

THE PRE-CLOVIS PEOPLING OF SOUTH AMERICA

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The peopling of America is perhaps one of the longest and most controversial debates in world archaeology, one in which South America has played a central role. There have been several competing models for the first peopling of the Americas, but with the exception of the controversial hypothesis of an Atlantic-Solutrean migration, there is major agreement among archaeologists and ancient geneticists that the first colonizers entered America from Northeastern Asia via Beringia and its shorelines. South America is fundamental to this basic agreement and is considered the final step in the colonization of the Americas.

In the last two decades, the acceptance of Monte Verde II as a site dating ~14,500 cal BP in southern Chile (Dillehay 1997) has broken the “Clovis barrier” (~13,000 cal BP), but deepened the debate: If the first Americans were from Asia via Beringia, why is the oldest site on the continent the most southern? As sites in North and South America were dated at a similar age, these data suggested that America was peopled *before* Clovis and that the colonizing process was very rapid. However, previous and recent claims for a pre-Late Glacial Maximum (LGM, dated between ~25,000 and 18,500 cal BP) age would indicate an alternative view that humans were in America long before ~14,500 cal BP, and therefore several sites during or before this period are the result of a much slower adaptation process to different environments. The tension between these two opposite views is the essence of the debate and perpetuates the arguments.

South American data are crucial to this discussion, although with the exception of Monte Verde II, it is not always fully considered in the continental models. The geographic coverage of research in South America is markedly uneven. Some regions, such as the Central Andes, Patagonia, and Pampas, are relatively well studied, while in others, such as Amazonia and Chaco, the density of early sites remains very low due to

low archaeological visibility/preservation and less scientific effort. Therefore, any discussion on the mode of expansion, the preferred environments, the speed of the colonization, and the routes of entry must accept these biases as well as the fact that geographic coverage and data are highly variable.

We must consider the basal timeline of the peopling of South America, a period agreed upon in general terms by the great majority of New World archaeologists. This line is around 14,000–14,500 cal BP and is defined by three sites with similar ages: Monte Verde II, Huaca Prieta, and Arroyo Seco 2 (Figure 1). There are also other sites, dated around 13,000 cal BP, across South America that are the same age as Clovis (for example, Quebrada Santa Julia in Chile; Cerro Tres Tetras, Piedra Museo, and Cueva Casa del Minero in Argentina; Lapa do Boquete and Caverna da Pedra Pintada in Brazil, etc.). Several “classic” sites such as Taima-Taima (13,000 ± 200 BP; 15,453 cal BP) in Venezuela, El Abra 2 (12,400 ± 160 BP; 15,511 cal BP) in Colombia, and Tibitó (11,740 ± 110 BP; 13,530 cal BP) in Colombia, provided dates between 13,000 and 15,500 cal BP, but they did not meet contemporary dating accuracy criteria. Nothing is inherently wrong with these sites or with the dates (although the measurement errors are large), but they should be redated to ensure their chronology in contemporary standards, and a re-excavation will be crucial to do geoarchaeological and taphonomic studies. In their present status they cannot be used as proof of pre-Clovis occupations in South America. Also, the human footprints and track from Pehuen Co cannot be considered yet, because despite being intimately associated with the tracks of Pleistocene fauna, they have not been adequately dated (see discussion in Bayón et al. 2011).

The best known and fully published pre-Clovis site is Monte Verde II in southern Chile (Dillehay 1997). The site dates to ~14,500 cal BP, although a recent ¹⁴C data analysis suggests that the human occupation of the site is between 14,485 cal BP and 14,160 cal BP (Politis and Prates 2018). The site is interpreted



Figure 1. Map with the sites mentioned in the text.

as a contemporaneous cultural event: a semipermanent camp resulting from a year-round occupation. Expediency tools made from local cobbles characterize the lithic technology; subsistence was oriented toward a broad spectrum of resources, with plants being dominant. The second site is Huaca Prieta, a famous mound along the Chicama Valley in northern Peru, which has a pre-mound phase with intermittent occupation between ~14,500 and 7500 cal BP (Dillehay 2017; Figure 2). More recently, new dates have been published that extend occupation of the site to ~14,800 cal BP (Dillehay et al. 2017). Stone tools were made primarily from locally available cobbles of rhyolite, basalt, andesite, and quartzite; subsistence was based on marine resources (e.g., sharks, sea lions, marine birds, and bony fish) despite the sea at ~15,000 cal BP being 100 m below today's elevation, and the coastline being 20–30 km from the site (Dillehay et al. 2017). Finally, the Arroyo Seco 2 site in the Argentine Pampas shows evidence of two occupation events that are interpreted as temporary processing camps for megafauna—the former at ~14,000 cal BP when a giant ground sloth (*Megatherium americanum*) and American horse (*Equus*

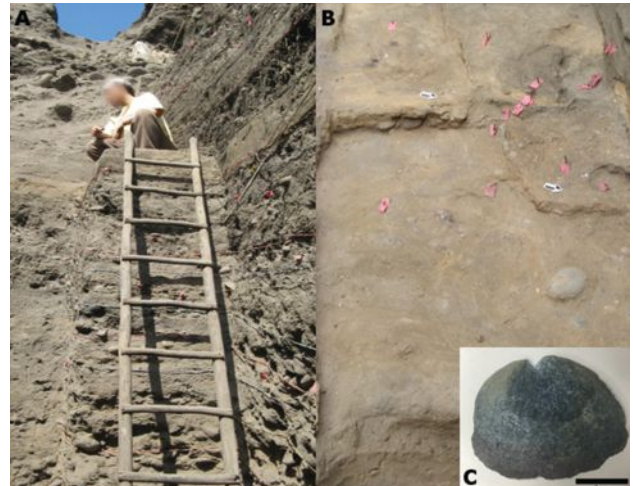


Figure 2. A) Upper portion of 29m deep pit (Unit 15) in the Huaca Prieta mound; B) Late Pleistocene use-surface at the 29m level. Note the burned areas and stone tools, radiocarbon dated at ~14,500 cal BP; C) basalt flake embedded in use-surface. Close-up of flake shows impact scar and bulb of percussion. Photo and caption courtesy of Tom Dillehay.



Figure 3. A) Aerial view of the Arroyo Seco 2 site showing the area excavated 1979–2018; b) Lithic artifacts, made on quartzite (upper row) and basalt seashore cobbles (lower row), associated with megafaunal remains.

neogus) were butchered, and the latter, dated at ~13,000 cal BP, when two genera of American horses (*Equus* and *Amerhippus*) were processed (Politis et al. 2016; Figure 3). In both components, lithic tools were unifacial and made from nonlocal raw materials (e.g., quartzite, whose closest outcrop is >100 km from the site) as well as chalcedony, chert, and rounded marine cobbles. No projectile points have been found.

Monte Verde II, Huaca Prieta, and Arroyo Seco 2 indicate that people were contemporaneously occupying and exploiting very different environments, and were using different

technologies, economies, and settlement patterns. This could suggest a previous longer presence of humans in South America and a reason for the different, distinctive adaptive patterns. However, the archaeological record (and the human DNA studies) does not fully support this hypothesis, an argument that is summarized below.

The proposed pre- or contemporaneous-LGM sites in South America are divisible into two groups. The first comprises several sites in northeastern Brazil, in the Piauí state, where French–Brazilian research teams (Niède Guidon, Eric Boëda, Christelle Lahaye, and others) have proposed ages from 15,000 to ~100,000 BP based on thermoluminescence and radiocarbon dating; however, recent papers lower the time to at least 60,000 BP (Parenti 2014). The most famous site is Boqueirão da Pedra Furada, where a Pleistocene human occupation, divided into four phases, has been proposed based on hearths and a lithic industry based exclusively on simple artifacts using local quartz and quartzite (Parenti 2001, 2014; Figure 4). The main criticism about Pedra Furada is that the purported artifacts are made from the same lithic material that is the dominant rock type in the conglomerate forming the cave's roof. Critics also questioned the lack of technological variation over tens of thousands of years and strongly suggested that gravity and falling quartz and quartzite cobbles caused the flaking, not humans. The monograph published by Parenti (2001; see also Parenti 2014) responds to these criticisms; however, some doubts still persist.

New excavations have been performed in the area by Eric Boëda and his team in several interesting sites—Toca do Tira Peia, Sítio do Meio, and Vale do Pedra—all of which date as pre- or contemporaneous-LGM (up to 35,000 cal BP; Boëda et al. 2013, 2016). Each site has specific problems needing clarification in order to evaluate the findings and interpretations (see critique in Borrero 2016; Schmidt Dias and Bueno 2014). For example, the Toca do Tira Peia publication (Lahaye et al. 2013) focuses on Optically Stimulated Luminescence (OSL) dates which, according to the authors, date the human occupation as >22,000 BP. However, little information has been published on the lithics, geology, and taphonomy of these sites, which are crucial to evaluating the context. In a second publication, there are some descriptions (asystematic) of the lithics and geology, although their relationships are confusing (see Boëda et al. 2013:453–454).

Certainly, these sites are promising and would change our view about the peopling of the Americas, opening new opportunities to study the LGM period. It is necessary to recognize the effort to identify new sites, excavate them carefully, and construct chronologies using different dating methods, but specific



Figure 4. View of the Toca do Boqueirão do Pedra Furada after the site was almost completely excavated. Photo taken by Gustavo Politis during the site visit organized by Niède Guidon in December 1993 at the Reunião Internacional Sobre o Povoamento das Américas in São Raimundo Nonato, Brazil.

analyses need to be performed before Boëda and his team's interpretations are accepted. We suggest the following agenda.

First, information should be fully published. Systematic description of lithics and features are needed. Because most artifacts are made from naturally outcropping rock at these sites, it is crucial to identify the provenience of the nonlocal raw materials (especially from those interpreted as *manuports*). Second, taphonomy and site formation processes should be included in the research design more systematically; raw data and results should also be available. For example, it is crucial to know the proportion between the natural cobbles and the artifact in each layer to quantify the lithic background noise. The association between the lithics and the dated samples or sediments must be confirmed and documented. Third, a new rock-breakage agent in Serra da Capivara should be considered: the *Sapajus libidinosus* (bearded or black-striped capuchin monkey; Fiedel 2017). As recent papers from primatologists (e.g., Proffitt et al. 2016) have shown, these monkeys recurrently produce sharp-edged flakes and cores with quite similar features and morphologies to human artifacts. New studies need to develop a methodology to clearly discriminate these “artifacts” (biofacts or faunal lithics) from the true, human-manufactured tools. Obviously, capuchin monkeys could not produce all the artifacts found in all levels of these sites, but they might be responsible for some. Ignoring this disconcerting origin for lithics that might not be of human origin will hinder interpreting the prehistory of the area.

A second group of sites in South America has a different degree of resolution and integrity: for example, Pubenza

in Colombia, Pilauco in Chile, and Santa Elina in Brazil. Evaluating these sites requires more published details on basic contextual data (for an exception, see Vialou 2005) and more systematic analyses, specifically on taphonomy and site formation processes. Some of these sites deserve brief discussion: Arroyo del Vizcaíno (Fariña et al. 2014), Chinchihuapi I and II, and Monte Verde I (Dillehay et al. 2015).

The Arroyo del Vizcaíno site in Uruguay has yielded more than 1,000 bones, most from the giant sloth *Lestodon armatus*, in the streambed of Arroyo Vizcaíno. Dates on the site are between ~32,200 and 31,200 cal BP (Fariña et al. 2014). Briefly, the main problems include the following: First, the site is in a streambed where the stream becomes deeper, forming a natural pond on a substrate of a cretaceous silicified rock. This is a typical location for a bone trap. Second, the very few lithic artifacts are not convincing, and even if they were artifacts, their presence in a bone assemblage in a streambed makes any association questionable. Third, the main argument for the human origin of the bone assemblage is the presence of some bones having marks, interpreted as the result of human tool use (Fariña et al. 2014); however, discriminating between trampling and cut marks (in a bone assemblage full of marks of different origin) is extremely difficult because these modifications overlap morphologically. Equifinality cannot be ruled out. Finally, excavation outside the streambed (a place where any association will be difficult to support) is urgently needed in order to evaluate the context and the interpretation.

In a recent paper, Dillehay and others (2015) published new research at the Chinchihuapi I and II and Monte Verde I sites, all in the Monte Verde area (southern Chile). The recent excavation of 30 test pits, 10 block areas, and 54 sedimentary cores yielded 39 lithics, 12 burned features, and 8 taxonomically unidentifiable animal bones. Based on these data, the authors proposed the occurrence of “short term anthropogenic activities that were most likely associated with hunting and gathering, heating food in small hearths, and producing and discarding expedient tools” (Dillehay et al. 2015:21). Dillehay and others dated these findings between ~18,500 and 14,500 cal BP. One limitation of the evidence is the scarcity of archaeological materials at these sites. This problem is magnified by the large extent of the excavated surface, and the wide temporal range of the artifacts. As Dillehay and collaborators have indicated, several studies were still in process and some results were therefore preliminary. Based on the limitations above, we consider that the evidence from Chinchihuapi I and II and Monte Verde I is promising but, at the moment, it is too weak, too chronologically broad, and too spatially sparse to support human presence in southern Chile immediately after the LGM.



Figure 5. A) Panoramic view of the Cerro de los Onas showing the entrance of the Tres Arroyos 1 cave site in Tierra del Fuego (Chile); B) Detail of the excavation of the 12,700 cal BP layer. Bifacial tool associated with a *Hippidion saldiasi* rib. Photo courtesy of Mauricio Massone.

Final Thoughts

It is clear that humans were in South America when Clovis people expanded in North America and that these populations were there at least 1,500 years before Clovis. No projectile points (except the few broken points in Monte Verde II) were found in any pre-Clovis South American sites, and megamammals constitute a significant occurrence only in Arroyo Seco 2. The first evidence of *continuous* human occupation in South America is found between ~14,500 and 14,000 cal BP. At ~13,000 cal BP, in coincidence with Clovis in North America, there is a significant increase in sites, and these are scattered in the main regions of South America. This rise could be associated with the expansion of Fishtail projectile point technology, and with other less popular types of projectile points such as Paijan or El Jobo, and would be related to a second pulse of peopling and/or the advantages brought by the incorporation of new hunting technologies.

In South America, humans were present in the southern tip of Patagonia at ~12,700 cal BP in Fell's Cave and in Tres Arroyos 1 in Tierra del Fuego, suggesting the final step for the expansion phase of *Homo sapiens* on the continent. Despite active research and dating programs over the last 40 years, and favorable conditions of visibility and preservation for early sites in Patagonia, the ~12,700 cal BP baseline remains firm, suggesting an actual temporal threshold.

Several issues should be resolved in order to test the validity of a pre-LGM human occupation of the continent. First, if the