Archaeology of the Pleistocene–Holocene boundary in Brazil

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Abstract

After a short history of Brazilian research about Pleistocene peopling, the Late Pleistocene/Early Holocene changes of climate and resources are discussed. Claims for a very ancient presence of Man before 13,000 BP (Itaborai, Toca da Esperança, Pedra Furada and Lapa Vermelha sites) are polemic, because putative structures and artifacts could have been made by natural processes. In central and northeastern Brazil some sites dated between 14,000 and 10,000 BP provide clear evidence of human activities and coexistence with huge Pleistocene mammals.

In a synthesis of our present knowledge about the 12,000/8000 BP period, biological aspects of the Lagoa Santa people and their subsistence are discussed. The main regional traditions are Umbu with bifacial projectile points, and Humaná with heavy implements in the southern part of Brazil. In the central and northeastern regions, the Itaparica tradition is characterized by typical retouched flakes and limaces. Although projectile points are generally thought to be absent in the earliest levels of this tradition, some have been found in Boquete Cave. In Amazonia, some cultural aspects seem to have been the same as in central Brazil.

1. Introduction

As in the rest of the Americas, there are great discussions about when Man arrived in Brazil. The geographic and climatic features were different enough from the present conditions and this point makes the work of the archaeologists difficult. The Late Pleistocene coastal margin, a probable way of penetration from the north, is now submerged, and the sites in which Man would have exploited the rich marine resources until 7000 BP, are no longer available. The inland sediments were generally eroded during the Early Holocene, which seems to have been much wetter than the Late Pleistocene. Only in places such as caves, where the sedimentary setting might protect Pleistocene layers from erosion, can ancient sites be preserved. Pleistocene findings older than 200,000 BP are claimed at Itaborai and Toca da Esperança (Lumley et al., 1988). Dates between 13,000 and 50,000 years BP were obtained in Goiás (Barbosa, 1991a), Mato Grosso (Santa Elina Shelter; Vialou et al., 1995), Minas Gerais (Lapa Vermelha: Laming-Emperaire, 1979; Prous, 1986a), and mainly Piauí (Guidon and Arnaud, 1991; Parenti, 1993).

In all these localities the dates, the stratigraphy, or the putative artifacts and charcoal considered of anthropogenic origin, are problematic (Fig. 2). Although these provocative affirmations are challenged, several open air sites and shelters yielded less polemic radiocarbon dates between 12,000 and 10,000 BP in the states of Rio Grande do Sul, Minas Gerais, Mato Grosso, Pará and Piauí. Some of these sites provide satisfactory evidences of human activity. Although not all of them have the same credibility, it seems that Man was really present in central Brazil around 11,000 or 12,000 years ago: Especially in Minas Gerais, rich occupation levels of this period are found.

For the next two millennia (10,000/8000 BP) there are many more sites in every state where archaeologists have worked intensively in the last decade (Rio Grande do Sul, Minas Gerais, Goiás, Bahia, Pernambuco, Rio Grande do Norte, Piauí, Mato Grosso, Pará), but the publications are mainly short preliminary reports. Even for this period, it is impossible to make a good synthesis of the human occupation in Brazil, as most of the territory remains archaeologically unknown.
As we have been asked to discuss the 14,000/8000 BP period, we shall not discuss the claims of older human occupations. We include an appendix of references on sites older than 14,000 BP (Appendix 1).

2. Results and discussion

2.1. Late Pleistocene/Early Holocene climate and natural resources

It is difficult to generalize about the past climatic and ecological changes of a large area such as Brazil, since we only have information from a few recent studies. The first attempt to elaborate synthetic models appeared in the 1970s (Ab'Saber, 1977) but these must now be modified using recent information from the southern, the central northeastern, and the Amazonian regions.

Today, southern Brazil is characterized by cool and wet highlands. The upper topographic areas are covered with parklands and the adjacent lower areas with mixed forests in which the Araucaria pine provides rich seed crops. Along the valleys of the Paraguay and Uruguay rivers, a riverine subtropical forest grows. Highlands also occupy a great part of central Brazil, covered by the tropical forest in the eastern wetter area and an arboreal savannah called the cerrado in the westernmost part, where the dry season exceeds 3 months. Northeastern Brazil, with a very long dry season, is mainly covered by scrub, bush and cactus vegetation called the caatinga. The north is mostly occupied by the Amazonian equatorial forest, but some areas of cerrado are found near Guyana and Venezuela (Fig. 1).

Between 20/18,000 and 13/11,000 BP, evidence indicates a generally drier climate. In Carajás and northern Amazonia, savannahs partially replaced the rainforest until 13,000 years BP (Markgraf and Bradbury, 1982). In Lagoa Santa, the intensive formation of carbonate concretions at the caves, indicates that not enough water was present to dissolve the carbonates. The palynological record shows that Podocarpus trees disappeared ca. 9300 BP.

In the 1970s, Ab'Saber (1977) stated that this arid phase was characterized by the expansion of the caatinga into central Brazil and the expansion of the cerrados into Amazonia, where only some forest refuges would have remained. In these refuges, insulation would have improved animal speciation processes (Brown and Ab'Saber, 1979). According to Ochsenius' opinion (1985), eolian sand accumulations would prove the existence of true deserts such as "Paraguacu" in northeastern Brazil. Today, many paleontologists and paleobotanists (Guérin, 1991; Oliveira, 1992; Cartelle, 1995) believe that the Late Pleistocene faunal remains and palynological records suggest a vegetation mosaic with forests along the rivers (even in Northeastern Brazil that would have been wetter than nowadays) and various types of cerrados in other areas.

Generally, dry periods have to be understood as more seasonal (i.e. long dry winter) rather than reflecting desertic conditions. Thus, the caatinga formations would have been of very limited extension, since all the animal species that are living in the caatinga (like Kerodon or Tolyptetes) also live in the cerrado and have no specific adaptation to dry climates. The caatinga modern extension would be a recent phenomenon. In Amazonia, the forest decrease would have been less important than the zoologists thought considering the now challenged refuge theory (Oliveira, 1992; Salgado-Labouriau, 1994). With the decrease of temperatures and the increase of open vegetation territories at the end of the Pleistocene, austral varieties of great mammals, typical of the Lujanian faunal assemblages of Argentina, migrated northward. Lestodon (a Giant Sloth) arrived in southern Brazil (São Paulo State), and many others reached much farther areas, such as central and northeastern Brazil. Myocastor coypus, Hippidion and Arctotherium, for instance, were clearly cold adapted animals. Furthermore, Cartelle (1995) recently found bones of Lama guanicoe in Toca da Boa Vista (Bahia State). All these animals met the indigenous tropical mammals, mainly large armadillos (Pampatherium, Panocetus and Hoplophorus), giant Sloths (Eremotherium, Nothrotherium and Scelidotherium), proboscidian (Haplomastodon waringi), Litopternae (Xenontherium), Notoungulae (Trigonodon) and the great monkey Brachyteles. The presence of this last animal demonstrates that the Atlantic type forest was present in central Bahia, today a semi-desert region.

At the very end of the Pleistocene, the pine (Araucaria) forest also grew northward, as the cold period became wetter. Previously, the very dry conditions did not let this forest grow into São Paulo or Minas Gerais States, as Ab'Saber (1977) stated.

By 12/10,000 years BP, the climate became wetter and warmer. In some places, lacustrine and fluvial sediments reveal important erosive phases at the beginning. Only later, mostly after 8000 BP, a general expansion of the forest occurred, as pollen assemblages clearly indicate. Thus, several geomorphologists think that the Pleistocene/Holocene boundary is older in tropical lowlands than in temperature regions, where the adjacent ice sheets caused temperatures to remain lower for two more millennia (Coltrinari, 1992; H. Kohler, pers. commun.).

It is still uncertain if there were short dry and cold episodes ca. 13,000 BP or 10,400 BP. In any case, all the huge animals disappeared in paleontological sites by 10,000/9000 BP. Hippidion returned to Argentina, where it survived a little longer. Some very recent, unpublished radiocarbon dates for giant sloth and mastodon from Bahia suggest that these animals also may have survived later into the Holocene, but the dates have been obtained.
by new techniques and need to be confirmed (L. Martin, pers. commun.).

As in other parts of America, the reasons of the extinction of huge mammals are not clear. There are very few evidences of killing by Man. Exceptions are an *Eremotherium* humerus from Toca da Boa Vista which has been, without any doubt, disjointed and butchered, and an iliac bone of *Haplomastodon* from Lagoa Santa, possibly showing human cuts (Prous, 1986b). In any case, the appearance of this new predator, whose hunting techniques the animals did not know, might have been a central factor in their extinction. More important, perhaps, was the decrease of grasslands and the increase of forest territories. Large Savanna mammals remained isolated and genetically weak while animals such as deers, tapirs and pecari, were able to survive in the forest. In some places of central Bahia or Piauí, the beginning of the desertification during the Early Holocene may be one of the extinction causes in this region, as herds of giant sloths are found in holes and caves that were the last places where permanent water remained available. It is important to notice that all the large gregarious mammals disappeared, which prevented Man from becoming a specialized big game hunter.

Lastly, from 17,000 to 7000 BP, Man lost the use of most of the coastal plains in central and southern Brazil because of the sea level rise. Owing to the absence of recent tectonic uplift in Brazil, archaeologists cannot examine the Pleistocene sites which must have been numerous along the shoreline, certainly an important way of colonization during the Pleistocene.

### 2.2. 13,000/10,000 interval

#### 2.2.1. Lapa Vermelha IV (Minas Gerais)

At this shelter of Lagoa Santa region, the skull and some bones of a woman were deposited in the intermediate levels between 10,200 ± 220 BP and 11,680 ± 500 14C years BP. Recently, W. Neves (pers. commun.) obtained a radiocarbon date on these human bones: of 9330 ± 60 BP (Beta 84439). However, the organic residue may come from humic acids, so the real age of the skeleton might be older. At more recent levels, some bones and coprolites of a giant Sloth (*Scelidotherium*) are dated ca. 9580 ± 200 BP (Gif 3208). There were no fireplaces or the typical industry of this period. Thus, dating was generally performed on scattered charcoal, probably of natural origin (at this site, the senior author could prove the presence of natural tree burning in Holocene sediments; surely this phenomenon also occurred during the Pleistocene).

#### 2.2.2. Santa Elina (Mato Grosso)

This cave is being excavated by A. and D. Vialou (Vialou and Vialou, 1994; Vialou et al., 1995). Under an anthropic pavement dated at 6040 BP is unit II of fluvial origin, which is dated between 7010 ± 70 to 10,120 ± 60 14C BP (Gif 9369 and 3954). At the base of unit II, numerous dermal bones and some bone fragments of a giant Sloth (*Glossotherium*) have been recovered near a fireplace, associated with flakes and retouched dolomite limestone splinters.

#### 2.2.3. Touro Passos/Lageado dos Fosseis

(Rio Grande do Sul)

Pleistocene sediments were deposited all along the lower reach of the Uruguay River under a volcanic ash layer dated at 10,400 ± 110 14C years BP. On the eroded terraces, E. Miller found several bones of huge mammals including *Glossotherium robustus* (one of them dated at 12,270 ± 220 BP). At the same stratigraphic levels, crude basalt and quartzite choppers and flakes were found associated with the rolled bones (Miller, 1974; Rodrigues, 1992). However, after S. Milder (1994) reexamined the stratigraphy, the lithic material, the field notes and discussed the results of the site with Miller's assistant (Jacobus, pers. commun.), many contradictions came out. Both the artifacts and their association with the bones (which were found around 4.5 km away from the 14C sample) are doubtful. Finally, Miller's publications contradict his own field notes. Therefore, the evidences of human occupations at these ancient layers are not accepted by some archaeologists of Rio Grande do Sul.

#### 2.2.4. Alice Boêr (São Paulo)

This open air site located on a fluvial terrace was first excavated by Becker (later Beltrão) in 1964 (Beltrão, 1974) and more recently by Heredia and Beltrão (unpublished) with a team that included a geomorphologist. Part of the industry has been studied by Cunha (1992 and 1994). A rich flint industry was found at unit III which is a thick sandy layer (excavated by the arbitrary levels method), that seems to be a secondary deposit; consequently, there were no archaeological structures. The radiocarbon dates come from floated charcoals while nine TL dates were performed on burnt flints. The middle part of unit III yielded ages of about 6000 years BP. However, two TL dates were recently obtained from the lower part: 10,950 ± 1020 and 10,970 ± 1620 BP. In some way, this confirms a previous date of 14,200 ± 1150 BP (SI 1208) (Beltrão, 1974) with a comment that suggests "the utmost caution in dealing with SI 1208, for the heavy dilution... the already large error quoted might be trebled". This lower part has the richest industry: mainly side scrapers, but also notched flakes, some typical end scrapers and burins. There are pendunculated or leaf shaped bifacial points, some of them with a spiral body, resulting from special alternating retouches. Blades and bladelets are not uncommon. The senior author, who examined part of this material in 1971, was very impressed by the high quality of some retouched
artifacts and also the occurrence of true burins, unusual instruments in South American prehistory.

At the deeper stratigraphic unit V, a gravel fluvial deposit, Beltrão found crude flakes and chopper-like flint chunks that she interpreted to be of human origin. However, according to the senior author of this paper, Tixier (pers. commun.) and Bryan (1978), this material is the result of natural processes, with the exception of a typical but unique end scraper, whose original location is not clear.

Problems relative to the sedimentation process, inconsistency between some dates and the stratigraphic sequence, and lack of information about the field procedures, make use of this site difficult, even if an Early Holocene or Late Pleistocene occupation seems quite likely.

2.2.5. Abrigo do Sol (Mato Grosso)

This cave in the Amazonian region was excavated by E. Miller in the 1970s, but we only know of short papers by Miller (1987) and Puttkamer (1979). A crude and atypical cobble industry is present at the lower levels (down to 5.4 m depth), dated between 12,000 and 9000 BP in square N 11/12, and 14,500 BP in square O 11/12. However, the stratigraphic location of this industry remains unknown, probably due to stratigraphic disturbance. Hence, no reliable information on Pleistocene Man is available from this site.

2.2.6. Cerca Grande (Minas Gerais)

W. Hurt and O. Blasi worked at several shelters in this locality of the Lagoa Santa region. Shelter VI, with 20 m² excavated, provided two radiocarbon dates for the lowermost metre: 10,378 ± 122 BP, 9720 ± 128 BP. From this period, there are several graves of Lagoa Santa Man, numerous quartz flakes, some end scrapers, bifacial projectile points and ground axes (Hurt and Blasi, 1969) that characterize Hurt and Blasi's Cerca Grande complex. They did not see any typological modification between ancient and recent occupations, even those with ceramics. Perusing this material at the Rio de Janeiro National Museum, the senior author observed that nearly all of the material was flaked by the bipolar technique, and most of the quartz “scrapers” were, in fact, bipolar cores (Prous in Leroy-Gourhan, 1988), although some true flint scrapers exist. Human remains have been described by Alvim (1977) and are now being studied by Neves.

2.2.7. GO JA 01 (Goiás)

The lower levels of this quartzite cave are radiocarbon dated from 9060 ± 65 (SI 3698) to 10,740 ± 90 BP (N 2348) and characterize the Paranaiba phase of southwestern Goiás. Big quartzite flakes unifacially retouched are typical of this phase. Numerous end and side scrapers, thick double side scrapers with one pointed end (limaces) are present. Awl and polished spatulas were made with deer bones. Some beads made with bones or egg shells have been found. Faunal remains mostly include armadillos, lizards, and snakes. Some deer, large rodents and a few fish have also been found (Moreira, 1981; Schmitz et al., 1976).

2.2.8. Other findings older than 10,000 BP

In several other localities, ancient dates have been obtained, but we will only briefly describe these findings. Some of these sites have not been published, and others have recently been widely divulgated (Pedra Pintada). The Boquete and Santana sites will be detailed in the next section of this paper.

2.2.9. Lapa Pintada Cave (Pará)

A first report about this Amazonian cave near Monte Alegre has been recently published (Roosevelt et al., 1996). The lowermost strata provided many consistent radiocarbon from ca. 11,200 to 10,000 BP. Many flakes and some retouched instruments (among them limaces and bifacial points) were found. Iron pigments were numerous and may have been used to paint the walls of the cave, as few pigments were recovered in the Holocene levels. Subsistence remains include fruits available during the rainy season, diverse mammals, reptiles, mussels and fish, suggesting an opportunistic strategy.

2.2.10. Barreiro site (Goiás)

From an unpublished dissertation (Martins, 1993), we know that level 5 of this open air site, located at a terrace near Rio Cocal, has been radiocarbon dated to 10,605 BP. The senior author examined part of the associated lithic collection which was mainly composed of chalcedony and quartz flakes, some of them chipped by the bipolar technique, and very few retouched artifacts.

2.2.11. Gentio II site (Minas Gerais)

In this cave, excavated by O. Dias, three radiocarbon dates are known from the lowest levels, ranging from 10,190 ± 120 (SI 6837) to 8620 ± 110 BP (Gif 3208) (Schmitz, 1987). Secondary burials with burnt human bones are described by Machado (1990).

2.2.12. Dragão Shelter (Minas Gerais)

The lower levels (8 and 10) are radiocarbon dated between 10,000 ± 255 and 11,000 ± 300 years BP (CDTN, 1007 and CDTN, 1008, with 9.5%). The chert and sandstone industry, still unpublished, includes some thick unifacially retouched quartzite instruments. Chalcedony and fine small and medium size flakes of chert are typical of the thinning or retouching process of delicate artifacts. Many of them show reddish colours resulting from accidental thermal processes. No hearth structures of the oldest periods have been found, and the dates come from isolated charcoal pieces (Prous et al., 1984).
2.2.13. Boquete cave (Minas Gerais)

This cave yielded various occupation levels (units VII and VIII), well dated between 12,000 ± 300 ^14C and 9870 ± 260 years BP (CDTN 1084 and CDTN 1077). These levels have a rich lithic industry, bone instruments, pit structures, hearths, food remains and red pigments. A big engraved block with pecked figures, and polished grooves and cupules was discovered in 1995, covered by unit VI and a fireplace dated at 9350 ± 80 BP (Cal BC 8450 to 8265-Beta 98573). A more full description of the lowest level is given in the last section of this paper.

2.2.14. Santana do Riacho Shelter (Minas Gerais)

This shelter has provided a charcoal concentration dated circa 18,000 BP at unit 8. As there were no associated human artifacts or structures, we believe that this charcoal concentration must have been the result of a natural fire. At unit 7, stratigraphically higher, a thick layer of ash and charcoal has been partially eroded by subsequent water action under more humid climatic conditions. We found some small, simple crystal flakes and processed ochre fragments, along with a little stone covered with pigments (natural or anthropic?). The charcoal was radiocarbon dated at 11,960 ± 250 BP (Gif 5089). However, we have to admit that though we have carefully excavated the site in order to identify every stratigraphic disturbance, the pigments and flakes we found at the non-eroded location, might be intrusive from the 9700/8400 year old graves excavated in the upper unit 4. A small animal may have used one of these burials to excavate deeper along the rock, and reach the remaining part of level 7 into which some small flakes and pigments could have fallen down.

2.2.15. Pernambuco State

Two poorly known sites yielded very old dates associated with a flake industry: Brejo da Madre de Deus rockshelter [11,060 ± 90 BP, see Schmitz (1987) and Lima (1991)], and the Chão do Caboclo open site (11,000 ± 250 BP, MC 1046 — see Laroche, 1975).

As we have seen, only few scholars believe that archaeologists have found sites older than 12,000 BP. However, no one in Brazil would deny the possibility of Man's entrance before this period.

Some findings around 12,000/10,000 BP are dubious, but many sites of this interval show unquestionable occupations. Thus, there is no doubt that Man was present in central Brazil and Amazonia shortly before ca. 12,000 BP. Evidence is less clear in the southern part of Brazil, where there were fewer systematic excavations. More recent sites, between 10,000 and 8000 BP, are much more numerous and less controversial, and thus they will not be described here.

3. Synthesis of the first secure occupations (13,000/8000 BP)

We will now review our present knowledge about Late Pleistocene and Early Holocene Man and Nature. However, it is necessary to consider that paleoecological research was very uncommon prior to the late 1980s, and that archaeological excavations, still limited, are mainly test pits excavated by artificial levels that have been only partially described in publications. Generalizations are, thus, very hazardous.

**Human bones remains.** There are no dated human bones older than 13,000 BP. Mostly, the Material of the 13,000/8000 period comes from the Lagoa Santa/Serra do Cipó region in Minas Gerais (Lapa Vermelha, Sumidouro II, Lapa Mortuaria near Confins, Escrivania III, Cerca Grande VI, and Santana do Riacho sites) and all have the typical Lagoa Santa Man morphology. Most of these human remains (from nearly 200 individuals) are deposited in Copenhagen (Zoological Museum), Rio de Janeiro (Museu Nacional) and Belo Horizonte (Museu de História Natural). As described by many authors (recently Alvim, 1977, 1992; Neves and Pucciarelli, 1991; Soto Heim, 1994), the Lagoa Santa type is very homogeneous and shows characteristic features.

Of submedium size, these people had a moderate sexual dimorphism, gracile bones and long forearms. The skull was extremely dolichocephalic, with a lengthened occipital part and occipital bun, a sagittal keeling, parieto-mastoidian depression under the parietal hump; broad and short face and nose, rectangular orbit. Non-metric characters (such as olecranial perforation, 3rd molar absence), also attest a great homogeneity suggesting genetic isolation.

Pathological evidence has been studied by Ferrigolo (1987) and Souza (1992). They show a high frequency of minor traumas among younger people. Osteomyelite is also frequent, sometimes intense, and so are arthroses in temporal/mandibular articulation (due either to hard vegetal mastication or from technological use of the teeth). Decayed teeth are not rare. Molar eruption is extraordinarily late in comparison with other tooth and bone development (Radicchi, in Souza, 1992).

**Subsistence.** For the Paleoindian/early Archaic period, information about subsistence comes exclusively from shelters. No killing sites are known, which is not surprising, since the huge animals which had to be butchered in the same place where they were killed no longer existed. The non gregarious tapirs were the only big mammals that remained.

In southern Brazil, only the Afonso Rodrigues shelter provided bones of medium size mammals such as deer (Ribeiro et al., 1989, and pers. commun.). However, for the early period, there were mainly gastropods shells and eggs of *Rhea americana*. This material has not been published in detail.
In central and northeastern Brazil, where cerrados provide plenty of fruits during the rainy season but medium size animals are scarce, the evidence from some Goiás (GOJA.01), Minas Gerais (Santana do Riacho, Boquete) and Pernambuco (Brejo da Madre de Deus) shelters suggest that prehistoric Man was a non-specialized hunter of some medium size animals (deer and armadillos), and even smaller prey such as big lizards and rodents. Apparently, the use of these small animals became more and more frequent after 9000 or 8000 BP. Fish and bird remains exist, but are very rare: egg shells occur at Brejo da Madre de Deus. In Goiás and Pernambuco, pieces of wax suggest honey collection, still an important gathering and ritual activity today. Freshwater mussels seem to have been an important part of the diet in Boquete ca. 10,000 BP. Later, however, they virtually disappeared, replaced by Megalobulimus, a giant land snail which occurred at this cave and elsewhere until recent times. In Lapa Vermelha after 8000 BP, these wet season snails were the only faunal remains in many of the small cooking hearths left by small bands that visited the shelter overnight during the rainy season.

Dental observations Lagoa Santa Man show a great frequency of decayed teeth, which in turn suggests great importance of vegetal food. In spite of vegetal fragility, findings of carbonized palm nuts (mainly Acerocoma, Astrocarum, Cocos corona, Syagrus) are common at all the shelters. Fruits of pequi, a typical cerrado tree (Caryocar brasiliense) very rich in vitamins, and Hymenaea fruit capsules also appear in some of the Santana graves (Prous and Malta, Eds, 1991). In southeastern Brazil, Arecastrum palm nuts have been found at Afonso Rodrigues shelter.

Usually, faunal studies only list taxa and number of elements; no analysis of taphonomic processes, spatial distribution or butchering techniques is performed. Therefore, it is difficult to know if part of the recorded animals were really prey or only cave dwellers. Thus, we have little doubt that the faunal remains in the shelters do not give an accurate testimony of subsistence. In some layers of the large excavations at Boquete and Santana, most of the deer bones we found were paws which had been carried to the site to make bone spatulas.

3.1. Regional traditions

Sites are rarely described, so archaeological structures or rituals cannot be used to compare cultures. Consequently, the archaeologists usually define prehistoric cultures mainly from the lithic industry, as it is the best preserved and described material. Nevertheless, few cultural units have been proposed in Brazilian archaeology due to the following reasons.

Obvious chronological or spatial typological differences between lithic complexes seem to be scarce. There are very few qualitative and quantitative studies of collections; lithic technology was barely studied until a few years ago. Consequently, in the identification of lithic units, archaeologists use, almost exclusively, few typological criteria, i.e. presence/absence of some instrument such as projectile points (southern Brazil) or limaces (central Brazil), a preference for thin flakes or heavy instruments.

3.1.1. Southern Brazilian traditions (Fig. 3)


3.1.1.1. Phases with projectile points. If accepted, the most ancient archaeological sites are those of Ipecui (2 sites, radiocarbon dated to 12,770 ± 220, SI 801; 12,690 ± 100, SI 2351) and Uruguay (10,400 ± 110 and 9595 ± 175 14C years BP) phases in the lower valley of the Uruguay river. Most of them have been found in fluvial terraces now covered by the forest and laterally eroded by waterflow. The sites are situated near islands or rapids (good places for fishing).

a) During the Ipecui phase, vegetation was probably scarce, the river less important, and Man may have hunted Glossotherium and Glyptodonts, whose bones are present in the same geological deposits. No projectile points have been found and the lithic material is simple, sometimes crudely retouched flakes and choppers.

b) During the Uruguay phase, there were small bifacial stemmed chaleoyony projectile points with triangular shapes, which were pressure retouched. Side and end scrapers, various retouched flakes and basalt chopping tools also were present, and pounders and anvilstones were frequent. In the Laranjito site, excavated by Miller, lithic instruments and carbonized fruits formed clusters around hearths (Schmitz, 1987).

c) Recently, two shelters with the same lithic industry have been excavated. Schmitz established the undated and unpublished Capivara phase with the material he found in one of the shelters, and Ribeiro (1989) the Batinga phase with the lower layers (160/230 cm) of the Afonso Rodrigues site. At this shelter, the 170/180 cm artificial layer is dated to 8290 ± 130 14C years BP (Beta 32183). Nearly 3000 medium and small metaquartzite flakes were recovered, along with 7 projectile points, some bifacial blanks and one deer antler used for retouch. No scrapers appeared; a flake from the wall (?) was stained with red pigment. Also some bones, egg shells, palm nuts and stones from hearths were found.
Uruguai, Batinga and Capivara phases would be the ancestors of the Umbu Tradition, typical of the open land hunters during the following millenia, characterized by its carefully made projectile points, scrapers and other retouched small or medium size flakes.

d) Three fishtail projectile points have been found in Santa Catarina and Paraná States, but none in a dated context. The senior author collected a fishtail projectile point in a coastal sand dune (Prous, 1992), where it may have been probably brought by more recent sambaqui dwellers. Another projectile point was found at an eroded site near Itapiranga (Rohr, 1968). The only fishtail projectile point recovered from a stratigraphic context appeared in the undated Vinitu site (Chmyz, 1978), probably ca. 6000 years old.

3.1.1.2. Occupations without projectile points. Along the Paraná river, Rohr (1968) excavated the Itapiranga terraces and collected heavy basalt artifacts. On the upper 6 meters, dated at $7260 \pm 100 \text{^{14}C}$ years BP (SI 440), he found a typical Altoparanaense industry, characterized by big flakes and very thick bifaces, some of them long and straight, others boomerang-shaped which were similar to those described by O. Menghin in Misiones, Argentina (Menghin, 1957). This material has been
studied by Schmitz and Becker (1968). At a lower depth (7 m), Rohr found similar flakes — but no bifacies — with a hearth dated at 8640 ± 95 14C years BP (SI 995), that he interpreted of altisuparaense origin. For Brazilian archaeologists, the Altoparanense industry belongs to the Humaitá Tradition that occupied exclusively riverine forests along the lower reaches of main rivers. Humaitá people are supposed to have been mainly gatherers, perhaps also fishermen, with an industry characterized by heavy basalt or metaquartzite instruments such as chopping tools and thick scrapers; they did not use stone projectile points.

Thus, in the southern region, Umbu and Humaitá traditions would have been coeval, from ca. 8000 BP. Umbu’s and Humaitá’s northern boundary seems to be the Tropic of Capricorn, in the state of São Paulo, where no sites older than 7000 BP are known. It is impossible to say if there were some contacts between the southern traditions and the cultures of central Brazil.

3.2. Central and northeastern archaeological units

Many shelters occupied in limestone and sandstone formations in Central and Northeastern Brazil (states of Bahia, Goiás, Mato Grosso, Minas Gerais, Pernambuco, Piauí and Rio Grande do Norte) provide a great amount of information. However, it is difficult to make comparisons between the different regions studied.

3.2.1. Central Minas Gerais

No dated ancient open air sites are known from this period, but many shelters were occasionally used by Man until 8000 years BP. In the Lagoa Santa region they used to face karstic lakes in transitional regions between the forest and the cerrados. In Serra do Cipó, prehistoric men occupied shelters near brooks and torrents at the boundary between the cerrados and the scarce herbaceous mountain vegetation. In both regions, vegetation resources were important during the summer period where quartz, mainly crystal, was the available raw material.

Several shelters were used as cemeteries (among others, Confins, Cerca Grande, Sumidouro, Santana do Riacho), while isolated human skeletons or bones came from other places (Caieras II, Lapa Vermelha). The bodies were in graves covered with stones, some of them with red pigments.

During this period, quartz was worked by bipolar technique on anvilstones, so we found many thousands of small simple flakes. Larger flakes (more than 2 cm), which were frequently extracted by free hand percussion, were retouched into end scrapers. Microwear analysis indicates that they were mainly used to fix ochre powder. Quartzite slabs, where available, were retouched in side scrapers for wood working. A few retouched small flakes and a broken flint limace showed that this imported material was a precious one. Pebbles were used as anvilstones to chip quartz, but also to break palm nuts. Greenstones were brought from kilometers away and ironstone (hematite) from long distances to make ground axes. Polished instruments seem to be very ancient in this region: axe fragments and blanks have been found in layers dated from 10,000 to 8000 years BP in Cerca Grande (Hurt and Blasi, 1969) and Santana do Riacho (Prous and Malta, 1991). Very scarce projectile points and thinning small flakes have been found in the same site. If the excavations were less extensive, it would have been easy to think that this period was a “pre-projectile point” one.

Few bone tools were found, the most interesting of which is a possible hook fragment from Santana do Riacho and some spatula fragments, bone and antler points. Vegetal beads and rope fragments from hammocks were also found in the same site.

Even though thousands of paintings cover the walls of many shelters, we do not know if they were made during this period. In Santana, however, some scrapers were stained with yellow powder that had not been used in the graves; perhaps, these pigments may have been made as early as ca. 9000 years BP to draw on the walls. However, at the moment, the oldest dated rock paintings in Santana and Lapa Vermelha, are between 7000/5000 and 4000 BP (animalistic Planalto Tradition).

3.2.2. Northern Minas Gerais

In the Januária and Montalvânia regions, several shelters with old dates are being excavated. The older layers of Lapa do Boquete and Lapa do Dragão have been dated from 12,000 to 11,000 years BP. There, silex, chaledony and metamorphic sandstone extracted from the highest hills of the region, were the main raw materials to be chipped. Sandstone was selected to make the heavy coarse limaces and thick scrapers up to 10 cm in length, which are characteristic of the period before 8000 years BP in this region (Fig. 4) and in the neighbouring Goiás State. Microwear analysis indicates that these instruments were used to work wood (Prous et al., 1992). Bone industry is poor, mainly having polished spatulas made of metapodial deer bones.

The excavations at Boquete cave revealed a great fallen boulder covered with grooved petroglyphs and buried by 9000/7000 year old years. Some red pigments have been found in the oldest layers, but we do not know if they were used for the oldest paintings of the cave walls (São Francisco geometric Tradition). After ca. 9000 years BP, the occupation remains in both this and nearby sites became completely different.

3.2.3. Goiás

The oldest dates come from the southwestern part of the State, near Serranópolis, where 40 m² were excavated by Schmitz (1989) in GO-JA-01 shelter. A rich industry
was found in the lower levels. Characteristic of this period were large, frequently more than 10 cm thick, unifacially retouched scrapers and *limaces* made of quartzite blades extracted from the walls, and very small (upto 3 cm long) flint cores. There also are bone spatulas and antler instruments.

Subsistence remains suggest a diversified habitat and unspecialized hunting and gathering. This archaeological complex, dated between 10,740 ± 90 (N 2348) and 8370 ± 85 (SI 5562) in 8 shelters, is known as the *Para-naiba phase*. Later, the characteristics of human occupations changed completely.

Similar lithic material, dated at 10,750 ± 300 14C years BP was found in GO-NI-49 shelter, located 100 km north of Serranópolis. Here, artifacts were mostly made of quartz. Two quartz unifacial projectile points were associated with the typical scrapers (Barbosa et al., 1976), but the archaeologists fear the points may have been intrusive.

**3.2.4. Northeastern region: Bahia, Pernambuco, Rio Grande do Norte and Piauí states**

In Pilão limestone shelter (central Bahia), A. Bryan and R. Gruhn (1993) excavated a 35 cm thick layer that provided four 14C dates between 8790 ± 80 (Beta 10014) and 9650 ± 90 years BP (Beta 10015) with some crystal, quartzite, chert (brought from many kilometers away) and limestone material. There were quite exclusively small (2 to 4 cm long) simple flakes; "some of them with edges stepped by retouched and heavy use", but also
some quartzite scrapers, limestone choppers, pebble hammerstones and few chert core fragments. Quartz vein was used after being flaked by the bipolar technique. Freshwater mussel shells (Diplodon) were used as scrapers; also one pointed deer bone was present. Charcoal and ash were abundant and so were faunal remains of medium size animals such as deer, peccary and armadillo. Few scattered human bones were recovered. As other sites of the region, Pilão shelter was abandoned during the Middle Holocene.

Furna do Estrago (Pernambuco) excavated by Lima (1991) stands near one of the rare permanent water points in the region. The lowest level, characterized by charcoal and ash lenses, was dated between 8495 ± 70 and 9150 ± 14C years BP (S16296 and 6298) but has been poorly described. Deep hearths in which many food remains were left, suggested a permanent settlement. Most of the bones were from small animals such as rodents and armadillos. Some egg shells and propolis (honeybee products are of great importance in all indigenous cultures) also appeared. Plant remains were scarce; including Spondia, Syagrus palm nuts, and resina of Piptadenia, a medicinal plant. Small quartz and flint flakes were the only lithic material found. After ca. 8000 BP, the site was abandoned.

In the same state, Gruta do Padre Cave (Itaparica region, Pernambuco) provided rich lithic material, mainly thick scrapers and planes made of pebbles collected at the nearby São Francisco river. Based on this material, Schmitz created his Itaparica Tradition in which he included all the Early Holocene industries characterized by thick unifacial instruments (especially limaces) and, theoretically, without bifacial projectile points.

Mirador site (Rio Grande do Norte), is a very small rockshelter (12 m²). Some burials, mainly of children with beads, recovered from the lowest level (1–60 cm, dated at 9640 ± 100 14C years BP—CSIC 720) would be “in contact with the lowest paintings of the pannel” (Lufi, 1989). According to G. Martin (1991), this would indicate an age of ca. 10,000 years for the rock art, belonging to the Serido style of Nordeste Tradition, which depicts small anthropomorphic figures in hunting and ritualistic scenes.

In the São Raimundo Nonato region (Piauí), climatic instability would have characterized the Early Holocene (wetter phase 10,000/9000 BP; increasing aridity since 9000 BP). The industries 14,300 ± 400 and 12,200 ± 60 BP in Toca do Sítio do Meio until 8450 years BP in Pedra Furada constituted the Serra Talhada phase. Though quartzite choppers like the Pleistocene ones continued to appear, the lithic material of this period is mainly of flint, chalcedony and quartz. In general, there were flakes, some of which were unifacially retouched tend and side scrapers, notched flakes). Most carefully worked artifacts (limaces, borers) were shaped from large chalcedony flakes. Heat treatment is considered to have been used for manufacturing of the quartzite double scraper type (Parenti, 1993). At Pedra Furada, a quartz bifacial projectile point has been found and is thought to be the result of barter, and not of local manufacturing. Recently, at Toca do Meio, a ceramic sherd would have been recently recovered from a hearth radiocarbon dated at 8960 years BP. A polished stone was found at the lower level, dated at 9200 BP (Guidon, 1994:5).

At Toca do Baixio do Pern shelter, various rock paintings, depicting deer, nandu, a wild cat and small anthropomorphic figures (some of them buried before the excavations), stand just above a 9700 BP layer and under a radiocarbon dated level of 4920 ± 70 BP (Gif 7739, Martin 1996); Guidon (1989) thinks they are at least 9700 years old because people would not have sat to paint, but we disagree with this interpretation. Also, following Guidon, the Nordeste Rock Art Tradition (hunting or ritualistic scenes carefully painted) and Agricista Tradition (with coarse great figures) coexisted in the São Raimundo Nonato region at the end of the Serra Talhada phase.

3.2.5. Workshops and quarries

Thousands of cores, cortical flakes and some finished Paranaiba like instruments were found along quartzite or flint outcrops at quarries which appeared in several open air sites of central Brazil (Goiás, Minas Gerais, Bahia). Although these sites remain undated, it seems they were probably worked since the Early Holocene.

Near Niquelândia (Goiás) several workshops were found on fluvial terraces. There, quartz and chalcedony pebbles (the senior author found many bipolar products in the collections with clear evidences of percussion with a wood or antler hammer in some of them), flint and metamorphic sandstone were flaked by prehistoric Men. Few retouched instruments such as typical limaces appear at the Barreiro site where the lower layer V provided a 10,605 BP date (D. Martin, 1993). In Goian state, the junior author found hundreds of Itaparica like retouched artifacts, debitage waste and an in situ associated projectile points workshop; they were under 2 m of Early Holocene sediments, in a fluvial terrace of the Tocantins River (Fig. 5a–d).

Concluding, we can say that most of the Early Pleistocene levels in central and northeastern Brazil are characterized by an industry with large thick flakes (Fig. 5), which are frequently unifacially retouched (limace type is the most representative, being most carefully worked in Goiás than in other states). Bone spatulas are also typical while projectile points tend to be absent. Apparent exceptions may be explained by the specificity of certain raw materials, mainly quartz. Large flakes cannot be obtained from medium or small size crystals. It is clear that Lagoa Santa and Santana’s industries could not show thick huge scrapers and limaces. For this
reason, in these sites the few medium size artifacts of quartz vein, unifacially retouched, are significant. Likely, they are the equivalent of the largest flint or sandstone instruments of the Itaparica Tradition of northern regions.

Another important point is the absence of projectile points. We saw that some appeared in Goiás and Piauí, where they were considered intrusive. This argument does not apply in Lapa do Boquete, where we identified the manufacturing waste. Otherwise, what would be the unknown culture responsible for the bifacial projectile points, which does not appear in the archaeological records? We think that Itaparica groups did make the points, but they left them at the shelters only when the points were broken. If archaeologists peruse the refuse that they classify as "microblade", they will probably find the proof of point manufacturing. Unlike southern hunters, Itaparica people did not easily leave their most carefully made artifacts.

3.3. Northern and western regions

In the western Pantanal swamps, no preceramic site has been found so far. In the higher western lands, Santa Elina shelter (Vialou et al., 1995) will provide important information, but the results of the recent excavation are mostly unpublished. The industry seems to be very crude (marginally retouched limestone slabs), similar to the putative Pleistocene.
In Amazonia, Lapa do Gavião has been studied by Lopes and Hilbert (Silveira, 1994); 40 of the 350 m² were excavated in the 1980s. Thousands of quartz and amethyst crystal flaked by bipolar techniques (Fig. 2a) were found in level A2, dated from 7900 ± 45 (Geochron Labs) to 8140 ± 130 BP (Teledyne Isotopes). The raw materials were brought from at least 30 km away. Inside the cave, cores and flakes were left along the walls; outside, on a sheltered area, lithic material surrounded a big disturbed hearth with faunal remains.

4. Spatial organization of archaeological remains at Santana do Riacho rockshelter and Boquete cave, Minas Gerais

Santana do Riacho shelter, which stands at the foot of the Serra do Cipo Mountains, can be seen from a long distance. Thus, it must have been a territorial reference in several periods, as it is suggested by the thousands of paintings on its walls. Between ca. 9700 and 8230 BP, the site was occupied by the Lagoa Santa people who took advantage of the two well separated cave platforms. The upper platform was used as a cemetery, mainly during the 8500/8200 BP period. On the lower platform, lithic material, mainly reflecting the daily life, was recovered: including thousands of small flakes of local quartz that were later swept along the wall. Carefully retouched crystal scrapers and borers were concentrated in a 15 m² surface where fallen stones were less frequent. There, worn out scrapers made on quartzite slabs were retouched, and clusters of little splinters revealed the place where this occurred. These retouched scrapers were reused to work wood, as indicated by microwear analysis, until they broke and the fragments, some refitted at the laboratory, thrown away. More precious flint instruments were also retouched. However, since they were carefully carried away, we only found small splinters.

Raw material used in the preparation of yellow, orange and dark red mineral pigments and some stained lithic flakes were found along the wall. A small boulder with one face painted, suggested that rock painting may have begun in this period.

On the upper platform, the cemetery (Fig. 6) stands in a 15 m², apse-like natural spot whose center was occupied by a huge fallen slab buried by sediment accumulation after 8000 BP. Prehistoric people dug the gritty soil, sometimes making a box with some slabs and the bent corpses were put down in the graves. In several sepultures we found rope fragments. In one burial, the rope fragments seemed to belong to a hammock where a young person laid with an infant wrapped in plant fibers upon his pelvis. A hearth was lit near the pit and the live coals mixed with the finer sediments, were thrown into the grave, heating or burning some bones. Finally, they built a cairn with the blocks, some of them painted. During the latest period, ca. 8300 BP, there were no more free places around the great fallen slab, and some burials were partly destroyed in order to bury new corpses. The disturbed ancient bones were then superficially buried again among the stones of the cairn, sometimes with ochre deposit. Three burials of adult females, far from the huge slab, might have been either the latest, or those of less important — or "different" — people as the lack of red powder at their grave suggested. One of these corpses was a woman with cranial pathology and probably with mental problems (Neves, pers. commun.).

In the cemetery, both men and women were present, but women died a bit younger. Little children were also numerous and frequently received a greater amount of concentrated red pigments and collars of vegetal beads. Paleopathological studies made by S. Souza (1992) showed several inflammatory bone processes and Harris lines, which point to frequent periods of physical stress. The cemetery was used during both wet and dry seasons. We found carbonized Caryocar seeds with shells of giant snails at some graves while in others, seeds only available in dry seasons such as those of Pterodon pubescens. The lithic material found at the undisturbed graves was mostly composed of bipolar flakes and crude scrapers for pigment (usually stained with yellow, though pigments of this colour seldom appear in the graves). The more delicate quartz artifacts or specialized quartzite side scrapers, common in the lower platform, were almost completely absent.

Santana do Riacho shelter is, at this date, the best known and published site in Brazil. It documents various aspects of prehistoric life. Unfortunately, we did not find the spaces where they cooked and discarded food remains. Perhaps, there were unexcavated parts of the site, but we think that prehistoric men probably occupied nearby places that we have not found yet.

4.1. Lapa do Boquete Cave

The Boquete Cave is situated close to the little Peruaçu River, in northern Minas Gerais. There, more than 60 sites, mainly shelters with rock art, have been recently discovered in an area of about 10 km². The very dry conditions at the cave preserved the organic material. The excavations revealed the existence of nine main geological units which were subdivided into 27 archaeological layers. We excavated about 20% of the cave in five places, and now we are working in the open air occupation, out of the sheltered area. We shall now present the lower archaeological level of excavation no. 1 (25 m²), dated from 12,000 to 11,000 BP.

This excavation was made in the western part of the cave, along a huge fallen stalagmite that constituted a kind of wall. Preliminary analysis of some clusters of material seems to represent different types of activities and may have been coeval (Fig. 7). The clay sediment of unit VIII,
frequently mixed with organic material, is aggregated in the zones where the more humid climatic conditions of the Early Holocene let the water percolate. Archaeological remains (down to more or less 1 cm²) and structures were mapped; and the smallest material recovered in the sieves was localized in its own square meter map. In this way, it is possible to study the first occupation floor of the region (Ribeiro et al., 1996).

4.1.1. Making, using and discarding lithic instruments

A big anvilstone used to break nuts and a ball of red prepared pigments occupied the center of an “empty” circular area in JK/11-12; an accumulation of flint waste was around this cleaned area. There were shaping and retouching flakes from scraper manufacturing, thinning flakes from projectile points and one bifacial point fragment. Three combustion structures (charcoal and ash
lenses) were located on the boundary of this circle. In the southern structure, a carefully shaped scraper and some expedient tools (irregularly retouched flakes) had been discarded. Microwear analysis revealed that some of them had been used to scrape dry wood (wood was not preserved in this layer, but post holes were found at the limit of this area). Though some discarded instruments were thrown in active fireplaces which is suggested by the
thermal alterations they display, retouched artifacts were generally left in another place, along the western calcite cemented wall.

4.1.2. Hearth

Most of the subsistence remains were found near or within the hearths; great concentrations of carbonized palm nuts broken upon an anvilstone were found at K10, J10 and L9, situation similar to those at K11 and M8, which showed typical pecked circular depressions. Palm nut wood, rich in oil, provides excellent coal. Other plants, like 

Cnidosculus and Sterculia seeds, also appeared near some hearths, mainly in JL9 and JK10. More than half of the bone refuse (836 g) concentrates in the hearths around JK/11-12 structure. These are mostly from small deer (Mazama); teeth, ribs and paw fragments were all probably rejected during artifact manufacturing. Scutes of armadillo (Euphractus and Dasypus) were possibly used for cooking purposes. Bones of little animals including birds, fish, and tortoises were found in JKL/8-9 and may be associated with the J10 hearth. Near the L10 fireplace, we found thousands of half calcinated bivalvia shells. In addition, there were some isolated small freshwater molluscs (Pomacea and Limnea), probably brought to the site with water or some other aquatic supply, as they are so minute that Men were not able to perceive them.

4.1.3. M8 structure

This structure stands in a poorly lit part of the cave. A deep artificial cylindrical hole contained anvilstones, few bones and chipping refuse. A hammerstone, limestone splinters and several retouched instruments were left at the margin of this hole. Within a short distance, nearly all the silicified sandstone artifacts of unit VIII were located. Was there a deposit to store this valuable material (the raw material was available some kilometers away and shaped at the quarry), later used as a refuse area?

It is clear that the first stages of the reduction process were absent at Boquete’s ancient levels or, at least in the six excavated areas, as virtually no cortex appeared on the flakes. Unretouched large flakes were also absent, and very few cores were collected (Prous et al., 1992; Fogaça and Lima, 1991; Fogaça, in press). Thus, these operations were made in other sites. Butchering was not a local process, unless the entire bones were carefully swept. Such a cleaning process seems to have existed, as in JK/11-12. Likely, the flaking refuse was first discarded in the hearths and only later pushed away, shaping the circle described.

The destruction of non carbonized plant remains in lower units prevents us from better knowing gathering strategies, although the occurrence of palm nuts suggests a summer occupation. Another question is if all the clusters represent one or several occupations. This latter hypothesis would fit better with some observations, but we have to conclude our analysis before we try to answer that question.

In spite of these constraints, the excavation of large surfaces and the detailed analysis of minute lithic refuse at Boquete permitted us to recognize two important points. First, artifacts not present at the shelters have been carried away, although they have been shaped at these places. Some of them have been found in the open air site, 20m from the shelter, where complete artifacts were left, and neither shaping nor retouching activities occurred. Second, some aspects of daily life during the Prehistory have been clarified.

5. Conclusion

Ancient or Middle Pleistocene human occupation is claimed in Brazil (Lumley et al., 1988), but the evidence is very weak (Prous, 1995). Upper Pleistocene Man is supported by Pedra Furada, Santa Elina and Lapa Vermelha’s lowest levels but, in the latter shelter, little evidence is available prior to 11,960 BP. Santa Elina’s lower levels are only known from previous information about faunal remains. At Pedra Furada, Guidon and Parenti’s interpretations are challenged, although few scholars deny the possibility that some of the chipped stones and burnt places might have an anthropic origin.

During the Early Holocene, no fluted point or leaf shaped projectile point Horizon is known. However, the obvious presence of Man between 12,000 and 11,000 BP in Minas Gerais and Piauí States points to a more ancient arrival in Amazonian or coastal regions. Littoral — now submerged — sites are not available, and Amazonia is poorly known since it is very difficult to explore and few suitable localities with preserved Late Pleistocene sediments are present. However, Lapa Pintada, Lapa do Sol and Gavião shelters prove that sites with a good stratigraphic sequence do exist.

If really there were human occupations during the Middle and Late Pleistocene before 12,000 BP and people left their marks in some of the sites we described, we have to recognize that they used very little stone — which is quite possible in regions where wood was very abundant (in some recent protohistoric sites, the chipped stones of Tupiguarani Indians, for instance, are not much more characteristic). Also, they would have had no interest in selecting good raw material and instead used only bad local ones. Low density and high mobility, typical of pioneer people, would explain the scarcity of sites and incontestable evidences. Besides this, the fact that hardly a “conservative” archaeologist would test a putatively sterile Pleistocene sediment reinforces this situation.

In the face of the present “evidences”, the Faithful and the Unbelievers will have useless discussions, as the
arguments of each depend on subjective interpretation of the facts. However, it is necessary that Unbelievers continue criticizing controversial data (if not, “Pleistocene sites” will multiply out of control . . . ) and it is also important that faithful archaeologists remain working in Pleistocene sediments. If they do not, possibly more representative ancient sites will never appear. 

By 12,000/10,000 years ago, the central and northeastern regions were inhabited by at least one type of a scarce, non mongolized and genetically isolated people: the Lagoa Santa Man. Sometimes, they would have occupied rockshelters to work and to bury people, painted some walls and engraved fallen rocks by 10,000/8000 BP. Unfortunately, open air sites have not been found. During this interval, lithic remains were characterized by the use of local and exotic raw materials at the shelters. They produced large thick flakes, frequently unifacially retouched; side and end scrapers, planes and limaces, with some regional variations, were typical. In spite of Brazilian archaeologists’ opinions, some evidence points to the production of bifacial projectile points; the other characteristics of the so called Itaparica tradition are not fully expressed. Nor is the chronological significance of the presence of famous limaces, since this artifact also appears in much more recent sites or layers.

Though chronological data and some isolated findings show that the pioneers met huge mammals like giant sloths, subsistence refuse and site location suggest unspecialized hunters/gatherers. By 8000 BP, everything abruptly changed in central Brazil. The shelters were much less occupied and frequently completely abandoned. Large flakes and retouched artifacts disappeared though scarce microflakes still can be found at the shelters. Shells of giant snails efficiently substituted stone scrapers to work wood. Gastropods were also much more exploited and the ratio of small animals increased in faunal refuse. We also believe that São Francisco and Planalto rock art traditions appeared at this time. Did the new inhabitants whose physical morphology proves that they were different from the Lagoa Santa Man, at least in Peruaçu Valley, bring a new way of life and discarded the ancient technologies?

Barbosa (1991b), according to Greenberg’s ideas and glottochronological data, suggests that by 10,000 BP the extension of the Amazonian Forest (at the expense of cerrado) would have been responsible for the separation between proto Gê, Pano and Karib languages. Each group would have migrated to a peripheral region, with Gê Indian ancestors in the new cerrados that were replacing Pleistocene caatinga in Brazil. Thus, they would have been the origin of the Itaparica Tradition. Though this is an attractive hypothesis, we have to remember that Itaparica like industries are present in Minas Gerais before 10,000 BP. We previously pointed out that recent research suggests that mixed cerrados formations remained in central Brazil during the Pleistocene, and that the Amazonian forest did not decrease in such a drastic manner as it was thought some years ago. Otherwise, the hypothesis of Barbosa would fit chronologically better for the arrival of new populations by 8000 BP in the states of Minas and Goiás.

Archaeologically little is known for this period in the state of São Paulo, which is considered the boundary between the central industries and the southern traditions. Would this boundary mean that Early Holocene cultures respected exactly the modern ecological regions and that their lithic industries had to be completely dependent on strict adaptation to climate and vegetation? We know very little to make such deterministic hypothesis.

In the southern states, since ca. 7000 BP, industries are also divided into two main groups, the Umbu and Humaitá traditions, but it is not clear if the most ancient industries known in Rio Grande do Sul would be their ancestors. Projectile points have been used as a diagnostic fosseille-directeur for the Umbu tradition and would exist in the Uruguay River Valley since the Late Pleistocene. Theoretically, the points found until ca. 7000 BP would have a triangular shape different from the more recent typical early Umbu points, that would generally be leaf-shaped (Ribeiro, 1990). But this point is challenged by A. Schmidt (commun. in SAB Congress, 1995). Otherwise, Early Holocene industries lack some carefully retouched artifacts such as the more recent Umbu scrapers. In any case, and in contrast to central Brazil, there is no decline in stone chipping technology and there is no abrupt change; only a clear opposition between riverine and upland industries that is thought to reflect cultural — and non seasonal — diversity.

As the Lagoa Santa Man along with the Tequendama Man, is one of the two oldest known American populations, anthropologists discuss his origins, believing he would be representative of the primeval inhabitants of the Americas.

As there are no results available on DNA analysis (preliminary tests are being made at the Laboratory of Molecular Biology of Minas Gerais University), anthropologists are using mainly multivariate analysis of metric characters for their comparative studies with other modern or archaeological populations. Neves and Pucciarelli (1991), from 13 cranio metric variables, suggest that Lagoa Santa Man would be much more like paleo-australian or upper Zhoubkoudian cave dwellers than like any other population. They think that a pre mongoloid population of northeastern Asia would be at the origin of at least two migratory waves: one southward (to Australia) and the other northward (to Beringia and Americas), Lagoa Santa Man being representative of the latter. Soto Heim (1994) believes that the broad face would be the sign of an incipient mongolization, which does not exist in other paleoindians skulls such as those of Chinchorro. It is not clear if Soto Heim thinks that
such phenomenon would be a sign that Lagoa Santa Man ancestors would have entered America in a second migratory wave, or if she believes it would be the result of a regional evolutionary process that occurred in America. In any case, Lagoa Santa Man seems to have derived from the shelter. People in the area still believed it would be the result of such phenomenon would be a sign that Lagoa Santa Man ancestors would have entered America in a second migratory wave, or if she believes it would be the result of a regional evolutionary process that occurred in America. In any case, Lagoa Santa Man seems to have.

Acknowledgements

We thank Irmhild Wüst (pers. commun. about Goiás sites and bibliography), D. Meltzer and an anonymous reviewer for their comments and suggestions on an early draft of this manuscript, and Marcos Eugênio Brito (map and illustrations).

Appendix

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