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HEADS 5

Human Origin Sites and the World Heritage Convention in the Americas

VOLUME I

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The First Colonization of Brazil: A Review of the Pleistocene-Holocene Transition, Chronologies and Routes

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In the Pleistocene-Holocene transition, the eastern lowlands of South America had already been occupied by hunter-gatherer populations that developed diversified strategies to adapt to the transformation of the landscape. In chronological terms, such diversity involves an initial occupation earlier than those assumed by traditional models. Radiocarbon dating that supports the hypothesis of a Pleistocene initial settlement of South America have been obtained for several archaeological sites in Brazil; but the validity of these data has been questioned, as they pertain to isolated contexts whose discrete characteristics make it difficult to identify any association with human activities (Dias, 2004; Dias and Bueno, 2013; Bueno, 2011; Bueno et al., 2013; to additional critical analysis to Brazilian Pleistocene sites, see also Meltzer et al., 1994; Prous, 1997; Schmitz, 1987, 1990).

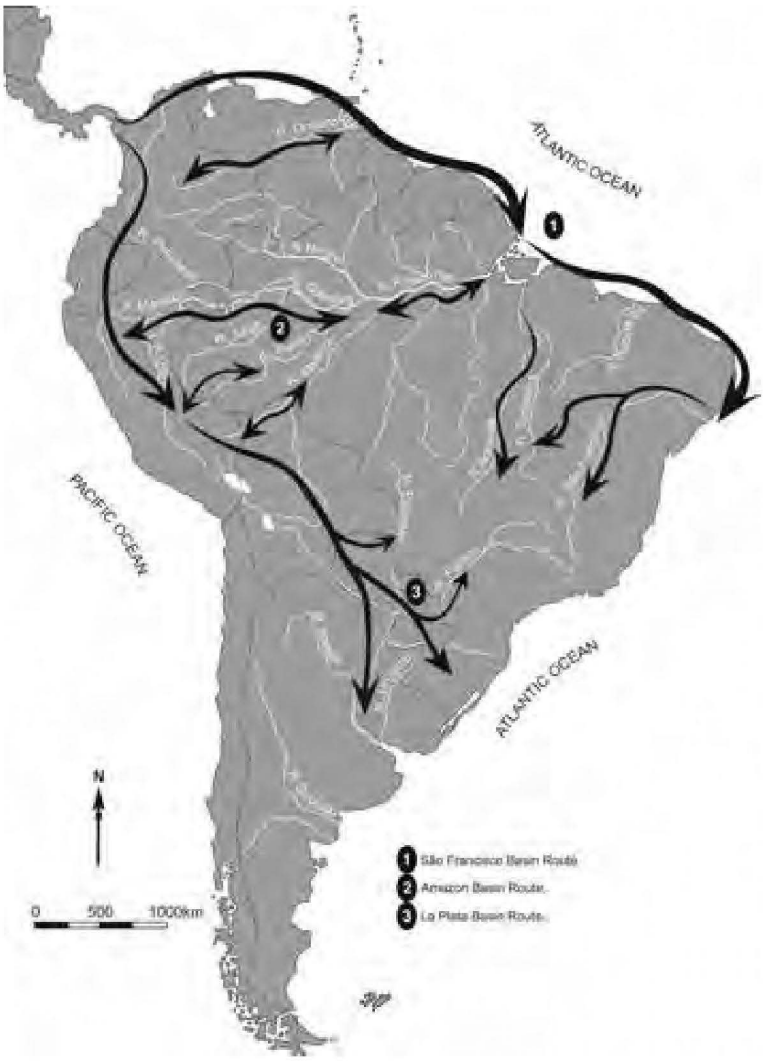

Figure 1. Hypothetical main routes for the initial colonization of the eastern South American lowlands. Dias and Bueno, 2013, p. 351.

Likewise, some models suggest that the pioneer colonization route of eastern South America occurred mainly through the Atlantic Coast, and the dispersal movements into the interior happened only in the Early Holocene, when the environment became more productive (Araújo et al., 2012; Dillehay, 2000; Dillehay et al., 1992; Dixon, 2001; Miotti, 2003, 2006; Miotti and Salemme, 2003). These models generally consider the geographical conditions of the Atlantic shore as a facilitating agent for pioneer population movements, and to some extent assume that the presence of tropical forests in the north of South America constituted an ecological barrier that inhibited an ancient human presence. However, recent archaeological, bio-anthropological and palaeoenvironmental research suggests that the process of initial colonization of the South American eastern lowlands entailed multiple strategies that included ancient inland routes related to the exploitation of fluvial settings and forest habitats.

Bueno et al. (2013) document the quantity, quality and distribution of archaeological ^{14}C dates for Brazilian territory between 13,000 and 8,000 BP. Analysing the resulting database, the authors indicate 277 dating samples for 90 sites distributed all over Brazil. The inclusion criteria for ^{14}C dates required information be available on: 1) type of material dated, method of analysis and sample lab number; 2) stratigraphic provenience of dated sample; 3) cultural associations (artefacts, features) with the dated sample; and 4) statistical uncertainty of the date (with the additional criterion that the standard error bars should be no greater than 300 years).

The authors analysed the dynamics of population expansion and cultural diversification, and their core hypothesis is that the colonization of the South America eastern lowlands involved two phases: *pioneering* and *establishment.* They may have been

initiated at different times and left distinctive demographic and cultural signatures in the archaeological record. The *pioneering* phase would have involved entering, exploring and gaining familiarity with the landscape, with the selection of specific places as foci of recurrent activity to facilitate exploitation of previously uninhabited lands. This process led to an archaeological record of low average population density, but concentrated in physically distinctive places that could have been frequently re-occupied. Regarding rates of population expansion and regional cultural diversification in inner Brazil, an archaeological threshold seems to have been reached in all occupied regions at *c.* 10,500 ^{14}C BP. The number of sites increased, as supported by the evidence of settlement of all biomes and, most importantly, there is clear evidence of inter-regional cultural diversity. In this sense, the 11th millennium ^{14}C yr BP represents the *establishment* phase of the colonization process of Brazil. From the beginning of the Holocene onwards, human populations expanded radially along branching routes and in an increasing range of locations, as part of a process of social and cultural construction of a landscape whose geographical structure was now familiar. There is cultural evidence of regional variation, possibly associated with the definition of smaller territories, with greater local density of occupation and regular cycles of annual mobility. The Early Holocene was the first phase of a more permanent settlement of inner Brazil, with delimitation of territorial boundaries associated with a peopling process, which involved multiple routes and dispersal dynamics (Bueno et al., 2013; Dias and Bueno, 2013).

Based on the results of the radiocarbon database and following the original hypothesis of Sauer (1944), Dias and Bueno (2013) suggest at least three main routes for the *pioneering* phase of human colonization of the eastern South American lowlands (Figure 1).

São Francisco Basin Route would be the oldest inland route with dates from the Pleistocene-Holocene transition. Associated with unifacial lithic industries (Itaparica Tradition), it probably was related to another *pioneering* settlement route linking the Caribbean, the northern Atlantic Coast and eastern portions of the Andean Chain. In this route, the São Francisco River may have linked the Atlantic Coast with north-eastern and central Brazil. This process continued in an *establishment* phase of the colonization process during the Early Holocene, with a radial expansion connecting other important hydrographic basins of central Brazil, such as Araguaia-Tocantins and La Plata.

During the early Holocene, a second *pioneering* route through the Amazon basin could have connected the northern Guyana Plateau, Venezuela and Colombia, entering Brazil by the rivers of the northern part of the country and by the lower Amazon. This hypothesis is based on the chronology and stylistic similarities noted between the Guyana and the lower Amazon basin archaeological record. The Brazilian data for this period support the idea of an early adaptation to tropical forests, also confirmed by the Colombian archaeological record. It can also be proposed that this northern route was related to the ancient sites of the middle Orinoco valley and the inland mountains of Colombia. The connection with northern Brazil could have been facilitated by rivers such as the Branco, the Trombetas and the Paru do Leste.

In the early Holocene, a third inland *pioneering* route to south and south-eastern Brazil is represented by bifacial lithic industries with projectile points (Umbu Tradition), which may have followed the fluvial systems of the Paraguay, the Paraná and the Uruguay rivers. Although there is still scant archaeological evidence for this area, the available information in Brazil seems to support the idea that the Bolivian llanos seem to have been a 'hot-spot' for population dispersals into southern South America. In this scenario, the La Plata Basin would have been a primary pathway connecting the east Andes with the Atlantic Coast, and even with the Amazon basin. Towards the mid-Holocene evidence of an *establishment* phase is represented by the growing number of sites in southern and south-eastern Brazil, stimulated by the spreading of the Atlantic Forest biome. It is also possible that this same scenario was present in similar ecological settings in Paraguay and north-eastern Argentina, where the archaeological record for this period still is poorly known.

The São Francisco Basin Route: The importance of Serra da Capivara and the Peruaçu Regions to Settlement of America Models

The pioneering phase of São Francisco Basin human colonization is represented by the regions of Serra da Capivara and Peruaçu. The location of several contemporary sites in these two areas, thousands of kilometres apart, support the idea that river valleys were one of the first main dispersion routes into the South American interior (Bueno, 2011, 2013; Bueno et al., 2013; Dias and Bueno, 2013).

The Serra da Capivara region is located in Piauí State, north-eastern Brazil. Archaeological research in this area was initiated in the 1970s by a French-Brazilian scientific mission, coordinated by Niéde Guidon (Guidon, 1978). The Serra da Capivara National Park was created in 1979 and has an area of 129,139.9 hectares, with a perimeter of 214.2 km. In 1991 it was inscribed on the UNESCO World Heritage List and in 1998, a proposal was submitted to the UNESCO Tentative List to incorporate three

Figure 2A. Boqueirão da Pedra Furada site, Serra da Capivara, Brazil © Sirlei Hoeltz, 2010

Figure 2B. Boqueirão da Pedra Furada site, Serra da Capivara, Brazil © Sirlei Hoeltz, 2010

contiguous Permanent Preservation Areas to the Park, with an additional 35,000 hectares (Guidon, 2007; Pessis and Guidon, 2007).

Serra da Capivara National Park spreads over a geological border where an extensive cliff separates the Piauí-Maranhão sandstone plateau from the São Francisco River plain. On both the slopes of the escarpment and the inner valleys, there are many rockshelters with paintings. Sites with rock engravings are also numerous on rock outcrops located on the banks of ancient and now intermittent rivers. The rock art is characterised by anthropomorphic figures and representations of a narrative nature, by compositions illustrating daily life and ritual scenes of the human groups that lived in the region. They also represent very diverse themes, such as dancing and hunting, but also sex and violence depicted in the form of battle, capture and execution scenes (Pessis, 2003; Pessis and Guidon, 2007) (Figure 2).

In the park area there is a record of more than 900 prehistoric archaeological sites, 657 of them with rock art. One of these sites is Boqueirão da Pedra Furada rockshelter, which presents Pleistocene dates. It is associated with a sandstone cliff, carved by waterfalls that contributed to the deposit formation. Between 1978 and 1987 an area of approximately 400 m^2 was excavated in the eastern and central portion of this site, revealing thousands of charcoal fragments in all levels, 156 archaeological features (interpreted as hearths) and around 8,000 lithic artefacts, 600 of them in the Pleistocene layers. The rockshelter's sedimentation is the result of two different phenomena: 1) the desegregation of the sandstone wall in the protected portion of the site; and 2) the quartzite pebbles which originated from the upper conglomerate that in times of major precipitations

Figure 3. Lapa do Caboclo 2, Peruaçu, Brazil ©: Andrei Isnardis, 2014

are dragged and projected over the slopes of the scarp. Due to the homogeneity of sedimentation there are no macroscopically different levels, but lenses of burnt remains which have discontinuous planimetric development. As a consequence, part of the excavated remains has a poor correlation with the dated structures (Parenti, 1996).

In the 1990s, Guidon and her research team considered that Boqueirão da Pedra Furada rockshelter had reliable radiocarbon dates ranging from 6,150 to 50,000 ^{14}C yr BP. Two principal cultural phases were identified. The oldest is the Pedra Furada Phase, with 32 radiocarbon dates from the Upper Pleistocene. It is characterised by debris of artefacts and choppers and chopping tools made of locally occurring quartzite and quartz that constitutes the walls of the upper conglomerate of the rockshelter. The Pedra Furada Phase lacks bones, wood and other organic remains, save for diffuse pieces of charcoal; and was divided into three chronological periods: PF1, with dates from 50,000 to 35,000 BP; PF2, with dates from 32,000 to 25,000 BP; and PF3 with dates from 21,000 to 13,000 BP. Additional AMS dates on charcoal and thermoluminescence on burnt quartz pebbles suggest dates between 30,000 and 100,000 BP for the layers PF1 and PF2, but there is no evidence that the heating was related to human activities. The second phase is the Serra Talhada Phase, with 6 radiocarbon dates between 9,500 and 10,400 BP. It is associated with a unifacial lithic industry (Itaparica Tradition), also present in other 15 sites of Serra da Capivara Park, with additional 25 radiocarbon dates between 12,440 and 9,000 BP. It includes artefacts of local quartzite and exotic chert, abundant rock art, human remains, and fire structures (Guidon, 1986, 1989; Guidon and Delibras, 1986; Guidon and Arnauld, 1991; Guidon et al., 1994; Lourdeau, 2010, 2012; Martin, 1997; Parenti, 1992, 1996; Santos et al., 2003; Valladas et al., 2003).

Two other sites from the Serra da Capivara Park present chronological evidence from the Pleistocene-Holocene transition. Toca do Gordo do Garrincho site has a date of 12,210±40 ^{14}C BP associated with a human tooth articulated in a maxillary fragment and its stratigraphical location, above a stalagmite, provides a secure chronological reference point. At Toca do Sítio do Meio there is a clear stratigraphic association between a charcoal sample dated to 12,440±240 ^{14}C BP and an Itaparica Tradition lithic assemblage characterised by flakes, cores, scrapers and *limaces* made of siltite, quartz and quartzite. This site has been recently investigated by Eric Böeda and his team, and test excavations reveal dates of 20,280±450 and 25,170±140

^{14}C BP for charcoal fragments, but there is no other kind of cultural association to the dates (Böeda et al., 2013; Guidon et al., 1994; Peyre et al., 1998).

The Pleistocene dates of Boqueirão da Pedra Furada site stimulated a broad debate (Guidon et al., 1994, 1996; Meltzer et al., 1994; Parenti et al., 1996; Prous, 1997; Prous and Fogaça, 1999; Schmitz, 1987, 1990); and it results can be compared with two other Pleistocene sites recently investigated in the same area: Vale da Pedra Furada and Toca da Tira Peia (Boëda et al., 2013, 2014; Lahaye et al., 2013). All these sites have the same problematic, unresolved issues: a) a lack of information about the contextual relationship between dated samples and artefacts; b) a lack of specific palaeoenviromental, geoarchaeological and formation process studies for supporting a better understanding of the cultural and natural differences between the occupational phases of the Serra da Capivara region. The methodology of dating is not the main issue here, but the absence of palaeoecological studies on factors other than human activity that could be responsible for the Pleistocene charcoal lenses (Dias and Bueno, 2014).

Another important aspect in this debate is that dates between 50,000 and 100,000 BP for PF1 not only questioned the Clovis Horizon as indicating the initial settlement of the American Continent, but contradicted the accepted evolutionary chronology for the modern human Africa *diaspora.* Important arguments in this debate are offered by the studies of palaeoparasitology on human coprolites found in Boqueirão da Pedra Furada, although it only demonstrated a tendency for coastal patterns of colonization that also included the Bering route (Araújo et al., 2008).

The same chronological controversies occur in relation to the Boqueirão da Pedra Furada rock art. The site has around 1,000 figures on its walls, whose age was first estimated at around 20,000 years ago by association with radiocarbon dates of some rock blocks with paintings discovered during the excavation. However, all the dates have standard error bars of more than 300 years, suggesting contamination: 17,000±400 BP (GIF 5397); 26,300±800 BP (GIF 6309); and 29,860±650 BP (GIF 6651) (Pessis and Guidon, 2007). More controversial data related to dating techniques for rock art in the Serra da Capivara region was published by Watanabe et al. (2003). Using thermoluminescence and EPR dating for calcite formation found on a painting at Toca da Bastiana rockshelter, an age of 35,000 to 43,000 BP was obtained. This paper was strongly criticised by Rowe and Steelman (2003) whose analysis on the same site and other sites in the Serra da Capiva Park indicate a chronology between 3,700 and 1,200 BP for these paintings.

Located in Minas Gerais State, in the south-eastern region of Brazil, the Caves of the Peruaçu Federal Environmental Protection Area and Veredas do Peruaçu State Park are two continuous areas, of 180,702 hectares, that were nominated to the UNESCO

Figure 4. Santa Elina site, Serra de Araras, Brazil.

Tentative List in 1998. Peruaçu River is one of the few permanent tributaries of the São Francisco River on its course from sub-humid tropical Savanas's (*Cerrado*) where it started, towards the semi-arid regions (*Caatinga*) of north-eastern Brazil. The Peruaçu River flows through a deep canyon, boarded by high limestone cliffs with caves, holes and secondary galleries. It is crossed by impressive limestone 'bridges' and in some stretches still flows underground through monumental caves.

Archaeological investigations in the Peruaçu region were initiated in 1978, when the first surveys were conducted by Alan Bryan, Ruth Gruhn and Carlos Magno Guimarães. Between 1981 and 1999, André Prous coordinated a French-Brazilian scientific mission in this area that recorded 84 prehistoric sites; mostly rock shelters, 64 of them with rock art. The superposition of drawing in a same panel, associated with radiocarbon dating of layers with pigments and buried fragments of panels, suggests a chronology of production of rock art for between 9,000 and 2,000 BP (Figure 3). Although it is difficult to relate the paintings from different styles with specific cultural occupational periods, cronostylistic studies in Peruaçu and in the near region of Montalvânia suggest that the tradition of painting large panels with geometrical figures made with two or three colours, some of them with more than 15 m high (São Francisco Tradition), began during the Middle Holocene. Later, cultural diversification in this area is represented by other rock art stylistic variations represented by animals (mostly birds and deer) and human beings superimposed on these geometric panels (Stylistic Units Piolho do Urubu and Desenhos) (Isnardis, 2004; Prous and Ribeiro, 1996/1997; Prous and Rodet, 2009; Ribeiro, 2006).

Situated in the centre of the Peruaçu Canyon, Lapa do Boquete Cave is one of the oldest sites in the region. The excavations here occurred between 1988 and 1996 and extended over an area of 150 m^2, revealing the existence of nine stratigraphic units which were subdivided into 27 archaeological occupational levels. Units VII and VIII were dated between 12,070 and 9,870 ^{14}C BP. These levels have a rich lithic industry, bone instruments, pit structures, hearths, food remains and red pigments. The lithic assemblage from the lower levels is associated with hearth features and is essentially a unifacial industry, classified as the Itaparica Tradition. It consists of large utilised flakes, small cores, thick scrapers, end and side scrapers and *limaces*. A big engraved block with pecked figures, polished grooves and cupules was discovered under the unit VI dated at 9,350±80 BP. An area of 25 m^2 was excavated in the western part of the cave, along a large fallen stalactite that constituted a kind of wall. In this area a big anvil used to break nuts and a ball of red pigments occupied the centre of an empty circular area. An accumulation of flint waste was around this cleaned area; and also a fragment of a bifacial projectile point. A deep cylindrical artificial pit, containing an anvil, several bones, a hammerstone, limestone splinters and several retouched instruments, including nearly all the silicified sandstone artefacts of this level were also found in unit VIII. Three combustion structures with charcoal and ash lenses were located on the boundary of this circle and post holes were found at its limits. Most of the subsistence remains were found near or within the hearths; like concentrations of carbonised palm nuts and other plants seeds and bone refuse, as well thousands of half calcinated bivalvia shells and small freshwater molluscs *(Pomacea* and *Limnea)*. Quantitative studies of archaeofaunistic remains of Lapa do Boquete Cave indicate that broad-spectrum hunting strategies were continuous from the Pleistocene-Holocene transition until the Middle Holocene, and mainly focused on medium and small prey, 3 kg or less, such as mocó (*Kerodon rupestres)* and preá (*Cavia aprea*), armadillos *(Euphractus* and *Dasypus)* and reptiles such as teiu (*Tupinambis* sp.) and calango (*Ameiva* sp.). Large mammals such as deer, peccaries and tapirs are also present in the Boquete Cave diet, and there is no evidence of Pleistocene megafaunal exploitation (Fogaça, 2001; Kipnis, 1998, 2002, 2003; Prous and Fogaça, 1999; Rodet, 2006; see also Prous and Ribeiro, 1996/1997; Prous and Rodet, 2009).

Lapa do Dragão rockshelter is the only other ancient Itaparica site in the middle São Francisco Valley, with radiocarbon dates between 10,000±255 and 11,000±300 ^{14}C BP. However, no hearth structures have been found in this site and the dates come from isolated charcoal pieces. Located 150 km north of Lapa do Boquete site, in the Montalvânia region, it presents a chert and sandstone industry that includes unifacially retouched quartzite instruments and chalcedony and chert flakes (Prous and Ribeiro, 1996/1997; Prous and Fogaça, 1999).

The occupational sequence of Lapa do Boquete Cave continues through the Holocene. Between 7,000 and 4,000 BP there is a cultural rupture with Itaparica Tradition occupation in Peruaçu region and Lapa do Boquete Cave started to be used as a cemetery, with a similar pattern that characterised Lagoa Santa and Santa do Riacho regions in an earlier period. The individual graves were made in pits whose bottoms were covered with limestone blocks. The bodies were covered with red pigments and accompanied by several kinds of lithic artefacts and adornments in shell and vegetal fibbers. Between 4,000 and 700 BP Lapa do Boquete Cave began to be used for another ritual proposes, related to agricultural societies. Pottery and an expedient lithic industry is found in association with several small pits (caches), with around 2 kg of volume, containing remains of crops, fruits and artefacts made of feathers (Prous and Ribeiro, 1996/1997; Rodet, 2006).

Via north and west: first evidence of settlement in the Brazilian Amazon and La Plata Basin routes

The first evidence of a pioneering route in the lower Amazon basin is represented by the lowest cultural level of Pedra Pintada rockshelter, with a radiocarbon date of 11,145±135 ^{14}C BP. This site also has 15 dates between 10,905 and 10,250 ^{14}C BP associated with cultural evidence of a consistent adaptation to the tropical forest biome, with a broad variety of plant and faunal remains that point to the preferential exploitation of fish, bivalve molluscs, turtles, birds, rodents and medium-size mammals. This data has a positive relation with palaeoenvironmental studies conducted at the mouth of the Amazon River that point to low deposits of grass pollen in the Last Glacial Maximum, indicating the persistence of tropical forests during the Pleistocene. The Pedra Pintada site presents a lithic assemblage that comprises scrapers, *limaces*, blade-like flakes, gravers and bifacial artefacts, as well as stemmed projectile points with triangular shapes (Colinvaux, 1987; Roosevelt et al., 1996).

Evidence places the establishment phase in the Amazon basin between 10,000 and 8,000 ^{14}C yr BP, and 11 sites have been recorded with 16 dates between 9,570 and 8,050 ^{14}C yr BP. Geographical expansion enlarged, reaching the middle Amazon, near the confluence of the Negro and Solimões Rivers, and the transition zone between the Tropical Forest and Savannahs biomes in the south-western lower Amazon (Carajás region). A tendency towards regional diversification on lithic industries can also be observed here. In the middle Amazon, the assemblage contains both unifacial and bifacial tools made of local raw materials. In the Carajás area the assemblages are dominated by informal artefacts made of quartz, with evidence of bipolar flaking technique (Bueno, 2011).

The initial colonization of La Plata Basin also shows a complex picture. La Plata Basin is one of the main South American lowlands internal fluvial corridors that connect western and eastern parts of the subcontinent. It links the Bolivian *chaco* with the Amazon basin through the Paraguay River. Likewise, the connection between central South America and the Atlantic coast is possible by the Paraná River and with the southernmost parts of the continent by the Uruguay River. For these reasons, this fluvial system that crosscuts a variety of ecological settings also represented a key role in human dispersal and cultural diversification in the Early Holocene. La Plata Basin was probably used in the same period as a gateway to the East for different cultural traditions that would be already present in Central South America. This situation can be illustrated by some of the most ancient evidence of human occupation of Paraguay Basin (Dias and Bueno, 2013).

Santa Elina rockshelter is located in the Serra das Araras, Mato Grosso State, in the geodesic centre of South America. This limestone rockshelter is a flat wall about 30 m high, with approximately 900 paintings of animals, human figures and signs associated with a panel 60 m long and 4 m high. Another low wall, in declivity and covered with sedimentation, is visible in part of the shelter. It lies 3 to 5 m distant from the painted wall, parallel to it and with the same inclination. The dwelling area is delimited by this gap. The site was subject of a French-Brazilian scientific mission, coordinated by Águeda Vilhena-Vialou, Denis Vialou and Levy Figuti. The excavation of the site occurred between 1984 and 2001, covered an area of 90 m^2 and 46 radiocarbon dates were conducted. An assemblage of 8,000 lithic remains was discovered, made in local raw material, mainly the limestone of the rockshelter's walls, as well silex, sandstone and hematite from sources no less than 5 km away from the site (A. V. Vialou, 2003, 2005, 2007).

The chronostratigraphy of the site is divided in three phases. Unit I (80-120 cm deep) has 22 radiocarbon dates from 275 to 6,000 BP, with evidence of intense human activity related to hunting and gathering local resources. The main plant species identified in this unit were jatobá (*Hymenaea* sp.), araticum and pindaíba (*Annonaceae* family), sapucaia (*Lecythis* sp.), ingá (*Inga* sp.), figo (*Ficus* sp.), veludo (*Guettarda viburnoides*) and pitomba (família *Sapotaceae*) (Scheel-Ybert and Solari, 2005). The faunal remains indicate the consumption of red brockets (*Mazama americana*), peccaris (*Tayasu* sp.), armadillos (*Dasypus novemcinctus* and *Euphractus sexcintus*), spotted paca (*Agouti paca*), agouti (*Dasyprocta* sp.), mocó (*Kerodon rupestres*) and other small rodents (*Echimyidae* and *Cricetidae*). Reptiles such as calango (*Ameiva* sp.), fish, molluscs (*Megalobuliminus* sp. and *Pomacea* sp.) and bivalves (*Diplodon* sp.) are also present (Figuti, 2005). Levels of red pigments are associated with this unit indicating the chronological association with painting activities. Most of the signs are geometrical and the remaining figures represent humans and groups of deer. Fish, birds, monkeys, tapirs, peccaries and felines are also represented. Santa Elina is the only site in the region with rock art and other sites with rock paintings in Serra das Araras are 200 km south-west (D. Vialou, 2005).

Unit II (100-250 cm deep) has 16 radiocarbon dates between 6,000 and 10,000 BP, and presents an assemblage of hearths aligned with the back wall dated to 10,120±60 ^{14}C BP. Also present in this unit are hundreds of bone remains (osteroderms) of giant sloth (*Glossotherium lettsomi)* with a Uranium-Thorium date of 13,000±1000 BP. The lithic assemblage is composed of 1,055 pieces, mainly limestone flakes and blanks. This unit presents some local evidence of sedimentary disturbance due to an area of fallen blocks (A. Vialou, 2003, 2005, 2007).

Unit III (250-350 cm deep), with Pleistocene dates, has sandy sediments rich in pebbles, but poor in charcoal. In an area of 8 m^2, there are 200 bone fragments and 4,000 osteroderms of a single giant sloth (*Glossotherium lettsomi)*. Two of these osteoderms of 2 cm are pierced and one of them has been abraded. The lithic assemblage is composed of 265 pieces, with 22 retouched limestone artefacts made on blanks or flakes and 4 artefacts in silex flakes, including a micro-scraper. This unit has three dates. One osteoderm was dated by Uranium-Thorium at 27,000±2000 BP; sediments associated with the faunal remains were dated by OSL to 27,600±1500 BP; and small fragments of charcoal were dated by AMS at 23,120±260 ^{14}C BP (Gif 99177). Two fragments of floated wood were dated by AMS at 22,500±500 ^{14}C BP (Gif 9366) and 23,320±1000 ^{14}C BP (Gif 9365) but they were considered contaminated by the disturbance in the base of unit II (A. Vialou, 2003, 2005). These chronological results were considered by Agueda Vialou and her team as coherent, indicating ages around 22,000 and 25,000 ^{14}C BP to the initial occupation of this site (A. Vialou, 2003, 2005, 2007).

It is important to mention that Santa Elina is located at the boundary of tropical forest and savannah environments, in the upstream area of the Amazonian and several river systems of the Brazilian Central Plateau. Besides the taphonomic issues regarding the Pleistocene unit of this site, this is a very important place in the discussions of early routes and displacements because it would be the western site for the *pioneering phase* of settlement in Brazil and a possible connection between the eastern highlands and western lowlands of South America, indicating the possibility of the initial human colonization of the La Plata basin, at least around the Pleistocene-Holocene Transition.

Similarly, this is the same period when the first evidence of human presence in the Middle Uruguay River was identified. In the Touro Passo region, Rio Grande do Sul State, Pleistocene sediments were deposited all along the lower reaches of the Uruguay River under volcanic ash layer dated at 10,400±110 ^{14}C BP. On the eroded terraces several bones of *Glossotherium robustus* were found, dated at 12,270±220 ^{14}C BP. At the same stratigraphic levels, crude basalt and quartzite choppers and flakes were found associated with the rolled bones. However, both the artefacts and their association with the bones (which were found around 4.5 km away from the ^{14}C sample) are doubtful (Prous and Fogaca, 1999; Dias and Jacobus, 2001).

The oldest evidence of human presence in this area is represented by two open air sites, Laranjito and Milton Almeida, with five radiocarbon dates between 10,800 and 10,200 ^{14}C BP (Dias and Jacobus, 2001). Related to grassland biomes (*Pampa*), these archaeological sites are associated with lithic industries characterised by the predominance of bifacial technology (Umbu Tradition). It is characterised by a variety of bifacial triangular projectile points, pedunculated and non-pedunculated, some of them with serrated edges and others with unifacial retouch, usually associated with bolas. The technological characteristics point to similarities with contemporary archaeological contexts in Uruguay, possibly indicating a common cultural matrix (Suarez and Lopez, 2003; Suarez and Santos, 2010; Lopez-Mazz, 2013). Nonetheless, based on the absence of fishtail projectile points in these assemblages, it is reasonable to propose that the routes that gave origin to the initial colonization of the Brazilian Pampa could be closely related to the occupation of the Paraguay and the Paraná river basin, still poorly known archaeologically (Bueno et al., 2013; Dias, 2012; Dias and Bueno, 2013; Hadler et al., 2013).

Regional diversification: Itaparica Tradition, Lagoa Santa Complex and Umbu Tradition

The general process of regional diversification in the South American eastern lowlands continued between 10,000 and 8,000 ^{14}C BP. Between 9,000 and 8,000 ^{14}C yr BP, the Itaparica Tradition reaches its greatest spatial extent, with 21 sites in the Araguaia-Tocantins and São Francisco basins, and 42 radiocarbon dates. However, after 8,500 ^{14}C yr BP some regions of central and north-eastern Brazil seem to have been abandoned. This process was accompanied by an abrupt cultural change in distinct regions, with a tendency for regional differentiation in rock art styles and lithic industries; the latter were mostly characterised by an expedient unifacial technology (Bueno et al., 2013).

Archaeological excavations carried out at rockshelters in the states of Goiás and Minas Gerais indicate that these spaces were used as domestic areas, often associated with rock paintings and human burials. General exploitation of the tropical savannah resources were dominant in the early stages of this occupation, especially the consumption of red brocket (*Mazama americana),* pampas deer *(Ozotocerus benzoarticus*), white-lipped peccary (*Tayassu tajacu*), armadillos (*Cabassous tatouay, Euphractus sexcintus* and *Dasypus novencinctus*), monkeys (*Alouatta caraya, Lagothricha lagothrix* and *Cebus apella*), capybaras *(Hydrochoeris hydrochoeris*), lizards (*Tupinambis teguxin* and *Common ameiva*) and turtles (*Chelonia sp.*), as well as several species of fish, birds and gastropods. There is also early evidence of heavy consumption of seasonal fruits like gueroba (*Syagrus oleacea*), jerivá (*Syagrus romanzoffiana*), acumã (*Syagrus flexuosa)*, jatobá (*Hymenea stigonocarpa*), babaçu (*Orbignya sp.*), cashew (*Anacardium sp.*), licuri (*Syagmus coronata*) and pequi (*Caryocar brasiliense*). Studies of settlement systems suggest that the mobility strategies in tropical savannahs were mediated by the rainy season (December to May). The higher productivity of flora in this period would support the concentration of people, these being dispersed in the dry season over areas that could cover up to 2,000 km^2. The aggregation sites would be marked by regional styles of rock art and lithic debitage which

displayed strategies of territorial demarcation and maintenance of long-distance social networks (Prous and Fogaça, 1999; Kipnis, 1998, 2003).

There is an increase in the number of occupational events in semi-deciduous forests in the middle of the São Francisco Valley, with 81 dates between 9,900 and 8,040 ^{14}C BP for 15 sites (Bueno et al., 2013). The most striking aspect of this record is the presence of human burials in several rockshelters at Lagoa Santa and Santana do Riacho regions, making them the largest and best preserved samples of human remains found in Brazil for this period. The burial practices of Lagoa Santa have been the subject of archaeological studies since the late nineteenth century. The first French-Brazilian scientific mission in Lagoa Santa was coordinated by Anette Laming-Emperaire, between 1971 and 1976 (Laming-Emperaire, 1979). In the excavation of Lapa Vermelha IV, the skull of a woman was deposited in the intermediate levels between 10,200±220 BP and 11,680± 500 BP. Recently, an AMS date on these human bones was obtained, with a value of 9,330±60 ^{14}C BP (Beta 84439). In more recent levels, some bones and coprolites of a giant sloth (*Scelidotherium*) are dated *c.* 9,580±200 ^{14}C BP (Gif 3208). There were no fireplaces or any typical lithic artefacts of this period. Thus, dating was generally performed on scattered charcoal, probably of natural origin (Prous and Fogaca, 1999). In 2000, Walter Neves begin a long-term archaeological research project in the area. Since 2001, four limestone rockshelters (Lapa das Boleiras, Cerca Grande VI, Lapa do Santo and Lapa Grande de Taquaraçu), one palaeontological site (Cuvieri Cave), and two open air sites (Sumidouro and Coqueirinho sites) were excavated. Until today the Lagoa Santa Region has generated a sample of around 300 human skeletal remains, associated with two burial peaks in the area: the older one, between 10,000 and 8,000 BP, and a more recent one between 2,000 and 1,000 BP. It is noteworthy that this second phase of occupation is related to a horticultural population without a biological relationship to the original hunter-gatherer groups (Araújo et al., 2005, 2012).

The results of the bio-anthropological analysis have offered support for the hypothesis that at least two biological components constituted the populations that originally colonized South America. The earliest occupation was carried out by people with a generalized cranial morphology, similar to that currently found among African and Australian indigenous populations, which also prevailed in East Asia for much of the Late Pleistocene. This biologic standard is modified from the mid-Holocene onwards, when a Mongoloid morphology became dominant among the South American population. These data suggest that a second wave of population with a classic Mongoloid morphology entered the Americas during the Early Holocene. The biological changes of present-day Native Americans indicate an abrupt transition, possibly involving population replacement by competition and, to a lesser extent, hybridisation. These features suggest that the time interval between the two population waves with distinct biological features may have been quite short, around two to three millennia at most (Neves et al., 2013; Neves and Hubbe, 2005).

The occupation of south-eastern and southern Brazil follows a different pattern from that recorded in central Brazil, with a growing number of Umbu Tradition sites towards the mid-Holocene. Ten sites have been identified with 21 dates between 9,855 and 8,020 ^{14}C BP. Their geographical distribution mainly follows the Paraná and Uruguay Basins; and the new colonized territories mostly correspond to the Atlantic Forest biome. Even though separated by long distances, in some cases more than 1,500 km apart, Umbu Tradition lithic assemblages in the Paraná and Uruguay basins show technological similarities, with predominant bifacial technologies and a variety of stemmed projectile points made on local raw materials. Furthermore, subsistence studies indicate a pattern that persisted throughout the Holocene, characterised by generalist hunting strategies mainly focused on forest resources. The hunt for mammals was characterised by a preference for armadillos (*Dasypus sp.*), red brocket and pampas deer (*Mazama americana* and *Ozotocerus bezoarticus*), collared peccaries (*Pecari tajacu*) and cavies (*Cavia aperea*). Reptiles were also a hunting priority, especially lizards (*Tupinambis sp*), and fragments of rhea eggs (*Rhea americana*) are frequent in the archaeological assemblages. Mollusc gathering also played an important role in subsistence, particularly the gastropod *Megalobulimus* and *Pomacea* and the bivalve *Diplodon* (Dias, 2012; Dias and Bueno, 2013; Bueno et al., 2013; Hadler et al., 2013).

Concluding remarks

Brazilian data for the Pleistocene-Holocene transition reinforce the idea that a *pioneering* phase of the human colonization of South America eastern lowlands was characterised by recurrent activities at salient landmarks or orientation points in a landscape that was still being explored, 'mapped' and encoded into traditional knowledge systems. Such a recurrence would have facilitated mobility and social aggregation into sparsely inhabited or uninhabited landscapes. Large river valleys in north-eastern and central Brazil, in the Amazon and in the La Plata Basin seem to have played this key role during the Pleistocene-Holocene transition, concentrating and directing an expansion that quickly reached new and distant areas without completely filling the vast territory surrounding these early settlement points. Besides being key navigational axes and reference points in the landscape, easily located and recognized, these river valleys also provided diverse and abundant resources for subsistence and technology, which must have been very valuable in situations of little or low knowledge of this large area (Dias and Bueno, 2013).

Bibliography

Araújo, A., Reinhard, K., Ferreira, L. F. and Gardner, S. 2008. Parasites as probes for prehistoric human migrations? *Trends in Parasitology*, Vol. 24, pp. 112-15.

Araújo, A., Neves, W., Pilo, L. and Atui, J. P. 2005. Holocene dryness and human occupation in Brazil during the 'Archaic Gap'. *Quaternary Research*, Vol. 64, pp. 298-307.

Araújo, A., Neves, W. and Kipnis, R. 2012. Lagoa Santa revisited: an overview of the chronology, subsistence, and material culture of Paleoindian sites in Eastern Central Brazil. *Latin American Antiquity*, Vol. 23, pp. 533–50.

Boëda, E., Lourdeau, A., Lahaye, C., Felice, G., Viana, S., Clemente-Conte, I., Pino, M., Fontugne, M., Hoeltz, S., Guidon, N., Pessis, A-M., Da Costa, A. and Pagli, M. 2013. The late-Pleistocene industries of Piauí, Brazil: new data. K. Graf, C. Ketron and M. Waters (eds), *Paleoamerican Odyssey*. Bryan, Texas A and M University Press, pp. 445-66.

Boëda, E., Clemente-Conte, I., Fontugne, M., Lahaye, C., Pino, M., Felice, G., Guidon, N., Hoeltz, S., Lourdeau, A., Pagli, M., Pessis, A-M., Viana, S., Da Costa, A. and Douville, E. 2014. A new late Pleistocene archaeological sequence in South America: the Vale of Pedra Furada (Piauí, Brazil). *Antiquity*, Vol. 88, pp. 927-41.

Bueno, L. 2011. L'occupation initiale du Brésil dans une perspective macro-régionale: les cas de l'Amazonie, du Nordeste et du Centre du Brésil. D. Vialou (ed.), *Peuplements et Préhistoire en Amérique*. Paris, CTNRS, pp. 209-20.

Bueno, L. 2013. Peopling the Eastern South America: occupying the landscape and constructing territories in Central Brazilian Plateau during Pleistocene/Holocene transition. *Paper presented in 78th SAA Meeting*, Honolulu.

Bueno, L., Dias, A. S. and Steele, J. 2013. The late Pleistocene/early Holocene archaeological record in Brazil: A geo-referenced database. *Quaternary International*, Vol. 301, pp. 74-93.

Colinvaux, P. 1987. Amazon diversity in light of paleoecological record. *Quaternary Science Reviews*, Vol. 6, pp. 93-114.

Dias, A. S. 2004. Diversificar para poblar: el contexto arqueológico brasileño en la transición Pleistoceno-Holoceno. *Complutum*, Vol. 15, pp. 249-63.

Dias, A. S. 2012. Hunter-gatherer occupation of South Brazilian Atlantic Forest: paleoenvironment and archaeology. *Quaternary International*, Vol. 256, pp. 12-18.

Dias, A. S. and Jacobus, A. 2001. The antiquity of the peopling of southern Brazil. *Current Research in the Pleistocene*, Vol. 18, pp.17-19.

Dias, A. S. and Bueno, L. 2013. The initial colonization of South America Eastern Lowlands: Brazilian archaeology contributions to settlement of America Models. K. Graf, C. Ketron and M. Waters, M. (eds). *Paleoamerican Odyssey*. Bryan, Texas A and M University Press, pp. 339-58.

Dias, A. S. and Bueno, L. 2014. More of the same. *Antiquity*, Vol. 88, pp. 943-45.

Dillehay, T. 2000. *The Settlement of the Americas: A New Prehistory*. New York, Basic Books.

Dillehay, T., Calderón, G., Politis, G. and Beltrão, M. C. 1992. Earliest hunters and gatherers of South America. *Journal of World Prehistory*, Vol. 6, pp. 145-204.

Dixon, E. J. 2001. Human colonization of the Americas: timing, technology and process. *Quaternary Science Reviews*, Vol. 20, pp. 277-99.

Figuti, L. 2005. Aqueofana do sítio Santa Elina: nota preliminar. A. V. Vialou (ed.), *Pré-história do Mato Grosso – Vol. 1: Santa Elina*. São Paulo, Edusp, pp. 155-58.

Fogaça, E. 2001. Mãos para o pensamento: a variabilidade tecnológica de indústrias líticas de Caçadores Coletores Holocênicos a partir de um estudo de caso. As Camadas VIII e VII da Lapa do Boquete (Minas Gerais, Brasil – 12.000/10.500 AP). Ph.D. dissertation, Porto Alegre (Brazil), Pontifícia Universidade Católica do Rio Grande do Sul.

Guidon, N. 1978. Missão arqueológica no sudeste do Piauí, Brasil: relatório final. *Revista do Museu Paulista*, Vol. 25, pp. 113-28.

Guidon, N. 1986. A sequencia cultural na área de São Raimundo Nonato. *Clio*, Vol. 3, pp. 137-44.

Guidon, N. 1989. On stratigraphy and chronology at Pedra Furada. *Current Anthropology*, Vol. 30, pp. 641-42.

Guidon, N. 2007. Parque Nacional Serra da Capivara: modelo de preservação do patrimônio arqueológico ameaçado. *Revista do Patrimônio Histórico e Artístico Nacional*, Vol. 33, pp. 75-93.

Guidon, N. and Arnauld, B. 1991. The chronology of the new world: two faces of one reality. *World Archaeology*, Vol. 23, pp. 167-78.

Guidon, N. and Delibras, G. 1986. Carbon-14 dates point to man in the Americas 32,000 years ago. *Nature*, Vol. 321, pp. 769-71.

Guidon, N., Parenti, F., Da Luz, M. F., Guérin, C. and Faure, M. 1994. Le plus ancien peuplement de l'Amérique: le paléolithique du nord-est brésilien. *Bulletin de la Société Préhistorique Française*, Vol. 91, pp. 246-50.

Guidon, N., Pessis, A., Parenti, F., Fontugne, M. and Guérin, C. 1996. Nature and age of deposits in Pedra Furada, Brazil: reply to Meltzer, Adovasio and Dillehay. Falsehood or untruth? *Antiquity*, Vol. 70, pp. 408-15.

Hadler, P., Dias, A. S. and Bauermann, S. 2013. Multidisciplinary studies of Southern Brazil Holocene: archaeological, palynological and paleontological data. *Quaternary International*, Vol. 305, pp. 119-26.

Isnardis, A. 2004. Lapa, parede, painel: distribuição geográfica das unidades estilísticas de grafismos rupestres do Vale do rio Peruaçu e suas relações diacrônicas (Alto Médio São Francisco, Norte de Minas Gerais). Master Thesis. São Paulo (Brazil), Universidade de São Paulo.

Kipnis, R. 1998. Early hunter-gatherers in the Americas: perspectives from Central Brazil. *Antiquity*, Vol. 72, pp. 581-91.

Kipnis, R. 2002. Foraging strategies of Eastern Central Brazil: An evolutionary ecological study of subsistence strategies during the terminal Pleistocene and Early/Middle Holocene. Ph.D. dissertation. Ann Arbor (USA), University of Michigan.

Kipnis, R. 2003. Long-term land tenure systems in Central Brazil: evolutionary ecology, risk management and social geography. B. Fitzhugh and J. Habu (eds), *Beyond Foraging and Collecting: Evolutionary Change in Hunter-Gatherer Settlement Systems*. New York, Plenum Publishers, pp. 181-230.

Lahaye, C., Hernandez, M., Boëda, E., Felice, G., Niéde, G., Hoeltz, S., Lourdeau, A., Pagli, M., Pessis, A-M, Rasse, M. and Viana, S. 2013. Human occupation in South America by 20,000 BC: the Toca da Tira Peia site, Piauí, Brazil. *Journal of Archaeological Science*, Vol. 40, pp. 2840-847.

Laming-Emperaire, A. 1979. Missions archéologiques franco-brésiliennes de Lagoa Santa, Minas Gerais, Brésil – Le Grand Abri de Lapa Vermelha. *Revista de Pré-história*, Vol. 1, pp. 53-89.

Lopez-Mazz, J. M. 2013. Early human occupation of Uruguay: radiocarbon database and archaeological implications. *Quaternary International*, Vol. 301, pp. 94-103.

Lourdeau, A. 2010. Le techno-complexe Itaparica: Definition techno-fonctionnelle des industries à pieces façonnées unifacialement à une face plane dans le Centre et le Nord-est du Brésil pendant la transition Pléistocène-Holocène et Holocène Ancient. Ph.D. dissertation. Paris (France), Université Paris-Ouest Nanterre la Défense.

Lourdeau, A. 2012. The Itaparica Techno-complex: the first conspicuous settlement of Central and North-eastern Brazil from a technological perspective. L. Miotti, M. Salemme, M., N. Flegenheimer and T. Goebel (eds), *Southbound: Late Pleistocene Peopling of Latin America*. Bryan, Texas A and M University Press, pp. 53-56.

Martin, G. 1997. *Pré-história do Nordeste do Brasil*. Recife, Editora da UFPe.

Meltzer, D., Adovasio, J. and Dillehay, T. 1994. On a Pleistocene human occupation at Pedra Furada, Brazil. *Antiquity*, Vol. 68, pp. 695-714.

Miotti, L. 2003. Patagonia: a paradox for building images of the first Americans during the Pleistocene/Holocene transition. *Quaternary International*, Vol. 109-110, pp.147-73.

Miotti, L. 2006. La fachada atlántica como puerta de ingreso alternativa de la colonización humana de America del Sur durante la transición Pleistoceno/Holoceno. J. C. Jiménez López (ed.), *II Simposio Internacional del Hombre Temprano en América*. México (DF), Instituto Nacional de Antropología e Historia, pp.155-88.

Miotti, L. and Salemme, M. 2003. When Patagonia was colonized? People mobility at high latitudes during Pleistocene/Holocene transition. *Quaternary International*, Vol. 109-110, pp. 95-111.

Neves, W. and Hubbe, M. 2005. Cranial morphology of early Americans from Lagoa Santa, Brazil: implications for the settlement of the New World. *Proceedings of the National Academy of Sciences*, Vol. 102, pp. 18309-314.

Neves, W., Hubbe, M., Bernardo, D., Strauss, A., Araújo, A. and Kipnis, R. 2013. Early human occupation of Lagoa Santa, Eastern Central Brazil: craniometric variation of the initial settlers of South America. K. Graf, C. Ketron and M. Waters (eds). *Paleoamerican Odyssey*. Bryan, Texas A and M University Press, pp. 397-412.

Parenti, F. 1992. Le gisement Quaternaire de la Toca do Boqueirão da Pedra Furada (Piauí, Brésil) dans le contexte de la préhistoire Américaine. Fouilles, stratigraphie, chronologie, evolution culturelle. Ph.D. Dissertation. Paris (France), École de Hauts Étude en Sciences Sociales.

Parenti, F. 1996. Questions about the Upper Pleistocene prehistory in the North-eastern Brazil: Pedra Furada rockshelter in its regional context. *Revista FUMDHAMentos*, Vol. 1, pp. 15-53.

Parenti, F., Fontugue, M. and Guerin, C. 1996. Pedra Furada in Brazil and its 'presumed' evidence: limitations and potential of the available data. *Antiquity*, Vol. 70, pp. 416-21.

Pessis, A-M. 2003. *Imagens da Pré-história: Parque Nacional Serra da Capivara*. São Paulo, FUMDHAM/Petrobras.

Pessis, A-M. and Guidon, N. 2007. Serra da Capivara National Park, Brazil: cultural heritage and society. *World Archaeology*, Vol. 39, pp. 406-16.

Peyre, E., Guérin, C., Guidon, N. and Coppens, Y. 1998. Des restes humains Pleistocènes dans la Grotte du Garrincho, Piauí, Br. *Sciences de la Terre e des Planète*, Vol. 327, pp. 335-60.

Prous, A. 1997. O povoamento da América visto do Brasil: uma perspectiva crítica. *Revista da USP*, Vol. 34, pp. 8-21.

Prous, A. and Ribeiro, L. (ed.). 1996/1997. *Arqueologia do Alto Médio São Francisco – Tomo I: Região de Montalvânia (Minas Gerais)*. Belo Horizonte, UFMG/Arquivos do Museu de Historia Natural e Jardim Botânico, Vol. 17-18.

Prous, A. and Fogaça, E. 1999. Archaeology of the Pleistocene-Holocene boundary in Brazil. *Quaternary International*, Vol. 53-54, pp. 21-41.

Prous, A. and Rodet, J. (eds). 2009. *Arqueologia do Alto Médio São Francisco – Tomo II: Vale do rio Peruacu e adjacências (Minas Gerais)*. Belo Horizonte, UFMG/Arquivos do Museu de Historia Natural e Jardim Botânico, Vol. 19.

Ribeiro, L. 2006. Os significados da similaridade e do contraste entre estilos de arte rupestre: um estudo regional das gravuras e pinturas do Alto-médio São Francisco. Ph.D. Dissertation. São Paulo (Brazil), Universidade de São Paulo.

Rodet, M.J. 2006. Étude technologique des industries lithiques taillées du nord de Minas Gerais, Brésil: depuis le passage Pléistocène/Holocène jusqu'au contact (XVIIIème siècle). Ph.D. Dissertation. Paris (France), Université de Paris X - Nanterre.

Roosevelt, A., Costa, M., Machado, C., Michab, M., Mercier, N., Valladas, H., Feathers, J., Barnett, W., Imazio da Silveira, M., Henderson, A., Silva, J., Chernoff, B., Reese, D. S., Holman, J., Toth, N. and Shick, K. 1996. Paleoindian cave dwellers in the Amazon: the peopling of the Americas. *Science,* Vol. 272, pp. 373-84.

Rowe, M. and Steelman, K. 2003. Comment on 'some evidence of a date of first humans to arrive in Brazil'. *Journal of Archaeological Science*, Vol. 30, pp. 1349–351.

Santos, G., Bird, M., Parenti, F., Fifield, L., Guidon, N. and Hausladen, P. 2003. A revised chronology of the lowest occupation layer of Pedra Furada rockshelter, Piauí, Brazil: the Pleistocene peopling of the Americas. *Quaternary Science Reviews*, Vol. 22, pp. 2303–310.

Sauer, C. 1944. A geographic sketch of early man in America. *Geographical Review*, Vol. 34, pp. 529-73.

Scheel-Ybert, R. and Solari, M.E. 2005. Análise dos macro-restos vegetais do setor oeste: antracologia e carpologia. A. V. Vialou (ed.), *Pré-história do Mato Grosso – Vol. 1: Santa Elina*. São Paulo, Edusp, pp. 139-48.

Schmitz, P.I. 1987. Prehistoric hunters and gatherers of Brazil. *Journal of World Prehistory*, Vol. 1, pp. 53-126.

Schmitz, P.I. 1990. O povoamento Pleistocênico do Brasil. *Revista de Arqueología Americana*, Vol. 1, pp. 33-68.

Suarez, R. and Lopez, J. M. 2003. Archaeology of the Pleistocene–Holocene transition in Uruguay: an overview. *Quaternary International*, Vol. 109–110, pp. 65–76.

Suarez, R. and Santos, G. 2010. Cazadores-recolectores tempranos, supervivencia de fauna del Pleistoceno (*Equus* sp. y *Glyptodon* sp.) y tecnología lítica durante el Holoceno Temprano en la frontera Uruguay-Brasil. *Revista de Arqueología*, Vol. 23, pp. 20-39.

Valladas, H., Merciera, N., Michaba, M., Joronb, J.L., Reyssa, J.L and Guidon, N. 2003. TL age-estimates of burnt quartz pebbles from the Toca do Boqueirão da Pedra Furada (Piaui, Northeastern Brazil). *Quaternary Science Reviews*, Vol. 22, pp. 1257–263.

Vialou, A.V. 2003. Santa Elina Rockshelter, Brasil: evidence of the coexistence of man and *Glossotherium*. L. Miotti, M. Salemme and N. Flegenheimer (ed.), *Where the South Winds Blow: Ancient Evidence of Paleo South Americans*. College Station, Texas A and M University, pp. 21-28.

Vialou, A.V. 2005. Abrigo Santa Elina: habitat e cronoestratigrafia. A. V. Vialou (ed.), *Pré-história do Mato Grosso – Vol. 1: Santa Elina*. São Paulo, Edusp, pp. 87-102.

Vialou, A.V. 2007. Metodologia de análise para as indústrias líticas do Pleistoceno no Brasil Central. L. Bueno, L. and A. Isnardis (eds), *Das Pedras aos Homens: Tecnologia Lítica na Arqueologia Brasileira*. Belo Horizonte, Ed. Argentum, pp. 173-94.

Vialou, D. 2005. Representações rupestres. A. V. Vialou (ed.), *Pré-história do Mato Grosso – Vol. 1: Santa Elina*. São Paulo, Edusp, pp. 245-54.

Watanabe, S., Ayta, W., Hamaguchi, H., Guidon, N., La Salvia, E., Maranca, S. and Baffa, O. 2003. Some evidence of a date of first humans to arrive in Brazil. *Journal of Archaeological Science*, Vol. 30, pp. 351–54.