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Archaeology of the Upper Delta of the Paraná River (Argentina): Mound Construction and Anthropogenic Landscapes in the Los Tres Cerros locality

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ABSTRACT

This article synthesizes the first results of the archaeological and geoarchaeological research at the archaeological locality of Los Tres Cerros, in particular one of its sites (Los Tres Cerros 1: LTC1). The sedimentological analysis of the site and its surroundings is presented, together with a discussion on its formation processes. In addition the results of the preliminary analysis of the pottery, fauna (especially fish), human bones and lithic materials are outlined. Eleven new ¹⁴C dates from the locality are given, which place human occupation between 920 and 560 ¹⁴C BP. It is proposed that the site was intentionally developed adjacent to a river and that it was probably multifunctional. Subsistence during the occupation of the site was oriented to the exploitation of fluvial resources, especially fish and the coipo (otter). The pottery is compatible with what is known as the Goya-Malabrigo cultural entity. The consideration of this archaeological entity as a sociotechnical aggregate is proposed. The site is articulated within a larger system of settlement and anthropic modification that has precedents in the lowlands of South America.

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1. Introduction

This article presents the first results of the archaeological and geoarchaeological research being carried out at the locality of Los Tres Cerros (Las Moras Island, Victoria Department, Entre Ríos Province, Argentina). This locality is formed by three sites (earth mounds) located in the Upper Delta of the Paraná River. The basic archaeological, geomorphological, and chronological information is summarized here and the genesis of one of the mounds, Los Tres Cerros 1 (LTC1; 32°51'16.97"S; 60°33'37.58"W), is discussed in the light of new information. Basically, the focus of this analysis is on the formation process involved in the genesis of the site and on attempting to identify the natural or cultural character of these earth elevations.

The study of the mounds of the South American Lowlands (known as *cerros* or *cerritos* in Spanish, *aterros* in Portuguese, or earthworks in English) has become one of the axes of archaeological debate in the continent (Andrade Lima and López Mazz, 2000;

López Mazz, 2001; Criado Boado et al., 2005; Bracco Boksar, 2006; Iriarte, 2006). This central relevance is owed not only to its monumentality (Gianotti García, 2000; Criado Boado et al., 2005) but also due to its being suggested that they are a very ancient development (ca. 4500–5000 BP, López Mazz, 2001; Bracco Boksar, 2006; Iriarte, 2006), in the manner of an urban area (Gianotti García, 2000; López Mazz, 2001; Iriarte et al., 2004) or a “village life style” (Dillehay, 2007:8). They have been presumed to be the manifestation of a phenomenon of social complexity, which suggests the emergence of an Early Formative (López Mazz, 2001; Iriarte, 2006). In some of these mounds, there are very ancient traces of early cultivation, such as of pumpkin and maize (Iriarte et al., 2004; Del Puerto and Inda, 2005).

Nevertheless, the discussion has gravitated to the mounds in the east and northeast of Uruguay, and the southeast of Brazil (Copé, 1991; Schmitz et al., 1991; Gianotti García, 2000; López Mazz, 2001; Bracco Boksar, 2006; Iriarte, 2006), and as yet the evidence from other regions close to the Paraná Delta and the Uruguay River, where the *cerritos* are characteristic and greatly visible, has not been taken into account in the debate. Although the mounds of the Lower Paraná were one of the important topics in archaeological discussion in the early 20th century (see Politis, 1988), with few exceptions (i.e. Caggiano and Flores, 2001; Nóbile, 2002; Campos,

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2003) the subject has been overlooked in the last few decades. Recent research carried out by the authors has revived this characteristic issue in the archaeology of the lower reaches of the Paraná and Uruguay Rivers (Bonomo et al., 2010a; Bonomo et al., in press).

At the end of 2006, the authors embarked on systematic research in the Upper Paraná Delta, an area that, with few exceptions (see Gaspary, 1950; Masferrer and Stanley, 1973; Nobile, 2002 for the Upper Delta, and Serrano, 1922; Badano, 1940; Rocchiotti et al., 2007 for the west islands of the alluvial plain), had remained virtually uncharted in archaeological terms. As a result of an intensive systematic survey, 60 sites were detected and mapped in the departments of Diamante, Victoria, and Gualeguay (Entre Ríos) and San Jerónimo (Santa Fe) (Bonomo et al., 2010a; Bonomo et al., in press; see Fig. 1). The sites are located in all the geomorphological units identified by Cavallotto et al. (2005), although in greater concentration on the inland alluvial deposits and the pre-deltaic tidal plain. When this project started all available ^{14}C dates ($n=7$) for different sites of the Upper Delta were very recent, related to the very final segment of the Late Holocene (ca. 500–700 ^{14}C BP; Bonomo et al., 2010a); although it must be borne in mind that all dated samples are from the upper and middle levels of the *cerritos*. However, these dates indicate that all the main geomorphological units existed when the sites were formed. Thus, one of the aims of this research project was to set up the chronological framework of the human occupation of the area and to determine the time the building of the mounds commenced.

In short, given the scarcity of systematic studies of the Upper Paraná Delta, this paper provides original archaeological and geoarchaeological information gathered at the Los Tres Cerros 1 site. Within this general context, stress is placed on the geoarchaeological analysis of the sediments that make up the site, and a preliminary analysis of the abundant archaeological materials obtained from the excavation is presented. Finally, the in-depth study of the Tres Cerros locality is inscribed within the recent studies on the *cerritos* of the Lower Paraná with the idea of including this area in the macro-regional discussion on this subject.

2. Background

The Paraná Delta is formed by the alluvial plain at the Paraná River's lower course, and develops in areas that bore strong marine influence during the middle Holocene. The Paraná Delta as a spatial unit of archaeological analysis enjoys a lengthy tradition of research (e.g. Torres, 1911; Aparicio, 1939; Caggiano, 1984; Loponte, 2008; Bonomo et al., 2010a). It is made up of two larger geomorphological units: one fluvial (the coastal plains of the lower Paraná basin), and the other deltaic (the subaerial plain of the Paraná Delta proper). Both cover an area of around 17,000 km² spread over a gently sloping terrain 320 km long. The proposed palaeoenvironmental reconstructions (e.g. Codignotto, 2004; Cavallotto et al., 2005) indicate that the area only became available for human occupation after 6000 BP, once the pre-deltaic tidal plain took shape, when the area became less subject to tidal influences.

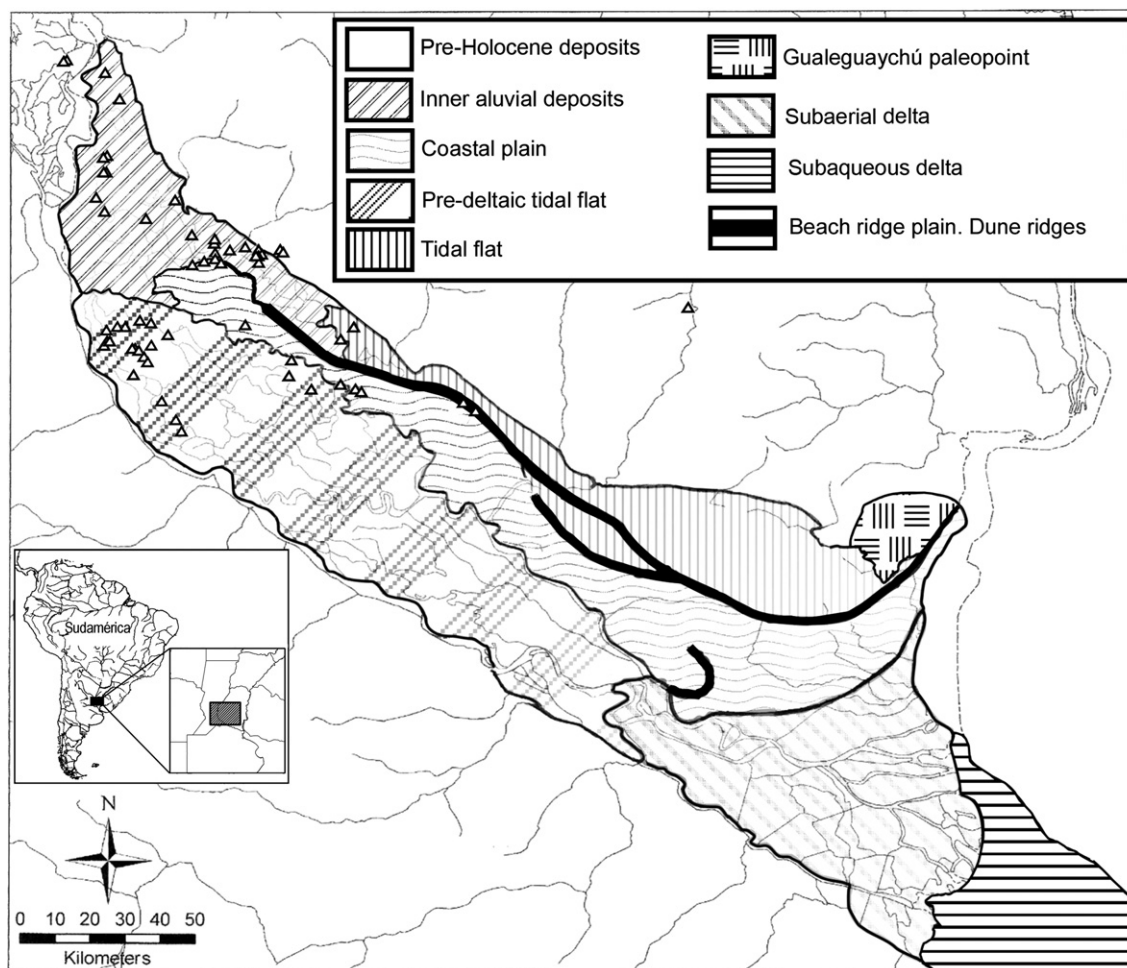


Fig. 1. Geomorphological map (modified from Cavallotto et al., 2005: Fig. 2) and location of the archaeological sites (Δ).

The archaeological studies of this vast area started at the end of the 19th Century (Zeballos and Pico, 1878; Ambrosetti, 1893) and carried on discontinuously during the course of the 20th Century (Torres, 1911; Lothrop, 1932; Lafón, 1971; Serrano, 1972; Ceruti, 1993). In recent decades systematic research has been carried out in the Lower Paraná Delta and the neighbouring plains (Caggiano, 1984; Caggiano and Flores, 2001; Acosta, 2005; Loponte, 2008). In general terms, the archaeology of the area has been interpreted within the framework of the cultural development of the Argentine Northeast (also named *Litoral*; Lafón, 1971; Serrano, 1972; Caggiano, 1984; Ceruti, 1993; Rodríguez, 2001; Ceruti and González, 2007), although supra-regional relationships have been recognized, especially with the Chaco, the Central Sierras, and the Pampas (Serrano, 1972; Ceruti, 1993; Loponte, 2008; Bonomo et al., in press).

The main archaeological entity defined for the Upper Delta is Goya-Malabrigo (González, 1977; Ceruti, 1993, 2003), amplified and redefined as from Serrano's "Ribereños Plásticos" Culture (1972). This cultural entity was attributed to groups of hunter-gatherers and fishers that inhabited the Lower and Middle Paraná and part of the delta from 2000 BP till the European conquest. Although small scale horticulture has been proposed, based on historical accounts (Serrano, 1950; Ceruti, 2003), no direct evidence had been obtained until starch grains from maize (*Zea mays*) and beans (*Phaseolus vulgaris*) were discovered in pre-Hispanic levels in several non-Guarani sites of the area (Bonomo et al., in press). According to the spatial distribution of zoomorphic appendages (which were considered the most distinguishing feature of Goya-Malabrigo) and other techno-typological traits, this archaeological unit would probably occupied the palaeo and the present alluvial plain of the Paraná, from its confluence with the Paraguay River down to the Paraná Delta, and the Lower Uruguay River (Ceruti, 2003; Ceruti and González, 2007).

The archaeological reflection of the Guarani ethno-linguistic group, the Tupiguarani Tradition (Brochado, 1984), was recorded on the basis of multiple features (especially pottery, polished axes, and burials in urns) in several sites of the Lower Delta (Arroyo Malo, Arroyo Largo, Arroyo Fredes, among others), on Martín García Island, and on the banks of La Plata River. This was used to propose archaeological cultures such as the "Tupí Guarani" (Serrano, 1972; Caggiano, 1984) and traditions such as the "Tupí Guarani generalizada" (Lafón, 1971) and "Tupiguarani" (Rodríguez, 2001). A recent dating at Arroyo Fredes places the earliest site of the Tupiguarani Tradition in the Lower Parana Delta at 690 ± 70 ^{14}C BP (Loponte and Acosta, 2007). In the Upper Paraná Delta, the archaeological presence of the Tupiguarani Tradition is even much weaker, as no fully Guarani sites have been detected. The only clear evidence is a human burial in a polychrome urn discovered in the Cerro de las Pajas Blancas 1 site (Badano, 1940) and two almost whole corrugated vessels from the Los Baños site ($32^{\circ}46'31.2''\text{S}$ and $60^{\circ}40'19.9''\text{W}$) near Los Tres Cerros. The Pajas Blancas 1 site was re-excavated by the authors and dated at 640 ± 60 and 650 ± 70 ^{14}C BP (Bonomo et al., in press). Some of the pottery recovered at the site can be assigned to Goya-Malabrigo, which indicates that the site was not an exclusively Guarani settlement as some of the Lower Delta ones are. In some other Upper Paraná Delta sites (Cerro El Durazno, Cerro El Lucerito, Los Laureles and La Tortuga 1), very low percentages (<2%) of corrugated pottery have been found that it could also be placed within the Tupiguarani Tradition. However, the socio-historical contexts which allowed this scarce presence of some Tupiguarani sherds in a Goya-Malabrigo matrix are not clear.

The genesis of the Lower Paraná River mounds has been a subject of debate. A natural origin (C. Ameghino, in Torres, 1911; Frenguelli and Aparicio, 1923; Cione et al., 1977), an anthropic origin (Zeballos and Pico, 1878; Torres, 1903, 1911; Greslebin, 1931),

or else the coexistence of a natural elevation with cultural accretion (González, 1947; Gasparly, 1950; Nóbile, 2002; Campos, 2003) has been proposed. Although other *cerritos* in neighbouring areas (Uruguay) have been studied in detail (e.g. Bracco et al., 2000; López and Castiñeira, 2001; Iriarte, 2006), no in-depth stratigraphic studies have been carried out on the Middle/Lower Paraná floodplain mounds.

Ethnohistorical sources show the Delta as a heterogeneous area of multiethnic confluence, with a marked population turnover (Fernández de Oviedo y Valdés, 1851–1855 [1546–1547]; García [1528] in Madero, 1902; Ramírez [1528] in Madero, 1902; Schmidl, 2009 [1567]; Villalta [1536–1556] in Schmidl, 2009). The aboriginal groups mentioned (Chaná, Mbeguá, Chaná-Timbú, Chaná-Mbeguá, Timbú, Corondas, Colastines, Quiloazas) might belong to different ethnic groups or, as Serrano (1930) and Aparicio (1939) maintained to diverse "partialities" (i.e. segments belonging to a single ethnic group but differing according to their chieftains or their geographical location). These authors have proposed the general name of "Chaná-Timbú" for the indigenous groups of the Paraná Delta in the first half of the 16th century, when the Europeans arrived. It is also possible that they may be considered as "sub-ethnos" in the terms proposed by Bechis (2010:53). Aparicio (1939) and Serrano (1950) also posit that what is now archaeologically known as Goya-Malabrigo belonged to the Chaná-Timbú and related ethnic groups at the beginning of the European conquest.

Several scholars (Torres, 1911; Nordenskiöld, [1930] 2009; Métraux, 1934; González, 1947; Serrano, 1950) have held that these groups are part of an Arawak migration, or at least showed influences by this ethno-linguistic group. This was mostly based on similarities in the clay modeled birds, and in the morphology of certain containers (such as large plates or dishes with a flat bottom and low edges) as well as in the building of mounds for living and burial purposes. It was Nordenskiöld (2009) that most convincingly proposed this idea in 1930. He stated, "it seems probable to me that the Arawaks, the peaceful, skillful Arawaks, had built these mounds everywhere, including the Paraná Delta, Mojos and Marajó islands, as well as originally in the upper Paraguay River region". To this was added the identification of sponge spicules included as a temper in the pottery of the Lower Uruguay River (Serrano, 1950) and the classification of the Guenoa language as an Arawak dialect (Perea y Alonso, 1942). Nevertheless, other authors (Aparicio, 1939; Caggiano, 1984; Ceruti, 2003) turned this proposal down, considering it too speculative. Although it is not the purpose of this article to discuss this subject, the term "chaná" (or chanás, chaneses, chanés) is a common Arawak word meaning "people," or "crowd, multitude" (see discussion in Combés, 2009). This term was frequently mentioned in the 16th Century documents both alone and associated with other words of Guarani and Spanish origin, such as Chaná-Timbú, Chaná-Mbeguá and "Chaná salvajes" (savage Chanás), to refer to the different "partialities" of the Lower and Middle Paraná River (e.g. García [1528] in Madero, 1902; Ramírez [1528] in Madero, 1902; Schmidl, 2009 [1567]). It is not yet clear if this term was an ethnonym used in combination with other words by Guarani and Spanish speaking people during the first expeditions up the Paraná River, or else a name given to the Lower Paraná Indians by Arawak-speaking people. In addition to the Chaná-Timbú presence, ethnohistorical sources (García [1528] in Madero, 1902; Ramírez [1528] in Madero, 1902; Schmidl, 2009 [1567]), identify Guarani groups in the Lower Paraná Delta and the Uruguay River, some of which (the "Guarani of the Islands" or "Chandules") appear until the 17th century in the list of indigenous populations in *reducciones* and *encomiendas*. The chroniclers in Sebastián Cabot's expedition, which took place between 1526 and 1530, make frequent mention of the presence of Guarani in the Upper Paraná Delta, although it seems that in this sector no villages existed as

stable and as numerous as those of the Lower Delta. Still, there is clear evidence of Guarani and Chaná-Timbú coexisting in the area in the 16th century, although the archaeological correlate is even weaker, and does not enable a discussion of the relation between them in pre-Hispanic times.

3. Los Tres Cerros locality

On the basis of the results obtained by Total-Station planimetric surveys in the *cerritos* sites in the Upper Delta of the Paraná River, two clusters were established agreeing with clear distribution and settlement patterns: isolated *cerritos* ($n = 9$), and groups of them ($n = 11$). The latter category includes groups of *cerritos* made up of two and, in one single case, three of these mounds. This latter case, Los Tres Cerros, is analyzed and discussed in this paper.

3.1. Fieldwork and geological studies

The Los Tres Cerros archaeological locality was surveyed with Total-Station and a digital elevation model was created (Fig. 2). It is made up of three monticular structures (LTC1, LTC2, LTC3) in a NW–SE line over 239 m, adjacent to the Zanjón Almada. LTC1 is the highest of these structures, at 2.10 m above the flatland, having a maximum diameter of 66.6 m and a minimum of 57.5 m. This mound is the central one, and it was here that the systematic excavations were made (Fig. 3). LTC2 is 133 m from LTC1, is 1.10 m

high, and its maximum diameter is 48.4 m. Structure LTC 3106 m from LTC1, is the lowest (0.60 m), probably due to erosion that has partially destroyed the site. Volumes were calculated at 1703 m³ for LTC1 and 828 m³ for LTC2, but these must be seen as minima as they have also suffered erosion by the river and trampling by cattle. The most notable landforms recognized in these wetlands are related to: (a) the morphological elements of meandering fluvial channels; and (b) the overlap of these patterns over the earlier tidal channels. These landforms are inactive or active sinuous channels, scroll-bars as a result of the continuous lateral meandering loop migration, point bars, ponds, and oxbow lakes. During December 2008 and in March–April 2009, an area of 15 m² was excavated in LTC1 to a depth of 0.8 m. along with two exploratory test pits in the top site. Another nine test pits (Figs. 2 and 4) were sunk in order to examine the distribution of archaeological material and the principal sedimentary characteristics of the deposits surrounding the LTC1 mound, and on the top of mounds LTC2 and LTC3.

The flooding of the Paraná River produces an alluvial accumulation on the surface of the area, and the sediments in the test pits are sandy muds, sandy silts, and muds. Near the LTC1 mound, the alluvial deposits have an upper layer 0.6 m thick with some archeological remains, perhaps formed by the accumulation of sediment washed out from the mound (test pits 4 and 6; Table 1). Test pit 3 was dug into the foot of the mound, where human burials were found, prompting a grid unit excavation of 4 m² (Figs. 2 and 5). At the distal test pits from the mound (test pits 5, 7 and 8;

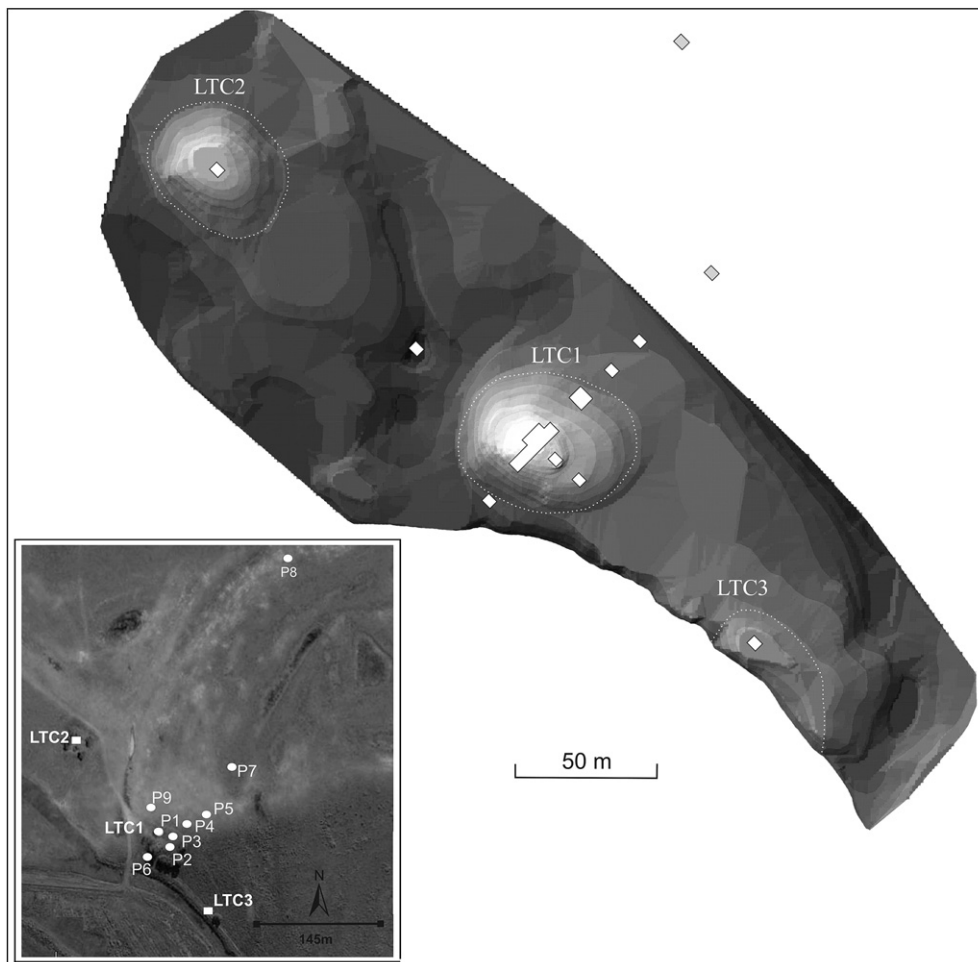


Fig. 2. Los Tres Cerros locality. Planimetric survey, location of the mounds LTC1, LTC2 and LTC3, grid units of the excavations and the test pits. Grid units of the excavations and the test pits are not to scale.



Fig. 3. General view of Los Tres Cerros 1 excavation.

Table 2; Fig. 4) the sediments are only made up of alluvial deposits and some immature soil with hydromorphic features. These sediments overlay muds of the pre-deltaic tidal flat. The deeper material corresponds to clay and mud sediments from an open estuary (Cavallotto et al., 2005). The pre-deltaic tidal flat sediments contain fresh water shells dated at 2550–2740 ^{14}C BP (Caggiano, 1984) and this was considered the minimal age of the deposit (Cavallotto et al., 2005).

Excavation of the site exposed two profiles 8 m in length. The upper and middle layers of the mound were systematically excavated to a depth of 1.5 m, from the “0” level (ca. 0.8 m depth from the surface, Fig. 5). An exploratory probe was carried out in grid 3 aimed at discovering the vertical development of the mound and the beginning of its human occupation. This probe reached a depth of 2.9 m from “0” level. The lower layers studied as from around 1.85 m down show a rhythmical alternation of thin, tabular mud, and sandy mud layers, the latter with a high content of organic matter, possibly owed to alluvial accumulations of 0.1 m average thickness. These lie upon a deposit of homogeneous gleyed clay, at which point the probe was stopped as it contained no archaeological remains. At these basal levels, excepting the archaeologically sterile clay, a smaller density of sherds and very few bone remains was found.

The mound deposits of LTC1, exposed in the systematic excavation, are characterized by three different layers (I, II, III). Layer III at the bottom of the excavation is made up of an alternation of discontinuous lenses, each 2–10 cm thick, of organic matter, charcoal, and burnt sediments (*tierras quemadas*). Layers II and I are located in the middle of and above the stratigraphic column of LTC1, and they contain sediments with a high content of organic matter and irregular fragments of burnt soil. Along the profile, root, earthworm, rodent *crotovina*, and other bioturbation features were recognized.

Analysis of the deposits making up the diverse layers of the structure was carried out using standard sedimentological techniques (Carver, 1971). Regardless of the natural and/or anthropic

character of these accumulations, the chosen methodology allows a standardization and correct characterization of the textural and mineralogical attributes (Blasi, 2008). Results of the grain size analysis from the different mound layers show a coarser texture than the sediments sampled in the floodplain (Table 3). The lenses of burnt sediments from layer III are of coarser size (gravelly muddy sand) and the coarsest fractions attain values between 5 and 30% of the total sample. This fraction >2 mm is important when the lenses of burnt sediment are the product of intense thermoalteration. This sediment is crumblier and, on breaking during the sampling, as in the subsequent laboratory treatment, it produces large-sized lumps.

In the studies of oriented samples by X-ray diffraction (XRD), reflection peaks corresponding to smectite, illite, and kaolinite—chlorite were identified, both in the samples taken from the *cerrito* (excavation and test pits 1, 2, and 3) and those of the surrounding flats (test pits 4–9). The semi-quantitative amount of each clay species was estimated from clay reflection under ethylene glycol treatment (Pierce and Siegel, 1969). On the basis of the percentages of these clay minerals present in the samples, three mineral assemblage types can be recognized: type A, comprising samples with $<10\%$ smectite, $>70\%$ illite, and 20–25% chlorite—kaolinite; type B, made up of samples with 10–20% smectite, 50–60% illite, and 20–25% chlorite—kaolinite; and type C, including samples with 40–50% smectite, $\sim 20\%$ illite, and $\sim 20\%$ kaolinite—chlorite. Samples from the plain surrounding structure LTC1 correspond to types B and C, whereas those taken from the structure (layers I, II, IIIa, IIIb, IIIc) are type A (Fig. 6). Similarly, the XRD analyses of total samples indicate that the mineralogical composition of red pigment lenses in layer III corresponds to hematite and quartz.

3.2. Archaeological remains

During the survey, test pits, and excavation, abundant archaeological remains were recovered from LTC1. This allowed a characterization of the cultural traits of the site as well as helped to

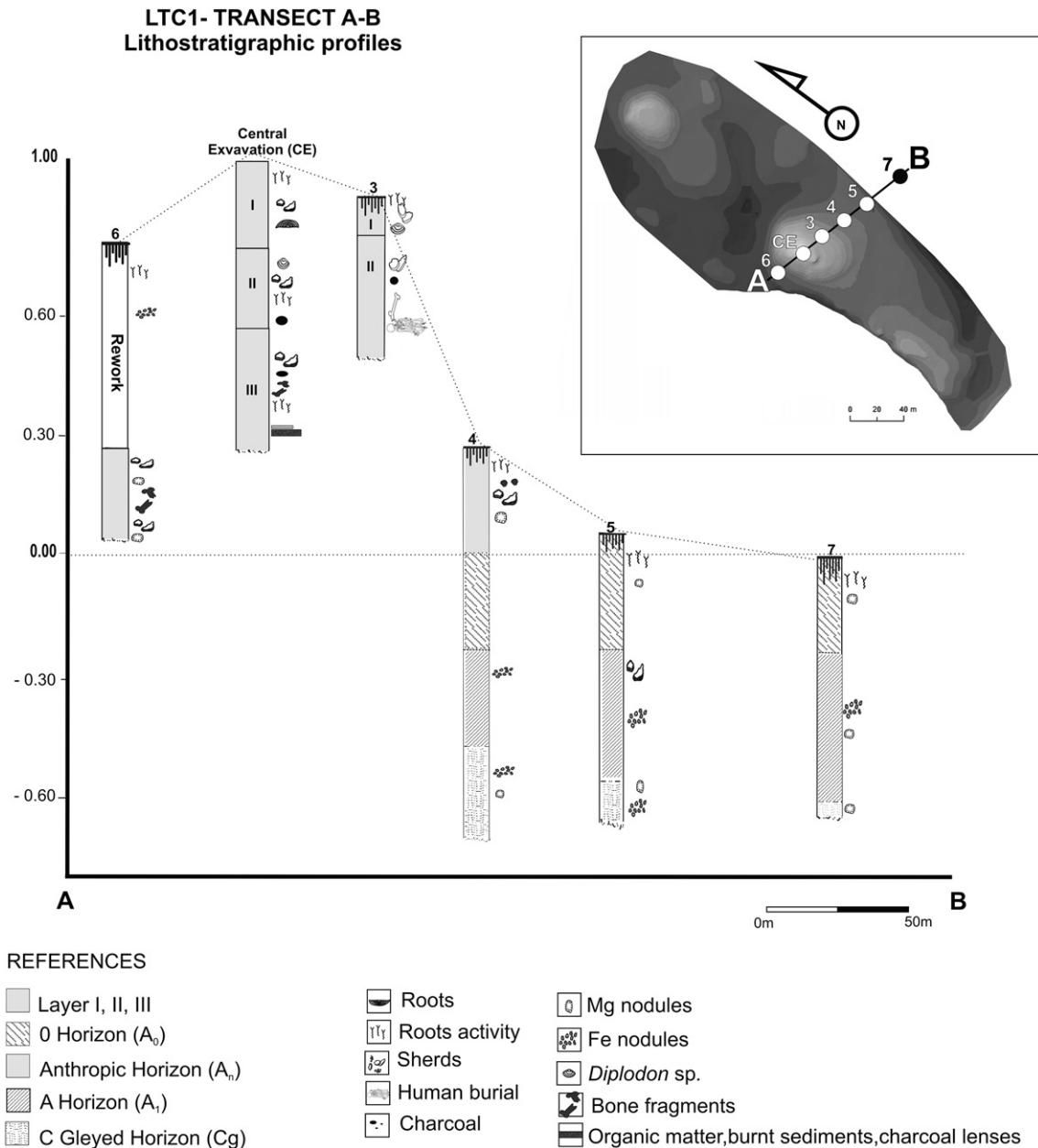


Fig. 4. Transect A–B of Los Tres Cerros 1. Lithostratigraphic profiles.

understand the formation process of the mound. Excavation was set up using a 1 × 1 m grid system, and the removal of sediment followed both the stratigraphic layers and 5 cm thick artificial layers to control the vertical resolution of the remains. Finds larger than 2 cm in size were recorded according to the three axes. Half the excavated sediment was water screened through a 2 mm mesh, using a Honda water pump. Grids-squares 2, 3, 4, 9, 10 and 15 were placed on the top of the mound, and their surface was roughly horizontal. This 6 m² surface is called the “central excavation”. The surface of the other grids had a gentle 5° declivity; therefore the artificial layers were corrected (approximately a 1 in 10 slope).

3.2.1. Pottery studies

Violeta Di Prado carried out a preliminary analysis of the pottery collection recovered from LTC1, following the methodological proposals set out in Balfet et al. (1992) and Orton et al. (1997). A total of 8789 pottery fragments recovered on-site and by means of

screening in grid squares 1, 2, 3, and 4 (Table 4) were quantified. All the pottery sherds (n = 2313) from grid square 1 and those recovered on-site in grid squares 2, 3, and 4 were analysed in greater detail. For this purpose the most frequently represented fragments of the vessel, the surface treatment, adherences and sizes were identified.

Main body fragments (80.8%), rim fragments (16.9%), clay lumps (1.9%), undetermined pieces (0.1%), whole “trimmed” silhouettes (0.2%; for example see Fig. 7a and c) and “solid sculpted” appendages (0.1%, for example see Fig. 7b) were recorded. Some of the trimmed silhouettes represent a bird-head (Fig. 7a), while others (Fig. 7c) might be the “tails” of Serrano (1950), which would be placed on the rim of the containers, directly opposite the heads.

The outer surfaces of the sherds appear as slightly smoothed (37.1%), smoothed (34.7%), or polished (25.8%), having a red (0.8%) or white slip (0.4%), with irregular ones (0.8%). Only 1.27% of the fragments have any kind of decoration. Of these, 83.3% show a recurring

Table 1
Lithological characteristics of soil horizons in alluvial deposits at proximal test pits.

Test pits (position)	Deepness from surface (in cm)	Grain size (Folk's classification)	Color	Observations
4 (32° 51' 16.8"S; 60° 33' 36.2"W)	0–50	Sandy mud	2.5 YR 3/2, Very dark greyest brown	Many roots. Archaeological material
	50–75	Sandy silt	2.5Y 5/0, Grey	Hidromorfic. Without archaeological material
	75–90	Muds	5Y 5/1, Grey	Hidromorfic. Without archaeological material
	>90	Silt	5Y 4/1, Dark grey	Hidromorfic. Without archaeological material
6 (32° 51' 17.7"S; 60° 33' 38.3"W)	0–60	Sandy mud	5YR3/2, Dark reddish brown	Iron's concretions. Without archaeological material
	60	Slightly gravelly, sandy mud	7.5YR 4/2, Dark brown	Iron's concretions. Many sherds
	65	Sandy mud	7.5YR 4/2 Dark brown	Without archaeological material
	70	Slightly gravelly, sandy mud	10YR 4/3, Dark brown	Iron's concretions. Many sherds and bone tool
	>75	Sandy mud	7.5 YR 6/2, Gray	Hidromorfic. Without archeological material

incising groove or drag and jab (*surco rítmico*) and 16.7% a full line incision. In some cases the recurring incising groove was employed to draw straight and stepped lines (Fig. 7d), and in others to design rhombi, and zigzags to represent the eyes, mouth and, in some cases, feathers of zoomorphic figures (Fig. 7a and b). A percentage of 26.6% of the analysed vessels show adherences on the outer surface – soot remains (82.1%), undefined adherences (2.4%), and dark stains (15.5%) – and 5.1% on the inner surface – soot remains (71.4%), undefined adherences (19.1%), and dark stains (9.5%). Soot, being a product of combustion, may be regarded as evidence of the use of the vessels, whereas the blackening can also be due to the firing conditions of the piece or to their being discarded in a combustion structure (García Rosselló and Calvo Trias, 2006).

Several recompositions of two, three, and four fragments from levels 3 and 4 (grid square 1), 11, 13, 14, and 17 (grid square 2), 3, 7, 12, 14, 15, and 17 (grid square 3), and 5, 9, and 14 (grid square 4), were carried out, which suggests part of the ceramic material shattered *in situ* and was not horizontally re-transported. Finally, the presence of red pigments (hematite, according to the XRD analyses effected together with the study of mineral structure by MEB), hearth structures, and fired and unfired clods of clay, some with signs of kneading (nail marks and finger prints), would be proof of local pottery production at Los Tres Cerros 1.

Among the most remarkable finds, in grid square 1, level 13, a whole vessel of an open shape, without decorations and internally divided into three hemispherical compartments, was recovered (Piece No. LTC1.1.13.267; Fig. 7e). A very similar container with three compartments has been recovered from the slopes of the left bank of the Paraná in the vicinity of Diamante. This container is presently deposited at the Departamento de Estudios Etnográficos y Coloniales de Santa Fe.

In grid square 2, level 15, 22 sherds belonging to a thin-walled (less than 0.35 cm), undecorated open vessel were turned up. In addition to the sample that has been systematically analyzed, other exceptional finds were made in other parts of the site, such as three almost complete pieces (LTC1.Sup.41; LTC1.5.9.323; LTC1.6.15.155:

Fig. 7f) of the so-called *campanas* or “bells” (in the sense of Serrano, 1950 they are roughly bell-shaped pottery items, generally having a modeled zoomorphic head at the top), one of them is a miniature (LTC1.Sup.41), and large incised appendages of the solid sculpted variety, which represent bird-heads (LTC1.7.3.99; LTC1.8.6.132 and LTC1.S3.1) and snake-heads (LTC1.8.8.211: Fig. 7b).

Considering only the analyzed sample, in general no substantial variations are observed, either technological or stylistic, throughout the stratigraphic sequence. Neither are there significant differences in the pottery of the three identified layers. The collection of pottery remains appears to be a relatively homogeneous group. In terms of vertical distribution there are certain density peaks in levels 3, 5, and 11, to which peaks can be added level 17 if the total weight of the pottery per level is taken into account. Additionally, if one considers the relation between dimensions and weight per level, which would represent the size of the sherds, the significantly largest of these was discovered in levels 16 and 17.

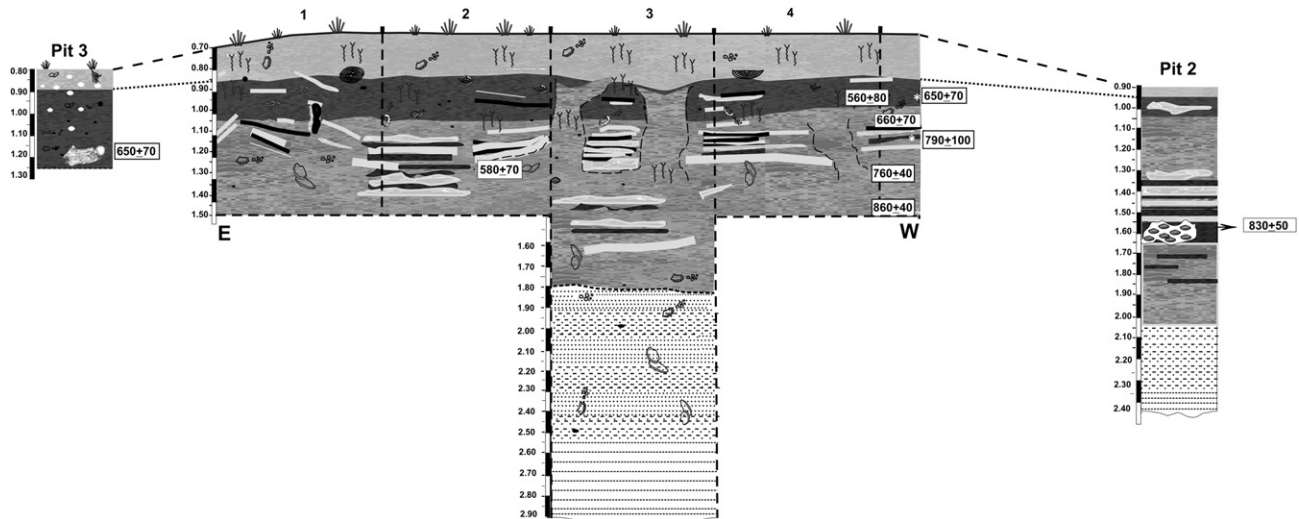
Below these levels, at layers IV and V, the density of pottery (and other cultural remains) thins out significantly. However, these layers were excavated in only one grid square that reached level 39. A cursory analysis of this small sample shows the absence of the bird-heads incised appendages of the solid sculpted variety, and some pieces of thick “bottle neck” (known as *alfarerías gruesas*). A round and flat, disc-shape sherd perforated in the center was also found in level 32. This piece could be interpreted as a spindle whorl used for weaving fibers.

3.2.2. Faunal remains

The faunal remains from the LTC1 excavation are still under study. A preliminary analysis indicates the recurrent presence of the coipo (otter) (*Myocastor coypus*), represented by the majority of the elements that make up both the axial and appendicular skeleton (C. Leon, personal communication, 2009). In addition, bones of the capybara or carpincho (*Hydrochaeris hydrochaeris*), lobito de río (*Lontra longicaudis*), canids (Canidae), and micro rodents have been identified, as well as fresh water shells (*Diplodon* sp.). The coipo and

Table 2
Lithological characteristics of soil horizons in alluvial deposits at distal test pits.

Test pits	Deepness from surface (in cm)	Grain size (Folk's classification)	Color	Observations
5 32° 51' 16.6"; 60° 33' 35.3"	0–30	Sandy silt	5YR3/2, Dark reddish brown	Many Roots. Without archeological material
	30–60	Muds	2.5YR3/2, Very dark greyest brown	Ceramics fragments. Roots. Fe and Mg nodules. Gley
	>60	Silt	5Y3/1, Dark gray	Without archeological material. Gley
7 32° 51' 15.5"; 60° 33' 33.7"	0–25	Sandy Silt	10 YR 3/2, dark greyest brown	Many Roots. Without archeological material. Fe and Mg nodules
	25–60	Muds	10 YR 3/2, dark greyest brown	Fe and Mg nodules. Archeological material
	>60	Silt	2.5 Y 3/0, Grey very black greenish	Compact. Gley without archeological material
8 32° 51' 7.8"; 60° 33' 29.3"	0–20	Clay	10 YR 3/2, Very black greyest brown	Humic carpet. Gley without archeological material
	>20	Clay	10YR 4/3, Black Brown	Compact, structure: angular blocky. Fe and Mg nodules. Gley without archeological material



REFERENCES

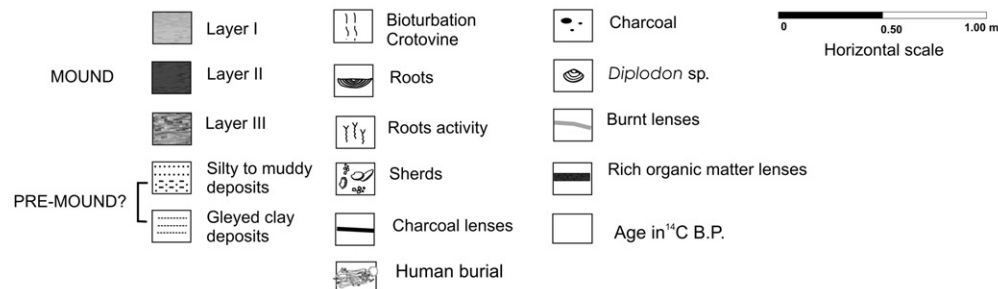


Fig. 5. Southern profile of the excavation (grids 1, 2, 3 and 4) and adjacent test pits. Stratigraphic characteristics.

carpincho bone remains show clear cut marks, which are evidence of human processing.

The most abundant remains are those of fish recovered during water screening. A first count of fish remains was made, giving a total of more than 4000, belonging to different-sized taxa (Zangrando and Ramos Van Rapp personal communication, 2009). Among these were determined on different levels: the Siluriform Order, represented by two families, not yet determined to species

level; they are the Doradidae family (armado) and Pimelodidae family (catfish). The species which have been determined are: *Hoplias malabaricus* (tararira), *Leporinus obtusidens* (boga) and *Cichlasoma facetum* (chanchita). There were abundant vertebrae, fish bones, and bones of the neurocranium. In the central grid squares of the excavation, the non-sloping ones, there are two peaks of concentration of fish remains: one among levels 3, 4, and 5, and the other in levels 10 and 11.

Table 3
Lithological characteristics of mound layers. References: IIIa: lenses with high organic content, IIIb: lenses of burnt sediments and IIIc: lenses of burnt sediments with charcoal.

Layer	Grain size (Folk's classification)	Color	Thickness	Observations
I	Slightly gravelly, sandy mud	2.5 YR 3/2, Very dark greyest brown	15 cm	Roots, high organic matter. Compacted by trample. Archeological material
II	Slightly gravelly, sandy mud	2.5 YR 4/2, Dark greyest brown	20–40 cm	Loose. Lenticular burning sediments and crotonines. Bioturbations features. <i>Diplodon</i> sp. valves. Abundant archeological materials. Mottled hematite.
III	General attributes		40 cm	Alternation of high organic, charcoal and burned sediments in very thin to thin tabular beds (IIIa, IIIb and IIIc). Archeological material. Lenticular concentration of hematite
IIIa	Slightly gravelly sandy mud	2.5 YR 4/2, Dark greyest brown	Very thin tabular beds	High organic content. Fine particles of charcoal.
IIIb	(1) Slightly gravelly, sandy mud (2) Gravelly suddy sand	5 YR 3/4, Dark reddish brown 5 YR 6/8, Yellowish brown	Very thin tabular beds	Pseftic clast or fragments of burning clays and muds some with valve fragments in their mass. Fe nodules. Charcoal fragments. Sherds, big valves fragments, fish bones and flakes. Sand clast or fragments of burning clays and muds. Fish flakes and sherds
IIIc	Slightly gravelly, sandy mud	2.5 YR 3/2, Very dark greyest brown	Very thin tabular beds	Carbonate veins. Fine particles of charcoal.

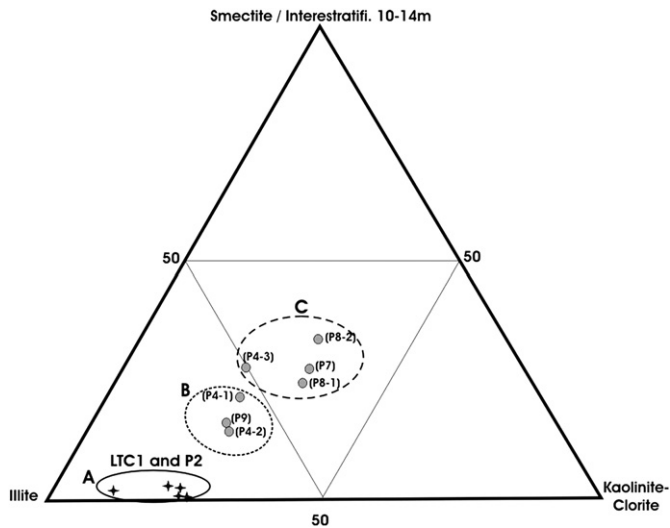


Fig. 6. Clay mineral content in the samples. References: (a) clay associations in the samples from the LTC1; (b) and (c) clay associations in the samples from the alluvial deposits.

3.2.3. Lithic and bone technology

Lithic artifacts are very scant: only 11 pieces were registered on-site, mostly undifferentiated debris. Despite their scarcity, the raw materials come from diverse geological formations in the Entre Ríos Province. The rocks exploited in LTC1 include sandstones from the Paraná and Ituzaingó formations, which appear at more than 50 km from the site, on the left bank of the Paraná River and its tributaries; silicified limestones from the Puerto Yeruá Formation; and vesicular basalt from the Serra Geral Formation, both available in the Uruguay River and its tributaries, more than 230 km from the site.

Additionally, 4 mid-sized (from 45 to 75 mm long) bone points were recovered between levels 2 and 8. The tips and edges of these bone tools have been sharpened or rounded by rubbing with abrasive substances. One of the points is a flat triangular one (Fig. 8b) and was manufactured from the rib of a large mammal. It possesses no shaft, though it may have broken off the body (the base is not bevelled). The other three heads are of the fluted type (Fig. 8a) and half-fluted types (Fig. 8c and d). Both kinds of points are made from long bones of a medium rodent or large mammal that have previously been fractured, and one perhaps from the antler of a deer hollowed out by removal of the spongy tissue. These

Table 4
Quantification of sherds from the LTC1.

Grid 1, 2, 3, 4	Frequency	Weight (in g)	Weight average in g	Size average in mm
Level 1	349	1501	4.3	–
Level 2	505	1933	3.82	36.27
Level 3	1090	3919	3.59	37.35
Level 4	506	2079	4.1	32.4
Level 5	904	2775	3.06	39.01
Level 6	435	1268	2.91	33.89
Level 7	430	1583	3.68	35.12
Level 8	489	1393	2.84	35.41
Level 9	326	1217	3.73	38.43
Level 10	413	1738	4.2	41.51
Level 11	659	2675	4.05	41.31
Level 12	449	1997	4.44	44.84
Level 13	509	2208	4.33	42.23
Level 14	482	2207	4.57	43.35
Level 15	499	2015	4.03	44.78
Level 16	248	1858	7.49	45.68
Level 17	496	2905	5.85	43.88

different types of points discovered in LTC1 have a wide spatial distribution in the sites of the Middle and Lower Paraná alluvial plain (Buc and Pérez Jimeno, 2010).

3.2.4. Human remains

On the mound slope, human bones were found in grid squares 11, 12, 13, and 14 (which included test pit 3) as from a depth of 30 cm from the surface of the land. There, the remains of at least four individuals were identified, some covered with red pigments (hematite) (C. Scabuzzo personal communication, 2009). The remains belong to adults and sub-adults of both sexes. The individuals are represented by incomplete skeletons and in some cases by a few bones. To date, it has been possible to determine the burial of the skeletons in a primary and secondary manner, and isolated remains.

The long bones (femurs, humeri, radii, and shinbones) of two of these individuals (individual 1 and 2) were lined up in a NE–SW direction, and placed in the form of a funerary package that also included a skull, scapulae, pelvises, a clavicle, ribs, and vertebrae. Individual 1 is an old female adult, whilst individual 2 has been determined to be a young male adult. On top of these skeletons a solid modeling appendage of a ceramic parrot head (LTC1.S3.1) was found, the largest in the site. This object may have been put there as a funerary offering. Additionally, from on top of and around the human skeletons, plentiful sherds, *Diplodon* sp. valves, coipo jawbones, fish bones, and pieces of charcoal were recovered. At the moment, it is uncertain whether they are a mixture of materials discarded during previous or post occupations or if they can be classified as some sort of material related to burials (see similar cases in Torres, 1911; Caggiano et al., 1978; Ceruti, 1993; Nobile, 2002). A radiocarbon date of one of the individuals (no 2) in the funerary package gave an age of 650 ± 70 ^{14}C BP (LP-2292). The colorimetric and textural characteristics of the sediments where this burial was found place it in layer II, identified on the upper part of the LTC1 mound (Fig. 5).

In levels 10 and 11 of the adjoining sectors in grid squares 9, 5 and 15, there was a very clearly defined bonfire with remains of charcoal and burnt bones. Inside this fire the burnt fragments of a human skull, including a few teeth with remains of adhered red pigments were recovered, as well as a knee-bone and a right clavicle. This could be the result of a cremation or some other kind of ritual including anthropophagi.

3.2.5. Chronology

Eleven radiocarbon dates on different materials from the Los Tres Cerros locality were obtained. For site LTC1 there are 9 radiocarbon dates: one on a human bone (mentioned above), three on *Diplodon* sp. valves in a good state of preservation, and five on charcoal. For LTC2 and LTC3 there is dating of the organic matter of the upper layers with archaeological material from each of the sites, which enables only a tentative estimate of the average age, as they give information of the carbon's average time of residence. As Table 5 indicates, the ages obtained in the three sites of the location are very young: 560 ± 80 to 920 ± 40 ^{14}C BP. This shows that the three sites were occupied, probably not in a continual manner, a minimum of four centuries prior to the Spanish Conquest including, at least during some periods, a simultaneous use of more than one *cerrito*. All dates of the three mounds come from their upper levels (in the case of LTC1 the middle levels as well). In other words, this chronological range allows an assessment of the end of indigenous use of the site, but not its commencement.

As can be seen in Table 5, the chronological sequence of dating from LTC1 maintains a stratigraphic coherence save for LP-2281, which comes from level 13 and gave an age of 580 ± 70 ^{14}C BP. This sample comes from charcoal found in layer III of a sector



Fig. 7. Pottery from LTC1. (a) Trimmed Silhouette with the figure of a bird-head (LTC1.1.14.308); (b) zoomorphic modelling. Snake-head (LTC1.8.8.211); (c) tail-like appendage (LTC1.4.16.G1); (d) sherd decorated with stepped drag-and-jab forming (LTC1.3.16.P); (e) vessel with three compartments (LTC1.1.13.267); (f) Bell (LTC1.6.15.155).

disturbed by a crotovina, where the burrow dissected the sequence of burnt sediments that characterize this layer. Thus, it is considered that the position of the material dated is the result of post-depositional processes that have acted on the deposit and need to be taken into account when the time comes round to analyze the factors intervening in the mound's formation. For this reason it is desirable to possess a good set of chronological information in order to carry out more reliable estimates of the dating chronology.

Fig. 9 shows the calibration of the 9 dates from LTC1 with two sigma standard deviation (using OxCal v.4.1.7). A chronological range of occupation between 1156 and 1505 AD occurred (see also Table 5), and the entire occupation of the site occurred during the pre-Hispanic period. Within this range two pulses are observable showing a certain concentration of dates, which could be related to the intensity or stability of the human occupation. The first pulse would include dates ranging from 560 ± 80 to 660 ± 70 ^{14}C BP and the second pulse from 760 ± 60 to 860 ± 40 ^{14}C BP.



Fig. 8. Bone tools from LTC1: (a) fluted point (LTC1.15.8.38); (b) flat triangular point (LTC1.15.8.32); (c) half-fluted point (LTC1.5.PN); (d) half-fluted point (LTC1.5.2.53).

4. Discussion

The geoarchaeological results obtained indicate that the monticular structure LTC1 shows accretion of anthropic layers (sensu Harris, 1991). This consideration rests on the contrast between the results obtained by grain size and mineralogical analysis of the samples from the mound and the surrounding plain. Appreciable textural differences were encountered between natural sediments from the plain with regard to those of the mound, modified by fire and the incorporation of archaeological materials: sherds, charcoal, shells, and bones. These materials of a coarser texture may have been incorporated intentionally for the accretion and consolidation of the structure and/or make up part of the record of multiple activities that developed at the site. Micromorphological analyses under way are aimed at providing elements for this discussion. A first approximation, by means of records of hearth, material culture, and events related to the spatial conditioning in the structure allows inference of the sequence of occupation episodes. However, the possible time lapses between these occupations have not been

reflected in the observed stratigraphical resolution, as no discreet features have been identified as erosion surfaces or sterile layers.

The presence of elements as aggradational and consolidating material has been amply reported for the monticular structures of Uruguay (in this respect see Bracco et al., 2000; Castiñeira and Piñeiro, 2000; Salles Machado, 2005; Suárez Villagrán, 2006). In the case of Los Tres Cerros 1, what is noticeable is the lack of coarse materials (coarse sands and pebbles) in the environs of the site. The response to this situation may well have been the employment of sediments with added pottery sherds, mollusc valves, and/or the firing of the sediments. The use of sediments with different textures and archaeological remains will have served to enhance the water drainage into the mound and to maintain its integrity (Milner, 2006).

Textural and compositional mineralogical analyses of the sediments indicate that at least the middle and upper levels of monticular structure LTC1 are the product of aggradation with selected and modified sediments. In layer III, the alternation of very thin beds or lenses of burnt sediments (at least 7) with abundant

Table 5
Radiocarbon dates obtained from Los Tres Cerros locality.

Site	Level	Lab. no	Material	¹⁴ C dates (years BP)	Calibrated dates ^a (AD)
Los Tres Cerros 1	5	LP-2295	Valves	560 ± 80	1288–1505
Los Tres Cerros 1	5	LP-2289	Charcoal	650 ± 70	1279–1435
Los Tres Cerros 1	7	LP-2284	Valves	660 ± 70	1275–1433
Los Tres Cerros 1	9	LP-2302	Charcoal	790 ± 100	1130–1406
Los Tres Cerros 1	13	LP-2281	Charcoal	580 ± 70	1289–1464
Los Tres Cerros 1	13	LP-2332	Charcoal	760 ± 70	1201–1397
Los Tres Cerros 1	16	LP-2296	Charcoal	860 ± 40	1158–1278
Los Tres Cerros 1	Burial 2	LP-2292	Human bones	650 ± 70	1279–1435
Los Tres Cerros 1	Test pit 2	LP-2243	Valves	830 ± 50	1156–1297
Los Tres Cerros 2	70–75 cm	LP-2303	Organic matter	920 ± 40	1099–1230
Los Tres Cerros 3	50–60 cm	LP-2305	Organic matter	600 ± 60	1300–1446

^a CALIB 5.0.1 Program (using 2 sigma).

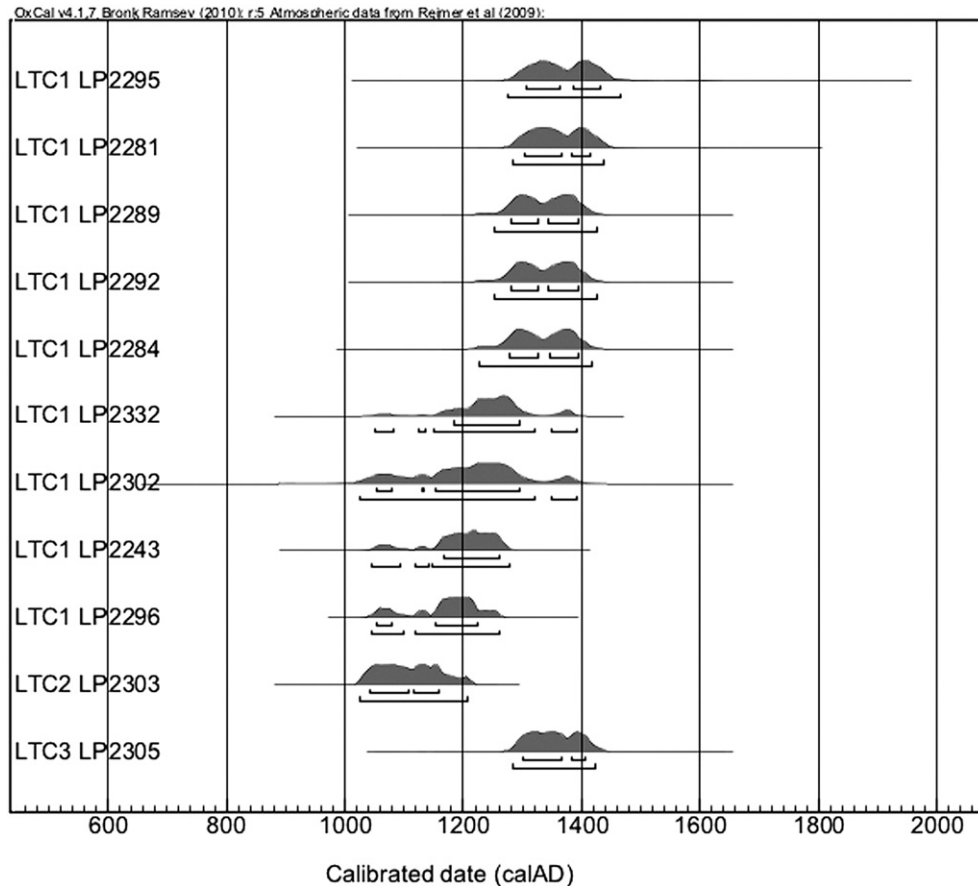


Fig. 9. Probability curves for calibrated ^{14}C dates from Los Tres Cerros locality (OxCal v.4.1.7 Bronk Ramsey 2010; using 2 sigma).

organic sediments (at least 8) suggests intermittent and rhythmic constructive or aggradational processes of the mound. Starting from the top of this layer III, made up of one of the highly organic sediment beds, a change in the accretional pattern is visible. In this way, in layers I and II, and owing to the absence of notable changes in the nature of the materials, discontinuous surfaces have not been observed, at least in field observations.

The monticular structure of LTC1 offers evidence, mainly in its mineralogical composition, that would indicate the provision of sediments did not take place by use of the immature hydromorphic soil with poorly defined horizons from the surrounding plain. The clay mineral composition in the alluvial deposits (types B and C) is different from the clay mineral composition of the mound samples (type A). The source of the mound sediment is still unknown. Perhaps it was extracted from pre-deltaic tidal flat or open estuary sediments, in areas not affected by the Paraná River floods, from the bed of ponds, lakes, swamps, or from non-functional channels. The size, form, and internal stratigraphical structure (of thin, superimposed layers, and altered by firing) of monticular structure LTC1, indicate that its formation is a consequence of the accretion of anthropic strata during a series of occupational events between 560 ± 80 and 830 ± 50 ^{14}C BP. These events will have generated a deliberate elevation of multifunctional areas for their habitational use.

In the analysis of the vertical development of the structure by means of the exploratory probe, the presence of alluvial materials in the basal sector (layers IV and V), and on which the monticular structure would have been constructed, has been suggested. The unknown factors related to the formation of the basal levels, together with those of its limits or contacts with the upper and

middle sectors (layers I, II, and III), and on the presence of *in situ* or re-deposited cultural material, will be addressed by means of in-depth (sedimentological, micromorphological, and chronological) studies in the next stage of this research.

At least two main areas can be distinguished at site LTC1: a denser one on the raised part of the site – on the monticular structure itself; and another around it, with less density of archaeological material. At first sight, this suggests a differentiated mode of occupation at the site, according to the different activities performed in the space. As a whole, the site shows strong evidence of domestic activities (campfires, abundant remains of food, the residues of every-day materials such as numerous fragments of pottery vessels or lumps of clay) which suggest it was occupied for residential purposes between ca. 560 ± 80 and 860 ± 40 ^{14}C BP. During this part of the site's history, it would have functioned as a place for living in a residential camp or may be something more stable like a village. The site was also used for funeral purposes at least around 650 ^{14}C BP, simultaneously with one of its periods of occupation represented by the pulses suggested by the increment in the signal of archaeological intensity. The types of interment were primary, secondary, in a funerary package, and isolated bones. The presence of human remains burnt in a hearth, in the central part of the mound with evidence of domestic activities, suggests two basic possibilities: one is the cremation of the bodies; the other, the ritual consumption thereof (anthropophagi). With the data available it is still not possible to evaluate which of the hypotheses is the more likely. The evidence available so far indicates that the function of the site was probably a multi-purpose one, though with a greater emphasis on the residential component.

The pottery present throughout the site's stratigraphic sequence, in layers I, II and III, is relatively homogeneous and is compatible with Goya-Malabrigo (González, 1977; Ceruti, 2003). There are no substantial changes between these layers or among the materials of the levels of excavation. The only difference observed is that in the deepest excavated levels the sherds are larger, which could indicate a differential discarding pattern as well as variations in the intensity of post-depositional processes such as reduced trampling. At this stage of research it is not yet possible to detect whether all (or most) of the sherds are the product of *in situ* breakage during the events of occupation, or if some of the sherds have been broken down and incorporated into the site as a filling, alongside sediment and other materials during the building phases of the monticular structure. In subsistence terms the exploitation of coipo, capybara, and calm water fish is evident. In the case of fish, their exploitation increases towards the upper levels. Towards layers IV and V the density of pottery decreases noticeably, and no clay bird-heads appendages, though this may be due to sample bias.

No pottery has been discovered in any levels that might be assigned to the Tupiguarani or any other regional tradition. The absence of Tupiguarani evidence agrees with previous knowledge on the Upper Delta of the Paraná River where the archaeological signal of the Guarani is synchronous but still very weak.

5. Conclusion

The sedimentological results derived from this study allow the proposal that the upper and middle parts of mound structure LTC1 (layers I, II and III) are the product of accretion with selected and modified materials, which does not come from the flatland immediately surrounding the mound. In turn, the preliminary approach to knowledge of the structure's vertical development, suggests that the mound is founded on sediments of the floodplain. Similarly, cultural evidence recovered at these foundational levels, except for the clay ones, might point to the existence of occupational episodes on the natural *pre-cerrito* surfaces.

The presence of relatively large mounds, grouped together and of roughly the same age, as those of the Tres Cerros locality, has implications for the discussion of the socio-political organization. First, building on land might presuppose some sort of consolidated leadership able to organize the communal work of moving sediments and erecting earth structures (see discussion in Bonomo et al., in press). In societies adapted to similar environments and having many traits in common, such as the Guató of Pantanal of the upper Paraguay River, the mounds are built through the cooperation of the extended family group (Eremites de Oliveira, 2002). This ethnographic example therefore suggests a possibility that the building of earthen mounds can be performed by societies without any marked hierarchical divisions, in which the organization of the collective building process is based on interlacing social relationships. These hypotheses will be contrasted as research advances in the Los Tres Cerros locality and the rest of the lower Paraná River.

Second, the grouping of the three mounds in close spatial association at Los Tres Cerros clearly distinguishes it from other sites in the region, made up of isolated mounds or sites placed on natural elevations (*albardones* or levee) in marshes and pools. These characteristics, together with the site's complex sedimentary sequence, the degree of wholeness of some vessels and the presence of large-sized ornamental figures are noticeable features at this locality, especially if they are compared with other contemporary sites like Taperá Vázquez (dated ca. 650–520 ¹⁴C BP; Bonomo et al., 2010b). This makes it possible to put forward the hypothesis that in the Paraná Delta, besides possible functional differences, a hierarchy of settlements may have existed that could

be a reflection of social distinctions of some sort (i.e. a ranked society). In addition to these elements, the preliminary data obtained at the Los Tres Cerros locality show an area of less dense occupation around the central mound which could point to a spatial intra site differentiation.

The chronology of LTC1 shows that the site was occupied recurrently between the 12th and 16th centuries (and before as well, although there are no dates for the base levels), which suggests these settlements are related to the indigenous people that the Europeans encountered in the early 16th century in the Upper Paraná Delta or to their immediate predecessors. The inferred characteristics for the occupation of LTC1 and other Upper Delta sites (see Bonomo et al., in press) uphold this hypothesis. Indeed, the reports left by chroniclers and travelers indicate a mode of life adapted to the exploitation of aquatic surroundings (above all the hunting of the coipo, and fishing), the seasonal occupation of the Lower Paraná islands (where the inhabitants "had their seedbeds", see Wieser, 1908:56–57), raising maize, beans and squash, and the practice of primary and secondary burials. In this way, the preliminary information presented in this paper supports the hypothesis that the Goya-Malabrigo archaeological entity would be related with what is generically known as the Chaná-Timbú.

The Goya-Malabrigo archaeological entity has been proposed based on ceramic very definite stylistic characteristics and associated with the exploitation of Lower and Middle Paraná River resources, reaching as far as the Lower Uruguay (see recent revision in Ceruti and González, 2007). For these authors, Goya-Malabrigo represents "the maximum expression of the use of the fluvial system" (Ceruti and González, 2007:115). Additionally, the presence of these microbotanical remains (particularly starches) at site assigned to this archaeological entity in the Paraná River Delta has made it possible to confirm the pre-Hispanic presence of cultivations such as maize (*Zea mays*) and beans (*Phaseolus* sp.) (Bonomo et al., in press). More recently, Ottalagano (2010) has discussed the regularities in this pottery style, especially in relation to the appendages of bird-heads, and has proposed that it might be considered an emblematic style (in the sense of Wiessner, 1983) that might contain precise messages as to the group identity. The temporal and geographical extension of the representations would be linked to the metaphorical potencies of these animals. This new interpretation complements previous studies and would explain the stylistic stability of Goya-Malabrigo on the basis of its role in the identity-configuration at a group level.

Following the idea of Ceruti and González (2007), which the results summarized in this paper confirm, and taking into account the suggestions of Ottalagano (2010), the Goya-Malabrigo pottery assemblage is proposed as a "sociotechnical aggregate" (in the sense of Gosselain, 2000), so that not only are morphology and style considered but also technological aspects and the *chaîne opératoire*. Thus these "sociotechnical aggregates", far from being a monolithic unity, are the result of "...an intricate mix of inventions, borrowed elements, and manipulations that display an amazing propensity to redefinition by individual and local groups" (Gosselain, 2000:190). As already proposed, Goya-Malabrigo is strongly associated to river exploitation but, in addition, like the evidence of site LTC1 and others detected in the area, is linked to a settlement pattern that occupied the elevated spots in the fluvial plain of the Lower and Middle Paraná River and the Lower Uruguay River. Some of these relatively high places, such as the *albardones* are the result of the fluvial dynamics after 6000 BP, whereas others, like the *cerritos*, are the consequence of conscious and planned human intervention. In both cases, the occupation of existing landforms and the elevation of these seem to be a firmly rooted behavior during the late Holocene in the Southeast of the South American Lowlands. The *cerritos* of the Paraná Delta are yet another of the multiple and

complex landscape modifications carried out by the indigenous societies of America before the arrival of the Europeans.

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