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Isotopic evidences regarding migration at the archeological site of Praia da Tapera: New data to an old matter

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ABSTRACT

The present study aims to elucidate, using $\delta^{13}C$, $\delta^{15}N$ and $^{87}Sr/^{86}Sr$ analysis of tooth enamel and dentin, some aspects of the geographic origin and the dietary habits of 42 individuals associated with a ceramic group buried in the coastal shallow site of Praia da Tapera, located on the island of Santa Catarina, Southern Brazil. The ceramic shreds found on this site would be associated with groups that inhabited the Southern Brazilian Plateau, and the presence of this evidence at Praia da Tapera and some other coastal sites raises important questions, not yet resolved, about the origin and the way of life of these pre-Columbian coastal groups that emerged in the region around 1500 years BP.

The isotopic results suggest that none of the analyzed individuals would have come from the Plateau region. They probably were born and raised on the coast, including the site area. The wider $^{87}Sr/^{86}Sr$ variation found in the women may be signifying a patrilocal post-marital residential system to this group. The isotopic results also suggest that marine resources such as fish were the main food source. Despite the terrestrial fauna not being an important part of the protein diet, the boars analyzed from the site presented strontium values incompatible with the local geology, suggesting that these animals were hunted on the continent. This first isotopic study on a shallow coastal site with ceramic reinforces the idea of complexity regarding migration and trade networks between groups that inhabited the coast and the Plateau of Serra Geral around a thousand years before the arrival of Europeans in the region.

1. Introduction

The occupation of the coast of Santa Catarina state, located in southern Brazil, happened about 6000 years B.P. The first inhabitants were fisher–gatherer groups that built shell mounds that could reach more than 30 m in height and some hundreds of meters in length, known in Brazil as Sambaquis (Prous, 1991, DeBlasis et al., 1998). The Sambaqui builders, however, were not alone on the coast; there were other hunter–fisher–gatherer groups in the area since at least the fourth millennium before the Christian era, as indicated by radiocarbon dating of the deepest levels of the site of Pantano do Sul (Rohr, 1977, Schmitz and Bittencourt, 1996). These groups occupied sites known as "shallow sites", which are primarily characterized by thin archeological packages, a much less significant number of shells compared to the Sambaqui sites and a predominance of fish among the faunal remains, although a high diversity and quantity of terrestrial fauna is also found.

Radiocarbon dates available for the coastal sites indicate that around the first millennium of the Christian era the Sambaqui system was already in decline (Gaspar, 1996, Lima, 1999/2000). Simultaneously to the end of this system, the coastal occupation is marked by the appearance of shallow sites with ceramics. This ceramic type, associated with the Itararé ceramic tradition, was originally related to ceramic groups from the Plateau of Serra Geral in Santa Catarina, which is located about 100 km away from the coast.

The ceramics found on the coast associated with groups that inhabited the plateau is a topic of great relevance for understanding the occupation process in this area, which includes issues such as migration and intergroup contacts. These topics are widely discussed in different perspectives and methodology by Brazilian archeologists (e.g. Beck,

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1972, Chmyz, 1976, Rohr, 1977, Neves, 1988, Bryan, 1993, Lessa, 2005, Okumura, 2007, Wesolowski, 2007, Hubbe et al., 2009, Bastos et al., 2011).

The main discussions are about the possibility that horticultural ceramic-producing groups from the plateau occupied these shallows sites. Therefore, the present study aims to contribute to the understanding of the geographic origin and diet of the occupants of these ceramist sites by doing the first isotopic study on shallow sites with ceramic, more precisely tooth enamel strontium isotopes analysis ($^{87}Sr/^{86}Sr$) and carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope analysis of the collagen contained in the dentin of individuals buried at the Praia da Tapera site, a shallow ceramist site located on the central coast of the state of Santa Catarina. From these results, we expect to identify whether the analyzed individuals were born on the coast or have migrated from the Southern Brazilian plateau.

Isotopic analyses have been used for decades in archeology as important tools to identify residential mobility and reconstruct diets in different past groups, with strontium isotopes being commonly used to identify immigrants in archeological populations (Price et al., 2002, Bentley, 2006), while carbon and nitrogen stable isotopes can distinguish, among other aspects, diets based on marine or terrestrial food (Ambrose, 1993).

1.1. Santa Catarina Island and Praia da Tapera Site

Praia da Tapera is located on the island of Santa Catarina, southern Brazil, which is characterized by Neoproterozoic (1 Ga to 530 Ma) crystalline basement rocks and by Quaternary coastal plains deposits (Caruso and Awdziej, 1993) (Fig. 1). In contrast, the Santa Catarina Plateau is formed by Cretaceous basalts that form plateau areas as high as 1800 m above sea level (Perrotta et al., 2004). These two areas are separated by the Serra Geral and Serra do Mar. mountains ranges, which are important physiographic features in that portion of South America.

The site is located on the South Bay of the Santa Catarina Island, about 20 km from the city of Florianopolis, the capital city of the state of Santa Catarina. It is situated in a plain area, next to the ocean and a creek. Around the area there is also a big mangrove which extends for more than 4 km, a wide area of shallow lands and the Atlantic forest on the higher grounds (Rohr, 1966, Silva et al., 1990).

The site was excavated between the years of 1962 and 1966. It was excavated to a total area of 2000 m^2 and in it were found scattered shells, charcoal, numerous lithics, bone artifacts, food debris, 172 human burials and 4631 ceramic shreds (Rohr, 1966). Fig. 2 shows the Beach of Tapera and the site excavation during the decade of 1960s.

According to Silva et al. (1990), there were a total of three occupation periods in the site of Praia da Tapera. The first two occupations are associated with the Itaraté ceramic tradition, presenting radiocarbon dates of 1140 ± 180 B.P. and 1030 ± 180 B.P. The first occupation lasted around 100 years and was formed by a small group of individuals that buried their dead under their dwellings. The second occupation was composed by a larger number of individuals that remained longer in the area and buried their dead in delineated areas next to their houses. The last occupation occurred much later (550 ± 70 B.P.) and was associated with another group, the Tupiguarani. This last occupation is restricted to the farthest portion of the site from the beach, on the periphery of the village of the former occupations. All the human burials were concentrated in a 608 m^2 area and are believed to be associated with the Itararé occupations.

All lithic, bone tools and food debris found in the archeological site point to a fishing, hunting and gathering economy. The terrestrial and

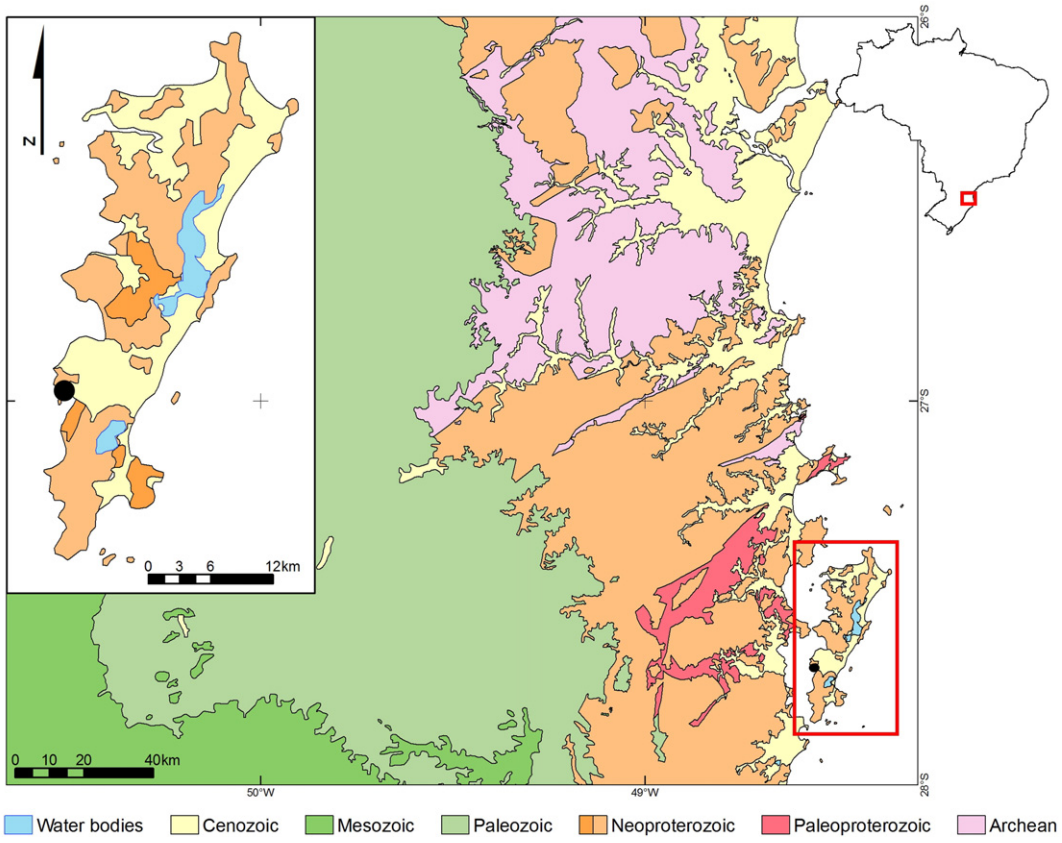

Fig. 1. Geological map of part of the coast and interior of Santa Catarina. The island of Santa Catarina is magnified and the site Praia da Tapera location is identified with a black circle. The outline of Brazil is in the upper right corner.