A historical memoir of archaeological research in Brazil (1981-2007)

Uma memória histórica da pesquisa arqueológica no Brasil (1981-2007)

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Abstract: This memoir gives a history of my archaeological research in Brazil and especially the theoretical issues, empirical interests, collaborations, and events that motivated it. I begin with my early course and field experiences as a student, my work as a museum curator and university professor, my research in literature, archives, and collections, and my early collaborations and interactions with other students and with scholars. Then I trace the relationship of my Venezuelan Orinoco dissertation work to my interest in the Amazon, and explain how that led subsequently to my field research in Brazil. I then summarize the work at the four regional *foci* of the project in the Lower Amazon of Brazil and point to what might be the theoretical implications of the results in light of the results of work by other scholars. I conclude with an explanation of how the Brazilian research relates to my preliminary research in Central Africa and conclude with the implications of the South American and African research for changing concepts of human evolution, human ecology, and culture history.

Keywords: Amazonian archaeology. Orinoco archaeology. Museum collections. Environmental determinism. Prehistoric tropical societies. Theories of cultural evolution.

Resumo: Essa memória fornece uma história de minha pesquisa arqueológica no Brasil, especialmente das questões teóricas, dos interesses empíricos, das colaborações e dos eventos que a motivaram. Inicio com meu primeiro curso e minhas experiências de campo como estudante, meu trabalho como curadora de museu e professora universitária, minhas pesquisas na literatura, nos arquivos e nas coleções, bem como minhas primeiras colaborações e interações com outros estudantes e acadêmicos. Traço, em seguida, as relações entre minha dissertação sobre o Orinoco, na Venezuela, e meu interesse na Amazônia, que subseqüentemente levou-me aos trabalhos de campo no Brasil. Sumarizo, depois, meu trabalho junto aos quatro focos regionais do projeto no Baixo Amazonas, no Brasil, e indico o que poderiam ser as implicações teóricas dos resultados à luz do trabalho de outros pesquisadores. Concluo com uma explanação de como os trabalhos que realizei no Brasil relacionam-se com minha pesquisa preliminar na África Central e com as implicações das pesquisas na América do Sul e na África para as mudanças conceituais sobre evolução humana, ecologia humana e história cultural.

Palavras-chave: Arqueologia amazônica. Arqueologia do Orinoco. Coleções museológicas. Determinismo ambiental. Sociedades tropicais pré-históricas. Teorias da evolução cultural.

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EDUCATION

As long as I can remember, I have been interested in archaeology and natural history. In school ancient history was taught, but not anthropology, so I focused on the early Old World cultures and studied Latin and Greek. In college, I majored in history, with minors in anthropology and classics, and I took more Greek and Latin and introductory courses in Hebrew and Akkadian. Although I later changed focus to New World archaeology, this early foreign language coursework was a boon to my vocabulary and for learning new languages later on. My undergraduate college, Stanford University, did not have a good archaeology program then, but I took various courses and the archaeological field school. In the summer, I interned in the South American archaeology department at the American Museum of Natural History in New York. Junius Bird, the curator, and Gary Vescelius, a research assistant, supervised me both in the lab and in the field in Peru, infecting me with their enthusiasm for their subject.

After college I went to the University of Pennsylvania on a Ford Foundation fellowship for a Ph.D. in ancient Near Eastern archaeology but for various reasons ended up transferring to Columbia University to study South American archaeology. I got a curatorial job at the Museum of the American Indian (then MAI, now NMAI) to pay my way, since I had left my fellowship behind when I left Penn. At MAI there I learned a huge amount about indigenous American cultures of all ages and regions and rose to the curatorship of South and Central American anthropology. My collegial and professional relations during that 15-year-long job were very rewarding and informative. The full curatorship gave me a professional platform from which to apply for my research grants and supported my salary during fieldwork.

At Columbia I studied with Edward Lanning, though he had left for Stony Brook University by the time I graduated four years later. Above all, Lanning was an environmental archaeologist, and I believe that I inherited from him a sense of close attention to ancient peoples' relationships with the particulars of their habitats. At that time, many American archaeologists espoused theories about the role of the environment in the rise of agriculture and urban civilization, but few actually critically studied environmental data, so their ideas about specifics were rather unrealistic. My idea was to really immerse myself in data on the aspects of habitat most important for the Ancient societies.

Lanning focused on mostly Andean South America, but I was more interested in the eastern lowland South America. I began my career as a principal investigator in a dissertation project investigating the course of prehistoric agriculture and population growth in the Orinoco, Venezuela (Roosevelt, 1980; 1997). I was inspired to look at the topic by several factors. A stint on Scotty MacNeish's project in Ayacucho, Peru, in 1971 excavating with Gary and Junius got me interested in the origins of agriculture, and my discussions with Howard Winters of New York University and Stuart Struever of Northwestern University introduced me to the new methods of paleodiet and demography coming out of the New Archaeology movement.

I and two fellow graduate students at Colombia University, John Hyslop and Mike Snarskis, came to believe that what was then called the 'intermediate area' had been neglected by Latin Americanist archaeologists, who concentrated more on Peru and Mexico. We organized for ourselves a graduate research seminar to really review what was known about the area. At that time many leading anthropologists felt that the tropical lowland intermediate area indigenous cultural sequences must be shorter and less complex than in the arid, upland areas of Peru and Mexico, which they thought of as the focal, or 'nuclear' areas of New World cultural development. Their conclusions about regional archaeology were based on the idea that rainy tropical areas had poor soils that could not support the type of intensive agriculture necessary for the development of pre-industrial urban civilization. In our seminar readings and discussions, however, we came to the conclusion that the general theories about the role of the environment in Latin American culture history were off the mark because

they were not very informed about particular habitats and subsistence systems, among other things.

For me especially, the theories were uninformed about the aptitude of tropical soils for use in agriculture. Much literature held that humid tropical soils were too leached and poor to be used for staple, annual cereal crop cultivation and only suitable for shifting slash and burn cultivation of root crops (Meggers, 1971; Sannders and Price, 1968). Even Lathrap (1970), a proponent of Amazonia as a hearth of ceramic stage cultural development, believed that manioc was the prehistoric cultivated staple. However, after my time in Peru on MacNeish's Ayacucho project, I read up on soil classification and evaluation, and my reading seemed to show that at least tropical river floodplains were perfectly able to be cultivated intensively, since the very same suite of soils occurred in them as in very famous intensive agriculture areas of the world, such as the Nile basin and the United States (US) corn belt. After reading Reichel-Dolmatoff (1965) on a possible prehistoric shift from manioc to maize in Caribbean Colombia during John's, Mike's, and my seminar at Columbia, I applied to do a dissertation there, using archaeobotany and prehistoric settlement survey to trace the history of diet and population growth through time to test that theory. If there had indeed been a period of intensive maize cultivation on the Orinoco floodplains, as the Columbian scholars were suggesting, then there was no economic barrier to the rise of dense populations and complex societies, according to the theoretical scheme of that time.

But when Reichel-Dolmatoff responded that he was planning to do just such a project himself, I turned to the Orinoco at the suggestion of Irving Rouse, of Yale, a leading archaeologist and specialist in Caribbean and eastern lowland South American archaeology. When he went to the Middle Orinoco with Fred Olson and Jose Cruxent in 1974 to collect charcoal for dating, they encouraged me to go down with them do pilot stratigraphic excavations and soil processing at Ronquin to see if the food remains were sufficiently preserved for such work.

On that visit, I found deep, stratified deposits and wonderful preservation of carbonized plant remains and animal bones and returned in 1975 to survey and excavate there. The Wenner-Gren Foundation for Anthropological Research, not as tied to the consensus environmental determinist theory as was the National Science Foundation (NSF), partially funded this work, and the Museum of the American Indian also supported the work with my salary and a small grant and furnished me generous lab space and the time to analyze the excavated collections.

My eventual results were exciting, for the food remains, tools, and carbon isotopes of the human skeletons suggested that although there had been a long period of cultivation manioc as a staple, supplemented by fish and small game, people eventually had shifted emphasis to intensive maize cultivation in later prehistoric times (Roosevelt, 1980; 1997; van der Merwe *et al.*, 1981). (It's not clear what happened in Caribbean Colombia, for Reichel-Dolmatoff never did follow up with an archaeological test of his maize hypothesis.) In the Orinoco, the culmination of agricultural development was staple maize cultivation in the final prehistoric period, the Arauquinoid phase, classified by archaeologists as a complex society or chiefdom of the widespread South American Incised and Punctate Horizon. And the results of my site surveys and ceramic seriation suggested that this change in subsistence went hand-in-hand with a continuing increase in size and number of habitation sites. At base, these findings supported the idea that the humid tropical lowlands were not such a barrier to indigenous cultural development because as adaptive environments, *per se*, they had been misunderstood.

The iconographic sequence, which I reviewed as part of the ceramic seriation, showed intriguing changes. In the early, or Formative, phases, much decoration was geometric or zoomorphic, and the only human images were also part animal, like the alter egos of shamanism. In the later, Arauquinoid, part of the sequence, human images, especially females, became predominant. I speculated that the

change had something to do with population growth and the intensification of labor in maize agriculture (Roosevelt, 1988b).

THE AMAZON

Having affirmed that intensive annual cereal crop agriculture had been adopted in a humid tropical river floodplain, I was of course very curious about what had happened in the Amazon, which was the humid tropical region of even greater interest to the environmental determinists (Meggers, 1954; Roosevelt, 1991a). But actually I began my research on the Amazon in museums, not in the field, because at the time, research permits were difficult for Americans to get. In any case, I felt that there were a lot of obscure publications, unpublished data, and collections to be studied and digested, and being then employed as a museum anthropologist, naturally I wanted to take advantage of these. So I applied for a grant from the US government to travel to study the archives, collections, and libraries in 1981 and 1982. Collections in my study ranged from the US and Europe to South America.

The Amazonian collection research was mind-opening (Roosevelt, 2000b). It showed me that there had been an even longer cultural developmental sequence than in the Orinoco. The assumption by some archaeologists that the humid tropical lowlands had short, simple cultural sequences was not upheld, for I found diverse artifacts and food remains that simply did not fit into the known late-prehistoric sequences. I also found in the archival documents and several publications in Portuguese (Hartt, 1871; 1883; 1885; Penna, 1876; Simões, 1976) information that supported the idea that there were several early phases of human occupation not generally recognized by modern archaeologists. Those new phases seemed to include an early preceramic phase of hunter-gatherers, an early Archaic ceramic-age phase of shellfishing and fishing, and several culturally complex 'Formative' phases. Researchers had already recognized that several influential ceramic horizon styles characterized by urn burial, monumental art, and mound building spread widely in the basin in later prehistory, though interpretation of them differed (Lathrap, 1970; Meggers and Evans, 1957).

Relevant to the collection research, I had spent a year at Columbia studying in the art history and archaeology department, an experience that was later useful in research on the artifacts, styles, and iconography of the Amazon sequence. I also had worked with Rouse from time to time analyzing related pottery styles at the Yale Peabody Museum and at MAI. Those experiences helped me a lot in my later research by making me attentive to methodology in seriating artifacts and interpreting their symbolism and functions.

Over and above the new information on the cultural and technological sequence, the collections and unpublished accounts showed that many more kinds of biological materials were preserved in Amazonian sites than modern archaeologists had thought possible. I encountered a lot of human bones, animal bones, shells, and plant remains that had been collected from archaeological sites in the Amazon parts of several countries, including Peru, Bolivia, and Brazil. In the Orinoco, also, I had found quite well preserved human skeletons and animal bone and very well-preserved carbonized plant remains. Such remains, when analyzed taxonomically, chronologically, and/or isotopically, were potential information about the history of the habitat and human land use.

But collecting and dating such remains in stratigraphic context had not been a big priority among mid 20th century archaeologists working in the area, so it seemed that new stratigraphic excavations were needed. Not only did the new regional archaeological sequence offer possible evidence of a much more complex developmental sequence than was conceived of for the area at the time, but it also shed an interesting light on the ethnographic picture. It suggested that the common ethnographic pattern of living in small, shifting settlements by slash-and-burn cultivation of starchy crops might not necessarily be representative of the lifeways of indigenous cultures over long-term prehistory (Roosevelt, 1989). Thus, despite abundant continuities from prehistory

to the present, Amazonian lifestyles and cultures had changed markedly in the transition to the period of ethnographic observation. The timing of change indicated a possible catalytic role of the European conquest for the ethnogenesis. But most important for me, all these patterns suggested that there had not been just one, tropical forest culture developed in the habitat for all time, but many very different ones in different places over a long time period. This pattern did not fit the idea that for each environment there was one appropriate cultural ecological adaptation, but rather that changing interactions with other human societies and changing human impacts on the habitat might have contributed to a diversity of adaptations through time (Roosevelt, 1992c). With Wenner-Gren funding, again, I organized an international conference in Brazil to present the new archaeological findings to a group of Amazonist ethnographers. We subsequently published our discussions and findings in a book (Roosevelt, 1994a; 1994b).

In these ways, I became very interested in doing long-term fieldwork to elucidate the developmental sequence of the Amazon. I focused the strategy of that fieldwork on several multicomponent sites that represented a range of settlement types, habitats, time periods. To investigate the long-term history of environment, subsistence, social organization, and quality of life, I decided to use geophysical, exhaustive soil-processing, stratigraphic, chronological, and analytical methods developed or refined by the New Archaeologists. These had not yet been comprehensively applied to tropical lowland sites but showed potential for shedding light on the kinds of theoretical issues prominent in Amazonia. It seemed best to organize the research at sites in three stages: first, the geophysical and surface surveys, second, stratigraphic excavations and analyses, and third, wide area excavations of theoretically significant site facilities revealed in the first two stages. As a practical matter, the first two stages often overlapped partly in time, and the schedule of completion of the stages has differed at different sites.

MARAJÓ ISLAND

Given the difficulty for Americans to get excavation permits in the Brazilian Amazon then, it was a stroke of luck that I met the then director of the Emilio Goeldi Museum of Pará, José Seixas Lourenço, a geoscientist, in the course of my collection study project. He and his collaborators had recently pioneered geoarchaeological approaches to Amazonian sites (Alves and Lourenço, 1981). While I was looking over the large, important collections in Belém, we had a chance to discuss Amazonian archaeology together, and the upshot was that he invited me to collaborate in an interdisciplinary project of geophysical survey and excavation on Marajó Island. This time I was able to get NSF support, due to supportive reviews by archaeologists like the late Wesley Hurt of Indiana University, who had experience in early cultures of both North and South America.

Lourenço and I worked there with various Brazilian and American collaborators for two seasons, 1983 and 1985, with the goal of testing geophysical surveying as a method to divine the stratigraphy and contents of archaeological mounds there. Then I continued the project on Marajó for field seasons during the period 1986-1988. Other counterparts for the research there and at our other sites higher up the Amazon included Guilherme de La Penha and Adélia de Oliveira Rodrigues, who both directed the Goeldi Museum at different times.

Marajó Island was especially interesting from a theoretical point of view because researchers had recognized for more than 100 years that it held abundant remains of the elaborate prehistoric mound-building Polychrome Horizon culture (Derby, 1879; Neto, 1885). For the modern archaeologists who devised the theory of environmental limitation, the remains constituted a sizable challenge for the theory as it applied to Amazonia. If the soils were so bad, then how could such a culture flourish there? The determinists' answer was that the culture was not from there but had been introduced by invaders from agricultural civilizations from the Andes and had quickly decayed in the unsuitable environment

of the tropical rainforest (Meggers and Evans, 1957). The mounds themselves were hypothesized to be empty ceremonial centers, not residential population centers. But absent confirming radiocarbon dates from both Andean Polychrome cultures and the Marajó mounds, the challenge had still not been met by the determinist theorists.

Lourenço and I each recruited collaborators, including, among others, several geophysicists from the Federal University of Pará, as well as Bruce Bevan from the US, and archaeologists such as John Douglas, Linda Brown, Fernanda Arauz, Kitty Machado, Maura Imazio da Silveira, Dirse Kern, and Marcos Magalhães. Geophysical surveying, combined with computerization (Alves and Lourenço, 1981; Bevan and Roosevelt, 2003; Roosevelt, 1988a) helped us enormously by giving a view of the structure and contents of mounds in advance of excavation. Excavating on Marajó, we had the opportunity not only to study the nature of the mound sites but also to date them and their artifactual materials, as well identify the food and environmental remains (Bevan, 1986; Bevan and Roosevelt, 2003; Roosevelt, 1988c; 1991b; Roosevelt, 2007). What we found was that the mounds we excavated represented long-term occupations beginning soon after the beginning of the common era and lasting until at least 1100 or 1200. The sub-Andean cultures of the Polychrome horizon in Ecuador, in contrast, had radiocarbon dates starting near the end of this sequence (Roosevelt, 1999d). Thus, the eastern Amazonian Polychrome cultures were a lot earlier than the related sub-Andean cultures, which could not, then, have been the originators of the horizon.

Furthermore, like the earliest researchers at the sites we excavated, we found abundant, perfectly preserved domestic habitation features, such as hearths, floors, and middens, in addition to the burials and feast dishes. So the mounds were habitation centers. Thus, the resource base on Marajó clearly must have been able to support substantial domestic occupations and a wide range of remarkable cultural elaborations.

But, although the determinists had classified Marajó Island as *terra firme* tropical rainforest and thus had extrapolated theory about rainforests to the Island, to me, the region was more a humid tropical floodplain (as shown by Brazilian radar images, figure 1.3, in Roosevelt, 1991b), and so the limitations that they had hypothesized for *terra firme*, did not necessarily apply. Thus, the Island was not necessarily a case against the theories about that habitat. Theories about human prehistory in the interfluvial rainforest would have to be tested in areas away from the main floodplains. By this phase of my research, I knew that parts of the Amazon interfluves had rich agricultural soils developed on different bedrock than poor tropical soils, rocks such as limestones and volcanics. I also had become aware that some highly complex prehistoric cultures had developed in the Ecuadorian Amazon *terra firme* (Porras, 1987; Roosevelt, 1991b; 1992c; 1993; 1999g).

In addition, our Marajó work in the decade of 1980 revealed that this ancient culture, which preceded the famous Santarém complex culture of later prehistory, had not been fully agricultural. Using fine-screening and bulk collection methods, we found such a wide range of food remains that we had to conclude that the subsistence was based on both horticulture (maize, other seeds, domesticated palms, and presumably cultivated roots) and broad-spectrum foraging on fish and wild plants. We did not find the staple maize agriculture I found in the Orinoco in a later prehistoric phase, c. A.D. 1200-1500. Thus, this seemingly complex and grandiose indigenous Amazonian culture had a mixed subsistence system in which wild food sources still played an important role (Roosevelt, 1991b).

In looking at the c. 100 human skeletons that had been found at Marajoara sites, we found mostly strong, tall people with few disease pathologies other than some moderate gum disease and minor anemic pathologies probably from intestinal parasites. Whatever the reason for the low stature of modern Amazonians, it was not a problem for most of these ancient ones. The population, however, was not uniform in food patterns, for some had stable isotope

ratios reflecting relatively higher consumption of food such as maize, while others showed lower maize consumption.

A final interesting insight, for me, from the Marajó results was that, despite the large-scale earthworks and built facilities, the elaborate and often large-scale ritual culture, arts, and crafts, and possible ranking, there was no indication as yet of centralized hierarchical political organization (Roosevelt, 1991b; 1999g; 2005). The wealthy culture seemed to have been organized in some other way. Also, in contrast to common state-level iconographic complexes, females and female-related animals frequently were depicted in shamanic or guise, whereas identifiable males were exceedingly rare. From then on, I began to explore theoretical developments in the field of heterarchy, which is an attempt to model and research non-hierarchical cultural complexity and organization (Arnold, 1996; Ehrenreich *et al.*, 1995).

Accordingly, our stage-three research on Marajó will focus on uncovering some of the large residential structures, some feasting activity areas, and some cemeteries at a site. Much of theoretical interest could be learned about social, ritual, and economic organization in these areas. In particular, the cemeteries should be illuminating in so many ways: about gender organization, age grades, comparisons of health of individuals with different cultural materials, etc. When it comes time to carry out this stage of research there, we hope to recruit at least some of our past collaborators to join us. Of special interest for this work will be the participation of Denise P. Schaan, who has led much of the more recent research on Marajó (Schaan, 2004), who is interested in patterns of cultural complexity, and who is now, fortunately, the Lower Amazon project's counterpart scientist.

TAPERINHA

Near the end of the first and second stages of the research on Marajó, I had a chance to follow up on one of most interesting the sites whose collections I had studied at museum and university collections and archives: Taperinha (Roosevelt, 1995; 1998b; 2000b; Roosevelt *et al*., 1991). This site is a large, pottery-age shellmound identified early on by Penna (1876) and others and excavated extensively by Hartt (1883; 1885) in the late 19th century. According to Hartt, the site was an early Holocene site of ceramic-age fishing people. As such, the site not only contradicted 20th-century Americanist theories about the importance of agriculture-based sedentism in the rise of pottery-making (as detailed in Barnett and Hoopes, 1995), but it also contradicted 20th-century environmental determinist ideas that tropical forest resources were too poor to allow pre-agricultural settlement (Bailey *et al.*, 1989). Among Amazonian researchers, Lathrap, in particular, had argued that early hunter-gatherers could not have colonized Amazonia because it lacked the herds of large game they relied on (Lathrap, 1968). Taperinha, in contrast to these ideas, seemed to be a site where people were perfectly able to live in a relatively large, stable aggregation by intensively gathering fish and shellfish from river lakes and streams. Its location on the edge of *terra firme* land overlooking the Amazon floodplain and backwater lakes and swamps was ideal for such a subsistence focus. Other sites of comparable cultures had been discovered in the Guianas and at the mouth of the Amazon, but these were assumed to be Formative in age or Preceramic in stage (Roosevelt, 1995).

My basic research problem was to excavate the site to see if its age, stratigraphy, and contents supported Hartt's assessment. Recruiting archaeologists and geophysicists who had worked on Marajó with us, my team included, among others, Douglas, Imázio da Silveira, Miranda, and grad students from both American and Brazilian universities. With two seasons of geophysical survey and archaeological excavations, 1987 and 1993, we were able to confirm the early Holocene age of the site, its pottery, and its food remains. Our maps, surface survey, augering, and excavation stratigraphy showed that the site was as deep and extensive as Hartt had indicated, and revealed some interesting details. The conformation of the site seemed to be, not just a shell-midden mound, but a more complicated kind of occupation site. The site not only held domestic

habitation and its refuse, but also there were features indicating feasting and mortuary rituals. These other kinds of activity areas lay in the areas outside of the topographic shell-mound. We also observed that the mound had been occupied for a long time after the Archaic. Superimposed on the Archaic occupation in the shellmound was a substantial Formative occupation, and a well-defined black-Indian-soil Santarém Phase occupation. A Polychrome horizon presence was indicated by scattered sherds outside of the shellmound and its surrounding deposit.

Thus, the Taperinha site, like the Marajoara mounds, created more problems for environmental limitation theories, in showing that there had been a long sequence of diverse cultures in the Lower Amazon, not just one tropical forest culture, as had been hypothesized in the mid-20th century (Steward, 1949). It also presented a challenge to technoenvironmental assumptions of 20th-century ecological anthropology about the history of subsistence vis-a-vis technological development, particularly of pottery. And finally, recognition that it might have discrete ritual activity areas motivated me to pay more attention to some new directions in theoretical thinking about Brazilian shell-mounds (Gaspar, 1999) and heterarchy (Arnold, 1996). Accordingly, our future, stage-three work at Taperinha, will focus on wide-area excavation of apparently significant geophysical and archaeological activity areas both within and outside of the main shellmound, with the purpose of better defining the structure and function of the settlement.

PEDRA PINTADA, MONTE ALEGRE

In the work on the Amazon developmental sequence, defining the nature of the initial human occupations in the area was a high priority. Although existence of a preceramic period seemed likely, since the finely pressure-flaked triangular points in collections had not been encountered at ceramic-stage sites, nevertheless, none had yet been excavated in site or dated. In fact, none of the examples in the collections were provenienced in any detail. However, nineteenth century researchers had mentioned that such points had been found by inhabitants in the hill country of Monte Alegre, where the researchers also recorded the existence of a highly developed style of polychrome monumental rock art (Hartt, 1871; Pereira, 2003; Wallace, 1889).

Accordingly, I made the time to visit the rock art area while working elsewhere in the Amazon in the mid-1980s, to see if there might not be a multi-component site suitable for excavation in the future. I hoped to be able to recover samples of artifacts and biological materials from clear stratigraphic contexts, to analyze and date. Among the many sites I visited, the cave Caverna da Pedra Pintada seemed an ideal site for this purpose. The slope of the thick deposit exposed below its entrance held an abundance of well-preserved fragmentary artifacts and biological remains on its surface. The cave also bore a number of painted designs of the local rock art tradition on its ceiling and walls, so we could also try to relate the art to dated strata.

With the US funding that I had got for research on the developmental sequence at Santarém (see below), I assembled a team to survey, map, and excavate at Monte Alegre in 1991 and 1992, including some of the same researchers who had participated in earlier seasons of the project and others: Maura Imazio da Silveira, Kitty Machado, Barbara Somer, and Christina Tenório. We mapped and sampled many minor sites in the hills but focused on the c. 2 meter-deep stratified deposit at Caverna da Pedra Pintada for more extensive excavations. In this deposit we found two major blocks of strata separated by a sterile layer. The upper block included well-preserved materials dating from at least three cultures of the Holocene epoch: the pottery Archaic, the Formative, and the Incised and Punctate Horizon. The lower block held five phases of a new Late Pleistocene pre-ceramic culture.

The Holocene deposit produced abundant pottery sherds, a mass of diverse well-preserved faunal remains, some decayed human skeletons, and abundant carbonized or desiccated plant remains. The biological remains have given us a wonderful look at the state of the environment

and human land use in the Amazon backwaters and adjacent forest uplands after the end of the Pleistocene. It confirmed the existence of an early ceramic stage intensive fishing culture on the Amazon and pushed its age 500 years earlier than at Taperinha. Also found in the deposit were Formative cultural and biological materials, dated to c. 3500 BP., close to the age of the Formative deposit we later identified at Santarém city.

Furthermore, the analysis of the Holocene materials at Pedra Pintada has furnished some of the first available detailed data on the history of human-environment interaction in the region (Roosevelt, 2000a). It revealed a contrast between a late prehistoric hill country cultural backwater and the contemporary cultural center at Santarém on the Amazon mainstream. While the people of the late prehistoric Incised and Punctate Horizon campsites of Monte Alegre maintained a food base including both cultivated maize and a wide range of wild foods in a habitat that remained densely forested, in contrast, at the larger site of Santarém, late prehistoric foods had a much lower diversity and the local forests had became significantly thinned, to judge from their stable isotopes. Thus, one could see that ancient Amazonian communities of different size and function in different local habitats had quite different subsistence adaptations and impacts on their habitats.

The data from the Pleistocene part of the deposit was more revolutionary in its theoretical implications, however (Roosevelt, 1998a; 1999e; Roosevelt *et al*., 1996; Roosevelt *et al*., 1997). It revealed for the first time that Paleoindians had lived in the Amazon at the same time as Clovis culture in the North American high plains. But it showed that both its lithic tradition and its subsistence orientation were distinct from those of the fluted-point, big-game Clovis culture. The lithics, though made in the traditional upper Paleolithic manner of careful percussion shaping and pressure finishing, were shaped into distinctive triangular, sometimes stemmed projectile points, gravers, and heavy and limaces not found at Clovis sites. And subsistence was not big-game hunting but a system of broad-spectrum river and forest foraging. The food remains consisted of abundant bones of small fish, rare large fish, diverse turtles, small animals, such as lizards and rodents, and abundant carbonized palm fruits, legume seeds, berries, and drupes, and rare Brazil nuts. Very abundant red pigment of similar chemical composition to that painted in the cave walls was in the lowest Paleoindian levels, suggesting that many of the paintings probably had been made then (Roosevelt, 1999c). Given the scarcity of bone even from middle-sized mammals, we have speculated that the points were either used as knives or harpoon points to spear the large fish.

Although unrelated to Clovis, this Paleoindian tradition was closely related to early preceramic cultures of southeastern Brazil, where comparable lithics, food remains, and paintings had been recorded by archaeologists (Prous, 1991; 1999). It was also in some ways parallel to early Paleoindian cultures elsewhere in South and North America, such as the broad-spectrum foraging Nenana culture of Alaska and the Yukon Territories (West, 1996), the coastal foragers of Southern California (Erlandson *et al*., 1996), the riverine plant collecting and fishing Paleoindians of Pennsylvania (McNett, 1985), the intensive marine foraging Paleoindian cultures in south coast of Peru (Chauchat, 1988), and small game hunters and foragers of Patagonia (Borrero and McEwan, 1997). The discovery of all these different non-big-game hunting, non-fluted point cultures has helped to unravel the Clovis migration theory of the peopling of the Americas. They show Clovis to be simply a distinctive regional culture of one of the many culture areas of the hemisphere, not the ancestor of all Paleoindian cultures (Roosevelt *et al*., 2002).

But beyond particular anthropological concerns, the biological materials from Pedra Pintada showed that at least in the late Pleistocene, Monte Alegre was not a dry cool grass steppe, as many paleoecologists had speculated on scanty, inadequately dated botanical evidence (Van der Hammen and Absy, 1994; Prance, 1982). All the *taxa* identified in the Paleoindian levels of Pedra Pintada still live in that part of the Amazon today, and the stable carbon isotopes of the ancient vegetation show a relatively dense,

canopied forest community not yet thinned by the historic horticulturalists and agriculturalists who have occupied the area in the late Holocene (Roosevelt, 2000a). The existence of tropical forest and riverine habitat in the area in the late Pleistocene is consistent with the idea of the tropical belt as well buffered from drastic environmental changes during the polar and boreal Pleistocene glaciations (Roosevelt, 2005). Thus, late Pleistocene foragers were, contrary to some earlier assumptions, perfectly able to occupy a tropical forest riverine region.

THE CURUA BASIN

As a follow up to the work at Monte Alegre, I took the team into the *terra firme* of Pará south of the Amazon, to investigate a possible Paleoindian presence in interfluvial terrain. There, at many places in older gravels of paleochannels under the bed of the current Curua river, artesenal miners and local people have found projectile points and in shapes comparable to ones recorded north of the Amazon at Monte Alegre and also in the upper Rio Negro (Roosevelt *et al.*, 2002). Although we have made progress locating and mapping some of these underwater sites, we have yet to begin excavations there. But the projectile point finds already are a strong indication of Paleoindian presence, based on some of the lithic forms' similarity to dated points at Pedra Pintada. Thus, there is no longer any reason to suppose that the earliest Amazonians avoided the *terra firme* in favor of the floodplain, any more than the early Archaic peoples did (Imazio da Silveira, 1994). The current rapids in the Curua are favored fishing locations during the seasonal *piracemas* of the great migrating fish. Such fish could very well have been harpooned by Paleoindians in large numbers from its banks. In addition, the lush rainforests along the streams support a wealth of nut and fruit trees, as well as edible herbs and small animals. Since wet-preserved wood, leaves, fruits, and nuts are present in the ancient gravels, we have great hopes for defining both local habitats and subsistence of Paleoindians there.

SANTARÉM

When I first started research in the Brazilian Amazon, I had intended to begin with Santarém but ended up excavating there in 1993 and in 2000, 2001, and 2007. Santarém was well-known among archaeologists and ethnohistorians as the major center of a presumed contact-period indigenous high culture of the Incised and Punctate horizon. Early conquest period records suggested the existence of a regional complex society based at Santarém, organized hierarchically and practicing ritual cremation and endocannibalism (Carvajal, 1934; Nimuendaju, 1949; 2004; Palmatary, 1960; Roosevelt, 1999g; Bezerra de Meneses, 1972). According to both the art style and the ethnohistoric records, this culture carried out ancestor worship, awarded significant power and ritual importance to females, and honored men richly accoutred as shaman chiefs. The pottery thought to relate to the contact period society had been collected in abundance by Nimuendaju and others from Santarém and many other sites along both sides of the the Amazon for a wide region above and below the mouth of the Tapajós.

In the Orinoco, I had identified local styles of this supra-regional horizon and had dated them to the middle (c. AD 500-1200) and late part (c. 1200-1500) of my sequence there. But the horizon had not yet been dated at Santarém. Researchers had differed as to the origin of the horizon and the relative time depth of its cultures (Howard, 1947; Lathrap, 1970; Bezerra de Meneses, 1972), so doing so was a priority. I had visited the site during my collection study tour and located continuous, artifact-rich, well-preserved black soil strata of the horizon at the Port Site, there, which was ideal for excavation. But Lourenço, who invited me to work in Brazil, wanted to me to work first with him on Marajó, and who could have resisted the siren call of such a renowned and problematic culture? But after the Marajó work was well into its second season, I applied to the US government for a separate grant of money to investigate the Amazonian developmental sequence at sites in the vicinity of Santarém. That way, I could expand research into cultures of periods both preceding and following the Marajoara culture, such as those at Taperinha and Monte Alegre.

At Santarém, where many of our former collaborators joined us again, the work was directed at our usual questions, with special attention to social organization and chronology. Our topographic and geophysical maps revealed that there were earth house-mounds and their borrow pits, the geophysics, and some auger holes indicated possible floors, deep pits, and burials or pots (Bevan, 1989; Roosevelt, 2007). When we opened a series of wider excavations in two of our geophysical survey areas we found the mounds, topped with quite clean but blackened and hard-packed floors containing small fishbones, a few carbonized fruits and seeds, small red sherds, and small flint flakes.

Adjacent to them, however, clustered at or near the geophysical point anomalies, we uncovered large pits full of purposely-broken, elaborately-decorated pottery, statues, stone artifacts, and figurines. These pits' rich fill we now interpret as the product of ceremonial termination rituals. Above and to the side of these pits were activity areas where people made and used ritually important artifacts such as fine decorated pottery dishes, the human figures, and lithic tools and tools to make such artifacts. They also prepared and ate food remains that were different from those in the house floors. There were many bones from larger species of fish, turtles of all sizes, rare small to medium forest animals, a few carbonized maize kernels, and many carbonized fragments of prized Amazonian fruit species. We interpret all these as the remains of ritual craft activities, display of special artifacts, exchange, and feasting.

That at least some of the feasts were for elaborate funeral rituals comparable to the ethnohistoric practices at Santarém has finally been confirmed in our last field season, when we recovered multiple fragments of black, cremated human bone in one of the ritual activity areas. Our results so far are moot as to the nature of organization at Santarém because we have only excavated one type of residential area. The original site as we now know from our surface survey and testing was so large, encompassing all of the Port area, the lagoons, as well as the Aldeia and its environs, that we have to assume that there may have been other kinds of use areas than the kinds we have encountered and excavated in the Port. The composition and activities of the settlement elsewhere will be difficult to divine until a larger, more comprehensive sample of the deposit has been investigated.

As for the state of the Santarém culture's environment and the human impacts on it, the biota identified so far are interesting (Roosevelt, 2000a). In contrast to the diverse biota and mature tropical forest used by the Formative occupants at the site, the Santarém people used fewer species and their fuelwoods were fast-growing, young trees. The contrast suggests that the large, dense habitation at late prehistoric Santarém had impacted the surrounding forest to the degree that it had thinned significantly and was in a state of active disturbance and re-growth. The lower diversity of fauna represented in food bone could have come from habitat loss, avoidance of the large, smoky, noisy settlement by animals, or over-use in hunting and gathering.

We now can make a definitive statement about the minimum age of Santarém. Thirteen radiocarbon dates show that the Santarém phase dates between AD 1200 and 1500 (tree-ring-calibrated), making the culture solidly late prehistoric, not ethnohistoric in age. That is not to say that the culture described by the Europeans was not directly descended from this one, but the famous culture with the elaborate pottery art and stone carvings for certain predated that time. The dates also show that the Incised and Punctate horizon at Santarém is at least 700 years younger than the earliest examples of the style in the middle Orinoco. Until future work should find earlier examples of cultures of the horizon in the Santarém area, Santarém thus appears to be a late offshoot of the culture, and the Orinoco remains the putative birthplace of the style.

THE FORMATIVE AT SANTARÉM

During the research at Santarém, we encountered the remains of a Formative culture and its agroforestry areas beneath the Santarém-phase layers. Our two preliminary dates for the occupation fall at about 1000 and 300 BC. The style of pottery, which has rare decoration of fine-

line, parallel, diagonal incisions, nicked rims, and everted rims, also occurs in the Arapiuns area of the lower Tapajós (Gomes, 2005). Thus, the community at Santarém already was part of a supra-regional pottery style by at least the first millennium before the common era. Where that style originated needs to be determined through excavation and dating of more Formative pottery sites in the Lower Amazon.

The soils of the Formative strata differ from those of Santarém-phase strata, which are classic black Indian (*Terra Preta de Índio*) soils. The Formative soils vary from sandy grey-brown *terra mulata* soils to pale yellow-red podzolic soils rich in translocated clays. The *mulata* contain very few and small artifacts but very abundant plant remains including valuable small fruits. These areas we interpret as agroforestry areas that were managed to produce clusters of valuable food-, medicine-, and materials-producing trees and perhaps also swidden gardens. The areas of more clayey, paler soil appear to be parts of earth platforms. They contain sparse but ever-present pottery sherds, lithics, carbonized plant remains, and well preserved animal bones.

The possibility of mound constructions in a Formative site would not be unprecedented, as there are mound complexes in the upper Amazon in Ecuador that also have yielded Formative dates (Salazar, 1998). But much further work to open up larger areas of the Formative site at Santarém will be necessary to get a better idea of the nature of the occupation at that time. Interestingly, the vegetation of the site during the Formative period was much denser and more diverse than it had become by the time of the Santarém Phase. The Formative flora recovered as carbonized plants included more species, much harder, denser, slower-grown woods, and the stable isotope ratios were much more negative than those of the Santarém Phase flora. Among the Formative fauna, fish are the most common, but in these levels small mammals are proportionately much more common than in Santarém phase levels. We have only just begun to separate these biological remains for identification, which will be necessary to gain a fuller picture of the resource areas managed and exploited by the Formative people. However, it appears that in Formative times Amazonian people's land use was more compatible with maintenance of dense, diverse, mature forest vegetation and diverse populations of smaller game than was the land use of people of the Santarém phase. Thus, the contrasts between the two phases of occupation at the site suggest that the human-environmental interaction pattern changed significantly through prehistoric time.

We don't yet have any skeletons from the Formative deposit, but the few Formative individuals from Pedra Pintada and one from Taperinha are interesting in the light of these findings at Santarém. The teeth of the Formative individuals are untouched by pathological dental defects, an indication that at least at these two sites Formative infants and children were well fed with non-cariogenic food and were free of serious illnesses that threatened their growth trajectory. Although prehistoric Amazonians remained comparably much healthier than ancient Andeans and Mesoamericans throughout their sequences, those of later prehistory did come to have some consistent gum infection problems and tooth wear from their food. Sadly, some modern Amazonian Indians' health and growth patterns do not compare favorably with that of ancient Amazonians. Anthropologists need to investigate what has changed in people's interaction with their habitats to create this recent deterioration in their state of health.

FUTURE WORK IN THE LOWER AMAZON

Our future work is directed primarily at completing the third phase of research at the sites of the project. However, the recognition of some additional phases requires that stage one and two work be carried out at some new sites. The Curua pre-ceramic sites are an important target for such work, as are the sites with Formative deposits. Both the interfluvial Paleoindian and the Amazonian Formative in general are very poorly known. Other poorly known cultural phases are the

Santarém-Monte Alegre area early Archaic phase and the Polychrome horizon occupations of the region.

Another problem area is the Amazon paleoecological and cultural ecological sequence. Our findings on the history of the environment and of land use have uncovered problems in earlier concepts and methodologies. Thus, the sequence of environmental change and human impacts leaves a lot to be desired. Our data from sites of many different ages needs to be more fully analyzed through taxonomic identification of biota and more radiometric dating and stable isotope analysis of them. Through such work, we can construct a fuller hypothetical sequence for further testing in other parts of the basin. For many reasons, it's important to do such work. Both development and conservation planning require a baseline of accurate and full data on the history of both human land use and environmental patterns. At present, no such history exists, but without it conservation and development programs are unlikely to be successful in the long term.

THE AFRICAN CONNECTION

So what does Amazonian archaeology have to do with Africa? For one thing, Amazonia presents an example of a tropical forest basin in which native people developed a long sequence of diverse cultures (I summarize the sequences in Roosevelt, 1999a, 1999b, 1999f, 1992a, 1992b). This example is relevant to the interpretation of the history of the occupation of the Congo forest. In Africa, just as in South America, consensus theorists have made wrong assumptions about the history of the habitat and its human occupation. Elucidation of this history through empirical research can have more important implications even than Amazonia's. In Africa, the entire hypothetical reconstruction of human origins and evolution has been based on assumptions that now appear to be mostly wrong. But evolutionary theorists' interpretations of such important things as human nature are based on these wrong assumptions. The picture emerging from the data from preliminary research in Sub-Saharan Africa suggests a very different history of the culture and biology of humans, their ancestors, and of their habitats (Roosevelt, 2005). This history, in turn, presents implications for our understanding of human nature (Roosevelt, 2002) that contrast greatly with those of the prior consensus (Wrangham and Peterson, 1996). The eventual result of further research is likely to change understanding of the human species.

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