



PROCEEDINGS OF THE IFRAO CONGRESS  
September 2010

2013 # 5

<http://www.palethnologie.org>  
ISSN 2108-6532

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PLEISTOCENE ART OF THE WORLD

Short articles



## CHRONOLOGY OF THE ROCK PAINTINGS IN THE SERRA DA CAPIVARA NATIONAL PARK (BRAZIL)

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In 1973, sites with rock paintings were discovered in the southeastern part of the State of Piauí. In a very uneven terrain, a group of sandy plateaus overlooks a plain covering approximately 200 km<sup>2</sup> following a south-west / north-west direction. This is one of the poorest regions of Brazil. It is semi-arid, with a typical vegetal cover called “caatinga”, which is the Indian word for “white forest”.

Due to their archaeological importance, these sites have been classified by UNESCO as World Heritage Sites and by the Instituto do Patrimônio Histórico e Artístico Nacional (IPHAN) as National Heritage sites in Brazil.

Excavations at the rock art sites led to the discovery of bits of detached wall paintings buried in the archaeological layers. Fragments such as these, found in the layers of the site of Toca do Boqueirão da Pedra Furada, have been dated to 29 860 ± 650 BP (GIF 6651-1984).

In the Perna Valley, which is one of many that compose the national park, charcoal samples found in a fireplace during the first excavations of the site of Toca do Baixão do Perna I yielded a <sup>14</sup>C date of 9 540 ± 170 BP (GIF 5414).

The continuation of excavations at this site resulted in a surprising and important discovery. On the wall, starting at 1.4 meters in depth and up to 2.4 meters below the current ground level, remarkably well preserved paintings were found on the wall. The lowest layer of sediment, which corresponds to the level of the paintings on the wall, was dated by a chronological sequence situated between 10 000 and 7 000 BP.

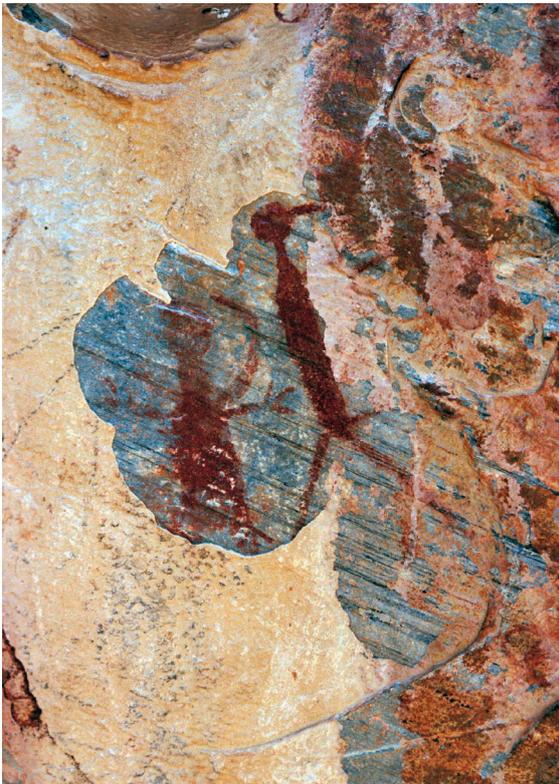
On the peripheral plane of the São Francisco River, opposite the Serra da Capivara National Park, there are limestone outcrops in which deep caves extend from long corridors that provide access down to the groundwater table. In the caves, we found a few lithic tools, a few charcoal pieces and many megafauna remains that survived in the region until around 6 000 years ago. In the rock shelters or near the entrances of the corridors and galleries, in areas lit by sunlight, we found paintings and engravings on the stone.

At the site of Toca da Bastiana, red painted figures were covered with layers of calcite first dated to 17 000 ± 2 000 BP, while other samples were later dated to between 33 000 and 35 900 years ago.

In 2002, new paintings were discovered under a thick layer of calcite and in both cases the results obtained were respectively to 48 286 and 39 442 years ago.

Steelman, Rickman and Rowe obtained much more recent  $^{14}\text{C}$  dates (2002). To verify these results with other dating techniques, M. Rowe took a sample of the painting of one of the human figures and of the calcite that covered them. A sanitary evaluation, realized by F. Bousta and S. Touron permitted the identification of microbiological or mineral alteration processes and to specify the agents responsible for the imbalances observed in the sites. Organic materials continually accumulate on the wall and mix with older deposits, affecting the reliability of the  $^{14}\text{C}$  dates.

The biological agents covering the wall and paintings indicate the presence of factors that can cause uncontrollable errors in attempts to obtain radiocarbon dates. This phenomenon applies to the entire zone of archaeological sites.



Toca da Bastiana: anthropomorphic figures covered by a 0.2 cm layer of calcite, a sample of which was dated by EPR in 1991 to 17 000 years ago. A new sample, collected in 2001, yielded a date between 33 000 and 35 900 years ago.

Sample collection is problematic for EPR dating. The first samples were obtained by scratching the surface and the product was composed of a mixture of all the layers of deposits. It was naturally possible that the more ancient crystals, and even rock crystal, could be present in the sample. It is also possible that in the process of dilution of the calcite plaques and the later crystallization, older crystals could also have mixed in, and would thus distort the sample. Work is currently in progress to definitively define the age of the paintings.

Despite technical advances made by specialized laboratories, the chronology of the paintings is still imprecise. Nonetheless, dialog between archaeologists, physicists and other metrological disciplines has enabled these researchers to reduce the distance between their different results. This dialog contributes to the increasing reliability of their interpretations.





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