of similar assemblages from the region (Schmitz, 1987; Rodriguez, 1998, 2001). MC and LM might be considered as long term base camps. Both shows high densities lithic tools and debitage, and are situated on landforms allowing views of surrounding landscape, providing access to water, fuel, good quality flaking materials as well animal and vegetal and other significant resources for survival (Dillehay et al., 2011: 36).

The observed transformations between Late Pleistocene, Early and Middle Holocene tools kits and artifacts may reflect change in technological organization through time. Actually, Paleoindian and early Holocene artefacts seem to be curated formal flake and core technologies. There are differences between Middle and Late Holocene assemblages; the latter show expedient and informal tools made on nodules of chalcedony available in the sites' vicinity, suggesting a more expedient technology with different mobility (Binford, 1979). The intensification of ground stone implements also suggests a technological change.

On the other hand, research in the area is crucial to produce new data on the earliest hunter-gatherers, and hence, to discuss the regional colonization process. Despite that finds of Paleo-South American remains are abundant all across Uruguay; the Negro River provides the highest amount. By its size, this water course probably resulted attractive for the early hunter-gatherers that colonized the southern cone. In this sense, the Uruguayan archaeological record must not be viewed as a local phenomenon. The evidence is increasingly showing that certain periods of the Uruguayan archaeological process is bound with other areas of South America, mainly with southern Brazil and Argentina. Conspicuous fishtail finds in southern Brazil and Uruguay is fitting with the regional Late Pleistocene archaeological record that emerges from intense investigations performed in the last decades in the Southern Cone (Politis et al., 2008; Salemme & Miotti, 2008; Miotti et al., 2012; Nami, 2012c). During the terminal Pleistocene, the current Uruguayan territory was part of the continental dispersion of the foragers that used fishtail points in their weaponry across South America. Despite that most Paleo-South Americans data belongs to surface finds, the available evidence shows that during the last millennia of the Pleistocene, Fell foragers occupied the current Uruguayan territory. Undoubtedly, certain technological similarities are shared with contemporaneous groups in other areas of the continent; such as "fishtail" projectile points, discoid stones, and unifacial stone tools.

Except Urupez site, located in southern Uruguay which yielded two clear fishtail pieces from a context dated at ~11.6 and 10.6 kya (Meneghin, 2004, 2006; pers. comm., 2012; Nami, 2007, 2008), there is no other stratified site with this kind of evidence. However, in the west of the country on the Uruguay River, El Tigre and Isla de Arriba sites produced uncalibrated ^{14}C ages spanning the timeframe of Fell occupations. The former yielded a date of 10,420 ± 90 years BP (Kn 2531, Hilbert, 1985, 1991: 15), while the latter one was dated in 11,200 ± 500 (Guidón, 1989) years BP. No diagnostic projectile points were found at either site; however, they might be considered contexts without projectile points of the same system, reflecting Paleoindian inter-site variation (Nami, 1996b, 2007).

Across the Uruguayan northwestern border in southern Brazil, at RS-I-69 (Laranjito) site a level with six dates ranging between 10.2 and 10.8 kya yielded five stemmed points, one of them matches the fishtail morphology (Miller, 1987: Figures 13(a), (e); Nami, 2012c: Figure 27(a)). Coincidently, RS-I-69 is located in a flood plain deposit from the banks of the Uruguay River, the natural border between Brazil, Argentina and Uruguay. It is worth mentioning that open air sites are disturbed by a number of geological processes (Butzer, 2008). The integrity of the archaeological record in sites located in the flood plain deposits of significant watercourses, such as the Uruguay river and its tributaries in northwestern Uruguay, might be affected by the disturbing effects of alluvial processes existing in that kind of high energy rivers (Ferring, 2000: 95). It is known that in certain places of this area, extinct fauna, archaeological remains and metal objects may be found at the same stratigraphic level (F. López, pers. com. 2003; J. Femenías, pers. com. 2006; A. Sánchez, pers. com. 2009). Interestly, in the area a fishtail point was found near Salto along with ceramic remains in a surface site in Salto Grande (Bosch et al., 1980: #29). Additional Fell points from the same region were collected in Salto Grande and Arapey area (Hilbert, 1991: Figures 23, 3), the mouth of Boicuá creek (Cordero, 1960: Figure 45), Los Pinos (Suárez & López Mazz, 2003: Figure 4(b), (c) and 6), Pay Paso locality (Suárez 2009: Figure 6.2) and Isla Itacumbú (Suárez, 2011: Figure 3(a)). Just in front of the Uruguayan border, also along the Uruguay River, fishtail points were found at the surface of Santa Lucía site (Serrano, 1932: Lam. XV: 11) and near Monte Caseros in Argentina (Nami, 2007: Figures 1(b), (c)).

Conclusion

The Negro River basin was a significant fluvial course for human settlement in terms of both its basin size and quantity of archaeological remains. River basins in eastern South America are providing stratified and surface sites dating to the time span of Fell points. Also, the Santa Lucía River basin in southern Uruguay shows a terminal Pleistocene paleoecological environment with data of Fell hunter-gatherers (López et al., 2001; Meneghin & Sánchez, 2009; Nami, 2011a). The area nearby the current mouth of La Plata River, which during that time period had a narrow course, likely similar to the present Uruguay River (Cavalloto et al., 2002; Nami, 2012c: Figure 5). In its basin, Urupez and Cerro Los Burros yielded data to understand the earliest human occupation observed in the region. Urupez produced evidence of a fishtail campsite (Meneghin, 2004; 2006; Nami, 2008) and Cerro los Burros, is a rhyolite quarry-workshop that reveals early stages of manufacture and fishtail points (Meneghin, 1977; Nami, 2001a). Finally, in the Southwest, in addition to the exemplar found at Real San Carlos (Bosch et al., 1980: #31) there is a new Fell point find in the Colonia department (FIG. 4n) witnessing the presence of these early hunter-gatherers near the shores of La Plata River, currently a major bio-geographical barrier.

Crossing this estuary, other important water courses yielded Paleoindian records in Argentina. Actually, during the terminal Pleistocene a chain of lagoons existed in the current Luján River basin, northeastern Buenos Aires province (Toledo, 2011). There, evidence of a Fell point was found in Luján (Zeballos & Reid, 1876; Lehman-Nietsche, 1907; Nami, 2012c: Figure 15(b)). Also, the Arroyo Frías site provided one of the few human skeletal remains in the southern cone dated at about 10 kya (Politis et al., 2011; Politis & Bonomo, 2011). Towards the south, at the Quequén River basin, evidence of fishtail occupations was found at Paso Otero 5 (Martínez, 2001). South of the Argentine Pampas, in the Patagonian region of the Deseado River basin in eastern Santa Cruz province showed a number of sites date to the time frame of the Fell hunters: at Los Toldos and El Ceibo caves (Cardich, 1987), Piedra Museo rockshelter (Salemme & Miotti, 2008), Casa del Minero, and Cerro Tres Tetas caves (Paunero, 2000; Paunero et al., 2007). On the southern tip, the Chico River basin in the Pali Aike volcanic field, Paleoindian occupations were found at Fell and Pali Aike caves (Bird, 1946, 1988).

At the same time, a similar pattern of river basin utilization has been observed in Eastern USA (Dunbar, 2012) and by Snarskis (1979) in Central America. Therefore, based on the locales mentioned above, it is evident that watercourses were important places for the earliest human occupants in eastern North and South America. As such, the Negro River basin might be one of the dispersal "routes" for the colonizers' bands while foraging the landscape. Also, is possible that at that time, the current continental shelf was used for the colonizers diaspora from north to south and from east to west (Nami, 2001c). This kind of environment facilitated movements during the colonization of northeast South America (Anderson & Gillan, 2000). In fact, the presence of numerous Paleoindian remains in the eastern part of the southern Cone, leads to reflect on issues related with the human migration across eastern South America. Actually, first it was thought that the Pacific coast and the Andean Cordillera in western South America were the dispersal "route" of earliest settlers (Sauer, 1944; Mayer-Oakes, 1963; Schobinger, 1987); however, there are fishtails finds in El Cayude, Los Planes de Giosne and Margarita island in Venezuela (Jaimes, 1999; Nami, 2010a: Lam. If; 2012c: Figure 19(f); Szabadics Roka, 2010), Cuyuní River in British Guyana (Evans & Meggers, 1960: Pl. 8d; Nami, 2012c: Figure 19(g)), and east-central and southern Brazil (Schobinger, 1974; Politis, 1991; da Silva Lopes & Nami, 2011). As reported above, fishtail are conspicuous finds in Uruguay, Buenos Aires and, eastern part of Santa Cruz provinces in Argentina. In consequence, they reveal and suggest that the eastern part of South America and the Atlantic slope was an additional "route" during the colonization diaspora. Possibly the sources of water, especially lakes and rivers were the favorite places for these early foragers.

Finally, as mentioned above, many fishtail points from Central and South America display true flutes. This distinctive technical feature allows to discuss issues about their relation with fluted points from North and Central America (Willey, 1966; Bryan, 1991; Politis, 1991; Nami, 1997, 2005, 2010a; Morrow & Morrow, 1999; Faught, 2006; among others). Actually, the flinknapping techniques employed to manufacture fluted points are highly specific and are generally thought to imply "genetic" relationships between the hunter-gatherers that produced these artefacts. These affiliations may be true relative to the North American fluted points, but the stratigraphic relationships between the unfluted/fluted points of South America and the coincident temporal occurrence of fluting between the two hemispheres creates a highly interesting archaeological and anthropological problem. Thus, to elucidate this question, an in-depth comparative and experimental study considering classic western Clovis and Folsom from the Great Plains, and Fell reduction sequences was conducted. Results from this investigation conclude that except the fluting, there are many technical and morphological differences among those patterns (Nami, 1997, 2003, 2005, 2010b, 2011b). However, beyond fluting there are other technological features suggesting that hunter-gatherers who made the "fishtail" points might not only be related with North American Paleoindian but to the Upper Paleolithic hunter-gatherers as well. In fact, the generic technical attributes and shapes in stone and bone technology[3] might imply a historical or social relationship among the first foragers that participated in the peopling of the Americas. In this regard, the South American Paleoindians that used Fell projectile points represent another member of a global family sharing Upper Paleolithic technological knowledge used in their previous homeland (Nami, 2005, 2010b, 2010c). In this sense, currently there are more clues that allow thinking about the origins of hunter-gatherers who used the Fell pattern. In fact, there are fishtail pieces in North America that despite certain technical and morphological differences, fit with similar ones in Central and South America. Several locales along the eastern coast of North America yielded fishtail lanceolate points finished by short pressure retouches on blanks partially or totally thinned by bifacial percussion flaking. Referred to by different names according the presence/absence of fluting, retouch morphology and locality of finds (Faught, 2006; Dunbar, 2012), they are found in Maryland (Lowery et al., 2011), Alabama (Futato, 1996: Figure 15.2), Georgia (Anderson et al., 1990: Figures 21, 22), Florida (Purdy, 1981; 2008: Figure 21(c)) and Texas (Redder, 1985: Figure 2(G)). In general, their morphology matches the lanceolate variant of fishtail point found in Mexico (Lorenzo, 1953; Santa María & García Bárcena, 1989: Figure 40), Belize (Hester et al., 1983), Guatemala (Coe, 1960), Costa Rica (Swauger & Mayer-Oakes, 1952; Snarskis, 1979: Figures 2, 3; Sheets, 1994), Panamá (Bird & Cooke, 1979: Figures 6(a), (b); Nami, 2012c Figure 19(c), (d)), Venezuela (Jaimes, 1999; Pearson & Ream, 2005; Szabadics Roka, 2010), Ecuador (Bell, 1965: Figure 10(b)-(c); Nami, 2012c: Figure 21(c)), and other South American localities (Nami, 2012c: Figure 21). A fishtailed "Clovis" and a fishtail point were found in the same stratigraphic layer at Los Grifos cave in Mexico (Santa María & García Bárcena, 1989: Figure 41), a fact that also occurred in Turrialba site in Costa Rica (Snarskis, 1979: Figures 2, 3), Madden Lake in Panama (Bird & Cooke, 1979: Figures 4 and 6) and Los Planes de Giosne and El Cayude in Venezuela (Jaimes, 1999; Szabadics Roka, 2010). Interestingly, the areas of major distribution of fluted points in North America are located in the eastern part (Anderson & Faught, 1998). Consequently, a plausible hypothesis is that the origin of the Fell pattern might be related to Paleoindian fishtailed pieces located along the eastern coast of North America, mainly in the southern states surrounding the Gulf of Mexico and entered to South America via Mexico and Caribbean continental shelve. The mutation or transformation towards the Fell pattern and its varieties might be in relation with some sort of environmental or social causes. Of course, problems of chronology, reliable stratigraphic records and dispersion timing (Faught, 2006) must be solved in order to arrive at consistent conclusions.

[3]Among the bone artifacts made by the hunter-gatherers that used fishtail points, there are beveled base bone points of excellent manufacture. They were found in the lower levels of Fell´s cave (Nami, 2010c: Figure 4; pers. obs., 1994; 1997).

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