

CERAMIC CLUES TO THE PREHISTORY OF AMAZONIA

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Since many Brazilians seem to misunderstand the procedures developed during the PRONAPA and PRONAPABA for collecting, classifying, and analyzing pottery (e.g. Noelli 1998:652) and their utility for reconstructing Amazonian prehistory (e.g. Funari 1995; Neves 1998; Wüst 1998), I appreciate this opportunity to explain the refinement of the methodology during the past three decades and some of the resulting interpretations.

First, I wish to emphasize that we did not begin by assuming, as critics have claimed, that "tropical forest culture" is the "standard model," that all pottery has Andean antecedents, that "temper is a universal indicator of cultural affiliations," that human occupation of the lowlands was recent, that the environment set a limit on the level of cultural complexity or that surviving indigenous groups are "fossilized images of the pre-colonial period." Instead, we designed a program to collect archeological evidence that would permit constructing a time-space framework large enough to reveal patterns of cultural continuity and change that might suggest historical relationships and environmental correlations. Comparability of the data from widely separated parts of the lowlands was insured by adopting uniform criteria for collecting, classifying, describing, and analyzing pottery, which constitutes the principal category of archeological evidence.

When the PRONAPA began in 1965, we assumed like everyone else that seriated ceramic sequences were only relative chronologies and that er-

ratic trends reflected the non-random composition of the pottery samples. Each seriation was designated a same phase, which was given a name, and no social significance was attached. Phases sharing a core of ceramic features (decoration and vessel shape) were assigned to the same tradition. After several traditions were identified, their environmental contexts were compared. This showed that the Tupiguarani Tradition predominated in forested habitats, whereas other coastal traditions were associated with different kinds of environment, suggesting that differences in subsistence strategies might have facilitated their coexistence. The increasing recency of the initial 14C dates for phases of the Tupiguarani Tradition from Paraná to Rio Grande do Norte was compatible with ethnohistorical accounts of a northward migration of speakers of these languages in search of an earthly paradise. Applying the same field and analytic procedures in widely separated parts of Amazonia during the PRONAPABA has produced relative and absolute chronologies along most of the principal tributaries. The availability of a large number of archeological phases has made it possible to verify that a seriated sequence represents a prehistoric community. As such, it provides various kinds of information on the settlement and social behavior of the group and indirectly on the impact of severe paleoclimatic events. A few examples will illustrate these interpretations.

SETTLEMENT AND SOCIAL BEHAVIOR

Prehistoric Territories. Survey of the Rio Tocantins between Nazaré dos Patos and Marabá prior to construction of the UHE Tucuruí recorded 37 habitation sites. One or two stratigraphic cuts were excavated in 10 cm levels in 5 sites. Seriation of 43 levels and 26 surface collections defined the Tauá, Tucuruí, and Tauari phases. Only three 14C dates were obtained, extending from 950 ± 70 to 400 ± 70 BP (Simões and Costa 1987).

The original seriation of the Tucuruí Phase was based on an increase in the relative frequency of a single undecorated type from 74.3 to 95.5%. This trend is an unreliable measure of chronology because it is influenced by differences in the abundance of the decorated types, which can be affected by surface erosion and sampling error. Fortunately, differences in temper permitted establishing four undecorated types: Tucuruí Simples tempered with coarse sand, Jatobal Simples tempered with fine sand, Jauari Simples tempered with crushed sherd, and Pitinga Simples tempered with cariapé. Revision of the Tauari Phase seriation identified three contemporary phases designated Tauari, Itapiranga, and Marabá.

Plotting the distributions of the sites included in each seriation produces five contiguous territories (Fig. 1) comparable to those of present-day endogamous Akawaio communities on the upper Mazaruni in western Guyana (Fig. 2). Similarities include bisection by the river, boundaries at junctions of tributaries, and variation in geographical extent. The difference in the number of settlements on the two maps reflects the difference in length of time represented. The Akawaio map shows only those villages occupied during the year of recording, whereas the Tucuruí Phase map shows village locations during several centuries of occupation.

The conclusion that the boundaries of phases correspond to the territories of endogamous communities is supported by evolutionary theory as well as ethnographic evidence. It has long been known that reduced interaction among formerly endogamous populations promotes genetic, linguistic, and cultural divergence and this process of evolutionary drift has been observed among several contemporary Amazonian groups. Akawaio communities differ in dialect and exhibit minor variations in the repertoire of songs, organization of dance festivals, preparation of foods and beverages, and details of origin myths (Colson 1983/4:111-112). Among the Yanomamo, endogamous village groups display slight dialectic and genetic differences (Spielman et al. 1974). Although the Panare dispersed from their homeland in Venezuelan Guiana less than a century ago, diminished interaction has already caused minor divergence in dialect, kinship terminology, dress, ornament, and ceremonies associated with male initiation, female puberty, and funerals (Henley 1982:11-14). Although less attention has been paid to detecting similarly unobtrusive divergences in material culture, minor details in hammock weaving coincide with social boundaries among the Timbira in southeastern Amazonia (Newton 1974, 1986) and details of basketry technology define prehistoric ethnic boundaries among Numic speakers in the western desert of North America (Adovasio 1986).

The rigidity of the prehistoric frontiers along the Tocantins is notable, particularly at the north end of the Tucuruí Phase territory. Although the Tucuruí and Tauá phases coexisted during several centuries and habitation sites are in close proximity, their distributions do not overlap (Fig. 1). The reason became clear after publication of the results of investigations of riverine conditions, population density, fishing methods, and seasonal changes in productivity prior to construction of the hydroelectric dam. These show significant regional differences that correlate with the boundaries of the prehistoric territories (Merona

1990:461-4). The region below the first rapid, occupied by the Tauá Phase, is associated with Amazonian aquatic fauna, which is varied and abundant throughout the year (Fig. 3). The region occupied by the Tucuruí Phase corresponds to the descent of the river from the Brazilian Shield over a succession of rapids; aquatic resources are least abundant and are subject to severe seasonal scarcity. The region occupied by the Tauari and Itupiranga phases is characterized by slow-moving water across a sandy floodplain, which narrows in the Itupiranga Phase territory; productivity is relatively high except during March and April. The kinds and abundance of fish and methods of capture differ in each region and these environmental differences indicate that methods appropriate for maximizing yields within each sector would have been less successful in the others. As a consequence, reciprocity would have been a more effective strategy than territorial expansion for offsetting scarcity, especially between the Tauá and Tucuruí phase populations. The clustering of Tucuruí Phase sites at the north end of the territory and the existence of a few sherds of Tauá Phase decorated types in Tucuruí Phase habitation sites provide archeological support for this interpretation (Miller et al 1992).

The same pattern of contiguous territories has been identified on the Rio Jamarí, a right-bank tributary of the upper Madeira (Miller et al 1992). Survey for a distance of 260 km above the first rapid recorded 121 sites. Up to nine strata cuts measuring 2 x 2 or 2 x 5 m were excavated in 10 cm levels in 22 sites. Seriation of 593 levels and 42 unselected surface collections identified four ceramic phases. The Urucurí, Jamarí, and Matapí phases are sequential in the northern sector, whereas the Cupuí Phase is contemporary with the Jamarí Phase in the south. Seventy-five 14C dates place the inception of pottery making ca 2500 BP following three successive preceramic phases that extend occupation of the region back to ca 8300 BP (Miller et al 1992). As on the Tocantins, this territorial boundary correlates with changes in the river, in this case from a narrow channel bordered by high banks in the south to a meandering course across a plain with numerous swamps and ox-bow lakes in the north. As on the Tocantins, the northern frontier coincides with the first rapid, which marks the limit of penetration of sediment-rich waters of the Madeira and associated aquatic fauna. Also like the Tocantins, habitation sites are more numerous adjacent to this barrier.

On all the rivers surveyed thusfar in Amazonia (Madeira, Xingu, Tocantins, Tapajós, Uatumã) and on the Orinoco, the first rapid is a permanent frontier between várzea and terra firme ceramic traditions. There is no archeological evidence for expansion across this barrier, either upriver by várzea groups

or downriver by hinterland groups (Meggers et al 1988). Detailed analysis of the riverine-hinterland dichotomy among the contemporary Achuar communities in eastern Peru/Ecuador makes it clear that each habitat has advantages and disadvantages from the perspective of subsistence productivity and that, contrary to popular belief, the less concentrated hinterland resources are more reliable (Descola 1994).

Village Movement and Reoccupation. Since a seriated sequence is a chronology, it provides the basis for reconstructing the history of village relocation by the community it represents. The reconstructions from different regions show similar patterns combining short and long moves, some to previously occupied sites and others to pristine locations. Differences in the placement of successive houses at the same general location and differences in the number of episodes of occupation produce sites with varying surface extensions and depths of refuse. The rare occurrence of identical relative frequencies in unselected samples of pottery from different sites may identify village fission. Similarly, the occasional existence of nearly identical relative frequencies in two successive levels of the same excavation suggest longer than average duration of residence during the episode involved. These interpretations are consistent with descriptions of village movement among surviving indigenous groups, including the Kayapó (Verswijver 1978) and Siona-Secoya (Vickers 1983).

The large number of sites, excavations, and 14C dates from the Rio Jamarí provides detailed evidence for reoccupation. The Jamarí Phase, which follows the Urucurí Phase and precedes the Matapí Phase in the same territory, is represented in multiple strata cuts at 16 habitation sites. The wide separation in the seriated sequence between successive levels of the same excavation identifies multiple episodes of abandonment and reoccupation in each location sampled (Fig. 4). In the case of RO-PV-35, the seriated positions of the levels in four stratigraphic excavations across the site imply five episodes of occupation by the Jamarí Phase, one of which appears to have consisted of two houses (episode 2). The first and fifth occupations were identified in Cut 3, the second in Cuts 1 and 4, the third in Cut 4, and the fourth in Cut 2 (Fig. 5). Since standardization of house diameter at 50 m (the maximum reported among existing tropical forest groups) leaves most of the site unsampled, the total number of Jamarí Phase occupations at the site (as well as the number of contemporary houses) was probably much greater.

Comparing the 14C dates with depth reveals a poor correlation. Dates from Level 10-20 cm in Cuts 1, 2, and 3 are not contemporary; those from

Level 20-30 cm in Cuts 3 and 4 differ by more than 300 years, and those from Level 50-60 cm in Cuts 1 and 2 differ by more than 2000 years. Finally, the date from Level 60-70 cm in Cut 3 is more recent than those from Level 50-60 cm in other excavations. Comparing the stratigraphic positions and cultural affiliations of more than 100 ¹⁴C dates permits eliminating intrusions and defining the duration of each phase. In spite of the fact that the charcoal samples from RO-PV-35 are from levels with Jamarí Phase ceramics, only the date from Level 30-40 cm in Cut 3 is assignable to the Jamarí Phase. The earlier dates are intrusive from preceramic occupations and the younger ones represent the Matapí Phase and recent settlers. The difference of nearly 1000 years in the dates from successive levels in Cut 3 is consistent with their separation in the seriated sequence. This example affirms the absence of stratigraphic evidence for episodes of abandonment and the importance of seriation for their identification. The existence of spurious associations between dates and ceramics is another potentially misleading characteristic of Amazonian habitation sites that must be taken into consideration in evaluating the antiquity and duration of episodes of occupation.

Matrilocal Residence. Pursuing the hypothesis that irregularities in the trends of pottery types are clues to behavior rather than biases in sampling stimulated efforts to identify possible social correlates. Examining the seriated sequence for the Tukurú Phase revealed relatively smooth trends in the undecorated types, but erratic fluctuations in the relative frequencies of several decorated types, especially Tukurú Painted. Separating the samples into two groups based on the presence of more or less than 5% Tukurú Painted produced two contemporary subphases (Fig. 6) and examination of the map showed that all except three sites are confined to one of the subphases (Fig. 7). In the three exceptions, the occupations are in different parts of the site rather than superimposed. This kind of dichotomy exists in most other Amazonian seriations and is particularly well documented in the phases along the Rio Jamarí (Miller et al 1992). Evolutionary theory implies that small differences in the output of two groups of potters will develop as a consequence of isolation and drift, a condition that is satisfied by matrilocal residence.

The restriction of most habitation sites to a single subphase in spite of multiple episodes of reoccupation was an unexpected discovery and I have been unable to find any publication reporting that the first household to occupy a location has priority for subsequent reoccupation. When I was finally able to question Brazilian ethnologists, however, I was told that this behavior is typical because the members of each moiety want to return to the graves of their ancestors.

Independent verification of the correlation between minor ceramic differences and matrilineal residence is provided for ring villages on the coastal strip. In 1980, Silvia Maranca and I published an article inferring the existence of matrilineal moieties at the Aldeia da Queimada Nova in southern Piauí based on the restriction of red-on-white painting to one half of the site (Fig. 8; Meggers and Maranca 1980). A decade and a half later, Irmhild Wüst (1994) published a map of a Bororo village showing the same dual division, which is associated with similarly minor differences in the ceramics (Fig. 9). The same pattern has also been identified at a ring site in southern Minas Gerais (Chmyz, pers. com. 1998).

CLIMATIC FLUCTUATION

Another unexpected result of the PRONAPABA surveys has been the identification of contemporary discontinuities in the local chronologies in widely separated parts of the lowlands. The best dated sequences are in lowland Bolivia, the central Amazon, the mouth of the Amazon, and eastern Venezuela, and 14C dates indicate that the hiatuses were brief and concentrate ca 1500, 1000, 700, and 400 BP (Fig. 10). Paleoclimatic evidence from various parts of the world identifies catastrophic episodes of El Niño at these times, which produced severe drought in some regions and massive flooding in others. Direct evidence of drought in northeastern South America is provided by increases in the proportion of grasses in a pollen core from Lago Ararí in east-central Marajó (Absy 1985; Meggers and Danon 1988), by the presence of charcoal in soil beneath normally nonflammable rainforest in northern Amazonia (Meggers 1994), and by exceptionally low water levels on the lower San Jorge in northwestern Colombia (Plazas et al 1988, Fig. 4).

Anecdotal evidence for the impact on humans of more recent El Niño events of lesser magnitude suggests what precolumbian populations would have faced. During the 1926 event, fire raged for a month through normally nonflammable vegetation in the Negro region, killing many birds and other animals and generating sufficient heat to kill fish in small streams (Carvalho 1952:16). Fires lasting several months during the 1912 event are said to have caused the deaths of thousands of rubber gatherers. Exceptionally low maximum and minimum water levels on the Amazon at these times severely decimated the várzea biota (Carvalho 1952:16; Sternberg 1987:206; Meggers 1994).

During the very strong 1982-83 event, all weather stations in Amazonia reported rainfall 70% below normal during January-February (Nobre and Renno 1985). Dessication of the vegetation was sufficient that fires burned for a week in the vicinity of San Carlos de Rio Negro in southern Venezuela (Uhl et al 1988). An indication of the subsistence stress that prehistoric droughts would have inflicted on prehistoric human populations is provided by the experience of a Yanomami community in southern Venezuela during the exceptionally dry summer of 1972. When newly cleared fields were burned, the fire spread into the adjacent gardens, destroying the plants. The majority of the people left the village and wandered through the forest in search of wild foods. Although they managed to survive by substituting palmito for their cultivated staple, they would have suffered famine if conditions had not returned to normal the following year (Lizot 1974:7).

The evidence for continuity provided by the seriated sequences implies that prehistoric communities were able to cope with milder droughts during the 300-500 year intervals between mega-Niño events, but were forced to disperse during the rare prolonged episodes. The suspension of flowering or fruiting would have reduced the productivity of many plants both for humans and for herbivores (Leigh Jr. et al 1982). The comprehensive knowledge of the biota documented among surviving Amazonian groups is intelligible in the context of millennia of repeated exposure to these unpredictable major and minor fluctuations in subsistence resources. Their cultivation of multiple varieties of staples and constant search for new plants are among other subsistence activities explicable as safeguards against risk (Meggers 1996). The archeological evidence that most groups did not return to their former territories when climatic conditions returned to normal is reflected in the heterogeneous linguistic and genetic distributions characteristic of Amazonia.

DISCUSSION

The credibility of the reconstructions produced by the PRONAPABA can be assessed by comparison with the data and results of a long-term project conducted in traditional Bororo territory in southwestern Mato Grosso (Wüst 1998). Survey in five 20 x 15 km areas recorded 155 sites, 26 of which were identified as Bororo on the basis of ethnohistorical and ethnographic evidence. Site area is linear along rivers and measurements of 16 sites range from 25 x 8 m to 450 x ? m. Refuse depth less than 30 cm is considered to be "an indicator

of relatively short-term village occupation.” Systematic surface collections were made at 12 sites (32 samples) and a single test pit was excavated at two other sites. One produced two 20 cm levels with 62 and 27 sherds each; the second produced only 11 sherds (Wüst 1998, Table 2). The sample of 2513 undecorated sherds was classified into five principal vessel shapes. No significant chronological differences were detected. Although small applique decoration and a “strong conical base” are associated with clans of the Tuarege moiety, this affiliation “does not restrict their occasional use by the members of another clan...[Thus] it cannot be expected that in the archeological context ceramic variability may reveal aspects of social organization” (Wüst 1998:670).

Pottery of the Uru and Tupiguarani traditions was encountered at 11 of the Bororo sites. Table 2 shows that Uru Tradition sherds occur only in one excavation, where they constitute 74 and 81% of the sherds per level, and in one surface collection, whereas Tupiguarani Tradition sherds were identified in the surface collections from seven other sites. The possibility of reoccupation is rejected based on this “repeated phenomenon” and “stratigraphic association.” Instead, these mixtures suggest “not only the possible existence of trading networks, but cultural and possible ethnic fusions” and also “that symbolic connotations, eventually linked to group identity, may have been involved” (Wüst 1998:672). Furthermore, “the tendency to homogeneity in ceramic artifacts in the more recent Bororo villages may reflect a process in which a former minority group...entered the area and started to dominate the already established groups, imposing new aesthetic patterns, even in ceramic production, in order to consolidate its ‘Bororo-ness’ at the eve of direct contact” (op.cit:673).

The amount of archeological evidence supporting these interpretations is slight compared with that obtained by the PRONAPABA. Reconstruction of the settlement and social behavior of the Jamari Phase is based on the seriation of 10 cm levels in from one to nine 2 x 2 or 2 x 5 m excavations at 22 sites, plus 42 unselected surface collections. A total of 108,422 sherds was classified, of which 77,765 were assigned to the Jamari Phase (Miller et al 1992). The abrupt changes in the relative frequencies of undecorated and decorated types in most stratigraphic excavations (Fig. 4) and the wide separations of consecutive levels of the same excavation in the seriated sequences document multiple episodes of abandonment and reoccupation at each site, as well as the history of movement from one site to another. The identification of two subphases repeats the dichotomy observed in the Tucuruí Phase and is consistent with the ethnographic evidence for matrilineal residence.

Are the PRONAPABA interpretations invalid and those presented by

Wüst acceptable merely because her ethnographic analogy is derived from an indigenous group still living in the same region (although no longer in the traditional manner) rather than one in another part of the lowlands? As far as I can determine, her concluding recommendation that "to understand the local processes of cultural symbiosis we need more regional full coverage surveys, particular attention to site morphology, settlement patterns, and—above all—detailed information on intrasite spatial variability" describes exactly what the PRONAPABA participants have been providing during the past 20 years.

CONCLUSION

I have tried to demonstrate that the classification of pottery and construction of seriated sequences is not an end in itself, but rather a means of extracting the maximum of information from the meager archeological record. Its success depends on obtaining comparable data over a wide span of time and space. If all of the pottery had not been collected and classified using uniform criteria, we would not have been able to identify prehistoric communities or to reconstruct their territories, village movement, settlement reoccupation, moiety divisions, and matrilineal residence. Nor could we have recognized the chronological discontinuities that correlate with mega-Niño events during the past two millennia, which provoked the dispersals reflected in the heterogeneous linguistic and genetic distributions that distinguish Amazonia from other regions of equivalent magnitude. The challenge of surviving infrequent severe episodes of subsistence stress can account for the in-depth knowledge of the biota and for many of the customs of those indigenous communities that maintain their traditional ways of life. The results obtained thusfar suggest that more detailed examination of pottery composition, decoration, and vessel shape may reveal additional features of prehistoric communities and their relationships in time and space.

This prospect is enhanced by the comparability of the data, which reflects the relative uniformity of the environment. Although Brazil occupies half the continent of South America, it incorporated a relatively low range of topographical, climatic, and ecological diversity. As a consequence, it sustained a relatively uniform level of cultural complexity throughout the precolumbian era. After the adoption of agriculture, communities consisted principally of autonomous villages with egalitarian social organization based on kinship. Pottery was made by women for their own use, minimizing the

variations in shape and decoration associated with specialized manufacture and function. Quantitative analysis and seriation can exploit this situation to identify endogamous communities and to reconstruct their behavior, but realizing this potential requires adopting uniform standards of classification. No botanist, zoologist, geologist, mineralogist, geneticist, chemist, physicist, astronomer, climatologist, or linguist can achieve credibility without conforming to the established rules and nomenclature of the discipline. Yet each archeologist can classify and describe pottery using any criteria he or she pleases, be it vessel shape, decoration, wall thickness, weight, color, composition or whatever, even when a previous classification exists for the same ceramic complex. The result is a maximum of non-comparability and a minimum of scientific progress. This situation is particularly detrimental in Brazil, where pottery constitutes the principal category of archeological evidence. Brazilian archeologists have a unique opportunity to collaborate on the production of a national data base that will not only facilitate the reconstruction of prehistoric cultural development, but will also contribute to the advancement of archeological method and theory.

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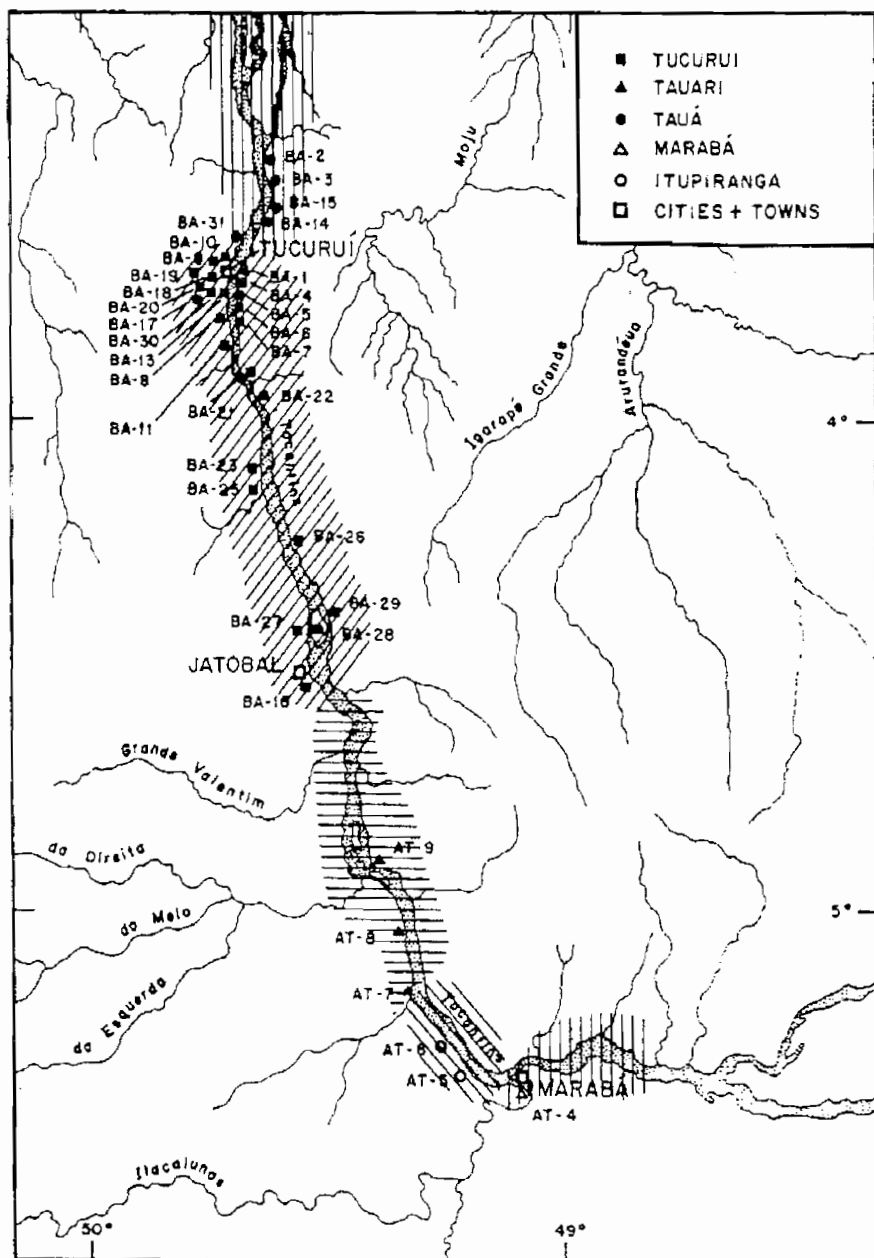


Figure 1. Distribution of habitation sites along the Tocantins and territorial boundaries of the archaeological phases. The boundaries coincide with changes in riverine conditions. Note the concentration of sites of the Tukurui Phase at the north end of the territory, which marks

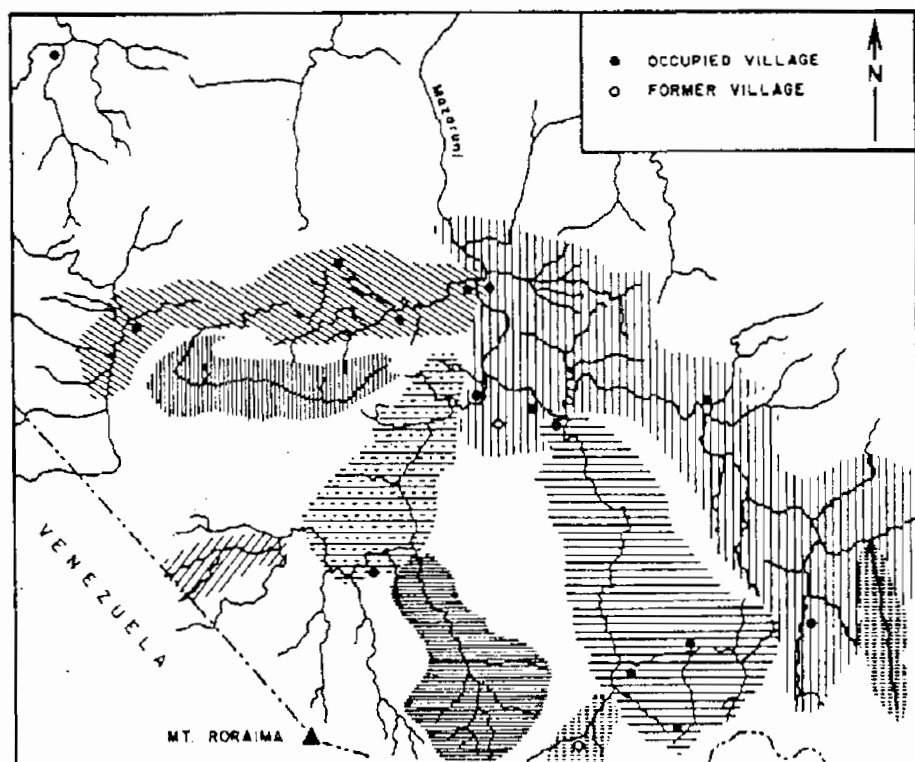


Figure 2. Territories of Akawaio communities in west-central Guyana, showing the same features as those reconstructed for the prehistoric communities on the Tocantins. Minor differences have begun to develop in dialect, ceremonies, and other features as a result of reduced interation (after Colson 1982-83).

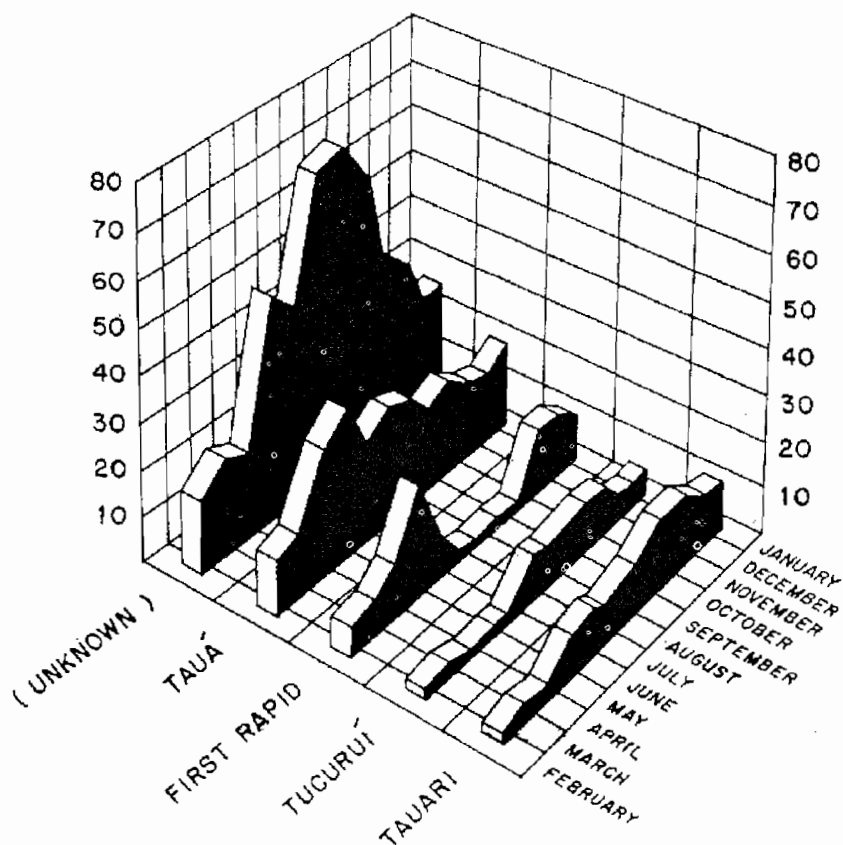
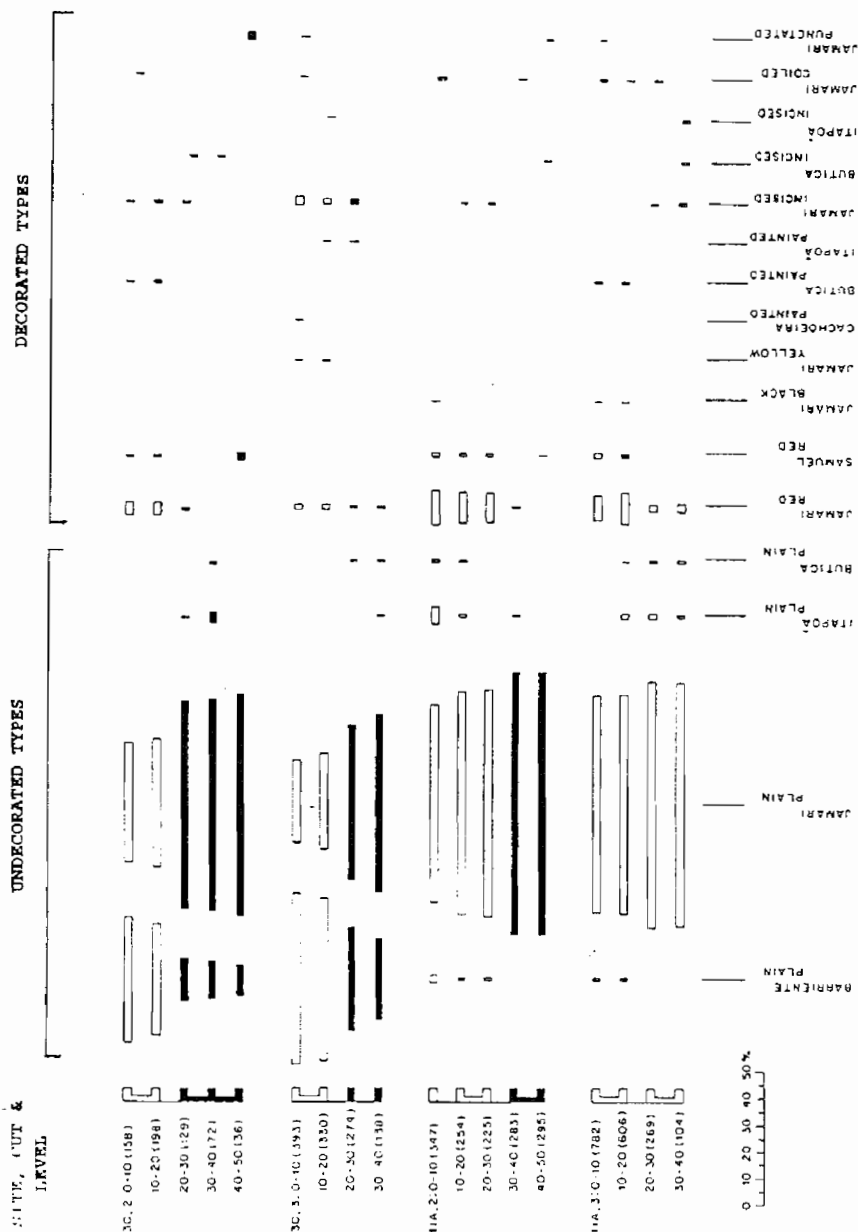


Figure 3. Monthly differences in the productivity of fish in different zones along the Tocantins in metric tons. Lack of coincidence between periods of scarcity and abundance in adjacent regions suggests that deficits might have been minimized by reciprocal agreements between adjacent communities (after Merona 1990).



at RO-PV-11A and RO-PV-30, habitation sites of the Jamari Phase. The abrupt changes from one level to the next in both undecorated and decorated types suggest that each 10 cm level corresponds to a single episode of occupation. The absence of sterile layers or other physical

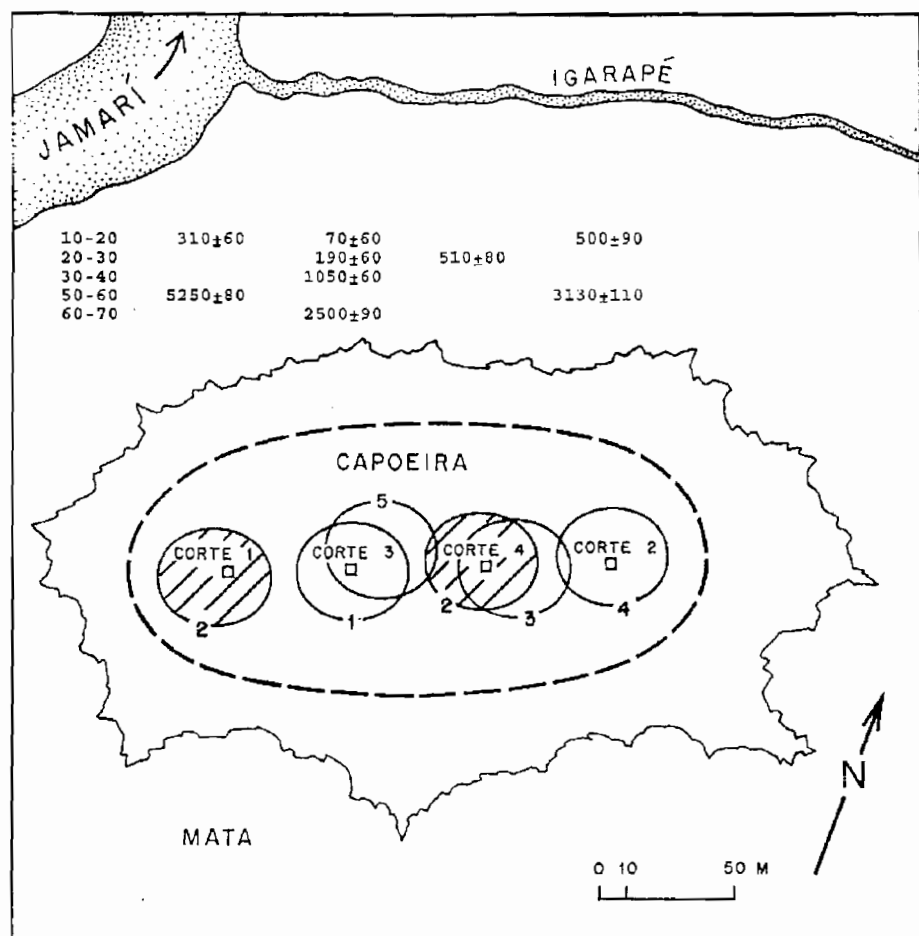


Figure 5. PV-RO-35, a habitation site of the Jamarí Phase, showing the locations of four stratigraphic excavations. Seriation of the levels suggests five episodes of occupation: two each in the locations of Cuts 3 and 4, one in the location of Cut 2, and one in Cut 1, contemporary dates (years before present) from the same depth in different excavations is additional evidence of discontinuous habitation. The three earliest dates are intrusive from preceramic occupations (after Miller et al 1992).

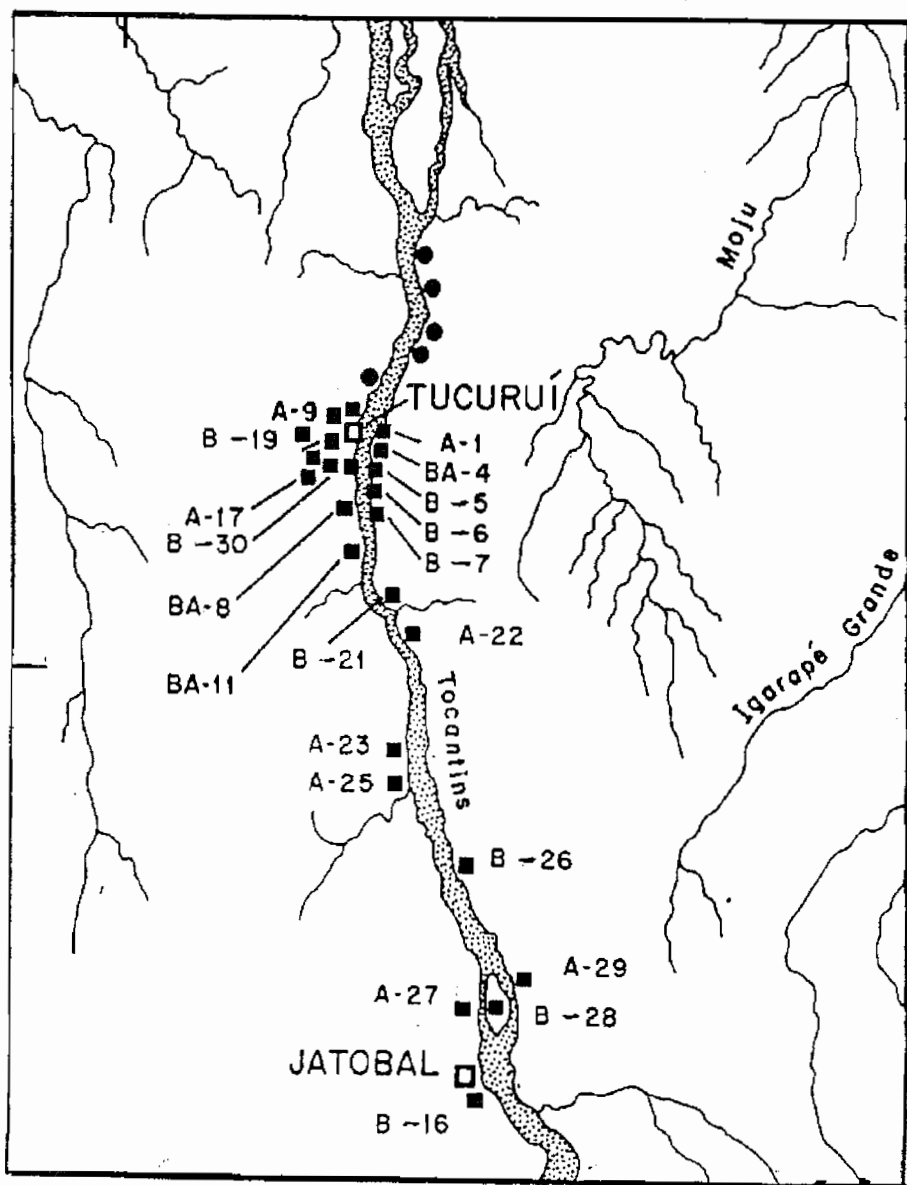


Figure 7. Locations of habitation sites assigned to Subphases A and B of the Tucuruí Phase, identified as matrilineal moieties. With three exceptions at the north end of the territory, the sites appear to have been occupied exclusively by one of the moieties (A=Subphase A, B=Subphase B, BA=both Subphases).

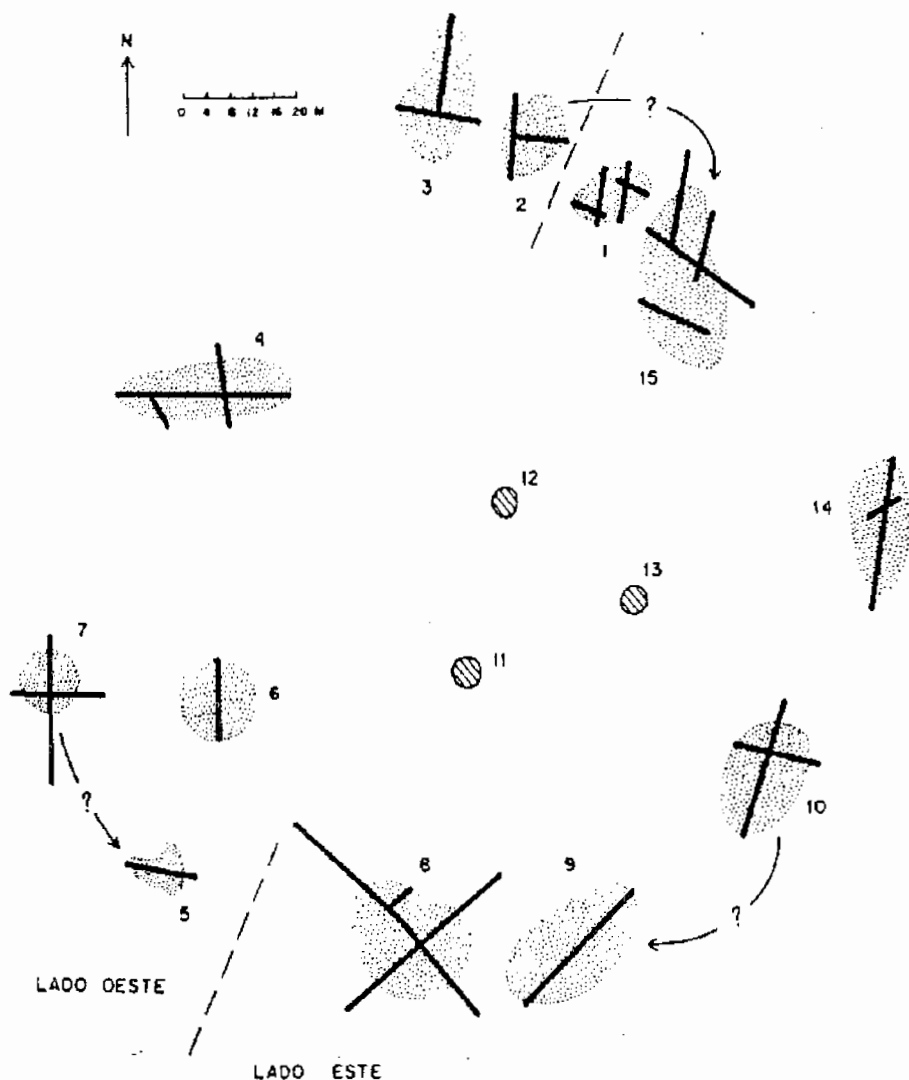


Figure 8. Plan of Aldeia da Queimada Nova, a ring site of the Tupiguarani Tradition in southern Piauí, showing the locations of former houses, excavations, and the inferred boundary between matrilineal moieties (after Meggers and Maranca 1980).

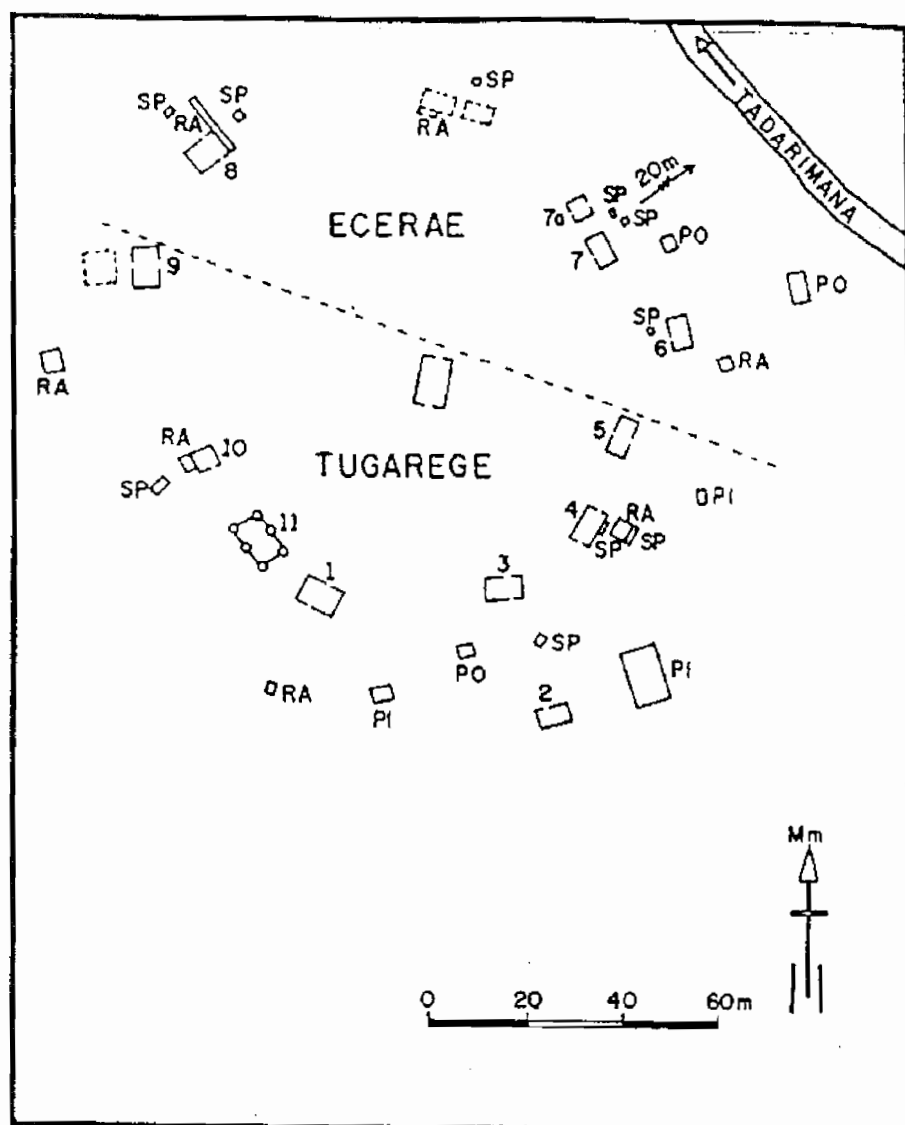


Figure 9. Plan of an historical Bororo ring village showing the boundary between matrilineal moieties. Differences in the sizes and orientations of the houses resemble those of the Aldeia da Queimada Nova and slight differences in ceramics are reported (Wüst 1994).

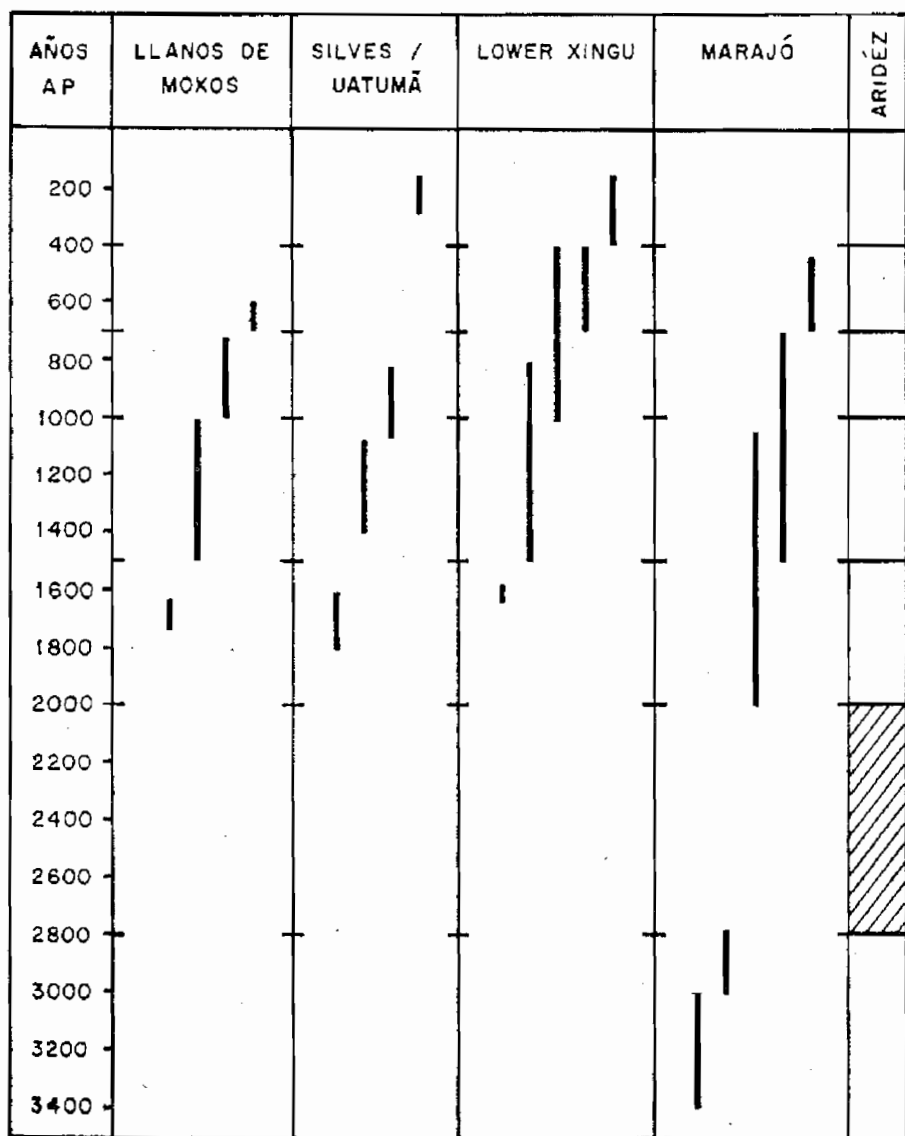


Figure 10. Durations indicated by 14C dates for consecutive phases on the Llanos de Moxos, the central Amazon (Silves/Uatamã region, lower Xingu), and Ilha de Marajó. The coincidence between these transamazonian discontinuities and mega-Niño events *ca* 1500, 1000, 700 and 400 BP attests to the catastrophic impact of these droughts on the indigenous population.