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THE ANTIQUITY OF THE PREHISTORIC SETTLEMENT OF THE CENTRAL-SOUTH BRAZILIAN COAST

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ABSTRACT. We discus here the prehistoric settlement of the central-south Brazilian coast, and, more specifically, 1 old radiocarbon date obtained for a costal shellmound, as well as its implications concerning the chronology attributed to the settlement process. The accelerator mass spectrometry (AMS) technique was used to determine the ^{14}C age of charcoal from a shellmound on the southern coast of Rio de Janeiro. The resulting age was 7860 ± 80 BP, an unexpected result that reinforces 2 similar previously obtained dates for the same region. Brazilian archaeologists, however, have questioned those 2 dates, because they would predate by some 2000 yr the antiquity consensually accepted for the settlement of the central-south Brazilian littoral.

INTRODUCTION

Prehistoric Settlement of the Central-South Brazilian Coast and Shellmound Chronology

This paper focuses on a phenomenon that happened in Brazilian prehistory: the settlement, in the central-south coast, of populations specialized in the exploitation of shellfish that reached a degree of social complexity that was unusual among hunter-gatherers (Lima 1997, 2000). The environmental characteristics of the Brazilian central-south coast, in association with socio-cultural factors, seem to have favored the emergence of the shellmound builders.

The dominant physiographic features of Brazil's south-southeast coast landscape are an abrupt, steep, forest-covered escarpment running parallel to the coast, reaching heights greater than 2000 m within a few km of the shoreline. There is also a narrow, quite irregular strip of coast, displaying a nearly continuous sequence of bays and lagoons edged with vast mangroves, as well as countless islands that are extensions of the continental relief.

Typical of estuarine systems where 2 neighboring ecosystems meet—land and sea—these ecotones comprise subsystems linked by the ebb and flow of tide and river waters, providing high nutrient influx, and displaying one of the highest productivity rates among marine ecosystems. These waters are veritable vivaria and one of the most fertile natural environments in the world.

Especially rich in mollusks, crustaceans, and fish, these ecosystems favored the settlement of prehistoric hunter-gatherers proceeding from inland highlands who arrived at the coast and became fishers and shellfish gatherers, shellfish being one of the most abundant and easily caught marine resources. These resources came to play a role of prime importance within their social system, as it was the search for greater proximity to mollusk beds that determined their settlement choices.

In these circumscribed landscapes, there is usually a high density of shellmounds, built by these fisher-gatherers, that stand out against the landscape. In some places, these mounds are as tall as 30 m. The most conspicuous and dense concentrations of shellmounds are found in the state of Santa

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Catarina. As one moves north through the states of Paraná, São Paulo, Rio de Janeiro, and Espírito Santo, they thin out progressively and disappear, as Brazil's straight northeastern coast does not offer the lagoonal areas with environmental conditions that favor this way of life. These shell-mounds, dated in general between 6000 and 2000 BP, are the result of the intentional accumulation of food remains—notably shells and bones—and sediments. The material culture recovered in these shellmounds consists essentially of artifacts made from shells and bird bones, fish, sea and land mammals, including projectile points, ornaments, and other tools and weapons. Axes, milling stones, anvils, and hammer-stones made with basic rocks, together with abundant vein quartz flakes, make up the lithic industry, common to practically all shellmounds. These industries were simple in general, commonly crude, reflecting no great technical skill. Hearths, as well as human burials, are also found in the midst of this chaotic midden of shells, sediments, and bones.

Around 4000 BP, Santa Catarina was apparently the heartland of the phenomenon of progressive complexity between fishers-gatherers. As we move away from this core, there is a progressive diminishment in the evidence of emergent complexity among the shellmounds. In São Paulo and Rio de Janeiro, the concentrations of shellmounds are less dense and the mounds considerably smaller, having an average height of only 2 or 3 m.

The ^{14}C dating of shellmounds is crucial for the understanding of the rise, maintenance, and collapse of these socio-cultural systems that flourished in the course of 4000 yr, until the beginning of the Christian era, when their vestiges disappear. By this time, the bold and well-succeeded inland horti-culturalists arrived at the littoral. Economically more powerful—since they were able to produce their own food—socially organized in more solid and concrete structures, technologically more advanced, and more expressive numerically, they ended up determining the absorption or extinction of the fisher-gatherers, in such a way that by the threshold of the 16th century, with the arrival of the Europeans to the Brazilian territory, those populations had long disappeared from the central-south coast.

There are currently some 290 ^{14}C dates available for Brazilian shellmounds, which attest to the initial occupation of the coast at around 6500 BP (Lima 2000). The frequency distribution of such dates shows that these cultures seem to have reached their peak between 5000 and 3000 BP (see Figure 1).

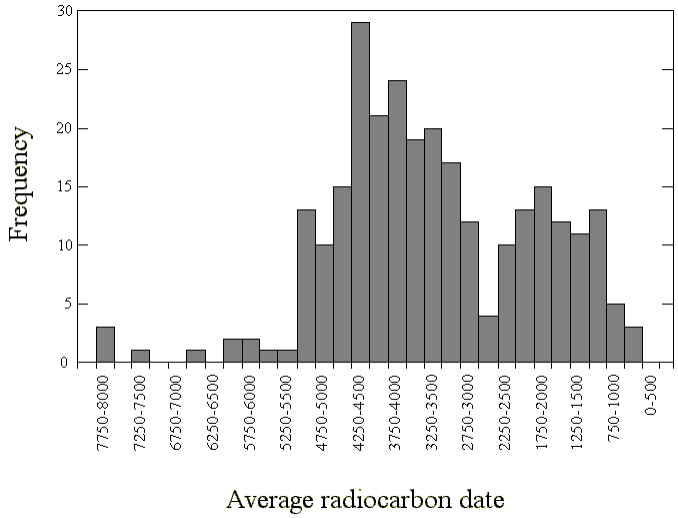

Figure 1 Histogram of average ^{14}C dates for the coastal shellmounds

Three very old ^{14}C dates were obtained decades ago for 2 different shellmounds; nevertheless, since they were considerably out of the average age range for these sites, they have been harshly contested by the professional community. In 1956, French archaeologists Joseph e Anette Laming Emperaire obtained 2 dates of 7803 ± 1300 BP and 7327 ± 1300 BP in Gif-sur-Yvette, France, for the Sambaqui de Maratuá, located in the region of Santos, São Paulo (Emperaire and Laming 1956). The dates were refuted due to the reason given above (Garcia 1979).

Twenty-four yr later, in 1981, while researching the Sambaqui de Camboinhas, in Rio de Janeiro (22°58′S 43°3′W), Lina Maria Kneip obtained a 2nd and slightly older date: 7958 ± 224 BP (SPC 207) (Kneip et al. 1981). Such a dating was also contested by the same reasons and by the supposition—which turned out to be mistaken (Muehe and Kneip 1995)—that the sand straps over which the shellmounds stood were more recent and would have been formed after the presumed date of the site. Until the present, both dates were viewed with strong distrust.

The Dating of the Sambaqui do Algodão

This paper is concerned with the dating of charcoal samples from the Sambaqui do Algodão. Located in a small island in the Ribeira Bay, in Angra dos Reis, Rio de Janeiro (22°55′48″S, 44°20′48″W), this site integrates a group of 7 shellmounds built very close together in different islets in the small Ariró Cove.

This site presents 2 distinct stratigraphic levels: the inferior, where an abundant capture of mollusks took place, and the superior, where there was a clear increase in fishing as a means of compensating the smaller availability of mollusks (see Figure 2). The superior level of the site has been dated previously as 3350 ± 80 (WSU 3359), in a study by Andrade Lima in the mid-1980s (Lima 1991). This result is compatible with the time range of occurrences for the shellmounds. The inferior level dating is reported in the present paper.

The accelerator mass spectrometry (AMS) technique was used for the ^{14}C dating of the charcoal sample, at the PRIME Lab of the Purdue University.

The charcoal sample was removed from the inferior level of the Sambaqui. The cleaning process began with the sample examination under microscope, where the gross impurities were removed. The usual chemical pretreatment for organic samples was performed. The sample was taken to PRIME Lab, where it was reduced to 1 to 2 mm thickness through the use of a razor blade. After being rinsed with ultra-pure water, the sample was treated with hydrochloric acid to remove the inorganic fraction. A base treatment, with sodium hydroxide, was done in order to remove the fulvic and humic fractions. Finally, another acid treatment removed the inorganic carbon that could have been incorporated to the sample during the base treatment. The entire chemical processing was performed at 95 °C. The sample was then dried and combusted at 900 °C in an evacuated quartz tube. Copper oxide was used as an oxidizing agent and a silver foil to remove sulphur compounds released during the oxidation process.

As carbon dioxide was obtained by combustion of the organic sample, the gas was injected into a vacuum line in order to be purified and transferred to the graphitization tube. A mixture of dry ice and ethanol was used to trap water from the gas and a liquid nitrogen trap froze the carbon dioxide while other gases were discarded. The graphitization tube consisted of a long quartz tube with a small tube, with iron, inside. A dimple in the bigger tube prevented the small one to touch its bottom, where the zinc was placed. In a vacuum, only the small tube was heated to 725 °C to remove any contaminants in the iron. The zinc was then heated to 550 °C to be distilled from the bottom to form

a surface area layer in the upper part of the big tube. The bottom was sealed and removed. The CO_2 was transferred to the graphitization tube with a liquid nitrogen trap. Finally, the tube was sealed and heated in the oven for 700 ºC for 10 hr. It was left to cool and heated again to 700 ºC for 10 more hr. At this temperature, the CO_2 was reduced to CO by a reaction with Zn. Then, the CO decomposed, forming graphite by the iron-catalyzed reaction. After the process, the graphite was deposited into the inner tube with the iron and they were both pressed into the sample holder to be measured in the accelerator.

The 7.5 MV FN Tandem accelerator of the PRIME Lab was used for the measurement. The terminal voltage used was 4MV, and $^{13,14}C$ beams, with charge state of 3+, were selected by the high-energy magnetic analyzer and detected. The age was calculated as in Donahue et al. (1990) and the oxalic acid standard used was the NBS SRM 4990 C.

Figure 2 Stratigraphic levels of the *Sambaqui do Algodão*

RESULTS AND DISCUSSION

The results of the charcoal AMS measurements lead to 7860 ± 80 BP (PLID T00-0677) or cal AD 7050–6500 (2 σ) (OxCal Version 3.5; Oxford University). This result confirms and reinforces the 2 other dates previously considered dubious. This fact reopens the discussions about the antiquity of the settlement of the Brazilian coast.

What is interesting when we analyze the 3 occurrences together is the remarkable temporal proximity of the dates, practically contemporaneous—7958 ± 224 BP (Camboinhas), 7860 ± 80 BP (Algodão), 7803 ± 1300 BP (Maratuá)—as well as the geographical proximity between the sites, in the axis Rio de Janeiro/São Paulo. We are not dealing with dates obtained in distant points of the coast, but among very close sites, concentrated in the same area of the southeast region, and very far from the area of Santa Catarina.

CONCLUSIONS

In the context of the prehistory of the Brazilian central-south coast previously described, it would be admissible to assume that the oldest dates would be found among the shellmounds of Santa Catarina. Nevertheless, it is surprising that the oldest dates appear in Rio de Janeiro and São Paulo. This demonstrates that the initial settlements occurred in an area that does not coincide with the one in which those cultures reached their highest degree of expression.

The origin and routes through which the hunter-gatherers reached the coast and became the littoral's oldest fisher-gatherers are still questions to be answered, as there is no evidence of hunter-gatherers in the highland region of Rio de Janeiro. If we were to consider the Ribeira Valley, in São Paulo, as 1 of the few possible routes of communication between the coast and the countryside in the extensive barrier constituted by the Serra do Mar mountainous range, and still, the existence of sites with fluvial mollusks along the Ribeira River course, 1 of which dated 9000 BP (Blasis 2001), we could say that those fisher-gatherers could have originated in the São Paulo plateau, above all because the Sambaqui do Algodão, in the southern coast of Rio de Janeiro, is very close to the coast of São Paulo.

This 3rd date compels us to consider the 2 previously questioned dates, predating the traditionally accepted chronology for the settling of the coast by at least 2000 yr.

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