Pre-columbia

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Abstract

PRE-COLUMBIAN EARTHWORKS IN THE RIBERALTA REGION OF THE BOLIVIAN AMAZON

Interpretations of the Amazonia prehistory have changed significantly in the last few decades, as the complexity and diversity of the Amazonian cultures are beginning to be documented and understood. Earthworking, a long-term conscious anthropogenic landscape alteration, was a widespread phenomenon throughout the South American tropical lowlands. A variety of earthworks has been documented in the Southwest Amazon, including ditches and embankments of different shapes and sizes, roads, extensive raised fields, canals, causeways, and artificial wetlands linked to adjacent mounds and forest island settlement sites. A field survey and test excavations were undertaken in the region of Riberalta, in the Bolivian Amazon. The purpose of these investigations was to study the distribution and characteristics of the pre-Columbian occupation in the region. We found different types of sites, some without visible earthworks, indicating fairly dense occupation on river bluffs and terra firme, but lacking long permanence in the same location. The earthwork tradition prevailed in the Riberalta region from at least 100 B.C. until the period of European contact. The function of the less-complex earthworks may have been to enclose the occupation areas, and in some cases, to serve as canals. Compared to the variable layout of the sites, the ceramic assemblages of the region are relatively homogeneous. A central objective for future research will be to determine if the earthwork sites correlate with a single or multiple cultural traditions.

Keywords: Southwest Amazonian archaeology, earthworks, ceramic traditions.

Resumo

OBRAS DE TERRA PRÉ-COLOMBIANAS NA REGIÃO DE RIBERALTA, AMAZÔNIA BOLIVIANA

Interpretações da pré-história Amazônica tem mudado significativamente nas últimas décadas, na medida em que a complexidade e diversidade das culturasamazônicas começam a ser documentadas e entendidas. Construções de terra, na forma de alterações consciente de paisagens ao longo do tempo, foi um fenômeno difundido através das terras baixas tropicais. Diversas construções

de terra tem sido documentadas no sudoeste amazônico, incluindo trincheiras e muretas de diversas formas e tamanhos, estradas, campos de cultivo, canais, caminhos e terras inundáveis artificiais ligadas a assentamentos na forma de montículos e ilhas de florestas. Prospecções e escavações-teste foram realizadas na região de Riberalta, na Amazônia Boliviana. O objetivo dessas investigações era estudar a distribuição e características da ocupação pré-Colombiana na região. Encontramos diferentes tipos de sítios, alguns sem obras de terra visíveis, indicando ocupação densa das ribanceiras de rios e terra firme, mas sem longo tempo de permanência nos mesmos locais. A tradição de construção de obras de terra prevaleceu na região de Riberalta de pelo menos 100 AC até o período do contato europeu. A função dessas obras menos complexas pode ter sido de circundar áreas de ocupação e, em alguns casos, servir como canais. Comparada ao leiaute variável dos sítios, a cerâmica da região é relativamente homogênea. O objetivo principal para as pesquisas futuras será determinar se os sítios com obras de terra correspondem a uma única ou várias tradições culturais.

Palavras-chave: Arqueologia do sudoeste da Amazônia, obras de terra, tradições cerâmicas.

Resumen

OBRAS DE TIERRA PRE-COLOMBINAS EN LA REGIÓN DE RIBERALTA, AMAZONÍA BOLIVIANA

Las interpretaciones de la Amazonia prehistórica han cambiado significativamente en las últimas décadas, como la complejidad y diversidad de culturas amazônicas están empezando a ser documentados y comprendidos. Construcciones de tierra, altaraciones conscientes del paisaje, a largo plazo, fue un fenómeno generalizado en las tierras bajas tropicales. Varias construcciones de tierra han sido documentadas en el Sudoeste del Amazonas, incluyendo trincheras y muros de piedra de diferentes formas y tamaños, carreteras, campos agrícolas, canales, carreteras humedales artificales vinculados a los asentamientos en forma de montículos y las islas de bosque. Estudios y excavaciones de prueba se llevaron a cabo en la región de Riberalta en la Amazonia boliviana. El objetivo de estas investigaciones fue estudiar la distribución y características de pre-ocupación precolombina en la región. Nos encontramos con diferentes tipos de sitios, algunos con obras de tierra visible,

lo que indica la ocupación densa de las orillas de ríos y barrancas de tierra firme, pero carecien de larga permanencia en los mismos lugares. La tradición de del movimiento de tierras prevaleció en la región de Riberalta de al menos 100 antes de Cristo hasta el período de contacto con los europeos. La función de estas obras menos complejas puede haber estado ocurriendo alrededor de las áreas de ocupación y, en algunos casos, sirven de canales. En comparación con la distribucion variable de los sítios, la cerámica de la región es relativamente homogénea. El objetivo principal para la investigación futura será determinar si los sitios con las obras de las tierras corresponden a uno o más de las tradiciones culturales.

Palabras clave: Arqueología del sudoeste de la Amazonía, obras de tierra, tradiciones cerámicas.

At certain times and places, the results of prehistoric environmental management were so profound that they are easily observable even today. Earthwork engineering, a testimony to long-term conscious anthropogenic landscape alteration, seems to have been a widespread phenomenon throughout the South American tropical lowlands, even though the existence of such earthworks has only recently been acknowledged by scholars. A variety of earthworks have been reported from different parts of the Southwest Amazon[1] (Figure 1). These include complex earthworks formed by ditches, enclosures, and roads of different shapes and sizes in the Brazilian State of Acre (Dias & Teixeira 2008; Pärssinen et al. 2003, 2009; Schaan et al. 2007), semicircular and circular ditches and embankments in the north of Bolivia (Arellano 2002; Arnold & Prettol 1988; Saunaluoma et al. 2002; Saunaluoma & Korhonen 2003), ring-ditches on forest islands in the savannas in Baures and Santa Ana de Yacuma of the Llanos de Mojos, in eastern Bolivia (Erickson et al. 1997, 2008; Prümers et al. 2006; Walker 2008b), and, perhaps as the most impressive example of landscapes of earthworks, extensive raised fields, canals and ditches of many types, causeways, and artificial wetlands linked to adjacent mound and forest island settlement sites in the Central Llanos de Mojos (Denevan 1966; Erickson 1995, 2001, 2006; Walker 2008a).

In the last couple of decades, interpretations of the prehistory of Amazonia have changed drastically (Heckenberger & Neves 2009; Stahl 2002). The vast complexity and diversity of the cultures of the tropical lowlands are beginning to be documented and understood. The idea of independent development of Amazonian regional cultural traditions, the existence of wide-spread and continuous long-term permanent settlements in the interfluvial areas, as well as on the well documented riverine bluffs, and the phenomena of late prehistoric complex chiefdom societies is increasingly accepted. Resent research has focused on flows of cultural influences and traits, networks of exchange and knowledge, and the unique ability of the pre-Columbian societies of the Amazonia to alter and control their environment (Balée & Erickson 2006; Heckenberger et al. 2008; Hill & Santos-Granero 2002; Woods et al. 2009).

In this article, I present and discuss the results of a survey and test excavations undertaken in the region of Riberalta, in the departments of Beni and Pando in the Bolivian Amazon. The purpose of these investigations was to study the distribution and characteristics of the pre-Columbian occupation in an area with few recorded archaeological sites, and to identify, determine the functions of, document the variation of and date the earthworks in the Riberalta region. This research contributes to the knowledge of the pre-Columbian cultural sequences not only of the northern lowlands of Bolivia but also of the Southwest Amazon in general.

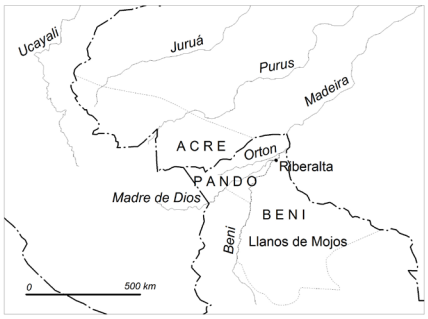

Figure 1 - Southwest Amazon, main rivers and regions mentioned in the text.

RESEARCH AREA

Riberalta was founded in 1894 at the confluence of the Beni and Madre de Dios rivers, 80 km from the Brazilian border. Established as a rubber boom center, today Riberalta is the primary exporter of Brazil nuts in Bolivia, and with its population of 95,000 inhabitants, the second-largest town in the Department of Beni. The region's contemporary ethnic groups, Chacobo, Pakawara, Cavineño, and Esse Ejja, belong to the Panoan-Tacanan language family (Teijeiro et al. 2001).

Riberalta is situated 130 m above sea level in the Amazonian plains, in a region covered by evergreen rainforest on undulating laterite formations (Wasson et al. 2002). The region's mean annual temperature is 27 ºC, and mean annual rainfall 1780 mm. The dry season extends from June to August, during which time less than 30 mm of rain falls per month (Myers et al. 2000). Occasional cold southern fronts, called *surazos* by the local people, pass over the region in June and July and can lower the temperature abruptly by several degrees, but only for two or three days at a time.

The tropical white-water rivers Beni and Madre de Dios, originating in the Andean mountain range, dominate the landscape of the region with their floodplains and numerous tributaries. In the Amazon plain, the meandering of the rivers causes notable processes of erosion and sedimentation in the proximity of the riverbanks. The average annual migration of the meanders of the Beni River is 30 m, but can extend to as much as 140 m (Gautier et al. 2008). The soils of the region are mainly weathered clayed latosols typical of the Amazonian plain.

LOCATION AND DESCRIPTION OF THE SITES

Prior to the present study, only few archaeological sites in the region of Riberalta were known to scholars: the Tumichucua earthwork complex (Arnold & Prettol 1988; Myers 1988:76), the earthworks of the Orthon River Basin (Arellano 2002), and the ruins of a supposed Inca fortress[2] situated on a bluff at the ancient confluence of the Beni and Madre de Dios Rivers, approximately 4 kilometers to the southwest of Riberalta. This La Fortaleza de las Piedras site features a wall constructed of conglomerate blocks that follows an old riverbank and a 600-m-long curved moat that connects the ends of the wall. These defensive features enclose an area of 10 ha, containing a group of small enclosures defined by low conglomerate walls (Korpisaari et al. 2003:8). The published radiocarbon

dates from the site suggest that the site was occupied A.D. 1300-1600 (Siiriäinen 2003).

In 2001-2003 and in 2005, mapping and test excavations were carried out at the following sites in the Province of Vaca Diez of the Department of Beni: Tumichucua, Estancia Girasol, Las Palmeras, and Estancia Giese, and in the Province of Madre de Dios of the Department of Pando: El Círculo, Chacra Telería, and Candelaria. In addition, the following sites were briefly inspected during the 2005 field season: Estancia Mendez and Estancia Velasco in the Department of Beni, and Chacra Carbajal and Dos Palmas in the Department of Pando (Table 1, Figure 2).

TUMICHUCUA

The earthwork complex of Tumichucua was discovered in the 1950s during the establishment of the infrastructure of the Summer Institute of Linguistics on the southeast margin of an oxbow lake, 18 km to the southwest of Riberalta. Recent land use has already begun to affect the site, but most of the extensive earthworks are still visible, even in the midst of the present-day community.

Dean Arnold and Kenneth Prettol (1988) mapped and excavated at the site in the early 1980s. They documented a complex of earthworks which covers an area of some 125 ha and consists of five distinctive ditches named A to E. The most significant earthwork at the Tumichucua site is the circular Ditch D, approximately 775 m in diameter, together with the smaller semicircular Ditch C adjacent to the oxbow lake. These two structures are connected by a smaller, ca. 30-m-long ditch. The L-shaped, 1350-m-long Ditch B connecting the oxbow lake and the floodplain of the River Beni is situated some 100 m to the north of Ditches C and D. The semicircular Ditch E, approximately 300 m to the southwest of the circular Ditch D, was barely visible in the present study. Furthermore, Arnold and Prettol (1988:461-462) refer to Ditch A, documented some 230 m to the north of Ditch B, and a partially destroyed mound inside the circular Ditch D, but these structures had vanished by 2002. In addition, we found a solitary ditch roughly 1500 m to the northwest of the Tumichucua community. This ditch begins from the bank of the oxbow lake and heads towards the Beni floodplain, disappearing into the swampy terrain at 70 m distance.

Arnold and Prettol excavated a 14-m-long trench, traversing Ditch D in the eastern section of the site and revealing a few potsherds, unburnt clay balls and a possible posthole feature on the inner edge of the ditch (1988:461-462). During the 2002 field season, we placed five 1 m x 1 m test units in the northern section of the site between Ditches D and B (Figure 3). Unit 1 inside the circular Ditch D had pottery in abundance in the levels 0.2-0.6 m in a reddish-brown colored cultural layer, while Unit 2, situated at the bottom of the Ditch D, contained only a few potsherds in the levels 0.2-0.8 m. Soil in Units 3 and 4 excavated between the

Table 1
Sites investigated during the present study

Site	Coordinates	Earthwork Type	m² Excavated	Number of sherds	Weight of sherds (g)
Tumichucua	11°08' S - 66°09' W	circular & semicircular ditches, canal	6	374	4813
Estancia Girasol	11°10'53" S - 66°11'02" W	double ditch, canal, road	3	141	1584
Estancia Mendez	11°13'28" S - 66°14'17" W	straight ditches	*	8	527
Chacra Carbajal	11°03'52" S - 66°19'13" W	U-shaped ditch	-	-	-
Las Palmeras	10°59'17" S - 66°00'37" W	roughly circular ditch	11	1072	10993
Estancia Giese	10°58'24" S - 66°00'52" W	semicircular? embankment	7	209	2126
El Círculo	11°02'09" S - 66°07'43" W	circular embankment, canal	39	838	21717
Chacra Telería	11°01'25" S - 66°09'22" W	none	1	107	1840
Candelaria	11°02'87" S - 66°17'06" W	none	2	27	991
Dos Palmas	11°05'13" S - 66°18'59" W	none	*	15	654
Estancia Velasco	11°09'18" S - 66°10'03" W	none	*	7	391

* superficial collection of sherds

ditches and in Unit 5 at the bottom of the Ditch B was culturally sterile. In 2005, we excavated an additional Unit 6 inside the circular earthwork to clarify the dating of the site. This excavation was placed some 500 m to the east of the present-day community, in a recently burnt field with many diagnostic potsherds on the surface. The Unit 6 contained abundant ceramics in a dark brown colored cultural stratum (levels 0.1-0.6 m), the major concentration of sherds (43%) occuring in level 0.2-0.3 m.

The pottery collected at Tumichucua during fieldwork in 2002 and 2005 includes 11% diagnostic sherds. The ware is mainly ground sherd tempered, although some sherds have carbon or sand tempering, and caraipé temper is rare. Rims are mostly everted, although direct and inverted rims are also pres-

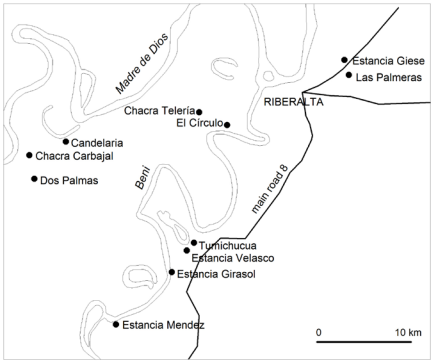

Figure 2 - Location of the investigated sites in the region of Riberalta.

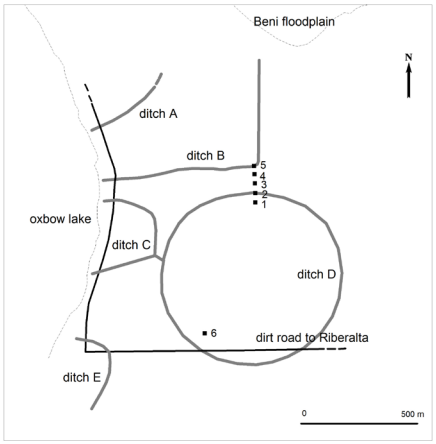

Figure 3 - Earthworks and location of test units excavated at the Tumichucua site in 2002 (Units 1-5) and 2005 (Unit 6). Map partially redrawn from Arnold & Prettol 1988:460.

ent (Figure 4B). The lips are rounded and thickened or tapered. Some fragments of flat-based vessels were recovered (Figure 4C). Little can be said about the surface treatment of the pottery, since the sherds are eroded. The common decorative techniques are incision (Figure 4A) and fine-line incision, in addition to some sherds with short parallel rim-nicking and fingernail incisions. Two small unnotched stone axes and a cylindrical grinding stone were also recovered at the site.

An interesting fragment of an anthropomorphic vessel was recovered by a resident of Tumichucua near ditch B connecting the oxbow lake with the Beni floodplain, at some 200 m distance from the lake. It represents a human face with coffee bean-shaped eyes (Figure 5). The reddish-yellow ware has ground sherd temper. The fragment in question resembles the modeled anthropomorphic effigies typical of the Barrancoid Tradition (Lathrap 1970:168). Stylistically similar anthropomorphic vessels have also been reported from the Upper Beni River, in the proximity of the Andean piedmonte (Nordenskiöld 1924, Portugal 1978).

ESTANCIA GIRASOL

The Girasol ranch is situated adjacent to the floodplain of the Beni River, 4 km to the southwest of Tumichucua. We documented four earthworks at the site (Figure 5). A 240-m-long and 9-m-wide ditch, oriented in an E-W-direction, connects a smaller stream to the Beni River. Approximately 170 m to the south, two partly parallel, badly eroded ditches connect to the old riverbank of the Beni. Approximately 500 m to the east of the floodplain, a 15-m-wide road defined by parallel 1-m-high berms in a N-S-direction was recorded, but due to thick secondary vegetation we could not follow the earthwork's course or to measure its

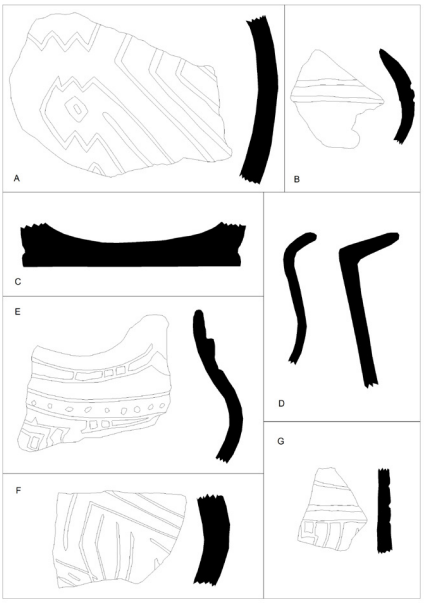

Figure 4 - A-C: Tumichucua assemblage, incised-design, inverted-rim, and flat-bottomed vessel fragments, D: Estancia Girasol assemblage, globular (rim diameter 19 cm) and direct (rim diameter 27 cm) body forms with out-turned rims, E-G: Chacra Telería assemblage, incised sherds representing globular and direct body forms. The base diameter of the flat bottomed vessel (C) is 10 cm, all fragments drawn to the same scale.

total length.

We excavated three 1 m x 1 m test units during the 2005 field season. Unit 1, 70 m to the north of the eroded double ditch, and Unit 3 placed in between these ditches yielded a few eroded potsherds in the 0.1-0.5-m-levels, while Unit 2, excavated in the bottom of the outermost ditch, suggested ceramic accumulation in the levels 0.2-0.7-m.

The Estancia Girasol pottery is deteriorated, and only five precent of the

Figure 5 - Fragment of an anthropomorphic vessel recovered at the Tumichucua site. Photo S. Saunaluoma.

sherds are diagnostic. The few recovered rim sherds represent globular or straight body forms with out-turned tapered or rounded lips (Figure 4D). The only basal sherd is flat. The ware is coarse, mainly cariapé tempered, but sand, carbon, and ground sherd tempers also occur.

ESTANCIA MENDEZ

The Estancia Mendez site is located 12 km to the southwest of Tumichucua. This earthwork site consists of two simple ditches oriented in N-S-direction, beginning on the bluff of the Beni River and disappearing at some distance from the floodplain. The westernmost ditch is 16 m wide and, in part, almost 1.8 m deep. A fragment of caraipé tempered pottery with

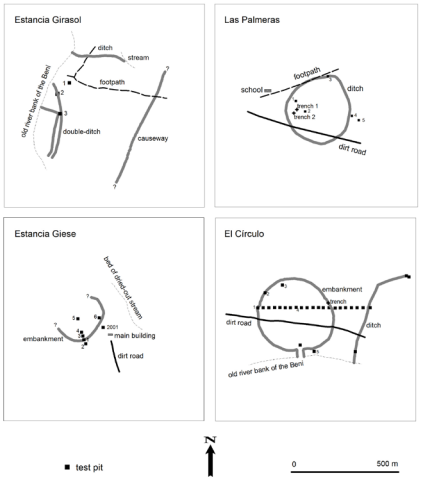

Figure 6 - Earthworks and location of test units excavated in 2001-2005 at the Estancia Girasol, Las Palmeras, Estancia Giese, and El Círculo sites.

a pedestal base was found in a cut of a dirt road which crosses the ditch. The other, less prominent ditch is 12 m wide. The distance between these two ditches is approximately one hundred meters and probably they associated in the same earthwork complex, although the full dimensions and shape of these earthworks remain unknown.

CHACRA CARBAJAL

An earthwork is located approximately 5 km to the southwest of the community of Candelaria and 1.5 km to the east of the Madre de Dios River. This site includes a shallow U-shaped ditch that surrounds a natural hill covered with thick secondary vegetation. The ditch ends in an old river channel, and the open side of the U-shaped earthwork faces in direction of the watercourse. We did not find any other archaeological remains while briefly exploring the course of the earthwork, but without doubt, a more careful survey would reveal more information on the site.

LAS PALMERAS

The community of Las Palmeras is situated 7 km to the northeast of Riberalta. Today the distance to the Beni floodplain is about 5 km. The Las Palmeras site was located in 1998 by Ari Siiriäinen and Jorge Arellano. Arellano carried out test excavations at the site the following year, acquiring pottery which he classified into six distinct types (Arellano 2002:58-65).

The earthwork of Las Palmeras is a roughly circular ditch, approximately 12-m-wide, 1-m-deep, and 270 m in diameter (Figure 5). According to the landowner, the ditch was more prominent when he purchased the property in the 1970s. The Las Palmeras earthwork has suffered considerably from modern-day land use, making the course of the ditch difficult to distinguish in certain places. The dirt road crossing the structure has all but de-

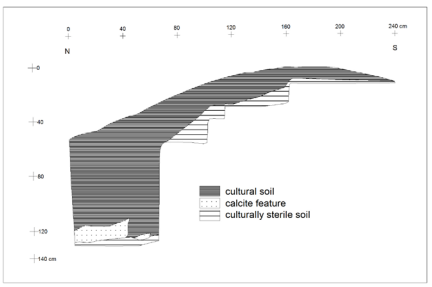

Figure 7 - Las Palmeras, profile of Trench 1 excavated in 2001.

stroyed the southernmost part of the earthwork. In the western part of the site, small mounds, approximately 2 m x 3 m in size, were observed inside the circular ditch. Recent agricultural activities had exposed numerous potsherds that were scattered on the surface of the mounds.

In 2001, we excavated Trench 1 (1.5 m x 2.5 m) on the northern side of one of the small mounds, cutting the feature into two halves (Figure 7). While excavating, we noticed that the mounds were actually formed by the backfill coming from oval-shaped depressions measuring approximately two square meters and situated adjacent to the mounds. The thickness of the cultural layer which lay underneath a thin humus layer was only 0.1 m on top of the mound, but reached down to a depth of 1.3 m on the side of the depression. Most of the pottery (64%) was concentrated in the depression, in the levels 0.1-0.3 m. The number of potsherds decreased gradually in the next three levels, but increased again in the 0.6-0.7-m-level, which was also the last level to contain pottery. Immediately underneath, in the 0.75-m-level, we observed a 0.15-m-thick feature consisting of a powdered substance in the dark brown cultural soil. A sample of this substance was later analyzed, revealing it to be calcite[3].

Trench 2 (0.5 m x 2 m) was placed on another mound, located some 20 m to the southwest of the Trench 1. The thickness of the dark brown cultural layer was some 0.2 m on top of the mound and almost 1.3 m on the bottom of a depression on the northern side of the mound. The majority of the potsherds were collected from the excavation levels 0.0-0.1 m (34%) and 0.3-0.4 m (35%). Pottery was absent from the levels 0.4-0.6 m, but we obtained the last few sherds from the 0.6–0.7-m-level.

Two 1 m x 1 m test units suggested that the thickness of the cultural layer reaches down to a depth of 0.4 m inside the circular ditch in the proximity of the above-mentioned mounds. Unit 4, situated 10 m outside the ditch, revealed a cultural layer of a similar thickness, but soil in Unit 5 placed 50 m to the east of the earthwork was culturally sterile. Unit 3, excavated in the bottom of the ditch on the northern side of the site, exposed a midden deposit: dark-colored culturally altered soil containing a considerable amount of charred organic matter and ceramics (303 potsherds), which begun at the 0.2-m-level and continued to a depth of 1.2 m.

Fifteen percent of the pottery recovered at the Las Palmeras site is diagnostic. Most potsherds have caraipé temper, but also sand and hematite temper was used. Traces of brown slip can be observed, as can incised design elements that form straight parallel lines, curved lines, and geometric designs (Figures 8 and 9F). A few sherds feature fingernail impression (Figure 9D), and some of the incised sherds have remnants of red paint. Decorated pottery represents a finer type of ware, while the undecorated sherds, probably from large containers, are more robust

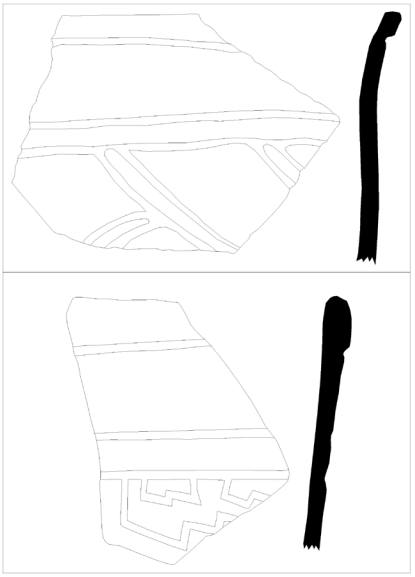

Figure 8 - Las Palmeras assemblage, incised rim (diameter 28 cm) from Unit 3 and below incised rim (diameter 20 cm) from Trench 1, drawn to the same scale.

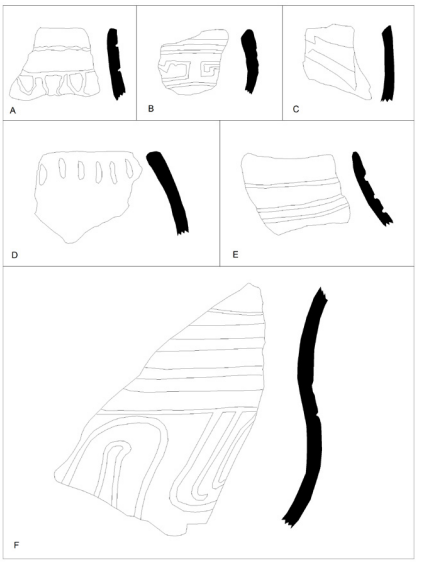

Figure 9 - A-C: Estancia Giese assemblage, incised rims (diameter 18 cm) and fine-line incised rim (diameter 12 cm), D-F: Las Palmeras assemblage, fingernail-incised rim, inverted rim, and globular incised body. The length of the incised body sherd (F) is 10 cm, all fragments drawn to the same scale.

and poorer in quality. Rims are everted, inverted or direct (Figures 8 and 9E). Lips are tapered, rounded and thickened or out-turned and squared. Some fragmentary handles and flat bases are also present in the assemblage. The main aspects of the ceramics are similar, regardless of the two separated occupation phases indicated by the ^{14}C dates (discussed below).

ESTANCIA GIESE

The ranch of Roger Giese is situated 6 km to the northeast of Riberalta and 2 km to the north of the Las Palmeras site. An embankment found on the ranch is eroded due to cane sugar cultivation and earlier cattle farming. The semicircular part of the embankment that we measured and mapped in 2002 has a 400-m-long perimeter and a diameter of 225 m (Figure 6). Because of dense secondary vegetation, we could not verify the course of the embankment to the northwest. The difference in elevation between the top and the base of the embankment varies between 0.5-1 m, and the embankment's width is 10-15 m. The earthwork propably was originally constructed adjacent to a minor watercourse. The bed of this now-abandoned stream runs on the eastern and northeastern sides of the embankment at a distance of some 100 m.

While laying the foundations for a hen house in the early 1990s, the proprietor found a small polished stone axe with side notches at a depth of some 0.2 m below ground level. In 2001, we excavated a 1 m x 1 m test unit near the spot at which the axe had been found, 30 m to the east of the embankment. This unit suggested that the cultural material was sparse, only a few eroded potsherds were observed in the 0.2-0.4-m-level.

In 2002, a six additional 1 m x 1 m test units were excavated at the site to study the extension of the occupational area located in 2001. Unit 1 was placed on top of the embankment and revealed only one potsherd at a depth of 0.6 m. The uppermost layer (0.0-0.3 m) excavated consisted of soil mixed with hematite fragments. This deposit of hematite was observed on the surface of the embankment of the entire northern part of the earthwork. The upper levels of Unit 2, excavated 20 m to the south of the embankment, had been disturbed by cane sugar cultivation. Three potsherds were recovered, again in the 0.6-m-level. In Units 3-5, placed 20 m, 40 m, and 100 m to north of the Unit 1, evidence of cultural material was scarse, only minor concentrations of potsherds in the levels 0.2-0.4 m. Unit 6, located near the base of the embankment on the western side of the site, contained a cultural layer associated with an accumulation of ceramics and organic material, charcoal, and carbonized seeds at depths of 0.4-0.8 m.

The ceramics recovered at the Estancia Giese site are fragmented and deteriorated, and only 10% of the shreds are diagnostic. The general characteristics of the pottery are predominant use of cariapé temper, hematite temper in lesser quantity, incised and fine-line incised decoration, direct rims in finer ware (Figure 9A-C), and out-turned thickened lips in the utility ware. The few recovered basal fragments are from flat-bottomed vessels.

EL CÍRCULO

The El Círculo site is situated in the community of Las Piedras, 7 km to the southwest of Riberalta. The existence of the El Círculo earthwork has been known to the local people for some time. This curious earthwork was encountered and chosen as an object of study during the 1997 preliminary fieldtrip to the region. Jorge Arellano surveyed the earthwork in 1999, but did not mention any other indication of cultural remains (Arellano 2002:56).

The El Círculo earthwork differs from the other earthworks documented so far in the region as it consists of a circular embankment 350 m in diameter and with an entrance towards the old riverbank of the Beni River (Figure 6). Eleven mounds measuring 10-18 m in diameter were observed attached to the inner side of the embankment. Contemporary land use at the site has caused erosion in some parts of the earthwork. Today, the height of the embankment is approximately 1 m, and the mean width is 10 m. Approximately 150 m to the east of the circular embankment, a 15-20-m-wide

ditch begins on the old bluff of the Beni floodplain, runs 380 m to the north, and then turns and continues some 140 m to the northeast, vanishing gradually. The ditch has a depth of 0.5-1 m, and is accompanied by a low embankment formed of the ditch backfill on the eastern side.

In 2001, we excavated five 1 m x 1 m test units at the site. Unit 1 was placed on one of the westernmost mounds attached to the embankment. The cultural layer began at a depth of 0.2 m, where the first few potsherds and dark colored soil were observed. The 0.4-0.6-m-level yielded a similar amount of pottery, but the soil contained more charcoal and burnt clay. The 0.6-0.8-m-level was associated with a hearth feature, consisting of a 0.1-m-thick crust of burnt clay beneath which a concentration of carbonized wood on top of another 0.1-m-thick layer mixed with burned clay and soot was observed. The base of the cultural deposit (0.8-1.0 m) contained an accumulation of pottery (48% of the sherds recovered from this unit). Some fragments of resin were also found in the cultural strata. Unit 2, situated on a smaller mound 80 m to the northeast of the Unit 1, suggested an even distribution of ceramics throughout the cultural deposit. Potsherds were found between the 0.2 and 0.6 m levels. The 0.3-0.4-m-level had an accumulation of fragments of burnt clay and charcoal in a sooty soil. Units 3-5 excavated in other parts of the site at some distance from the embankment turned out to be culturally sterile.

During the 2003 field season, more comprehensive excavations were carried out at the site to define the limits and extent of the cultural strata. Nineteen 0.6 m x 0.6 m test units were excavated at 25 m intervals along an E-W-line transecting the site beginning from the western side of the circular embankment and ending at the ditch situated to the east of the site. Three additional test units were excavated at the ends of the ditch, and one test unit

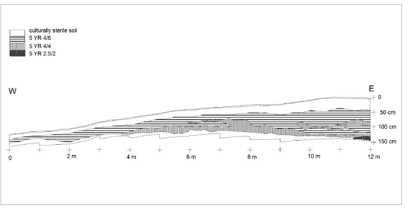

Figure 10 - El Círculo, profile of the trench excavated in 2003.

was placed 20 m to the north of the entrance of the circular embankment. None of these units contained archaeological material.

A well-preserved mound located on the eastern side of the site was chosen for excavation to clarify the stratigraphy of the mounds attached to the embankment. The mound is 1.5 m high and 18 m in diameter. A 1 m x 12 m trench oriented in an E-W-direction was positioned to intersect the highest point and the inner edge of the mound. The trench was divided into twelve 1 m x 1 m units which we excavated in artificial 0.1-m-levels. Culturally sterile soil was reached at a depth of 0.4 m in the western end of the trench (Unit 1) and

at 1.5 m in the eastern end (Unit 12), on top of the mound (Figure 10).

Underneath a thin humus layer, we encountered a culturally sterile light reddish-brown soil. The thickness of this layer was 0.15 m in the western end of the trench and 0.40 m on top of the mound. Below this sterile layer, we observed a 0.15-0.45-m-thick yellowish-red (5 YR 4/6) stratum. In the 0.6-1.3-m-levels, from Unit 5 to the eastern end of the trench, a reddish-brown (5 YR 4/4) layer was encountered. This layer mixed with the yellowish-red one in Units 7, 11, and 12. Both layers contained accumulations of potsherds and fragments of burnt clay as well as organic material, such as carbonized seeds. In Unit 12, at a depth of 1.3 m, we encountered a thin dark reddish-brown (5 YR 2.5/2) layer mixed with charcoal reaching to a depth of 1.45 m.

In Units 4 and 5, the 0.4-0.5-m-level consisted of a hearth feature with a concentration of charcoal and burnt clay. Another hearth was found in Unit 8, level 0.7-0.8 m. Unit 6 yielded one third of an undecorated ceramic vessel which had remains of organic material and carbonized seeds inside. A total of 658 sherds (19 kg) were obtained from the trench excavation, most of which (53%) were found in Units 6-8. The major accumulation of pottery was in the levels 0.5-0.8 m.

The ceramics of the El Círculo site differ from the other ceramic assemblages of the Riberalta region. Twelve percent of the sherds are diagnostic. The ware is caraipé tempered, and incised decoration is sparse, although several fingernail-incised sherds (Figure 11B) were recovered. Traces of a dark brown as well as red all-over slip and red painting on white slip are still observable on several sherds (Figure 11F). Rims are direct or everted with squared or rounded and thickened lips (Figure 11A). Flat basal fragments as well as pedestal bases (Figure 11C) are present, as are spindle whorls (Figure 11D-E). Reconstructed vessels bodies are globular in shape, and open-mouthed bowls are also present in the assemblage. Some fragments of grinding stones made of laterite slabs and small fragments of resin[4] were also recovered. Surface collection at the site yielded a re-utilized polished stone axe.

CHACRA TELERÍA

The Chacra Telería site is located about 3 km to the northwest of the El Círculo site and the present-day Beni floodplain. The proprietor of the land had noticed abundant potsherds scattered on the surface of his field, but he was unaware of any earthworks related to these finds. To clarify the chronology and variation of the cultural material of this site in relation to the earthwork sites of the region, a surface collection of the diagnostic pottery was made, and a 1 m x 1 m test unit was excavated during the 2005 field season. The test unit exposed a cultural layer at a depth of 0.2-0.5 m associated with abundant ceramics.

Thirty-three percent of the sherds recovered from the Chacra Telería site

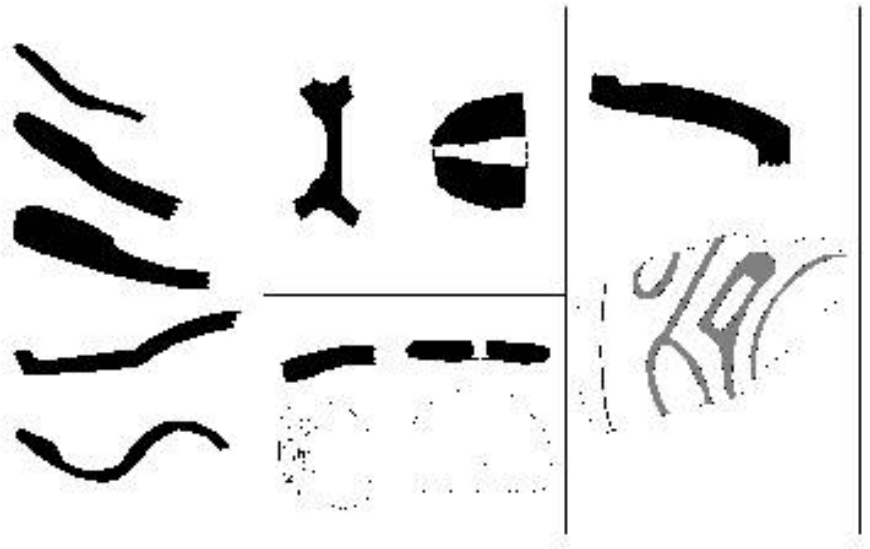

Figure 11 - El Círculo assemblage, A: rims (diameters 18-21 cm), B: fingernail-incised rim, C: pedestal base, D-E: spindle whorls, F: painted rim (diameter 14 cm). The diameter of the discoidal spindle-whorl (D) is 4,5 cm, all fragments drawn to the same scale.

are diagnostic. The ware is caraipé, sherd, and sand tempered. Rims are everted, but also some direct rims are present. Lips are rounded and thickened, and the base sherds are flat. Rim diameters vary between 10 cm and 20 cm in decorated pottery, and larger undecorated rimsherds have a diameter up to 40 cm. The few defined vessel forms represent globular and round bodies. Frequently used decoration techniques are incision and fine-line incision (Figure 4E-G). Dark brown all-over slip occurs on some sherds.

CANDELARIA

Adjacent to the bluff of the Madre de Dios River, near the small community of Candelaria, local inhabitans had located abundant potsherds, including a small pedestal base, scattered on the surface. This site does not contain any visible earthworks. In 2005, we excavated a 1 m x 1 m test unit which revealed a dark reddish-brown culturally altered soil continuing to a depth of 0.4 m, underlain by a culturally sterile latosol. The composition of the culturally altered soil, perceived as darker in color and containing sand, differs from the soil of the other sites we excavated. Pottery was found only in the 0.0 m-0.2-m-levels. The depth of the cultural layer is more superficial than at the other sites we investigated in the region.We found two kinds of pottery at the Candelaria site: a coarse ware and a fine-grained ware, both of which are caraipé tempered. The small sample of ceramics (27 potsherds) from the site does not include diagnostic sherds.

DOS PALMAS

Dos Palmas, a small community of ca. 100 inhabitants, is situated 5 km to the southwest of the community of Candelaria. A brief surface collection carried out during the 2005 field season in a manioc field yielded few undiagnostic potsherds and a sandstone flake. The Dos Palmas site does not have any earthworks.

ESTANCIA VELASCO

Halfway between Tumichucua and Estancia Girasol, we noticed archaeological remains on a stream bank. A surface collection at the site yielded some fragmented grinding stones made of laterite slabs, a fragment of an abraded stone artifact, a fragment of a pottery vessel base, as well as some fragments of fine-grained ware with caraipé temper. This site has no visible earthworks.

CERAMIC TRADITIONS OF THE SOUTHWEST AMAZON

Information about the ceramic sequences of the Southwest Amazon is scarce. So far, the most completely documented are those of the River Ucayali Basin (De Boer 1972, Lathrap 1970, Myers 2002, Roe 1973, Weber 1975). Tutishcainyo, the earliest ceramic style recognized in the region, was replaced around 300 B.C. by Hupa-Iya modeled-incised style pottery, whose introduction is interpreted as resulting from Arawakan migration into the area (Lathrap et al. 1985:46-47). Approximately A.D. 90, Yarinacocha, a new tradition of robust, almost non-decorated ceramics, interpreted as having had its roots in the Central Amazonian Polychrome Tradition, arrived in the region (Lathrap et al. 1985:47). The period A.D. 300-800 corresponds to the arrival and dominance of the Panoans along the Ucayali River. They brought with them the Pacacocha Tradition of technologically simple ceramics, featuring all-over red slip, zoomorphic adornos, corrugation, everted rims, and globular forms (Lathrap et al. 1985:47-48). The hallmarks of the subsequent tradition, Cumancaya (A.D. 800-1250), include corrugated, fine-line incised, and brushed decoration, as well as use of caraipé temper (Myers 2002:76). The appearance of the region's last recognized prehistoric ceramic tradition dates to around A.D. 1200, when Tupi-speaking groups, producers of highly elaborated polychrome ceramics, invaded the floodplains of the Ucayali River (Lathrap et al. 1985:91).

Ondemar Dias, who carried out the first archaeological investigations in the State of Acre in the 1970s, named the ceramic tradition related to the sites of the Juruá River Acuriá and the ceramic tradition of the eastern part of the State of Acre in the River Purus Basin Quinari. He subdivided the Quinari tradition into four phases: Iquiri, Xapuri, Iaco, and Quinari (Dias 2006). The characteristics of the Quinari tradition include a great variability of vessel forms, cylindrical forms dominating, caraipé used as the most common tempering material, and red

slip and red lines on white slip used as the predominant decorative technique. Incised potsherds are also found, but in lesser quantities. Typical of the Quinari tradition is an anthropomorphic vessel in the form of a cylinder on a globe, representing a human face in which the design is executed using the appliqué technique.

The common traits of the ceramic sequences of the Central Llanos de Mojos are: the use of ground sherd, shell, and cauxi temper, incised-modeled, incised, and polychrome painted decoration, globular tripode and tetrapode vessels, and pedestal bases as well as large discoidal plates and grater plates (Calandra & Salceda 2004:159, Dougherty & Calandra 1981, Jaimes 2009). In addition, pottery related to the Barrancoid Tradition and the Central Amazonian Polychrome Tradition has been recovered at some mound settlements (Lathrap 1970:124-125,159, Nordenskiöld 1913). The mound settlements have been dated to around the time span A.D. 350-1300 (Dougherty & Calandra 1982) and A.D. 600-1400 (Jaimes 2009). The late pre-Columbian ceramics from the Baures region, in northeastern Llanos de Mojos, are mainly cauxi, kaolin, or ground sherd tempered and fine-line incised. Figurines, appliqué technique, supports, and painting are also present, but to a lesser extent. (Dougherty & Calandra 1985:50, Prümers et al. 2006:274-279). Some fragments of flat bottomed vessels with impressions from palm fiber basketry were recovered in the Bella Vista complex (Prümers et al. 2006:280).

The ceramic traditions of the northern Bolivian lowlands are poorly known. The fragmentary pottery collected at sites with earthworks along the Orthon River is generally tempered with caraipé, hematite, ground sherds, and shell. The few defined vessel forms are globular in shape with everted rims. Additionally, the use of all-over slip, incision, and excision has been reported (Arellano 2002). The Finnish-Bolivian excavations at the La Fortaleza de Las Piedras site yielded a handful of Inca-style ceramics, a much larger quantity of typical regional caraipé and sand tempered utility ware, a few sherds of painted and incised pottery, as well as larger fragments of more sophisticated pottery, most likely ceremonial bowls, decorated with incised geometric designs and bearing some common features with the Sivia-style pottery of the Upper Amazon of Peru (Siiriäinen et al. 2002; Korpisaari et al. 2003).

CERAMIC STYLES OF THE RIBERALTA REGION

Unfortunately, the quite fragmented and eroded state of the ceramics collected in the Riberalta region did not allow us to accurately define the vessel body forms and surface treatment of many sherds. The few reconstructed body forms are globular and rounded. Thick undecorated sherds, probably from large containers, with rim diameters up to 40 cm are common in all Riberalta assemblages. The documented ceramic assemblages dis-

play some common traits typical of Amazonian ceramics, such as caraipé and ground sherd temper, incision, fine-line incision, all-over slip and, to a lesser extent, fingernail incision, while the most distinctive attributes of the Incised-Punctated and the Amazonian Polychrome Tradition are lacking. The El Círculo ceramics differ from other assemblages in having painted ware, mainly red designs on white slip, open-mouthed-bowls, and spindle whorls. Otherwise, the stylistic differences among the ceramics of the investigated sites are slight, regardless of the chronological dispersion. The Riberalta ceramic assemblages can be considered as regional styles which have some features typical of late prehistoric ceramic traditions of the Upper Purus River Basin and the Ucayali River Basin, although the corrugation occurring in the Pacacocha and Cumancaya traditions is not present.

Arnold and Prettol (1988:462) mention that Tumichucua pottery is comparable to the Curralinho ceramic complex of the lower Madeira River, while Thomas Myers (1988:76) finds it related to Miracanguera, a subtradition of the late prehistoric Amazonian Polychrome Tradition. However, our dates of the Tumichucua site (72 ± 81 cal. B.C. and cal. A.D. 98 ± 43) do not support these inferences. The Curralinho complex, which pertains to the Incised-Punctated Tradition, has three dates: A.D. 840 ± 60, A.D. 885 ± 90, and A.D. 1451 ± 55 (Simoes & Lopes 1987:122). Furthermore, the spread of the Amazonian Polychrome Tradition upstream from the Central Amazon occurred only after A.D. 900, and possibly influenced the ceramic complexes of the Bolivian tropical savanna lowlands around A.D. 1000 (Brochado 1984:329-330). Curralinho pottery is also characterized as predominantly having caraipé temper (Simoes & Lopes 1987), which is rare in Tumichucua pottery.

INTERPRETATIONS AND CHRONOLOGY OF AMAZONIAN EARTHWORKS

Scholars have interpreted the function and significance of the Amazonian earthworks in different ways, taking into consideration the location, technical attributes, dating, and cultural affliation. One of the most frequent explanations for the different shapes of ditches is that they protected the occupation areas (Heckenberger et al. 1999, 2008; Pärssinen et al. 2003; Petersen et al. 2001:97). Arnold and Prettol (1988:463) also explain the function of the earthworks at the Tumichucua site as defensive moats. This inference is supported by the fact that their excavations revealed a possible posthole on the inner edge of the circular ditch D, leading them to suggest that this sector of the site was encircled by palisades (Arnold & Prettol 1988:461-462). Arellano (2002) argues that in the less-complex earthwork sites located alongside the Orthon River, the occupational area is surrounded and protected by semicircular or square-shaped ditches adjacent to the bluff of the river. Consequently, this kind of protection has

been considered advantageous during the Amazonian late prehistory which is often described as a period of intensifying waves of migration and ethnic expansion, accomplished by Tupi-Guarani groups (Brochado 1984; Heckenberger 1996; Lathrap 1970:78-79; Lathrap et al. 1985:91-94; Pärssinen et al. 2003; Wüst & Barreto 1999:6). Moreover, the Pano-speaking groups have a lengthy history of conflicts with the neighboring ethnic groups, as well as of constant endo-warfare (Santos-Granero 2002:29). Villages surrounded by moats and palisades in the eastern lowlands of Bolivia are reported in the ethnographic record (Denevan 1966; Erickson et al. 2008; Metraux 1948:82; Nordenskiöld 1918), so the building of protective palisades may have been practiced also in pre-Columbian times, at least during the late prehistoric period.

The ring-ditch sites of the savannas of the Baures region may have enclosed settlements, or been constructed for defense, elite residences, cemeteries, ritual spaces, and/or special gardens (Erickson 2006:259, Erickson et al. 2008, Prümers et al. 2006). Some of the more complex earthwork sites found in the State of Acre possibly served as ceremonial centers or meeting places (Pärssinen et al. 2009) – or both – and would thus be related to the cosmology and socio-political concerns of the peoples that occupied them. The repetitive pattern of precise geometric forms of the earthworks, carefully planned and constructed, and the way in which these constructions are situated in the landscape, suggest ritual functions that were part of a tradition of shared collective perception and ideology.

While some ditches reserve water during the rainy season, Martti Pärssinen and colleagues (2003:101,130) suggested that the ditches of the State of Acre could have also been used for aquaculture, as ethnographic literature mentions the raising of small fishes, molluscs, and turtles in artificial aquatic depressions near the indigenous villages.

Only a small number of the earthwork sites have been dated. In the Llanos de Mojos, indications of human settlements and the alteration of the savanna began by 900 B.C., but the active use of the massive earthworks related to agricultural activities took place between 400 B.C. and A.D. 1500 (Erickson 2006: 253). In the community of Bella Vista, situated at the confluence of the Blanco and San Martin Rivers, in the northeastern Llanos de Mojos, a site containing burials and surrounded by ditches was dated to A.D. 1300-1400 (Prümers et al. 2006). The Upper Xingu region's earthwork sites also date to the late prehistoric period (Heckenberger et al. 1999), as does one of the occupation sequences of the Fazenda Colorada, one of the most complex earthwork sites in the State of Acre, having been dated to the end of the thirteenth century A.D. (Pärssinen et al. 2003:122-123). Ceramics recovered at the earthwork sites of Xipamanu and Alto Alegre, located in the eastern part of the State of

Acre, in the Purus Basin, have yielded thermoluminescence dates of approximately 1200-0 B.C. and 200 B.C.-A.D. 200, respectively (Nícoli 2000:131). These published dates reveal that the Amazonian earthwork engineering is a cultural tradition covering an extended period.

DATING OF THE INVESTIGATED SITES

One of the principal goals of our research in the Riberalta region was to collect radiocarbon samples from secure archaeological contexts. So far, 18 samples from seven sites have been dated (Table 2).

Tumichucua and Chacra Telería sites represent the earliest occupation of the sites discussed here, dating from the first century B.C. to the first century A.D. At the Las Palmeras site, we dated two different components of the site: one of the small mound/depression features situated inside the ditch and the cultural layer in the circular ditch at a depth of 0.6 m. The sample collected from cultural soil located directly below the calcite feature in Tench 1 is late (cal A.D. 1582 ± 57). In contrast, the date obtained from the ditch, is much earlier (cal A.D. 159 ± 51). Thus, the mounds/depressions correspond to a later phase of human activity at the site. Based on the moderate depth (0.4 m) of the cultural layer inside the area demarcated by the ditch, the occupation of the site was not continuous. Perhaps the abandoned site was chosen to be re-occupied in a later phase precisely because of the presence of the existing earthwork.

The radiocarbon dates[5] recovered at the Estancia Giese earthwork site (cal A.D. 194 ± 54 and cal A.D. 330 ± 57) indicate that the initial stage of the use of this site was roughly coincident with Las Palmeras' first occupation phase. The Candelaria site, situated adjacent to the floodplain of the Madre de Dios River, dates to cal A.D. 327 ± 56, and is contemporaneous with the later date of occupation of the Estancia Giese site. Based on a single date, the Estancia Girasol site seems to be much more recent (cal A.D. 1428 ± 13).

In total, we have eight radiocarbon dates from the El Círculo site. The ^{14}C dates indicate that the occupation of the site lasted for slightly over one hundred years (from cal A.D. 1272 ± 11 to cal A.D. 1349 ± 44)[6]. It is remarkable that the site was inhabited for only such a relatively short time, just for a few generations. The active river channel of the Beni is nowadays situated some hundreds of meters from the site. The migration of the river could have caused the site to lose its principal attraction, the proximity to a navigable water route, gradually leading to the abandonment of the site. Similar circumstances may have been at play at the Estancia Girasol and Candelaria sites.

Based on the radiocarbon dates, two tentative separate periods of human occupation can be proposed for the archaeological sites of the Riberalta region: an initial period dating to 100 B.C.-A.D. 400 and a later period continuing from A.D. 1200 until the

Table 2
Radiocarbon dates of the sites.

Site	Unit, Level	Context	Lab id	C14-age bp	Calibrated date
Tumichucua 2002	Unit 1, - 40 cm	Charcoal in cultural layer	Hela-702	1905 ± 40	Cal 98 ± 43 AD
Tumichucua 2005	Unit 6, - 60 cm	Charcoal in cultural layer	Ua-24932	2045 ± 65	Cal 72 ± 81 BC
Estancia Girasol 2005	Unit 1, - 40 cm	Charcoal in cultural layer	Ua-24929	475 ± 35	Cal 1428 ± 13 AD
Las Palmeras 2001	Trench 1, -96 cm	Charcoal in cultural layer	Ua-24076	285 ± 35	Cal 1582 ± 57 AD
Las Palmeras 2005	Unit 3, - 60 cm	Charcoal in cultural layer	Ua-24930	1850 ± 40	Cal 159 ± 51 AD
Estancia Giese 2002	Unit 4, - 40 cm	Charcoal in cultural layer	Hela-708	1815 ± 45	Cal 194 ± 54 AD
Estancia Giese 2002	Unit 6, - 60 cm	Charcoal in cultural layer	Hela-709	1695 ± 40	Cal 330 ± 57 AD
Estancia Giese 2002	Unt 1, - 80 cm	Charcoal under cultural layer	Hela-707	10355 ± 80	Cal 10318 ± 211 BC
El Círculo 2001	Unit 2, 50 -60 cm	Ceramic temper	Hela-570	1790 ± 75	Cal 233 ± 93 AD
El Círculo 2001	Unit 1, - 85 cm	Hearth	Hel-4585	600 ± 60	Cal 1349 ± 44 AD
El Círculo 2003	Unit 7, - 20 cm	Charcoal in cultural layer	Poz-9523	680 ± 30	Cal 1326 ± 45 AD
El Círculo 2003	Unit 7, 40 - 50 cm	Soot on sherd surface	Poz-9426	715 ± 30	Cal 1272 ± 11 AD
El Círculo 2003	Unit 6, - 53 cm	Charcoal under a ceramic vessel	Poz-9524	650 ± 30	Cal 1334 ± 41 AD
El Círculo 2003	Unit 8, - 80 cm	Hearth	Poz-9427	660 ± 30	Cal 1331 ± 42 AD
El Círculo 2003	Unit 10, 100 - 110 cm	Carbonized seed in cultural layer	Poz-9428	685 ± 30	Cal 1324 ± 46 AD

El Círculo 2003	Unit 10, 120 - 130 cm	Soot on sherd surface	Poz-9429	645 ± 30	Cal 1335 ± 40 AD
Chacra Teleria 2005	Unit 1, - 42 cm	Charcoal in cultural layer	Ua-24931	1940 ± 40	Cal 57 ± 44 AD
Candelaria 2005	Unit 1, - 25 cm	Charcoal in cultural layer	Ua-24928	1700 ± 40	Cal 327 ± 56 AD

period of European contact[7]. What, then, happened before and between these two periods? Assuming that the settlement pattern was preferably riverine and bearing in mind the active meandering on the floodplains of the Beni and Madre de Dios Rivers, many archaeological sites today may today be located far from the active river channels, and some have been destroyed by the relocations of the watercourses. The present survey found a few of the possibly hundreds of archaeological sites in the region. Therefore, the initial stage of human occupation could have begun centuries, or even millennia earlier, and the region may have been inhabited more or less continuosly with settlement locations along navigable water routes.

EARTHWORK FUNCTIONS AND SETTLEMENT LAYOUT

I argue that the primary purpose of simple, individual earthworks, such as those of the Riberalta region, was to visibly delimit and mark the area of occupation. In some cases the earthwork enclosure could have been more symbolic than practical. Based on the test excavations, the archaeological deposits seem to be concentrated mainly inside the area delineated by the earthworks in the Tumichucua, Estancia Girasol, Las Palmeras and Estancia Giese sites. Moreover, the ditches contained quantities of cultural debris. The moderate depth of the archaeological deposits and lack of marked stratigraphy did not indicate centuries-long uninterrupted occupation at the investigated earthwork sites. The occupation persisted for a few generations, or the use of the sites was more sporadic than continuous.

By building enclosures, people may have wanted to protect themselves from the natural and supernatural worlds, too. The vast rainforest encircling the villages was not completely tamed, although the prehistoric inhabitants of Amazonia were certainly acquainted with their environment. Many activities occurred in the village at night when darkness transformed the surrounding rainforest into a place more mysterious and dangerous than in daylight. Even today, the forest is home to many inexplicable entities and supernatural beings or spirits such as *caboclinho da mata*, the powerful guardian of the forest, recognized throughout present-day Amazonia (Virtanen 2008:126). Any understanding of the spiritual life of the pre-Columbian

communities needs to be grounded in archaeological data, but one can imagine the multitude of mythical creatures, some benevolent, some evil, which formed part of the universe of the past Amazonian peoples.

Some of the ditches can be interpreted as evidence of water management. Ditch B at the Tumichucua site may have served as a canal facilitating access between the oxbow lake, the river, and the floodplain (Arnold & Prettol 1988:463). The Estancia Girasol and El Círculo sites also have simple ditches which pass within several hundred meters of the occupation sectors and could have been used as canals to link smaller streams with more primary watercourses.

In addition, the ditch at the Las Palmeras site apparently served as a dump for domestic waste, judging by the intensely dark color of the cultural layer found on its bottom. This charcoal rich cultural layer was different from that found inside the earthwork. At Tumichucua we also found fragments of pottery and charcoal in the circular Ditch D, which was also observed by Arnold and Prettol (1988:461), as in the outer double-ditch of the Estancia Girasol site. Still, the possible utilization of these earthworks in the disposal of refuse should not be considered as one of their central functions, but rather as one of the secondary ways in which the ditches situated in the proximity of the settlements could have been used. Furthermore, if the earthwork sites were later re-occupied, as seems to have been the case with the Las Palmeras site, the earthworks may have had completely different function or meaning for the new inhabitants.

The small mound/depression features inside the perimeter of the Las Palmeras ditch are elements that we did not find at the other investigated sites. Arellano (2002:67) interprets them as habitation mounds, but our excavations revealed that these formations are more likely depressions filled with abundant sherds and midden debris. The small mounds were probably formed by backfill removed from the depressions. In addition to ceramics we observed a calcite feature in one of the depressions, in Trench 1 (Figure 7), but the implication of this feature remains uncertain. Today, calcite has more uses than almost any other mineral as construction material, a pigment for paint, a field dressing, and in medication.

At the Estancia Girasol site, we documented a road, a structure that has so far not been observed at any other earthwork site in the Riberalta region. Since we only mapped the Estancia Girasol road partially, and did not excavate or date the feature, it may either belong to the same complex as the ditches or be a remnant of an earlier or later occupation. Roads are a basic element of the earthwork sites of the State of Acre (Pärssinen et al. 2003, 2009; Schaan et al. 2007) and Llanos de Mojos (Erickson 2001, 2006) probably due to the complexity of these two regions' ancient settlement networks and to environmental factors, at least in the case of seasonally inundated savanna. The distinctive earthworks are linked

by roads, forming a complex entity of clusters of occupational sites, which is not the case of the earthwork sites of the Riberalta region.

In regard to the settlement plan, the El Círculo site was apparently different from the other sites studied in the region. I interpret the El Círculo mounds as the remains of residences because our excavations revealed intense concentrations of ceramic and domestic debris (Figure 10), including hearth features, in the mounds forming part of the embankment. The circular occupation zone for domestic activities encloses an area which was presumably kept clean as a plaza since the test units excavated inside this zone contained no archaeological remains. The earthwork type and the settlement plan, together with the presence of a distinct pottery style contrast with the other pre-Columbian sites found so far in the region of Riberalta, suggesting that the occupants of the El Círculo site may have had a different ethno-cultural background[8].

The settlement form and size (350 m in diameter) of the El Círculo site resemble the ring villages of Central Brazil in which a circular, elliptical, or semicircular arrangement of houses enclose the central plaza (Wüst & Barreto 1999). The ring villages prevailed around A.D. 800-1700 and are associated with the Aratu and Uru ceramic traditions (op. cit.). The circular plaza was the public, communal sector of the village, reserved for certain gatherings, festivities, rites, and ceremonial displays. The habit of considering the central plaza as the political and ritual center of the village can still be seen in the Upper Xingu area among the present-day Kayapó (Turner 2002) and Kuikuro, of which the last-mentioned group may be preserving the cultural characteristics of their ancestors, although the size of the villages today is much smaller (Heckenberger et al. 2008:1215). The circular village plan linked with socioceremonial organization is also common among the contemporary Gê and Bororo groups of Central Brazil (Nimuendajú 1946:37, Wüst & Barreto 1999:3-4).

All the sites surveyed in the Riberalta region lack the dark anthropogenic soil, or Amazonian Dark Earth (ADE), that is often found in the pre-Columbian riverine sites of the Central and Lower Amazonia (Glaser & Woods 2004, Lehmann et al. 2003, Petersen et al. 2001, Woods et al. 2009). Despite of the absence of ADE, and the circular rather than linear organization of the sites, Tumichucua, Estancia Girasol, Estancia Mendez, El Círculo, Candelaria, as well as the River Orthon sites can be regarded as bluff sites (Denevan 1996) situated on upland terraces adjacent to the floodplains of the main river channels. However, the locations of the sites of the Riberalta region are not exclusively riverine. For example, the sites of Las Palmeras, Estancia Giese, Chacra Telería, and Dos Palmas, are situated a distance from the navigable main rivers. However, because of the extensive meandering and migration of the rivers of the Riberalta region, these sites may have been located

closer to a triburitary or main channel when occupied in the distant past.

DISCUSSION

Construction and use of earthworks was not restricted to certain prehistoric periods or areas of the South American tropical lowlands. The earthwork tradition manifests itself in slightly different ways at different times in a number of regions, determined by natural and cultural factors. Clark Erickson (2006) argues that the monumental earthworks of the seasonally inundated savanna plains of the Bolivian Amazon are domesticated landscapes shaped by a long, complex history of past human activities, a profound process that was driven by social demands. Thus, the reasons for constructing the earthworks were not only practical, but also aesthetic, ideological, social and political. The earthworks were planned and constructed intentionally, with the purpose of altering the environment permanently and visually. Simultaneously, the domination and manipulation of the landscape were symbols of territoriality, demonstrating to others any given group's ability and right to occupy a given territory. These activities left important signatures embedded in the landscape – traces which remain long after the sites were abandoned and the groups that carried out the landscape engineering moved away or ceased to exist.

Cultural traditions and ethnicity are not necessarily related (Lucy 2005). The characteristics of material culture are easily transferred from one ethnic group to another, which can be seen, for example, among the modern-day Piro who belong to the Maipuran-Arawakan linguistic group but whose ceramic decorative/artistic tradition is Panoan, typical of the Shipibo-Conibo (Lathrap et al. 1985:33). However, the connection between certain ceramic traditions and ethno-linguistic families is appealing. Donald Lathrap and colleagues (1985) and Myers (2002:105) propose that analogues of the Pacacocha (Panoan) ceramics of the Ucayali are to be found in the tropical lowlands of Bolivia, and that a continuous long-term stream of people moved from the Eastern Bolivian Panoan heartland towards the floodplains of the Peruvian Amazon. Lathrap (1970:81) also describes the interfluvial ecological dispersal typical of Panoan groups, extending across the upper watersheds of the Madre de Dios, Purus, Juruá, and Ucayali Rivers. Taking into account the incised, fine-line incised and fingernail impressed ceramic styles found at the Riberalta sites, the hypothesis of the Panoan connection requires careful consideration.

On the other hand, the circular plaza village has been considered as a sociocultural pattern characteristic of the Arawak (Heckenberger 2002:109), although today the circular village plan is also found among the Central Brazilian Gê and Bororo groups (Wüst and Barreto 1999:3). The settlement layout of the El Círculo site does bear a resemblance to Central Brazilian ring villages, but more sites of this type must

be studied before any conclusions of the ethnicity and/or socioceremonial aspects of the El Círculo inhabitants can be drawn.

The earthworks in the Riberalta region have a variety of forms and are found in slightly different locations, indicating separate time periods, possibly distinct cultural affiliations, and obviously diverse functions. Although only a small number of the possible pre-Columbian sites of the Riberalta region were recorded during the present study, we found different types of sites indicating fairly dense occupation, but lacking long permanence in the same location. The earthwork tradition prevailed in the Riberalta region from at least 100 B.C. until the period of European contact. Compared to the variable layout of the sites, the ceramic assemblages of the region are relatively homogeneous. Except for the El Círculo assemblage, which has a small number of incised sherds and painted sherds in abundance, a uniform ceramic style prevailed in the Riberalta region througout the late pre-Columbian period. The environmental conditions alone apparently did not influence the position of the earthworks, as some sites are situated on the river bluffs and others at some distance from the navegable river channels. The earthworks of the Riberalta region are less complex and diverse than the ones registered in the State of Acre and Central Llanos de Mojos. The functions of the structures may have been simply to enclose the occupation areas and, in some cases, to serve as canals. We also recorded sites without earthworks that are contemporaneous with the earthwork sites. One objective for future research would be to determine if these two types of sites are associated with each other, being used by the same people but for different purposes, if the sites were hierarchically related, and if the earthwork sites correlate with a single or multiple cultural and/or ethnic traditions.

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NOTES

[1] By Southwest Amazon, I refer to the region defined by the triburitary areas of the rivers Ucayali, Juruá, Purus and the white-water triburitaries of the Madeira River, flowing in the alluvial extension zone of the Amazon Basin.

[2] For the detailed bibliography, historical context, and description of the La Fortaleza de las Piedras site, see Siiriäinen and Pärssinen 2001:64-70.

[3] The X-ray diffraction analysis of this sample was carried out on March 10, 2005 in the University of Helsinki.

[4] The contemporary Cavineño use resin to glaze their pottery (Plaza & Carvajal 1985:70).

[5] The third date (10355 ± 80 B.P.) from the Estancia Giese site is a clear outlier. The 14C sample was collected below the cultural deposit with the objective of dating the initial establishment of the embankment. Unfortunately, this charcoal sample turned out to actually date some ancient natural burn event.

[6] One date (cal A.D. 233 ± 93) is an exception. The material dated was organic temper from a non-diagnostic potsherd. The sample was collected in 2001 from test unit 2 at a depth of 0.6 m, which was the last level containing ceramics. I consider that this potsherd does not belong to the actual earthwork but rather is an evidence of an earlier occupation in the same area, taking into account that the Chacra Telería site, situated 3 km from the El Círculo site, dates to more or less the same period (cal A.D. 57 ± 44).

[7] The La Fortaleza de Las Piedras site was possibly occupied until A.D. 1600 (Siiriäinen 2003).

[8] Corresponding earthworks have been discovered in eastern Acre. The Coqueiral site consists of seventeen mounds 1.5 m high and 15-20 m in diameter in the form of a circle. Furthermore, the Sol de Maio site features numerous mounds forming a

circle, as well as a simple ditch in the proximity of the mounds. Both sites yielded surface ceramics which bear some resemblance to El Círculo pottery (Schaan & Bueno 2008:37, 78).

REFERENCES

Arellano, J. 2002. *Reconocimiento arqueológico en la cuenca del rio Orthon, Amazonia Boliviana*. Quito: Museo Jacinto Jijon y Caamaño/ Taraxacum.

Arnold, D. & K..Pret¬tol. 1988. Aboriginal earthworks near the mouth of the Beni, Bolivia. *Journal of Field Archaeology* 15(4):457-465.

Balée, W. & C. Erickson (eds). 2006. *Time and complexity in historical ecology. Studies in neotropical lowlands*. New York: Colombia University Press.

Brochado, J. 1984. *An ecological model of the spread of pottery and agriculture into Eastern South America*. Ph.D. Diss., University of Illinois at Urbana-Champaign.

Calandra, H. & S. Salceda. 2004. Amazonia boliviana: arqueología de los Llanos de Mojos. *Acta Amazonica* 34 (2):155-163.

DeBoer, W. 1972. Archaeological explorations on the Upper Ucayali River, Peru. Ph.D. Diss., Department of Anthropology, University of California at Berkeley.

____. 1966. *The aboriginal cultural geography of the Llanos de Mojos of Bolivia*. Berkeley: University of California Press.

____. 1996. A bluff model of riverine settlement in prehistoric Amazonia. *Annals of the Association of American Geographers* 86(4):654-681.

Díaz-Andren, M., S. Lucy, S. Babic & D. Edwards (eds.). 2005. *The archaeology of identity. Approaches to gender, age, status, ethnicity and religion*. London & New York: Routledge.

Dias, O. 2006. As estruturas arqueológicas de terra no estado do Acre – Amazônia Ocidental, Brasil. Um caso de resiliência? in *Estudos Contemporaneos de Arqueologia*, Edited by O. Dias, E. Carvalho & M. Zimmermann, pp. 59-168. Palmas: Unitins, IAB.

Dias, O. & E. Teixeira de Carvalho. 2008. As estruturas de terra na arqueologia do Acre, in *Arqueologia da Amazônia Ocidental: Os Geoglifos do Acre*. Edited by D. Schaan, A. Ranzi & M. Pärssinen, pp. 45-56. Belém: Editora Universitária Universidade Federal do Pará - UFPA; Rio Branco: Biblioteca da Floresta Ministra Marina Silva.

Dougherty, B. & H. Calandra. 1981. Nota preliminar sobre investigaciones arqueológicas en Llanos de Moxos, Departamento del Beni, República de Bolivia. *Revista del Museo de La Plata* VIII 53: 87-106.

____. 1981-82. Excavaciones arqueológicas en la Loma Alta de Casarabe, Llanos de Moxos, Departamento del Beni, Bolivia. *Relaciones de la Sociedad Argentina de Antropología*, N.S., XIV(2): 9-48.

____. 1984-85. Ambiente y arqueología en el Oriente Boliviano. La provincia de Itenez del departamento del Beni. *Relaciones de la Sociedad Argentina de Antropología* XVI (N.S.):37-61.

Erickson, C. 1995. Archaeological perspectives on ancient landscapes of the Llanos de Mojos in the Bolivian Amazonia, in *Archaeology in the American Tropics: Current*

Analytical Methods and Applications. Edited by P. Stahl, pp. 66-95. Cambridge: Cambridge University Press.

____. 2001. Precolombian roads of the Amazon. *Expedition* 43(2):21-30.

____. 2006. Domesticated landscapes of the Bolivian Amazon, in *Time and complexity in historical ecology. Studies in Neotropical Lowlands*. Edited by W. Balée & C. Erickson, pp. 237-278. New York: Colombia University Press.

Erickson, C., W. Winkler & K. Candler. 1997. *Las investigaciones arqueológicas en la region de Baures en 1996*. La Paz: University of Pennsylvania and Dirección Nacional de Antropología and Arqueología. Unpublished report.

Erickson, C., P. Álvarez & S. Calla. 2008. *Zanjas circundantes: Obras de tierra monumentales de Baures en la Amazonia Boliviana*. La Paz: Unidad Nacional de Arqueología, La Paz. Unpublished report.

Gautier, E., D. Brunstein, C. Garcia, P. Vauchel, O. Fuertes & J. Guyot. 2008. Meander dynamics of a tropical river: the Rio Beni (Bolivian Amazonia). *Geophysical Research Abstracts*. 10, EGU2008-A-04299.

Glaser, B. & W. Woods. 2004 (eds). Exploration in *Amazonian Dark Earths*. Berlin: Springer-Verlag.

Heckenberger, M. 2002. Rethinking the Arawakan diaspora: Hierarchy, regionality and the Amazonian formative, in *Comparative Arawakan Histories: Rethinking Language Families and Culture Area in Amazonia*. Edited by J. Hill & F. Santos-Granero, pp. 99-122. Urbana: University of Illinois Press.

Heckenberger, M. 1996. War and peace in the shadow of empire: Sociopolitical change in the upper Xingu of Southeastern Amazonia, A.D. 1400-2000. Ph.D. Diss., Department of Anthropology, University of Pittsburgh.

Heckenberger, M. & E. Neves. 2009. Amazonian Archaeology. *Annual Review of Anthropology* 38: 251-266.

Heckenberger, M., J. Petersen & E. Neves. 1999. Village size and permanence in Amazonia: Two archaeological examples from Brazil. Latin American Antiquity 10(4):353-376.

Heckenberger, M., J. Russell, C. Fausto, J. Toney, M. Schimdt, E. Pereira, B. Franchetto & A. Kuikuro. 2008. Pre-Columbian urbanism, anthropogenic landscapes, and the future of the Amazon. *Science* 321:1214-1217.

Hill, J. & F. Santos-Granero (eds.). 2002. *Comparative Arawakan Histories: Rethinking Language Families and Culture Area in Amazonia*. Urbana: University of Illinois Press.

Jaimes, C. 2009. *La cerámica de la Loma Salvatierra, Beni, Bolivia*. Ph.D. Diss. University of Bonn.

Korpisaari, A., J. Faldín, R. Kesseli, J. Korhonen, S. Saunaluoma, A. Siiriäinen & M. Pärssinen. 2003. Informe preliminar de las investigaciones arqueológicas de la temporada 2002 en el sitio de La Fortaleza de Las Piedras, in *Reports of the Finnish-Bolivian Archaeological Project in the Bolivian Amazon*. Edited by A. Siiriäinen & A. Korpisaari, pp. 7-34. Helsinki: Department of Archaeology, University of Helsinki.

Lathrap, Donald. 1970. *The Upper Amazon*. London:Thames and Hudson.

Lathrap, D., A. Gebhart-Sayer & A. Mester. 1985. The roots of the Shipibo art

style: Three waves on Imiríacocha of there were "Incas" before The Incas. *Journal of Latin American Lore* 11(1):31-119.

Lehmann, J., D. Kern, B. Glaser & W. Woods (eds). 2003. *Amazonian Dark Earths. Origin, Properties, Management*. Dordrecht, Boston, London: Kluwer Academic Publishers.

Lucy, S. 2005. Ethnic and cultural identities, in *The archaeology of identity. approaches to gender, age, status, ethnicity and religion*. Edited by M. Díaz-Andren, S. Lucy, S. Babic & D. Edwards, pp. 86-109. London & New York: Routledge.

McEwan, C., C. Barreto & E. Neves (eds). 2001. *Unknown Amazon: Culture in Nature in Ancient Brazil*. London: British Museum Press.

Métraux, A. 1948. The Guarani, in The Tropical Forest Tribes. Handbook of South American Indians. Edited by J. Steward. *Bureau of American Ethnology Bulletin* 143(3):69-94. Washington, D.C.: Smithsonian Institution.

Myers, G., A. Newton & O. Melgarejo. 2000. The influence of canopy gap size on natural regeneration of Brazil nut (*Bertholletia excelsa*) in Bolivia. *Forest Ecology and Management* 127(1-3):119-128.

Myers, T. 1988. Vision de la prehistoria de la Amazonia Superior, in *I Seminario de Investigaciones Sociales en la Amazonia*, pp. 37-87. Iquitos, Peru: Editorial Ceta.

_____. 2002. *The Pacacocha and Cumancaya traditions at Yarinacocha, Peru*. University of Nebraska State Museum. Unpublished report.

Nícoli, I. 2000. *Estudo de cerâmicas de sítios com estrutura de terra circulares do alto curso do rio Purus, por meio de métodos geoquímicos: Datação e caracterização*. Ph.D. diss., Universidade Federal Fluminense, Rio de Janeiro.

Nimuendajú, Curt. 1946. The Eastern Timbira, in *University of California Publications in American Archaeology and Ethnology*. 41. University of California Press.

Nordenskiöld, E. 1913. Urnengräber und Mounds im bolivianischen Flachland. Baessler-Archiv 3(6):205-255.

Nordenskiöld, E. 1918. Palisades and "Noxious Gases"among the South-American Indians. *Ymer* 3: 220-243.

_____. 1924. Finds of graves and old dwelling-places on the Rio, Beni, Bolivia. *Ymer* 43: 229-237.

Pärssinen, M., A. Ranzi, S. Saunaluoma & A. Siiriäinen. 2003. Geometrically patterned ancient earthworks in the Rio Branco region of Acre, Brazil: New evidence of ancient chiefdom formations in Amazonian interfluvial *terra firme* environment, in *Western Amazonia – Amazônia Ocidental. Multidisciplinary Studies on Ancient Expansionistic Movements, Fortifications and Sedentary Life*. Edited by M. Pärssinen & A. Korpisaari (eds.), pp. 97-133. Helsink: Renvall Institute Publications 14.

Pärssinen, M., D. Schaan & A. Ranzi. 2009. Pre-Columbian geometric earthworks in the upper Purus: a complex society in Western Amazonia. *Antiquity* 83(322):1084-1095.

Petersen J., E. Neves & M. Heckenberger. 2001. Gift from the past: terra preta and prehistoric Amerindian occupation in Amazonia, in *Unknown Amazon: Culture in Nature in Ancient Brazil*. Edited by C. McEwan, C. Barreto & E. Neves, pp. 86-105. London: British Museum Press.

Plaza, P. & J. Carvajal. 1985. *Etnias y lenguas de Bolivia*. Instituto Boliviano de Cultura. La Paz.

Portugal, Max. 1978. *La Arqueologia de la Region del Rio Beni*. La Paz: Editora Universo.

Prümers, H., C. Jaimes & R. Plaza. 2006. Algunas tumbas prehispánicas de Bella Vista, Prov. Iténez, Bolivia. *Zeitschrift für Archäologie Außereuropäischer Kulturen* 1:251-284.

Roe, P. 1973. Cumancaya: Archaeological excavations and ethnographic analogy in the Peruvian Montaña. Ph.D. Diss. Department of Anthropology, University of Illinois at Urbana-Champaign.

Santos-Granero, F. 2002. The Arawakan matrix: Ethos, language, and history in native South America, in *Comparative Arawakan Histories: Rethinking Language Families and Culture Area in Amazonia*. Edited by J. Hill & F. Santos-Granero, pp. 25-50. Urbana: University of Illinois Press.

Saunaluoma, S., J. Faldín, A. Korpisaari & A. Siiriäinen. 2002. Informe preliminar de las investigaciones arqueológicas en la región de Riberalta, Bolivia, in *Reports of the Finnish-Bolivian archaeological project in the Bolivian Amazon*. Edited by A. Siiriäinen & A. Korpisaari, vol. I, pp. 31-52. Helsinki: Department of Archaeology, University of Helsinki.

Saunaluoma, S. & J. Korhonen. 2003. Informe preliminar de las investigaciones arqueológicas realizadas en la región de Riberalta, Bolivia, en 2002, in *Reports of the Finnish-Bolivian archaeological project in the Bolivian Amazon*. Edited y A. Siiriäinen & A. Korpisaari, vol. II, pp. 55-71. Helsinki: Department of Archaeology, University of Helsinki.

Schaan, D., M. Pärssinen, A. Ranzi & J. Piccoli. 2007. Geoglifos da Amazônia ocidental: Evidência de complexidade social entre povos da terra firme. *Revista de Arqueologia* 20: 67-82.

Schaan, D., A. Ranzi & M. Pärssinen (eds.). 2008. *Arqueologia da Amazônia Ocidental: os geoglifos do Acre*. Belém: Editora Universitária UFPA; Rio Branco: Biblioteca da Floresta Ministra Marina Silva.

Schaan, D. & M. Bueno. 2008. Geoglifos do Acre. Primeiro relatório parcial de campo Janeiro-Julho. Rio Branco: Universidade Federal do Pará & Universidade Federal do Acre. Unpublished report.

Siiriäinen, A. 2003. Towards the chronology of the Las Piedras fortress in the Bolivian Amazon: Four radiocarbon datings, in *Reports of the Finnish-Bolivian archaeological project in the Bolivian Amazon*. Edited by A. Siiriäinen & A. Korpisaari (eds.). Vol. II, pp. 1-6. Helsinki: Department of Archaeology, University of Helsinki.

Siiriäinen, A. & M. Pärssinen. 2001. The Amazonian interests of the Inca State (Tawantinsuyu). *Baessler-Archiv, Band* 49(45-78).

Siiriäinen, A. & A. Korpisaari (eds.). 2002. *Reports of the Finnish-Bolivian archaeological project in the Bolivian Amazon,* vol. I. Helsinki: Department of Archaeology, University of Helsinki.

Siiriäinen, A., J. Faldín, M. Jalkanen-Mäkelä, A. Korpisaari & S. Saunaluoma. 2002. The fortress of Las Piedras in the Bolivian Amazon, in *Reports of the Finnish-Bolivian Archaeological Project in the Bolivian Amazon*. Edited by A. Siiriäinen & A. Korpisaari (eds.), vol I, pp. 1-30. Helsinki: Department of Archaeology, University of Helsinki.

Siiriäinen, A. & A. Korpisaari (eds.). 2003. *Re-*

ports of the Finnish-Bolivian archaeological project in the Bolivian Amazon, vol. II. Helsinki: Department of Archaeology, University of Helsinki.

Simões, M. & D. Lopes. 1987. Pesquisas arqueológicas no baixo/médio Rio Madeira (AM). *Revista de Arqueologia* 4(1):117-134.

Silverman, H. & W. Isbell (eds.). 2008. *Handbook of South American Archaeology*. New York: Springer.

Stahl, P. 2002. Paradigms in paradise: Revising standard Amazonian prehistory. *Review of Archaeology* 23:39-50.

____. (ed.). 1985. *Archaeology in the American Tropics: Current analytical methods and applications*. Cambridge: Cambridge University Press.

Steward, J. (ed.). 1948. Handbook of South American Indians. *Bureau of American Ethnology Bulletin* 143, Vol. 3. Washington, D.C.: Smithsonian Institution.

Sullivan, L. (ed.). 2002. *The native religion and cultures of Central and South America, Anthropology of the Sacred*. New York: Continuum.

Teijeiro, J., F.Santalla, S. Ajacopa & T. Laime. 2001. *Atlas étnico de investigaciones antropológicas "Amazonia Boliviana"*. La Paz, Bolivia.

Turner, T. 2002. The sacred as alienated social consciousness: Ritual and cosmology among the Kayapó, in *The native religion and cultures of Central and South America, anthropology of the sacred*. Edited by L. Sullivan, pp. 278-298. New York: Continuum.

Virtanen, P. 2008. Observacões sobre as possíveis relacões entre os sítios arqueológicos de Acre e um povo Aruak contemporâneo, in *Arqueologia da Amazônia Ocidental: Os Geoglifos do Acre*. Edited by D. Schaan, A. Ranzi & M. Pärssinen, pp. 120-133. Belém: Editora Universitária UFPA.

Walker, J. 2008a. The Llanos de Mojos, in *Handbook of South American Archaeology*. Edited by H. Silverman & W. Isbell, pp. 927-940. New York: Springer.

Walker, J. 2008b. Pre-Columbian ring ditches along the Yacuma and Rapulo Rivers, Beni, Bolivia: A preliminary review. *Journal of Field Archaeology* 33(4):1-15.

Wasson, J-G., S. Barrera, B. Barrere, D. Binet, D. Collomb, I. Gonzales, F. Gourdin, J-L. Guyot & G. Rocabado. 2002. Hydroecoregions of the Bolivian Amazon: A geographical framework for the functioning of river ecosystems, in *The ecohydrology of South American rivers and wetlands*. Edited by M. McClain, pp. 69-91. IAHS Special Publications nº. 6.

Weber, R. 1975. *Caimito: An analysis of the late prehistoric culture of the Central Ucayali, eastern Peru*. Ph.D. Diss. Department of Anthropology, University of Illinois at Urbana-Champaign.

Woods, W., W. Teixeira, J. Lehmann, C. Steiner, A. WinklerPrins & L. Rebellato (eds.). 2009. *Amazonian Dark Earths: Win Sombroek's view*. Berlin: Springer.

Wüst, I. & C. Barreto. 1999. The ring villages of Central Brazil: A challenge for Amazonian Archaeology. *Latin American Antiquity* 10(1):3-23.

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