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Dissertation

THE ANCESTORS OF PARITA: PRE-COLUMBIAN SETTLEMENT PATTERNS IN THE LOWER LA VILLA RIVER VALLEY, AZUERO PENINSULA, PANAMA

by

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Dedication

In memory of my beloved ancestors Silveria, Luisa, Emma, and Julia.

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LOWER LA VILLA RIVER VALLEY, AZUERO PENINSULA, PANAMA

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ABSTRACT

The first European accounts of Panamanian native society describe several small territories controlled by chiefs and their entourages in the early sixteenth century A.D. The Europeans witnessed and documented the behavior of native elites, including the burial rites of a chief called *Parita*, which were interrupted by Spanish troops in A.D. 1519. Anthropologists came to view the Panamanian non-state polities as archetypal chiefdoms when the detailed descriptions of *Parita's* mortuary rites were confirmed by archaeological excavations at the Sitio Conte cemetery. In spite of the apparent congruence between ethnohistoric and archaeological data with regard to wealth and power in neo-tropical chiefdoms, other features of these pre-Columbian polities remain obscure. Little is known about the size of political territories, their stability, inter-polity relationships, the procurement and distribution of resources, production, the kinds of materials and goods that entered the exchange system, and the distances over which goods were traded. To address these issues, I designed the *Proyecto Arqueológico del*

Río La Villa (PARLV), a regional settlement survey that builds on the long-term program of investigations at Cerro Juan Díaz, a pre-Columbian village situated in the coastal plain of the La Villa River. The lower La Villa is one of two fair-sized river valleys to have been under the dominion of the chief *Parita.* The objective of the project is to provide archaeological evidence to complement Colonial documents and to evaluate the antiquity of this chiefdom. This dissertation documents the site hierarchy within the lower La Villa Valley and presents comprehensive analyses of the pottery, lithics, and fauna collected during the survey. The results show that by A.D. 550 a four-level settlement hierarchy had developed in the valley and that the exploitation of rich coastal resources and agriculture stimulated the political expansion of *Parita's* ancestors. In sum, the PARLV provides support for the idea that the development of chiefdoms in Panama reflects social and economic adaptations by an indigenous population that, even if receiving products and technologies from outside the isthmus, interacted more closely with their neighbors than with distant peoples.

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White/cream Black Red Purple Brown

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List of Abbreviations

ACP	*Autoridad del Canal de Panamá*
AG	Aguadulce District, Coclé Province
AG-1	Cerro Mangote
AG-2/CO-2	Cerro Girón
AG-3	Sitio Sierra
AG-13	Aguadulce Shelter
AG-145	Vampiros Cave
ASP	Acoustic Subsurface Probe
BU	Barú District, Chiriquí Province
BU-17	Pittí-Gonzalez
BU-24	Barriles
CA	Cauchero District, Bocas del Toro Province
CA-3	Cerro Brujo
CHI	Chitré District, Herrera province
CHI-6	El Auditorio
CHI-25	Puerto El Agallito
CHI-30	La Terminal
CHI-33	IDAAN
CHI-34	Represa IDAAN
CHO	Chepo District, Panamá Province
CHO-3	Miraflores
CJDP	Cerro Díaz Juan Díaz Project
CJG	Cerro Juan Gómez
CL	Calobre District, Veraguas Province
CL-2	Corona
CL-4	Bajo Chitra
CNRS	*Centre National de la Recherché Scientifique*, France
DRI	Desert Research Institute, Nevada, United States
DO-46	Site in the Donoso District, Colón Province
GIS	Global Information System
GPS	Global Positioning System
HA	Huertas Arriba
HI	Huertas La Isleta
HLP	Huertas Los Pozos
HE	Herrera Province
HE-1	Sixto Pinilla
HE-2	Leopoldo Arosemena
HE-4	El Hatillo
HE-5	Monagrillo type-site
HE-15/PR-32	Zapotal
HO-1	Hornito, Chiriquí
IDAAN	*Instituto de Acueductos y Alcantarillados Nacional*, Panama

IDIAP	*Instituto de Investigación Agropecuaria de Panamá*
IFARHU	*Instituto para la Formación y Aprovechamiento de Recursos Humanos*, Panama
INAC	*Instituto Nacional de Cultura*, Panama
IS	Isla, Gulf of Chiriquí
IS-3	La Pitahaya or Isla Palenque
IS-7	Villalba
ITCZ	Intertropical Convergence Zone
LA	La Arena District, Herrera Province
LA-28	Finca La Flora
LP	La Pintada District, Coclé Province
LP-1	Cueva de Los Ladrones
LP-8	Calaveras Shelter
LP-16	La Peguera
LS	Los Santos District, Los Santos Province
LS-3	Cerro Juan Díaz
LS-4	Camaronera
LS-7	Represa La Nestlé
LS-10	Las Huertas
LS-11	Finca Los Olivos
LS-13	Finca Abel Moreno
LS-15	La Chilonga
LS-17	Finca Los Pilones
LS-18	Balneario Los Olivos
LS-21	Cantera Santa Ana
LS-22	Santa Cruz
LS-24	Finca Tito Castillo
LS-31	Finca Germán Castillo
NA	Natá District, Coclé Province
NA-20	Sitio El Caño
NSF	National Science Foundation
PARLV	*Proyecto Arqueológico del Río La Villa*
PARP	*Proyecto Arqueológico Río Parita*
PN	Penonomé District, Coclé Province
PN-5	Sitio Conte
PN-14	La Herradura
PN-62	Capacho shelter
PR	Parita District, Herrera Province
PR-14	La Mula-Sarigua
PPALV	*Patronato de Panamá La Vieja*
PSM	*Proyecto Santa María*
SA-27	Santiago- 27, Veraguas
SE-189	Los Santanas, Veraguas
SENACYT	*Secretaria Nacional de Ciencia Tecnología e Innovación*, Panama

SERD	Ships of Exploration and Discovery Research
SI-1	Río Bermejito, Veraguas
SF	San Francisco District, Veraguas Province
SF-9	Carabalí
STRI	Smithsonian Tropical Research Institute
SI-1	Río Bermejito
TI	Tonosí District, Los Santos Province
TI-1	La India
TI-9	La Cañaza
TI-18	El Indio
TI-22	Búcaro
TI-35	El Cafetal
UTM	Universal Transverse Mercator

Chapter 1

Introduction

1.1 The archaeology of chiefdoms

The archaeology of chiefdoms is rooted in the evolutionary framework of American ethnologist Julian Steward, whose research emphasized interactions between culture and environment. Steward's approach (1937a, 1937b, 1955) reflected an increasing awareness among social scientist of the importance of ecology for understanding human behavior. It stimulated archaeologists worldwide to adopt a multidisciplinary approach to studying changes in subsistence economies, population dynamics and settlement patterns (see Trigger 1995: 280). Inspired by the writings of Steward (1955) and Leslie White (1959), Elman Service (1964: viii) formally defined and popularized the chiefdom concept as a cultural stage in the sequence of political evolution between egalitarian societies and states (Service 1964: 143).[1] Social groups within chiefdoms are ranked. The nature and number of ranks exhibits great variability in space and time, however, with regard to the importance of birth, occupation and ability. But political power is invariably invested in individuals ("chiefs") who belong to the highest ranked groups generally rooted in genealogy.

In the study of chiefdoms there has been great deal of interest in determining the driving forces that triggered their origins and development (e.g., Carneiro 1981, 1990, 1998; Drennan 1991; 1995 Earle 1991, 1997; Drolet 1988; Haller 2004; Helms 1998;

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[1] The term chiefdom was first used by Kalervo Oberg (1955) to designate an indigenous society type from South America. The term was a literal translation of the Arawak word *cacicazgo* which was adopted by the Spaniards during the sixteenth century.

Renfrew 1976; Sanders and Webster 1978), their dynamics (Drennan 1995; Drennan *et al.* 1991; Earle 2002; Johnson and Earle 1987) and their subsequent transformation into state level polities (Carneiro 1970; Flannery 1999). In Lower Central America and Northern South America the field has benefited from research, which has focused on ethnohistoric analyses (e.g., Carneiro 1970, 1990; Cooke 1993b; Helms 1979; 1994; Ibarra 1990; Linares 1977b; Redmond 1994a-b, 1998; Reichel-Dolmatoff 1965; Romoli 1987; Roosevelt 1987; Sauer 1966; Steward and Faron 1959; Trimborn 1949), ethnography (Redmond 1994b; Young 1971a-b, 1976), case studies of burial practices and ancestor veneration (Briggs 1989, 1993, Linares 1977b, Drennan 1995b; Lange 1992b), and multidisciplinary surveys (Cooke 1984; 2005; Cooke and Ranere 1992c; Drennan 1985; Drennan *et al.* 1991; Lange 1984; 1992b; Linares and Ranere 1980b; Plazas *et al.* 1993; Roosevelt 1980, 1987; Spencer and Redmond 1992). The last-named studies, which have been particularly significant for the reconstruction of regional patterns of organization, have improved scholars' understanding of the differences between chiefdoms and simpler societies (Drennan and Uribe 1987: 60).

The chiefdoms of pre-Columbian and contact period Panama have occupied a prominent place in anthropological theories of political power within small-scale polities (Briggs 1989; Cooke and Ranere 1992c; Cooke *et al.* 2003 b; Creamer and Haas 1985; Drennan 1995; Drennan and Uribe 1987; Earle 1987, 1991; Helms 1976, 1979, 1982; Linares 1977a, 1977b; Lothrop 1937; Redmond 1994b; Sauer 1966; Steward 1948a; Steward and Faron 1959). The first European accounts of Panamanian native society, which date back to the first half of the sixteenth century A.D., describe several small territories controlled by chiefs and their entourages, whose interactions with other chiefdoms vacillated between peaceful exchanges, i.e., feasting and trading, to violent ones, i.e., conflicts over land, and raiding to acquire valuable objects, and male and female captives. Summaries of this behavior can be found in Lothrop (1937: 18–22), Sauer (1966), Helms (1979), Linares (1977), and Cooke and Sánchez (2004a).

Panama became virtually synonymous with the concept of the chiefdom (Steward 1948a) because of the influence of excavations conducted at Sitio Conte by Samuel Lothrop and J. Alden Mason before the Second World War (Lothrop 1937, 1942; Hearne and Sharer 1992; Stirling 1949b). Lothrop's 1937 monograph made it quite clear that there were close correspondences between archaeological evidence for marked wealth differences among individuals buried in this funerary site and the documentary information for social rank provided by the Spanish soldiers. These observant people witnessed the behavior of native elites, including the burial rites of a chieftain called *Parita*,[2] which were interrupted by Spanish troops in A.D. 1519. *Parita* and other members of his entourage were buried with the same kinds of well-crafted objects that Lothrop recovered in the richest graves at Sitio Conte (Briggs 1989).

If Lothrop was the first scholar to disclose archaeological data for social ranking in Neotropical chiefdoms, Swedish archaeologist Sigvald Linné anticipated him in establishing relationships between the distribution and nature of pre-Columbian

[2] "The name of this chief usually is given by historians as *Paris*, admittedly a corruption of some such forms as *Parise, Parisen, Pariza, Pariba, Parita.* The last mentioned term has survived as the name of a town, a river and a bay ..... This chief also is called by Fray Bartolomé de Las Casas and Pascual de Andagoya Cutatara, Cutara, Quitatara...believed to be the name of his father or his son and successor" (Lothrop 1937: 10).

settlements and the documentary record for cultural geography at Spanish contact. This happened during an expedition directed by the ethnologist Baron Erland von Nordenskiöld (Linné 1929: 1–4). Linné and von Nordenskiöld worked on both coasts of Panama using a research vessel as transport. On the Pacific, they conducted surveys and a few test excavations on the Pearl Islands, and along the marine littoral of Panama and Darién provinces (Figure 1.1). They then transited the Panama Canal and explored the Caribbean coast from the river Calovébora in Veraguas to the Gulf of Urabá. In San Blas, they carried out test excavations at two sites situated within the sixteenth century chiefly province of *Careta.* The Swedish researchers also conducted ethnographic studies of the mortuary rituals of the Cuna Indians who were living there at this time.

Linné's research was the first in Panama to attempt the chronological ordering of materials. He proposed that round refuse lenses with incised pottery found on the Pearl Islands were earlier than rectangular accumulations with painted pottery. Subsequent research has shown that it is really the other way round, painted pottery antedating incised wares (see Cooke and Sánchez 2004a: 9). Some of Linné's interpretations were also innovative. He noticed that the remains of pearl and spiny oysters (*Pinctada* and *Spondylus*) were absent in Pearl Island middens, and was the first investigator to suggest that these valuable materials were used in exchange relationships with mainland polities (Linné 1929: 10, 129–134). It was not until the 1980s that archaeologists found evidence for an autochthonous shell ornament industry in Panama (Ichon, 1980). To substantiate his ideas Linné present detailed analyses of the contact period chronicles. This was an improvement on the unsubstantiated opinions of the early ethnographers.

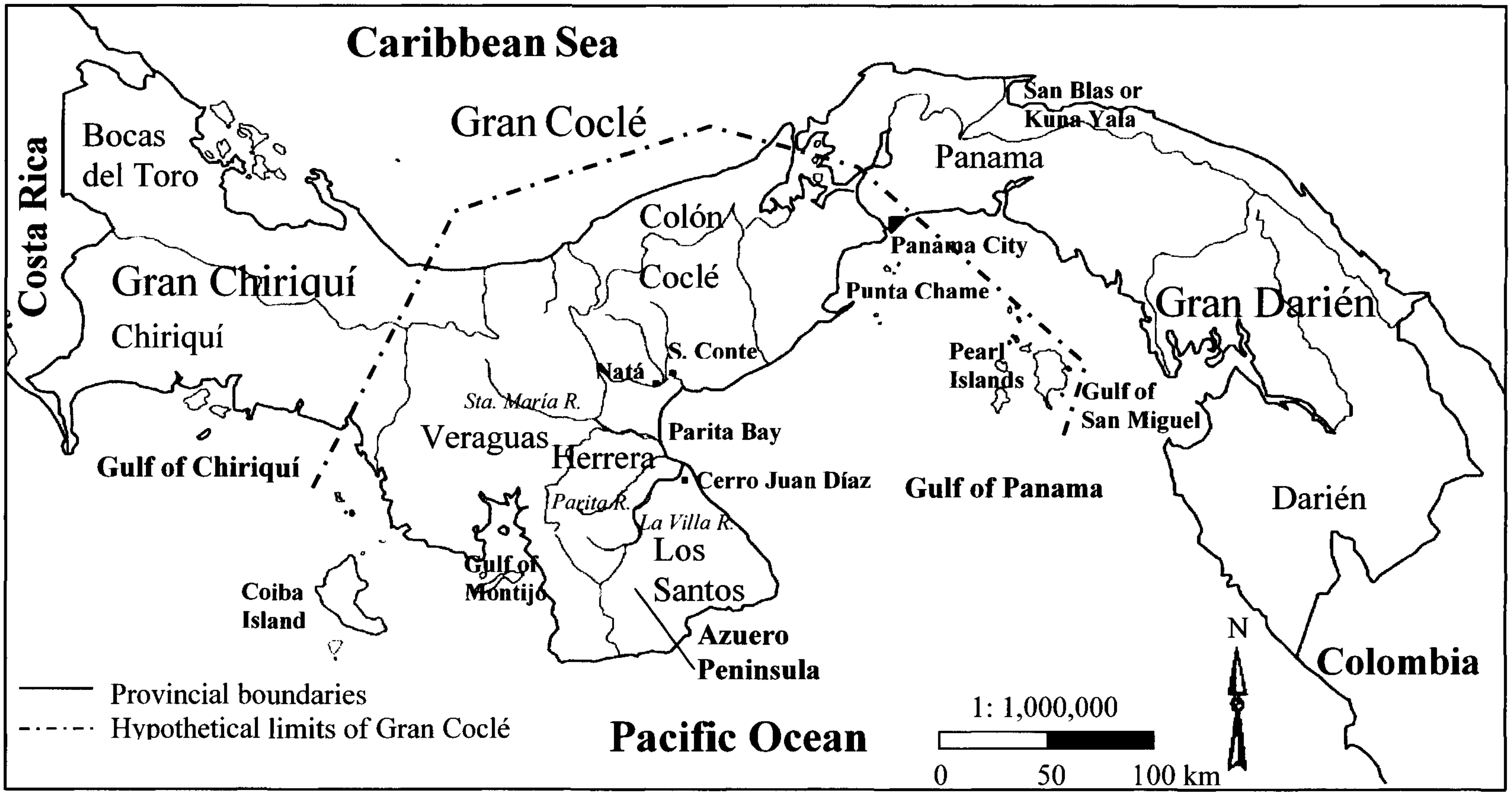

Figure 1.1 Political map of Panama showing the different cultural regions in which the country is divided and location of Sitio Conte (PN-5) and Cerro Juan Díaz (LS-3)

A year after the Swedish expedition, an overflow of the River Grande in Coclé Province broke its banks exposing a rich collection of gold and clay artifacts. Alfred M. Tozzer and Earnest A. Hooton from the Peabody Museum visited the site. They signed an agreement with the Conte family who owned the land to perform archaeological research. Thus, the site became known as Sitio Conte or PN-5 (Figure 1.1).[3] The excavations at Sitio Conte were directed by Henry Roberts between 1930 and 1931, and by Samuel Lothrop in 1933 (Lothrop 1937, 1942). Lothrop was not a theoretician, but his research in Panama anticipated the debate about social complexity that arose after World War II (Lothrop 1937: 9–29). He was well aware of the ranked nature of ancient Panamanian societies (Briggs 1989; Cooke 2005: 151; Cooke and Sánchez 2004; Earle 1991; Helms 1979; Linares 1977b; Roosevelt 1979).

In spite of the apparent consensus of ethnohistoric and archaeological data with regard to wealth and power in New World chiefdoms (i.e. Drennan 1995), other features of small scale polities remain less clear from the archaeological record. Poorly understood characteristics of chiefdoms include the following: (1) the size of political territories; (2) their stability through time; (3) inter-polity relationships; (4) the distribution of resources in relation to procurement, production; and distribution, and (5) the kinds of materials and goods that entered the exchange system, and the distances they traveled. This dissertation aims to clarify these features by means of an archaeological case study of the La Villa Valley on the eastern side of the Azuero Peninsula of Panama

[3] Panamanian archaeological sites are cataloged with a two letter and number combination (Biese 1962). The letters designate the initials of the province or district (*distrito/corregimiento*) where the site is located. The number indicates the order in which they where found. See list of abbreviations on p. xxiv-xxvi.

(Figure 1.1). I selected the La Villa Valley for two reasons: (1) at Spanish contact (A.D. 1515) it lay within the area that several contemporary Spanish documents record as being under the sway of a particularly influential chieftain called *Parita*; (2) it contains an important archaeological site called Cerro Juan Díaz (LS-3) where a ten-year research project (1992–2002) directed by Richard Cooke of the Smithsonian Tropical Research Institute (STRI) has uncovered many details about subsistence economy, ceremonial life, artifact production, and exchange relations (Carvajal 1998; Carvajal *et al.* 2006; Cooke 2001, 2004a, 2004b; Cooke and Sánchez 1998, 2001, Cooke *et al.* 1998, 2000, 2003a, 2003b; Díaz 1999; Jiménez and Cooke 2001; Mayo 2004; Sánchez 1995).

1.2 Cerro Juan Díaz Project (CJDP): A brief synthesis

Occupied between 200 B.C. and the sixteenth century A.D., Cerro Juan Díaz contains features that have been identified as residential areas (dwellings and their detritus), workshops, and ritual zones where burials and associated activities were carried out. Results of archaeological excavations suggest that between ca. A.D. 100 and 1350 specific areas of the hill, which dominates the site tographically, were set aside for burials, some which appear to correspond to specific social groups. There is also evidence for low-level modification of the hill's topography by leveling and filling in order to flatten an area on the southern section of the hill where many of the burials were located (Cooke *et al.* 1998; Cooke and Sánchez 2004a: 44; Desjardins 2000; Díaz 1999).

In the earliest burials, which date between about A.D. 100–550, some individuals were interred with special artifacts including finely carved shells and gold artifacts. They may have had correspondingly special positions, e.g., those of shaman or curer. Elsewhere, however, there is no evidence for the opulence exhibited by a few individuals at Sitio Conte. Besides, there is a much larger proportion of adult women and children in the sample of mortuary features at Cerro Juan Díaz than at Sitio Conte. Burial goods are few in number and consist of small personal ornaments, food offerings, tools (such as axes with males and grinding implements with females), and a few pottery vessels (Cooke *et al.* 1998, 2000, 2003a; Díaz 1999; Sánchez 1995). Some evidence was also found for activities related to the preparation and care of the dead. For example, it has been speculated that a circular arrangement of stone-walled ovens may have been used to desiccate the dead with heat—a practice that is described by some Spanish chroniclers. On the summit of the central hillock, Diana Carvajal discovered a circular structure with a clay floor, which she has interpreted as a mortuary house; alongside this feature she found a group of upturned vessels lying on a clay floor whose only offerings were human mandibles and maxillae, whose teeth were extracted post-mortem (Carvajal *et al.* 2006). These and other discoveries suggest that the preparation and burial of the dead was a protracted and complex activity notwithstanding the apparently modest rank or status of the people buried at Cerro Juan Díaz after A.D. 550 (Carvajal *et al.* 2006; Cooke and Sanchez 1998: Figure 3; Cooke *et al.* 1998, 2000, 2003a-b).

There is also evidence that manufacturing activities were carried out at Cerro Juan Díaz. Julia Mayo (2004) recently described a workshop for the production of shell and bone ornaments and tools. This was cross-dated with the *Cubitá* style of the regional polychrome sequence to about A.D. 550–700 (Sánchez 1995). In other parts of the site, and at a later period, dense scatters of fossilized wood debris point to the making of stone tools out of this locally available material.

The copious data on animal exploitation indicates that hunting, fishing and marine shellfish gathering were carried out "within a day's round-trip" from Cerro Juan Diaz—in inshore waters, mangroves and mud flats, along sandy beaches and riverbanks, and in wooded savannas (Carvajal 1998; Cooke and Sánchez 2001; Cooke *et al.* 2006; Jiménez 1999; Jiménez and Cooke 2001). On the other hand, published sources have discussed the possibility that some of the raw materials used for shell ornaments, such as thorny oyster (*Spondylus* sp.), pearl oyster (*Pinctada mazatlanica*), and conchs (*Strombus galeatus*) were not obtained locally and—in the case of the valuable oysters—may have been brought in from quite distant localities such as the Pearl Islands (Cooke, 1998a: 39). Some animals and their materials, which were not necessarily primary food sources, may also have been obtained from beyond the immediate environs of the site, like macaws (*Ara*), parakeets (*Aratinga*), boobies (*Sula*), guans, curassows (Cracidae), pumas (*Puma concolor*), and jaguars (*Panthera onca*; Cooke *et al.* 2007b). Assumptions about the exotic nature of such resources remain conjectural, for example, Carvajal recently noted that *Spondylus* shells are still obtained on a nearby rocky islet called Isla Villa (Figure 1.2) where pelagic blue-footed Boobies (*Sula nebouxii*) have been reported nesting in recent years (Olson, 1997: 71).

1.3 The *Proyecto Arqueológico del Río La Villa* (PARLV)

The presence of special ritual features at Cerro Juan Díaz (LS-3), the density of its

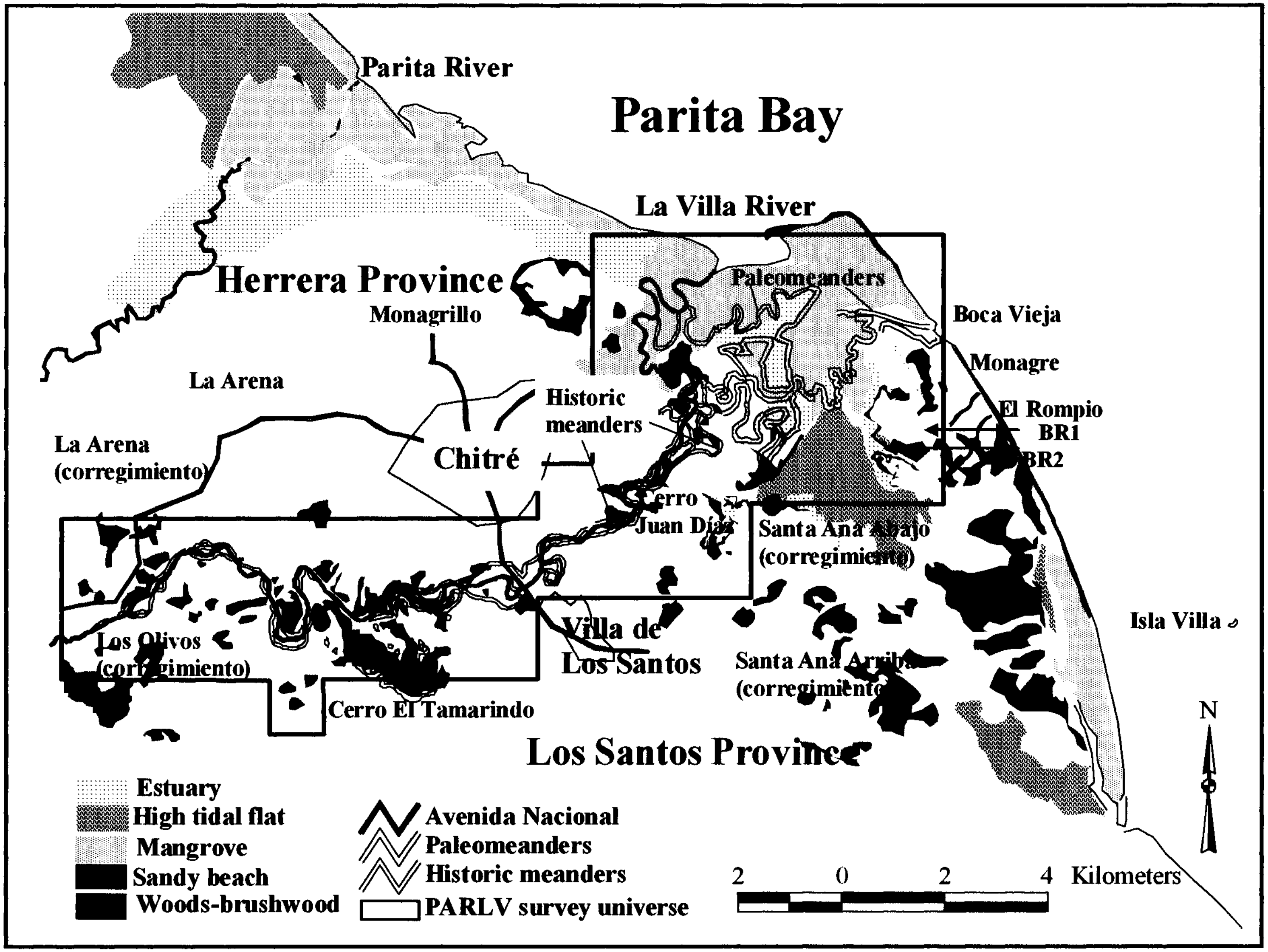

Figure 1.2 Proyecto Arqueológico del Río La Villa (PARLV) survey universe

refuse, and its geographical position on a hill overlooking the sea suggested to researchers when they initiated the CJDP that this was the largest and most influential site in the La Villa river valley, and also one of *Parita's* residential sites (Carvajal 1998; Cooke 1993b; Cooke and Sánchez 1998: 61; Díaz 1999; Sánchez 1995). As the project unfolded, however, little evidence was found for wealth differentials. During my two-year participation as a staff member on the CJDP from 1993–1995, I nurtured the idea of conducting a survey in the lower reaches of the La Villa valley (Figure 1.2). In 1998, when I was granted a full scholarship from the Panamanian Bureau of Science Technology and Innovation (SENACYT) and the Institute for the Formation of Human Resources (IFARHU) to obtain my doctorate degree at Boston University, Cooke suggested I design a survey project whose immediate goal would be to determine whether Cerro Juan Díaz was in fact the largest site in the region by reconstructing a site hierarchy, which would elucidate its regional importance in relation to the contact period chiefdom of *Parita*. The results of my research demonstrate that after A.D. 550, two large nuclear settlements began to emerge on the coastal plain of the La Villa River and Cerro Juan Díaz was one of them. By A.D. 1100 a third nuclear settlement, La Chilonga (LS-15), began to emerge on the upper valley in the westernmost section of PARLV survey universe.

1.4 The chiefdom of *Parita*

Spanish chroniclers state that Chief *Parita* controlled the lower valleys of two fair-sized rivers—*Río del Asiento Viejo* and *Río de Los Mahizales*—known today as

Parita and La Villa rivers respectively (Figure 1.3). Both rivers flow year round from the piedmont to the coast. Chroniclers also describe the environment of these valleys as dominated by extensive savannas with abundant game, and cultivated with maize, manioc, and squash. They noted perceptively that the littoral environment contained a wide variety of habitats including sandy beaches, swamps and high tidal flats, with extensive salt flats.[4] To the north, *Parita's* "province" bordered with that of his brother-in-law, *Escoria*, with whom he was at war during the first Spanish *entradas* between 1515 and 1516. To the west and south were the territories of *Usagaña, Chicacotra, Quema*, and *Guararé* over whom *Parita* had some influence (Figure 1.3). The Spanish chronicles give the impression that *Parita* was the paramount chief in the region. Andagoya (1994), for example, says that he subjected four neighboring chiefs "by war." He also attributes his prowess to a victory over raiding bands from Nicaragua (Andagoya 1994: 34–35). Fernández de Oviedo said that *Parita* had dominion over the chiefdoms that bordered the bay that now adopts his name—Parita Bay. This influence was probably due to a combination of his leadership qualities and his controlling important coastal resources, among them salt beds. Spanish eyewitnesses said that highly valued goods, like colorful cotton blankets and hammocks were produced in his land (Espinosa 1994c: 66). *Parita* is best known historically because the Spanish Captain Gaspar de

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[4] *La dicha tierra y provincia de París está en la costa de esta Mar del Sur; toda la costa que se incluye en ella es muy buena, por que es toda de arenas y de grandes pesquerías, así de pescados como de mariscos, tiene dos ríos grandes, allende de otros arroyos y esteros pequeños, el uno que se dice del Asiento Viejo y el otro que se dice el Río de los Mahizales, en cada uno de los cuales pueden entrar de pleamar todos los navíos que están hechos, porque de pleamar tienen de dos brazas de agua arriba; tienen los dichos ríos muy buenas riberas y de grande posición para maizales y yuca y todos los bastimentos de indios, especialmente melones de los indios, que se hallan allí los mejores y más sabrosos que se han visto en estos reinos, y tales que asados parecen carne propiamente, que de membrillo* (Espinosa 1994c: 65).

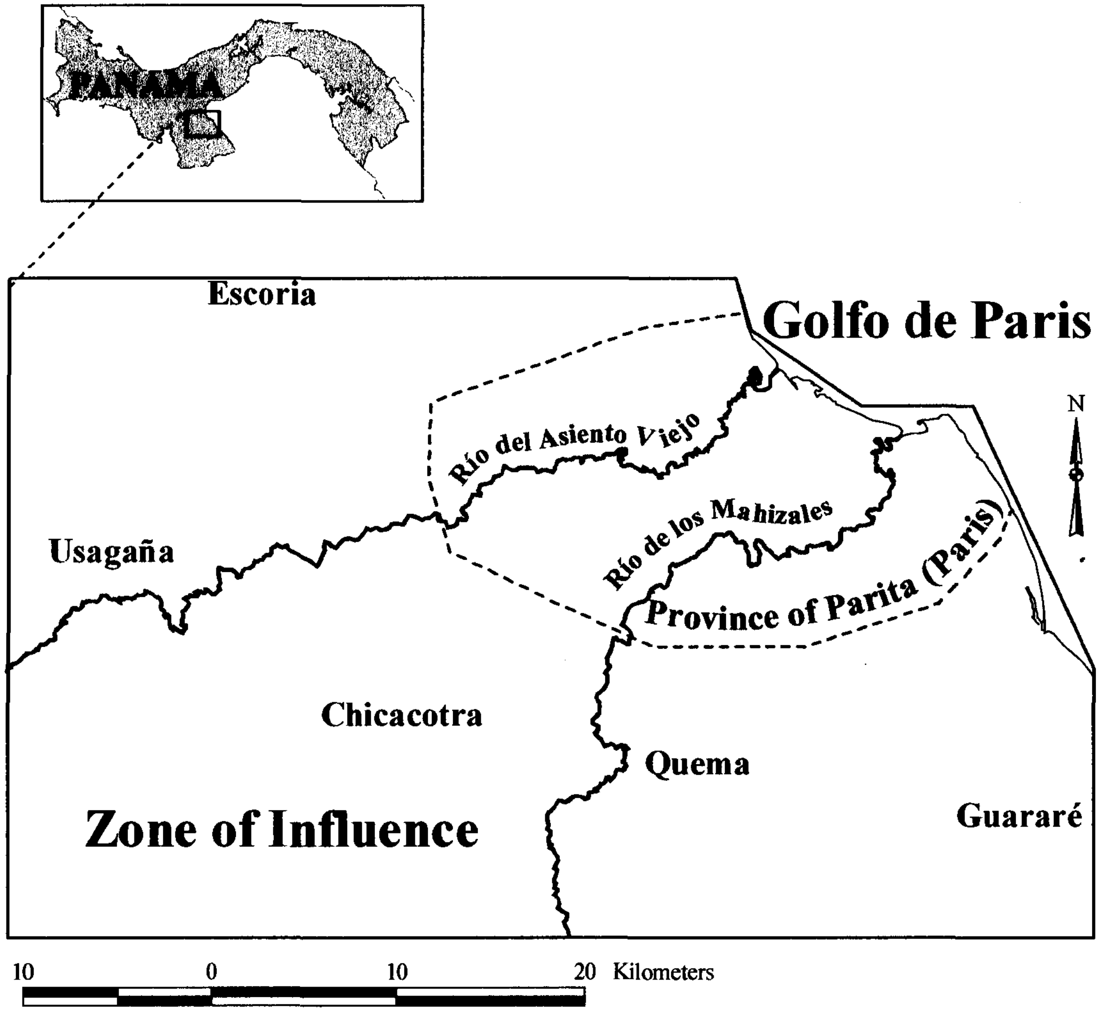


Figure 1.3 *Parita's* Province and his zone of influence. According to Gaspar de Espinosa the *Parita's* province adjoined that of his rival and brother in-law *Escoria* to the north; *Usagaña* to the west; *Chicacotra, Quema,* and *Guararé* to the south. The last four were said to be under *Parita's* authority. Based on these descriptions the chiefdom of *Parita* would have spanned approximately 381 km^2 and his zone of influence 1,846 km^2.

Espinosa interrupted his burial rites on the second expedition he led to western Panama in 1519. Espinosa left a detailed description of the burial ritual and the lavish funerary artifacts. I already stated above that the most lavish tombs at Sitio Conte have traits that correspond to Espinosa's descriptions of *Parita's* burial (Lothrop 1937: Figure 32; Hearne 1992: Figure 1.7).

1.5 Ethnographic and archaeological sources

The pre-Columbian societies of Panama were not literate. Information about their social complexity and organization comes from two sources: field archaeology and documents written by the Spanish who first came into contact with them. Some of these documents were authored by Spanish soldiers and officials who witnessed the subjugation and colonization process (such as Fernando Colón, Gaspar de Espinosa, Gonzalo Fernández de Oviedo and Pascual de Andagoya); others were written by people who had only second-hand knowledge (Bartolomé de las Casas, Peter Martyr d' Anghera). Obviously, these documents are not equally objective or trustworthy.

To date, archaeology has provided information about social complexity at a few sites, one of which (Sitio Conte) is informative about wealth and hierarchy (Briggs, 1989). Some field surveys have provided information about the numbers, relative sizes and, in a few cases, functions of sites. When these are related to features of the landscape, they are relevant to discussions about chiefdoms. Researchers generally find more details about the organization of chiefdoms in Spanish contact period documents than in archaeological field records. In some cases (e.g., Helms 1976, 1979, and 1982), hypotheses have been formed almost exclusively from the documentary record. This situation is understandable, but unsatisfactory, since even the most trustworthy contact period Spanish documents contain biases and deficiencies. Our understanding of tropical chiefdoms—and their variability—would benefit from more field data about the distribution, organization, and antiquity of archaeological sites in the specific regions that based on Spanish documents, in which chiefdoms once flourished.

Contact period Spanish documents provide some details about the boundaries and degree of settlement nucleation of a limited number of Panamanian chiefdoms. For the Caribbean area, chroniclers describe dispersed and short-term sites. In other areas, they allude to large, more permanently occupied territories. Chroniclers make constant reference to the *bohíos* of the chieftains, a word that could describe one of their several residences (Helms 1979: 9). For the territory of *Parita,* sources refer to an old and a new settlement—*Asiento Viejo* and *Asiento Nuevo*. Other settlements, which also are described as the chief's residence, appear to have had specialized workforces. At the chiefly *bohíos* of *Comogre* and *Cori*, both described as accomplished goldsmiths, the Spaniards witnessed specialized workshops for smelting gold (Pedrarias Dávila 1510 in Jopling 1994: 21–22, 24; Cooke *et al.* 2003a: 104). This is very interesting considering the fact that Lothrop (1937), Carl Sauer (1966) and Mary Helms (1979) doubted that much gold objects were produced on the isthmus. The fact that some structures are described as better built, more lavishly decorated and furnished suggests functions beyond residential use. Were these all chiefly residences or were some communal building such as council houses? Overall, ethnohistoric documentation suggests that areas were well populated, especially in the lowlands near estuaries and good fertile soils. Little else is recorded, however, about site hierarchies. Theoretically, one can expect tropical chiefdoms to have been characterized by fewer ranks and categories of sites than more complex societies, like the Maya, but archaeological survey is needed to support this notion.

1.6 Archaeological surveys: Past and present

Regional archaeological surveys have been undertaken in the following watersheds and coastal zones in Panama: Chiriquí Viejo (Chiriquí); coastal Bocas del Toro; coastal Chiriquí; Tonosí (Azuero Peninsula); Belén, Coclé del Norte and Indio (Caribbean slopes of Coclé and Colón); Coclé del Sur, Grande, Chico; Santa María; and Parita (Parita Bay). The field methodologies employed in each survey vary considerably. Attempts to conduct total coverage surveys were made in the upper Chiriquí Viejo (Linares *et al.*, 1975; Linares and Sheets 1980, Parita (Haller 2004) and La Villa (Isaza, this dissertation). The *Proyecto Santa María* (henceforth PSM) employed a double strategy consisting of randomly chosen linear transects and purposive pedestrian surveys of selected areas within this drainage (Cooke and Ranere, 1984, 1992b, c). John Griggs' surveys on the very humid Caribbean slopes have also combined field methodologies (Griggs 1995, 2005; Griggs *et al.* 2002). Julia Mayo's survey of eastern Coclé province has focused on remote sensing and sites with architecture (Mayo *in press* 2007).

Despite the differences in methodologies employed, archaeologists have been able to relate sites to landscape features identifying clusters of sites which they interpret as territories appear to be comparable with contact period "chiefdoms" in that some of them possess one or two particularly large settlements (Clary *et al.* 1984; Cooke 1972, 1984; Cooke and Ranere 1984, 1992c; Drolet 1980; Griggs 1998, Griggs *et al.* 2002; Haller 2004; Ichon 1980; Linares and Ranere 1980a; Weiland 1984; Willey and McGimsey 1954). Some sites contain above-ground features, including stone walls (Caribbean sites), cobble stone pavements and stone column alignments (El Caño in Coclé Province), stone-faced terraces (Cerro Cerrezuela in Coclé), and platforms and special stone monuments (Monte Lirio, Villalba, La Pitahaya, and Barriles in Chiriquí Province). Other sites were apparently reserved for special ritual functions (Sitio Conte in Coclé and El Hatillo in Herrera Province). Unfortunately, the chronology for some of these special-function sites (e.g., Barriles) is still uncertain.

The longest complete regional chronological sequence of human occupation and paleogeographic data in Panama comes from Parita Bay, where the mouths of the Parita and La Villa rivers are located (Cooke and Ranere 1992a–c; Cooke and Sánchez 2004a–c; Isaza 1993; Ladd 1964; Pearson 2002; Piperno *et al.* 1990, 1991a–b; Piperno and Pearsall 1998; Ranere and Cooke 2003; Sánchez 1995, 2000; Willey and McGimsey 1954). Since the early 1950s, the region has been known as a center for early and middle Holocene coastal settlement (Cooke and Ranere 1992c; McGimsey 1956; Willey and McGimsey 1954; Willey 1971). Because it is characterized by excellent bone and shell preservation, it has also provided much data on subsistence economies. The first human settlements around Parita Bay date to the Paleoindian technological horizon of the Late Glacial Stage (Cooke 1998b, 2004; Pearson 2002, 2003; Piperno and Pearsall 1998;

Ranere 2003; Ranere and Cooke 2003). Paleoindian, Preceramic, and Early Ceramic sites are scattered from the coast to the foothills and Central Cordillera (Cooke 1998b; Cooke and Ranere 1992a–b; Pearson 2002, 2003; Pearson and Cooke 2002, Ranere and Cooke 1991, 1995, 1996, 2003). Recently, John Griggs (2005) demonstrated that people were also active in the very humid forests of the central Caribbean during these periods.

The archaeological record suggests that an important reorganization of settlement distribution and nucleation occurred around 200 B.C. This was accompanied by important technological developments, such as improving standards for pottery manufacture, its use for conveying ideology, prismatic blades made out of silica-rich stones, and well-fashioned grinding stones (metates and manos). Current field data give the impression that this process was quite rapid particularly in the Santa María watershed, the lower Parita valley, and Chiriquí highlands (Figure 1.1; Cooke 2005; Haller 2004; Linares and Ranere 1980a). My research in the lower La Villa River appears to support rapid population growth and nucleation during the first millennium A.D. Nevertheless, it is important to bear in mind that the lower river valleys of this area alluviate very rapidly. Therefore, it can be argued that current survey data are overly biased towards large late sites and thus exaggerate the rapidity of settlement nucleation (Cooke and Ranere 1992c; Weiland 1984).

One important feature that some surveys have highlighted, is the existence of special sites, which are either much larger than others in the survey universe, or possess unique features. The fact that there are far fewer sites of this nature than purported chiefdoms suggests that their importance transcended the political boundaries of a single chiefdom (Cooke *et al.* 2003a). Along the coast and in the highlands of Chiriquí (Figure 1.1), Linares and Ranere (1980a) demonstrated that settlement distributions were related to a rapid expansion of people from elsewhere into a previously uninhabited zone. According to paleoecological data of Behling (2000), this process occurred at the beginning of the first millennium B.C. For Linares and Ranere, the subsequent settlement nucleation resulted from the growing importance of special sites such as Barriles and La Pitahaya, whose preeminence was probably related to local social history and myth related to political centralization.

A recent survey conducted by Mikael Haller (2004) on the lower reaches of the Parita River concluded that the settlement history of the valley was driven by sociopolitical factors, rather than population pressure, i.e., warfare, long-distance trade and/or control of esoteric knowledge—causal factors which have been stressed by other researchers (Carneiro 1970, 1981, 1990, 1998; Helms 1979, 1992, 1994; Redmond 1994a, 1994b). Haller also demonstrated that in his survey area, one very large site, La Mula-Sarigua (PR-14), which does not have evidence for architectural features, was supplanted by another, El Hatillo (HE-4), which has burial mounds supposedly "arranged around a court" (Haller 2004: 90; Bull 1965: 31–33). None of the sites surveyed by the PARLV showed clear signs of architecture. However, this does not mean that there is a lack of sites without special functions.

1.7 Geographic setting

The present case study focuses on the lower reaches of the La Villa River, a 119 kilometer-long meandering system that originates in Las Minas District in the north-south central mountain range of the Azuero Peninsula, and empties into the southern portion of Parita Bay (Figure 1.1). My survey universe covered 40 km^2, (3.1%) of the total area drained by the river 1,298.03 km^2 (Figure 1.2). Today, this fluvial system serves as a political boundary between the Herrera and Los Santos provinces of Panama. The river measures up to 80 meters at its widest point and is partially navigable by canoe or motor boat up to a modern dam built by the Nestlé Company 5 kilometers inland. Only these 5 kilometers of the lower valley are influenced by tidal action. Beyond this point, there are rapids and bedrock channels. In the dry season, some of these areas can easily be crossed by foot. During the rainy season, however, the river overflows its banks and widens up to 400 meters, occasionally cutting-off meanders. The river is also capable of transporting large amounts of debris causing gradual destruction of the archaeological sites located along its banks. In one case (LS-23) we found material being redeposited on an exposed cobble beach.

The seasonal climate is defined by the interaction of the trade winds, which blow in a northeast to southwest direction, with a large low-pressure air mass known as the Intertropical Convergence Zone or ITCZ (Jackson and d'Croz 1997: 39). Each year between May and December, the ITCZ moves northward over Central America resulting in the cooling of the air mass, condensation, and prevalent rains. Seasonality is stronger in the coastal lowlands around Parita Bay than elsewhere on the Isthmus of Panama. Dry seasons are severe, in some years the season have lasted up to five months. The strong winds and sunny days desiccate the landscape rapidly. Along the coast, annual precipitation averages about 1000 mm rising inland towards the cordillera. Between January and April the ITCZ moves south of Central America causing the northeast trade winds to produce a more stable, drier air mass and less precipitation. An important consequence of the dry season in central Panama is the passage of strong winds through low saddles in the mountains and across Panama Bay. This blows warm surface waters southward, causing oceanic upwelling and increased production of plankton and phytoplankton. It has been amply demonstrated that this enhancement of marine productivity favors high biomasses of nektonic animals, especially pelagic fish and shrimp. Nevertheless, the overwhelming predominance in Parita Bay archaeological sites of marine species that prosper in perennially warm shallow estuarine waters makes it unlikely that upwelling was the prime driver of marine productivity, the animal protein supply and human carrying capacity (Cooke 1992; Cooke and Ranere 1994, 1999; Jiménez and Cooke 2001).

The landscape of the lower La Villa valley consists of three primary zones: (1) the littoral zone under marine influence: this has been rapidly changing through time due to the constant transformations of landforms resulting from the interplay between sea level, riverine sedimentation and marine tides. Habitats include: sandy beaches, mud flats, stilt mangroves, and high tidal flats (Clary *et al.* 1984: 58); (2) the alluviated flatlands, that is the main channel of the river whose constant flooding accretes sediments; and (3) the non-alluviated areas in which flat land is interspersed with low hills, these increasing in size and prominence towards the west (Figure 1.4).

Figure 1.4 The Lower La Villa Valley habitats.
(a) High-tidal flat (*albina*) and estuary of recent formation; (b) Lower stretches of the La Villa River during ebb tide; (c) Cerro Juan Díaz seen from the northern banks of the La Villa River during the rainy season; (d) Rolling hills south of Cerro El Tamarindo.

The entire area has been strongly influenced since Spanish colonization by cattle ranching, and concomitant annual burning and over-grazing. It is possible to plant crops anywhere during the rainy season, but the fertility of the soils varies considerably. Present-day agriculture is most extensive and intensive in the alluviated bottomlands where water can be pumped from the river in the dry season facilitating the intensive production of crops such as maize, melons and watermelons. Forest remnants are evident along the river margins and abandoned meanders where trees can reach a considerable height. Although there are no paleoecological records specifically for this area, Spanish eye-witness descriptions make it clear the alluviated bottomlands were planted in maize, manioc, and squash (Espinosa 1994c: 65). This panorama of wooded savannas with gallery forests is confirmed by the presence of remains in kitchen middens of animal species that naturally favor these types of environments. Tree species presence and abundance is influenced by soil type, human selection and forest history. Typical of gallery woods are: "espavé" (*Anacardium excelsium*), "caimito" (*Chrysophyllum cainito*), "cedro amargo" (*Cedrela mexicana*), "cedro espino" (*Bombacopsis quinatum*), "árbol Panama" (*Sterculia apetala*), and "guachapalí" (*Pithecolobium saman*), some of which are intentionally left when woods are cleared for pasture in order to provide shade and food for cattle. The dominant tree species in the dry coastal margins outside the high tidal zone are the "agallo" (*Cesalpinia coriaria*) and "palo verde" (*Parkinsonia aculeata*), which often form dense thickets with cactus (*Opuntia*) as undergrowth. Species such as the "ciruelo" (*Spondias purpurea*) are commonly planted as components of live fences. The "chumico" (*Curatella americana*) and the "nance" (*Byrsonima crassifolia*) are resistant to fire and dominate in heavily disturbed areas with degraded soils. The introduced coconut palm (*Cocos nucifera*) forms stands along river margins along with native palm species (e.g., *Bactris* spp. and *Elaeis oleifera*; Figure 1.4b).

The coastline is characterized by a low gradient of less than half a meter per kilometer and a high tidal range (Clary *et al.* 1984: Figure 7). Areas subjected to tidal influences are characterized by several mangrove species, of which the red or stilt mangrove (*Rhizophora mangle*) forms dense stands along the coast, while the black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*) and buttonwood (*Conocarpus erectus*) are typically found along tidal channels (Figure 1.4a).

To the northeast of the river mouth, the daily tides expose an area of mud flats (low tidal flats) which span 0.5 to 1 kilometer seaward of the shoreline at low tide. Farther north at the mouth of the Santa María River, for example, the mud flats extend as much as 6 kilometers seaward from the shoreline at the lowest tides (Figure 1.2). The mud flats expose a mixture of fine sand, clay and silt sediments resulting from fluvial and long shore currents. At low tide, this area exposes large concentrations of shell fragments between the sand ripples (Clary *et al.* 1984: 55). On the opposite side of the mouth of River La Villa (immediately south of the area known as Boca Vieja) the coastline is characterized by 6 kilometers of sandy beaches.

In the late 1970s and early 1980s, geologists working with the PSM carried out Vibracore surveys of the sub-tidal and high tidal zones of Parita Bay. Their analyses suggest that: (1) prior to the second Holocene transgression event, ~5000 B.C. supra tidal and high tidal zones extended as far inland as the present coastline (Barber 1981; Clary *et al.* 1984; Dere 1981). (2) As sea level rose between 3000 and 1000 B.C., the Parita coastline became extensively covered with mangroves and developed high-tidal flats (locally known as *albinas*) along the landward side. (3) Two thousand years ago the *albinas* expanded seaward and the supra tidal and high tidal regions acquired their present distribution (Dere 1981: 73–86). On going colonization by mangrove runs parallel to a seaward expansion of the coastline. According to Clary *et al.* (1984: 61) both present and past-Holocene transformations of the Parita Bay coast were influenced by (1) the low angle of the coastal slope, (2) the restricted river channels, (3) tectonic movements, (4) sedimentation rates, (5) sea level fluctuation, (6) climatic change, and (7) anthropogenic activity. Combining information on sea level rise and sedimentation, Clary *et al.* (1984: 61) estimates that the coastal progradation rate for Parita Bay over the last 4000 years was one kilometer per 1000 years in the vicinity of the Santa María Delta and 0.5 kilometers per 1000 years for the southern portion of the Parita Bay (along the rivers Parita and La Villa). Consequently, most archaeological sites situated on the lower river valleys are farther from the coast and lie in ecosystems that differ from the ones that existed during their pre-Columbian occupation.

1.8 Summary of research issues

The *Proyecto Arqueológico del Río La Villa* (PARLV) builds on the long-term program of investigations at the site of Cerro Juan Díaz, a pre-Columbian village situated within the historical domains of the chiefdom of *Parita*. It also relates to geoarchaeological research conducted in the 1950s by Willey and McGimsey and subsequently by the PSM. This research demonstrated that the location, history, and function of archaeological sites around Parita Bay cannot be understood without empirical information about paleogeography.

The PARLV was designed to provide a regional context for Cerro Juan Díaz and therefore identify its role within a bounded territory, which at Spanish contact was described as being under the control of a single political leader, *Parita*. I want to test the hypothesis that Cerro Juan Díaz was one of chief *Parita's* two residential sites and therefore at the apex of a site hierarchy. A second goal is to investigate the origins and historical development of *Parita's* chiefdom. In addressing issues of chiefdom archaeology using settlement patterns, special attention is given to site size, site location in relation to the natural resources, and site permanence through time. The latter is evaluated based on the density distribution of diagnostic cultural material, in particular ceramics. Thus, if a site hierarchy that is similar in structure to contact period settlement pattern can be projected backwards in time to earlier periods, then it is likely that chiefly governance enjoyed great antiquity in a given region. On the other hand, if the distribution of earlier sites is one of dispersed small villages, then an earlier acephalous political organization is more likely.

Without a regional archaeological study, the archaeological signatures of Panamanian chiefdoms—their emergence, size, internal variability, and external linkages—will continue to be only faintly detected. A regional survey, the results of which are presented in the pages to follow, allows the following questions to be addressed:

(1) Was Cerro Juan Díaz the largest settlement in the valley of La Villa?

(2) If so, was it always the largest settlement?

(3) Did certain features, such as the proximity of the tidal river, salt flats, and the coast, convey special advantages to Cerro Juan Díaz, which enabled it to outlive important centers in neighboring river valleys?

(4) Can it be proven that the town occupied by chief *Parita* at contact, the *Asiento Nuevo,* is Cerro Juan Díaz?

(5) Some categories of artifacts, e.g., stone tools, were not made at Cerro Juan Díaz; were these made at other sites in the lower valley or did they come from

farther away?

(6) How does the settlement system of La Villa valley compare and contrast with that of the Parita valley, which was also within the territory of Parita's chiefdom?

To expand the base of knowledge beyond the central sector of the Cerro Juan Díaz (dominated by the eponymous hill), I supervised a foot-survey of 40 square kilometers of the lower La Villa River between 2001 and 2002 (Figure 1.2). The survey was undertaken in three stages: (1) field reconnaissance and systematic surface-sampling collections using transects; (2) remote sensing surveys with magnetometry and electrical resistivity of 20% of the registered sites; and (3) test excavations.

In view of the fact that previous geomorphological analyses of the Parita Bay coastline in the northern Santa María and Parita valleys provided field evidence for sea level changes, deltaic sedimentation, and (perhaps) tectonic tilting—features that influenced the placement of ancient settlements—I invited geomorphologist Thomas Bullard from the Desert Research Institute in Nevada (DRI) to investigate the causes affecting the river delta transformations and its influence upon the location and existence of archaeological sites. Aerial photographs and topographic maps from the past three decades show historic and paleomeanders in the lower 5 kilometers of the La Villa valley, between the current river mouth and the Boca Vieja ("old mouth") region near Monagre beach (Figure 1.2). The orientation of these meanders suggests that the river has been changing its course in a northwestern direction. Results of this geoarchaeological component of my research project are presented in chapters 4–7.

1.9 Organization

This dissertation is organized in eight chapters. After this introduction, I provide a brief summary on the Panamanian cultural geography, chronology, and scholars' interpretations of the available data (Chapter 2). In Chapter 3, I make use of the ethnohistoric accounts to describe the situation of sixteen century Panamanian chiefdoms, particularly for the region controlled by *Parita* and its neighbors. Chapter 4 focuses on the results of the geomorphologic evaluation of the La Villa River, the PARLV settlement survey and a description of the documented sites and settlement rank pattern. This is followed by the results of the remote sensing surveys (Chapter 5), ceramic and lithic analyses (Chapter 6) and faunal analyses (Chapter 7). In the concluding chapter, I will summarize the mayor accomplishments of PARLV survey, address the question on the role of Cerro Juan Díaz in regional in regional society, and provide information on the factors that influenced the settlement occupation of the lower La Villa valley and how chiefs ascended into power.

Throughout the manuscript, I provide the original quotations of Spanish accounts using footnotes and summarizing them in the text. As a warning to the reader, the name of some sixteen century chiefdoms, geographic features, modern place names, ceramic phases and cultural regions may be the same. The best example is *Parita*, the sixteen century chief focus of this dissertation. On footnote 2, I noted that this chief name has survived as the name of a bay, a river, and a town all located on the northeastern side of the Azuero Peninsula. Parita is also the name given to a ceramic style and cultural phase. To avoid confusion, the names of sixteen century chiefs and their territories are italized and when referring to a geographic feature, place name, ceramic style or phase they will be described as such. Other names, i.e., Veraguas and *Veragua* although spelled similar refer to different things. Veraguas spelled with the final (s) refers to the name of one of Panama's political provinces, the only one that has access to both the Pacific and Caribbean coasts (Figure 1.1). The name was originally given by Christopher Columbus (without the final s) to the Veragua Vieja River on the Caribbean coast (Lothrop 1950). *Veragua* (without the final s) is the name of the contact period chief or *queví* who controlled the valley of the Veragua River (see Anghera 1912: 326).

In volume II of this dissertation I include several appendices to complement information from one or several chapters. In them, I also include the summary reports provided by different specialists. Appendix 1, for example, provides a summary list of all radiometric dates mentioned in the dissertation. For ease of prose throughout the dissertation, calibrated date results are given in their 2-sigma range followed by their lab number and bibliographic source in parenthesis. In Appendix 1, the reader will find additional information such as the dates in radiocarbon years, their calibrated intercept, the material dated, and corresponding cultural complex. Appendix 2 includes several tables with the quantitative molluskan fauna from each individual excavation unit and quantitative summary of the surface collected shells. Appendix 3 also includes several tables with the quantitative data of the vertebrate fauna from the different excavation units and surface collections. Appendix 4 presents the results of the analysis of human remains by Claudia Díaz of the Cerro Juan Díaz Project. Appendix 5 is a summary report of a magnetite analysis using a Mössbauer Spectrum undertaken by Dr. Juan Jaén from the *Centro de Investigaciones con Técnicas Nucleares*, Universidad de Panamá. Appendix 6 contains the field data and geographic coordinates of a resistivity survey conducted by Alexis Mojica on the northeastern foothills of Cerro Juan Díaz. Appendices 7–10 summarize the information regarding the habitat preferences, current present status, and geographic distribution of the vertebrate and invertebrate fauna collected by the PARLV.

Chapter 2

Cultural Chronology

2.1 Introduction: culture areas in space and time

Archaeologists who work in Panama have been preoccupied with establishing cultural divisions ever since the 1920s when the paradigms of temporally static 'culture areas,' championed by Franz Boas and William H. Holmes, were still prevalent in academic circles (Cooke and Sánchez: 2004c: 4). Lothrop (1937), for example, proposed that Panama comprised four such culture areas—Chiriquí, Veraguas, Coclé and Darién. He formulated his "Coclé culture" after a thorough analysis of the artifacts discovered at Sitio Conte (PN-5), a rich burial ground excavated by the Peabody Museum of Harvard University and the University of Pennsylvania Museum between 1930–1933 and 1940 respectively. Together, the Peabody and Pennsylvania Museum expeditions recorded one hundred graves, several ritual deposits or "caches," lines of natural basalt columns, and other stone features—possibly floors (Briggs 1989; Hearne and Sharer 1992; Lothrop 1937, 1942). The offerings of many of Sitio Conte graves and caches included polychrome pottery and gold ornaments. Peter Briggs (1989) used cluster analysis to summarize the relationship between numbers and classes of artifacts and the occupants of the graves concluding that a few costume and sumptuary items appear to have been reserved for people with the highest rank or status.

Lothrop (1937) thought that the gold found at Sitio Conte was not produced locally and proposed that the polychrome pottery was produced by a culture centered upon the Pacific coastal lowland of the present-day province of Coclé and adjacent parts of the Azuero Peninsula. Thus, Coclé became the third culture area of Panama, two others having been defined by previous investigations—Chiriquí (Holmes, 1884–5; MacCurdy 1911; Osgood 1935) and Darién (Linné, 1929)—and another (Veraguas) by Lothrop (1950) himself (Figure 2.1). Because his work was done prior to the development of radiocarbon dating, Lothrop incorrectly assumed—though not unreasonably—that these archaeological cultures developed in the last centuries of the pre-Columbian period (A.D. 1330–1520). On the one hand, radiometric dating was not yet available while, on the other, Lothrop adhered to Franz Boas concept of culture areas with short histories, thinking that their origins could be traced outside the isthmus. Subsequent investigations have shown that the most likely time-span for the Sitio Conte graves that were sampled by Lothrop and Mason spans about A.D. 700–1050 (Cooke *et al.* 2000).

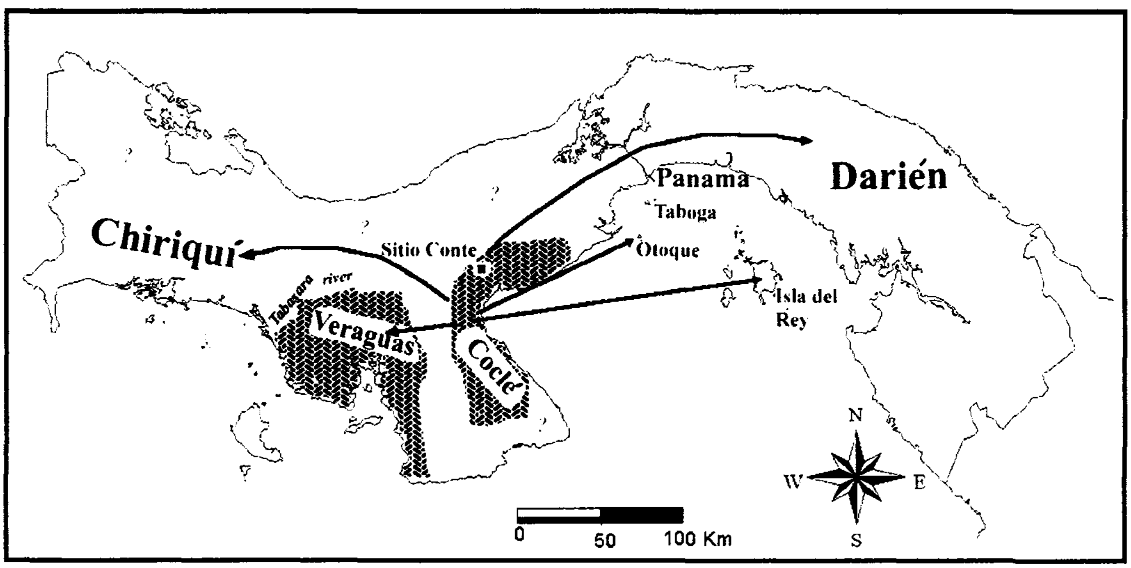
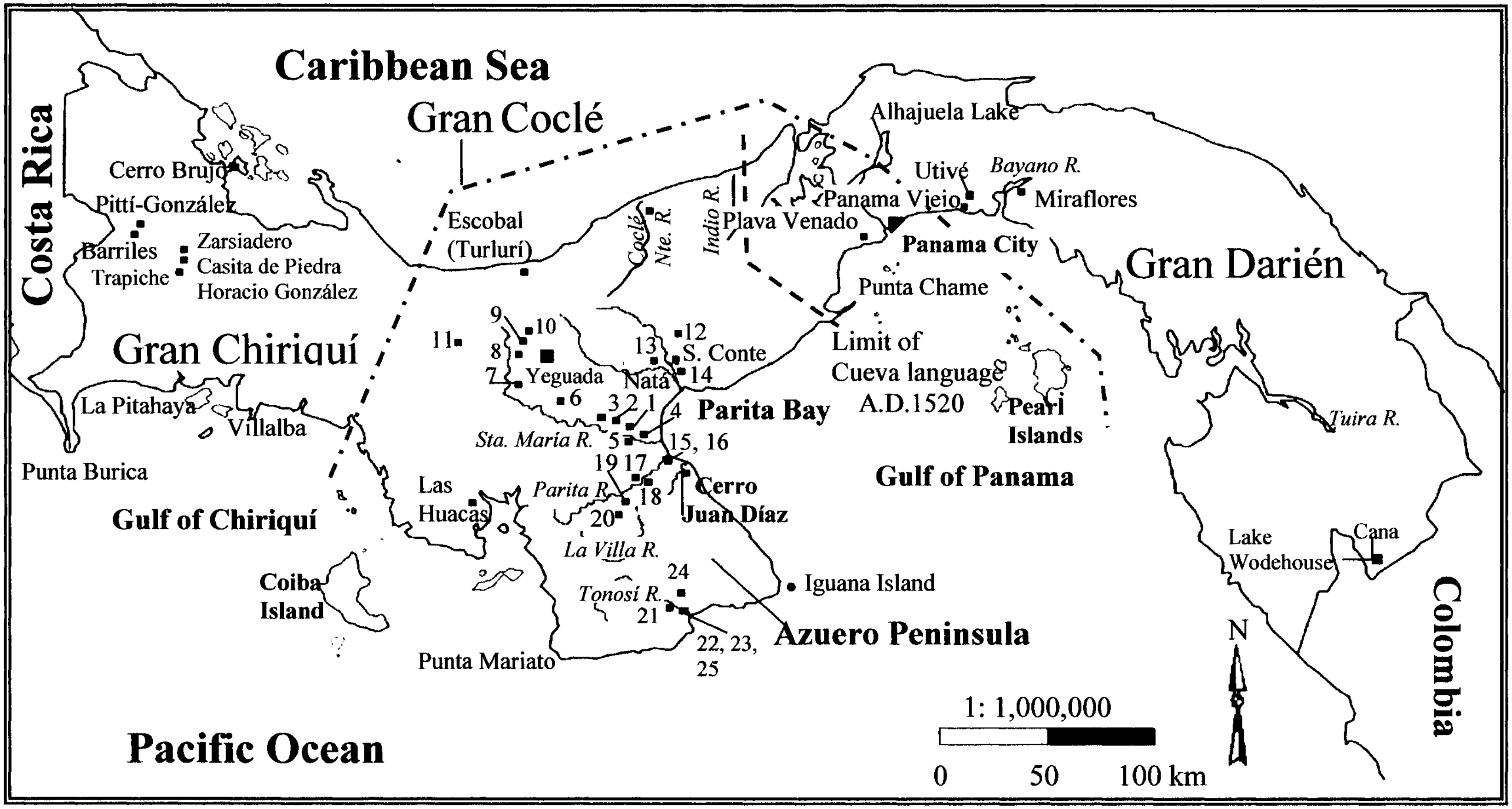


Figure 2.1 Map showing Lothrop's (1942) proposal for distribution of aboriginal Panamanian cultures. The arrows show the areas to which Coclé style artifacts were traded (after Lothrop 1942: Figure 486).

After World War II, a number of developments in Panamanian archaeology led to a greater preoccupation with the evolution of culture through time and with activities other than funerary ritual. Archaeologists also became increasingly interested in the relationship between different kinds of archaeological sites to the surrounding landscape. In Panama, many of these trends were introduced by a very influential figure, Gordon Willey. Between 1948 and 1951 Mathew Stirling, chief of the Bureau of American Ethnology, invited Willey to lead an archaeological expedition to the Azuero Peninsula of Panama. As part of the expedition Willey carried out settlement surveys along the littoral zone of Parita Bay between Coclé and Herrera provinces and assisted Stirling at the excavations of several sites, including El Hatillo (HE-4), Sixto Pinilla (HE-1), and Leopoldo Arosemena (HE-2), where they discovered cultural assemblages coeval with the Spanish conquest (Figure 2.2). The results of these excavations were summarized by Willey's graduate student John Ladd (1964).

In 1952 Willey returned to Azuero in order to survey and excavate some coastal middens that he and Stirling had identified in the Herrera *albinas* (or high salt flats) located in the province of Herrera. The highlight of this research was the discovery of two early ceramic complexes, Monagrillo and Sarigua, which were noticeably more simple than the polychrome pottery found in Coclé and Parita Bay grave sites (Willey and McGimsey 1954). Consistently, the lithic assemblages associated with these complexes included simple grinding stones made of cobbles and boulders. This led Willey and his student Charles McGimsey (1954) to believe that the Monagrillo and Sarigua complexes were of greater antiquity than the Coclé culture defined by Lothrop.



1. Cerro Mangote (AG-1)
2. Cerro Girón (AG-2)
3. Sitio Sierra (AG-3)
4. Vampiros Cave (AG-145)
5. Zapotal (HE-15)
6. Aguadulce (AG-13)
7. Carabalí (SF-9)
8. Los Santanas (SE-189)
9. Bajo Chitra (CL-4)
10. Corona (CL-2)
11. Río Bermejito (SI-1)
12. Cueva de Los Ladrones (LP-1)
13. Sitio El Caño (NA-20)
14. Cerrezuela
15. La Mula-Sarigua (PR-14)
16. Monagrillo-type site (HE-5)
17. Sixto Pinilla (HE-1)
18. Leopoldo Arosemena (HE-2)
19. El Hatillo (HE-4)
20. Sitio Nieto
21. La India (TI-1)
22. El Cafetal (TI-35)
23. El Indio (TI-18)
24. La Cañaza (TI-9)
25. Búcaro (TI-22)

Figure 2.2 Map of Panama showing cultural regions and archaeological sites mentioned in the text

Furthermore, Willey and McGimsey (1954: 136) proposed that Monagrillo pottery was associated with ancient peoples with a littoral (maritime edge) subsistence orientation, although they did not discard the possibility that they practiced some sort of horticulture. This idea was developed further in Willey's influential *Introduction to American Archaeology* (Willey 1971).

Through stratigraphic analysis of the *albina* middens, Willey and McGimsey (1954) identified other pottery styles—La Mula, Alvina, and El Tigre—which they assumed were more recent than Monagrillo and Sarigua. Since there were no ^{14}C dates they did not know exactly how old they were. Willey and McGimsey (1954: 82) proposed, however, that El Tigre was a colonial or modern ware, older than La Arena pottery, which is still produced in the region.[1]

The antiquity of the Monagrillo ceramic complex was confirmed through radiocarbon dating five years after the publication of *The Monagrillo Culture* monograph. A charcoal sample collected by Willey at the Monagrillo-type site (HE-5) yielded a date of cal. 2880–2460 B.C. (Y-585, Deevey *et al.* 1959; Cooke 1995: 169). Willey and McGimsey were quite surprised by the date because its antiquity brought into question their theory that the inhabitants of the Monagrillo site practiced some sort of horticulture. Willey (1971: 262–277) soon changed his mind and associated the Monagrillo complex with a sedentary hunter-gatherer-fisher culture, having some "incipient" food production. Claude Baudez (1963) speculated that the Sarigua complex dated to around 1000 B.C.

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[1] A charcoal sample collected in 1991 by Richard Cooke and Oscar Fonseca from a fire pit at the Monagrillo-type site (HE-5) yielded a date of cal. A.D. 1650–1955 (Beta-46784) for El Tigre ceramic group (Cooke 1995: Endnote 14). This date, in addition to frequent finds of similar pottery styles at demonstrably historic sites elsewhere in Panama, has confirmed Willey's hypothesis.

In 1955 Charles McGimsey (1956, 1957) discovered Cerro Mangote (AG-1), in the Santa María river valley. This was the first Preceramic site ever reported in Central America and the first radiometrically dated through ^{14}C to cal. 5930–5450 B.C. (Y-458d; McGimsey 1957; Cooke and Sánchez 2004a: 15). The cultural assemblage of Cerro Mangote included the same kind of grinding stones discovered at the Monagrillo-type site, suggesting that the Late Preceramic and Early Ceramic people prepared the same kinds of plants. McGimsey's excavations as well as those performed by Anthony Ranere in 1979 revealed also the presence of a Preceramic burial ground at Cerro Mangote (Cooke and Ranere 1992c: footnote 8; McGimsey *et al.* 1986–87; Norr 1980; Ranere and Hansell 1978). A total of 86 individuals were found buried in primary flexed position or as multiple bundles of disarticulated bones inside the graves.[2] Among them were 50 adults (18 of which were identified as females and 25 as males), 22 children, and 13 infants. The few mortuary arts encountered included shell beads and pendants most of which were found with the infants and adolescents.

Willey and McGimsey's work on the Azuero Peninsula reflected a growing interest among archaeologists in establishing sequences of artifacts that could be interpreted in temporal and geographic contexts, since it demonstrated that people had been living around Parita Bay for much longer that formerly believed (Baudez 1963; Cooke and Sánchez 2004a: 15; Lothrop 1959; McGimsey 1956, 1957; Willey and McGimsey 1954). This interest in chronology also resulted in the placement of Sitio

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[2] Eighteen of the 67 graves reported by McGimsey *et al.* (1986–87) corresponded to secondary bundle burials that contained up to 11 individuals.

Conte's polychromes at the *middle* rather than the *end* of the Coclé tradition as Lothrop had originally proposed (Willey and McGimsey 1954: 124 *cf.* Lothrop 1942: 199).

The location of Cerro Mangote and Monagrillo (HE-5) sites on an ancient strand line type-sites nurtured Willey's hypothesis that their inhabitants were non- or incipiently agricultural population whose subsistence economy was dominated by collecting marine shellfish. Willey (1971) also proposed that this "littoral" pre- or incipient agricultural population was linked to other areas of tropical Pacific America and coined the term "north-west South American Littoral Tradition" to accommodate his ideas (Willey 1971).

In the 1960s, the idea that there was a pan-American formative substratum of small, simple, mostly coastal cultures, was to the forefront of researcher's thinking. Meggers and Evans entered the debate with claims for an extra-American origin for pottery. As a result, the Institute of Andean Research developed the *Interrelationship Project* (1961–62) with the goal of searching for evidence of formative period interactions between Meso, Central, and South American cultures. Charles McGimsey was assigned the task of directing surveys along the coast of Chiriquí between Punta Burica and Mariato, and also along the Darién coast (Figure 2.2). His rapid survey did not yield any evidence for cultural connections between the isthmus and the nuclear areas of Mesoamerica and the Andean region, but test excavations during this project did allow Panamanian anthropologist Olga Linares to establish the first chronological sequence for the area now known as Gran Chiriquí, backed up with radiometric dates (Linares de Sapir 1968: Figure 47).

Further developments in the chronology and geographic distribution of the

Monagrillo and other Preceramic complexes resulted from Ranere's research at the Aguadulce Shelter or AG-13 (Ranere and McCarty 1976; Ranere and Hansell 1978); Junius Bird and Cooke's (1978a, 1978b) excavations at Cueva de Los Ladrones (LP-1) and Alhajuela Lake; Ranere and Linares' re-assessment of the Monagrillo-type site (in Ranere and Hansell 1978). A consequence of research conducted in the 1970s was a re-formulation of Lothrop's 'culture areas.' The western Panama project of Linares and Ranere (1980) demonstrated that strong historical ties existed between social groups established on the Caribbean and Pacific slopes and in the central cordillera in spite of considerable diachronic cultural divergence (see also Linares 1977a). Cooke (1976, 1984) later argued that a similar situation existed in central and eastern Panama and accordingly proposed a tripartite cultural division of Panama into three "mega-culture areas", which are now known as Gran Chiriquí, Gran Coclé and Gran Darién (Figure 2.2).

The cultural elements that archaeologists have used to define these and earlier archaeological culture areas are pottery and stone tools, emphasizing painted and other wares assumed to be "non-utilitarian" as well as ideologically meaningful stone tools such as metates carved like felines. This presents a historical problem because it is known that some parts of Panama—particularly Parita Bay—were occupied continually by human groups for many thousands of years before people began to paint pottery, make gold items, or carve metates. In this and other ways, Cooke's original tripartite model portrays an unrealistic static, quasi-Boasian development of cultures whereas it is common knowledge that social groups—and the artifacts they made—clustered and dispersed in variable ways through time (Cooke and Ranere 1992c; Cooke and Sánchez 2003b; 2004a, 2004c; Cooke *et al.* 2000; Isaza 1993; Sánchez 1995). There has also been a tendency to equate uncritically the distribution of archaeological material culture, and contact-period languages and cultural geography. When Cooke (1984a) initially proposed a line running between the Indio River and the historical chiefdom of Chame as the boundary between Gran Darién and Gran Coclé, he based his decision on linguistic data gleaned from Spanish chronicles, arguing that contact period pottery distributed from Punta Chame eastwards across historical Cueva territory coincided with settlements that the Spanish said spoke a Cueva language (Figure 2.2).

How far can we project this situation backwards in time? In the light of new analyses of pottery, shell and metalwork from Venado Beach, the Spanish colonial site of Panama Viejo, and the Pearl Islands, not very far. These analyses suggest that the distribution of art styles around the marine littoral of Panama and in offshore Panama Bay islands was quite different ca. A.D. 550–700 than at Spanish contact. During the former period, cultural traits typical of Gran Coclé were produced in large numbers well to the east of the purported cultural boundary at Chame. After these dates, red-painted and modeled wares predominate over polychrome ones.

Archaeologists are a long way from knowing how this situation translates into real social and economic dynamics. Cooke and Sánchez have suggested that the fluctuations of the Gran Coclé artistic tradition around Panama Bay could be related to changes in social and economic relationships stimulated by the acquisition and distribution of raw materials for the production of personal ornaments and sumptuary goods, such as

Spondylus shells and gold (Cooke and Sánchez 2003b, 2004a, 2004c; Sánchez 1995). It is also possible, that eastern Panama came increasingly under the influence of ideas and beliefs emanating from northern South America.

We are confronted, then, with the likelihood that boundaries between the three Panamanian culture areas fluctuated in space and time in response to social parameters that have not been investigated or are as yet poorly understood. It would help to have materials analysis of relevant artifacts in order to identify production zones and routes exchange routes, but we don't have them. Nevertheless, we can conceive Panamanian culture areas as interaction zones between centers and peripheries, when each one does possess a distinctive and well-defined art style, which seems to reflect discrete belief systems and technological choices. The integrity of the Gran Chiriquí and Gran Coclé art styles can be traced back more than 2000 years. The situation for Gran Darién is more complicated. This is because no systematic surveys have been undertaken in this area and the few sites that have been excavated are located on or near the coast. In addition, there are a few radiocarbon dates which are not always well supported with the associated context.

A reasonable way of visualizing the relationship between the culture areas is in terms of 'epicenters' and 'peripheries' whose interactions waxed and waned through time in response, not only to social and economic variables, but also—in the clear case of Chiriquí—to the devastating effects of disasters, such as volcanic eruptions (Linares 1980a). Much more polychrome pottery is present at sites situated in Lothrop's old Coclé culture area (the 'epicenter') than in western Azuero and the Caribbean slopes of

Coclé (two 'peripheries').

2.2 Cultural Chronology of Gran Coclé

Fifty years after Willey and McGimsey's work in Azuero, Gran Coclé offers one of the most detailed regional chronological schemes for human settlement in the American tropics based on archaeological, paleoecological, and geomorphological data (Table 2.1). In this section I summarize the cultural chronology for Gran Coclé as it provides a background on the subsistence economy, social, and political developments that helped model the type of complex societies encountered by the Spaniards during the sixteenth century.

2.2.1 Paleoindian (11,500–9500 B.C.)

There are paleoecological and archaeological data for the colonization of Gran Coclé during the Paleoindian horizon and perhaps earlier. Information is also available for neighboring areas. The archaeological comprise: (1) evidence of Clovis and Fishtail Paleoindian points discovered in the early 1970s at Alhajuela Lake (Bird and Cooke 1978b); (2) a short-lived camp site at Vampiros-1 rockshelter (AG-145) where people mended or made Clovis tools (Cooke and Ranere 1992a, 1992c; Ranere and Cooke 1991, 1995; Pearson 2002; Pearson and Cooke 2002); (3) a quarry/workshop discovered at La Mula-West site (Cooke and Ranere 1992a, 1992c; Ranere and Cooke 1991, 1995, 1996, 2003); (4) a quarry/workshop at the Sitio Nieto, where points similar to Clovis were made (Pearson 2002, 2003); and (5) the more than 20 open sites (<0.1 ha) located above

Table 2.1
Chronological Sequence for Gran Coclé
(After Cooke and Ranere 1992, with modifications proposed
by Isaza 1993, Cooke and Sánchez 2004b, and Dickau 2005)

Date B.P.	cal Date A.D./B.C.	Period	Subsistence Economy	Flora/fauna	Diagnostic Technology
 450	1821 1520	Colonial			Majolica Olive jars
1200	A.D. 700	Late Ceramic	(Emergence of Chiefdoms)	↑	Polychrome ceramics Gold work Slab metates Points with long narrow tangs Trifacial points
2500	200 B.C.	Middle Ceramic/	Agriculture in Fertile lowlands Horticulture Hunting Fishing (Early Villages)	Maize, manioc, squash White-tailed deer, collared peccary, agouti, cottontail rabbit and armadillo Marine fish that frequent the estuary: (e.g., catfish, croakers, grunts), and species that swim in clear water columns at the edge of the estuary (lookdown, thread-herrings) Shellfish from inshore habitats (e.g., *Tivela, Donax, Anadara*)	Prismatic blades Legged metates Initial gold work Tri-colored ceramics Carved stone, bone, and shell jewelry
4500	2500	Early Ceramic	Slash-and-burn agriculture Hunting Fishing	Squash, lerén, arrowroot, sweet potato, manioc, maize, beans, yam, bottle gourd and *Capsicum* peppers White-tailed deer, peccary Freshwater and estuarine fish Shellfish from inshore habitats	Stemmed flake points Rimmed legless "breadboard" metates Early development of pottery Polished stone axes (Caribbean slopes of Coclé) Simple grinding stone slabs Edge-ground cobbles

Table 2.1 (continued)

Date B.P.	cal Date A.D./B.C.	Period	Subsistence Economy	Flora/fauna	Diagnostic Technology
4500	2500			Emergence of secondary forests	
		Late Preceramic	Horticulture	Maize and manioc, arrowroot, legumes	Chipped stone tools,
			Hunting	Deer, raccoon, reptiles, amphibians, and small birds	Edge-ground cobbles,
			Fishing	Marine fish that frequent the estuary	Simple grinding stone slabs
7000	6000				
		Early Preceramic	Horticulture	Bottle gourd arrowroot, lerén, squash, coyol palm nut, American oil palm, nance, zapote	Bifacial flaking Edge-ground cobbles
			Hunting-gathering Fishing?		
10000	9500				
		Paleoindian		Increase in burnt *Heliconia* and grass phytoliths, typical of forest gaps, and pollen from secondary forest trees, e.g., *Cecropia*	Fluted projectile points Clovis/ Fishtail styles
11500	11500				*Jobo*-like projectile points
	?		Hunting-gathering Fishing (?)	Giant ground sloth, horse, and mastodons Foothills and mountain areas of Central Panama covered with woodland and thorn scrubs	

the alluvium of secondary streams in the Santa María watershed (Cooke and Ranere 1984, 1992c; Piperno and Pearsall 1998).

The paleoenvironmental data is based on sediment cores extracted from Lake La Yeguada, located 650 meters above sea level in the Pacific foothills of Veraguas and El Valle in Coclé (Piperno *et al.* 1990, 1991a, 1991b; Piperno and Pearsall 1998, Ranere and

Cooke 2003). The cores from La Yeguada revealed a disturbance horizon of forest fires and small-scale land clearing beginning around 11,000 B.C. These features are absent during the previous 3000 years when the lake was in existence and accruing sediments during the drier and cooler conditions of the Late Pleistocene (Piperno *et al.* 1990; 1991a; Piperno and Pearsall 1998: 175–179). The disturbance horizon contains an increase in burnt *Heliconia* and grass phytoliths, typical of forest gaps, and pollen from secondary forest trees, among them *Cecropia* (Piperno and Pearsall 1998: Figures 4.3 and 5.9). According to Piperno, the evidence is consistent with modern frequencies of phytoliths from areas subject to constant anthropogenic alteration. The scenario model extrapolated from La Yeguada core data postulates that the foothills and mountain areas of Central Panama were forested during the last glaciation and the coastal plain (areas below 200 meters) was covered with woodland and thorn scrubs (Ranere and Cooke 2003; Piperno and Pearsall 1998: Figure 4.2). At the onset of the Holocene climate change, there is evidence of anthropogenic alteration of the forest, which intensified during the first millennium B.C. (Piperno and Pearsall 1998: 209–227). Two *Jobo*-like projectile point fragments found at Alhajuela Lake and La Yeguada, both on the continental divide, provide tenuous evidence of a pre-Clovis presence on the isthmus (Table 2.1; Cooke 2005: 136; Cooke and Sánchez 2004c: Figure 4i; Pearson 2002: Figure 38c; Ranere and Cooke 2003, fig. 5d).[3]

The archaeological evidence supports the permanence of people on the Gran Coclé landscape after the onset of Holocene climatic conditions, by which time the

[3] The points are similar to samples from Venezuela (*cf.* Dillehay 2000: Photo 5.1.)

Paleoindian stone-working tradition were being replace by others around 10,500 B.C. (Cooke 2005; Ranere 2000; Ranere and Cooke 2003). The stratigraphic sequences from five rock shelters—Aguadulce, Carabalí (SF-9), Corona (CL-2), Los Santanas (SE-189), and Vampiros-1—yielded evidence of a long history of occupation dating from Paleoindian to Early Ceramic Periods (Figure 2.2). The earliest ^{14}C dated deposits come from ongoing excavations at Vampiros-1 rockshelter located on an inselberg 3 kilometers from the Parita Bay coast (Pearson 2002; Pearson and Cooke 2002; Pearson *et al.* 2003). Vampiros-1 was discovered in 1982 by Cooke and Ranere during the course of their *Proyecto Santa María* (PSM), an archaeological survey designed to study the evolution of settlement and subsistence patterns of the early human groups that colonized the Santa María watershed (Cooke and Ranere 1984, 1992c). The first excavations at Vampiros-1 yielded evidence of bifacial thinning flakes associated with a calibrated date of 8,170–8,120 B.C. and cal. 7,985–7,300 B.C. (Beta-5101; Cooke and Ranere 1984). Beginning in 1999, Georges Pearson expanded excavations at the mouth of the cave and exposed an even earlier occupation floor associated with a bulk sediment date of cal. 12,080–11,200 B.C. (Appendix 1: Beta-167520; Pearson 2002; Cooke 2005: 136). Between the floor and the stratigraphic position of a charcoal sample that dated to cal. 8260–8200 B.C. (Beta-166505), he discovered bifacial thinning flakes typical of Clovis reduction techniques, scrapers, and the tip of a Fishtail fluted point (Pearson 2002: 67–71; Pearson and Cooke 2002: Figure 3b; Cooke and Sánchez 2004c: Figures 4d & p). Corona shelter, located in the foothill zone at 200 meters above sea level and 15 kilometers southeast from La Yeguada, a bifacial thinning flake was associated with a calibrated date of

11,750–8090 B.C. (Beta-19105; Cooke 2005: 136). A third dated deposit also containing bifacial thinning flakes was identified at Aguadulce shelter in the coastal plain, where dates ranged between cal. 10,869–10,408 B.C. and cal. 10,879–9887 B.C. (R-24531/2 and R-24531/1; Cooke 2005: 136; Cooke and Ranere 1992c; Piperno *et al.* 1991a, 2000).

Evidence of the production of Clovis lanceolate points has been documented at two open-air quarry/workshop sites, La Mula West and Sitio Nieto, both situated in the valley of the Parita River. La Mula-West is located on an small eroded hill now 2 kilometers from the coastline (Cooke and Ranere 1992a, 1992c; Ranere and Cooke 1991, 1995, 1996, 2003), while Sitio Nieto is adjacent to an exposed quarry vein of translucent cryptocrystalline quartz about 28 kilometers from the present-day coastline (Pearson 2002, 2003). Certain technological characteristics of the projectile point fragments from La Mula-West and Sitio Nieto workshops suggest that they represent the initial stages of the Clovis horizon (Cooke 2005: 137).

Efforts to locate evidence of Paleoindian or Preceramic occupation south of the Parita Valley have been unproductive. Prior to the PARLV survey, Pearson conducted a field reconnaissance on the *albinas* east of La Villa fluvial system where local workers had reported the presence of extensive quarry areas. He did not detect evidence of Paleoindian or Early Preceramic occupation (Pearson personal communication 2002). Likewise, Willey notes unsuccessful efforts to locate early sites between the mouth of the La Villa River and Playa Monagre (Willey and McGimsey 1954: 101).

Even though direct association between big game and human cultural remains eludes the Panamanian archaeological record, Ranere and Cooke (2003: 240) propose that the Paleoindian groups who crafted the Clovis and Fishtail projectile points were hunter-gatherers. Since their tool kit was used elsewhere in tropical America to hunt and butcher large extinct mammals such as giant ground sloth, horse, and mastodons it is likely that they would have hunted these animals on the isthmus too, seeing that their remains have been reported at paleontological sites on the Azuero Peninsula (Pearson, 2005). Since evidence for fishing has been discovered in Paleoindian contexts in Peru (Sandweiss *et al.* 1988), it is of course possible that they also fished and used other aquatic resources; but there is no evidence for it on the isthmus (see also Cooke 2005: 136).

Evidence from La Yeguada indicates that as soon as Paleoindians arrived at the lake they deliberately opened patches of the moist tropical forest with fires. Ranere and Cooke (2003: 241) believe that these fires were probably set in order to replicate the natural fire patterns of drier forests. Piperno, on the other hand, interprets the anthropogenic disturbances as part of a hunting strategy designed to "attract big game and the biomass of useful plants resulting from human interference" (Piperno and Pearsall 1998: 179). These disturbances overlap in time with contextual archaeological evidence from sites, which at the time of the Paleoindian technology would have been located, according to Piperno and Pearsall's model (1998: Figure 4.2), in different habitats, including tropical forest (La Yeguada, Corona and Alhajuela Lake) and scrubby thorn scrub zones (La Mula-West, Sitio Nieto and Vampiros). The site of Turrialba, on the eastern slopes of the Central Cordillera of Costa Rica, contains Clovis and Fishtail spear points that are technologically and stylistically similar to those reported at

Panamanian sites. The data indicate that Paleoindians in Central America were culturally affiliated all over, had tool kits that are very similar to those from well dated sites in North and South America, and moved around in a wide variety of habitats (Cooke 1998b; Ranere and Cooke 1996, 2003).

2.2.2 Early Preceramic (9500–6000 B.C.)

After the climatic change that marked the inception of the Holocene, human activity intensified in central Pacific Panama. The increase in the number of sites along the Santa María watershed and the paleobotanical record indicate that occupation was continuous and stone tool traditions continued (Table 2.1). Piperno and her research team at STRI have identified microbotanical remains of bottle gourd (*Lagenaria siceraria*), arrowroot (*Maranta arundinacea*), lerén (*Calathea allouia*), and squash (*Cucurbita moschata*) both in sediment cores raised from water bodies and incrusted into the crevices of edge-ground cobbles excavated at Carabalí, Vampiros and Aguadulce rock shelters (Cooke 2005: 140; Piperno and Pearsall 1998; Piperno and Holst 1998; Piperno *et al.* 2000). Being found in deposits dating between 8600 and 6000 B.C., these are considered the earliest plants cultivated in small house gardens or the alluvium of small streams of the seasonally arid areas of Gran Coclé (Piperno and Pearsall 1998: 287). In addition, the presence of carbonized remains of the coyol palm nut (*Acromia mexicana),* American oil palm (*Elaeis oleifera*), nance *(Byrsonima crassifolia)* and zapote (*Sapotaceae*) at Corona, Carabalí and Aguadulce shelters indicate that Early Preceramic groups also consumed wild fruits (Cooke and Ranere 1992c; Dickau 2005;

Piperno and Pearsall 1998). The lithic assemblage for the Early Preceramic Period includes stemmed and un-fluted projectile points, keeled scrapers, bifacial thinning flakes, and edge-ground cobbles (Ranere and Cooke 1996: 60–62). Evidence for activities that represent this period of early horticulture have been found on the Pacific coast and adjacent foothills of Coclé and Veraguas provinces.

2.2.3 Late Preceramic (6000–2500 B.C.)

The Late Preceramic Period marks a major turning point in the course of cultural evolution. The size and number of sites registered by the PSM show a 15% increase and their debris content is even larger (Cooke and Sánchez 2004a). Sites are still relatively small, however, being less than 1 hectare in size and mostly situated more than 15 kilometers from the coast, on elevated areas overlooking streams and rivers on the cordillera zones (400–1500 m.a.s.l.), foothills (100–400 m.a.s.l.), and Santiago Plains (Cooke and Ranere 1992b–c; Weiland 1984). Rock shelters show more continuous occupation as if they were used as dwelling sites, rather than occasional camps. Other significant changes are evident in the lithic technology and subsistence strategies. Ranere and Cooke (1996) highlight the replacement of bifacial thinning technologies with core reduction, and an increase in edge-ground cobbles and simple grinding stone slabs as hallmarks of the Late Preceramic Period (Table 2.1). The latter are associated with an increase in the reliance on plant foods and cultivation (Ranere and Cooke 1996; Piperno and Pearsall 1998). Most of the Late Preceramic sites documented in the Santa María watershed are close to sources of high-quality chalcedony found in pebble, cobble or boulder form (Weiland 1984).

Two new exogenous plant foods—maize and manioc—appear for the first time in the paleobotanical record of Gran Coclé during the Late Preceramic. Piperno (1988: 168–176; Piperno *et al.* 1985) identified maize (*Zea mays*) pollen and phytoliths in the Late Preceramic sediments of Los Ladrones shelter and *Zea* phytoliths from the earliest occupational level of Los Santanas (SE-189) shelter dating to approximately 6000 B.C. Piperno's additional starch grain analyses yielded evidence of a primitive race of maize (similar to the Nal Tel and Harinoso de ocho), domesticated manioc, arrowroot, and unidentified legumes contained within the pounding facet of edge-ground cobbles and the surface of a boulder grinding stone base from deposits dating between ca 6000–5000 B.C. at the Aguadulce shelter (Piperno and Holst 1998: 771; Piperno and Pearsall 1998: 219).[4] Since maize and manioc (*Manihot esculenta*) were the most common isolated residues identified on the Aguadulce tools, Piperno and Holst (1998: 770) suggest these were most likely consumed on a regular basis. La Yeguada records also show substantial changes in the landscape due to the introduction of slash-and-burn agriculture early in the Late Preceramic Period (Table 2.1). The disappearance of the primary forest and the emergence of secondary forests are seen through the pollen and phytolith evidence, while there is also phytolith evidence to show increased frequencies of burnt grasses between 6000 and 3000 B.C. (Cooke and Ranere 1992c; Piperno and Pearsall 1998: 225).

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[4] The Panamanian data accord very well with a very early (10,000–8000 B.C.) domestication of *teosinte* in southwestern Mexico which is where the vast majority of geneticists think maize evolved gradually from this plant, and of a subsequent dispersal of early cultivated varieties southwards into South America (see Pohl *et al.* 1996; Pope *et al.* 2001).

Coupled with the gradual intensification and diversification of farming is the exploitation of coastal resources after the sea level rose (Clary *et al.* 1984; Cooke and Ranere 1999). Cooke's faunal analyses indicate that people who settled at Cerro Mangote (cal. 6000 and 4000 B.C.), for example, focused on fishing, shellfishing, and crab collecting in estuaries, as well as hunting deer and raccoon, and procuring reptiles, amphibians, and small birds in a variety of habitats including coastal and gallery woods (Cooke and Ranere 1992 a-c, 1999). Deer remains are abundant in Cerro Mangote's middens. All adult bones with distinguishing characteristics are referable to the white-tailed deer (*Odocoileus virginianus*), the larger of the two Panamanian deer species, which is associated with the anthropogenic alterations of the landscape, since they thrive in uncultivated areas filled with secondary forest, and grasslands (Cooke and Ranere 1992c; Piperno and Pearsall 1998). In contrast, bone isotope geochemistry obtained from 69 samples of Cerro Mangote's human bones yielded low values of nitrogen isotope ratio ($\delta\ ^{15}N$) pointing to little consumption of protein from marine resources (Norr 1995). For Cooke *et al.* (1996) the problems generated by the isotope ratio interpretation are most likely related to the fact that, isotopically, estuarine organisms tend to have an intermediate position between marine and terrestrial. The archaeofauna from the site indicate its inhabitants consumed fish is technically "marine", but because the majority spend most or all of their lives in the oligohaline stretches of the coast and tidal river they would give an intermediate isotopic signal (Cooke *et al.* 1996: 118).

Bone collagen results showed the predominant consumption of a terrestrial diet with significant amounts of carbon isotope ratio of C_3 plants and some C_4 plants, whose source Piperno assumes is most likely maize (Piperno and Pearsall 1998: 291), while the bone apatite values indicate that the diet was based on terrestrial fauna and C_4 plants. To explain the discrepancies between the archaeological and isotopic data, Piperno (in Piperno and Pearsall 1998) and Norr (1995) suggest Cerro Mangote was most likely occupied during the seasonally dry periods by groups that spent the rest of the year farming inland (see also Cooke and Ranere 1992c: 269). Cooke cautions, however, that with the available data it is impossible to distinguish between groups of people moving seasonally between coastal and inland sites and a homogenous group simultaneously occupying both coastal and inland sites, and moving resources between them (Cooke 2005: 143). Based on the size of Cerro Mangote (1750 m^2), Cooke (2005) estimates that the site would have had a population of about 30 people (Table 2.2).

Table 2.2
Population estimates available for different sites in Gran Coclé

Site	Period	Site Size	Population estimates
Natá	Colonial (1519)	100 ha[a]	1,500 people[b]
El Hatillo (HE-4)	Late Ceramic E	19.5 ha	120 people[c]
El Hatillo (HE-4)	Middle Ceramic C	20.4 ha	302 people[c]
Sitio Sierra	Middle Ceramic	42 ha	900 people[d]
La Mula-Sarigua	Middle Ceramic A	58 ha 19 ha	900 people[e] 123 people[c]
La Mula-Sarigua	Early Ceramic B	8.4 ha	550 people[e]
Zapotal	Early Ceramic	3.1 ha	500 people[f]
La Mula-Sarigua	Early Ceramic A	1.3 ha	50? people[f]
Monagrillo	Early Ceramic	1.4 ha	200 people[f]
Cerro Mangote	Late Preceramic	1,720 m^2	30 people[g]

[a] Breece 1997; [b] Espinosa 1994a; [c] Haller (2004); [d] Cooke (1998C); [e] Hansell (1988); [f] Cooke and Ranere (1992c); [g] Cooke (2005)

The PSM proved that marine resources were moved some distance from the coast as is evident in Los Ladrones and Aguadulce Late Preceramic and Early Ceramic deposits (Cooke 2001b; Cooke and Jiménez 2004). These sites are located at 25 and 18 kilometers from the coast respectively. In the case of Cerro Mangote, there is evidence of Caribbean goods brought to the site from across the cordillera during the Late Preceramic Period. Manatee (*Trichechus manatus*) ribs found in middens at Cerro Mangote are evidence for contacts with the Caribbean because, as far as is known, manatees were not present in the eastern tropical Pacific (Cooke and Ranere 1992c).

2.2.4 Early Ceramic (2500–200 B.C.)

The paleobotanical record from La Yeguada indicates that beginning in the third millennium B.C. the "frequencies of both particulate charcoal and pollen of woody secondary taxa decline and pollen and phytoliths of grasses reach their highest frequencies" (Piperno and Pearsall 1998: 295). According to Piperno the intensification of agriculture is such that secondary growth wood taxa are scarce (Piperno and Pearsall 1998). Piperno and Pearsall argue that, as the fertility of the land decreased and the growing population became more dependent on cultivated plants, they were forced to look for more fertile areas in the alluvial bottomlands of the coastal plains. Paleobotanical data from Aguadulce Shelter indicates that severe environmental degradation was not limited to the foothills. The Early Ceramic levels of this site contain *Curatella americana* phytoliths. This fire-resistant species is dominant in areas that are regularly burnt (Piperno and Pearsall 1998: 295).

The third millennium B.C. witnessed new technological developments with the introduction of ceramics and polished axes. In a continental context, this date is late considering the fact that pottery appeared in Brazil, Colombia and Ecuador during the fifth and fourth millennium B.C. (Cooke 1995; Cooke and Ranere 1992c). Cooke and Ranere (1992c) argue that Monagrillo, Panama's first pottery, was developed locally (Table 2.3). Their argument is supported by the fact that the technology, vessel shape, and decorative elements typical of Monagrillo ceramics do not share similarities with any earlier or coeval ceramic complexes from Colombia (Monsu, Puerto Hormiga) Ecuador (Valdivia) or even Costa Rica (Tronadora; *cf.* Hoopes 1992: Figures 1–4). It is now clear that it was used throughout the foothills and cordillera of Coclé and Veraguas provinces since it has been recorded, not only at Aguadulce Shelter and Los Ladrones, but also in smaller quantities at the Carabalí, Corona, Los Santanas, and Río Cobre rock shelters. At all these sites except Río Cobre, Monagrillo sherds appear stratified directly above Preceramic strata (Cooke 1995, 2005). John Griggs (2005) recently found Monagrillo sherds at Calaveras Shelter (LP-8), located on the humid Caribbean slopes of Coclé, 28.5 kilometers south of the Caribbean coast (Griggs 2005). The Monagrillo sherds at Calaveras were associated with four radiocarbon ranging from cal. 1770–1395 B.C. (Beta-143855, Beta-131421, Beta-131423, Beta-131425; Griggs 2005).

Wherever found, Monagrillo pottery represents the first attempts on the isthmus to create non-perishable receptacles for containing liquids, drinking, eating, and cooking (Figure 2.3). Cooke (1995) has suggested that this pottery was made extemporaneously with locally available clays. Monagrillo vessels and potsherd from coastal sites like Monagrillo and Zapotal (HE-15/PR-32) were made using coarse sand, while the samples from inland rock shelters suggest the use of river sand (Cooke 1995; Isaza 1993). John

Hoopes (1995) and Jo Ann Pratt (1999) suggest that the adoption of pottery could be the result of the changing ways in which people were preparing and storing foodstuffs. Coupled with this, Cooke finds it relevant to note that it was the difficulty of providing sufficient plant containers, such as gourds (*Lagenaria*, *Crescentia*) that forced people to create new ways of producing durable containers for both storage and cooking (Cooke 1995; 2005: 143).

Table 2.3
Gran Coclé Ceramic phases

		GRAN COCLÉ Ceramic Phase	
cal Date B.C./A.D.	**Period**	**Parita Bay**	**Tonosí Valley**
1821			
	Post-Colonial	El Tigre	
1650			
	Colonial	Mendoza	
1522			
	Late Ceramic D	El Hatillo	
1400			
	Late Ceramic C	Parita	
1100			
	Late Ceramic B	Macaracas	Bijaguales
950			
	Late Ceramic A	Conte	
700			
	Middle Ceramic C	Cubitá	La Cañaza
550			
	Middle Ceramic B	Tonosí	El Indio/Tonosí
250			
			Búcaro
A.D. 1	Middle Ceramic A	La Mula	
200 B.C.			
	Early Ceramic C	El Agallito	
600			
	Early Ceramic B	Sarigua	
1200			
	Early Ceramic A	Monagrillo	
2500			

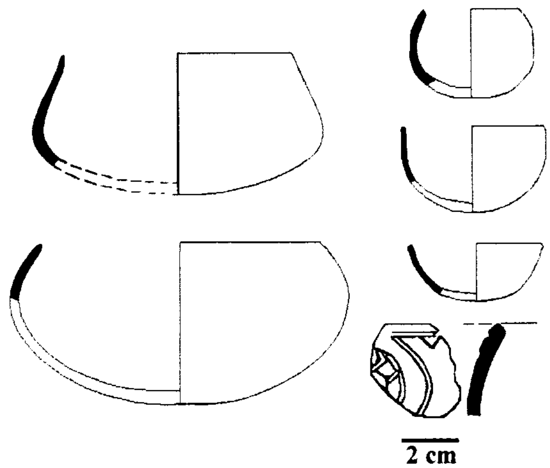

Figure 2.3 Monagrillo vessel reconstructions from Cueva de los Ladrones and Aguadulce shelter (redrawn from Cooke 1995: Figures 14.2 and 14.4G)

For the most part the chipped tool and ground stone assemblage of the Early Ceramic remained unchanged from Late Preceramic times (Table 2.1). Griggs (2005: 321, 330) recently found evidence, however, for polished stone tools at sites with Early Ceramic components in the Coclé del Norte drainage (Griggs 2005: 321, 330). Prior to Griggs' discovery, it was estimated that the polished axe technology postdated the first millennium B.C. (Cooke and Ranere 1992c: 277; Piperno and Pearsall 1998: 295; Ranere and Cooke 1996: 70). This important find challenges the idea that the clearing of the forests during the Late Preceramic were only done through fire, particularly for the humid Caribbean forest "where the vegetation cannot be burned unless felled" (Griggs 2005: 320). I should point out, that although Junius Bird and Cooke (1978) found two polished axe chips stratified in the Late Preceramic layers at Ladrones, but they rejected them as intrusive (Ranere and Cooke 1996: 70).

Currently, a consensus among scholars holds that, even though food production and slash-and-burn agriculture can be documented back to the Early Preceramic Period for those areas of the isthmus with pronounced dry seasons, it was not until 200 B.C. that permanent villages are visible archaeologically (Cooke and Ranere 1992c; Hansell 1987; Ranere and Cooke 1996; Weiland 1984). Coeval developments were documented in Gran Chiriquí where the earliest evidence of village life based on maize agriculture dates back to La Concepción phase (~ 300 B.C.) in the Chiriquí plains (Linares 1980a: 240; Linares *et al.* 1975; Linares and Sheets 1980). In Gran Darién, cores taken from the Cana Swamp and Lake Wodehouse in the upper Tuira Valley (Figure 2.2) yielded high amounts of *Zea* pollen, which indicate that maize was being cultivated in the area by 2000 B.C (Bush and Colinvaux 1994: 1765). The paleobotanical record from the Gatún Lake shows that deforestation and burning episodes intensified between 1200 B.C. and A.D. 150 (Piperno and Pearsall 1998: 297). Griggs' (2005) archaeological data for the Caribbean watershed from the River Coclé del Norte to the Costa Arriba suggest a noticeable but lower-level growth and concentration of population.

Phytolith and/ or starch grain data indicate that the following plants were under cultivation during the Early Ceramic Period at site located around Parita Bay: squash, lerén, arrowroot, sweet potato (*Ipomoea batatas*), manioc (*Manihot esculenta*), maize, beans, *Dioscorea* yam, and bottle gourd (Piperno and Pearsall 1998), and *Capsicum* peppers (Perry *et al.* 2007).

The Early Ceramic Period marks a major shift in settlement pattern for Gran Coclé as coastal sites increase in number and size. As in earlier times, the coastal inhabitants obtained food from both coastal and inland habitats. The people who lived at Cueva de los Ladrones, located at an elevation of 400 meters above sea level, between the Coclé plains and the continental divide, hunted white-tailed deer, peccary (*Tayassu* *tajaçu*), and other mammals, but also consumed freshwater and estuarine fish, and mollusks from inshore habitats. This led Cooke (1995: 179) to propose that the cave was "home enough to attract kinsmen on social trips or to send people on a long walk in search of something different to eat." The fish, for example, could have traded in from kin groups living on the coast (Cooke personal communication 2006).

The sizes of the largest settlements associated with the Monagrillo ceramic complex have been estimated as follows: Zapotal (3.1 hectares), the Monagrillo-type site (1.4 hectares) and La Mula-Sarigua (1.3 hectares; Cooke and Ranere 1992c: 273; Hansell 1988). All three sites are located within 25 kilometers of Parita Bay coast and attained population densities of 50 to 500 people (Table 2.2). Of the three, Monagrillo contains a greater density of refuse and, based on its radiometric dates, was occupied for a longer period of time. At Zapotal, located 7 kilometers up the Santa María River, Monique Giausserand (Yale University/PSM) discovered the edge of a small oval structure presumably made of stick or cane walls (Cooke 1995; Cooke and Ranere 1992c: 273). A shell date obtained from underneath a hearth feature at the center of the structure yielded a result of cal. 1660–1220 B.C. (Beta-20850, Cooke 1995: 173). This is the earliest structure documented in the region.

Ranere and Linares re-assessed the Monagrillo-type site in 1975 demonstrating that it was first used early in the fourth millennium B.C. when people camped on a sandy beach subject to wave action (Cooke 1995: 171; Ranere and Hansell 1978). By approximately 2000 B.C. a barrier beach formed offshore, creating a lagoon in the surrounding area that favored a more permanent occupation. Monagrillo's archaeofauna suggests its inhabitants consumed both fish and terrestrial animals (Cooke 2001b; Cooke and Jiménez 2004; Ranere and Hansell 1978). The most common fish taxa belong to the sea catfish family Ariidae—e.g., the Congo sea catfish (*Cathorops furthii*), Chihuil sea catfish (*Bagre panamensis*), many-rayed sea catfish (*C. multiradiatus*)—all shoaling species which swim in shallow coastal waters and frequent the estuary. The Pacific lookdown (*Selene brevoorti*) and Pacific thread-herrings (*Opisthonema libertate*) were also frequently captured. Other sources of protein included white-tailed deer, collared peccary, agouti (*Dayprocta punctada*), cottontail rabbit (*Sivilagus*), and armadillo (*Dayspus*).

Patricia Hansell (1979) who studied a sample of Monagrillo's molluskan fauna, extracted from a 0.3 meter column of one of Ranere's excavations, noted the dominance of sandy beach *Tivela* clams, the same genus which overwhelmingly dominated in the samples documented by Willey and McGimsey (1954: Appendix I, Table 8). She proposed that these clams would have been collected from sandy beaches exposed to wave action on the opposite side of the bar (Cooke 1995: 171). By 1400 B.C. the lagoon began to fill up creating conditions appropriate for mangrove encroachment and rendering the locale less attractive for habitation. By the end of the first millennium B.C. the Monagrillo-type site was abandoned. Subsequently, it was sporadically re-occupied by groups of people who added subsurface features both in the later pre-Columbian and historic times (Cooke 1995; Ranere and Hansell 1978; Willey and McGimsey 1954). In historic times, there is evidence that it was used for salt-boiling activities: a fire-pit with El Tigre collared jars was carbon-dated to AD 1665–1955 (Beta-46784; Footnote 1).

The third littoral site that shows evidence of growth during the Early Ceramic is La Mula-Sarigua (PR-14). This site sits on an eroded marine terrace overlooking the Sarigua *albina*, about 2 kilometers from the coast and half a kilometer west of the Parita River (Hansell 1987: 121; Willey and McGimsey 1954). Intensive surveys and excavations directed by Hansell (1987, 1988) of the PSM, indicates that La Mula-Sarigua grew from 1.3 ha in the Early Ceramic A to 8.4 ha during the first millennium B.C., a growth of about 6%. This development is coeval with the abandonment of neighboring coastal sites like Monagrillo.

Elsewhere in central Pacific Panama, paleoecological research has documented the intensification of slash-and-burn agriculture, which led to severe degradation of productive soils in the uplands. I mentioned above that the first millennium B.C. is seen by regional archaeologists as the period during which agricultural populations gravitated away from the foothills on the Pacific slopes and towards the alluviated bottomlands where they established nucleated villages. I also warned that this hypothesis is weakened by the fact that the depth of the colluvium in the appropriate areas is such that earlier sites may well lie buried well beneath it. At the same time, evidence from La Mula-Sarigua and Cerro Juan Díaz (LS-3) substantiates the proposal that it was during the period of manufacture of the La Mula polychrome ceramic style (200 B.C.–A.D. 250) in the subsequent Middle Ceramic Period when we have the most palpable evidence for this kind of change.

La Mula-Sarigua provided such an ideal place for human settlement being situated between the productive alluvium and the coast (Hansell 1987, 1988). Added to its geographic setting was the presence of a large (5 ha) outcrop of workable chalcedony that eventually turned into a valuable resource for the production of household tools (Hansell 1988: Plate 41; Cooke and Ranere 1992c: 278; Ranere and Cooke 1996: 67–70).

2.2.5 Middle Ceramic (200 B.C.–A.D. 700)

The Middle Ceramic Period marks the beginning of early village life in Gran Coclé. The sites that provide the most significant data about this period are: La Mula-Sarigua, Sitio Sierra (AG-3), and Cerro Juan Díaz, located along the Parita Bay littoral, Búcaro (TI-22), La India (TI-1), El Indio (TI-18), La Cañaza (TI-9), and El Cafetal (TI-35) in the Tonosí valley (Figure 2.2). Most of the rock shelters excavated by the PSM on the Pacific side of Gran Coclé were used little or not at all after about 500 B.C. The exceptions are the Vampiros-1 shelter at the mouth of the Santa María River, which was used as a fishing station from about 200 B.C. to A.D. 250 (Carvajal *et al.* 2006) and the Río Bermejito (SI-1) rock shelter in the cordillera, which also was settled in later centuries (Figure 2.2). Increasing settlement nucleation is also apparent in the contiguous Parita and La Villa river valleys where Haller (2004) and the PARLV documented rapid population growth particularly by the end of the Middle Ceramic Period.

2.2.5.1 La Mula-Sarigua (PR-14)

Mikael Haller's recent survey of the lower Parita Valley showed that between 200 B.C. and A.D. 500, 72% of the sites he registered were clustered within 1 km^2 of La Mula-Sarigua (Figure 2.2). During this time he estimates that La Mula-Sarigua reached a settlement size of 19 hectares with a population of 123 people (Haller 2004: 61). Haller's estimates differ considerably from those provided by Hansell (1987, 1988) who proposed that by the Middle Ceramic La Mula-Sarigua was a 58 ha village housing 570 to 700 people (based on calculations of 10 people per hectare) and 960 based on an estimate of 5 persons per house cluster (Cooke and Ranere 1992c: 275; Hansell 1988: 200). Differences in La Mula site estimates may in fact lie in the way each investigator conducted their research.

> "Hansell (1988) determined her site boundaries by collecting samples every 25 m along transects systematically aligned 100 m apart throughout a 2 km^2 survey zone. If materials were separated by more than 100 m, they were considered separate entities, but still part of the La Mula-Sarigua site. On the other hand, if collection units in the Río Parita survey were separated by more than 100 m they were assigned to separate sites. It is difficult to evaluate these estimates with a one to one comparison; the Río Parita Valley survey was conducted with surface collections, whereas Hansell incorporated several collection strategies (surface collections, shovel tests, and excavation units), but does not say how she standardized these into one site estimate. It is disconcerting that the Río Parita survey does not come close to Hansell's estimate. Hansell (1988) conducted three field seasons of intensive investigation at the site and, thus, her estimate of 58 ha, although not substantiated by this project, is plausible. The salt flat zone is a very active erosional and depositional area with the presence of wind-borne fine salt deposits, which have contributed to the destruction, alteration, or re-deposition of diagnostic ceramics and, thus, affecting the site-size estimates for the Río Parita survey" (Haller 2004: 61–62).

Despite the site-size and population estimate discrepancies, there is no doubt that La Mula-Sarigua was at the apex of a site-size hierarchy during the La Mula phase (200 B.C.–A.D. 250) of the Middle Ceramic Period (Haller 2004: 130). The internal layout of La Mula-Sarigua includes dwelling areas, midden deposits, burial features, and workshops for lithic and shell tool production (Hansell 1987, 1988). Most prominent are the lithic workshops with large numbers of cores and tools at different stages of production as indicative of a manufacturing center for chipped stone tools (Cooke and Ranere 1992c: 278; Hansell 1987). The presence of other already finished tools made from materials not available at the site, such as ground stone tools in the form of polished stone axes, "breadboard" metates, and manos suggests that some sort of trade or exchange mechanism was established with distant inland regions (Hansell 1987, 1988). Cooke and Ranere (1992c: 281) suggest that the means to bring the tools to the site was probably organized along kinship lines: "…that is adult males who lived in La Mula-Sarigua traveled to an ignimbrite or basalt dyke upstream, where they pitched camp, stayed long enough to make as many metates or axes as they could, and carried them on their back to their villages … subsequently distributed among family members." The problem is that we need materials analysis in order to determine how far people traveled. Also it is impossible to distinguish people camping out at the sources from the goods entering by trade (Cooke personal communication 2006).

Can we then support the hypothesis that Mula-Sarigua represents the emergence of a 'central place' (Cooke and Ranere 1992c; Hansell 1987, 1988)? According to Haller (2004:66) it is unlikely, since there are no noticeable signs of the presence of social ranking, administrative, or specialized ceremonial functions at the site. The inhabitants of La Mula-Sarigua probably benefited economically from the proximity and size of the large banks of chalcedony. By around A.D. 500, the coast had prograded away from La Mula-Sarigua and the *albinas* had expanded, rendering the site less attractive for habitation (Cooke and Ranere 1989, 1992c; Haller 2004: 72; Hansell 1988: 241). Coupled with this situation is the likelihood that the rich chalcedony outcrop became exhausted (Cooke personal communication to Haller 2004: 111). As a result, people moved to the floodplains farther up the Parita River and south to the lower La Villa valley, perhaps to Cerro Juan Díaz which increased in size during this same period (Haller 2004: 111).

Concurrently with settlement nucleation of La Mula-Sarigua there is evidence for important changes in the cultural inventory, which themselves allude to the existence of localized production centers. The edge-ground cobbles and their simple bases used as plant-grinding tools, were replaced by cylindrical manos and rimmed legless "breadboard" metates. One breadboard metate found at La Mula-Sarigua had starch grains from maize, Calathea, yam (*Dioscorea*) and manioc embedded on its grinding surface (Piperno and Holst 1998). The main innovation in the chipped stone industry was the stemmed pointed flake tool made from a prepared core and further modified into a multipurpose tool used either as a scraper, spoke shaver, graver, perforator or knife (Figure 2.4; Ranere and Cooke 1996: 75). True prismatic blades also appeared, but not before the end of the first millennium B.C.

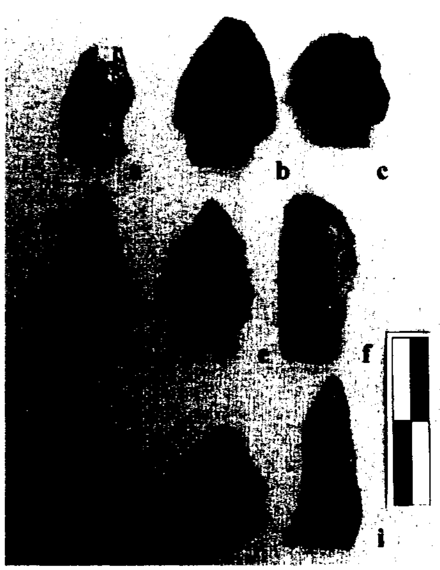

Figure 2.4 Chalcedony tools found at site LS-3. a–e represent pointed tools made from prepared cores, with stems made by notching. These multipurpose tools, known as 'La Mula points' were used as scrapers, spokeshaves, gravers, perforators or knives. Scale: 4 cm

With regard to ceramic production, a notable improvement in manufacturing techniques and firing control is visible in the small Middle Ceramic A samples from La Mula-Sarigua. Innovations at this time include the use of black and red pigments together, large collars, and the use of calcium carbonate to fill incisions (this material is illustrated in Cooke and Ranere 1992c, Hansell 1988). The vessels were better made and incorporated a wider variety of shapes and decorative designs than in the preceding Early Ceramic period. Other craft technologies introduced during the first half of the first millennium A.D. include production of non-utilitarian tools and adornments made from shell, bone, stone, and metal.

2.2.5.2 Sitio Sierra (AG-3)

Sitio Sierra represents a 42-hectare village (200 B.C.–A.D. 1520) situated on a flood-free mound along the Santa María River (Figure 2.2). This site was test-excavated in 1969–71 by Richard Cooke and the results summarized in Cooke 1972. It was re-tested in 1973 during a field school for the *Instituto Nacional de Cultura* (INAC) and again in 1975. Some aspects of the 1975 work were summarized by Cooke (1979, 1984) and also by Isaza (1993). Cooke's excavations at the site recorded three levels of superimposed palm thatch and cane-wall domestic structures dating between cal. 65 B.C. and A.D. 475 (Isaza 1993: 71–77). One of the structures (labeled context A/1-2) measured 8 by 4 meters and contained a hearth and two hourglass pits each lined with sand and stone (Isaza 1993: Figure 13). At the base of second smaller round structure (context B/1-1) La Mula painted pottery was well stratified in refuse lenses associated with a radiocarbon date of cal. 190 B.C.–A.D. 115 (I-9702 and I-9703; Isaza 1993: Figure 13 and 16). Adjacent to the second structure was a burial ground—clearly for non-elite peoples—where 25 individuals were found buried in a flexed position with a few utilitarian artifacts. Interments from Sitio Sierra point to the existence of male artisans such as an "axe-maker", while female individuals were buried with domestic tools, particularly those associated with food preparation, such as manos and knives (Cooke 1977a; Isaza 1993: Table 6).

Faunal and plant remains collected from the fill that covered the structures as well as the adjacent middens indicate that the early residents of Sitio Sierra cultivated large amounts of maize (mostly 8-12 rowed varieties) and hunted in adjacent savannas and river-bank forest concentrating on white-tailed deer, iguanas (*Iguana iguana*), and birds (Bird 1984; Dickau 2005). In addition, they collected small reptiles and amphibians; while also consuming a lot of fish (Cooke *et al.* 1996: 119). Interestingly, Sitio Sierra is located at 12 kilometers from to coast of Parita Bay, and a large percentage of its fish comprises marine taxa that do not enter the turbid estuary, but live instead in the deep water of the bay itself. This suggests that although the community focused on food sources near the settlement, some kind of exchange mechanism allowed the residents to acquire marine fish (Cooke and Ranere 1999: 118). Carvajal and Cooke (2007) propose that the Vampiros rockshelters, located at the mouth of the Santa María river, were used to preserve fish for up-river transport. Thus the evidence from Sitio Sierra demonstrated that pre-Columbian communities were well stocked with meat and fish.

The presence of a wide variety of maize macrobotanical remains at Sitio Sierra also indicates that maize agriculture became more productive and a better provider of food, a pattern that continues through the Spanish conquest (Cooke and Ranere 1992c; Piperno and Pearsall 1998). Additional analyses of human bone for ratios of stable isotopes of carbon and nitrogen, and stable carbon isotope composition of bone apatite carbonate from Sitio Sierra and La Mula-Sarigua, although considered less revealing than the archaeozoological and paleobotanical data (Cooke personal communication 2006), indicated that the inhabitants of both villages subsisted on a mixed diet with both terrestrial and marine protein and both C_3 and C_4 plant foods (Norr 1995 214–223).

2.2.5.3 Cerro Juan Díaz (LS-3)

The third site that exemplifies the settlement shift towards alluviated bottomlands is Cerro Juan Díaz. This is one of the sites that I surveyed in the lower reaches of the La Villa River. Cerro Juan Díaz represents a multicomponent settlement occupied between 200 B.C. and the Spanish conquest, and latter re-occupied after conquest (Carvajal 2006; Cooke *et al.* 2003b). When this site was initially occupied, it seems that the southern edge of the prominent central hill was modified for use as a platform for burials and, perhaps, other kinds of rituals or gatherings. The extent of the modification has not yet been determined by careful analysis, however, while its precise age has likewise not been clarified (Cooke and Sánchez 2003a, 2004a: 44; Desjardins 2000). Some of the earliest graves on the platform show evidence of being used for several generations as earlier bodies were pushed to the side and sometimes their offerings re-used by the more recent interments, i.e. Grave 1, 2, 16, 94 (Cooke *et al.* 2000: Figure 8.6). Only a few individuals, particularly males (both adult and sub adult) were associated with a variety of small adornments made of marine shells (*Spondylus*), polished stone—two highly polished bone tubes, one made out of agate and another out of an unidentified blue stone—perforated puma (*Puma concolor*), jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), and raccoon (*Procyon lotor*) canines, and the earliest radiometrically dated metal objects in Lower Central America (Bray 1998; Cooke 2004b; Cooke and Sánchez 2004b; Cooke *et al.* 2000, 2003a).

The association of metal objects and animal tooth necklaces as grave goods is confirmed through one of Sitio Conte's oldest burial features, Grave 1 (Lothrop 1937: Figure 33 and 207; Cooke 2004b: 278). Such associations seem to designate social identities—including shaman, healer, chanter, and/or apprentice—based on age, sex and occupation (Cooke 2004b; Cooke *et al.* 2003a: 117–118).

Coeval cemeteries at La India, El Indio, La Cañaza, and El Cafetal in the Tonosí Valley (González 1971; Ichon 1980), and Venado Beach (Lothrop 1954) include graves with similar offerings to those identified at Cerro Juan Díaz (*cf.* Bray 1992: Figure 3.2; Cooke and Sánchez 1998: Figure 4, Cooke *et al.* 2000: Figures 8.1-8.2 & 8.7-8.8; Sánchez and Cooke 1998: Figure 2). In some cases—such as at El Indio, La Cañaza and El Cafetal—individuals of lesser age where associated with the most elaborate goods and treated more as a class than their elders (Table 2.4). This practice intensified from El Indio (A.D. 250–500) to La Cañaza (A.D. 500–900) phases[5] (Ichon 1980; Briggs 1989, 1993).

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[5] El Indio and La Cañaza phases refer to the local sequences defined by Alain Ichon (1980) for the Tonosí Valley in the southern Azuero Peninsula (see Table 2.3).

Table 2.4
Socio-geographic information from Gran Coclé sites

Archaeological site	High status burials	Low status burials	Stone floors	Lines of Stone columns	Stone terraces or stone-faced mounds	Ritual platform	Houses	Workshops
Cerro Cerrezuela	No	No	No	No	Yes[3]	No	No	No
Cerro Juan Díaz	Yes[2]	Yes[2, 3]	No	No	Yes[2, 3]	Yes[2]	Yes[2]	Yes[2]
Cerro Mangote	No	Yes[1]	No	No	No	No		
Cerro Hacha					Yes[2]			
El Cafetal	Yes[3]	Yes[2]	No	No	No	No	No	No
El Caño	Yes[3]	Yes[2]	No	Yes[3]	Yes[3]	Yes[3]	No	No
El Hatillo	Yes[2, 3]	Yes[2, 3]	No	No	No	Yes[3]	Yes[2, 3]	No
El Indio	No	Yes[2]	No	No	No		Yes[2]	No
La Bernardina	Yes	No	No	No	Yes[3]	No	No	No
La Cañaza	Yes[3]	Yes[2]	No	No	No	No	No	No
La Mula-Sarigua	?[2]	Yes[2]	No	No	No	No	Yes?[2]	Yes[2]
La India	No	Yes[2]	No	No	No	No	No	No
Monagrillo	No	Yes	No	No	No	No	Yes[2]	Yes?
Sitio Conte	Yes[2, 3]	Yes[2]	No	Yes[3]	No	No	No	No
Sitio Sierra	No	Yes[2]	Yes[2]	No	No	No	Yes[2]	Yes[2]
Venado Beach	Yes[2, 3]	Yes[2, 3]	No	No	No	No	No	No

[1] Pre-Ceramic
[2] Middle Ceramic Period
[3] Late Ceramic Period

Select children's graves at El Indio were found with the most elaborate goods—Tonosí style double-shaped globular jars—while adolescents were buried with large numbers of shell objects. The child interments at El Cafetal not only incorporated a wider variety of grave items—shell and tumbaga pendants—but also were placed in a formal cemetery. Despite the social disparities portrayed in the El Indio and El Cafetal interments, Briggs (1989: 62–63; 1993) proposes that such practices still point to an egalitarian society. Differences in the mortuary offerings in the Tonosí Valley sites are based on age, gender and activity, rather than rank, repeating Cerro Juan Díaz and Sitio Sierra mortuary practices.

A slightly different situation was documented at Venado Beach, a rich cemetery situated at the southwestern entrance to the Panama Canal, at which several burials were excavated mostly by amateurs without professional supervision (Table 2.4). Of the 369 individuals found inside single and multiple graves, 95.5% were identified as adults and 4.5% as infants (Lothrop 1954: Table 8). As at Cerro Juan Díaz, the Venado Beach graves included a wide variety of burial treatments. Among the primary burials, 50% were found in tightly flexed position and 14% in extended position. An important feature of Lothrop's interpretation of these data is his proposal that 19% showed signs of "mutilation"—a missing arm, leg, jaw, fingers, upper front incisors or evidence of a broken back or neck. Evidence for broken necks is particularly interesting because it suggests execution or war wounds. Some commentators have accepted Lothrop's word for this behavior (e.g., Redmond 1994b), but it would be useful to have a modern re-evaluation by a forensic anthropologist. Secondary graves include bundle burials of disarticulated bones (6.5%) and urn burials (17%). For the most part, the latter contained the articulated bodies of infants buried with gold jewelry and pottery. In these cases, the urns were placed beside an adult grave without funeral offerings. Other urns contained the bundled remains of adult individuals. Bundled burials were however the most elaborate as they contained the richest offerings (Lothrop 1954: 229).

Venado Beach is an important site because it was partially coeval with Cerro Juan Díaz. Although details of burial associations have not been published, the richest interments probably antedate those at Sitio Conte or are at least coeval with the earliest graves there—Graves 1 and 32 (Lothrop 1937).

A recent analysis of Venado Beach's artifacts housed at Dumbarton Oaks and the Peabody Museum at Harvard University undertaken in 1996 by Luis Sánchez (CJDP) noted that much of the funerary pottery of this site is stylistically linked to his recently defined Cubitá style cal. A.D. 550–700 (Table 2.3; Sánchez 1995; Sánchez and Cooke 2000). Of the 269 vessels Sánchez analyzed, 63 were associated with skeletons and 44 with caches (Sánchez and Cooke 2003: 13–14). Sánchez concluded that the majority of Venado Beach painted vessels associated with skeletons (95%) and caches (87%) belong to the Cubitá style, while only 3% of the painted pottery associated with skeletons corresponds to the early phase of the Conte style (A.D. 700–850). Furthermore, the Cubitá vessel varieties present at Venado Beach are the same ones reported at Cerro Juan Díaz (Sánchez and Cooke 1998, 2003). What differentiates the two sites is the better quality and apparent quantity of shell and gold objects found at Venado Beach. The close similarities in polychrome pottery and jewelry with Cerro Juan Díaz suggest some of the grave offerings—shell ornaments and pottery vessels—were locally produced in the Parita Bay and/or perhaps the Pearl Islands (Cooke and Sánchez 1998, 2004a).

In the late 1920's Sigvald Linné noted that there were no remains of pearl oysters or *Spondylus* shells on the Pearl Island middens leading him to propose, not unreasonable, that they were too valuable to be eaten and were thus used exclusively as trade items linking the island communities with those in mainland (Linné 1929: 10, 129–134). What is interesting about the Pearl Island data is that the earliest dated sites identified by Linné are related to a pottery stylistically akin to Sánchez Cubitá style (*cf.* Linné 1929: 134–139; Cooke 1976, 1998a; Cooke and Sánchez 1998: 34, 2004a).

Overall, the Venado Beach data show powerful individuals—warriors and elites, children included—who received lavish mortuary treatment (Linares 1977b: 72; Redmond 1994b). This site compares well to Cerro Juan Díaz, especially with regard to multiple burial modes (urns, primary, and secondary bundles) and offerings of pottery and shell artifacts made out of *Spondylus* and pearl oysters (Sánchez and Cooke 1998, 2003a, 2003b). It is important to note, however, that none of the Cerro Juan Díaz individuals from Middle and Late Ceramic Period graves shows evidence of violent trauma (Cooke *et al.* 2003a: 137).

2.2.5.4 Craft specialization during the Middle Ceramic Period

Overall, the Middle Ceramic is characterized as a period of technological improvements, most probable a direct result of craft specialization. The great number of pointed and stemmed flake tools at La Mula-Sarigua suggests that its huge bank of chalcedony was exploited to make these tools in very large numbers. At Sitio Sierra there is evidence that at least one individual in this community repaired axes (Isaza 1993: 83). The discovery of an open air workshop/midden on the southern base of Cerro Juan Díaz (LS-3) indicates that a specialized craft production of marine shell jewelry and bone tools was already in place by the end of the Middle Ceramic Period (Mayo 2004). Evidence from this feature showed that specific types of personal adornments were made from several genera of marine shells: *Strombus* (43%), *Melongena* (15%), *Spondylus* (15%), *Conus* (9%), *Anadara* (2%), and *Pinctada* (1%). Ornaments were found at different stages of manufacture along with special stone tools including bifaces and perforators. The techniques used in the production of these tools were quite sophisticated and similar to those used in the production of chipped stone tools (Mayo 2004: 232). Since this is the first workshop of its kind ever studied in Panama it is hard to assess the role of this workshop in the development of shell jewelry craft production. As noted above, there is evidence of shell artifacts and metal in the early funerary horizon, but there is no evidence for workshops at this time. This shell workshop is firmly associated with Cubitá pottery (AD 550-750). It is clear, however, that the production of carefully crafted marine shell ornaments goes back at least to the second half of the La Mula phase.

Cerro Juan Díaz also produced the earliest radiometrically dated metal objects in Gran Coclé. Stylistically these objects belong to the Initial Group whose geographic distribution extends from northern South America to Lower Central America (Bray 1992). This group includes raised spiral plaques, beads, ring pedants, curly tailed animal figures, double eagles, and conjoined animal pendants made by alloying copper and gold through hammering, annealing, sheathing, depletion gilding, open-back casting, and lost-wax casting techniques (Bray 1992: 34; Cooke and Bray 1985: 35; Cooke *et al.* 2003a; see also Bergsøe 1938; Root 1937, 1950). In 1999 I carried out metallographic analyses on four of Cerro Juan Díaz Initial Group objects—a fragment of a metal sheet (perhaps an overlay), a fragment of the tail of an "open-wing bird" pendant, and a copper wire fragment from Feature 16, and small a gold bead from Feature 94 (Figure 2.5). The results showed that Gran Coclé smiths used sophisticated metalworking methods. The metal sheet was heavily corroded, but the little metal preserved exposed evidence of gilding (Figure 2.6a). The copper wire and small gold bead, for example, were both forged and annealed to shape (Figure 2.6b–c). The microstructure of the tail section, on the other hand, revealed evidence of two morphologically distinct tumbaga layers welded through a technique known as cladding (Figure 2.6d). It appears that the original cast metal was bonded with a second metal layer through high pressure (e.g. hammering) and annealing, probably to mend the object or to provide surface color contrast along the edge (Figure 2.6e).[6] In addition, the microstructure of the tail fragment showed that the outer metal layer contained large metal inclusions, originally identified through Scanning Electron Microscopy as osmium (Os).[7] A recent analyses with a Microprobe Inductively Coupled Plasma Mac spectrometer (LAMIC-PM) done at the Geology Department,

[6] The metallurgical analyses were done at the Center for Material Research in Archaeology and Ethnology, Massachusetts Institute of Technology, under the direction of Professor Heather Lechtman. The idea that the two layers were welded to produce color contrast was suggested by Professor Lechtman, based on well known practices from the Andean Region. It is not known, however, if the Gran Coclé smiths applied these techniques for the same purpose. I suggested the mending hypothesis given that the cladding feature ends immediately where the tail fragment presents a superficial fissure on one side and green colored patina on the opposite surface.

[7] Osmium is a heavy platinum-like element found in native ores, mainly in placers deposits together with gold (Boyle 1979: 163).

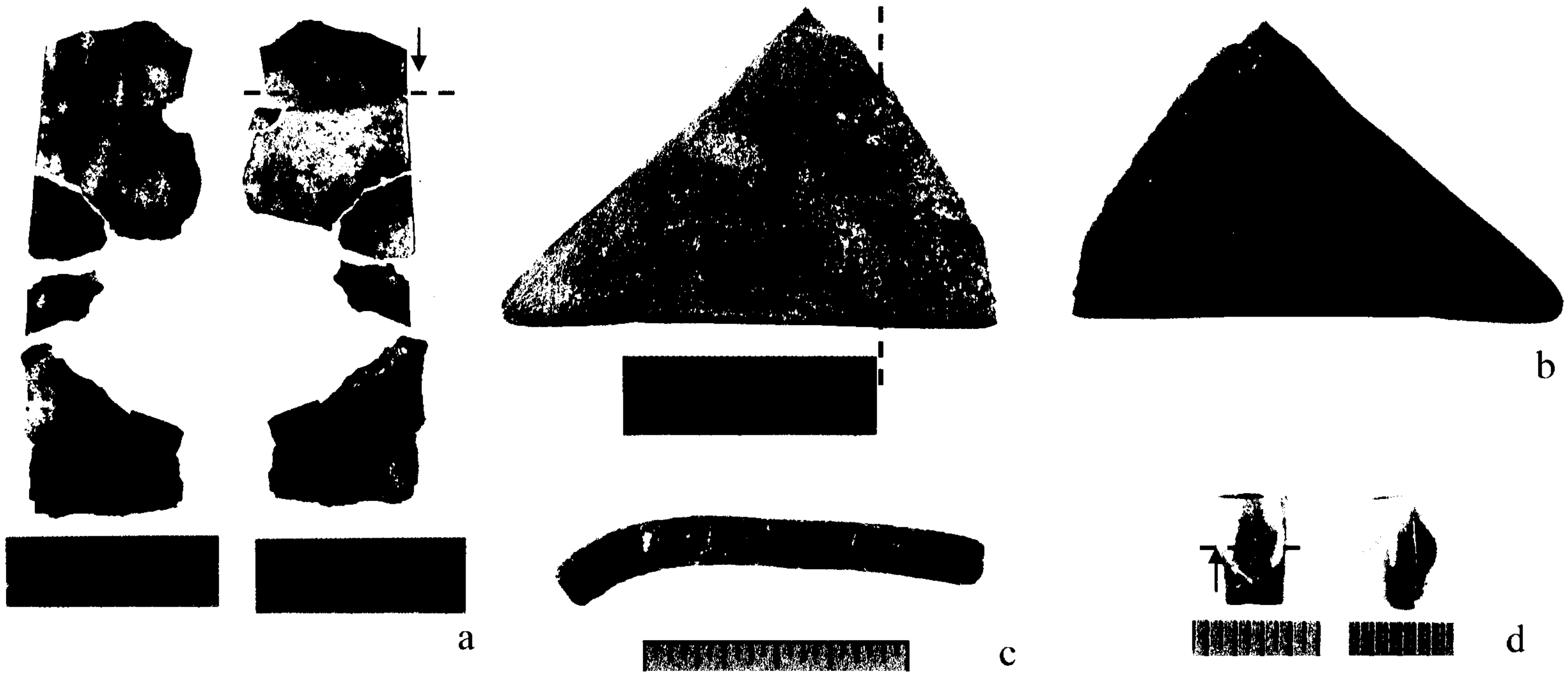

Figure 2.5 Metal objects from Feature 16 and Feature 94, Cerro Juan Díaz (LS-3) selected for metallographic analyses.
(a) Metal sheet (cat CL-44-93); (b) Fragment of tail of an open-wing bird pendant (cat CL-3-95); (c) Copper wire fragment (cat CL-47-93); (d) Gold bead (cat M-1). The dotted lines indicate the area where the object was cut and the arrow points to the profile selected for analysis.

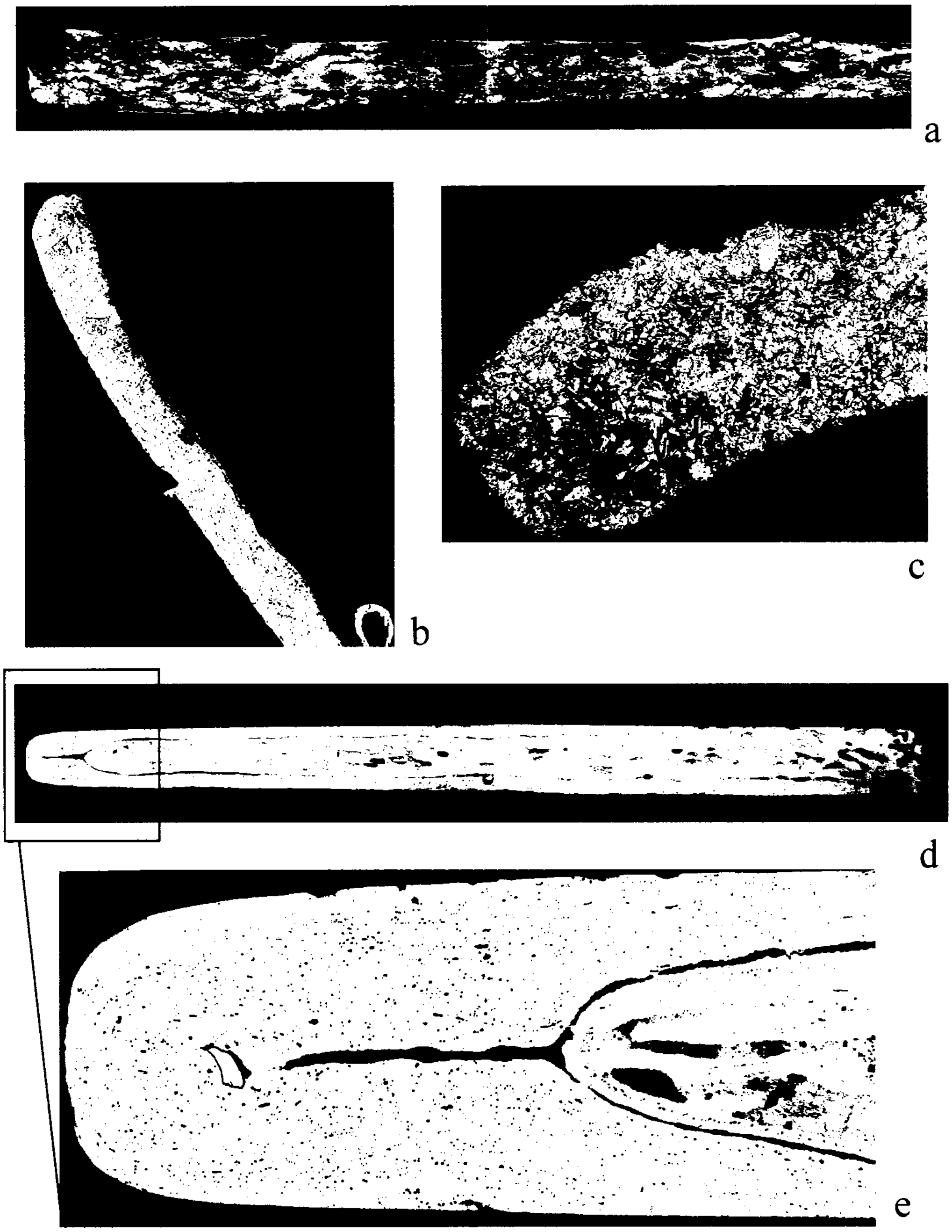

Figure 2.6 Photomicrographs from analyzed metal objects from Cerro Juan Díaz (LS-3).
(a) True edge section of the metal sheet (Figure 2.5a) illustrating the areas that still contain metal and gilded surface. Magnification: 50. As polished; (b) True edge section of the gold bead (Figure 2.5b) illustration the grain boundaries and black colored round features associated to the areas of active corrosion. Magnification: 200. Etchant: potassium cyanide + ammonium persulphate; (c) True edge section of the copper wire (Figure 2.5c) illustrating the equiaxed grains and annealing twins indicating that the object was forged and annealed to shape. Magnification: 29.5. Etchant: potassium dichromate; (d) True edge of the tail fragment (Figure 2.5b) showing the cladding profile. Magnification: 100. As polished; (e) Close up of the tail fragment illustrating the large unidentified inclusion, fissure and cladding structure. Magnification: 100. As polished.

Boston University provided, however, a negative result for the presence of osmium (*contra* Isaza 2000; Cooke *et al.* 2003a). In any case, the large inclusions in the tail fragment represent particles of a metal whose melting point is higher than gold. The inclusion must have been natural from the alluvial ore used to mend the object.

The result of metallographic study from Cerro Juan Díaz Initial Style objects proved is that metallurgy was in the hand of skilled smiths since its early stage. Some Initial Style ornaments like the raised spiral plaques, found in Features 1 and 2, were also found in Middle Ceramic period graves in the Tonosí Valley and are common in Caribbean and inland Colombia. Although there is no doubt that metallurgy was initially introduced to Lower Central America from the Sinú, Quimbaya and/or Tairona Regions of Colombia, at this point it is impossible to determine whether artisans traveled outside the isthmus to learn the art of metal working (Cooke *et al.* 2003a) or if the earliest dated pieces are the product of long distance trade as Helms (1979) and Sauer (1966) once proposed. Another possibility proposed by Cooke (personal communication 2007) is that artisans came from Colombia and established themselves locally. What is evident is that as soon as metallurgy was introduced, Gran Coclé smiths began to adopt the same "semiotic system"[8] used on other artistic media such as painted ceramic vessels, carved shell, stone and bone objects, raising the issue "whether one technology's ideology was influenced the other" (Bray 1992; Cooke *et al.* 2003a: 96; Sánchez and Cooke 1998, 2000, 2003a; Sánchez 2000b).

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[8] The term "semiotic tradition" was adopted by Cooke on the basis that different artistic media in Gran Coclé share a long tradition of icons and motifs (Cooke 1998d, 2004a; Cooke *et al.* 2000; Cooke and Sánchez 1998, 2003a, 2003b, 2004a: 15; Sánchez 2000a; Sánchez and Cooke 1998, 2000).

2.2.5.5 Emergence of settlement hierarchy

Apart from craft specialization during the Middle Ceramic Period marks the beginning of a settlement hierarchy. In the Parita river valley this hierarchy is first headed by La Mula-Sarigua during the La Mula phase (200 B.C.–A.D. 250) and then by El Hatillo site (HE-4) during the Cubitá phase (A.D. 500–700; Haller 2004). Previously a hamlet less than 2 ha in size, around A.D. 550 El Hatillo grew to be a 20.4 ha settlement, eight times larger than the regional average hamlet (2.5 ha) documented (Haller 2004: 74–78). According to Haller (2004: 79) the demographic growth that occurred in the Parita River valley is "characterized by the population being attracted to pre-existing hamlets, with one, El Hatillo, increasing substantially due to natural population growth or migration." This pattern of a three-tiered settlement hierarchy is the one that prevails in the valley until the contact period (Haller 2004: 79). The situation contrasts with that documented in the lower La Villa River, where I documented a 4-tier settlement hierarchy, and where no particular site seems prevail over the others at any particular time.

The differences in settlement patterns that are apparent from Haller's and the PARLV surveys are noteworthy. I discuss the several factors that I believe may have caused or influenced these discrepancies in Chapters 4 and 6.

2.2.6 Late Ceramic (A.D. 700–1520)

The social and economic developments of the Middle Ceramic Period ushered in the changes that took place during the Late Ceramic Period after A.D. 700. Evidence for social differentiation becomes more apparent in the archaeological record at this time. How paramount chiefs ascended to power has been a matter of much debate. The regional archaeological data supports the proposal that the hereditary office of the chief resulted from the ability of kin-based groups to control and mobilize local subsistence resources (see Cooke and Ranere 1992c; Cooke and Sánchez 2004b; Haller 2004; Hansell 1987; Linares 1977b). This is comparable with D'Altroy and Earle's (1985; Earle 1997) descriptions of staple finance and Blanton *et al.* (1996) elite strategic corporate involvement with agricultural production (see also Haller 2004: 9). As the population rose, social tension probably increased. Inter-territory rivalry, characterized by raiding and stealing, is well documented in the ethnohistoric record.[9] We have no idea when this behavior set in. Even so, it is reasonable to presume that the fact that these river valleys are filling up with people who have to be fed, led to internal pressures on resources and the increasing difficulty of obtaining them outside each chiefdom's territory—because of the dangers involved. To these social parameters we should add certain stochastic and longer term environmental factors—i.e., torrential rains, flooding, landslides, seasonal droughts, coastal progradation—that would have brought additional pressure on village and/or spiritual leaders.

Cooke and Ranere (1992c) proposed that social and environmental circumscription created opportunities for social or corporate groups to compete over the

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[9] The following is a quote from Espinosa where he describes coming across a band of 200 warriors going to fight against Escoria, during a search for water in the valley of the *Río Escoria* (today the Santa María):

era gente de gandules e indios varones que iban a la guerra, y no iban como gente alborotada, antes iban con sus armas muy sosegados y seguros y consejando y hablando entre sí, y que a los que creían iban a la provincia de Escoria a la guerra al cacique della, que sería hasta numero de doscientos gandules, poco más o menos; de lo cual holgamos todos y lo tubimos por muy buena señal y aparejo (Espinosa 1994c: 62).

control of limited local resources—fertile arable lands, rich coastal and estuarine areas, workable stone outcrops or dikes, coral reefs, salt flats, and/or mineral ores. The increasing economic specialization that emerged among villages, such as La Mula-Sarigua, Sitio Sierra, and Cerro Juan Díaz must have stimulated trade in order to obtain utilitarian products not available on site. Stressful circumstances, such as famine, competition and social conflict, must have also set mechanisms for leaders to congregate and strengthen their political alliances. It is reasonable to suppose that such alliances must have taken place at sites which exhibit special characteristics that suggest had special functions within large community—e.g., Sitio Conte and El Caño in Coclé, La Pitahaya and Barriles in Chiriquí (Table 2.4). La Pitahaya (IS-3) is located in a protective embayment on the Palenque-Boca Brava Island, Gulf of Chiriquí (Figure 2.2). The site presents artificial mounds marked by rows of basalt columns, basalt tools imported from the Chiriquí highlands, and polychrome ceramics from Gran Coclé dating between A.D. 700 and 1000. The physical characteristics of the site and material culture suggests it served as a large nucleated center of trade, perhaps even the seat of a paramount chief (Linares 1980a: 247).

2.2.6.1 Emergence of special function sites

Although some individuals found in graves dating prior to A.D. 700 appear to have had special functions—axe-repairer or shaman-curer—it is not until after this date that there is conclusive evidence for extremely wealthy people. This pattern has been demonstrated by the remains documented at Sitio Conte (see Lothrop 1937, 1942; Hearne and Sharer 1992). Together with its neighboring sites El Caño and Cerro Cerrezuela, Sitio Conte (Figure 2.2) functioned as a meeting place and a necropolis for wealthy and very influential individuals between A.D. 750 and 950.[10] The extent of rows of carved and uncarved basalt columns and the cobble pavements between El Caño and Sitio Conte define the boundaries of a ceremonial precinct that would have transcended the domains of the single polity or *chiefdom* in which it was located (Lothrop 1937: 296; Cooke 1984a; Cooke *et al.* 2003b). Given its uniqueness Cooke (2004b: 273–274) hypothesizes that the precinct functioned as a pan-regional meeting place "for affirming common ancestry and for celebrating ritual games." The latter being perhaps a more formalized version of the modern *balsería* or *krun* (stick-throwing game) practiced by the Ngöbe speaking Guaymí (Cooke 1984a: 289; Lothrop 1950: Figure 149; Young 1971, 1976).

Used for similar ends, the *balsería* are held for several days at the peak of the maize or palm (*Bactris gasipaes*) harvest. The event is sponsored by politically influential individuals capable of gathering sufficient food and drink (*chicha*) to satisfy guests (Cooke 2004b: 273–274). The game involves teams of eight men taking turns one by one to throw a 2-meter long stick at the opponent's lower leg (Young 1971: 204–208). Successful players are well-regarded and wear a stuffed animal on their back, believed to be symbolic of their skills or social group identifiers (Johnson 1948, cited by Cooke 2004b: 274). One of the carved columns from El Caño portrays a human wearing on its back what appears to be a monkey or sloth (Cooke 2004b: Figure 2b). The statue representation parallels the use of stuffed animals in the modern *balsería*. Other carved

[10] The distance between El Caño and Sitio Conte is 3800 meters and between Sitio Conte and Cerro Cerrezuela is 1500 meters (Julia Mayo personal communication 2006).

columns depict animal or humans statues in different positions. Among the latter are naked male individuals in submissive gestures as if they were slaves or captives (i.e., Linares 1977b: Figure 15; Lothrop 1937: Figure 7) or wearing what appear to be gold pendants characterizing perhaps their high status (Cooke 2004b: Figure 2c). References to a *juego de cañas*—stick game or perhaps spear-throwing contest—played among the Cueva groups as well as in the Cauca Valley of Colombia parallel the modern *balsería* (Andagoya 1945: 436, Redmond 1994: 88–89). The Spanish Captain Gaspar de Espinosa (1994a: 55) also witnessed a "ball game" played in the territory of Tabraba near the Gulf of Montijo, Veraguas, which Cooke (1984a: 289) interprets as a regional counterpart of the *balsería* (see also Cooke and Ranere 1992c: Footnote 17).

Although the ethnohistoric documentation does not provide much information it is evident that the pre-Columbian inhabitants of Panama practiced special games involving rubber balls or canes. It is not unreasonable, then, in the light of the importance of the *balsería* among the historic Ngöbé, to suppose that at sites like El Caño, the columned areas are identifying spaces for these kinds of social and/or ritual gatherings. Judging from the modern *balsería* practices Cooke witnessed in the 1970s, he estimates that large amounts of food would have been needed to keep everybody "wined and dined" at these gatherings (Cooke personal communication 2006).

At the site of Barriles (BU-24), in the Chiriquí highlands, large carved stone monuments shaped as drum cylinders and human statues, and boulders with petroglyphs define the limits of a 1,254 m^2 ceremonial precinct (Rosenthal 1980: 288; Stirling 1950: 234–243). The Barriles human figures, unlike those found at El Caño seem to depict important people, perhaps "chiefs." One of the most prominent carved stone monuments from Barriles depicts an individual being carried in a squatting position on the shoulders of a naked male figure, which has been interpreted as a captive (see Cooke 1997b: Figure 6-17; Haberland 1984: Figure 9.4). The top individual wears a conical shaped hat and on his chest he sports a representation of a figurine pendant (presumably a gold one). In his hands he holds human heads presumably trophies. Other stone monuments, found exclusively inside shaft-tomb graves, include giant metates whose carved legs depict individuals carrying trophy heads (Linares *et al.* 1975: Figure 5; 1977b: Figure 7). Linares argues that the iconographic portrayal of Barriles lapidary art work can be linked with symbols of rank and war ascribed to maize agriculture (Linares *et al.* 1975: 141; Linares 1980a: 243). One can assume, then, that as in the case of El Caño and Sitio Conte, Barriles must have served as a center for a chiefly council and pre-war rituals during the Late Ceramic Period (Cooke 1984a, 2004b; Linares 1977b, 1980a; Lothrop 1937; Redmond 1994: 89).

The sample of 101 burials that was excavated by Lothrop and Mason at Sitio Conte predates the Spanish incursion by 600–900 years, but the artifacts found in its richest graves are very similar to those seen by Espinosa at *Parita's* mortuary ritual along the *Río del Asiento Viejo* (Parita River) in July of 1519 (Figure 1.3). Peter Briggs' (1989: 75) analyses of Sitio Conte's mortuary population determined that 72% of the 201 excavated skeletons found in 100 graves were adult males, 21% adult females, 2% adolescent males, 4% adolescent females and 1% children. Some interments were associated with a large variety of goods, not just ceramic and gold items, but also including bundles of stingray spines, perforated dog canines, stone mirror backs, serpentine beads, agate pendants, stone beads, blades, and axes. Only the largest and richest graves—Grave 26 (Lothrop 1937: Figure 31) and Grave 74 (Hearne 1992: Figure 1.7)—contained multiple interments of up to 21 individuals laid faced down in extended positions as if representing warriors, prisoners or embalmed ancestors. All individuals were accompanied with rich grave offering, but none compared with those of the principal occupant, the latter always being an adult male who received special treatment (e.g., placed in a seated position). Briggs (1989) pointed out that certain categories of artifacts were only found in the top three grave clusters: embossed gold helmets, cuffs, greaves[11], disks, plaques, and belts with bells, pendants made of scarce or ritually-charged items made of manatee bone and whale ivory. These graves also contained a large number of pottery effigy vessels, polychrome plates and bowls whose iconographic elements highlight the presence of aggressive animal creatures as if emphasizing the "values held by warriors" (Linares 1977b: 70).

The mortuary data from Sitio Conte also confirm ethnohistoric accounts that important people, primarily adult males, were given special burial treatment through desiccation by heat; their bodies were placed in a seated position at the center of graves that were protected with roofed structures (Briggs 1989: 73; Lothrop 1937: 49–58; Cooke *et al.* 2003a: 126). Special treatment of adult females is not as clearly manifested although the female consorts found inside the richest graves were buried with a lot of finery.

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[11] Thin armor for the legs from the ankle to the knee.

Sitio Conte was studied before the discovery of the radiocarbon method. Ceramic typologies indicate that the area investigated by Lothrop and Mason was not used after A.D. 950. At this time a new regional cemetery emerged farther south in the Parita Valley at El Hatillo (Haller 2004: 182). Aside from being the largest settlement, El Hatillo is the only site in the valley of the Parita River that shows clear evidence for social inequality (Cooke *et al.* 2003b: 10; Haller 2004: 55, 110, 182). The presence of artificial mounds, arranged around a central plaza and containing rich graves, indicate that rituals at the site focused on mortuary activity from A.D. 900 though the sixteenth century (Bull 1965; Haller 2004: 177). Based on the physical and contextual characteristics of the site it has been suggested that El Hatillo corresponds to the location of *Parita's* old settlement (Cooke 1993b: 114), while the neighboring Leopoldo Arosemena site the location where Espinosa interrupted *Parita's* burial rites (Figure 2.2; Haller 2004: 103).

2.2.6.2 Grave features from egalitarian villages

Available mortuary evidence from other sites in the region, such as Cerro Juan Díaz, El Indio, and La Cañaza shows that the discovered interments belonged to more egalitarian individuals than their contemporaries buried at Sitio Conte and El Hatillo. A community cemetery—dating between A.D. 750 and 1100—discovered on the eastern side of Juan Díaz' earthen platform (Operation 4) included for the most part children and adult females (Díaz 1999). The presence of a few complex graves, which contained several different burial modes—e.g., primary flexed and secondary burials inside urns, and ossuaries—suggests that some graves were kept open in order to receive members of the same social group, which could have been clan or other type of descent group (Díaz 1999: 55). Grave offerings in this cemetery at Cerro Juan Díaz consist mostly of utilitarian items made of bone and stone, modest personal adornments made of shell and gold, amulets or necklaces made of animal bones and perforated teeth, and possible food offerings—mollusks, crab claws and deer bones—which were inside ceramic vessels (Díaz 1999).

The formal cemeteries at La Cañaza and El Indio site that date A.D. 500–900 also contain a large variety of grave goods. Briggs (1989: 54) interpreted their distribution within individual graves as evidence for social recognition of the individual's achievements. But he claims nonetheless, that they are typical of an egalitarian type society.

The majority of Cerro Juan Díaz' graves that date after A.D. 1200 consist of scattered shallow interments with individuals placed in primary extended position. The most elaborate mortuary features that belong to this period, however, were discovered on the summit of the central hill. One of these features, identified at Operation 6, corresponded to a circular structure, which Carvajal *et al.* (2006) have interpreted as a mortuary house thought to have been reserved for protracted and complex burial rites from cal. A.D. 1275 to 1420 (Beta-133339; Cooke and Sánchez 1998, Cooke *et al.* 1998 and 2000).

The second post A.D. 1200 burial feature was identified in the uppermost levels of Operation 31. It consisted of an offering of 30 ceramic vessels, many of these placed face down on a burnt clay floor. Five of the jars contained human mandibles and maxillae with cut marks and evidence that their teeth had been extracted postmortem. Charcoal collected from two of the jars yielded results of cal. A.D. 1165–1400 (I-18681) and cal. A.D. 1195–1450 (I-18682).

2.2.6.3 Ancestor-worship or warlike behavior?

One of the richest grave excavated by Stirling and Willey at El Hatillo, Find 10 on Mound II, included a deposit, which is interesting to compare with the feature found at Cerro Juan Díaz with the human mandibles and maxillaries. This feature contained the remains of about 15 individuals and more than 50 pottery vessels including El Hatillo style bird effigy jars and five urns (Ladd 1964: Appendix 2). The presence of El Hatillo pottery alludes to a very late pre-Columbian date (A.D. 1400–1520). All the urns contained disarticulated human remains and mandibles, some without skulls. Inside one of them (Urn 1) was a necklace made up of 737 perforated human incisors, an offering that would have required at least 184 individuals to produce (Ladd 1964: 245; Haller 2004: 106; Stirling 1949: 385). Basing his opinion on details shared by the feature in Cerro Juan Díaz's Operation 31 and El Hatillo's Find 10, Haller (2004) concludes that the necklaces found in the burials of El Hatillo might have been manufactured from deceased individuals and not from living slaves captured in battle.

The only other Panamanian site at which the custom of removing body parts have been reported, is Venado Beach where at least 10 of the 71 individuals, which Lothrop identifies as mutilated, lacked one or two of their incisors, which were apparently extracted *before* death unlike those from Cerro Juan Díaz (Lothrop 1954: 229–223, 23). This behavior recalls contact period reports of war captives having their incisors extracted (i.e., Andagoya 1945; Oviedo 1944: VIII).

The above synthesis makes a good case for two sites with special dimensions and features having been special ritual centers in Gran Coclé where only the individuals with the appropriate credentials—i.e., distinguished warriors, powerful leaders and their entourage—received special burial treatment during specific times of the year (Cooke *et al.* 2003a: 127). These sites are El Caño–Sitio Conte complex and El Hatillo. In fact, Cooke *et al.* (2003a: 127) proposed that, given the unique characteristic of these sites, the individuals buried at them and the people that participated in the social gatherings may well have come from "catchments" larger than the territory controlled by an individual chieftain. It should be stressed, however, that only at El Caño–Sitio Conte complex has architecture been identified. Based on this fact, Cooke (personal communication 2006) suggests that this site complex had higher rank than El Hatillo at the macro-regional level.

Other researchers have stressed the role of violence in their interpretations of some grave units. For example, Linares (1977b: 7) and Lothrop (1954) interpret the mass graves of Venado Beach as containing the bodies of "war captives or members of a group killed in a raid."

The obvious signs of wealth and warlike features[12] portrayed in the material

[12] Some warlike feature include the presence of bundles of stingray spines, blades, and axes, embossed gold helmets, cuffs, greaves, disks, plaques, and carved manatee bone and whale ivory pendants decorated with the same motifs depicted on the polychrome vessels.

culture and interments of Playa Venado, El Caño, Sitio Conte, and El Hatillo has led researchers like Elsa Redmond (1994b) and Mary Helms (1976, 1979, 1994) to propose alternative hypothesis to explain the emergence of chiefdoms in Central Panama. In her comparative analyses of archaeological, ethnohistoric and ethnographic accounts from Panama and northern South America, Redmond (1994b: 130–131) highlights, for example, the role of warfare and demography as catalysts for the emergence of chiefs, delegating control of local and foreign resources to a second place. Redmond follows Robert Carneiro's (1998: 21) argument that "war and military leadership lay at the very root of the chiefdom." According to this theory, social and/or environmental circumscription triggered social conflict. In order to overcome their differences, autonomous villages were forced into temporary alliances. Under conditions of increasing warfare and intervillage alliances, it is suggested that temporarily victorious leaders became permanents chiefs (Redmond 1994: 129). According to Haller's interpretation of the River Parita the demographic densities for Late Ceramic villages are very low in relation to the carrying capacity. Coupled with this, he did not identify any defensive features that would clearly indicate that warfare led to the emergence of chiefly societies (Haller 2004: 183). But a different situation is depicted for the lower La Villa valley. Villages are much larger and the largest nucleated settlements were established on prominent hills. It is reasonable to suppose that such hills served a defensive purpose especially in light of comments made by the Spanish soldiers who attacked the Parita Bay chiefdoms that chieftains often retreated to defensible localities when they found themselves in trouble on the battle field. The situation most relevant to my research concerns Espinosa's battle with chief *Parita* in 1517, when the chief and his troops retreated to a steep and stony hill near his new settlement. In 1993 Cooke suggested that the description of this hill is consistent with the topography of Cerro Juan Díaz. Another reference deals with chief *Natá* who according to Pascual de Andagoya (1994: 33) took refuge together with his people at Cerro Cerrezuela located in the middle of his territory. Most recently Julia Mayo documented stone walls at Cerro Cerrezuela, which she interprets as defensive works (Mayo *et al.* 2007).

There are, of course, other reasons for sites having been located near prominent hills. These sites are adjacent to the rich alluvial plains, which provided inhabitants of the La Villa valley with good land to plant maize, manioc and other crops (i.e., Espinosa 1994c: 64). The hilltops must have served as monitoring centers for the traffic of canoes carrying goods up and down the river. In addition the higher ground provided protection from the annual floods. The absence of walls and ditch like features suggests to me that warfare was not as prominent in pre-colonial times as it was during the contact period. Another possibility is that the surveyed area was under the domain of a single chiefdom and thus no defensive features were necessary. Therefore the defensive features would be on the peripheries between the La Villa and Parita rivers.

2.2.6.4 Long distance exchange

A very different presentation of causality is provided by anthropologist Mary Helms who has argued intensely over the past thirty years that the major force behind the rise of political hierarchies in Panamanian chiefdoms was the need for exotic goods imbued with special "esoteric" characteristics (Helms 1979, 1994). Therefore controlling the trade routes that brought these items in was fundamental. Helms bases her arguments on the erroneous idea that the large number of cast and alloyed gold objects found inside the richest graves at Sitio Conte were not produced in Panama, but obtained as finished products from northern Colombia (Helms 1979: 84; Sauer 1966; 276–277; *cf.* Bray 1984; Cooke 1984b; 2005; Cooke *et al.* 2003a: 93, 133–134; Linares 1977b: 71). Furthermore, Helms claims that the emergence of chiefdoms in pre-Columbian Panama is linked with the appearance of these valuable items which portrayed emblems of sacred power which chiefs acquired as result of long-distance trade. It is difficult to accept Helms arguments when it is well-known that the iconographic depictions of Gran Coclé embossed gold objects and polychrome ceramics are deeply rooted in the standardized artistic traditions and ideologies that develop during the Middle Ceramic Period. There is also sufficient mineralogical and ethnographic data to demonstrate that Panama could have sustained local metal workshops (Cooke *et al.* 2003a; 96–108). The archaeological evidence is more elusive, but there are local reports for the identification of a local smiths and tools used in the production of metal objects. In their 1985 publication on the "Goldwork of Panama," Cooke and Bray mention the discovery of an alleged goldsmith grave documented by an amateur. The location of the grave was about 8 kilometers from Sitio El Caño. The grave apparently contained seven collapsed furnaces, molds, and river sand with flakes of gold and copper (see also Cooke *et al.* 2003a: 106). Two crucibles have been also reported by Lothrop (1942: Figure 337a) from Sitio Conte and Leo Biese (1964: Figure 9c), the latter at Panama Viejo (see also Cooke *et al.* 2003a: Figure 5).

Most recently John Griggs in his surveys of the Rivers Belén, Coclé del Norte and Indio on the Caribbean documented pre-Columbian sites near areas known to have been use for mining gold (Cooke 2005: 155; Cooke *et al.* 2003b; Griggs 2005). In a separate survey undertaken at La Pintada in Coclé Julia Mayo found several mines. Mayo (*et al.* 2007) has not yet determined with mineralogical analyses what was mined at them, but she identified special miner's kit of stone tools that has parallels with mining tools in northern Chile (Bird 1975) and Zacatecas, Mexico (Weigand 1968).

There is no denying that some of the Sitio Conte grave items (i.e., emeralds and gold objects) could have originated well beyond the boundaries of the catchment it served. It is important to note, however, that the large majority of the offerings discovered at Sitio Conte as well as other Panamanian grave sites correspond to items whose origins (raw material and/or production) are traceable to areas within the sociopolitical catchment of each site. In consideration, a more feasible explanation for regular long-distance contacts between Panamanian and northern Colombian chiefdoms, could be a "down-the-line" exchange between continuous settlements (Cooke and Ranere 1992c: 285; Cooke *et al.* 2003b: 134; see also Bray 1984: 337–338; Lange 1984; 1992a). This point of view is more consistent with the linguistic and genetic data of modern-day Amerindian groups—living between Costa Rica and Panama—whose contact relations take place more often among nearest neighbors than distant ones. These groups are speakers of two culturally related language families, the Chibcha stock of the Paya-Chibcha phylum and the Chocoan family (Constenla 1991, 1995). They have genetic characteristics that differentiate them from groups in Mesoamerica and northern South

America, meaning that they are descendants of an ancient population that evolved *in situ* (Barrantes et al. 1990: 80). From the glottochronological point of view, the fission of these groups can be traced back to 5000 years ago with the introduction of agriculture (Constenla 1991: 45).

As stated above, it cannot be denied that some goods arrived in Gran Coclé from distant localities. For the most part these exchanges were most likely indirect in which local groups embrace new technologies but soon adapted them to fit into their own belief system. For Bray (1984: 308–309, 337–338) such a situation further characterizes the adaptable nature of local groups with strong ideological sentiments. To this I would add that people seek technological knowledge not just esoterica. Since the Gran Coclé belief system is ancient it seems unlikely that people felt an urge to add foreign knowledge although ethnohistoric data suggest that the manufacture of gold items was sometimes a secret operation and therefore "esoteric" (Anghera 1912; Cooke *et al.* 2003a: 110, 135, 137–138). Kuna curers and chanters, to whom Helms cite as an ethnographic parallel make two-day walks over the mountains to acquire special knowledge, but from their own specialists (Cooke 1984c: 116; Cooke *et al.* 2003a: 134).

2.3 Summary

Archaeological and paleoecological data acquired in the area that by about 200 B.C. can be identified as Gran Coclé demonstrates that, as soon as humans settled the isthmus by the end of the Late Glacial, they began to modify the landscape, through burning and cutting the vegetation that had been under increased drought stress during the Late Glacial period. Populations which remained in the area after climatic amelioration adopted several tropical American cultigens including some, like maize and manioc, which were indisputably first cultivated far from the isthmus. There is convincing evidence from one lake watershed—that of Lake Yeguada—that hill slope cultivation severely impacted local vegetation even when populations remained small and scattered across the landscape. This is not surprising, however, in this area of the seasonal tropics where dry seasons are sunny and extremely windy. Fires get quickly out of control.

Prior surveys have shown that there was a major shift in settlement pattern towards the end of the first millennium B.C. The data give the impression that this change was fairly abrupt. Some investigators, i.e., Ichon, used this abruptness to argue that cultural changes were stimulated by foreign immigration. But it seems more likely that endogenous processes were involved. Throughout this chapter I have cautioned, however, that the recent alluviation of the lower river valleys where there is the best evidence for settlement nucleation has probably deeply buried sites older than 2000 years, causing biases in the survey data.

The effects on the environment were more devastating when slash-and-burn agriculture intensified, eventually outstripping the productive potential of soils. As a result, the population moved to the alluvial bottomlands and coastal plains. The regeneration of the forest is not evident in the lake cores until after the Spanish conquest when it is known historically that there was a dramatic reduction of the indigenous population (see Piperno and Pearsall 1998: Figures 5.8 and 5.9).

The Parita Bay estuary has been defined as a productive environment with abundant resources that are also easy to harvest (Cooke 1979, 1992, 2004a; Cooke and Ranere 1989, 1992a, 1999; Jiménez and Cooke 2001). Salt and dry winds facilitate the preservation of fish and their transport inland. Most animal foods could probably be obtained on a regular basis within each chiefly territory, which often extended from coast to cordillera. But this is an area of highly seasonal climate. Weather-driven catastrophes such as floods, droughts, lighting and storms can cause devastation at a local level. Probably the end of the dry season was always a lean period: rivers loose volume, the wind is too strong to go out and fish, no fresh agricultural produce is coming in. Constant tension between territories, and probably among villages within territories, would have made it dangerous to hunt in someone else's land. It is naïve to think, then, that the resource base was stable. Disasters must have occurred. Periodic famine conditions probably occurred, as they do today, especially when there is a strong El Niño. This may be one reason why seemingly unpalatable animals such as toads are frequent in some Parita Bay middens where their remains seem to represent food items (Cooke 1989; Cooke *et al.* in press 2007).

The botanical evidence, on the other hand, shows that slash-and-burn agriculture preceded the introduction of pottery by at least 2000 years, and that the introduction of pottery did not trigger any changes in other aspects of life. The increasing productivity and reliance on fewer crop plants like maize and manioc prompted settlement nucleation and the rise of village life by 200 B.C. Less population mobility meant more people to feed. This opened the door for craft specialization, technological innovations, and the need to maintain social contacts through trade.

Starting in the Middle Ceramic and continuing through the Late Ceramic Period, well-crafted pottery and grinding stones were made all over the isthmus. The breadboard metates were replaced by legged metates and ceramics vessels were made in more diverse shapes and decorative elements, some of which also occur in other artistic media like shell, carved stone, and metallurgy (Cooke and Sánchez 1998, 2003a, 2003b, 2004a, 2004c, Cooke *et al.* 2000, 2003a; Sánchez 2000a; Sánchez and Cooke 1998, 2000). The increasing specialization stimulated trade contacts, social conflict, competition, and the accumulation of prestige goods by few individuals as evident in the mortuary data.

Multidisciplinary approaches applied in Gran Coclé demonstrate that the emergence of social complexity on the isthmus was an endogenous process even though some exogenous products and/or technologies—like metallurgy—were initially acquired from outside the isthmus. These social, economic, and technological developments were gradual, a product of local population growth. The time-span of these developments can be traced back to 7,000 years ago (Cooke and Ranere 1992c: 247; Ranere and Cooke 1996). This evidence is supported by linguistic and genetic data of modern indigenous populations, which suggest that the peoples of Lower Central America developed autochthonously over a very long period of time, without major intrusions from either continental mass (Arias 2003; Arias *et al.* 1992; Barrantes 1993: 171; Barrantes *et al.* 1982, 1990; Constenla 1985: 45, 1995).

Chapter 3

Sixteenth Century Chiefdoms and their Territories

3.1 Introduction

At the time of European contact (ca. A.D. 1501–1530) Panama was home to a large indigenous population, which subsisted by farming, fishing, and hunting. The population dwelled in hamlets and villages that often were organized into confederations. Anthropologists attribute these non-state polities to an intermediate social construct—chiefdoms. There is a consensus among specialists that (1) some regions were more densely populated than others, and had more nucleated and more permanent settlements; (2) groups of settlements formed discrete social units with varying degrees of cultural homogeneity and complexity; (3) the confederations generally contained a few settlements that were much larger than others; (4) political power was in the hands of a small number of people, which Spanish chroniclers organized into a hierarchy, e.g., "the paramount chief" (*queví* or *quibian*), "lower tier chief" (*tiba*), "subchiefs or noblemen" (*sacos*), and "warriors" (*çabras*) who dominated "commoners" and "war captives" (*pacos*); (5) powerful people were able to amass large numbers of personal ornaments and other sumptuary articles; and (6) rivalry existed among elites who competed for land, goods, political ascendancy, and labor by means of slaves[1] (Briggs 1989; Cooke 1979, 1984, 1993b, 1998a; Helms 1979; Lange 1992; Linares 1977a, 1977b, 1979; Linares and Ranere 1980). The development of chiefdoms in Panama is thought to reflect

[1] My use of the term "slave" is in reference to the practice of using other people's labor without remuneration. Oviedo (1944, VIII: 21), for example, suggests that the *pacos* or "war captives" served as slaves for the *Cueva* elite.

demographic growth, as well as social and economic adaptations of an autochthonous population that, even if it received products and technologies from outside the isthmus, interacted more closely with nearest neighbors, than with distant peoples (Bray 1984; Cooke 1984; Cooke and Ranere 1992a–b; Haller 2004; Linares 1977a, 1977b, 1979; Linares and Ranere 1980, *cf.* Helms 1979, 1994).

In the previous chapters I pointed out that Panamanian pre-Columbian society has been accepted as archetypical of chiefdoms. I also summarized some of the individual scholars' interpretations of the available data. In this chapter, I make use of ethnohistoric accounts to focus on the situation described for sixteenth century Panamanian chiefdoms. The area where I performed my research is located within the territory of a particular chief—*Parita* also known as *Paris or Antatará*—who at contact was described as being particularly influential (Chapter 1: Footnote 2). *Parita* also fought strongly against Spaniards during their first expeditions to Central Panama and the Azuero Peninsula in 1515, 1517 and 1519, the year of his death.

Ethnohistoric accounts for this region comprise two kinds of sources. The first group of documents represents eyewitness reports, written by soldiers and state officials who actually participated in the subjugation of the indigenous population, such as those of Pascual de Andagoya (1945, 1994), Gaspar de Espinosa (1994a–d), and Gonzalo Fernandez de Oviedo y Valdés (1944–45). Second group consists of hearsay accounts, such as those of Peter Martyr d' Anghera (1912) and Bartolomé de Las Casas (1995), who, in the case of Panama, wrote down what other people told them they had seen. For this reason they sometimes exaggerated or embellished descriptions of what *conquistadores* reported to them. In some cases, the different social backgrounds and positions of the Spanish chroniclers affected their objectivity. Additionally, their observations lack time-depth, because they describe situations prevalent at the time they conquered a particular area. They rarely tell us about the antecedents of the polities they encountered. For this reason, I compare the available and relevant ethnographic information with the archaeological data. I make special use of documents recently compiled under one title by Carol Jopling (1994). Her transcriptions are not necessarily the most accurate, but they are useful because other readers can easily access them.

3.2 Sixteenth Century Panamanian Chiefdoms

The first Spanish raids or *entradas* into the coastal savannas of the Pacific Coast were preceded by a series of events, summarized in Table 3.1 and Figure 3.1. Rodrigo de Bastidas first sighted the Isthmus of Panama in 1501. A year later, Christopher Columbus, in the course of his fourth and final voyage, sailed through the Chiriquí Lagoon and eastwards along the Caribbean coast of Veraguas reaching the coast a little beyond Nombre de Dios (Figure 3.1). Then he turned back westwards and founded a settlement at the mouth of the Belén River (Griggs 1995, 2005; Keith *et al.* 1990). In 1510 Martín Fernández de Enciso and Vasco Núñez de Balboa founded Santa María del Darién on the western shores of the Gulf of Urabá (Figure 3.1). This is the first Spanish colony on the continent and the place from which the initial expeditions to the Pacific coast departed. Balboa, who managed to gain the trust of some local chiefs, led the first expedition. In 1513, Balboa and his party first sighted the Pacific Ocean. Two years later, Captain Gonzalo de Badajoz led the first expeditions across the central cordillera and into the chiefdoms of Coclé and the Azuero Peninsula—the heartland of the archaeological culture area of Gran Coclé (Figure 3.1).

Table 3.1
Chronological sequence of events that occurred in Panama during the first half of the sixteenth century

Year	Event
1501	First Spanish sighting of Panama by Rodrigo de Bastidas
1502/ 1503	Christopher Columbus expedition to the Caribbean coast of Veraguas Establishes brief settlement at Santa María de Belén
1510	Founding of Santa María La Antigua del Darién by Martín Fernández de Enciso and Vasco Núñez de Balboa
1513	Discovery of the Pacific Ocean by Vasco Núñez de Balboa (Figure 3.1: Route #1)
1515	Gonzalo de Badajoz makes first *entradas* to central and western Panama (Route #2) Badajoz reached the land of *Natá*
1516	*Parita* defeats Badajoz and forced him to retreat from Azuero
1517	Gaspar de Espinosa first expedition to central Panama (Route #3) Espinosa's encounters with *Natá, Esquegua, Parita,* and other chieftains in the Azuero Peninsula and lands bordering the Gulf of Montijo
1519	Foundation of Panama City (the first Spanish Colony of the Pacific coast) by Pedrarias Dávila Espinosa's second expedition to central Panama (Route #4) Death of *queví Parita*
1520	First Spanish incursion into Chiriquí (Route #5)
1522	Natá receives charter as town
1527	Destruction of Natá by Urracá
1530s	Frontier wars with *Pocoa, Urracá* and *Estiber*
1556–1558	Creation of the "*Pueblo de Indios*" of Santa María, Parita, and Santa Cruz de Cubitá
1558	Foundation of La Villa de Los Santos Foundation of Santa Fé and Turlurí, Veraguas

Estimating the population demography at the time of the Spanish *entradas* has been a matter of much debate. According to Oviedo (1849–1855 cited by Cooke *et al.* 2003b: 4) the Amerindian population for *Castilla de Oro*[2] before 1542 surpassed two million people, an estimate that has been labeled as "too generous or exaggerated" (see

[2] This was the name given by King Ferdinand II in 1513 to the territory occupied by the Cueva speaking groups, which extended from the Gulf of Urabá to the Belén River on the Caribbean Coast of Panama. After the discovery of the Pacific Ocean the jurisdiction of *Castilla de Oro* was expanded to the Pacific coast of Panama, Costa Rica, and Nicaragua.

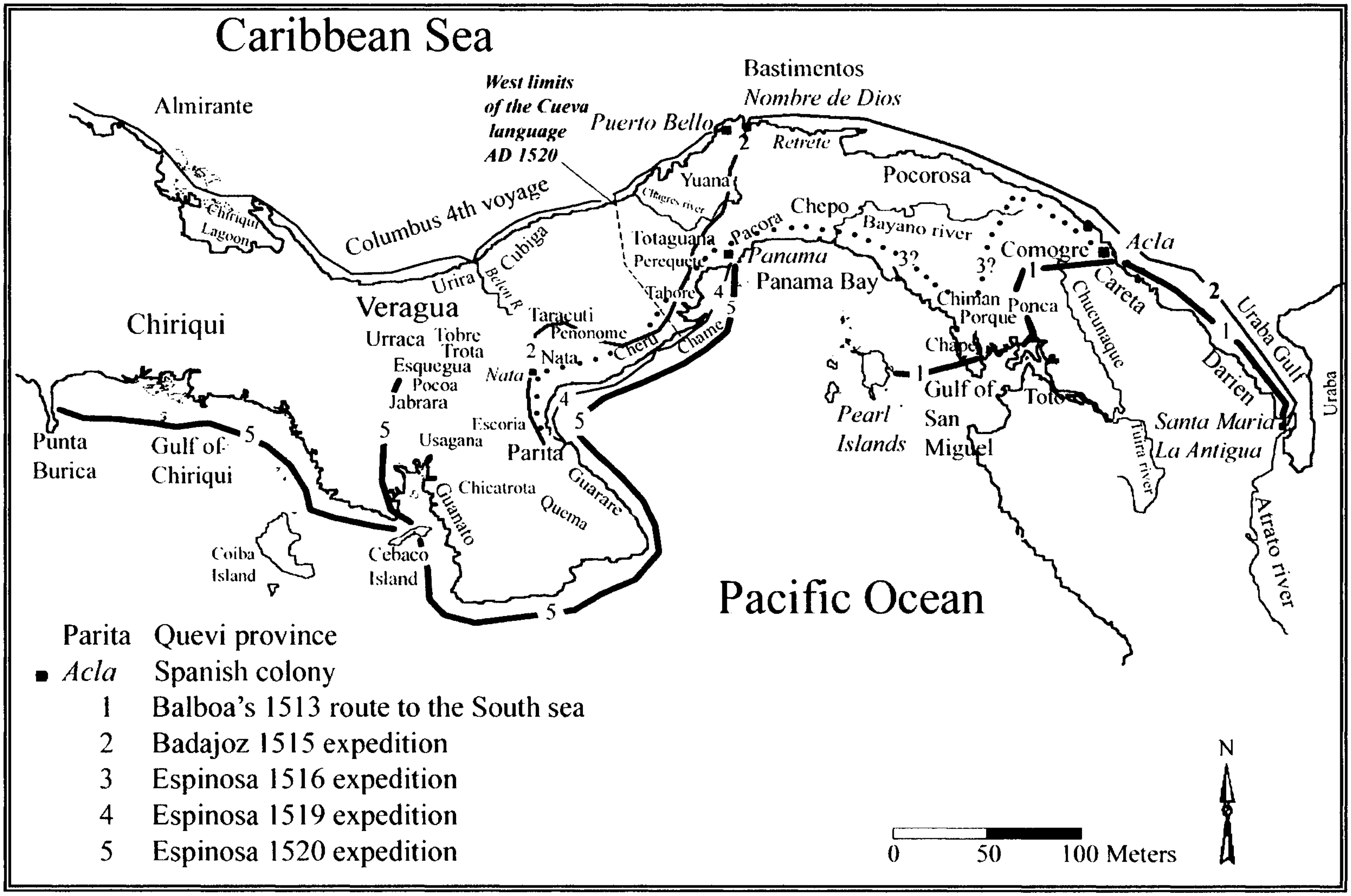

Figure 3.1 Sixteen century chiefdoms and route of major Spanish expeditions cited in the text

Cooke and Sánchez 2004c: 50). Historian Kathleen Romoli (1987: 33), on the other hand, estimated that the Cueva territory, which included 89 chiefdoms in an area of 25,000 km^2, would have housed 230,000 people (or 9.2 people/km^2). Other historians such as Omar Jaén (1979: 50; 1981: 36) propose half to a quarter of a million people for the entire isthmus. The most conservative estimate is given by Alfredo Castillero (1995: 39) who suggests 130,000 to 225,000 people for the entire isthmus. In Castillero's judgment, 70% of this population—between 100,000 and 175,000 inhabitants—concentrated on the Pacific coastal savannas between the chiefdoms of Darién and Azuero (Castillero 1995: 39). This last statement, however, has been challenged by Cooke (*et al.* 2003b: 5–6) who notes that the settlement surveys in Chiriquí and Caribbean slopes of Coclé demonstrate that these areas were as densely populated as Azuero and Darién.

In some well-documented territories, the paramount chief or *queví,* as they came to be known in Spanish documents, appear to have exercised control over several biotopes, including portions of the productive alluvial valleys and mountainous ranges rich in mineral sources (Linares 1977b: 73). In some cases, chiefs living in the interior are said to have controlled 'ports', where they obtained coastal resources e.g., *Comogre* whose principal village was located probably on the upper Chucunaque river, on the Pacific watershed, but who controlled a port on the Caribbean Coast (see also Cooke 2005: 156; Helms 1979: 43). Some chiefdoms stretched from coast to cordillera, as in the case with *Natá* in the central Pacific region of modern Coclé (Figure 3.1). Physiographic features, such as river valleys or mountain ranges, often bounded the different chiefdoms. The Spanish indulged in the practice of giving the name of the chief they encountered on entry to the territory or "province" he allegedly controlled (Figure 3.1). They also tended to use this name even after the original chief had died, or was killed by Spaniards.

The size of chiefly territories varied greatly, and when the borders of two or more chief's adjoined, territorial markers were established by means of *mojones* (Spanish term) or boundary stones (Jopling 1994: 21). Some *queví* are reported to have possessed three to four residences, or *bohíos,* contingent upon their political power and the size of the territories they controlled. These *bohíos* were often located in the most nucleated villages, which Helms (1979: 8) interprets as the "dwelling places of the family and personal servants of the chief." The location of these principal villages also seems to have changed from time to time. In the land of *Parita*, for example, Espinosa (1994a, 50–51, 1994c: 63–65, 69) referred to an old and new settlement, the *Asiento Viejo* and *Asiento Nuevo.*

The Spaniards describe some buildings, which seem to have had special functions. Ferdinand Columbus reports seeing structures made of lime and stone "*cal y canto*" at *Cateba* on the Caribbean coast, and is said to have even taken some samples from it to show in Spain (Sauer 1966: 132). Diego Méndez (in Sauer 1966: 132), on the other hand, described the residence of *queví Veragua*, built of fine timber and palm thatch near a large plaza on top of a flat hill, surrounded by three hundred trophy heads in a sort of palisade enclosure (see also Cooke *et al.* 2003a: 110). Anghera (1912: I, 219) describes the residence of *Comogre*, on the Caribbean coast, as been made of timber beams, with carved ceilings, decorated floors, and walls made of stone. This structure measured "one hundred and fifty paces the length and eighty paces the breadth" (roughly 137 by 73 meters) and had multiple rooms. "Here the Spanish noticed a store house filled with native provisions of the country and a cellar stacked with earthenware, barrels and wooden kegs," explains Anghera (1912, I: 219). The kegs were said to contain a fermented beverage made from manioc, yams, and maize. In the inner apartment, Spaniards found a room dedicated to the ancestors, whose desiccated bodies were lavishly decorated and suspended on cotton ropes (Anghera 1912, I: 219). Anghera's descriptions suggest that this structure was not a chiefly residence but rather a mortuary home, storehouse and/or something like the modern congress hall of the Cuna. According to Oviedo's descriptions, the *bohíos* of *queví Natá*, on the Pacific coast, were better made than those of commoners being large round structures, built with thick cane walls and thatched roofs that rose to a spire, topped by an object of pottery[3] resembling a long-necked candelabra (Oviedo 1944, VIII: 6, Plate I; Sauer 1966: 240–241, Lothrop 1937: Figure 5). Two unique pottery roof apex caps shaped like candelabras were found at Cerro Juan Díaz (LS-3), one on the summit of the central hill and other at the edge of the purported ritual platform (Cooke *et al.* 2003b; Cooke and Sánchez 2004b: Figure 5g). A third roof apex cap was found by Haller at Leopoldo Arosemena (HE-2) in the Parita Valley, the site he assumes was the final resting place of *Parita* (Haller 2004: 118). The non-elite at *Natá* dwelled in smaller *bohíos* of various shapes and sizes located in dispersed settlements.

[3] This is one of the few descriptions the Chroniclers provide for ceramics in Central Panama.

Structures the Spanish called *bohío* had other, non-residential functions. Espinosa mentions that some of *Natá's bohíos* were used to store food,[4] while others served as mortuary structures. Burial ceremonies, like the ones witnessed for the *queví Comogre* in the Chucunaque basin and *queví Parita* on the Pacific took place in large *bohíos.*

3.2.1 Heterogeneous population

The Isthmian population was both physically and linguistically heterogeneous. The first account regarding this topic comes from Christopher Columbus' fourth voyage along the Caribbean coast of Veraguas. Columbus was quite impressed by the fact that each valley seemed to speak a different language. On the other hand, between the Atrato basin, the Rio Indio on the Caribbean, and Punta Chame on the Pacific, the people of *Careta, Comogre, Pocorosa, Pacora, Chimán, Perequete,* and *Chame,* among others, are reported to have spoken a homogenous language known as *Cueva* (Oviedo 1944–45; Romoli 1987). Although Oviedo (1944: VII) and other chroniclers state that *Cueva* was widely spoken and actually gave boundaries for its extent, they also said that there were many differences of vocabulary. West of the *Cueva*-speaking provinces, the multilingual character of the Pacific coast chieftains was more pronounced. Communication between the different provinces took place by means of interpreters (Cooke and Ranere 1992; Cooke *et at.* 2003b; Andagoya 1994: 32; Lothrop 1937: 12; Romoli 1987). Andagoya (1994: 32) mentions that in each province from the region of Burica to Tobreytrota a different language was spoken (Figure 3.1). To this he adds that although the people of

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[4] *..se hallaron en los bohíos de Natá en sus despensas hasta trescientos venados en cecina antes más que menos; y la mas hermosa carne de comer que nunca se vió* (Espinosa 1994a: 55).

Chirú, Natá, Parita, *Escoria,* and *Esquegua* each spoke a different language they dressed the same as the people of *Cueva* (Andagoya 1994: 34; see also Espinosa 1994c: 67). Since there are only a few words recorded for these languages, there is no way of knowing their typology or relationship to each other. Cooke and Sánchez (2004a: 39) suggest that the Pacific coast chieftains must have also used a *lingua franca*, or trade language, to communicate in regions characterized by linguistic heterogeneity. Cueva may well have been a *lingua franca*.

When Oviedo described marriage rules for the *Cueva* polities he noted that the *Cueva* men would not take wives that spoke a different language,[5] or were from other groups (see also Helms 1979: 15 and Lothrop 1937: 24, 25). But, on the Pacific coast the situation seems a bit different. One of *Escoria's* wives, for example, is said to have been *Parita's* sister (Oviedo 1944, VII: 244). This suggests that the elites engaged reciprocal marriage. If the Spanish are right about the territorial integrity of languages, they must then have married women who did not speak their own tongues. The use of interpreters suggests a degree of mutual unintelligibility. The interpreters that Espinosa (1994c: 70–71) took on his 1519 expedition to the land of *Parita* were from *Natá*. According to Espinosa they spoke two different dialects defined as the *Francisca* and *Violante*. The people of *Queco*, *Parita's* successor, apparently understood these languages.

The nature of the *Cueva* language is unclear (Constenla 1991: 45–49; Cooke 1991, 2004; Romoli 1987: 55–99). Early chronicles mention two similar languages

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[5] *El tiba ó señor principal tiene tantas quantas mujeres quiere; si les puede dar de comer. É estas mugeres no las toman de lengua é gente extraña, e los señores las procuras de las aver que sean hijas de otro señores, ó al menos de linaje de hombres principales ó sacos ó cabras.* Oviedo (1944, VIII: 11)

spoken east of the Isthmus: *Cueva* and *Coiba*. Romoli (1987: 22) warns us, however, that Coiba was never a "geographical, ethnographic, nor a linguistic reality", but an illusion which emerged from the misinterpretation of the meaning of *Coiba*. In a letter written in 1510, Pedrarias Dávila (cited in Jopling 1994: 21) makes it clear that *Coiba* meant "a far land" in the native language. The term *Cueva*, however, seemed to have had a geographic connotation, but there is no known group within the geographic boundaries provided by the Spaniards who called themselves *Cueva* (Romoli 1987: 22). Comparative analysis of the short list of *Cueva* words indicates some similarities with modern Cuna, who are Chibcha speakers, and close parallels with modern Waunáan, Chocoan speakers (Constenla 1991: 45, 1995: 23; Romoli 1987: 81–88). Romoli (1987: 16) traces the Cuna-*Cueva* relationship through the resettlement history of the Cuna, who in their migration to the islands (today known as *Kula Yala*) from the Choco region of Colombia passed through the extinct territory of the Cueva during the sixteen century. Although there has been a wide acceptance that the *Cueva* language formed part of an extensive Chibcha linguistic family, Constenla (1991: 47–48) argues that there are far more linguistic elements to associate it with the Chocoan family. This fact shows that the linguistic situation was very complex and it will be very difficult to unravel unless more lists are discovered.

When documentary, genetic, and linguistic data are compared, one can conclude that pre-Columbian Panama west of the El Valle massif comprised several social groups that by contact times spoke different languages and had probably been distinct for a long time. These languages may well have been all ancestral Macro-Chibchan tongues, but we cannot be absolutely sure of this. The fact that contact-period chiefdoms apparently spoke different languages suggests that social divisions were to a degree coterminous with local speech. This hypothesis receives some support from standard marker genetic evidence for reproductive isolation among recently separated groups like the Buglé and Ngöbé, i.e. that chiefdoms had an ethnic, as well as a political connotation.[6] The reverse seems to have applied east of El Valle massif, in the territory defined as *Cueva* by the Spanish, were linguistic homogeneity prevailed. In view of the fact that there seem to have been very few cultural differences all over the pre-Hispanic isthmus, however, makes this situation curious. Scholars have proposed that the Spanish overestimated *Cueva* homogeneity citing differences in dress or that *Cueva* was a trade language or lingua franca that facilitated communication among groups. The fact that linguists propose that the short list of 50-odd Cueva vocabulary words possess words that cognate with the Cuna and Waunáan supports both scenarios (Romoli, 1987; Constenla, 1991; Cooke and Sánchez, 2004b).

3.2.2 Chiefly competition

Chiefs had frequent armed conflict for territorial expansion and political ascendancy, but rarely did a particular *queví* amass enough power to invade and control another's territory for very long (Carneiro 1981; Cooke and Ranere 1992c; Creamer and Haas 1985; Helms 1976, 1979, 1982; Linares 1977a, 1997b, 1979; Lothrop 1937).

[6] Today the Buglé occupy the easternmost portion of Bocas del Toro and westernmost portion of northern Veraguas (Young 1995: 31), and the Ngöbé live on the rugged mountains and lower slopes of Bocas del Toro, Chiriquí and Veraguas in western Panama and Costa Rica (Young and Bort 1995: 194).

Unlike the imperial armies of the Aztecs, who fought to take prisoners for sacrifice, the native Panamanian style of warfare was really skirmishing to right a wrong, to seize good land to sow maize, and/or to steal women. Some of the comments made by Spanish soldiers give the impression that there was intense mutual antipathy among different social groups.[7] On occasions, local chiefs allied with the Spaniards to take vengeance on their enemies, describing them as very rich and cruel. Only after suffering from the Spaniard's skirmishes did two or three chiefs temporarily ally to defeat the invaders (Romoli 1987: 112).

Specialized warriors named *çabras* led these battles. By means of securing their loyalty the *quevi* rewarded his most forceful *çabras* the power to inherit land and also gave them wives (Oviedo 1944, VII: 306). These warriors fought with paddle-type clubs called *macanas* (sometimes studded with shark teeth) and long spears made of black palm and *xagua* (tagua) trees.[8] According to Espinosa (1994a), the best weapons used by the warriors from the Pacific coast provinces were made in the land of *Escoria*, near the continental divide.[9] Oviedo (1944, VII: 304) had a high regard for the spears he saw in the land of *Esquegua, Urracá, Burica*, and *Parita*. Other weapons mentioned by the

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[7] *traíamos hasta cien gandules de la lengua de Comogre, que estoy por decir de los queríamos y nos aprovechaban tanto, como algunos cristianos que cierto ver con esfuerzo que peleaban con otros indios, y la enemistad que se tienen unos con los otros es mayor que la nuestra con ellos* (Espinosa 1994a: 51).

[8] *En algunas partes desta tierra son belicossos los indios, é en otras no tanto: no son flecheros, é pelean con macanas é con lanças luengas y con varas que arrojan, como dardo con estóricas (que son çierta manera de avientos) de unos bastones bien labrados...con los cuales arrojan las varas, quedando siempre la estórica en la mano* (Oviedo 1944, VII: 301).

É las lanças luengas, que usan algunos destos indios, hácenlas assimesmo de palmas é de xagua é de otras buenas maderas; é traen macanas de una é de dos manos, y en algunas provincias, assi como en Esqueguas, é Urraca, 'e Borica, é París tienen lanças tan luengas ó mas que picas, de palmas muy reçias é hermosas é negras como açabache (Oviedo 1944, VII: 304).

[9] *La gente de este cacique son muy valientes hombres y muy de Guerra y como en Milan se hacen los buenos arneses en esta tierra se hacen todas las buenas armas los indios de aquellas provincias* (Espinosa 1994a: 54).

chroniclers include darts and pikes[10] (Lothrop 1937: Figure 10). Archaeology provides evidence for spear points made from stone arrow heads, chipped stone blades and stingray spines found in graves 5, 19, 26 and 32 at Sitio Conte, and spear throwers or *atlatls* from grave 32 also from Sitio Conte (see Lothrop 1937: Figures 64–63, 32, 34, 66, 67 respectively). Lothrop noted that although the ethnohistoric accounts offer descriptions of weapons like clubs, only the gold figurines from Chiriquí and Coclé offer indirect evidence the warrior's attire (Lothrop 1937: Figure 9j, and Figure 150; see also Cooke *et al.* 2003a: Figure 9). Numerous golden pendants depict mythical figures—half animal and half human—wearing beaded necklaces, belts, leggings, and loincloths, and holding *macanas* and spear throwers (Cooke *et al.* 2003a: 130).

During war, the *çabras*, like the elite, wore elaborate headdresses, gold ornaments, and used protective armor made of stiffened cotton. The warriors of *Cabo*, in Coiba Island (Figure 3.1) wore thick cotton corselets that reached from the shoulders to the knees and even below, with sleeves to the elbows (Espinosa 1994a: 56–57). They were so cunningly made that according to Espinosa a crossbow bolt will not pierce them. For this reason the Spaniards had to resort to artillery to blow them to pieces.

3.2.3 Trade and the *areytos*

When the chiefs were not engaged in fierce competitions, they focused their

[10] *Está la dicha Provincia de Esqueba metida en la sierra bien áspera...pelean por la mayor parte con piedra y con estosias y tiraderas y con lanzas...* (Espinosa 1994c: 67).

efforts on trade and feasting.[11] Trade was done through a bartering system in which the value of goods was based upon their uniqueness. Among the most traded items mentioned by the chroniclers were salt, maize, salted fish, basalt and jasper stones, spun and unspun cotton, blankets, and minerals, e.g., copper and gold. Some basic materials, like cotton, sometimes acquired special uses. While everyone used cotton clothing, not everyone wore well-made and brightly colored cotton garments, which were especially beautiful in *Natá* and *Parita's* territory.[12] Cotton was also important for making fishing and hunting nets.[13] In 1527, Oviedo witnessed how colonists settled at Natá sent Christianized natives to exchange cotton blankets and hammocks for fine gold in the Central Cordillera of Veraguas (Oviedo 1944, VII: 76). These observations are archaeologically substantiated by the identification of spindle whorls in the vicinity of Natá (Breece 1997; Cooke 1972), the Parita valley (Haller 2004: Figure 6.11), and excavations at El Hatillo, HE-4 (Ladd 1964: Figure 54f; Mitchell and Acker 1961: Plate XI h). The two spindle whorls identified in the lower La Villa valley are similar to the ones reported in the Parita valley and are associated with Late Ceramic Period pottery.

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[11] ***Quando los indios no tienen guerra, todo su exercicio es tractar é trocar*** *quanto tienen unos con otros; é assi de unas partes á otras los que viven en las costas de la mar ó por los rios, van en canoas á vender de lo que tienen complimiento é abundançia, é á comprar de los que les falta.*
...llevan sus cargas á cuestas de sus esclavos: unos llevan sal, otros mahiz, otro mantas, otras hamacas, otros algodon hilado o por hilar, otros pescados salados, otros llevan oro (al qual en la lengua de Cueva llaman yrabra). En fin, aquello que les falta á los indios es lo que mas estiman, é aun algunos venden los propios hijos (Oviedo 1944, VIII: 23; my emphasis).
[12] *...en esta gobernación de Castilla de Oro la manta de hamaca no es hecha de red, sino entera é muy gentil tela delgada é ancha, é tan luenga como conviene* (Oviedo 1944, VIII: 5).
La dicha tierra y provincia de Paris ...hay... algodón y muy buena ropa de ello, así de mantas como de lienzos pintado, de labores y colores bien primas, como vuestra señoría los ha visto (Espinosa 1994c: 66).
...provincia de Natá ...hay en ella mucha ropa de algodón...(Espinosa 1994c: 68).
[13] *É assi* ***en la pesquería como en la montería****, se* ***aprovechan muchos de las redes, que haçen de*** *henequen é cabuya é assimesmo de* ***algodón, que tienen mucho é bueno,*** *de que la natura los ha proveydo* (Oviedo 1944, VIII: 16; my emphasis).

At Cerro Juan Díaz fragments of twisted cotton fibers were found attached to the suspension rings of a bicephalous crocodilian pendant found at base of a Conte/Macaracas phase grave, Feature 115 (Cooke and Sánchez 1998; Cooke *et al.* 2003a: Figure 8b). This pendant was found along a skeleton covered with a fibrous mass that included phytoliths of the Moraceae tree family, plant commonly used to for making bark cloth (Cooke *et al.* 2000: 166). Presumably, the body of the individual was wrapped in bark cloth. The 2-sigma date range from a charcoal sample collected from the grave's fill yielded A.D. 650–985 (I-18683). Fragments of bark cloth and negative impressions of ancient textiles were identified in several Sitio Conte's graves floors, stone slabs, and the oxidized surfaces of copper plaques (Lothrop 1937: Figures 79 and 80). Cooke also reports multiple finds of burnt clay surfaces with textile impressions from Cerro Juan Díaz, but none has been analyzed (Cooke personal communication 2006).

Secondary sources state that in the Atrato basin, *queví Dabaibe*—renowned as a fine goldsmith—crafted fine gold pieces in response to individual demands in exchange for fish, peccaries, salt, cotton clothing, human slaves, and gold nuggets from the neighboring alluvial gravels controlled by the Chiefs *Yinofi* and *Mueli* (Balboa 1994: 23–24; Rodrigo de Colmenares 1516 or 1517 in Jopling 1994: 41, Cooke *et al.* 2003a: 104). *Comogre*—another famous goldsmith whose domain included portions of the Caribbean north coast—exchanged cotton cloth and slaves for gold nuggets from the inland mines, and pearls from the Pearl Islands.[14] On the Pacific coastal savannas

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[14] *... a la casa de este cacique Comogre vienen indios de la otra mar en canoas por un río que llegan a casa del cacique Comogre, y traen oro de minas por fundir en muy gordos granos y mucho: el rescate que les dan por el oro es ropa de algodón y indios e indias Hermosa ... dicen que por el brazo que entra hacia el*

controlled by *Natá*, Espinosa (1994a: 55) documented a storehouse with maize and 300 dried and salted deer carcasses. The fact that *Natá* had a lot of meat and produce supplies allowed the chief to gather food provisions and offer big feasts when he so desired.

3.2.3.1 Trade in pre-Columbian times

Analyses of funerary deposits and contextualized domestic refuse have permitted the tracing of some archaeological exchange systems. Excavations at Sitio Conte whose sampled funerary features are cross dated to ca. A.D. 750–1050 exposed numerous stone tools and weapons, plausibly imported from the nearby highlands, sperm whale teeth, carved manatee bone ornaments, whose raw materials must have come originally from the Caribbean coast, and emerald stones presumably from Colombia (Briggs 1989; Cooke and Ranere 1992c; Linares 1977b; Lothrop 1937, 1942). Since gold and copper ores are abundant on the Caribbean side of Coclé, Colón, and Veraguas Province the gold artifacts at Sitio Conte are likely to have been made from these sources of gold (Cooke and Bray 1985: 35; Cooke *et al.* 2003a: 134–135). Sperm whale teeth, another valuable commodity described by Briggs (1989), were presumably obtained from stranded whales, a not-infrequent occurrence in Panamanian waters. From a stylistic point of view, some gold pieces from Sitio Conte appear to be non-local and probably were obtained from the region between Darién and Ecuador. However, it is very difficult to specify exactly where they were made (Cooke and Ranere 1992c: 285). At the contiguous columned ritual precinct of El Caño, the presence of beads made from European glass, black stone,

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ponente vienen las perlas a rescatar en canoas a casa del cacique Comogre (Balboa 1513 in Jopling 1994: 24).

and shell inside an indigenous urn are interpreted as the result of European-indigenous interactions that occurred between the period of the Columbus expedition (1502–1503) to the Caribbean and the establishment of the 1516 Spanish provisioning center at the Pacific coastal town of Natá located only 5 kilometers from El Caño (Cooke *et al.* 2000: 168, Figure 8.10a–g). At the site of Cerro Brujo on the coast of Bocas del Toro, Linares (1980e) identified non-local basalt axes, andesite blades, and Chiriquí highlands pottery traded from the cordillera around A.D. 900. Other means of pre-Columbian trade included animals and their materials. The commonest bird genus found in the refuse deposits at Cerro Juan Díaz, for example, is the macaw *(Ara)*, now extirpated. The abundance of macaws in an area where they no longer exist suggests that some were exotic (Cooke personal communication 2006). Another bird species that was identified at Cerro Juan Díaz is the parakeet (*Aratinga finschi*) not known from the area today (Cooke *et al.* 2006). The problem with birds is that there is no secure way to determine whether these birds were once there and extirpated or were exotic animals.

Another article of trade, to which chroniclers constantly refer is marine shell, used either as trumpets during wartime,[15] or to make beads and other personal ornaments such as penis-sheaths. Julia Mayo's analysis of workshop debris she excavated at the base of Cerro Juan Díaz, demonstrated that *Strombus, Melongena, Spondylus, Conus,* and *Anadara* are the top five most important marine shell genera for making personal ornaments (Mayo 2004: Table 5). As I will further discuss in Chapter 7 all these shells genera except *Spondylus* can be naturally found on the coast of Parita Bay. It is tempting

[15] *En las cosas de la guerra he visto desta gente que se presçian mucho; é quando salen en campo llevan caracoles grandes fechos boçinas, que suenan mucho* (Oviedo 1944, VIII: 19).

to assume that *Spondylus,* for example, comes from clear waters near coral reefs or rocks. Since the Parita Bay estuary does not present these types of habitats today, Cooke (1998) appealed to long boat journeys to the Pearl Islands or even Isla Iguana, located at 140 and 55 kilometers respectively from the bay. Recently, however, Diana Carvajal discovered relict populations *Spondylus calcifer* on Isla Villa (Figure 1.2). Taking into consideration post-Holocene transformations and rate of sedimentation at the mouth of the La Villa River is all possible, as Cooke and Sánchez (2001: 34) propose, that 1500 years ago Isla Villa had a wider circumference and its surrounding waters were clear of suspended sediments making it an ideal place for large populations of *Spondylus* to live. The relative large size and the number of *Spondylus princeps* artifacts from Cerro Juan Díaz and other sites suggests, however, that a large and healthy population of *Spondylus* was being utilized suggesting that a small island like Isla Villa would not have been sufficient to supply the market. There is a slight possibility then that certain shells were traded in from outside chiefly territories when the local supply was low. The only way that we can determine how far these raw materials are traveling is through chemical analyses of the shells.

3.2.3.2 *Areytos*

The Spanish started using the word *areyto* on Hispaniola to refer to a general get-together at which matters were discussed and large quantities of drink and food consumed. They transferred the term to the isthmus where it also referred to several social events. In the land of the *Cueva*, it was a common custom of the chiefs to determine their trade and peace agreements over a feast or *areytos* (Oviedo 1944, VII: 307). According to Oviedo (1944, VIII: 18), the *areytos* were their "letters or memorials" sung at the end of the feast as a public announcement of what was established by the chief. It also was common for the principal chiefs to offer lots of food to his officials and commoners in feasts organized in the fields or primary villages.[16]

This practice of public meetings has continued among natives peoples on the isthmus. The Kuna, for example, have a community meeting house—or *congreso*—in each village were they meet twice a year and political leaders—"*saklas*" and *caciques*—discuss problems that affect the community. The political meetings at the *congreso* are alternated by religious celebrations where the "*saklas*" and *caciques* chant religious and historical songs with mythical connotations which are interpreted by a chief's spokesman (Tice 1995: 150). Another type of meeting are the *chicherías* held to celebrate marriages, puberty rites for girls—the *inna tunsiklalet* and cutting of the hair *inna suit*. In all these events there is a large gathering of people, where a lot of *chicha* and food is consumed.

Andagoya (1945) provides some details about a game of canes—*cañas*—played among the *Cueva*. The game was played after feasting and much drinking at chiefly seats during a social gathering or the celebration of the end of year of a deceased ancestor. Like the *balsería* described on Chapter 2, the game involved teams of 30 to 50 men—the chief included—taking turns to rush at their opponents using spearthrowers and shields

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[16] *Tienen una costumbre los indios desta provincia de Cueva, que es muy sociable é obligatoria á los comunes con su señor en el comer; y es quel capitán ó señor principal, ora sea en el campo ó en su asiento é casa, todo lo que hay de comer se le pone delante, y él lo reparte á todos, é manda dar 'a cada uno lo que le plaçe...no son con todo el pueblo cuando el señor reparte toda la comida; pero con los principales é más señalados é aun algunos otros, estando en el campo, á la continua; y estando en paz, todas las fiestas, é algunos dias, aunque no sea fiesta* (Oviedo 1944, VIII: 10).

throwing a spear at each other as if they were enemies (Andagoya 1945: 436). According to Cooke, the ceremonial precinct at El Caño probably served as a gathering place to where ritual games like the balsería were carried out (Cooke 2004b: 273–274; Cooke *et al.* 2003b).

3.3 The succession of power

The chroniclers' descriptions of indigenous social traditions suggest a society that used symbols of rank and hierarchy to legitimize their ancestral lineage as well as authority. Political power, for the most part, was ascribed through lines of kinship. Heirs had to compete, however, in order to qualify for such distinction and eventually establish their own political realm (see also Cooke *et al.* 2003a: 136). Lower ranking positions were achieved through highly competitive tasks, primarily in battle, and were granted only by a paramount chief (e.g., Oviedo 1944, VII: 306). In this regard, the chronicles depict a social flexibility that according to Linares (1977b) explain the continuous rivalry over land, goods, women, and political power. I agree with Linares' position. In this section, I focus on a comparative analysis of historical and archaeologically documented traditions in an attempt to trace their origins and geographic distribution.

Gonzalo Fernández de Oviedo y Valdés (1944), the most erudite observer of the contact-period, wrote the most extensive work on contact period social behavior and ritual life. His comments are often based on what he observed among certain sectors of *Cueva* society, with which he was most familiar (e.g., Oviedo 1944, VII: 299–306, VIII: 5–25). There is a wealth of data in other chronicles, however, and these data have the advantage of not having been interpreted through the Spanish way of construing the primary data. Also, it is important to note that Parita Bay chieftains did not share all social practices recorded for the *Cueva.* One thing they did share, as stated above, was the way they dressed (Andagoya 1994: 34; Espinosa 1994c: 67). Among commoners, *Cueva* women wore a cotton skirt that wrapped around their waist and dropped down to their knees. The principal wife of high-ranking males, known as *espabe*, wore long woven cotton skirts that reached them all the way to their ankles. In addition, *espabe's* are reported as using gold bars to support their breasts (Oviedo 1944, VII: 299). Some dressing customs among the *Cueva* males were more restricted. The high-ranking males wore a sheet of gold, but only the commoners from the Caribbean wore a gastropod shell or wooden penis-sheath.[17]

Decorative items used by elites, primarily during war, included gold eagle pendants, thin hammered gold disks, elaborate headdresses, and shell jewelry. A general custom among paramount chiefs and noble men was to wear gold on the chest, arm or arms while in battle, in order to be recognized by their own men and their enemies (Oviedo 1853: 138; Cooke *et al.* 2003a: 120). In the year 1516, Espinosa's troops were confronted in the land of *Parita* by a "captain" dressed in a cotton shirt decorated with gold disks and cuffs (Cooke *et al.* 2003a: 120; Espinosa 1994a: 51). Eleven years later, *quevi Pocoa,* leading a troop of 500 men attacked the Spaniards at *Natá*, dressed with a great paten (metal plate) on his chest and spears in either hand (Oviedo 1853: 118).

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[17] *Andan desnudos, y en su miembro viril un caracol de pescado ó un cañuto de Madera* (Oviedo 1944, VII: 299). On the Pacific coast the men did not use a shell sheath

Cueva *espabes* often accompanied their husbands during battle and when they traveled to other territories. They were carried on hammocks and escorted by an entourage of one to two dozen "slaves" (Oviedo 1944, VII: 300). The site of Barriles (A.D. 600) in Gran Chiriquí takes its name from the large barrel shaped stone monuments, giant metates and human statues. The latter depict naked men, presumably captives, carrying other men sporting figurine pendants and conical hats (Cooke *et al.* 2003: Figure 7 a–d). Both pendants and hats have been interpreted as symbols of authority and rank, and were restricted to specific individuals, most likely *sacos* and *quevís.*

3.3.1 *Devisas*

In times of war, the *çabras* painted their bodies with specialized motifs that associated them with their *queví.*[18] These motifs, labeled *devisas* by the Spaniards, served as insignias to differentiate the enemy in battles involving several allied provinces or chieftains (Oviedo 1944, VIII: 20–21; Linares 1977b). Body paint served also to differentiate elites from commoners and slaves. Free men painted their faces below the mouth while slaves were painted between the mouth and the forehead (Oviedo 1944, VIII: 20–21). Oviedo also mentions the extraction of the front teeth from "war captives" or *pacos*. The *pacos* served the elite as slaves (see Footnote 1). Archaeologically it has been assumed that the cemetery at Venado Beach included war captives since 10 of the

[18] *Quando van á la guerra, llevan sus caudillos ó capitanes: estos son sacos ó cabras, é son ya hombres de experiençia en las cosas de armas quellos usan, é van con sus penachos é embixados ó pintados de xagua, é llevan insignias señaladas para ser conoçidos en las batallas, assi como joyas de oro ó penacho ú otra devisa* (Oviedo 1944, VII: 306–307).

71 individuals that show signs of being mutilated also had one or two of their front teeth extracted (Lothrop 1954; Redmond 1994: 102). Since the work at Playa Venado was done in the 1950s this needs to be corroborated by modern physical anthropology. Two mortuary features post dating A.D. 1100, one from Cerro Juan Díaz and the other from El Hatillo, contained human mandibles inside jars, some of which had their teeth extracted *post mortem* and do not seem to have resulted from violent conduct (see Chapter 2: 86).

Commoners were capable of becoming *çabras* only when the *queví* witnessed their aptitude in real battle. According to Oviedo (1944, VII: 306) an injured commoner who fought fiercely against a rival *queví* was titled a *çabra*, his wife became an *espabe*, and their children were forced to continue a career in the art of war.

The Spanish documents give the impression that there was considerable regional variation in the way people dressed. Obviously dress and the use of finery were contingent upon the relative wealth, power and influence of individual territories. The chroniclers of Christopher and Ferdinand Columbus' expedition to the territory of *Veragua* on the Caribbean coast note that despite the regional abundance of mineral gold, elite men dressed like commoners and wore few gold adornments on a regular basis (Cooke *et al.* 2003a). In *Veragua*, the principal chief had several wives, but only the children of the principal wife, or *espabe,* were allowed to ascend to power. However, the heir still had to demonstrate ability in the art of war and political influence in competitions against his brothers and/or other high-ranking men. Linares (1977b) suggests that the period of political succession most likely caused chaos by temporarily jeopardizing the alliance system. The death of the *queví Parita*, for example, brought conflict among his surviving brothers, *Quema* and *Queco,* who fought to ensure the political power of the late chief (Espinosa: 1994c; 71–72; Cooke and Ranere 1992: 296). The *quevi's* heir had the option of keeping his father *devisa* or adopting a new one. This was done to create distinction between his and the father's warriors (Oviedo 1944, VIII: 20–21). A son who chose not to adopt his ancestral *devisa* was looked down upon and expelled from his father territory.

3.3.2 Mortuary rituals

The Spanish chroniclers were impressed by the custom of immolating women with a chief when he died. The funeral ceremony of a *queví* started with the desiccation of the body through smoking (Andagoya 1994: 31). The objective was to preserve the bodies and keep the wild animals away. Subsequently, the remains were covered with gold regalia and wrapped in several layers of finely woven cotton blankets. The interment of *Pocorosa* in the *Cueva* province involved the hanging of the *queví's* body on a hammock over burning coals, in a sort of brazier that burned for several days and nights. Under the hammock, attendants placed big jars that collected the body fat (Andagoya 1994: 31). Another style of burial preparation described by Oviedo (1944, VIII: 51) involved the excavation of a large rectangular pit. At the bottom of the pit, the principal chief adorned in gold regalia was placed in a seated position over a wooden stool along with his wives, who were also covered in gold regalia.

In the previous chapter I referred to Sitio Conte as one of the few Panamanian sites displaying the magnitude of wealth and status differences that parallels contact-period funerary practices (Briggs 1989; Cooke *et al.* 2000, 2003a; Cooke and Ranere 1992; Hearne and Sharer 1992; Linares 1977b; Lothrop 1937). Important people, primarily adult males, were given special burial treatment and associated with impressive quantities of costume and/or sumptuary goods. Briggs' (1989: 137) analyses of Sitio Conte mortuary data proved that the identity of the principal occupants inside the richest graves was defined by the use of selected personal ornaments, such as embossed helmets, cuffs, greaves, disks, and plaques made of gold and pendants made of manatee bone and whale ivory (Briggs 1989: 138; Cooke *et al.* 2003a: 93).

Lothrop (1937: 202) believed that Sitio Conte functioned as the summer village settlement of "a supreme chief, his wives and immediate family, his personal retainers and his slaves." He estimated that the population reached 200 people, conceivably increasing during special gatherings, such as dances, ceremonies, and religious festivals. Other scholars, like Briggs (1989) and Linares (1977a), prefer to describe the site as a special cemetery, or "necropolis," for wealthy and very influential individuals. Perhaps, Sitio Conte served as the burial ground of a larger site that included the neighboring Cerro Cerrezuela and El Caño sites (Lothrop 1937; Cooke *et al.* 2003a: 126). No one denies that it is a special site, but it should also be noted that it is the only Panamanian site where rich graves have been excavated by professional archaeologists. Its uniqueness has led Cooke and colleagues (2000: 172, 2003b: 10, 2003a: 127) to suggest that Sitio Conte most likely had a greater influence on an area larger than the territory controlled by an individual chief. In their view "it is feasible that the people whose remains were buried at Sitio Conte came from catchments larger than the territories described by Espinosa, Andagoya, and Fernández de Oviedo as being under the sway of individual chieftains, such as *Natá, Escoria*, or *Paris [Parita]"* (Cooke *et al.* 2003a: 127). On the other hand, Haller's (2004: 97, 187–188) recent survey of the lower Parita valley makes a strong case for El Hatillo becoming a ritually important "central place" after A.D. 900. Despite the lack of stone columns and pavement features reported at Sitio Conte, El Hatillo is the only first order site reported by Haller (2004: 91, 177, 182) in the Parita valley (Figure 2.2). Haller (2004: 55) states that Parita valley provides solid evidence to support Cooke *et al.* (2000: 172, 2003a: 127–128, 134, 136–137) hypothesis that El Hatillo replaced Sitio Conte as the main macro-regional cemetery in Central Panama starting in A.D. 900 and lasting until the Spanish contact.

3.4 Indigenous resistance: the case of *queví Parita*

The Pacific coastal chiefdoms of Panama strongly resisted the Spanish incursion despite the use of superior weaponry, i.e., horses, artillery, steel swords and crossbows by the latter. *Parita* was among the renowned *quevís* responsible for delaying the Spanish *entradas* into Azuero and western Panama. His territorial domain comprised the coastal alluvial valleys between the *Río del Asiento Viejo* (today the Parita River) and *Río de Los Mahizales*, renamed Cubitá in the late 1500s (today La Villa River). *Parita's* province adjoined that of his rival brother in-law *Escoria* to the north; *Usagaña* to the west; *Chicacotra* (or *Chiracona*), *Quema,* and *Guararé* to the south (Andagoya 1994: 32–33; Espinosa 1994c: 66). The latter four chiefs were said to be under *Parita's* authority (Figure 3.1). In addition, Lothrop (1937: 10) lists eight more chiefs under *Parita*: *Asa*, *Chichima*, *Choarri*, *Churigra*, *Guera*, *Pano*, *Queco*, and *Yaguahira*. This permitted *Parita* to control a large coastal territory extending up to 6 leagues from the province of *Guasabe* [Guararé] to the *Escoria* River (today the Santa María).[19] If one league equals 4.44 kilometers (Romoli 1987: 221; see also Cooke 1993b) the province of Parita would have spanned approximately 381 km^2, its coastal domain would have covered 26.64 km, and his zone of influence about 1,846 km^2 (Figure 1.3). This allowed Parita and his allies control over major trade routes and gain "benefits from the military manpower" (Helms 1979: 59–60).

Two years prior to the Spanish incursions, *Parita* proved himself a great warrior by annihilating an invading group from Nicaragua,[20] who apparently had subjugated neighboring provinces (Andagoya 1994: 34–35). By the time of the 1515 Spanish expeditions to the Pacific coastal savannas, led by Captain Gonzalo de Badajoz with an army of 70 men, *Parita* was the first *queví* to successfully confront the Spaniards and force them to leave. Knowing that the Spaniards had taken control of the provinces of *Natá* and *Chirú,* and that this group of foreigners was approaching his land, *Parita* sent

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[19] *Este Cutatura, señor de Paris, fue valeroso hombre, y por guerra sujetá la provincia de Quema y Chicacotra y Sangana y Guararé. Con los de Escoria tenía siempre guerra...*(Andagoya 1994: 33–34).
... confina por la parte del este con las provincia de Escoria y Pacora, y por la parte del sureste con la provincia de Guasabe y Usagaña y por la parte norte con la provincia de Chicacotra y Quema;.todas las cuales dichas provincias son sujetas y obedecen al dicho cacique de París; y por la parte del sur, la dicha Mar del Sur, y tiene por ella de costa hasta seis leguas, que desde la dicha provincia de Guasabe hasta el Río de Escoria, son los indios y gente de la dicha provincia, a lo que parece, gente mas sábia y más polida y mas concertada que los otros que se han visto (Espinosa 1994c: 66).
... de la dicha provincia de ***Escoria*** *a la dicha provincia de* ***Paris****, que hay obra de* ***seis leguas****... de la dicha provincia de* ***Quema... a Chiracona****, que está tierra adentro, obra de* ***dos jornadas*** *de esta dicha provincia sobre la mano derecha y que torna y* ***confina con*** *el dicho cacique* ***Quema*** *y con la provincia de* ***Usagaña****. De este dicho asiento de* ***Chiracona*** *al* ***asiento viejo*** *había* ***cuatro jornadas*** *y del dicho* ***asiento de Quema*** *donde fue el dicho Albitez había* ***dos jornadas*** (Espinosa 1994a: 50–54; my emphasis).
[20] Cooke and Sánchez (2004b: 55) associate them with a group of merchants, similar to the Aztec's *pochtecas*.

messengers with eleven ducats (*ducados*) of gold, warning the soldiers to retreat (Andagoya 1994: 32–33). The greed for more gold only motivated the Spaniards to advance, but not without encountering battle and experiencing great losses. With an army of three to four thousand warriors, *Parita* not only forced Badajoz to retreat, but also recovered fifty thousand coins of gold that the Spaniards had stolen from the neighboring provinces (Andagoya 1994: 32–34; Espinosa 1994b: 60). As a consequence of the Spaniards' terrible embarrassment, in 1516 the local authorities appointed the Licentiate Gaspar de Espinosa to lead subsequent expeditions against *Parita* and the neighboring chiefs (Figure 3.1). Accompanying Espinosa on this second expedition to Azuero, the first for the Licentiate, were Jeronimo Valenzuela, Pablo Mexia, Pedro de Gámez, Bartolomé Hurtado, and Gabriel de Rojas. On several occasions Espinosa and his soldiers confronted *Parita*, but were never able to take him captive as they did with *Natá* and his rival *Chirú*. From the province of *Escoria,* Espinosa sent eighty of his soldiers to locate *Parita's bohío.* They reached *Parita's* old settlement or *Asiento Viejo* and found it deserted, "as it was ten years after its abandonment" (Espinosa 1994a: 50). The soldiers encountered only the messengers that Espinosa had previously sent from *Natá*. They reported that *Parita* and his brothers were in the vicinity, debating whether to comply with the Spaniards' demands for gold or to annihilate them. Soon after, the Spaniards engaged in a battle with *Parita's* warriors that lasted more than six hours. Despite Espinosa's efforts to capture *Parita,* the *quevi* escaped to a nearby shelter situated in a craggy precipice of a hill (Espinosa 1994a: 51).[21] *Parita's* escape was

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[21] *... el dicho cacique tenía guardia (=guarida?) tan cerca que era un despeñadero áspero de un cerro que*

followed by a series of indigenous retaliations against the Spaniards, even from the earlier subjugated provinces of *Natá* and *Chirú.* The initial Spanish *entradas* to the Pacific coastal chiefdoms were challenged and the soldiers were forced to retreat and reorganize, advancing by land rather than by boat because the riverbanks were heavily inhabited, and it was easy for the natives to detect them.

After the foundation of Panama City in 1519, the appointed Governor Pedrarias Dávila assigned Espinosa to a third expedition to gather provisions for the city from the territories of *Natá* and *Parita* (Espinosa 1994b). This time, Captains Pascual de Andagoya, Francisco Pizarro (the future conqueror of the Inca Empire), Alvaro de Guijo, Andres Garabito, and 115 other soldiers accompanied Espinosa in the venture. The group departed from Panama by sea on two vessels: the San Cristobal and the Santa María de Buena Esperanza, and two canoes (Espinosa 1994c: 61). Along the coast of Chame, the group split after being sighted by local communities. Espinosa, Garabito and 48 of the soldiers traveled by land, while Pizarro and the rest of the men sailed directly to the *Escoria* River (or Santa María) to control the uprising and avoid having the people of *Chirú* alert chiefs *Natá* and *Parita* (Figure 3.1). In their search for *queví Parita,* and while exploring the *Río del Asiento Viejo*, Espinosa and his soldiers disrupted burial preparations for the recently deceased chief, two of his succeeding chiefs, and two women taking place in a smoking *bohío* structure. The bodies had been previously desiccated through smoking and wrapped in numerous layers of fine and colorful mantles held in place with cords of cotton and human hair. The bundles were placed over a

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no lo pudimos alcanzar (Espinosa 1994a: 51).

finely-crafted hammock made of straw. In their greed Espinosa and his soldiers tore the clothing of the chief and found *Parita* elegantly covered in gold paraphernalia. A basin-shaped helmet was positioned over his head, necklaces on the neck, cylindrical cuffs on the arm, pectoral and upper back disks on the chest and back, belts with many bells hanging from them along the waist, and leg armors.[22] The extended bodies of two women, also adorned with gold objects, were placed at the head and feet of the chief. The two other male chiefs inside the burial pit were also covered with gold ornaments but in lesser quantities than *Parita.* From Espinosa's description we can appreciate that it was not only gold that made the burial preparations rich and elaborate, but also the textiles and cordage (see other syntheses provided by Cooke and Bray 1985; Hearne 1992: 18; Linares: 1977b: 76; Lothrop 1937: 46).

At a second *bohío,* Spaniards found twenty of *Parita's* enemies from the territories of *Escoria* and *Chirú* held captive, and scheduled to be killed the following

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[22] *Estaba cada uno dellos en un lio luengo, cubierto la cobertura de encima de unas hamacas de paja muy primas y muy bien labradas, de las muy buenas que hay nos se hacen en esta tierra, e encima liado con unos cordeles de cabuya como lian [lino] fardeles de Flandes; y más de dentro otro envoltorio e cobertura de muchas mantas muy buenas y muy pintadas, liadas de la misma manera con cordeles de algodon; y más de dentro otro envoltorio de mantas más delgadas y más primas, liadas de la misma manera con cordeles hechos de cabellos de indios, y dentro del cuerpo del difunto muerto asado, el uno de los cuales dijeron que era el cacique viejo...que había desbaratado al capitán Gonzalo de Badajoz y a los cristianos que con el fueron, y les había tomado el oro; que había fallecido después que de allí nos partimos, el cual estaba todo armado de oro, y en la cabeza una gran bacina de oro a manera de capacete, y al pescuezo cuatro a cinco collares hechos a manera de gorjal, y en los brazos armaduras de oro hechos como cañones, todos cubiertos de las dichas armaduras, y en los pechos y espaldas muchas piezas y patenas y otras piezas hechas a manera de piastrones, y un cinto de oro, ceñido todo de cascabeles de oro, y en las piernas asimismo armaduras de oro; por manera que de la manera que el dicho cuerpo del dicho cacique estaba armada, parecía un arnes o coselete trenzado; tenía a la cabecera una mujer muerta, y a los pies otra, las cuales tenían asimismo muchas piezas de oro puestas; en los otros dos envueltos estaban otros dos caciques que dice que habían sido y sucedido después de él, y se habían muerto, los cuales estaban de la misma manera armados de oro, y aunque no tan rica ni tan apuestamente, con mucha cantidad como el dicho que envuelto el dicho cacique Antatará, los cuales se desenvolvieron y se sacó el dicho oro de todos ellos, el cual avalíamos que podía haber en ellos hasta diez mil pesos, e hice sacar todo lo que se halló en las habas, y en los indios e indias que se tomaron, y en presencia de todos se metió en otras habas mejores y más convenientes para llevarlo cargado y recojido todo lo que se halló...* (Espinosa 1994c: 63–64).

day. Among the captives was the teenage son of *Pacora*, a sub-chief or *saco* who lived along the Santa María River in the chiefdom of *Escoria.* The boy's mother would witness his death after the new *quevi* refused to accept the basket of gold she had brought for ransom.[23] In a strategic move to form alliances, Espinosa liberated the prisoners and continued his journey through Azuero and west into the territory of *Veragua* (Table 3.1). Immediately after *Parita's* death his chiefdom fell apart. Soon the decline of many other chiefdoms followed suit. Although *Natá* escaped, for example, his chiefdom was basically subdued by 1522 when the Spanish town of Natá was founded (Table 3.1).

Although the Spanish destroyed the chiefdoms along the Pacific coast as far as Chiriquí in two decades (1510–1530), resistance continued in the Veraguas and Coclé foothills for another 30 years. Resistance after the 1530s became more effective—from a strictly military point of view—as the surviving population adapted to the Spanish method of warfare, life style, and low numbers. Two chiefs led the resistance in Veraguas, *Pocoa* in the Soná area and *Urracá* in the central highlands (Cooke 1993b; see also Lothrop 1950). Spaniards acquired control of the area around the Turlurí or Escobal mines on the Caribbean side of Veraguas (Figure 2.2), but resistance continued on the western Caribbean slopes, and in the mountains behind the El Valle massif until the mid-

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[23] *tenía el dicho cacique en el dicho bohío hasta veinte indios atados con sus cuerdas a las gargantas, los cuales eran y habían traído de las provincias de Escoria y Cherú, en las cuales tenía Guerra el dicho caique, entre los cuales* ***tenía un hijo del cacique de la provincia de Pacora, que es*** *la dicha* ***provincia de Escoria****, el más bien dispuesto mancebo que se ha visto en estas partes, y muchacho de edad de hasta diez y ocho o diez y nueve años, los cuales tenía todos para matar la noche siguiente; y los dichos indios que topamos dicen que habían ido por iguanas y pescado para hacer el areyto, y* ***una madre del dicho cacique de Pacora****, que así tenían preso,* ***había venido a lo rescatar, y había traído un haba de oro*** *y le había dado al dicho cacique por él, y* ***el dicho cacique*** *se la había tomado y* ***no la quería dar el dicho su hijo****, antes decía que lo había de matar con los otros en su tierra, que quiere decir en trueque del enojo que tenía dellos; y estando la madre muy afligida aguardando de ver morir a su hijo, y llorando con él,* ***llegamos nosotros y los libramos a todos****...*(Espinosa 1994c: 64; my emphasis).

sixteenth century (Cooke *et al.* 2003a: 96). Here the resistance was led by the "Coclé Indians", who may have been ethnically and linguistically related to the contemporary Ngöbé (Arias 2001: 9–13; Cooke *et al.* 2003b: 27–28)[24].

3.5 Population in decline

The depopulation of Azuero and the Coclé plains was very rapid. Major causes for this abrupt decline include: (1) exotic pathogens, (2) the ferocity and brutality of the conquest *per se* coupled with a very different attitude towards war, (3) the disruption of native agriculture and trade systems, (4) the subjugation of the native population to provide labor in the mines, (5) the rapid loss of reproductive males, (6) and shipment of

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[24] Genetic studies of the modern ethnic group known as the "*Cholos de Coclé*" have led investigators like Arias (2001, Arias *et al.* 1992) suggest these are the direct descendants of the Coclé Amerindians. A serum protein sample taken from the *Cholos de Coclé* living 20 kilometers from the town of Penonomé, on the continental divide of the Coclé province, revealed that they share a common pool of genes whose racial composition is a trihybrid mixture of Amerindian (44%), Spanish (38%), and 18% of Black African (Arias *et al.* 1992: 180; Arias 2001: Figure 1; Griggs 2005: 372). The Amerindian component of the admixture includes two genes which link the *Cholos de Coclé* with the Ngöbé. Although, the genetic association between the Coclé and Ngöbe is close they are not identical and this is due to the contact the *Coclé* had with their eastern neighbors, the Cueva (Arias 2001: 80). A third gene links the Cholos population with the Cuna, who as stated above were related with the Cueva. The genetic traits that link the *Coclé* and the Ngöbe seems to receive confirmation through other means including ethnohistoric, linguistic, and archaeological data.

On ethnohistoric grounds, John Griggs traces the roots of the *Cholos de Coclé* population to the reduction settlement of Penonomé, originally established between 1573 and 1576 (Griggs 2005: 370). The original town was quickly abandoned; but a 1581 proposal to repopulate the Penonomé written by Villanueva Zapata led to successful second attempt to establish the town. According to Griggs (2005: 371), the new inhabitants of Penonomé were Coclé Amerindians who were forced to migrate to Penonomé from the mountains. Centuries of mixing with the whites and blanks living near Penonomé gave raise to the "Cholos of Coclé" (Arias 2001: 80).

At the end of the eighteen century, priest Blas José Franco drew up a vocabulary of words, which was later republished by Pinart as the Guaymí-Penonomeño language. Linguist Adolfo Constenla (1991) considers it to be a variant of the language spoken by the Ngöbé (see also Arias 2001: Footnote 66; Cooke *et al.* 2003b: 28).

Most recently Griggs links the production of an indigenous made pottery style—named Limón—from the Caribbean slopes of Coclé to the Coclé Amerindians. Based on radiometric dates obtained from carbon-encrusted Limón pottery from sites PN-21 and LP-48, Griggs (2005: 158) estimates that the chronological range of this ceramic style is A.D. 1300–1640. The decline of Limón pottery production coincides with the entradas of Spaniard Juan López de Sequeira to exploit the placer mines in 1602.

Panamanian natives to Peru and other places. The voluntary or enforced cohabitation of native women with the Spanish accelerated acculturation. Spaniards thought that the supply of slave labor was endless and did little to prevent population decline (Jopling 1994: 40). According to Castillero (1995: 39–40) conservative estimates for the isthmian population, at the beginning of the conquest range between 150,000 to 250,000 people. By 1522, one decade after the first Spanish incursion to the Pacific side of the isthmus, only 7 to 12% of the original population survived if one uses Castillero's estimate. The worst collapse happened in Darién and *Cueva* province where both Andagoya (1994: 29) and Oviedo (1944) describe the depopulation. In 1537 Friar Tomás Berlanga noted that the indigenous population of Natá, estimated to be less than 3000 by 1522, was reduced to about 500 (Castillero 1995: 57–59). This last estimate includes, however, natives brought from outside Panama. Another estimate provided by Espinosa, states that by 1519 Natá was inhabited by about 1,500 people (Espinosa 1994a: 48). In the year 1527, Oviedo (1944, VIII: 9) said that there were about 45 to 50 remaining *bohíos* made of wood and thatch in the town of Natá.

Despite the fact that native slaves were emancipated throughout the colony in 1549, and that the Royal Prohibition of Cigales (dated March 21, 1551) recommended the suppression of the *encomienda* and indigenous division, colonial authorities in Panama chose to ignore the Royal decrees (Cooke *et al.* 2003b: 23). Instead, foreign natives from Nicaragua and elsewhere were brought to repopulate and be integrated into the *encomienda* system. The Church promoted the foundations of *pueblos de Indios*—places were surviving natives were gathered under the protection of a religious group—in an effort to relocate local and foreign people in the vicinity of Spanish towns. The creation of the *pueblos de Indios* was a provision included in the 'Prohibition of Cigales' to protect the Amerindians without affecting the colonists. By 1558, the indigenous population at Natá increased to at least 700, but most of the native people were still people born elsewhere (Castillero 1995: 59).

In the region of Azuero, three *pueblos de Indios*—Santa María, Santa Elena de Parita, and Santa Cruz de Cubitá—were created between 1556 and 1558.[25] The last of the three was located half a league (~2.2 km) from the Spanish town La Villa de Los Santos (Castillero 1995: 82; Anonymous letter dated May 7, 1575 in Jopling 1994:13, 19). According to Juan López de Velasco, in 1575, Cubitá was a community of 90 to 100 people who grew maize and raised cattle for the colonists of La Villa and Natá (Castillero 1995: 82; Cooke *et al.* 2003b: 23; Jopling 1994: 19). In a letter written to the king of Spain, in April 25, 1577 Francisco Díaz, *Chantre* of Panama Cathedral, states that by that time the men and women of Cubitá were at the service of the colonists of Los Santos in order to avoid working in the fields (in Castillero 1995: 73). Ten years later the town of Los Santos had apparently absorbed the people of Cubitá.

Research at Cerro Juan Díaz links its last occupational phase with the *pueblo de indios de Santa Cruz de Cubitá* (Carvajal 1998; Carvajal *et al.* 2006; Cooke and Sánchez 1998: 61; Cooke *et al.* 2003; Díaz 1999: 18; Sánchez 1995). The scarcity of El Hatillo

[25] *El Gobernador les señaló tres pueblos a donde se recogiesen, el uno lo situó a las orillas de un rio llamado* ***Cubita*** *y le puso nombre* ***Santa Cruz,*** *otro situó una legua de este a las riberas de otro rio llamado Parita, y el pueblo se llamó* ***Santa Helena,*** *otro señaló diez leguas de estos dos leguas del pueblo de Natá, llamase el término y el pueblo Santiago* (1561 letter written by San Pedro de Santamaria, *in* Jopling 1994: 336; my emphasis).

pottery and complete absence of *Mendoza* wares, the last variety of indigenous pottery defined for Gran Coclé, led Cooke *et al.* (2003b: 18–22) to suggest that occupation during the last decades of the pre-Columbian period at Cerro Juan Díaz was slight. Since *Mendoza* wares are prevalent at sites in the lowlands and foothills of Coclé and Azuero, which were in the vicinity of the Spanish town of Natá, but only occasionally are reported south of the Santa María River, Cooke and his colleagues proposed that Cerro Juan Díaz was not occupied for a potter's generation after contact. The discovery of 70 fragments of wheel-thrown *Bizcocho* pottery from the late sixteenth century and few metal artifacts at the hill summit is interpreted, however, as evidence that Cerro Juan Díaz was re-settled as the *pueblo de Indios de Cubitá* (Carvajal *et al.* 2006). This hypothesis receives support from finds of extended burials without native artifacts, one of which was buried in a primitive stone-lined grave and returned a dentin date of cal. A.D. 1440–1640 (Beta-148204; Cooke *et al.* 2003b: 26).

3.6 Conclusions: the chiefs and their territories

Ethnohistoric documentation describes densely-populated valleys in many areas of Panama at the time of Spanish contact. Sixteenth-century indigenous settlements ranged from small villages with scattered houses on hilltops in the middle of forested areas (e.g., *Veragua*), to large nucleated settlements particularly in the coastal savannas of the Pacific coast (e.g., *Natá* and *Parita*) situated along the rich alluvial valleys with houses packed closely together, some even arranged around plazas (Andagoya 1994; Anghera 1912; Espinosa 1994a; Oviedo 1944, VIII: 6; see also Cooke 2005: 131; Helms

1979 8–11; Sauer 1966). Not much else is offered about site hierarchies in the chronicles. There is a constant reference to the *queví's bohío*, which Helms (1979: 8) rightly interprets as the place where the chief, his family, and servants happened to be when Spaniards arrived. In some instances, chroniclers make reference to buildings that seem to have had special functions like *Comogre's* mortuary house, the well-made store houses at *Natá,* and the fortified towns in the province of *Tabraba* and sub chief *Pocoa,* in mountains of Veraguas.[26] The latter were "protected with moats and very strong palisades of spiny plants—*cardos*—interwoven making a well fortified wall" (Andagoya 1994: 32; see also Sauer 1966: 271). In other instances, when the Spaniards refer to the chief's residence it is difficult to assess whether they are describing the place where the *queví* lived, the place where the ancestor's remains were kept, or buildings that were congress halls or other meeting places. Since chiefs would have presided over communal events, it would be logical for the Spaniards to have been confused. Excavation at Cerro Juan Díaz yielded evidence of several oval and circular floor-plans, defined by burnt clay floors and post-holes. One of these features identified at the hill summit has been tentatively interpreted as a mortuary house. Burnt post-holes suggest a date of A.D. 1275–1420 (Carvajal *et al.* 2006; Cooke *et al.* 2003b).

With regard to the archaeological field record, the few intensively surveyed regions like the Chiriquí highlands, the Tonosí valley in Azuero, Coclé, the Santa María and Parita Rivers, in Central Panama, document a comparable situation in which contact-

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[26] *Tienen los caciques sus fortalezas hechas con sus dos otros cercos de maderos y árboles muy gruesos nacidos y su cava muy grande a la redonda de manera que esta del dicho cacique Tabraba y otra de otro cacique a donde fué el dicho capitán que se decía Pocoa, podían muy bien pasar por muy buenas fortalezas en Italia* (Espinosa 1994a: 55).

period "chiefdoms" represented by one or two particularly large sites, some with surface features like stone walls, columns, paved floors, and artificial mounds arranged around central plazas. Through the ethnohistoric accounts, we also learn that sites were temporarily abandoned and reoccupied, which may explain the archaeological hiatuses depicted in the ceramic record of certain investigated sites. The temporary abandonment of sites could be the result of combined factors including: (1) over-population and accumulation of waste, which would have left sites unbelievably foul-smelling,[27] (2) degradation of surrounding resources, (3) rivalry and/or defense (Cooke *et al.* 2003b: 10). The mobile situation portrayed at the time of contact could perhaps also explain the lack of permanent structures outside the ceremonial centers (Cooke *et al.* 2003b: 10). Based on Espinosa's accounts of *Parita's* old settlement, it appears that the chief had transferred his residence here ten years prior to the first Spanish *entradas* to Azuero (Espinosa 1994a: 50). Based on the ethnohistoric documentation, Helms (1979: 59) proposed that the Parita River must have been the core of Parita's chiefdom, while the southern territory of the La Villa valley, a subsequent acquisition (see also Haller 2004: 19). *Parita's* new settlement was said to be distant from the coast, which would have favored defense against canoe-borne attacks. The physiographic nature of Cerro Juan Díaz, being a prominent hill with large boulders covering its summit and northwestern section, led Cooke and Sánchez (1998; see also Cooke 2001b: 57; Castillero 1995: 72) to suggest that its location coincided with the rocky outcrop hill where *Parita* escaped during a battle

[27] The evidence from Sitio Sierra and Cerro Juan Díaz suggests that even though these sites experienced a long history of settlement occupation, there are periods of population decline and partial abandonment for reasons beyond political conflict (Cooke and Sánchez 2004b: 51).

encounter with Espinosa in 1517 (see footnote 21). The area where this historic encounter took place was said to be located near the new settlement (Espinosa 1994a: 51).

The situation documented in the Santa María valley suggests a large settlement every 2 to 4 kilometers up the river, a pattern similar to the La Villa Valley as will be discussed in the following chapter. This situation contrasts with the Parita Valley settlement pattern, where Haller identified numerous, but smaller-sized hamlets and dwellings headed by a single site, El Hatillo (HE-4). Through his survey of the Parita river valley, Haller (2004: 103) confirmed that El Hatillo may in fact be the location of *Parita's* old settlement (see Cooke 1993: 114; Cooke *et al.* 2003a: 134).

Espinosa's (1994c: 62, 64) accounts of the *Río de los Mahizales* (La Villa River) make reference to a densely populated region, cultivated with extensive fields of maize, manioc, and squash.[28] The coastal domains extended up to six leagues with sandy beaches and abundant fisheries and saltpans. Results from the PARLV survey to be presented indicate the presence of refuse dumps replete with fish bones at some distance from the coast and adjacent to a beach ridge. The geographic situation of *Parita's* province seemed to have placed the chief in control of certain commodities such as salt, fish, cotton, venison, maize, and manioc, which were most likely, exchanged for basalt stones, metal ores, and/or finished objects from the cordillera provinces. Using archeological data provided by the PARLV, in the following chapters I will further

[28] *...por el río que se dice de los Mahizales, ... estaba todo poblado, y no podrían subir sin ser sentidos aunque fuésemos de noche...* (Espinosa 1994c: 62; see also Chapter 1: Footnote 4).

address the issue of *Parita's* chiefdom's antiquity, stability through time, settlement hierarchy, and subsistence economy.

Chapter 4

Settlement Survey of the lower La Villa River

4.1 Introduction

The Archaeological survey of the lower La Villa River (in Spanish *Proyecto Arqueológico del Río La Villa,* henceforth PARLV) was conceived as a complement to a field investigation directed by Richard Cooke, Staff Scientist at the Smithsonian Tropical Research Institute in Panama, which focused on the Pre-Columbian and early Colonial site of Cerro Juan Díaz (LS-3). The site is located in the lower reaches of the La Villa River, not far from the coast of Parita Bay on the central Pacific coast of Panama (Figure 1.2). The Cerro Juan Díaz Project or "CJDP" began in the dry season of 1992. Cooke's team of researchers used décapage excavation techniques, following the cultural stratigraphy of large units opened in different areas on and around the large hill located on the southern (Los Santos) side of LS-3. Emptied looter pit walls enabled features to be identified easily. The exposed sequence of domestic and ritual features date from approximately cal. 200 B.C. to the sixteenth century A.D. The final monograph, which will summarize the entire project, is in preparation. Data on certain aspects of the investigation can be found in Carvajal 1998; Cooke 2001a, 2004a, 2004b; Cooke and Sánchez 1998; Cooke *et al.* 1998, 2000, 2003b; Desjardins 2000; Díaz 1999; Jiménez 1999; Jiménez and Cooke 2001; Mayo 2004; Mayo and Cooke 2005, 2005; Sánchez 1995; Sánchez and Cooke 1998, 2000. A summary of salient aspects of the CJDP is presented on pages 158 to 175.

When field work began, Cooke and his team conjectured that LS-3 was likely to have been a special or important site because of its depth, artifact density and geographical prominence. In fact, Cooke (1993b) proposed that it may have been one of the two principal settlements of the contact period chiefdom of Parita, which Spanish eye-witnesses named the *Asiento Viejo* (old settlement) and *Asiento Nuevo* (new settlement). The CJDP, however, concentrated on the southern (Los Santos) side of the site even though it was clear that cultural material was extensive on the opposite banks of the river. In the expectation that a regional survey would form part of the research it did not attempt to determine the size and extent of the settlement nor its relationship with other sites in La Villa valley and elsewhere in the historic chiefdom of the *queví Parita.* Cooke's hypothesis therefore was based on interpretations of contact period documents and did not have the support of empirical field data.

The PARLV was designed to address the question of the spatial and regional characteristics of LS-3, i.e. How large was the settlement? How did it grow? How did it compare to other sites located in the region? Consequently I decided to cover as my survey universe 40 square kilometers of the lower valley, extending 3 kilometers across the banks of the La Villa River, from the coastal mangrove to 14 kilometers inland (Figure 1.2). As fieldwork progressed, however, I decided to expand the surveyed area five kilometers east of the river margin after discovering a coastal site (LS-31) which appeared to be a pre-Columbian fishing community located two kilometers southeast of a feature that I am interpreting as the former major mouth of the La Villa River.

The survey was carried out with the assistance of three local workers using commercial grade 1: 25,000 aerial photographs and 1: 50,000 topographic maps. After field reconnaissance, one hundred and eighty-eight properties, covering an area of 10 square kilometers, were sampled using intensive surface collections (Figure 4.1). The locations of archaeological features and material scatters were registered with a hand-held Global Positioning System (GPS) and entered into ArcView's Global Information System (GIS) program.

After the pedestrian survey and evaluation of registered sites, the PARLV conducted remote sensing surveys at five sites. The purpose of including remote sensing survey was to complement the surface sample collections with high-resolution geophysics and to identify areas of interest for excavation. Before the 2002 rainy season began, the PARLV was able to test the results of these surveys by excavation at LS-31. Other test units were opened in areas where stratigraphy exposed by dirt roads that cut through mound features and unfilled looter's pits showed early diagnostic artifacts and partially intact features. These units were opened to corroborate site chronologies and define the types of features destroyed by the looters.

In January 2003, Thomas Bullard of the Desert Research Institute conducted a seven-day geomorphologic reconnaissance of the lower La Villa valley. He was invited to the PARLV in order to: (1) investigate the transformations of the La Villa fluvial system, (2) explore appropriate methods for defining a chronology of changes in the system, and (3) search for the relationship between elevated paleovalleys upstream and the paleo-meanders located near the river mouth. In this chapter, I present the results of Dr. Bullard's geomorphologic evaluation of La Villa fluvial system, the archaeological survey, and the test excavations.

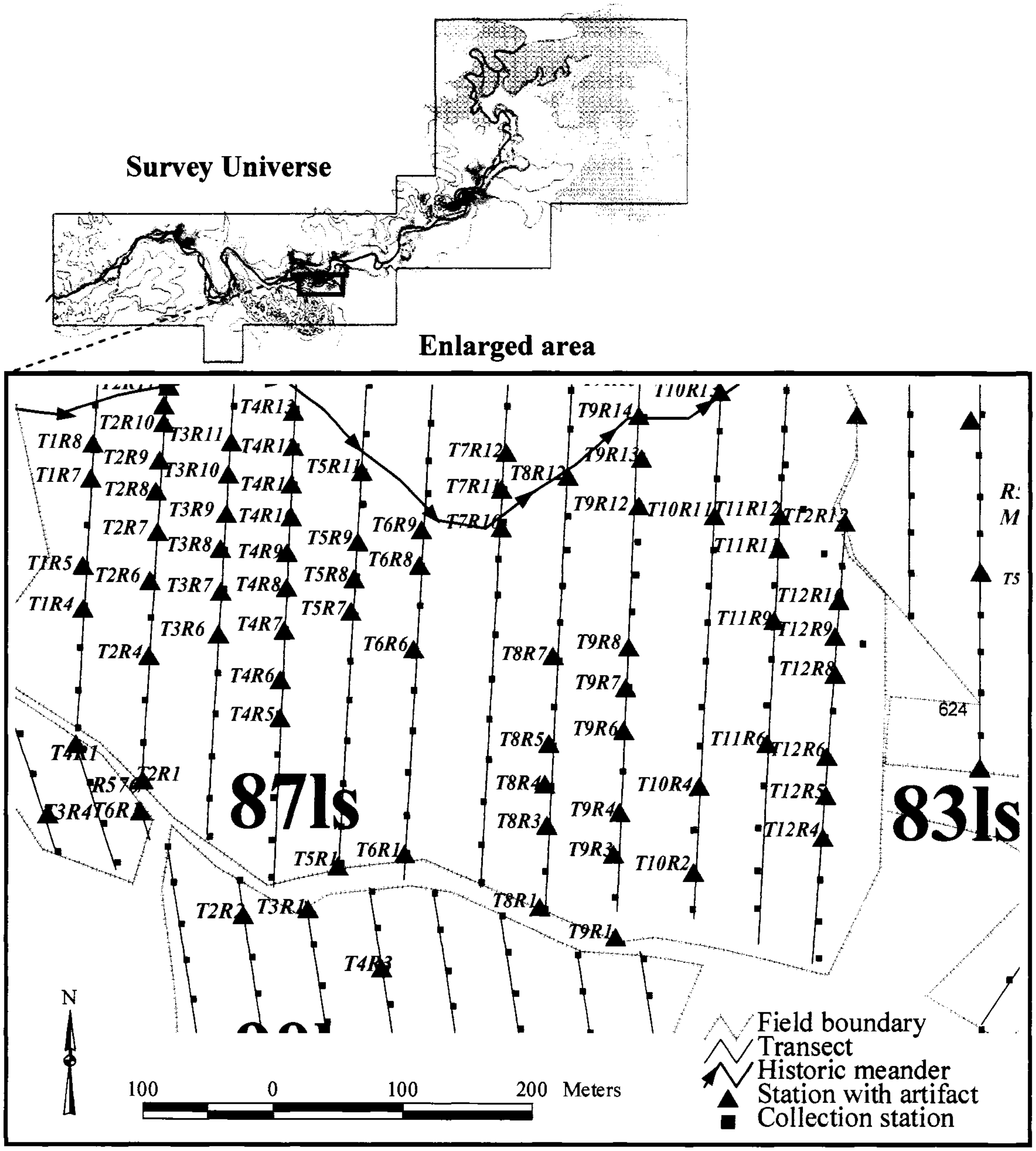

Figure 4.1 Lower La Villa Valley division of surveyed fields

4.2 La Villa Fluvial System

Aerial photographs and topographic maps dating from 1979, 1985, and 2000 show that meander cut-off activity is common throughout the lower valley of the La Villa River (Figure 1.2). A sequence of historic and paleo-meanders is noticeable in the mangrove, estuary, and high tidal flat (*albina*) biotope between the river mouth and the region known as "Boca Vieja," or old mouth. The field geomorphic expressions of the paleo-meanders range from subtle changes in relief and vegetation to abrupt breaks in topography with clear definition of former channel courses. A geomorphological reconnaissance enabled Bullard to confirm the presence of two sets of paleo-meanders separated by a low divide. The first set of paleo-meanders is located one to three kilometers from the present river channel; the second is closer to the active river channel. Heavy vegetation cover was associated with both sets of abandoned meanders. Based on the orientation followed by the paleo-meanders Alberto Ruiz, a local geologist from Los Santos, suggested that the location of paleo-meanders indicated, at some point, the La Villa River discharged to the ocean southeast of its present mouth, near the Boca Vieja area (Figure 1.2). A possible cause of the northward migration of the river could be tectonic tilting. According to Clary *et al.* (1984: 57), the presence of estuaries, broad tidal flats, wide coastal plain and meandering rivers on the northwestern side of Parita Bay point to a stable tectonic area in a vertical sense. However, a transisthmian fault running parallel to the eastern Azuero coastline suggests horizontal displacement. Further studies are needed to establish tectonic activity in the La Villa valley and determine how it influenced the local geography and location of archaeological sites.

During the reconnaissance, Bullard was able to document three to four Holocene age fluvial terraces and two beach ridges within two kilometers of the coastline (Figure 1.2). The dynamic nature of La Villa is apparent through the broad fluvial terraces where the stratigraphy shows the river experienced fluctuating base-level conditions. Bullard states that the cut-and-fill cycles and the presence of buried soils attest to periods of relative landscape stability punctuated by episodes of channel aggradation (deposition and elevation of the channel bed), and incision (when new channels were eroded). Periods of stable base level conditions are marked by the relative stability of the landscape during which time soils begin to form on fluvial deposits.

Between Cerro El Tamarindo and the community of Los Olivos, Bullard noticed the presence of bedrock channels and an increase in terrace elevation, or a deviation of fluvial terraces in an upstream direction. Also the terraces up river are wider and fewer in number. Bullard argues that the deviation of fluvial terraces is indicative of uplift. Similarly he interpreted the occurrence of up river bedrock channels as a sign of the presence of either more resistant bedrock units, tectonic features (faults or folds), or both.

According to Bullard's field observations of the soil morphology on the exposed terraces can be correlated on the basis of soil morphology differences, e.g., profile thickness, presence or absence of the Bt horizon, thickness of the Bt horizon, B horizon color and clay film development (summarized on Table 4.1).

Table 4.1
Soil characteristics for fluvial terraces and beach ridges in the lower La Villa River

Prepared by Thomas Bullard
Desert Research Institute

Terrace/ Beach Ridge	[1]Age Estimate (ky)	Height Above local base level	[2]Dominant Horizon	Horizon Thickness (cm)	[3]Maximum B Horizon Hue	[4]Maximum clay films
T4	< 0.5	1–3 m	C	100–300	10YR	n.o.
T3	< 1–3	2–3 m	Bw	50	10YR	n.o.
T2	4–6	3.5–4.5 m	Bw-Bt	90	10YR-7.5YR	1n-m, br
T1	8–15	4–6 m	Bt	80	7.5YR	2m pf, po
BR2	4–6	5–10 m	Bw	20+	10YR	n.o.
BR1	> 20	15–20 m	Bt	300	2.5YR	2mk, po, pf

[1] Bullard estimated the antiquity of the deposits from a general correlation of soils formed on dated beach ridges and fluvial deposits on the Osa Peninsula, Costa Rica (Bullard 1995, 2002: Table 2).
[2] C Horizon: subsurface mineral horizon composed of unaltered or slightly altered parent material.
Bw Horizon: soil characterized by the development of red color or structure, loss of carbonates, with no apparent illuvial accumulation of material.
Bt Horizon: characterized by the accumulation of clay (horizon definitions are based on Waters: 1996: Table 2.4).
[3] Hue is Munsell Soil Color hue.
[4] Clay film presence and location is an indicator of time required for clay translocation and accumulate in the B horizon. n.o. = not observed in the soil; Frequency: 1 = few, 2 = common; Thickness: n = thin, discontinuous; m = moderately thick; k = thick; Location: br = bridging sand grains, pf = ped faces, po = lining pores.

Bullard's field observations have been recently confirmed through laboratory analyses of soil samples collected at nine stations, including the beach ridge closest to the coastline (Figure 1.2). The analysis revealed that there is a large increase in clay at BR1 with respect to the active beach (the ratio is 30% to <1%). Consistent with the increase of clay accumulation is the increase in soil structure, clay films, oxidation, and reddening. What Bullard cannot determine is "whether the clay formed (1) through transformation of the original mineralogy, (2) the aerosolic clay-sized particles mechanically infiltrated into the sandy deposits, or (3) a combination of the two. The relatively lesser amount of sand in the older beach (BR1) deposits could be indicative of favorable minerals weathering to clay minerals. The beach sediments from Playa Monagre, for example, contained large components of rock fragments and non-quartz material, making it possible for well-developed soils to form *in situ* by means of weathering of minerals of clay. On the other hand, the proximity to the marine environment, with the presence of salt in the air, could have also accelerated the effect on soil development" (Bullard personal communication 2006). At the moment it is impossible to provide a accurate date for the beach deposits, but through correlation with soils formed on dated beach ridges and fluvial deposits on the Osa Peninsula in Costa Rica (Bullard 1995, 2002: Table 2) he estimates about 20,000 years (Table 4.1). Future analyses would be required in order to define the soil development, the environmental constrains and/or influences (Bullard personal communication 2006).

The soils from the upper reaches of the river at Las Huertas (LS-10) and LS-16 exhibit typical trends in particle size for fluvial deposits. A section of the La Villa banks along site LS-10 (Station R533, 562125E 877362N) that exposed multiple cut-and-fill deposits, "contained buried soils with less sand than the younger overlying soils suggesting a different part of the fluvial system was responsible for the deposits. In this case, the fine nature of the deposit reflects the depositional environment, e.g., primarily fine-grained over bank deposits relative to coarser deposits carried along the channel bottom and in suspension during extreme flood events" (Bullard personal communication 2004). A charcoal sample collected from the buried channel feature at Station R533 yielded an AMS date of 250 ± 40 B.P., cal. A.D. 1490–1660 (Beta-178028, Appendix 1).

The result was disappointing because Bullard's field analyses pointed to the presence of a Paleochannel. In this case, we suspect contamination from modern organics such as roots penetrating the deposits, although Bullard states that the nature of the material did not suggest that (Bullard personal communication 2006).

The majority of documented sites are located along the banks of the river, abandoned meanders, and small streams, indicating that pre-Columbian inhabitants were attracted to the deep and fertile soils of fluvial origins ideal for agriculture and the navigable conditions of the La Villa River. On the other hand, settlement history in coastal areas was influenced by changes in the location of the active shoreline and landforms related to a prograding La Villa delta after ca. A.D. 5000. Recent river cut-off exposed evidence of buried channels and hearth features (Figure 4.2).

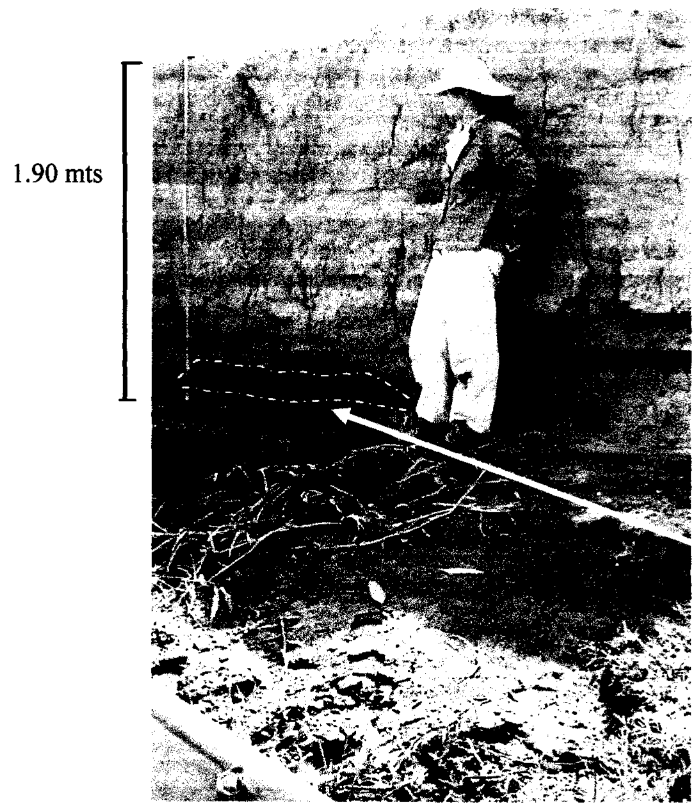

Figure 4.2 Buried hearth feature identified along La Villa banks. Station R0002 (566748E 880787N) under 1.90 meters of alluvium. The feature is characterized by a distinct burned clay layer with high charcoal content.

Despite the obvious problem with alluviation, cultural material scatters were identified in the riverbed and mangrove swamps during the ebb tide, as well as at the edge of oxbow lakes.

4.3 PARLV Pedestrian Survey

PARLV undertook the pedestrian survey of the lower La Villa valley in two seasons: March–July 2001 and December 2001–May 2002. The survey universe was divided in accordance with property boundaries, and each field was subdivided into transects, in order to facilitate the surface sampling of artifacts and mapping of cultural features. Each surveyed property (our sampling unit) was assigned an individual number, by order of visitation. To differentiate between properties located in Herrera and Los Santos provinces (e.g., on the northern and southern banks of the river), the lowercase initials "ls" follow the assigned numbers for the Los Santos properties (e.g., fields 1ls, 14ls), while the lowercase initials "he" follow the Herrera surveyed properties (e.g., fields 9he, 18he).

We implemented two collection strategies: (1) a systematic method using transects running parallel to the field boundaries, and (2) an arbitrary collection method set in areas that were impossible to examine by means of transects due to heavy vegetation and/or waterlogged conditions (Figure 4.1). The arbitrary method was also used in areas that showed diagnostic artifacts outside the transect lines or in disturbed areas e.g., watering holes for cattle, mounds, or areas disturbed by looters. The systematic method included stations (collection units) of three meters in diameter set at

30-meter intervals along each transect. Within each unit, we collected all artifacts visible on the surface. This method proved useful in open areas without vegetation and recently plowed fields, but it was fruitless in areas subject to annual flooding, areas covered with high vegetation and fields used for cattle grazing where the topsoil structure was extremely hard and "prismatic" (see Waters 1996: 44). To counteract the visibility problem, primarily in the southern banks of the coastal plain areas, we opened 40 cm^2 test pits of up to 40 cm in depth. The collection units set along each transect were cataloged using a capital letter "T" for transect and the capital letter "R" for collection units set along each transect (*recolección* in Spanish), e.g., T3R6 (Figure 4.1). Arbitrary collection stations were catalogued with a single capital letter R. Some stations (systematic and/or arbitrary) were identified with the handheld GPS[1] and their catalog number is followed by a Universal Transverse Mercator (UTM) coordinate e.g., Station R170 (563414E 878354N). In total the PARLV set 7,536 collection stations, but only 1,810 (24%) yielded archaeological remains distributed as follows: 991 (or 55%) of the stations yielded ceramics, 739 (40%) stone tools, 507 (28%) shells, and 91 (5%) yielded vertebrate remains.

These sampling methods proved to be useful when defining activity areas and territorial boundaries of La Villa sites. Surface distribution of ceramics, lithics, and/or ground stone tools, and cultural features often clustered in well-defined areas. In accordance with the research methods employed by Linares and Ranere (1980b) in Gran

[1] The error value of the handheld GPS receiver used was of 7–10 meters.

Chiriquí, the boundaries for La Villa sites were determined by observing the decrease and disappearance of surface archaeological artifacts and cultural features.

4.4 Lower La Villa settlement pattern

The settlement pattern observed for the lower La Villa is a **linear stream pattern** (*sensu* Flannery 1976b). Within the pattern we identified four ranks of sites based on the relative surface distribution of surface artifacts and presence of above ground features—primarily middens and mounds.

Type 1: Large nuclear settlements, covering more than 51 hectares, equidistantly spaced from each other, and associated with prominent topographic features along riverbanks (Figure 4.3).

Type 2: villages ranging between 15 and 50 hectares, located in the intermediate valleys between type 1 sites (Figure 4.3).

Type 3: small villages or hamlets less than 15 hectares in size often found at the periphery of type 1 or type 2 sites (Figure 4.3).

Type 4: remnants of isolated dwelling or activity areas. Characterized by the presence of isolated clusters of archaeological artifacts (e.g., ceramics, stone tools, colonial ware, faunal remains) exposed by river cut off, or located near small streams, abandoned meanders, the base of large hills, high tidal flat, estuary or at some distance from the other type sites (Figure 4.3).

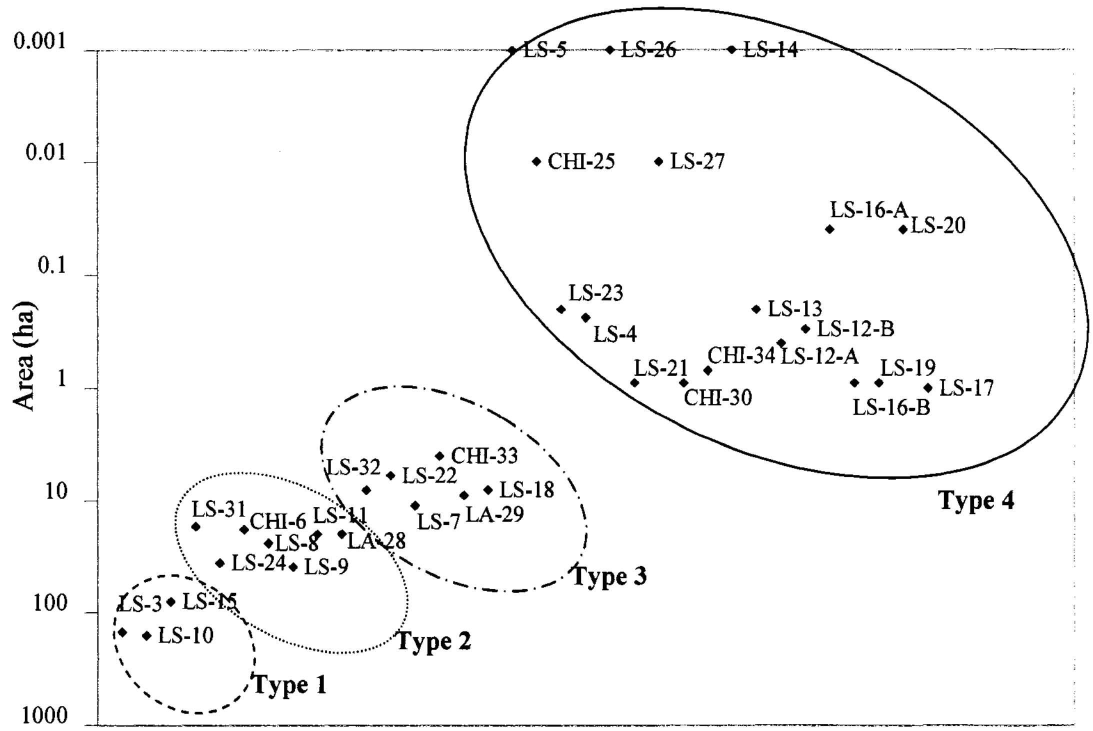

Figure 4.3 Histogram La Villa valley type sites

Type 1 and type 2 sites were characterized by the presence of low-raised mounds, midden features, scattered surface debris and/or remains of burnt clay surfaces. In the case of type 1 sites there is also evidence that certain sections of the areas were selected for ritual and specialized crafting activities. Therefore, I interpret them as multicomponent settlements. Very few sites show clear evidence of large-scale alterations to the landscape. Examples of this behavior are visible at LS-3 where a flat area on the southern slope of Cerro Juan Díaz appears to have been artificially leveled. Sites LS-9 and LS-10 contain large earthen mound features arranged in flat open areas. At the Balneario Los Olivos, on the westernmost section of the research universe, the PARLV documented the presence of rock carvings and a single petroglyph. Los Olivos petroglyph includes images that are found on portable artifacts. Here, I propose that these monuments functioned as ancient boundaries, similar to the boundary stones described by the Spaniards (Jopling 1994: 21; see also Chapter 3: 103).

The location of past and present channels of the La Villa River affected all sites located along the riverbanks by cutting though sections of the site and burying features under the alluvium. At the river's widest point, the oldest fluvial terraces are 300 meters apart (Figure 1.2). Even so, I assumed that sites located on opposite banks, as well as those affected by meander cut-off, belonged to a single social group. Therefore, I classify them as a single settlement.

The UTM coordinates provided at the beginning of each site description correspond to a central or prominent station shown on the site maps provided. My assessment of site function is based on a preliminary analysis of the surface features and the collected artifacts. My estimation of the age of the sites is based on current knowledge of Gran Coclé ceramic typology (Table 2.2; Cooke 1995, Ichon 1980, Griggs 2005; Isaza 1993, Ladd 1964, Lothrop 1942; Sánchez 1995, 2000a). A more in-depth explanation of this typology is provided in Chapter 6.

The site catalog for lower La Villa sites follows local protocols in which each site's number is preceded by the initials of the province or district (*distrito* or *corregimiento*) where it is located (e.g., LS-3, CHI-33, LA-29). Several sites, however, include both banks of the La Villa River, which now functions as the boundary between Herrera and Los Santos provinces, as well as the districts of Chitré and Los Santos, and *corregimientos* of La Arena and Los Olivos (Figure 1.2). In these cases sites are identified by the initials of the *distrito* or *corregimiento* where it was first found (Figure

4.4). For example, sites prefixed with "LS" are in Los Santos district, while those that are prefixed "CHI" and "LA" are in the *corregimientos* of Chitré and La Arena. Some sites are also identified by local names; e.g., LA-28 is "La Flora" and LS-11, "Finca Los Olivos" (Table 4.2).

Table 4.2
Classification of sites located in the lower valley of the La Villa River

Classification	Site	Toponym	Occupation phase
Type 1 Nuclear settlements	LS-3	Cerro Juan Díaz	La Mula–Colonial Period
	LS-10	Las Huertas	La Mula–Parita
	LS-15	La Chilonga	La Mula (?)–Colonial Period
Type 2 Villages	LS-31	Finca Germán Castillo	Cubitá–Conte
	LS-24	Finca Tito Castillo	Tonosí–Parita
	CHI-6	El Auditorio	La Mula–Cubitá ?
	LS-8	Unnamed	Tonosí–Parita, Colonial Period
	LS-9	Unnamed	Tonosí–Parita, Colonial Period
	LS-11	Finca Los Olivos	Tonosí–Macaracas
	LA-28	Finca La Flora	Tonosí–post-Colonial
Type 3 Hamlets	LS-32	Unnamed	Conte
	LS-22	Santa Cruz	Middle Ceramic Period
	LS-7	Represa La Nestlé	Tonosí–Macaracas
	CHI-33	IDAAN	Conte–Parita
	LA-29	Unnamed	Tonosí–El Hatillo, post-Colonial
	LS-18	Balneario Los Olivos	Parita–El Hatillo–post-Colonial
Type 4 Isolated dwellings or activity areas	LS-5	Unnamed	Monagrillo
	CHI-25	Puerto El Agallito	Cubitá
	LS-23	Unnamed	Tonosí–Conte, Colonial Period
	LS-4	*Camaronera*	Middle Ceramic Period
	LS-26	Unnamed	Undetermined
	LS-21	Cantera Santa Ana	Middle–Late Ceramic Period
	LS-27	Unnamed	Late Ceramic–Contact Period
	CHI-30	La Terminal	Undetermined
	CHI-34	Represa IDAAN	Late Ceramic Period
	LS-14	Unnamed	Undetermined
	LS-13	Finca Abel Moreno	Middle Ceramic Period
	LS-12-A	Unnamed	Middle–Late Ceramic Period
	LS-12-B	Unnamed	Middle–Late Ceramic Period
	LS-16-A	Unnamed	Cubitá, Colonial Period
	LS-16-B	Unnamed	Late Ceramic Period
	LS-19	Unnamed	Middle Ceramic–Late Ceramic
	LS-20	Unnamed	Undetermined
	LS-17	Finca Los Pilones	Undetermined

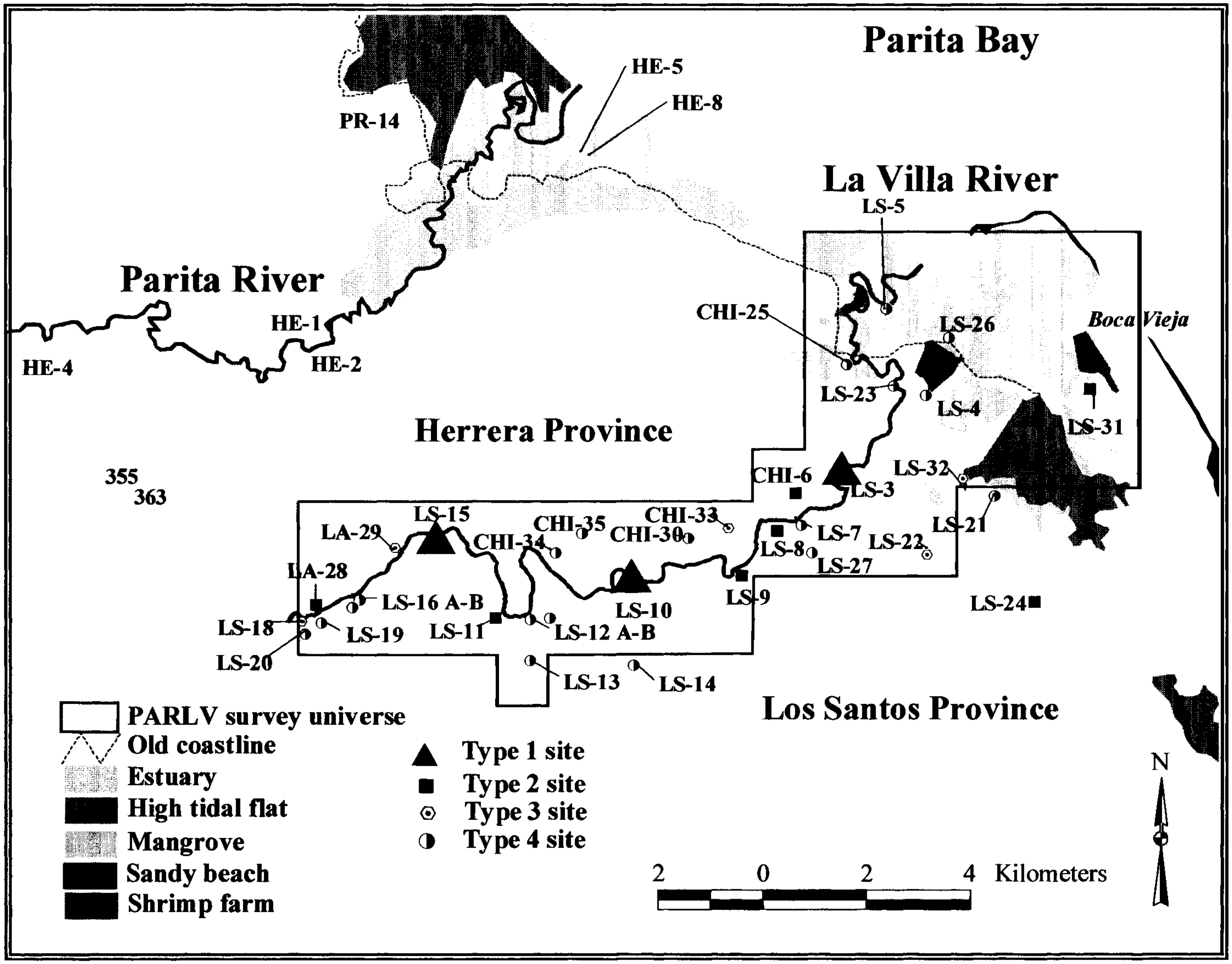

Figure 4.4 Distribution of archaeological sites registered by the PARLV in the lower La Villa valley and principal sites in the lower Parita Valley.

The site descriptions that follow are organized under each type—type 1 through 4—and according to their geographic location from East to West and following the list in Table 4.2. I begin with the type 1 sites with the description of LS-3—of the three large nuclear settlement this is the one that is closest to the coast—followed by those farther inland. I use the same format in describing sites types 2 through 4.

4.4.1 Type 1 sites: Large nuclear settlements

I have classified the three type 1 sites as "large nuclear settlements" (LS-3, LS-10 and LS-15). A characteristic shared by all three sites is that they started off small absorbing neighboring villages and hamlets or as separate villages but as their boundaries increase they coalesce and form a larger nuclear settlement. These sites exhibit the largest and most extensive concentrations of archaeological remains, which cover both banks of the river (Figure 4.4).

In addition, the type 1 sites yielded the longest occupational sequences of all the surveyed sites. It appears that both the local topography and social factors influenced their location and spacing. These three sites are in sections of the river, which are bounded by prominent hills where the rich alluvial bottomlands would have enhanced the productivity of farming during the rainy season, especially nutrient-hungry crops such as maize and squash, which sixteenth century documents describe in Parita's chiefdoms (see Espinosa 1994c: 65 quoted in Chapter 1: Footnote 4). On the other hand, the existence of hills within each site's boundaries would have facilitated the monitoring of commodities transported along the river and provided defensive locations against raiding. It is important to note, however, that despite the constant references of rivalries between contact period chiefs in the Spanish chronicles,[2] the PARLV did not recover the kinds of data that are useful for addressing the subject of warfare in pre-Columbian times. As a matter of fact, the archaeological field evidence for warfare has not yet been found anywhere in the culture area of Gran Coclé. This does not mean that such evidence does not exist; simply that no one has systematically looked for it. Julia Mayo found some stone walls on the slopes of Cerro Cerrezuela, Cerro Cebollal, Cerro Liso, and Sitio El Cercao (LP-117) in Coclé Province that she interprets as defensive works (Mayo *et al.* 2007: 96–97).

4.4.1.1 Site LS-3

Name: Cerro Juan Díaz

UTM coordinates: 566000E 879422N (summit of the hill called Cerro Juan Díaz)

District: Los Santos and Chitré

Estimated area: 150 hectares

Functions: habitation, mortuary ritual, and workshops

Occupation phase: La Mula phase (Middle Ceramic A)–Colonial Period

Description: LS-3 is located 4.3 kilometers from the present river mouth and 2.5 kilometers north of the township of La Villa de Los Santos, founded in 1558 (Table 3.1). Two prominent hills dominate the landscape of the coastal plains of the La Villa River and site LS-3: 1) the 42-meter high Cerro Juan Díaz located on the Los Santos banks of

[2] See Andagoya 1994: 33–34; Espinosa 1994a: 54 quoted in Chapter 3: Footnotes 19 and 9 respectively.

the river, and 2) the neighboring 29-meter high Cerro Juan Gómez on the Herrera banks. Cerro Juan Díaz measures 100 by 200 meters at its base, and presents a conical profile. Large boulders of Tertiary volcanic origin are strewn across its summit and northwest slopes. Cerro Juan Gómez, immediately west of Cerro Juan Díaz (565141E 879326N), measures 180 by 450 meters, and also contains exposed rocky outcrops and large volcanic boulders. The distance between the summits of these two hills is about 700 meters. On the northern (Herrera) bank, 500 meters from Cerro Juan Díaz, there is a third much lower hill (10-meters high), named Cerro Tello by the PARLV[3]. It may have acted as the northern boundary to LS-3 (Figure 4.5).

Although local people have been aware that LS-3 was an important pre-Spanish settlement for a long time, professional archaeological investigations were not undertaken here until French Archaeologist Alain Ichon conducted a survey of the Azuero Peninsula (1968–1970). In his 1980 publication, Ichon identifies LS-3 as Cerro Juan Gómez while giving the coordinates of Cerro Juan Díaz.[4] Apparently, Ichon was confused about the real names of the two hills. This is hardly surprising since the residents and local authorities of Los Santos still call the tallest hill Cerro Juan Díaz while the Herrera residents refer to it as Cerro Juan Gómez.

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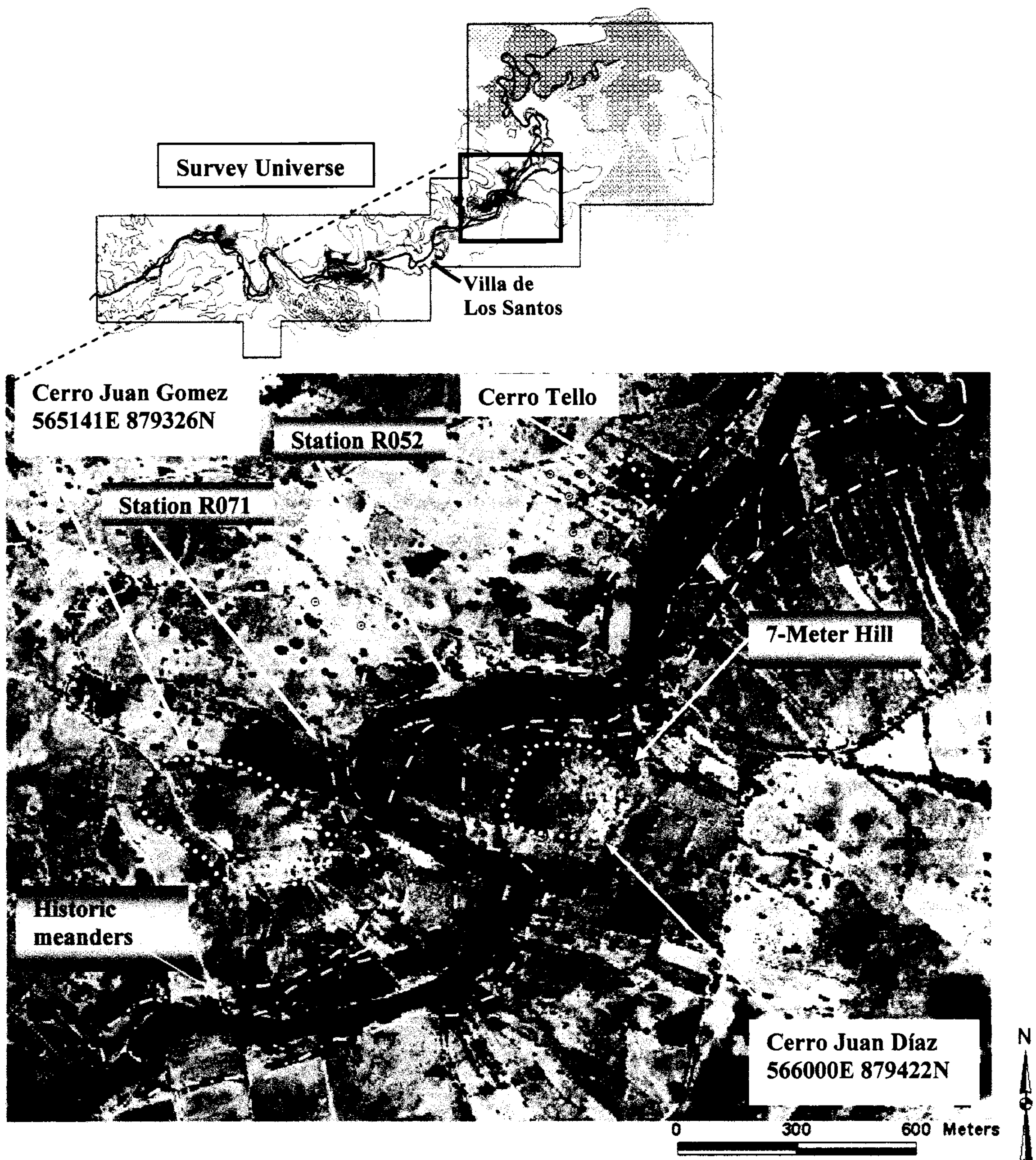
[3] Cerro Tello expands from the surveyed fields labeled 3he through 9he (Figure 4.8). The majority of these fields are owned by member of the Tello family hence the name given to this third low hill and its surroundings which exposed abundant archaeological remains.

[4] It is possible that the name Juan Díaz goes back to early Colonial times: Juan Díaz was the name of the foreman of a 1530 ranch situated at the margins of the River Parita, owned by the Spanish captain Hernán Sánchez de Badajoz (Jopling 1994: 229–38; see also Carvajal *et al.* 2006).



● Low mound features
○ Middens

Figure 4.5 Cerro Juan Díaz (LS-3) aerial photo from 1985.
Image shows the location of Cerro Juan Díaz, Cerro Juan Gómez, and Cerro Tello at LS-3.

The continuous distribution of surface artifacts, middens, and low mound features on both banks of the La Villa River between Cerro Juan Díaz, Cerro Juan Gómez, and Cerro Tello is evidence for a nucleated site whose initial occupation dates back to the La Mula phase of the Middle Ceramic A Period. For the purpose of this dissertation, I follow Ichon's (1980: 446) catalog designation and call this site LS-3 rather than Cerro Juan Díaz by which it has come to be known in published reports. I will use the name "Cerro Juan Díaz" when addressing features found on or near the prominent hill on the southern (Los Santos) side. "Cerro Juan Gómez" will refer to features documented on or near the western (Herrera) hill. "Cerro Tello" will be used to describe finds from the northern Herrera banks of LS-3 (Figure 4.5).

Before addressing the results of the PARLV survey, I will summarize salient results of Cerro Juan Díaz Project (CJDP) in order to provide cultural and temporal background for my interpretation of the history, functions and regional role of LS-3.

4.4.1.1.1 The Cerro Juan Díaz Project (CJDP)

The archaeological site of LS-3 has been subjected to intensive looting for many years. The entire cultural deposit on both sides of the La Villa River is liberally strewn with clandestinely dug holes (for an idea of the extent of this destruction see Cooke and Sánchez 2004a: Figure 13). Purported finds of intact gold pieces led to a destructive surge in these activities in 1990 and 1991 (Cooke 1997). As a result, Professor Marcela Camargo, then Director of the National Heritage Department of Panama's Institute of Culture (INAC), asked Richard Cooke to seek funds and personnel for a long-term research project whose goals would be to determine the site's occupational history and function by conducting extensive excavations.

For a period of ten years (1992–2002) CJDP archaeologist opened ten cuts of different dimensions, called "*Operaciones*" (operations), on the summit and flanks of Cerro Juan Díaz (Figure 4.6a).[5] These excavations revealed the remains of structures with clay floors and postholes, some of which have been interpreted as dwellings since they are associated with refuse lenses, often containing the remains of so many marine mollusks that they appear to be "shell mounds". Many mortuary features were also discovered. These represent several periods. Some are graves, of many different sizes and types, which are frequently arranged in groups that allude to use by discrete social units. Other features have been interpreted as mortuary buildings or as rituals that involved the re-burial of human remains.

The analyses of the many kinds of data recovered in these operations, is still not complete. My summary makes use of the preliminary results, which have been reported in Carvajal 1998; Carvajal *et al.* 2006; Cooke 2001a, 2004a, 2004b; Cooke *et al.* 1998, 2000, 2001a, 2001b; Cooke and Sánchez 1998, 2001, 2003a, 2003b; Díaz 1999; Mayo 2004; Mayo and Cooke 2004, 2005; Jiménez 1999; Jiménez and Cooke 2001; Sánchez 1995; Sánchez and Cooke 1998. These references provide valuable information about subsistence activities, trade, crafting and mortuary customs at LS-3, one of the three "nuclear settlement" that I identified in the lower stretched of the La Villa River.

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[5] The Cerro Juan Díaz Project was funded by the National Geographic Society, the Smithsonian Institution (Educational Outreach, Scholarly Studies and Latino Initiatives programs), and the Smithsonian Tropical Research Institute in Panama.

The fact that features around Cerro Juan Díaz contain all the major styles of the Gran Coclé polychrome tradition, from La Mula to the El Hatillo phase, suggests that this area of LS-3 was occupied continually from 200 B.C. until Spanish contact (Table 4.3). It is unwise to assume, however, that there were no hiatuses in this occupation. Specialists in regional pottery are still unsure about the space-time relationship of certain pottery categories. Particularly complicated is the relationship between the La Mula and Tonosí polychrome styles and other coeval pottery categories, such as the Aristide style. Since these kinds of typological details are hardly relevant to my interpretations of the broad patterns of settlement in the chiefdom of Parita, I have obviated discussing them in the following text.

4.4.1.1.2 Initial occupation

Site LS-3 was first occupied during the La Mula phase of the Middle Ceramic A period (200 B.C.–A.D. 250). This early occupation is manifested most clearly in an excavation conducted University of Montreal student Benoit Desjardins (2000) on a flattish area on the southern of Cerro Juan Díaz, which slopes abruptly to the south forming a steep talus (Figure 4.6a: Operation 5). The bottom third of the deposits on the talus slope contained large numbers of sherds belonging to the La Mula complex (Hansell 1988), thus providing clear evidence for the contemporaneity of these deposits with the major occupation at the La Mula-Sarigua site (Table 4.3; see also Cooke and Sánchez 2003a: Table 1).

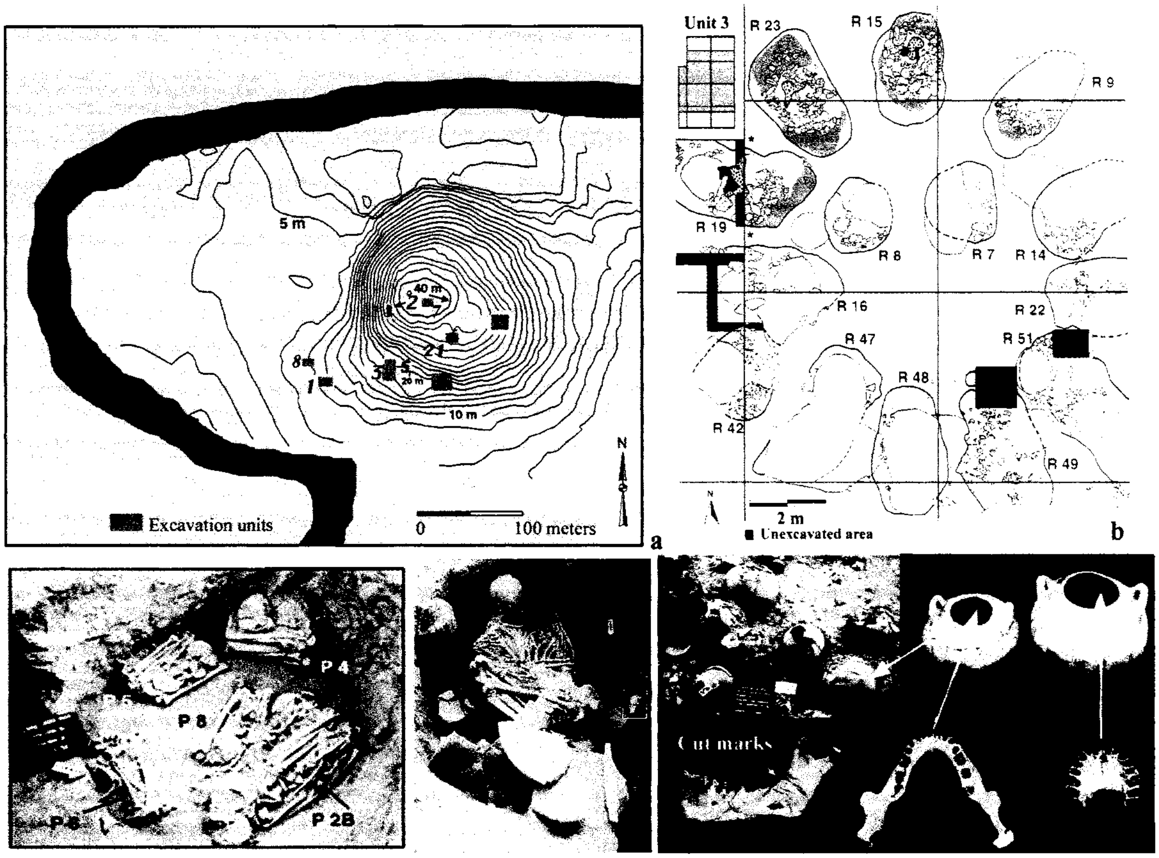

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Figure 4.6 Cerro Juan Díaz Project excavation units and features.
(a) Topographic map of Cerro Juan Díaz showing the location of the excavation units opened by the CJDP.
(b) Stoned lined pit features discovered at unit 3 on the eastern side of the earthen platform dating between cal. A.D. 350 and 890 (I-18222, 18286, 18287, 18288, 18672; 18675).
(c) Cylindrical shaped grave (Feature 2) from Unit 3 measuring 1.5 meters in diameter by 2 meters in depth. The feature contained the remains of 25 individuals arranged in thirteen bundle packages of disarticulated bones positioned in three different levels. Nine human dentin samples returned dates with a 2-sigma range of cal. 390 B.C.–A.D. 660 (Beta-147876-77, Beta-224780–224781, Beta-224783–224786, Beta-224788.
(d) Cylindrical shaped grave (Feature 94) from Unit 3. The grave cut down into the bedrock and was used twice. On the upper most levels were the remains of 20-25 years old female (shown) placed in supine flexed position over a bed of 3 ritually killed Cubitá style bowls and a legged metate. At the base of the feature were the scattered remains of a second adult. A charcoal date collected from the base level of the grave yielded a calibrated date of cal. A.D. 340–650 (I-18637), while a wood charcoal chunk found around upper skeleton returned a date of cal. A.D. 450–640 (Beta-147878).
(e) Unique offering found at the summit of Cerro Juan Díaz (Operation 31). Included 30 jars placed upside down above a clay floor. Inside five of the jars were human mandibles and maxilla sections as offerings with the teeth extracted post mortem. Some of the mandible exposed cut marks (shown). Charcoal collected from two of the jars yield date results of cal. A.D. 1165–1400 (I-18681) and 650 ± 110, cal. A.D. 1195–1450 (I-18682) (Photos courtesy of Richard Cooke).

Table 4.3
Cerro Juan Díaz (LS-3) Settlement Chronology

Phase	Diagnostic Ceramic complex	Dates	Archaeological evidence
Post-contact	Bizcocho	A.D. 1550–1650 (?)	*Fourth mortuary phase:* Evidence of domestic refuse (Operation 6, 7, and 31). Colonial Period graves (Operation 7) Probably equates with *pueblo de indios de Cubitá*
Hiatus			Hiatus
El Hatillo	El Hatillo	A.D. 1400–1500s	Domestic refuse
Parita	Parita	A.D. 1100–1400	*Third burial horizon at the hill summit* Deposit of human maxillae and mandibles inside globular jars (Operation 31) Round structure, perhaps mortuary house (Operation 6)
Early Conte/ Macaracas	Conte Macaracas	A.D. 700–1100	*Second burial horizon on the platform* Primary and secondary burials (cremation, urn burial, ossuaries, burials in niches Primary burials with ash fills
Tonosí/ Cubitá	Tonosí Cubitá	A.D. 250–700	*Stone-lined pits* (Operation 3) *Sub-oven graves* (primary extended, primary flexed, in urns and secondary in bundles) Evidence of craft specialization
La Mula	La Mula	200 B.C.–A.D. 250	*Initial occupation* Initial preparation of the ritual platform?

There is evidence from the Operation 5 that people strengthened the talus slope with stones and undertook low level engineering works in order to flatten the area that was used for burials during the La Mula phase, and subsequently. Six ^{14}C dates obtained from these basal levels of the talus have a 2-sigma range of cal. 200 B.C.–A.D. 405 (Beta-131417-131420, GX-25701, and GX-25402; Cooke and Sánchez 2003a: Footnote 5), a span that compares favorably with assessments of the chronology of the La Mula polychromes from other sites: Sitio Sierra, La Mula-Sarigua and Vampiros-1 (see Appendix 1).

4.4.1.1.3 Mortuary features on the platform: Sub-oven graves

Whether it was artificially leveled, or not, the platform area on the southern side of Cerro Juan Díaz was used for many burials over several generations thus suggesting that it was indeed a special mortuary precinct. A useful stratigraphic marker, which separates two groups of burials of different ages, configuration and social significance, consists of a circular arrangement of 15 stone-lined feature (Operation 3) that was heavily disturbed by looter activities. These form a circle of 13 meters in diameter (Figure 4.6b). Each oval-shaped pit was about 3 meters long, 2 meters wide and 2 meters deep. Some pits were cut into the bedrock, others into the earliest graves, which I will describe shortly. The stones used for the walls were collected from the surrounding hill-slopes. They were set into a reddish clay. The fills of the features contained abundant plant charcoal mixed with ash. Some have a cream-colored residue of calcareous material at the bottom. These features led Cooke to speculate that they may have functioned as "ovens" to desiccate corpses (Cooke *et al.* 1998, 2000, Cooke and Sánchez 1998). There is documentary evidence for this behavior in contact times (see Chapter 3: 104, 121, 126). Charcoal collected in the red clay into which the stones were set gave dates of cal. A.D. 555–855 (I-18222), cal. A.D. 555–665 (I-18287) and cal. A.D. 350–650 (I-18672). A construction date of A.D. 550–650 is harmonious with the typology of pottery found in the red clay, and with C^{14} dates obtained from the graves stratified underneath these circular features (Cooke and Sánchez 1998).

The first excavation at Cerro Juan Díaz, in 1992, located several mortuary features that had been intruded by some of the ovens. These were cut into bedrock and contained primary and secondary modes of interment (Figure 4.6c). The earliest radiometrically dated grave in this group (Feature 16) belongs temporally to the La Mula phase even though none of the 20 secondary interments places within it was accompanied by typologically distinct pottery. One bundle package at the base of this feature contained the remains of a child and an unsexed adult accompanied by special objects including a bracelet or nose-ring made of copper-rich gold alloy, two polished stone bars, beads and carved pendants made of *Spondylus* sp. and *Pinctada* shells, and 2 necklaces made of puma, ocelot and raccoon canines (Cooke and Sánchez 1998: Figure 4a, 5; Cooke *et al.* 2000: Figure 8.7–8.8; Sánchez 1995: 51). This association of artifacts led Cooke to propose that the human remains belonged to an adult specialist (i.e., shaman, healer, chanter or curer) and his apprentice, an inference that by his own admission may be more imaginative than accurate (Cooke 1998d; 2004b; see also Cooke *et al.* 2003a: 117–118). Dentin protein from one of the individuals in the special bundle gave a calibrated date of A.D. 130–370 (Beta-147880). A charcoal sample from the surrounding fill as dated to cal. A.D. 120–530 (I-18679; Cooke *et al.* 1998: Table 3).

It would seem therefore that Feature 16 was deposited at the end of the La Mula phase or beginning of the Tonosí phase. Thus, the copper-gold ring found in this feature constitutes the oldest dated metal object from lower Central America (Cooke and Sánchez 1998: Figure 5c; Cooke *et al.* 2003a). Fragments of the other metal pieces, which were found in Feature 16's fill may be older because it is possible they were disturbed from an earlier grave (Feature 26). Among these broken pieces were three of the four metal objects on which I performed metallographic analyses in 1999 (Chapter 2:

74–77). Among these objects was the fragmented wing section whose microstructure revealed evidence of welding. This is a sophisticated technique where the smith joined two copper rich thin metal layers through heating and annealing in order to repair the piece or produced color contrast (Isaza 2000).

Other graves found in this same "sub-oven" group have been described (Cooke and Sánchez 1998; Cooke *et al.* 1998, 2000). One, Feature 94, included pottery belonging to the Ciruelo Black-on-Red type of the Cubitá complex (Figure 4.6d). This grave was used at least twice, probably in the middle of the sixth century A.D. On the upper most levels were the remains of an adult woman buried in primary flexed position with a splendid probably *Strombus* shell pendant and a metate covered in maize starch (Piperno and Holst 1998). At the base of the feature were the scattered remains of a second adult. A charcoal date collected from the base level of the grave yielded a calibrated date of A.D. 340–650 (I-18637), while an AMS date obtained from human teeth protein from the upper skeleton returned a date of cal. A.D. 450–640 (Beta 147878).

Another sub-oven grave (Feature 1), also used more than once, contained an adult male buried with incense burners, two hammered gold plaques with raised spirals, hundreds of *Spondylus* shell beads, and perforated puma and jaguar canines. These associations were interpreted by Cooke (1998, 2004b) as evidence for special activities, such as shamanism or curing. Feature 1 was not radiometrically dated, but the typology of the incense burners points to contemporaneity with Feature 94 and Feature 3, where an urn lidded with a large Ciruelo Black-on Red plate contained the remains of an infant (Cooke *et al.* 1998; Sánchez 1995: Figure 14).

Although the small group of graves found stratified below the circle of "ovens" represents a long period (at least 300 years), the mortuary offerings point to the use of this part of the platform by a group of people that included specialists in ritual. It is also clear that at this early date, mortuary ritual was already complex resorting to different burial treatments (primary extended, primary flexed, in urns and secondary in bundles. This pattern continues in the subsequent burial horizons identified at Cerro Juan Díaz.

4.4.1.1.4 Second burial horizon on the platform

Stratified above the ovens in Operation 3, and scattered further east along the platform (Operation 5 and 4), another group of burials was identified, which date to the Early Conte and Macaracas phases (A.D. 700–1050; Díaz 1999). Thus, they are partially coeval with the Sitio Conte mortuary sample that includes the remains of high status people.

Graves varied considerably with regard to depth, size, and number and types of interments. Some received several modes of burial. Feature 51 (Operation 4), for example, contained a large urn with the remains of several adult and sub-adult individuals, an extended primary burial and a jumble of bones that was probably disturbed to accommodate it. The largest grave in Operation 4, Feature 4, is particularly interesting. Much deeper than the other nearby graves, and possessing lateral niches with burial, this feature was used several times and received at least 19 individuals. The latest burial was that of an aged adult woman buried with a late Macaracas polychrome vessel (Cooke 2001a: 56; Díaz 1999: Plate 11). The manner in which shallower graves with single social or few individuals are arranged around this deep feature suggests that we are dealing with a single social group (Díaz 1999). To judge from the modest mortuary arts, the said group was not high status, but had its own internal hierarchy (see also Cooke 2001a: 59; 2004b: 274). None of the graves in the second horizon on the platform followed any particular orientation or arrangements, and very few contained offerings. When present, grave offerings consisted of occasional painted, modeled, and plain clay vessels, utilitarian items made of bone and stone, perforated human and animal teeth, and possible food offerings (e.g., mollusks, crab claws, and deer bones), some apparently stored inside perishable receptacles (Díaz 1999: 25). The most elaborate offerings were made out of shell and accompanied sub-adult individuals.

A bioanthropological study of the remains of the 115 individuals found in the post-oven interments in Operation 4 determined that the majority of the remains belonged to adult females and children. Claudia Díaz, who undertook the study, reported pathologies including those affecting dentition, osteitis, and arthropathy, as well as non-pathological features like the presence of Inca and Wormian bones (Díaz 1999: 58–67). The study also yielded evidence of the only two cases of cranial deformation yet reported for Lower Central America.

4.4.1.1.5 Activities on the hill (Cerro Juan Díaz)

No evidence for the earliest La Mula phase was found on the top and slopes of Cerro Juan Díaz itself although occasional La Mula complex sherds found in fills and refuse lenses of later date suggest that people did use this part of the site at this time. The earliest intact feature is a lens of clay apparently subjected to heat, which was identified at the northern and southern edges in Operations 2 and 31 (Figure 4.6a). Named "Macrostratum C" this unit appears to have been laid down at the end of the Tonosí phase or beginning of the Cubitá (A.D. 400–600); most of the painted pottery included in this fill is late Tonosí in style (Sánchez 1995; Cooke and Sánchez 1998). Its function is not obvious, but it may represent a conscientious effort to shore up the edges of the hill that frequently crumble and erode. The impression of heat may be the result of constant fires lit on the summit. These as represented by extensive lenses of ash sometimes as a much as a meter deep. By way of speculation, this ash could be the result of firing pottery or the lighting of beacons (Cooke personal communication 2006).

4.4.1.1.6 Ritual activities

One zone of the summit (Operations 6 and 31) was used for burials and other ritual activities involving the secondary use of human remains (Figure 4.6a). A low natural mound investigated by Diana Carvajal was chosen for small and simple graves dug through the mound during the Conte and Macaracas phases. These graves consist of primary and secondary interments including urn burials. Mortuary objects are few and simple consisting of stone and bone tools and ornaments, and clay vessels. The most intriguing burial was that of a young woman deposited in primary flexed position. A basket of ash was thrown over her. Alongside her body were several cylindrical burnt clay objects with grass leaf impressions in their surfaces. They were placed in a tight group as though they were representing symbolic food offerings of *bollos* (maize meal wrapped in leaves).

Stratified above this group of features, Carvajal found the remains of a simple clay-floored structure with post-holes. Its layout was defined by another burnt clay surface extending 20 meters in diameter and outlined by postholes along the edge. Since one these sloped inwards it is likely that the roof was thatched around poles that stretched from the apex to the floor (Cooke personal communication 2006). No obvious domestic refuse was recovered. Fragments of human teeth and bone were found embedded into the clay floor. Near this feature Carvajal found a polychrome roof apex vessel similar to the example Fernández de Oviedo described at Natá in A.D. 1527 (Cooke and Sánchez 2004b: Figure 5g; *cf.* Oviedo 1944, VIII: 6, Plate I). These features led Carvajal (*et al.* 2006) to suggest that the circular structure was used for rituals involving human remains, perhaps a simpler version of the mortuary houses witnessed by several Spanish soldiers (see also Cooke 2001a). Three samples of carbonized wood extracted from the central postholes of the structure returned calibrated date of A.D. 1285–1405 (Beta-133337–Beta-133339; Cooke *et al.* 2003b: 24).

Contemporary in time and perhaps connected physically with the "mortuary house" was Feature 6-7, located about 10 meters away in Operation 31 (Figure 4.6 d). This unique deposit of 30 clay vessels most of which had been place face-down on a clay floor. Five vessels contained human mandibles and maxillae without teeth (Figure 4.6e). In Chapter 2, I interpreted these finds in the light of ethnohistoric and archaeological data from other sites. The typology of the pottery found in this unit suggests a short-term deposit contemporary with the Parita polychrome style, dates between A.D. 1100 and A.D. 1400. This attribution is confirmed by charcoal dates obtained in proximity to two of the vessels: cal. A.D. 1195–1450 (I-18682) and cal. A.D. 1165–1400 (I-18681). It is most likely therefore, that Feature 6–7 and the purported mortuary house nearby were contemporary representing the same suite of ritual activities.

4.4.1.1.7 Domestic activities

Accumulations of cultural material, mollusk and vertebrate remains on the summit and edges of Cerro Juan Díaz attest to this area having been used for domestic activities. Two of the refuse lenses—the ones that were easiest to define in space and time—contain abundant remains of marine shells, although they are best described as 'shell-bearing middens' rather than 'shell-mounds' (Carvajal 1998). One of these deposits is associated with Macaracas pottery and the other with the Parita style (Midden CH). The Macaracas phase deposit, which was excavated by Koichi Udagawa and Carvajal, contains abundant animal bones characterized by unusually large numbers of black and green iguana bones (Cooke *et al.* 2006). No obvious house features were reported in association with these features. Nevertheless, the composition of the middens suggests that they represent domestic, rather than ritual activities.

Contemporary with the *Parita* phase middens in Operation 7 are others stratified above the burial zone along the platform (Operations 3, 4 and 5). These can also be classified as shell-bearing middens.

4.4.1.1.8 Cubitá phase deposits associated with bone and shell working

Another area of Cerro Juan Díaz that contains accumulations of refuse was found on the southern slopes where Operations 1 and 8 were excavated. In Operation 1 Luis Sánchez, Adrian Badilla, and Olman Solís completely cleared and excavated an elliptical feature replete with shell and animal bone, and stratified above various features, including a burnt clay floor and postholes, which allude to the presence of dwellings. A carbonized maize cob found between this Feature 1 and the underlying clay floor yielded a date of cal. A.D. 415–710 (TO-4594), which agrees with Sánchez' attribution of the pottery sample to the Cubitá phase of the Middle Ceramic Period (Sánchez 1995: Table 6b).

This feature contains unusually large numbers of worked deer bones, an anomaly that links it to another feature located 30 meters away, which was studied ten years later by Julia Mayo (2004; Mayo and Cooke, 2004, 2005). The pottery included in Mayo's excavation (Operation 8) is late Cubitá alluding to deposition between A.D. 650 and A.D. 750 (Figure 4.6a; Mayo 2004: 60). It is full of debris resulting from the manufacture of shell ornaments, and contains bone and stone tools used for this purpose. This debris lay over a burnt clay floor, which was subsequently intruded by grave features post-dating its use (Conte and Parita phases).

Mayo's (2004) description of the workshop and the manufacturing processes identified there is very detailed. The shell species used for crafting small costume items are by rank-order of abundance: *Strombus galeatus* (43%), *Melongena patula* (15%), *Spondylus* (15%), and *Conus patricius* (9%). These do not seem to have been used as a regular food source at LS-3 or elsewhere around Parita Bay. At least one of the species used, *Conus patricius*, is toxic. The fact that the operculum and spire of *Strombus galeatus* are always missing in the workshop led Mayo to suggest that these shells were processed somewhere else before the usable parts were transported to LS-3 (Mayo 2004: 236–237).

4.4.1.1.9 Post-contact activities

Exactly what was happened around Cerro Juan Díaz during the last few decades of the pre-Columbian period is not yet clear. This is unfortunate because it would be useful to know whether this site was actually inhabited or used for ritual when *Parita* was the paramount chieftain. Earlier on (Chapter 3: 134–135), it was noted that researchers hypothesized that this site may have been the steep hill where *Parita's* troops regrouped during the 1517 battle with the Spaniards. Sánchez is currently re-working the typology of pottery from the Parita and El Hatillo phases. Therefore earlier suggestions that the site was not in use at contact, or was little used, may be premature (Carvajal *et al.* 2006; Cooke *et al.* 2003b).

The brief abandonment of Cerro Juan Díaz after contact is a stronger hypothesis. Sherds of the distinctive Mendoza style, which is coeval with or slightly postdates contact, have not been recorded (Cooke *et al.* 2003b). Finds of wheel-thrown sherds of Spanish pottery in Operations 6, 7 and 31—typologically consistent with a late sixteenth century date—in apparent association with domestic cow, chicken and pig bones and other European artifacts, constitute evidence for a light occupation on the central hill.

CJDP archaeologists argue that this cluster of materials equates with the *pueblo de indios de Cubitá*, which was said to have been established two and a half kilometers from the Spanish colonial La Villa de Los Santos (Castillero 1995: 82; Cooke *et al.* 2003b: 23; Jopling 1994: 19). This settlement was occupied for a decade or two either side of A.D. 1575. Two burials found in the same area are likely to represent the *pueblo de indios*. One contained an adult individual placed between large boulders in an extended position. The second grave was that of ~6-year old child placed over a bed of flagstones. Dentin protein gave a date of cal. A.D. 1440–1640 (Beta-148204; Cooke *et al.* 2003b: Figure 6).

4.4.1.1.10 Site LS-3 summary

I propose that the geographic location of LS-3, close to the coast but far enough from the developing high tidal flat to constitute a comfortable living space, was a factor that led to its establishment and rapid growth between 200 B.C. and A.D. 700. This occurs while another important coastal village (La Mula-Sarigua) in the neighboring Parita valley diminished in importance before the inception of the Late Ceramic Period. Here the encroachment of high tidal habitats ostensibly influenced the decision to abandon the site temporarily.

The inhabitants of LS-3 benefited from the productive alluvial plains, suitable for extensive planting of crops, and the proximity of coastal and littoral habitats, gallery woods and wooded savannas, which provided food and raw materials for the production of tools and costume items (Carvajal 1998; Jiménez and Cooke 2001; Mayo 2004).

The earliest mortuary features at LS-3 also have the greatest number and variety of grave goods. It is possible that the age of the deceased in the sampled features influenced this pattern since at other sites on the Azuero Peninsula shell ornaments were found associated mainly with sub-adults (Ichon 1980). Many sub-adults were also buried in the Cerro Juan Díaz graves with multiple interments where many shell artifacts were placed (Features 2 and 16). It is also likely that adult occupation, e.g., shamanism or curing, is identified in some graves dating before A.D. 700 in which ritual paraphernalia consisting of fine gold ornaments, large felid teeth, and *Spondylus* bead aprons or shirts were recorded.

It is tempting to propose that crafting was in some way involved with Cerro Juan Díaz's early ascendancy, but the data are difficult to evaluate. Finds of broken *Spondylus* shells at various points around Cerro Juan Díaz suggest that ornaments made out of these shells were manufactured on site. However, no concentrations of *Spondylus* have been found similar to those that characterize the workshop studied by Mayo where *Strombus galeatus* was by far the prevalent shell species. Mayo argued that the fact that very few graves at Cerro Juan Díaz contained the types of finished items that were manufactured in the Operation 8 workshop demonstrates that these products were not destined for people living at Cerro Juan Díaz. Nevertheless, two splendid shell ornaments from this site were probably fashioned from *Strombus*—one deposited in Feature 94 (Figure 4.6d) and the other a large crocodile image (Cooke and Sánchez 1998: Figure 6d; Sánchez and Cooke 1998: Figure 6d). Some utilitarian goods were certainly not manufactured at this site, e.g., chipped stone tools, polished stone axes, and metates and manos made of tuffs and lava stones. Therefore making a causal connection between LS-3 early (200 B.C.–A.D. 700) growth and exchanging special artifacts made of locally available materials for the above items, is not implausible, although it would benefit from additional data.

After A.D. 700 there is no evidence in the mortuary features for high status or high rank people, or even for people with special occupations—at least not in the areas that were sampled by the CJDP. This is in stark contrast to Sitio Conte located 30 kilometers to the north and El Hatillo located 17 kilometers to the west. Even so, there is strong evidence for portions of the site having been reserved for groups of people in ways that allude to some kind of descent group, such as clans (Díaz 1999).

Determining whether or not Cerro Juan Díaz was occupied at Spanish contact is hampered by imperfect knowledge of the kinds of material goods that were being manufactured in this area in the last century so of pre-Columbian time. Some interesting and apparently complex rituals were certainly being practiced here between ca A.D. 1200 and 1400. These reflect a general characteristic of prior mortuary behavior at this site that is evident since first occupation: an overriding concern for treatment and placement of the dead. We cannot yet identify whether the coeval existence of so many burial modes resulted from burials of people from different places, burials at different times of the year, or multi-stage treatments in which primary interment is followed, for example, by exhumation, reburial and cremation. These possibilities are topics for future investigations.

4.4.1.1.11 The PARLV survey

The PARLV survey of LS-3 confirms the settlement chronology proposed by the CJPD. The geographic distribution of diagnostic ceramics helped determine how the settlement boundaries waxed and waned through time, and where different activity areas focused. The earliest diagnostic artifacts documented on both banks of LS-3 were indeed from La Mula and Tonosí phases. Diagnostic artifacts from these early phases come from three different areas: (1) the flanks of Cerro Juan Díaz, (2) the southern side of Cerro Juan Gómez, and (3) Cerro Tello (Figure 4.5).

During the geomorphological reconnaissance of La Villa the owner of field 201s—located on the northwestern flanks of Cerro Juan Díaz—opened a 2-meter deep trench at the base of a dry watering hole to deposit trash providing Bullard the opportunity to briefly examine the profile before it was back-filled. The base of the trench revealed a reddish sediment layer with rich clay content that according to Bullard's observation must have formed around 2000 years ago. Among the pottery sherds collected from the piles of unearthed fill was the neck fragment of a painted La Mula globular jar (200 B.C.–A.D. 250). A neighboring collection station also yielded a few diagnostic plastically decorated La Mula sherds. This was very significant because as it was stated above, the CJDP found large numbers La Mula ceramics at the edge of the earthen platform on the opposite side of the hill were contained in a matrix rich in red clay. Similar deposits were identified on the southern side of Cerro Juan Gómez where bulldozing activity cut through shell-bearing middens containing a few La Mula and Tonosí phase ceramics, as well as diagnostic stemmed points known in the literature as

La Mula style points (Hansell 1988; see also Figure 2.4). Since I could not demonstrate that the distribution of La Mula phase artifacts is continuous, I suggest that the initial settlement of LS-3 began with a 6-hectare village whose focal point were the northern and southern base of Cerro Juan Díaz. Evidence from the Herrera banks points to the presence of two small coeval hamlets one on the southern flanks of Cerro Juan Gómez (2.6 ha) and the other near Cerro Tello (1 ha).

All three areas continue to experience gradual growth and by the end of the Middle Ceramic (Cubitá phase) and continuing through the Conte Phase they coalesced into a single settlement. At this time, cultural materials cover an area of 160 hectares. By the Macaracas phase, however, the growth slows, and LS-3 settlement boundaries began to contract. A more detail description and interpretation of diachronic changes in settlement pattern of this and other sites in the La Villa valley is provided in Chapter 6.

Dense concentrations of archaeological refuse were documented in association with low mounds situated 20 and 160-meters apart on the northern (Herrera) banks of LS-3 (Figure 4.7). I identified eighteen mounds spread over an area of about 28 hectares (Figure 4.8). Three additional mounds were recorded on the eastern slopes of Cerro Juan Gómez and two on the eastern extremity of Cerro Juan Díaz, on a flat area between the hill proper and a 7.3-meter high conical hillock located 100 meter to the northeast. On the southeastern (Los Santos) banks of LS-3, these mounds were spaced as far as 500 meters from the base of Cerro Juan Díaz, while on the Herrera banks they are 350 meters from the riverbank (Figure 4.5).

Figure 4.7 Cerro Juan Díaz (LS-3) archaeological features
(a) Mounds are indicated with arrows, Field 9he (b) Field 10he; (c) Koichi Udagawa performing surface collection atop a 2.5-meter high shell bearing midden, Station R071, Field 13he (see Figure 4.5).

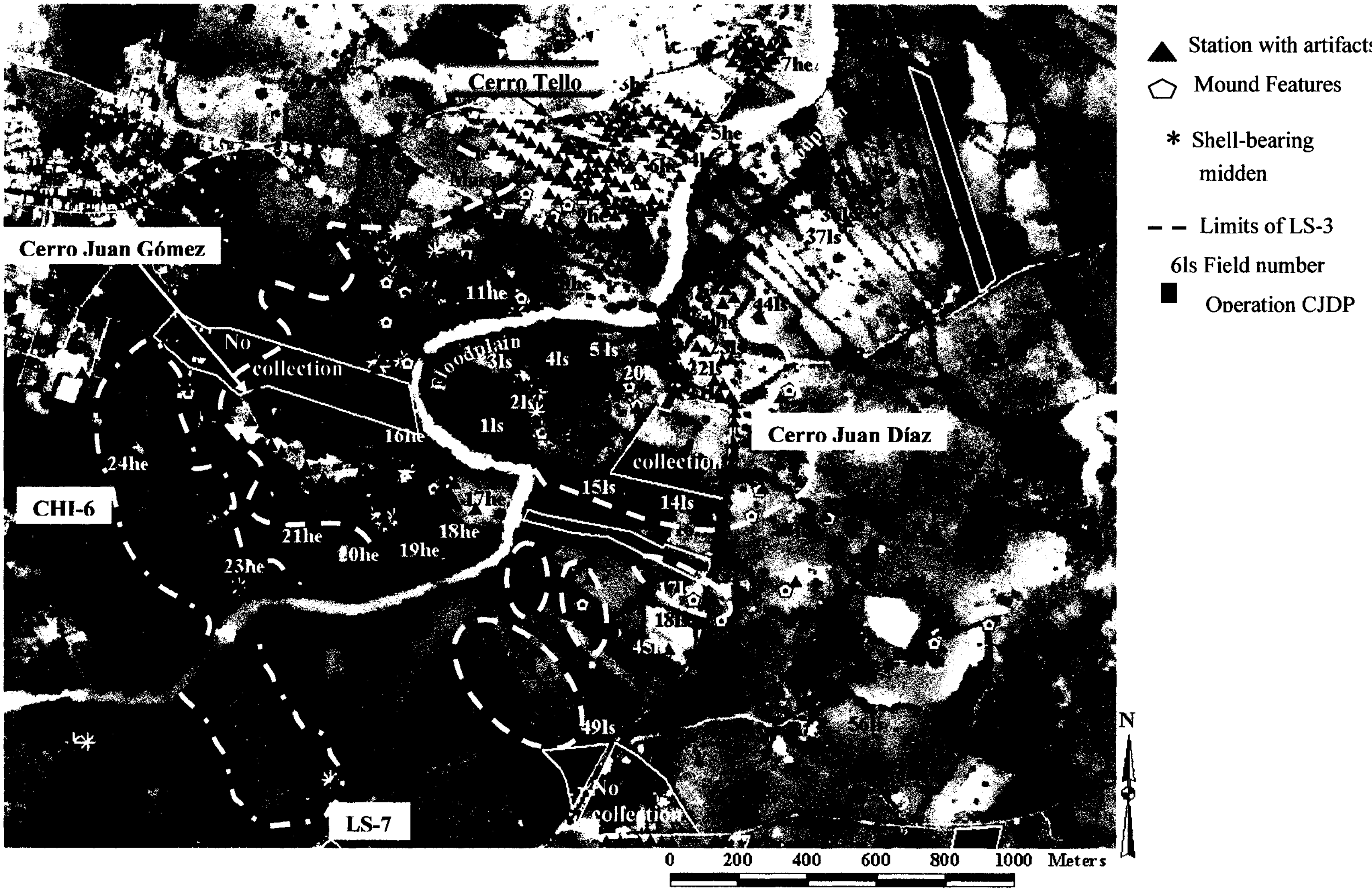


Figure 4.8 Cerro Juan Díaz (LS-3) aerial photo from 2000
Image shows the destruction of Cerro Juan Gómez and extent of material distribution as defined by the PARLV survey.

Many mounds have been leveled or bisected by cattle watering holes or dirt roads. Recent looting has also played a role in destroying domestic and ritual features buried under the mounds. These disturbances have revealed diagnostic ceramics, food processing objects—e.g., blades, manos, and metates, pecking stones, worked and unworked shells, and faunal remains. Assuming these mounds represented an accretion of living floors, I decided to examine one identified on the eastern side of Cerro Juan Díaz by using remote sensing techniques. The results of geophysical surveys at this and other sites are described in Chapter 5.

Another prominent surface feature, was the shell-bearing midden. Some middens were associated with the low mound features, while others formed large accumulations distributed across the alluvial bottoms and along the riverbanks. While numerous shell-nearing middens were recorded on the eastern flanks of Cerro Tello, the most prominent ones were found at stations R052 (565774E 879730N) and R071 (565479E 879544N) on the eroding Herrera banks of LS-3 (Figure 4.8). These particular middens measured 10 to 15 meters in diameter and were almost 3-meters high (Figure 4.7c). Samples taken from these and other middens included a wide variety of shell taxa found in the intertidal zone in various habitats, i.e., mangroves, mud flats, and sandy beaches. They were intermixed with vertebrate remains including marine and estuary fish; reptiles (snake, caiman, turtles, and iguana); aquatic birds; and mammals that live in grassy areas with trees, dry forest, second growth, and/or cultivated fields (e.g., armadillo, whitetail deer, rodents, cotton tail rabbit, fox). As I will point out in Chapter 7, this evidence provides additional support for the proposition that the inhabitants of LS-3 did not travel far to obtain their food resources.

Documenting archeological material from Cerro Juan Gómez proved a bit more complicated. The hilltop has been quarried for gravel and other raw materials (*cf.* Figures 4.5 and 4.8). An additional impediment is the encroachment of urban development on the western side of the hill. Despite significant destruction of this section of LS-3, the PARLV was able to document some intact mounds and diagnostic artifacts along the southeastern slopes of Cerro Juan Gómez, along the La Villa River, and across a series of rolling hills that run parallel to the river. Surface erosion at the base of Juan Gómez and the southern rolling hills exposed a few diagnostic artifacts dating from La Mula phase through the contact period.

The exposed stratigraphy of a shallow shell midden cut by construction workers south of Cerro Juan Gómez provided an opportunity to open small test units (Figure 4.9a). Although it was associated primarily with Cubitá phase pottery, this midden also contained a few La Mula style artifacts. It contained a large number of marine shell taxa. In order to confirm the chronology for Cerro Juan Gómez and obtain comparative samples of shells and fauna, two (0.5 by 1 meter) columns labeled Operation 19-1he and Operation 19-2he were opened at the edge of the road.

Operation 19-1he was placed to the north of the summit of the hill where the midden was very shallow and contained only two layers (Figure 4.9b). The surface was heavily eroded and lacked a humic layer. The upper sloping fill was 20 cm thick and characterized by a granular, yet compact brown (7.5 YR 4/4) clay layer. The stratum yielded one diagnostic La Mula style stemmed point, several flakes and quartz fragments,

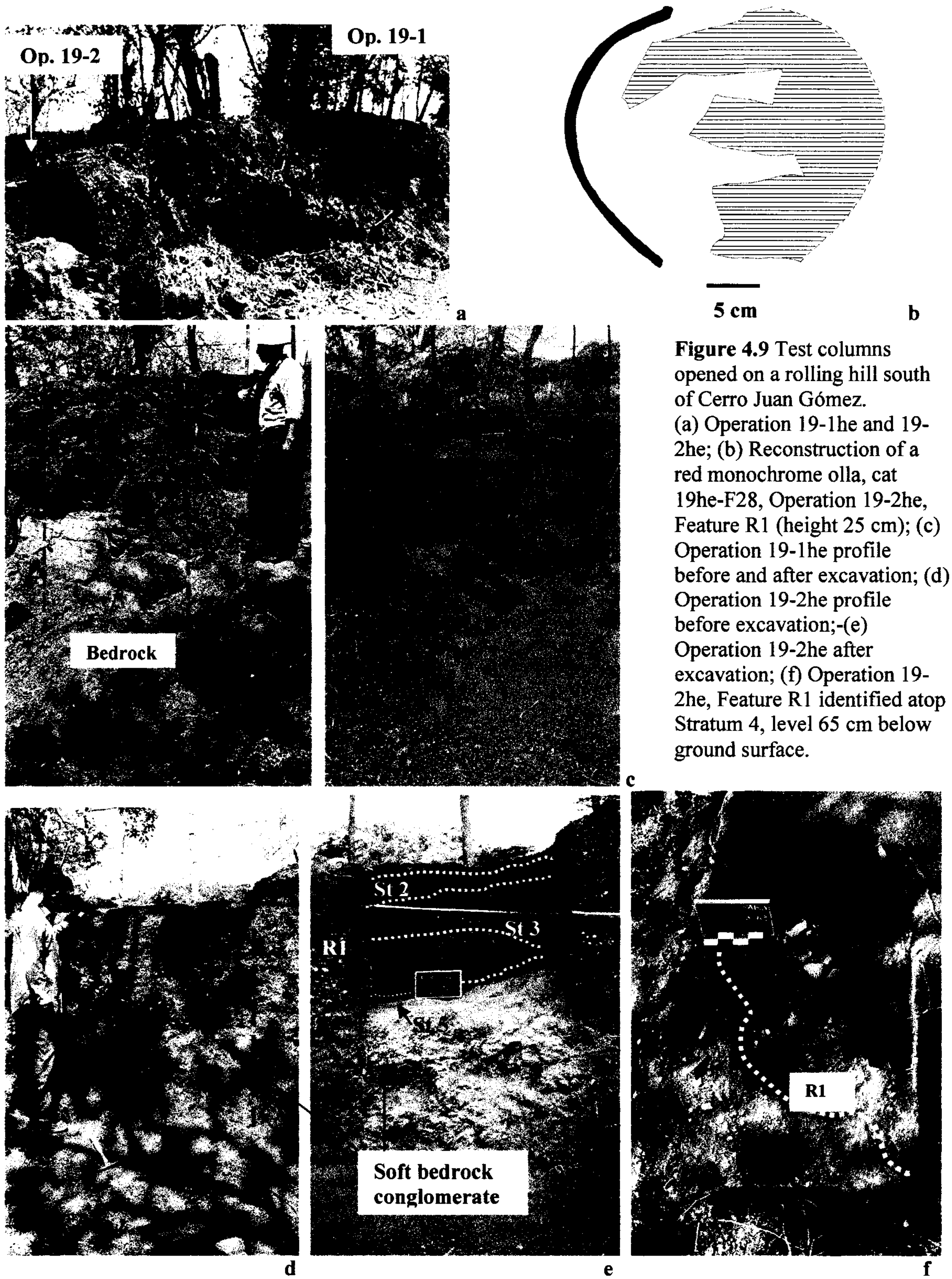


Figure 4.9 Test columns opened on a rolling hill south of Cerro Juan Gómez. (a) Operation 19-1he and 19-2he; (b) Reconstruction of a red monochrome olla, cat 19he-F28, Operation 19-2he, Feature R1 (height 25 cm); (c) Operation 19-1he profile before and after excavation; (d) Operation 19-2he profile before excavation;-(e) Operation 19-2he after excavation; (f) Operation 19-2he, Feature R1 identified atop Stratum 4, level 65 cm below ground surface.

and Cubitá and Conte style potsherds (Table 4.4). A reddish-brown (5YR 4/4) clay deposit characterized stratum 2 which lay immediately above the bedrock conglomerate. Contact with the underlying sterile layer was irregular, and stratum 2 measured up to 10 cm in its deepest section. This second layer contained a few Cubitá and Conte style sherds. Faunal remains included a few undiagnostic fish and mammal remains as well as remains of various marine shell taxa. The latter included genera associated with sandy beaches (*Donax,* and *Tivela*), mangroves (*Cerithidea*) mangroves or mud flats (*Anadara, Natica*; Appendix 2: Table I).

Table 4.4
Operation 19-1he: Number of pottery sherds per stratigraphic layer

Ceramic Complex Type–variety	**St 1**	**St 2**	**Total**
Late Ceramic	2		2
Conte complex			
Conte polychrome	2	4	6
Middle/Late Ceramic	91	36	127
Middle Ceramic	1		1
Cubitá complex		2	2
Arcabú	1		1
Guachapalí	4	3	7
Macano Linear Stippled	2		2
Grand Total	**103**	**45**	**148**

Operation 19-2he (565384E 879105N) was opened 9 meters south of Operation 19-1he, on the opposite side of the slope (Figure 4.9a). Here, the midden deposits were stratified into 5 layers within a deep 95 cm profile (Figure 4.9d). Like Operation 19-1he, the surface was highly eroded and lacked a humic layer. The uppermost layer, measured 15 cm at its deepest section and comprised a reddish-brown (5YR 4/4) clay deposit. Very few artifacts and shells were found at this level; which contained primarily undiagnostic ceramic potsherds from the Middle and Late Ceramic Period (Table 4.5).

Table 4.5
Operation 19-2he: Number of pottery sherds per stratigraphic layer

Ceramic Complex Type-variety	St 1	St 2	St 3	R1	St 4	St 5	Total	%
Late Ceramic+		6	1				7	**0.4**
Conte complex								**1**
Conte polychrome		5					**5**	
Red line			1	5			**6**	
Buff ware		6	1				7	
Middle/Late Ceramic+	32	420	962	10	221	81	**1,726**	**89**
Middle Ceramic		11	4				**15**	**1**
Cubitá complex								**8**
Cubitá		10	11				**21**	
Ciruelo–Ciruelo		6	17		3	1	**27**	
Cábimo					1		**1**	
Guábilo			1		3		**4**	
Nance			1				**1**	
Guachapalí		7	13		23	1	**44**	
Arcabú						2	**2**	
Macano linear stippled		1	1				**2**	
Madroño						1	**1**	
Miscellaneous		2	34		5		**41**	
Incomplete jar				1			**1**	
Incomplete plate*				1			**1**	
La Mula complex								**0.6**
La Mula trichrome			2		1		**3**	
Plastic decoration			8				**8**	
Grand Total	**32**	**474**	**1,057**	**17**	**257**	**86**	**1,923**	

+ Undiagnostic pottery sherds
* *cf.* Ladd's Platanillo (Ladd 1964: Figure 65b)

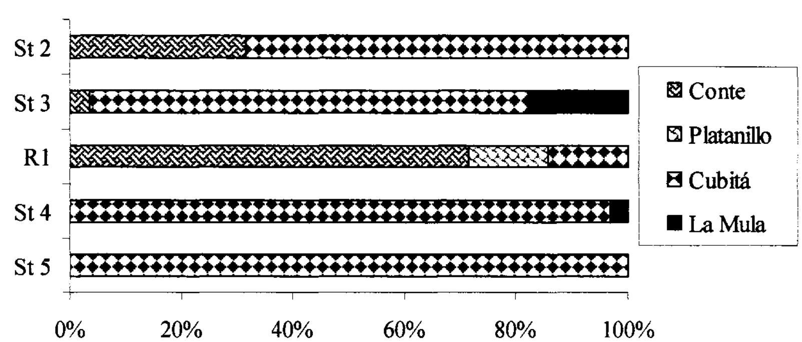


Figure 4.10 Distribution of diagnostic pottery in Operation 19-2ls per stratigraphic layer

Stratum 2 was 30 cm deep being characterized by a dark gray and compact sandy clay deposit containing large quantities of shells and vertebrate remains (Figure 4.9e). Stratum 3 measured 45 cm in depth, contained less clay, was slightly more compact, and colored a lighter gray. The density of shells and vertebrate remains continued to be very high, while its ceramic component doubled in quantity proportionally. Most diagnostic pottery corresponded to the Cubitá style (Figure 4.10). Between stratum 3 and 4 we identified a shallow deposit (R1) containing the remains of an incomplete red monochrome jar and plate (Figure 4.9b, f). This deposit marked the upper most level of stratum 4 part of which ran parallel to stratum 3 (Figure 4.9e). Sediments from stratum 4 were looser with greater content of sand and even lighter gray hue. The lowermost layer, stratum 5, lay above the hard bedrock and was mixed with some of the soft conglomerate. It did not contain many ceramics and the shell component, although large, was reduced to a quarter of the strata above.

The shell sample from Operation 19-2he suggests mass collection methods were used for exploiting shells that prefer sandy beaches (e.g., *Donax, Tivela*), mangrove (*Thais, Stramonita*), and brackish estuarine waters (*Polymesoda*; Appendix 2: Table II). Although the majority of specimens were likely used for human consumption, 3 bivalves (*Dosinia dunkeri, Iphigenia altior, Pinctada mazatlanica*) and one gastropod (*Oliva sp)* specimen showed evidence of cultural modification. A few *Dosinia* and *Iphigenia* bivalves from stratum 4 showed evidence of being worked and polished on the inferior margins. Diana Carvajal, who identified the shell, associates these kinds of wear patterns with ceramic production, perhaps surface polishing (Carvajal 1998). The single *Oliva* shell documented in the midden contained a perforation along its top margin, indicating that it was used as a pendant. Several perforated *Oliva* shells were recovered in burial features studied by the CJDP (e.g., Mayo 2004: Figure 29, Plate 42). The only *Pinctada mazatlanica* shell fragment was classified by Carvajal as worked waste. Small personal adornments made out of this oyster were reported in several grave features by the CJDP (e.g., Cooke 1998: Figure 8.10 l–p; Cooke and Sánchez 2004: Figure 1k; Cooke *et al.* 2000: Figure 8.7 e–h; Mayo 2004: Plate 28).

The vertebrate component of Operation 19-2he include two amphibians (the marine toad *Bufo marinus* and a marsh frog *Leptodactylus insularum*), six mammal taxa (whitetail deer, grey fox, a murid rodent, a pocket rat, armadillo, cottontail rabbit), six reptiles (two turtles, two lizards, and two snakes), three bird genera (hawk *Buteo*, ani *Crotophaga,* and wattled jacana), and 41 genera and 49 species of inshore marine fish (Appendix 3: Table I). The most abundant marine fish in the unit is the Pacific moonfish (*Selene peruviana*). This small shoaling inshore species dominates the kitchen midden samples from Cerro Juan Díaz analyzed by the CJDP (Jiménez 1999; Jiménez and Cooke 2001: Figure 7). Other species that have a high rank for abundance are: Furth's sea catfish (*Cathorops furthii*) from the upper and middle estuary, Panamanian grunt (*Pomadasys panamensis*) which is found in shallow but clear coastal waters, and some genera that avoid turbid water plumes such as the green jack (*Caranx caballus*), needlefish (*Tylosurus*), and bonefish (*Albula*). Further comments on how the habitat preferences and behavior of these and other vertebrates can help us address methods of procurement will be discussed in Chapter 7.

A small sample of human bones, the majority from one adult and one infant, were found scattered in the different levels of the deposit. It is assumed that a burial feature was disturbed by the midden.

Eighty nine percent of the ceramic sample from Operation 19-2he comprises material that is not assignable to type of style, but presents characteristics typical of both Middle Ceramic Cubitá phase and Late Ceramic period pottery categories (Table 4.5). Most typologically diagnostic material (8%) correspond to the Cubitá style (A.D. 550–700) followed by (1%) Conte. There is also a light (0.6%) La Mula phase occupation underneath the Cubitá one. A few diagnostic La Mula potsherds were identified in Operation 19-2he, stratum 3 and 4 (Figure 4.10). A few other La Mula potsherds and flake points discovered nearby suggest that, at the time when people were accommodating the earthen platform on the Los Santos side of the river, a small group of people were also settled on the Herrera bank near Cerro Juan Gómez.

4.4.1.2 Site LS-10

Name: Las Huertas

UTM coordinates: 562350E 877995N (Station R297)

District: Los Santos and Chitré

Estimated area: 160 hectares (type 1)

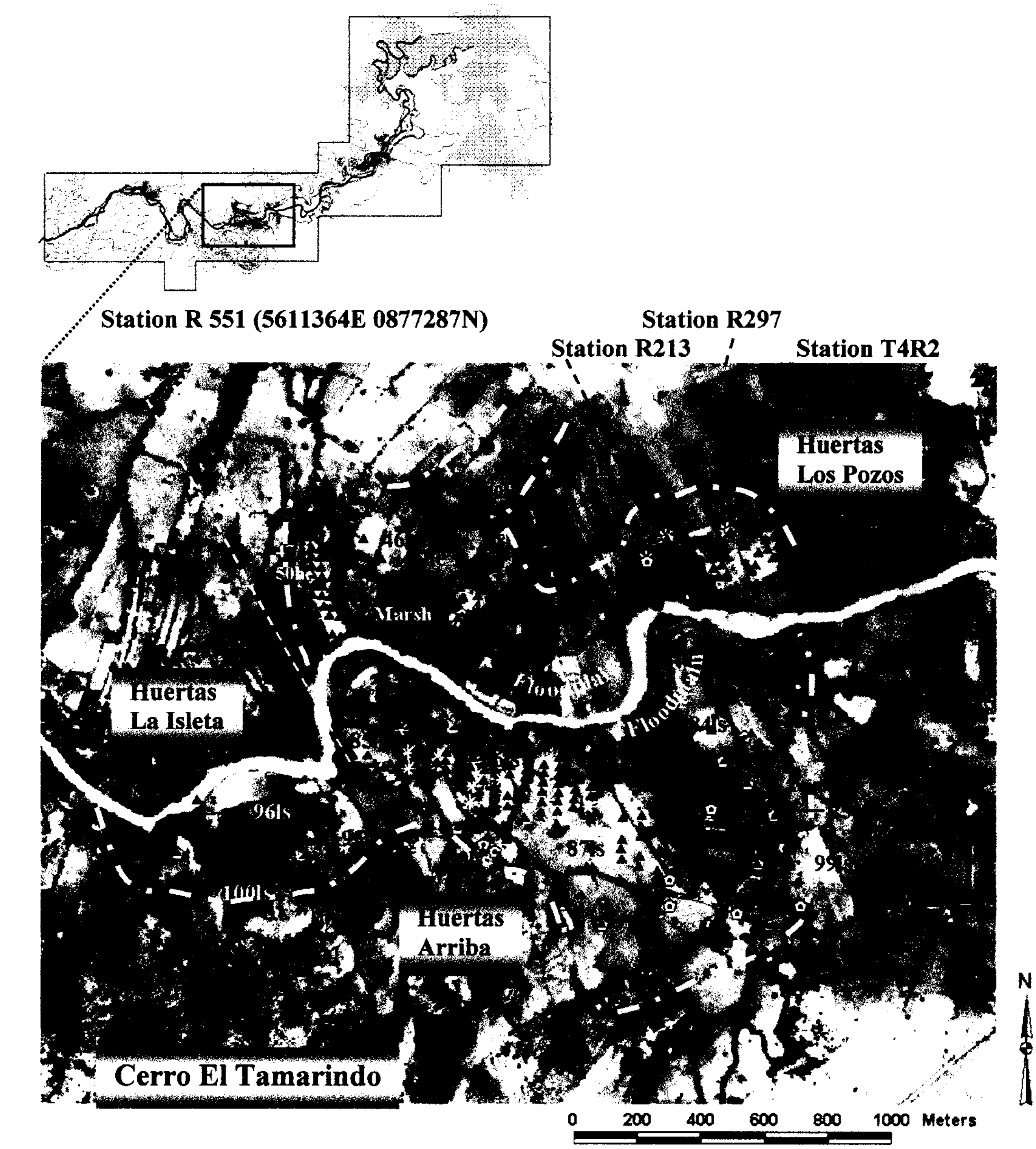
Function: habitation and cemetery

Occupation phase: La Mula phase (Middle Ceramic A)–Parita phase (Late Ceramic C)

Description: Two and a half kilometers west of the urban center of La Villa de Los Santos is site LS-10, located within the area known locally as *Las Huertas Arriba, Huertas La Isleta,* and *Huertas Los Pozos*, henceforth simply Las Huertas. The landscape of Las Huertas is dominated by a series of 20 to 30-meter high rolling hills bisected by paleovalleys (Figure 4.11). South of Las Huertas is Cerro El Tamarindo, a longitudinal chain of hills reaching 50 to 130 meters above sea level. Cerro El Tamarindo from whose summit Cerro Juan Díaz is visible to the east is the highest of hills around Las Huertas. It dominates the central portion of our survey universe and serves as a natural boundary between the coastal plains and the up river region of Los Olivos. This chain of hills also defines the southern margin of site LS-10 (Figure 4.11).

The geography of LS-10, which dominates the coastal valley and rich alluvial soils north of Cerro Tamarindo, most likely attracted indigenous groups to the area. Low mounds and midden features were dispersed atop the rolling hills and on their flanks. Larger mounds were found on the leveled areas at the base of the rolling hills between fields 84ls and 99ls at the Huertas Arriba and in field 44he, Huertas La Isleta (Figure 4.11 and 4.11c–d). Cultural activity was documented at the base of Cerro El Tamarindo summit, but not on its summit.

I suggest that Las Huertas (LS-10) represents a multicomponent village whose settlement is coeval with that of LS-3 and neighboring type 2 sites LS-8, LS-9 and CHI-33. When the PARLV team first visited this site, looting activity, road construction, and surface erosion had exposed several domestic and ritual features on both river margins. Some of these features lay buried under thick midden deposits of up to 50 cm in depth.



▲ Station with cultural material

⬠ Mound Features

* Shell-bearing midden

— · — Limits of LS-10

87ls Field number

Figure 4.11 Las Huertas (LS-10) aerial photo

Finds from a single collection station, R297, indicate that LS-10 was occupied since the second half of La Mula phase, although evidence for the Tonosí phase occupation is stronger. Diagnostic forms of Tonosí phase pottery clustered in three separate areas: Huertas Los Pozos, Huertas La Isleta and Huertas Arriba, indicating that the initial occupation of LS-10, began as three separate hamlets.[6] Cubitá and Conte phase pottery and sherds that could only be assigned to the Middle or Late Ceramic had a much wider distribution. This indicates that this settlement grew rapidly in size between the Cubitá and Conte phase as the formerly separate hamlets began to coalesce into a 160-hectare village. Diagnostic Macaracas and Parita style ceramics are less frequent on the surface. This suggests a slow-down in growth after the Conte phase. The absence of El Hatillo and Spanish wares suggests the area was abandoned or lightly settled after A.D. 1400.

The largest concentration of low mounds was identified on the high alluvial terraces between fields 85ls and 99ls, on the northern slopes of Cerro El Tamarindo (Figure 4.11). Round or oval shaped, these mounds measured between 7 and 15 meters in diameter, and less than a meter in height. They are widely dispersed, spaced between 30 and 250 meters apart. The most disturbed mounds were covered with domestic refuse: ground stone tools, flakes of fossilized wood, faunal remains, shells, and pottery from all phases between Tonosí and Parita. This demonstrates that all these areas were continually used between A.D. 400 and A.D. 1400.

Two large oval-shaped mounds stand out in fields 83ls and 84ls, at the Huertas Arriba. One identified at Station R542 (562657E 876951N) measured 47.4 by 60 meters

[6] More details on the physical distribution of diagnostic ceramics is provided in Chapter 6.

and was 5 meters in height. Another at Station R545 (565607E 877223N) measured ~20 meters in diameter and ~3 meters in height (Figure 4.12a). Cultural materials around these larger mounds were not as abundant as in the low mound features or along the summits of the nearby hills. I assume that this is because they have been disturbed less. Without excavation it is difficult to assign a specific function to these features.

The largest mound on the Herrera banks of LS-10 was located in the highest alluvial terrace of field 44he at Huertas La Isleta (Figure 4.12b). Measuring 60 meters in diameter and almost 2 meters high, it has been heavily looted. The topsoil has been completely removed exposing large quantities of un-worked and worked shell (including fragments of *Melongena patula, Conus,* and *Oliva*), modeled and painted pottery from all occupational phases, polished stone axes, and flakes of fossilized wood. Unlike the Huertas Arriba mounds, field 44ls represents a large midden feature that formed over about ten centuries from the Tonosí to the Parita phases.

4.4.1.2.1 Test excavations at LS-10: Station R213 and R297

I decided it was necessary to identify the types of features that had been destroyed by looters and also to determine the antiquity of the initial occupation at Las Huertas. Therefore two test pits were opened, one at station R213 (562353E 878010N) and the other at station R297 (562350E 877995N) both located in Huertas Los Pozos (Figure 4.11). After cleaning the looter pits and drawing the wall profiles, test columns were opened on the walls that preserved intact stratigraphy.

a

b

Figure 4.12 Las Huertas (LS-10) Archaeological features.
(a) Artificial mound identified at Station R545 (565607E 877223N) Field 84ls. The base of the mound measured ~ 20 meters in diameter by 3 meters in height.
(b) Mound feature from Field 44ls. The mound measured 60 meters in diameters and 2 meters in height. The mound was heavily looted and exposed abundant archaeological remains from the Tonosí to Parita phase (A.D. 250–1400).

At *Station R213* the looters had dug several interconnecting pits that, when cleaned, measured 1.5 by 4 meters and 1.70 meters in depth (Figure 4.13). I found human long bones and several superimposed jars (cut in half) exposed in the walls of these disturbances. The fill contained pottery assignable to the Middle and Late Ceramic, including diagnostic Parita phase sherds. The human remains comprised two adults and one infant. The criteria that physical anthropologist Claudia Díaz used to describe one of the adults as senile were the absence of teeth on the maxillary and mandible fragments, and closed alveoli (Appendix 4: Table I).

In order to reconstruct the chronology of the deposit, a 1 by 0.50 meter column was opened in the undisturbed west wall. The stratigraphy was defined on the basis of sediment structure, color, and cultural components. Excavations revealed the remains of a Parita phase feature in stratum 2, superimposed over midden layers with ceramics from the Conte and Macaracas phases of the Late Ceramic period and Cubitá phase of the Middle Ceramic (Table 4.6, Figure 4.14).

The first 30 cm, labeled stratum 1, were composed of a reddish brown (5YR 4/3) clay fill, containing small light reddish-yellow (7.5YR 6/6) clay inclusions. This stratum was mixed with soil that the looters deposited in the surface when they dug their pits (Figure 4.13a). Therefore, the sherds included within it represent several phases (Figure 4.14).

Stratum 2, 35–40 cm thick, was composed of a very compact red (2.5YR 4/6) clay fill, granular in structure, with red (2.5 YR 5/8) streaks and charcoal particles. We recorded at least 5 crushed Parita style polychrome and modeled jars cut in half by the

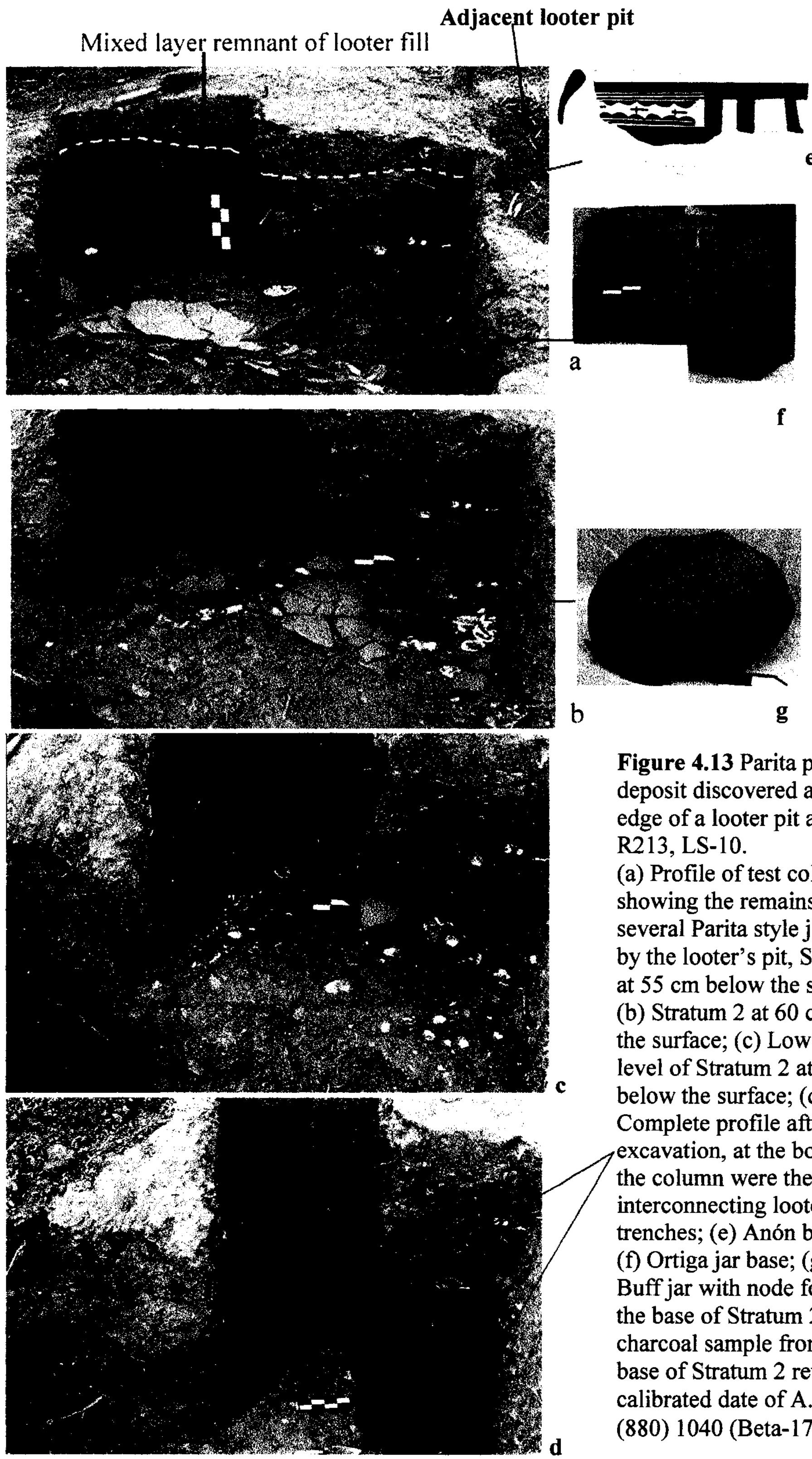


Figure 4.13 Parita phase deposit discovered at the edge of a looter pit at station R213, LS-10.
(a) Profile of test column showing the remains of several Parita style jars cut of by the looter's pit, Stratum 2 at 55 cm below the surface; (b) Stratum 2 at 60 cm below the surface; (c) Lowermost level of Stratum 2 at 65 cm below the surface; (d) Complete profile after excavation, at the bottom of the column were the interconnecting looter trenches; (e) Anón bowl rim; (f) Ortiga jar base; (g) Red Buff jar with node found at the base of Stratum 2. A charcoal sample from the base of Stratum 2 returned a calibrated date of A.D. 655 (880) 1040 (Beta-170994).

Table 4.6
Station R213: Number of pottery sherds per stratigraphic layer

Ceramic Complex Type–variety	**St 1**	**St 2**	**St 3**	**St 4**	**LP fill***	**Total**	**%**
+Late Ceramic	692	200	446	8		**1,346**	**71**
Parita							**13**
Parita	23	*169	1	1	55	**249**	
Níspero			1			**1**	
Ortiga		♦1	1			**2**	
Anón	1	1	2			**4**	
Macaracas							**0.1**
Macaracas			2			**2**	
Pica-pica			1			**1**	
Conte							**2**
Conte polychrome	8	1	24	3		**36**	
Red line	6	1				**7**	
Middle/Late Ceramic	1	6	56	114	17	**194**	**10**
Cubitá complex							**3**
Cubitá	4		1	▲8		**13**	
Ciruelo			8	4		**12**	
Guábilo				1		**1**	
Nance			4	1		**5**	
Caracucho			1			**1**	
Cubitá Red			1			**1**	
Juncal			2	2		**4**	
Espabe red				1		**1**	
Guachapalí			10	9		**19**	
Macano	1		1			**2**	
Tonosí							**0.7**
Tonosí polychrome			2			**2**	
La Bernardina				1		**1**	
Aristide–Cocobó			1			**1**	
Grand Total	736	379	565	153	72	1,905	

* Includes 4 incomplete vessels
♦ Incomplete vessel
▲ Includes one incomplete vessel
+ This material was just quantified

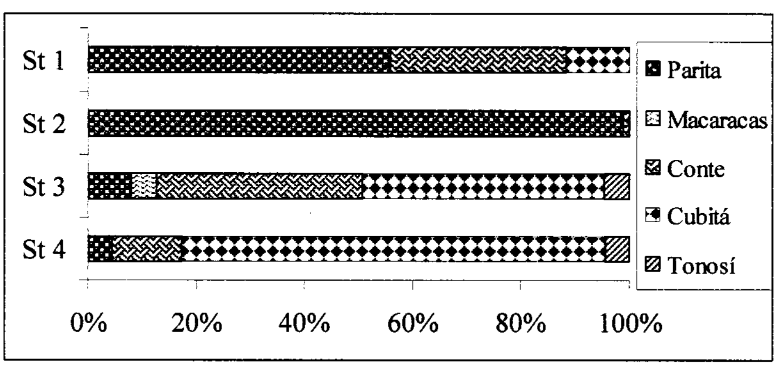


Figure 4.14 Distribution of diagnostic pottery in Station R213 per stratigraphic layer

looter's pit (Figure 4.13). Charcoal adhering to a monochrome sherd found 60 cm below the surface (stratum 2) and immediately below the Parita style jars returned a date of 1170 ± 110 B.P., cal. A.D. 655 (880) 1040 (Beta-170994, Appendix 1). This date falls within the time span currently attributed to the Macaracas polychrome style (Cooke *et al.* 2000). Given its stratigraphic position at the base of the Parita jars our date result seem just right.

At the lowermost level of stratum 2 and the beginning of stratum 3, shells began to appear and the clay changed color to a reddish brown and less compact granular structure. Stratum 3 measured 30–35 cm in thickness and contained mostly Cubitá and Conte style ceramics with a few Macaracas and Tonosí sherds (Table 4.6, Figure 4.14).

Stratum 4, 35 cm thick, was composed of fine and compact red (2.5YR 4/6) clay with limonite and andesite inclusions. It overlay the soft yellowish-brown (10YR 5/8) bedrock conglomerate, mixed with small pale yellow limonite and andesite inclusions of variable hues (2.5Y 8/4) and (2.5YR 7/4). Among the diagnostic typed material this last layer contained primarily Cubitá style ceramics and a few Conte polychrome sherds (Figure 4.14). In sum, the test column revealed three overlaying deposits, dating between A.D. 300–1400.

The unit contained few marine shells, of which the majority were widely used for human consumption (Appendix 2: Table III). But at least four fragments of *Anadara* and one of *Melongena patula* showed evidence of being worked. Two of the worked *Anadara* fragments were found associated with the Parita phase feature in stratum 2. Vertebrate remains were recorded only strata 1–3 as well as in the looter pit fills. The sample is too small to be statistically meaningful. While-tailed deer, nine-banded armadillo, iguana, and eight marine fish species were recorded (Appendix 3: Table II).

Despite the presence of human remains in the looter pit fill, none was found in the column. Therefore, it is impossible to ascertain whether they belonged to the Parita phase feature or were part of a previous funerary deposit destroyed by the looters.

The second test excavation, at *Station R297*, was located 20 meters west of Station R213 (Figure 4.11). Here a surface collection made around a shallow looter pit revealed polychrome and zoomorphic modeled ceramics from the Tonosí and Conte phases, mano and metate fragments, worked shell, and vertebrate remains surrounding a shallow looter pit (Figure 4.15). After cleaning the pit, we noticed the base of a miniature pedestal cup protruding from the north wall 30 cm below the ground surface, in a stratum that exposed a lot of marine shells. An armadillo burrow in the same wall section contained fragments of human bones—including the distal epiphysis of a fibula, section of the left ascending ramus of a mandible, sections of the femur, and a rib bone, which belonged to a single adult (see Appendix 4: Table II).

In order to identify the type of feature that contained the bones and the pedestal cup, a one-square meter column was excavated along the northern wall. The uppermost level was 5 cm deep, and contained mixed sediments from the looting activity. Stratum 1 underneath consisted of a brown (7.5 YR 4/3) coarse clay layer, 40 cm deep at its deepest point. Within it, we identified several complete and incomplete Conte vessels including a tripod cup, another 3 monochrome miniature cups, three geometrically painted miniature cups, a miniature lid, and an incomplete polychrome plate depicting a crocodilian with

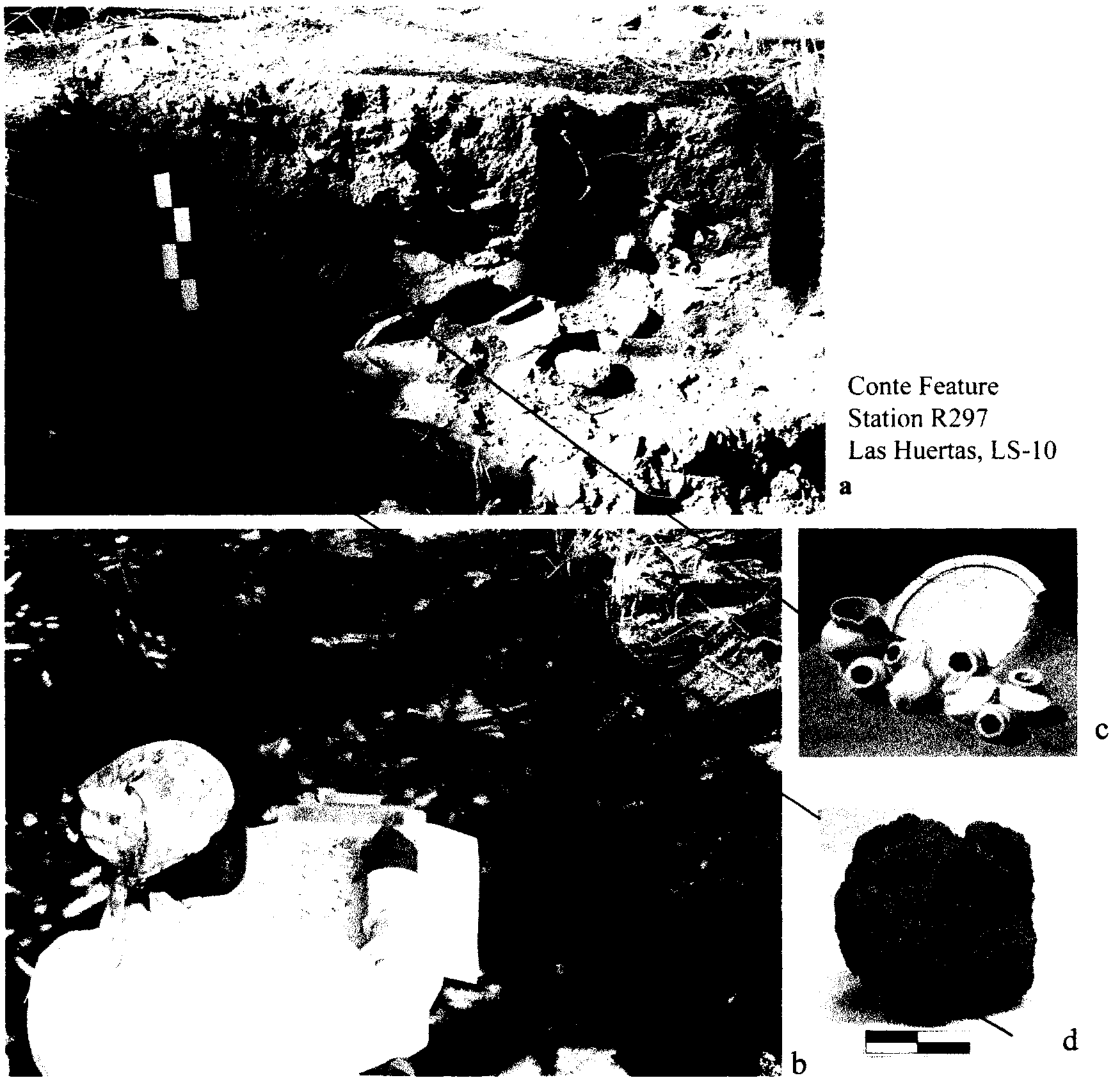


Figure 4.15 Conte phase deposit discovered at the edge of a looter pit at Station R297, LS-10
(a) Remains of a Conte style feature at 35 cm below surface.
(b) Maria Elena Mendieta drawing artifacts in situ. (c) Artistic representation of the complete vessels identified in the test column at station R297, include a Colibrí cup with pedestals, three monochrome miniature cups, three polychrome miniature cups, and a polychrome plate with a painted anthropomorphic saurian motif. A fourth monochrome miniature cup comes from Station R118. (d) Large block of burnt clay with wood impressions on the top portion of the black and an attached Tonosí style potsherd at the base.

human features (Figures 4.13c). This material epitomizes the late Conte-early Macaracas phases placed chronologically about A.D. 850–1050 (Table 4.7).

Most of the sherds recovered in stratum 1 (74%, n=1,022) could not be assigned a category more precise than Middle to Late Ceramic (Table 4.7). With regard to typologically diagnostic materials, sherds assigned to the Conte style represented 10% (n=142) and Cubitá 4.5% (n=62). Therefore, I propose that this stratum was laid down between A.D. 550–800. However, a few (<1%) sherds from earlier phases were also present including a plastically decorated La Mula sherd, Aristide (n=4), and Tonosí (n=5; Table 4.7; Figure 4.16). This kind of mixing occurs in sites with long occupations since earlier refuse lenses are constantly being eroded and scuffed.

Other artifacts found in stratum 1 included a large block of burnt clay with wood impressions and a Tonosí polychrome sherd attached to its base (Figure 4.15d), a metate leg, and scattered animal and human bones. The latter included additional fragments of the adult individual found inside the armadillo borrow.

I conclude therefore that the vessels contained in stratum 1 belonged to a late Conte/early Macaracas burial deposit most of which was destroyed by the looters. A charcoal fragment collected from the fill of stratum 1 at 40 cm from the ground surface, returned an AMS date of 420 ± 40 B.P., cal. A.D. 1425 (1450) 1620 (Beta 170995, Appendix 1). The results were more recent than what was expected, specially because the typed pottery contained in the stratum pre date A.D. 1100. Unfortunately, this confirms that using charcoal from middens or fills is a total waste of time and money. This was in most part my fault for sending the sample to date before I had thoroughly evaluated the deposit.

Table 4.7
Station R297: Number of pottery sherds per stratigraphic layer

Ceramic Complex Type–variety	**St 1**	**St 2**	**St 3**	**St 4**	**St 6**	**Wall**	**LP**	**Total**	**♦%**
Late Ceramic misc.	65	4	11	13		5	978	**1,076**	29
Macaracas–Parita									
Buff	2							**2**	0.1
Red buff							3	**3**	0.1
Macaracas									
Macaracas polychrome	18	1	1				13	**33**	1
Pica-pica			1				3	**4**	0.1
+Late Conte–Macaracas	2							**2**	0.1
Conte									
Conte polychrome	125	16	5	3		11	140	**301**	**8**
*Late Conte	8							**8**	0.2
Smoked	1							**1**	0.1
La India red	6	1	1			2	14	**24**	0.7
Red line	16					3	28	**47**	1
Red Buff							1	**1**	0.1
Smoked	1							**1**	0.1
Middle/Late Ceramic misc.	1,016	107	50	28			702	**1,903**	52
Middle Ceramic misc.	48				3		1	**52**	1
Cubitá	12	2	8	1			11	**34**	0.9
Ciruelo	11	3	5				23	**42**	1.2
Jagua		1					1	**2**	0.1
Sangrillo	1							**1**	
Guábilo	1	1	1				3	**6**	0.2
Cábimo							1	**1**	
Caracucho							1	**1**	
Nance	1						2	**3**	0.1
Juncal red							1	**1**	
Harino	1							**1**	
Espabe red	4							**4**	0.1
Guachapalí	31	9	2	4		1	17	**64**	1.8
Macano linear stippled		1					2	**3**	0.1
Madroño							1	**1**	
Culebra appliqué							1	**1**	
Zumbo							1	**1**	
Tonosí misc.	2	1					3	**6**	0.2
Aristide–Girón	3						1	**4**	0.1
Aristide–Cocobó							1	**1**	
Tonosí black/white	3		1					**4**	0.1
Tonosí black & red/white							1	**1**	
La Mula									
cf. Minitas incise	1						2	**3**	0.1
Aristide–Escotá	1							**1**	
Grand Total	1,380	147	86	49	3	22	1,956	3,643	

* whole cups, + incomplete vessels, ♦ Percentage of types and varieties from total

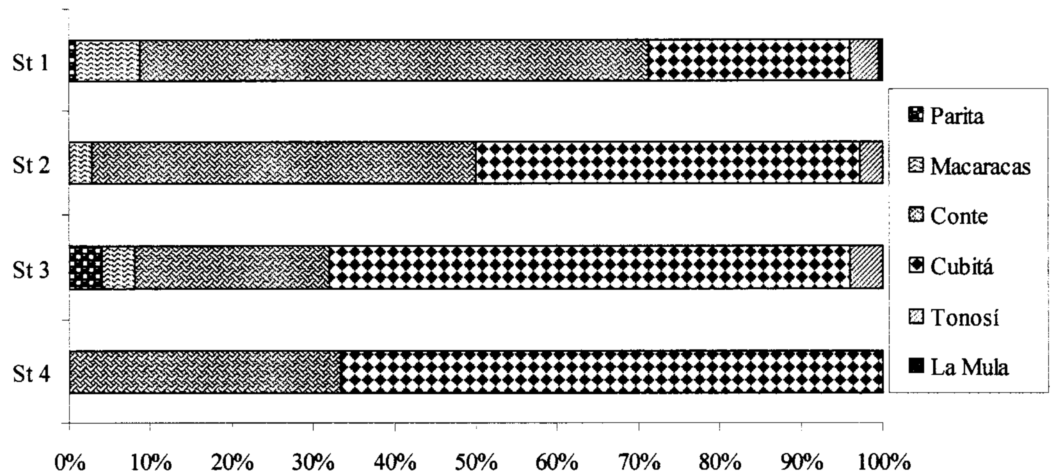


Figure 4.16 Distribution of diagnostic pottery in Station R297 per stratigraphic layer

Stratum 2 was 20–25 cm thick and composed of a dark reddish brown (5 YR 3/3), granular and poorly sorted clay containing stone inclusions and shells. Although the ceramic component of stratum 2 was 9.4% less than that documented for the upper stratum, the proportion of miscellaneous Middle/Late Ceramic Period sherds continue almost the same, representing 72% (n=102) of the stratum's sample, followed by an equal percentage (11.5%) of Cubitá and Conte style pottery. The remaining 5% included a few Late Ceramic forms and single samples from the Macaracas and Tonosí style. Stratum 2 overlies both strata 3 and 4 where the Conte ceramic content decreased noticeably (Table 4.7). Measuring 15 cm deep, stratum 3 was comprised of a compact red (2.5 YR 4/8) clay with reddish yellow (7.5 YR 6/8) streaks, and limited cultural material (Figure 4.17). Stratum 4, on the other hand, corresponded to a 20-cm deep posthole feature distinguished by its dark reddish brown (5YR 3/4) granular clay, which had cut into a compact red (10R 4/6) clay layer, labeled stratum 5. Representing the lower-most cultural level excavated at R297, stratum 5 contained primarily vertebrate fauna remains, a few shells, and some ceramic sherds. Its base was found at about one meter from the surface and was mixed with the soft conglomerate of the bedrock, stratum 6. Although a few pottery sherds and shells were found in this last level they are probably remnants from the previous level.

More marine shells were found in the test pit at station R297 than at Station R213. They also represented more taxa (21 as opposed to 10 genera). The sample is dominated by *Natica* snails (60%), which are collected over sand-mud substrates at low tide (Appendix 2: Table IV). There is a low input from sandy beach, mangrove and low intertidal taxa. A few shell fragments show evidence for working: these comprise a fragment of *Anadara*, an *Iphigenia* bivalve polished by use on its inferior margin, and worked spires of *Melongena patula*. The only diagnostic mammal bones belonged to whitetail deer (at least 12 specimens). Green turtle (*Chelonia*) and black iguana (*Ctenosaura similis*) were represented by single specimens (Appendix 3: Table III). Fourteen genera, 14 species and one tentatively identified species of marine fish were identified. Five bones of the fang jaw eel (*Echiophis brunneus*) were recorded, from at least three individuals weighing about 1 kg, 2.5 kg and 3 kg respectively. This fish is not a popular food source today although it is frequently trawled in shallow turbid water. It probably lives in burrows in soft substrates. Its presence at LS-10, 7.7 kilometers from the coastline, suggests it was used as a food item in pre-Columbian times (Cooke personal communication 2006).

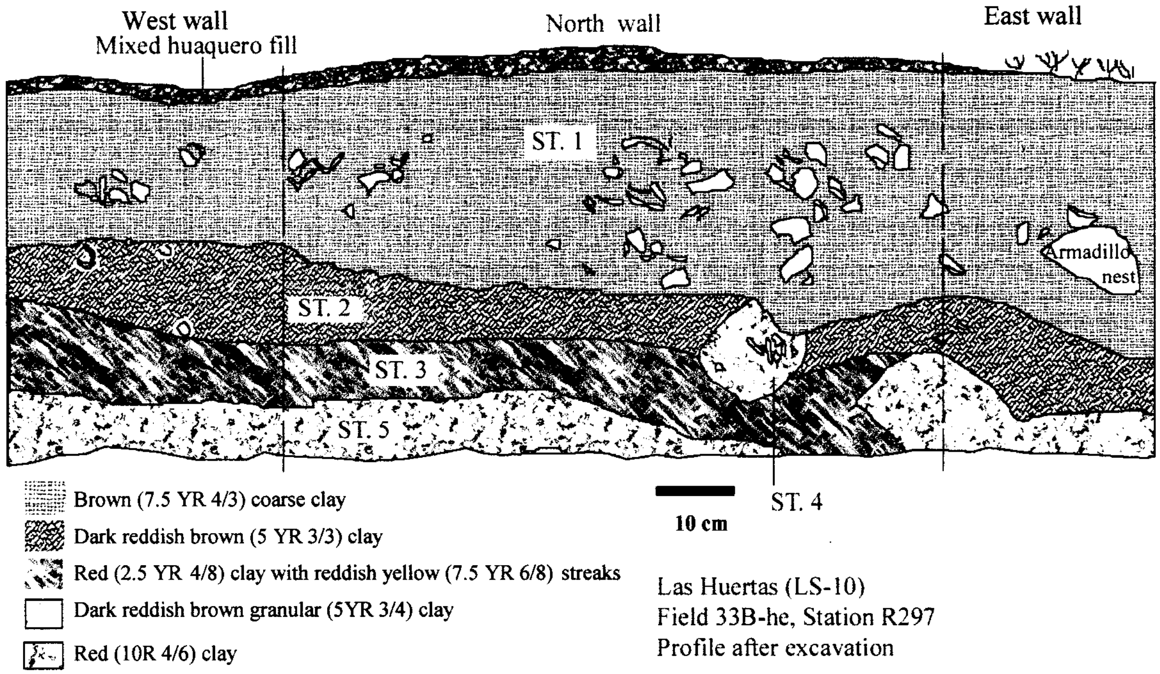


Figure 4.17 Profile drawing from Station R297 after excavation

The majority of the human bones found in the R297 column, belonged to the same adult individual whose partial remains were first discovered inside the armadillo borrow. Only one small fragment of a rib belonged to an infant (Appendix 4: Table II). Also scattered throughout the deposit were several stone polishers, and mano and metate fragments.

Despite the small size of test pits, the information retrieved from Stations R213 and R297 columns correlates with the surface collection data. The test pits recovered cultural materials that belongs to the La Mula through the Parita phases. Although this material was out-of-place stratigraphically it does confirm that this site was occupied during these phases.

4.4.1.2.2 Site LS-10 Summary

The overall configuration of LS-10 shows that this was a large village where people lived in widely dispersed structures built atop hills and high alluvial terraces close to the banks of the La Villa River. The low-lying areas on the northern (Herrera) banks today are subject to flooding (Figure 4.11). These were perhaps reserved for farming. Looter pits show that several caches and burials have been destroyed by illegal digging, the majority identified on the tops of hills and on the slopes between fields 82ls to 87ls and fields 33B-he to 43he (Figure 4.11). This custom of using high places for ritual activities was also observed at LS-3. The large mound features in the southeastern leveled areas of fields 83ls and 84ls, which lack domestic refuse, could indicate additional areas reserved for ritual activity. This idea needs further confirmation through excavation.

As at LS-3, the settlement occupation of Las Huertas (LS-10) began sometime during La Mula phase as hamlets when residences seem to have been scattered. Between the Cubitá and Conte phase the villages that had grown up at the localities names “Huertas Arriba”, “Huertas Los Pozos” and “Huertas La Isleta” coalesced to form a large nuclear village whose occupation lasted until the end of the Parita phase.

4.4.1.3 Site LS-15

Name: La Chilonga

UTM coordinates: 558470E 878514 N

District: La Arena and Los Olivos

Estimated area: 80 hectares (type 1)

Function: habitation, cemetery (?)

Occupation phase: Middle Ceramic B–Colonial Period

Description: Site LS-15, which is an area known locally as La Chilonga, is located 6 kilometers from the center of La Villa de Los Santos and 2.5 kilometers from Cerro El Tamarindo (Figure 4.18). The surrounding landscape consists of rolling hills running parallel to the banks of the La Villa River (Figure 4.19e). Artifacts and surface features are present on both sides of the river. I was originally shown the southern section of LS-15 by local informant Professor Aris Calderón in June 2001. At this time, looting and bulldozing had destroyed several mounds overlooking the river six months earlier. The area where the mounds were located contains thick midden deposits with abundant shell. Arbitrary collection units placed in the most disturbed middens yielded evidence of Conte, Macaracas, and Parita polychrome style pottery, as well as chipped and ground stone tools (Figure 4.19a). All of these middens were clustered within an area of 5 hectares, between the northern sections of fields 102ls and 103ls (Figure 4.18).

While cleaning a looter pit wall that cut into a shell midden we identified an incomplete Macaracas style bowl (Figure 4.19d). It contained a large *Anadara* bivalve, a few remains of three small fish (brassy grunt, thread herring and congo sea catfish), and the distal metatarsal bones and external auditory meatus of a whitetail deer.

On the northern (Herrera) bank of LS-15 in contrast to the mounds mentioned above, the extensively plowed areas between fields 57he and 69he yielded artifacts representing additional phases, i.e., the Tonosí phase and the Colonial period (Figure

Station R679 (558102N 878175E)

▲	Station with cultural material
◌	Mound
▬ ▪	Limits of LS-15
......	Remote sensing survey
58he	Field number

Figure 4.18 La Chilonga (LS-15) aerial photo

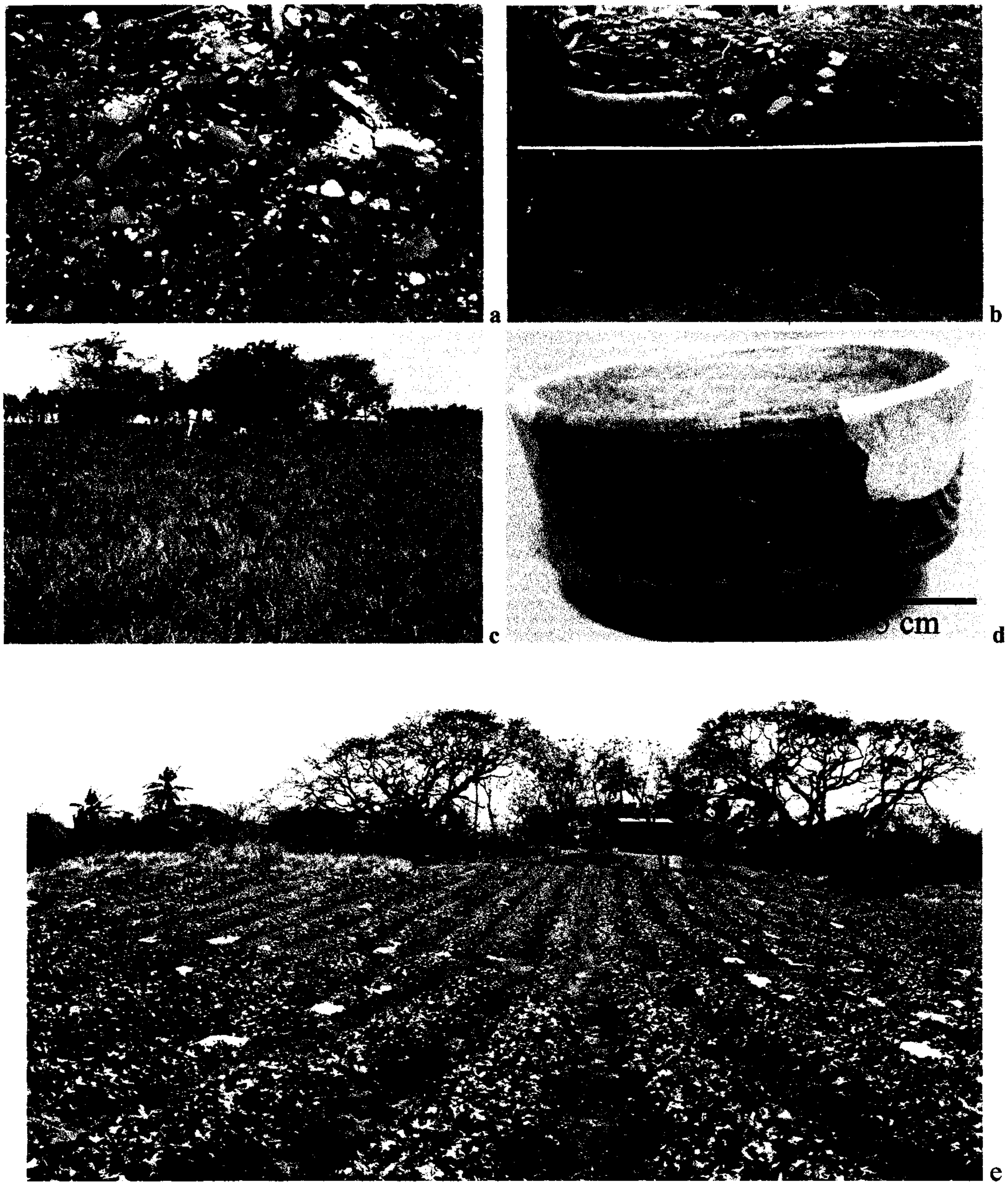


Figure 4.19 La Chilonga (LS-15) landscape and archaeological features.
(a) Site LS-15 midden deposits exposed by looting activity on Field 103ls near the river edge. (b) Identification of a Macaracas: Pica-pica style bowl at the base of a looter pit profile in Station R679-C (558102N 878175E) see also Figure 4.15 for the location of the station. (c) Aris Calderon and Celestino Rodriguez a top a hill feature at field 102ls. (d) Reconstructed Macaracas bowl recovered from Station R679-C. (e) Field 58he where Late Ceramic period and Colonial artifacts were documented in the vicinity of the mound seen at the far distance (view to the south).

4.18). A hill outlined by large volcanic boulders, which was identified in the southern sections of field 58he and overlooks the La Villa River, is the most prominent feature on this northern bank (Figure 4.19e). At a distance of 200 meters from it, the PARLV collected Parita and El Hatillo style pottery in association with Spanish colonial wares and olive jar fragments. In the same area, the PARLV collected a spindle whorl and a wide variety of stone tools including four large slab metates. The metates represent a Late Ceramic Period style of grinding stone that continued to be used after the contact (e.g., Willey and McGimsey 1954: Figure 16). These metates are particularly distinctive because their base measures between 20 to 30 cm thick, 50 cm across, and the worked grinding area ranges between two to seven centimeters deep. LS-15 also yielded El Tigre style ceramics (*sensu* Willey and McGimsey 1954: 80) mixed with a few nineteenth century printed wares. This association is consistent with the ^{14}C date of cal. A.D. 1650–1955 (Beta-46784) obtained from a charcoal sample recovered in a fire pit that contained El Tigre ceramics at the Monagrillo-type site (see Chapter 2: Footnote 1).

The presence of a La Mula style point and a few Aristide style (Girón variety, *cf.* Sánchez 1995: Figure 84ch–d) potsherds provides evidence for an initial occupation of La Chilonga between La Mula and Tonosí phase of the Middle Ceramic Period. But the majority of sampled ceramics correspond to highly eroded monochrome pottery which can be assigned to the Late Ceramic C–D, Colonial, and post-Colonial periods. The very low representation of diagnostic Cubitá pottery at LS-15 is a striking difference with the other two nucleated villages, LS-3 and LS-10.

The continuous distribution of pottery, stone tools, and midden features with shell at LS-15 over about 80 hectares, justifies its being classified as the third nuclear site registered on the margins of the La Villa River. The growth of LS-15 seems to have occurred beginning in the Macaracas phase of the Late Ceramic Period. Thus the addition of LS-15 to the suite of large nucleated sited is harmonious with the pattern of demographic growth that Haller documented in the Parita Valley after the emergence of El Hatillo (HE-4) as a ritual center (Haller 2004: 85–94).

4.4.2 Type 2 sites: villages

Seven type 2 villages were registered between the inland edge of the coastal mangrove and the westernmost limit of our survey universe. The majority of type 2 sites clustered on the coastal plain between Cerro Juan Díaz and Las Huertas (Figure 4.4). These villages are characterized by above ground features like mounds and culturally modified low hills, some of which conceivably served for community functions as they exposed some unique features and objects, including manos with heavy use polish, and unworked and worked shell objects. With one exception, the Finca Germán Castillo (LS-31), type 2 hamlets are equidistantly spaced, strategically situated on high alluvial terraces along the La Villa River, and adjacent to rich alluvial bottomlands.

4.4.2.1 LS-31

Name: Finca Germán Castillo

UTM coordinates: 570462E 880945N (Station R525)

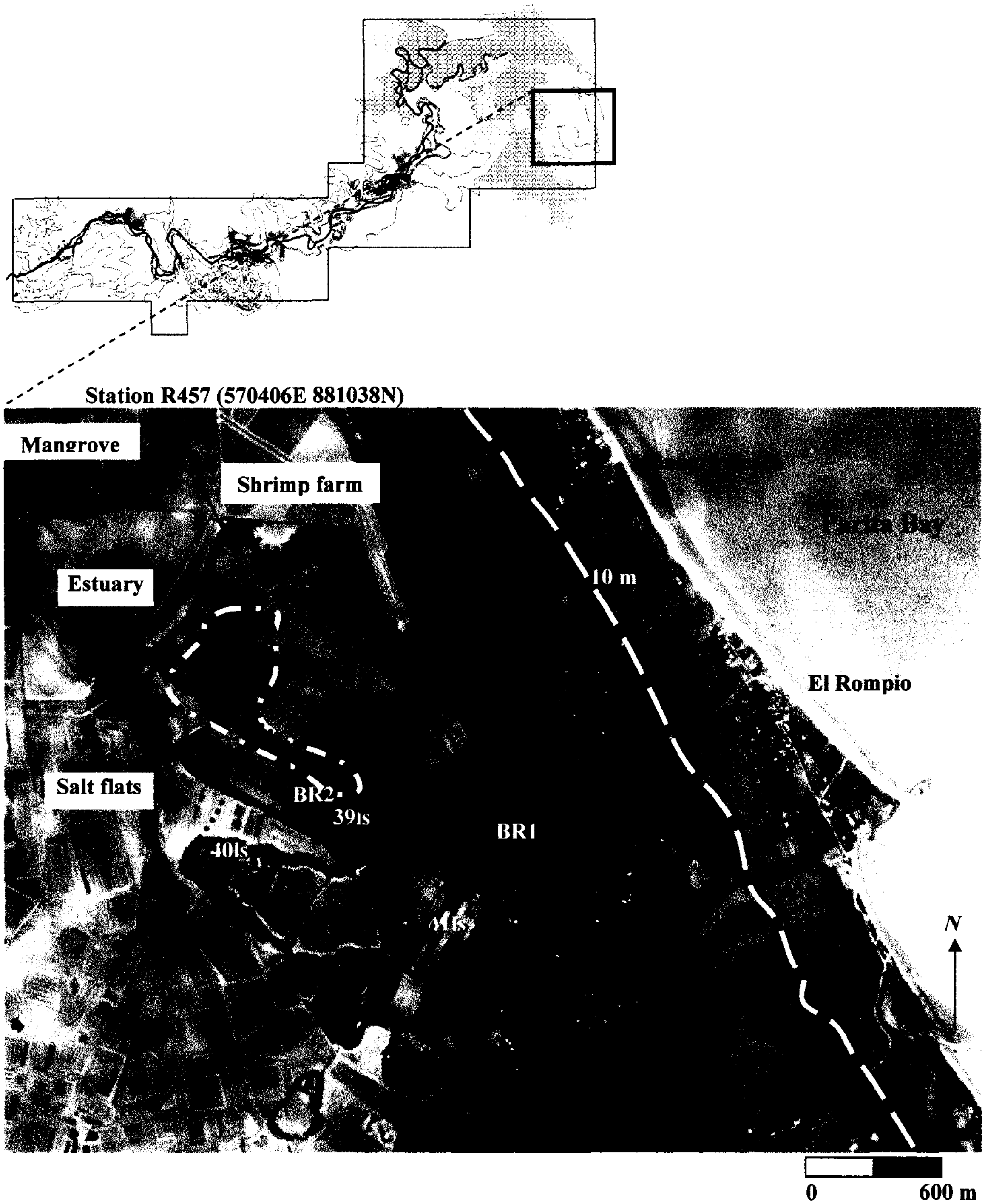
District: *Corregimiento* Santa Ana Abajo in Los Santos district

Estimated area: 17 hectares

Function: fishing village

Occupation phase: Tonosí phase (Middle Ceramic B)–Conte phase (Late Ceramic A)

Description: Site LS-31 is located in the district of Santa Ana Abajo, 4.6 kilometers to the Northeast of LS-3, between the salt flats, a shrimp farm, and Playa Monagre (Figure 4.4). I visited the area after Eduardo Gonzalez, a night guard for the CJDP, reported seeing artifacts similar to those at LS–3 when he worked building wire fences in a peanut farm (field 19ls), property of Germán Castillo. Between 2001 and 2002 when the PARLV team visited the site, the property was being used as a cattle ranch. After a field reconnaissance and evaluation of the above ground features, surface artifacts, and the site's geographic features, I decided to survey field 19ls using the transect system, while three neighboring properties—labeled field 39ls, 40ls, 41ls—were unsystematically surveyed using opportunistic collection samples (Figure 4.20). The systematic survey covered 60 hectares, and the unsystematic survey, 30 hectares. The results of the surface collection revealed that the major portion of LS-31 sits on a beach ridge (BR2) identified between fields 19ls and 39ls, about 1.8 kilometers from the active coastline and 300 meters from the paleo-meanders to the east (Figure 4.20). The densest concentration of archaeological material was found to the northeast of the ridge, in field 19ls, associated with four large mounds measuring 60–100 meters in diameter and between 0.5 to 1.5 meters in height (Figure 4.21).



▲ Collection station with cultural material
19ls Field number
BR Beach ridge

— · — Limits of site
—— — 10 meter contour line
········ Surveyed property boundaries

Figure 4.20 Finca Germán Castillo (LS-31) aerial photo

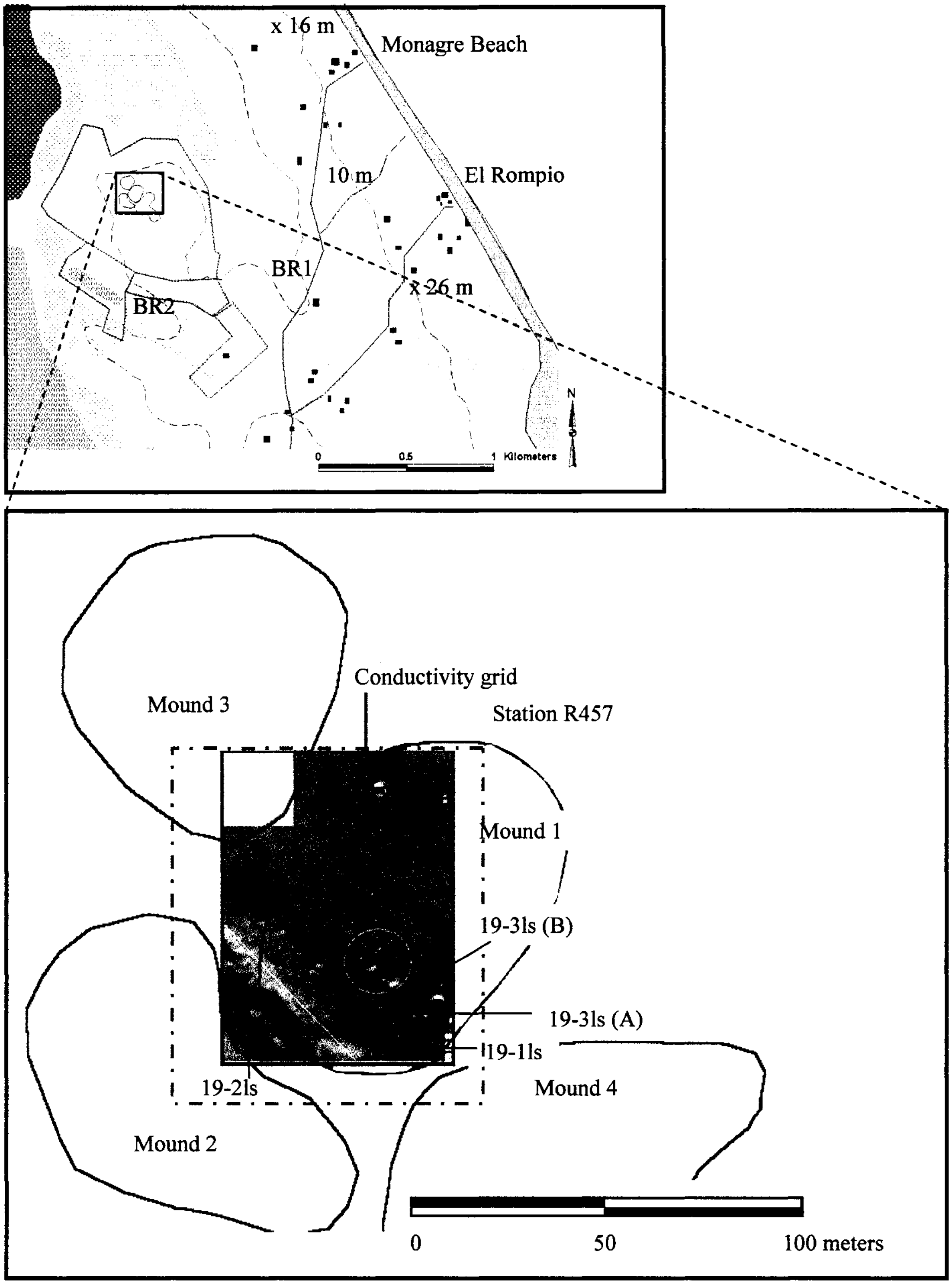


Figure 4.21 Finca Germán Castillo (LS-31) plan view showing the location of the excavation units and remote sensing surveys

The mounds are composed of compact sandy sediments, covered primarily by grass and a few trees known locally as "guácimo"(*Guazuma ulmifolia*), "pino carbón", "manzanillo" (*Hippomane mancinella*), and "mangle salado" (*Avicennia germinans*). The shape and size of the mounds suggested that they represent natural features covered by accretions of anthropogenic materials. The ridge (BR2), on the other hand, acts as a boundary between the salt flats and the mounds (Figure 4.20). Along its length and summit, the PARLV documented remnants of shell-bearing middens at different intervals. Additionally, isolated artifacts were found scattered along the edge of the salt flat and estuary in fields 40ls and 41ls (Figure 4.20).

A second area of interest was identified at field 41ls, located 186 meters of the beach ridge and 1.2 kilometers southeast of field 19ls mounds. Field 41ls exposed a large mound on which a shell-bearing midden contained several *Melongena patula* gastropod shells whose body whorls where missing. Other shell taxa identified at field 41ls mound included *Strombus* sp., *Hexaplex, Anadara,* and *Tivela argentina*. This is very significant, because as noted above, the *Melongena, Strombus* and *Anadara* were marine shells most frequently selected for the manufacture of personal adornments at the Cubitá-phase workshop studied by Julia Mayo at LS-3. Mayo notes that the spire and operculum of the *Strombus galeatus* are always missing as if their meat was extracted at a different location before being taken to the workshop (Mayo 2004: 236). Perhaps coastal sites such as LS-31 and field 41ls served as the centers for processing and redistributing of both food and raw materials used in specialized crafts between the last (Cubitá) phase of the Middle Ceramic and the beginning of the Late Ceramic Period.

The physical and cultural characteristics of LS-31 encouraged me to conduct remote sensing surveys. A section of one of the mounds in field 19ls mounds, labeled Mound 1, was surveyed using a caesium vapor magnetometer and a conductivity meter.[7] I selected three areas for excavation after comparing magnetic and conductivity readings with information from the surface collection, which were identified as: Operation 19-1ls, Operation 19-2ls, and Operation 19-3ls (Figure 4.21). Natural layers were subdivided into arbitrary levels of 10 cm where necessary. Due to time constraints the units were excavated until we reached a very fine and compact yellowish sand layer lacking cultural material. In the field, sediments were screened using 0.0625-inch (1.6 mm) metal screens. The sediments remaining on the screen were subsequently water screened in the laboratory using a 0.0197-inch (500 micrometers) metal sieve. This allowed the recovery of very small vertebrate bones.

4.4.2.1.1 Test excavations at LS-31: Operations 19-1ls, 19-2ls, and 19-3ls

Operation 19-1ls (570395E 880902N): a 2 by 2 meter unit opened on the southeastern slope of Mound 1 to a depth of 1.10 meters below the ground surface (Figure 4.21). This excavation showed that this section of the mound is composed of five strata (Figure 4.22a).

Stratum 1 is a 20 cm loamy-sand deposit, which is dark grayish brown (10YR 4/2) to dark brown (10YR 3/3) in color (Figure 4.22a). This first stratum define a shell-bearing midden containing abundant grass roots, charcoal, marine shells of many taxa,

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[7] The remote sensing surveys results are presented in Chapter 5.

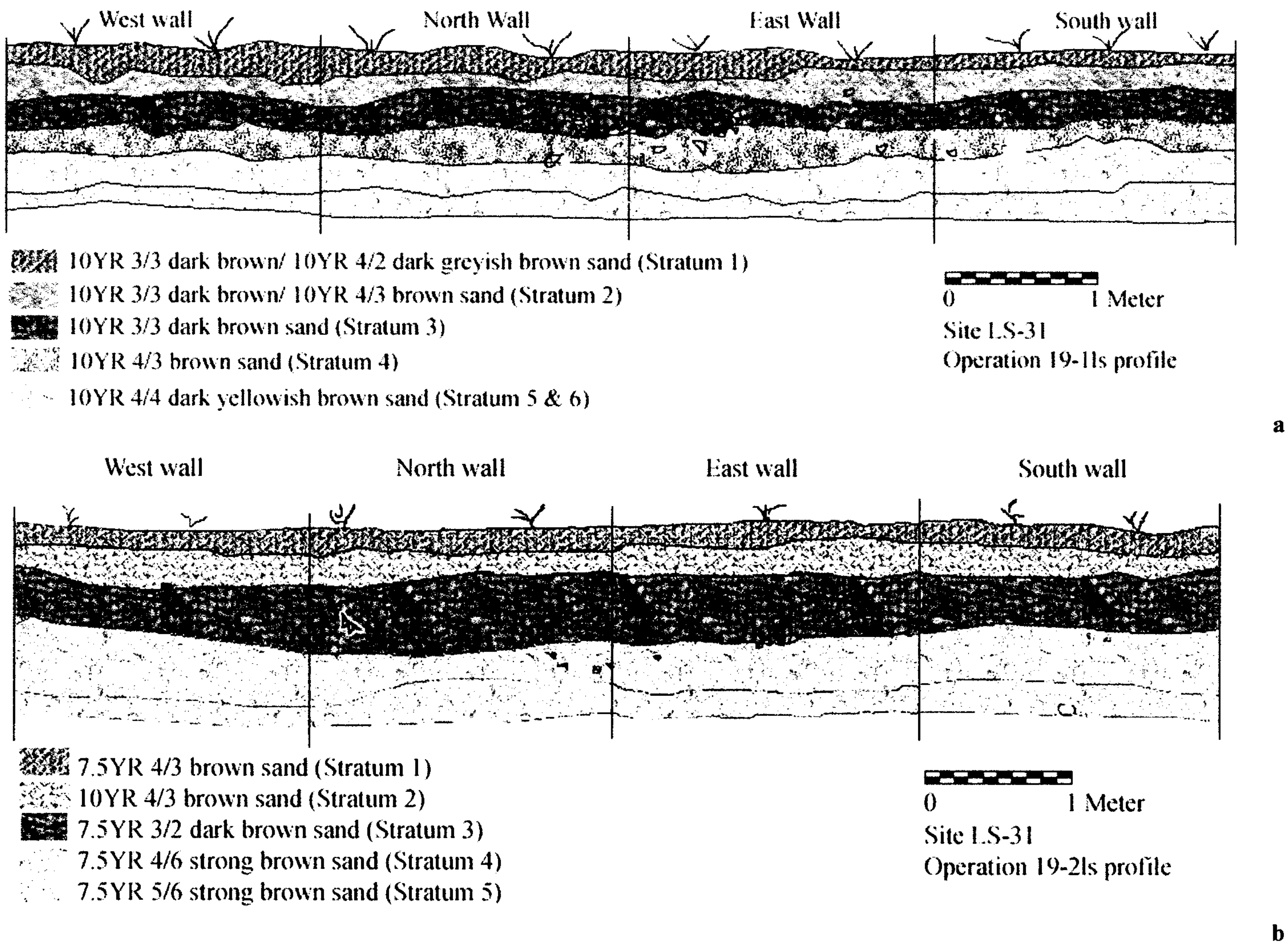


Figure 4.22 Finca Germán Castillo (LS-31) excavation profiles from Operations 19-1ls and 19-2ls

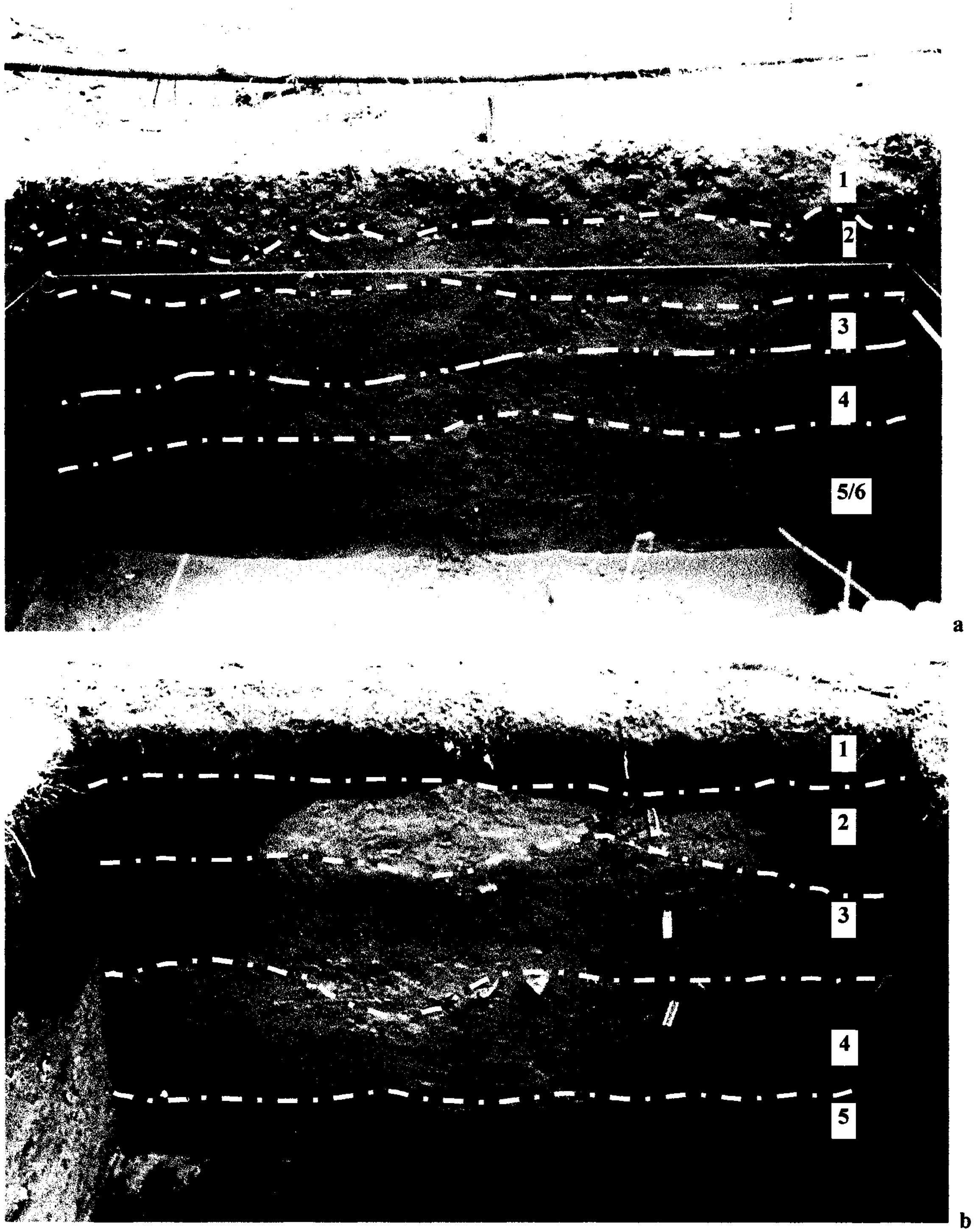


Figure 4.23 Finca Germán Castillo (LS-31) excavation units.
(a) Operation 19-1ls west wall profile; (b) Operation 19-2ls west wall profile after rain storm.

fish remains, and pottery.

Although stratum 2, was structurally similar to stratum 1, it contained smaller amounts of grassroots, charcoal, and cultural material (Figure 4.23). My analysis of 55% of the excavated sample indicates that the greatest number and diversity of shell and fish remains were found in the first two strata (Appendix 2: Table V; Appendix 3: Table IV).

Strata 3 through 5, were very difficult to distinguish during the excavations because they were composed primarily of brownish sand whose slight changes in color were apparently due to differences in humidity. I based my field identifications on these strata on changes in sand grain size, charcoal and clay content, also considering the amount of shells and pottery sherds. Stratum 3, 20 cm thick, was composed of coarse sand of a dark brown hue (10YR 3/3). It contained 96% less shell than Stratum 2, but about the same amount of pottery.

Stratum 4, 10 cm thick, consisted of finer and less compact sand, and contained substantially smaller quantities of shell and pottery. Stratum 5, immediately underneath, was 30 cm thick, being characterized by a dark yellowish brown (10YR 4/4) layer of fine-grained sand (Figure 4.22a). Despite its greater thickness in relation to the other strata, it yielded very small amounts of cultural artifacts and faunal remains. The last 10 cm of the unit were labeled stratum 6 because of slight changes in the sand texture. But as soon as the sediments dried out the wall profile revealed that this last stratum represent in fact the basal level of stratum 5 (Figure 4.23a).

The material assemblage of Operation 19-11s consisted primarily of pottery sherds, marine shells, and the remains of fish and a few other classes of vertebrates.

Surprisingly, the only stone tools we recovered consisted of three jasper flakes and a pumice stone. Based on the 54% of analyzed ceramics from Operation 19-11s, the midden that covered southern section of Mound 1 was deposited during the last phase of the Middle Ceramic Period. With the exception of two Tonosí style sherds all diagnostic pottery correspond to the Cubitá style (Table 4.8). The majority included rims and painted body sherds from Ciruelo bowls painted in black over red. Other diagnostic forms of the Cubitá style included a few Cábimo, Guábilo, Nance, Macano bowl sherds, and Guachapalí jar fragments. There is even a greater amount of undecorated miscellaneous body sherds from both bowls and large globular jars.

Table 4.8
Operation 19-11s: Number of pottery sherds per stratigraphic layer

Ceramic Complex **Type–variety**	**St 1**	**St 2**	**St 3**	**St 4**	**St 5**	**St 6**	**Total**
Cubitá (miscellaneous)	6		4			7	17
Ciruelo black on red	169	49	61	4	10	7	300
Cubitá black & red/ cream	2						2
Cábimo	2	1					3
Guábilo	2			4		1	7
Nance	1	2	1	1			5
Guachapalí	4		3		2	1	10
Macano	4	1	3				8
Handle	22		3	5		1	31
Rims (undiagnostic)	78	30	17		4	2	131
Slipped bodies (undiagnostic)	41	54	6				101
Modeled (zoomorphic)			2				2
Monochrome bodies	2,036	480	629	110	181	106	3,542
Necks	434	1	3	1		3	442
White slipped bodies	1		4	1			6
Tonosí	2						2
Grand total	**2,804**	**618**	**737**	**126**	**197**	**128**	**4,610**

Although the marine shell from Operation 19-11s includes 63 taxa, only four dominate in number, weight, and biomass: *Tivela argentina, Natica* sp., *Cerithidea* sp., and *Polymesoda* sp. (Appendix 2: Table V). *Tivela* frequents high energy sandy beaches, *Natica* and *Cerithidea* mudflats and mangroves, and *Polymesoda* clams, brackish and fresh water where they can form very dense populations. Interestingly the four marine fish species identified in the Operation 19-1ls sample frequent shallow coastal waters, and enters estuaries and tidal rivers: *Ophioscion typicus*, *Bagre panamensis*, *Cathorops furthii,* and *Larimus acclivis* (Appendix 3: Table IV). The small sample of other vertebrate taxa is harmonious with the shoreline location I am proposing for this site: the migratory solitary sandpiper (*Tringa solitaria*) frequents wet areas, both saline and freshwater; *Columbina* ground doves and white-tailed deer are at home in scrubby littoral vegetation formations; the marine toad is ubiquitous in Panama, especially around human settlements; green iguanas are very abundant in coastal mangroves and along riverbanks; pocket mice (*Liomys*) need well vegetated areas, but are also frequent around human settlements.

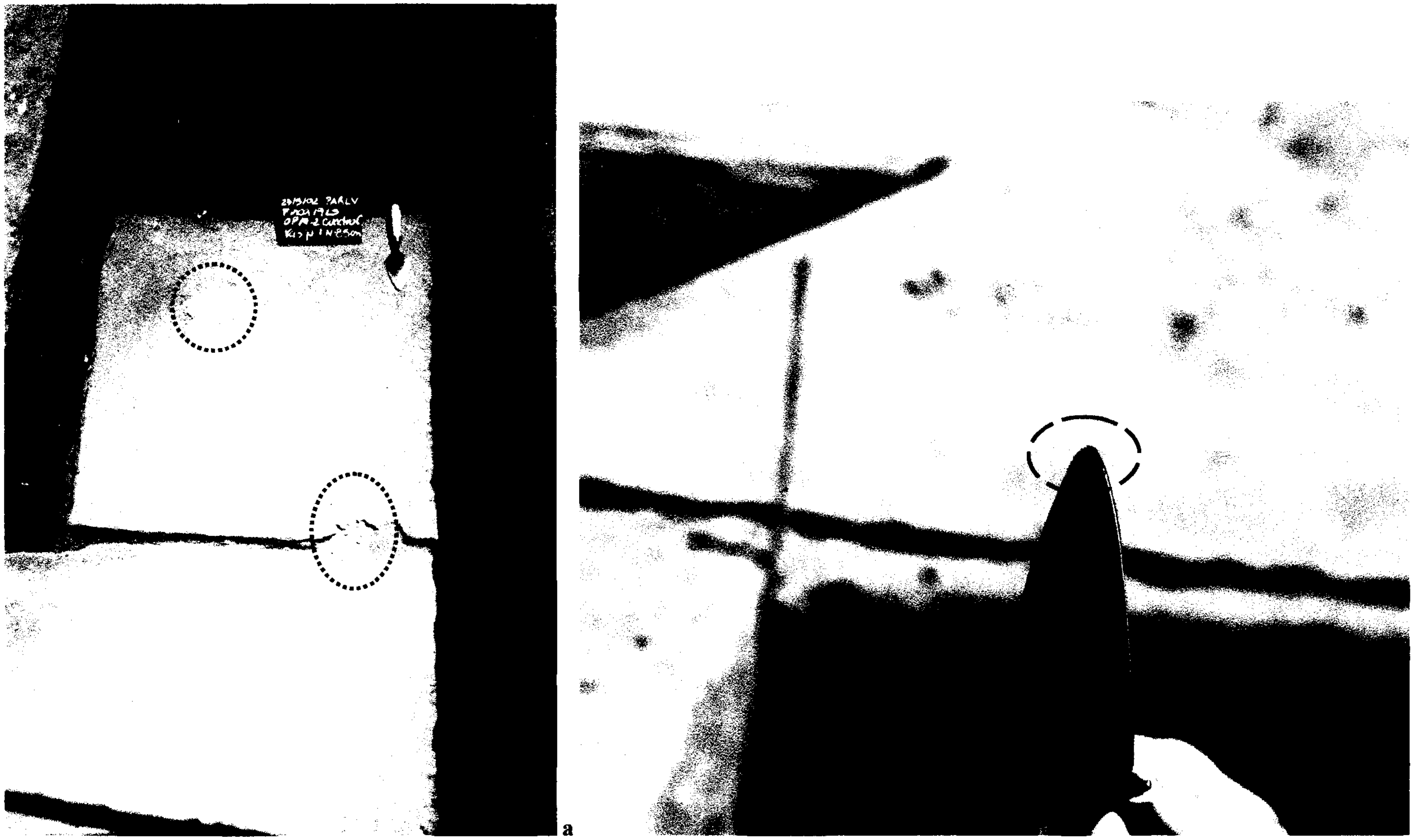
Operation 19-2ls (570353E 880906N): a second 2 by 2 meter unit was opened 40 meters to the west of Operation 19-1ls, on a low depression between Mound 1 and Mound 2 (Figure 4.21). It consists of four superimposed layers of very loose sand whose subtle color changes made it challenging to sub-divide (Figure 4.22b, 4.23b). This area was selected for excavation following a strange anomaly depicted by both the magnetic and conductivity readings (Figure 4.21).

The uppermost layer, stratum 1, a 20-cm thick brown (10YR 4/3) coarse sand deposit with some clay (Figure 4.22b). It contained some organic material and a hand full of very small pottery sherds.

Stratum 2, attained a maximum thickness of 25 cm. Although its sediment structure was the same as that of stratum 1, it contained larger amounts of marine shells and pottery sherds (Appendix 2: Table VI; Table 4.9).

Stratum 3, immediately below and 20–30 cm thick, was a sand deposit slightly darker brown in hue than stratum 2 (Figure 4.22b). It exhibited a notable diminution of cultural material relative to the two overlying strata.

Beginning in stratum 4, approximately 60 to 70 cm under the ground surface, we noticed a substantial increase in the number of artifacts, while faunal remains, though sparse, were more frequent than in the above strata. At different levels in stratum 4 and stratum 5, we also noticed small circular stains of light gray sand—approximately 10 cm in diameter—that resembled posthole features (Figure 4.24a). The light gray sand from these features provided a great contrast with the strong brown (7.5YR 4/6, 5/6) colored sand of the surrounding matrix. It also caught our attention that the sand from these features was very fine and contained abundant black particles that adhered to our trowels (Figure 4.24b). After consulting with local geologist Alberto Ruiz and performing magnetic field tests, it became obvious that the black particles clinging to the trowel were magnetite. Later, Juan Jaén from the *Centro de Investigaciones con Técnicas Nucleares, Universidad de Panamá* volunteered to analyze samples from two of the circular features with a Mössbauer spectrometer, a nuclear instrumental method, to determine the presence of magnetite in sediment samples from Operation 19-21s. The results of this test confirmed the presence of partially oxidized magnetite (Appendix 5). As I will further explain in Chapter 5, it is most possible that the presence of magnetite in the area caused



a b

Figure 4.24 Finca Germán Castillo (LS-31) Operation 19-2ls features
(a) Two circular features identified 85 cm below the ground surface, Stratum 4. (b) Very fine of oxidized magnetite particles adhered to trowel.

the high magnetic reading between Mound 1 and Mound 2 at site LS-31.

Table 4.9
Operation 19-2ls: Number of pottery sherds per stratigraphic layer

Ceramic complex Type–variety	St 1	St 2	St 3	St 4	St 5	Total
Cubitá						
Ciruelo black/red			1	16	1	18
Nance		7		6		13
Guachapalí				1		1
Madroño				2		2
White slipped				1		1
Miscellaneous slipped			1	10	18	29
Miscellaneous monochrome	19	149	46	166	64	444
Grand Total	**19**	**156**	**48**	**202**	**83**	**508**

Operation 19-2ls was excavated to a depth of 1.30 meters from the ground surface until we reached the same yellowish brown sand stratum devoid of cultural material that we identified at Operation 19-1ls. Although the cultural assemblage of Operation 19-2ls did not prove to be substantially different from that of Operations 19-1ls, was neither abundant nor diverse. Just like in Operation 19-1ls, the ceramic assemblage is uniform and consisting only of Cubitá phase categories (Table 4.9). But in this unit we found a slightly larger amount of stone flakes, as well as an angular core fragment of coarse buff siliceous stone with circumferential battering, perhaps a hammer.

The shell sample of Operation 19-2ls comprised a small number of the following specimens: *Anadara (Larkinia) grandis, Cerithidea valida, Donax dentifer, Natica (Natica) unifasciata,* and *Tivela argentina* (Appendix 2: Table VI). A suite that points to collection on sandy beaches (*Tivela, Donax*), in the low sub-tidal (*A. grandis*), on mudflats (*Natica*), and around mangrove roots (*Cerithidea*). The vertebrate faunal sample was equally small.

Operation 19-3ls refers to two (1 m^2) test columns—Square A and Square B—opened 10 and 11 meters north of Operation 19-1ls, and 20 meters south of the highest point of Mound 1 (Figure 4.21). The stratigraphy of the two Operation 19-3ls columns consisted of three layers of compact sand underlying a 40 cm deep shell-bearing midden (Figure 4.25). The midden, designated stratum 1, was enclosed by a dark grayish brown loamy sand. Stratum 1 contained abundant charcoal, thousands of marine shells from 57 different taxa, and the remains of 48 marine bony fish taxa, two sharks, two rays, and three reptiles (two snakes and a green iguana). All the diagnostic sherds correspond to the Cubitá phase of the Middle Ceramic Period (Table 4.10).

The next layer, stratum 2, consisted of a dark brown (7.5YR 3/2) sand deposit measuring 10 cm in depth. This stratum was distinguished by the lack of shell and pottery, although it still yielded some charcoal and vertebrate remains. By stratum 3, a 60 cm layer of compact and very dark brown (7.5YR 2.5/3) sand, the quantity of pottery increased although only a few marine shells collected.

The lowermost stratum excavated from both columns was stratum 4, which corresponded to stratum 5 defined at both Operation 19-1ls and 19-2ls. This yellowish brown sand deposit was excavated to a depth of 95 cm from the ground surface at square A, and 1.30 meters at square B. Each unit stopped at the point where we no longer identified cultural artifacts or faunal remains. Although we did not reached the bedrock I am quiet confident that all our units at LS-3 reached the base levels of Mound 1.

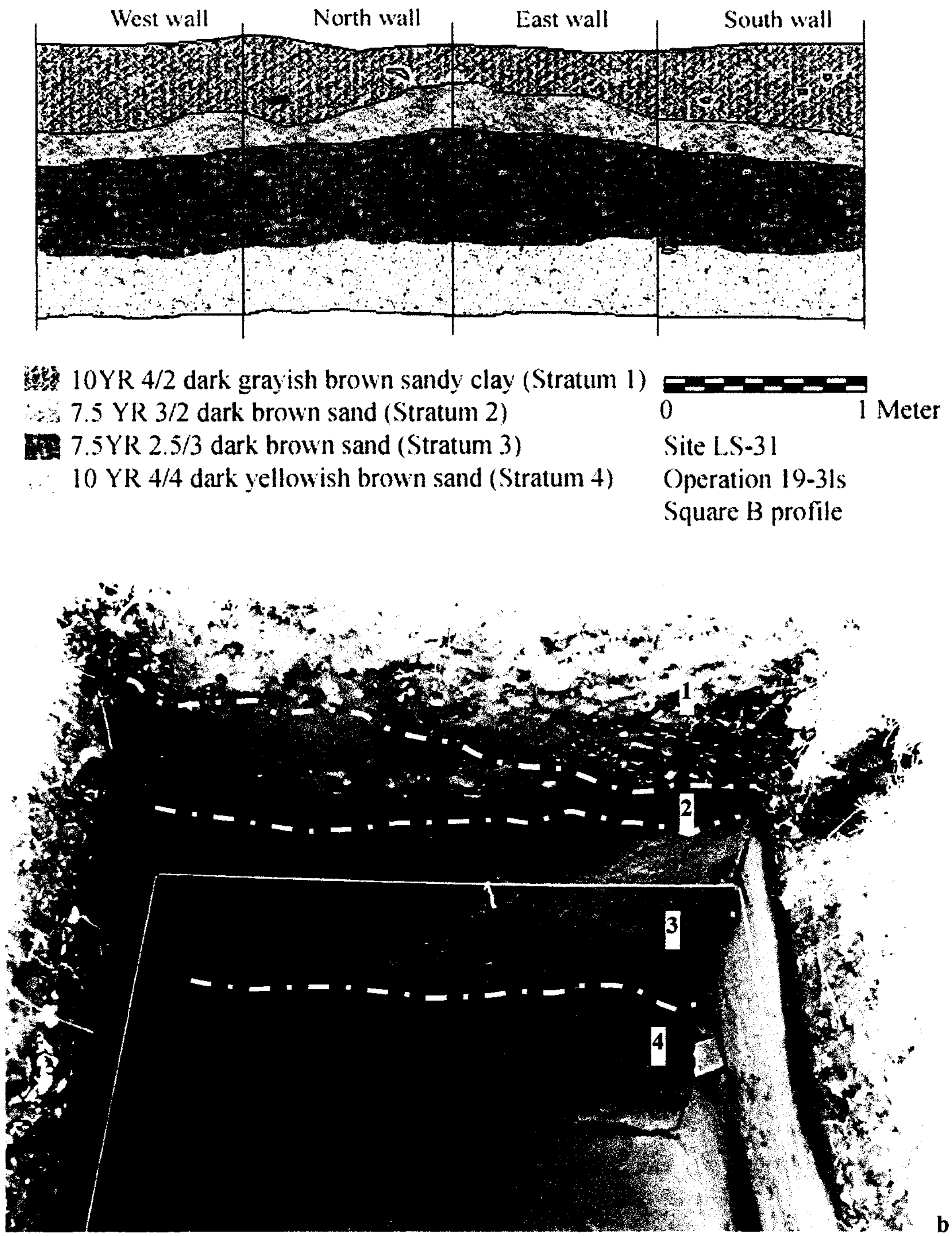


Figure 4.25 Finca Germán Castillo (LS-31) Operation 19-3ls.
(a) Operation 19-3ls Square B excavation profile, (b) Square B east wall photo taken after a rain storm.

Table 4.10
Operation 19-3ls: Number of pottery sherds per stratigraphic layer

Square A

Ceramic complex **Type-variety**	**St 1**	**St 2**	**St 3**	**Total**
Cubitá				
Ciruelo	10			10
Cubitá black & red/ cream	1			1
Cábimo	1		1	2
Guábilo	1			1
Guachapalí	13			13
Macano	4			4
Zoomorphic	1			1
Ribbon handle	20			20
Rims	43			43
Slipped sherds	57		1	58
Necks	12			12
Monochrome sherds	1,781	2	10	1793
Grand Total	1,944	2	12	1958

Square B

Ceramic complex **Type-variety**	**St 1**	**St 2**	**St 3**	**Total**
Cubitá				
Ciruelo black/ red	108		30	138
Cubitá black and red/cream	12			12
Guábilo	1		20	21
Nance	1		1	2
Caracucho	1			1
Guachapalí	17		13	30
Jagua	1			1
Macano	1		1	2
Madroño			4	4
Marañón	1			1
Zoomorphic			1	1
Ribbon handle	29		4	33
Rims	70		19	89
Necks	10		9	19
Modeled	3			3
Slipped sherds	21		1	22
Monochrome sherds	2,325	1	588	2,914
Grand total	2,601	1	691	3,293

The diagnostic pottery in all the strata at Operation 19-3ls correspond to the Cubitá phase of the Middle Ceramic C Period (Table 4.10). This suggests that the deposits above Mound 1 accumulated between A.D. 550 and 700. This relative short occupation of LS-31 could have been influenced by the changing river delta and coastal progradation. If we take into consideration the estimate of 0.5 kilometers per 1000 years for local coastal progradation that was proposed by Clary (*et al.* 1984), LS-31 would have been approximately one kilometer from the coast at the time of its pre-Columbian occupation and, perhaps, even closer to the river mouth. A location closer to the active shoreline than today is confirmed by the nature of the zooarchaeological evidence. The midden deposit that covers Mound 1 yielded a wide variety marine shell taxa that frequent sandy beaches, the turbid inter-tidal zone, and brackish sections of tidal rivers. The most ubiquitous shell taxa from Operation 19-31s are *Tivela*, *Natica*, *Cerithidea,* and *Polymesoda* (Appendix 2: Table VII).

Because of the great abundance and taxonomic complexity of the fish remains in this operation, only the samples from stratum 1 were selected for complete taxonomic analysis. This stratum produced fish remains from four elasmobranchs (shark/ray) families and 19 teleosts (bony fish) families, comprising two shark genera (*Carcharhinus* and *Sphyrna*), and 34 genera of teleosts (Appendix 3: Table VI). All the represented species are inshore, and many enter turbid intertidal zones, e.g., the Pacific sharpnose (*Rhizoprionodon longurio*), scalloped hammerhead (*Sphyrna lewini*); long tailed stingray (*Dasyatis* cf. *longus*), and spotted eagle ray (*Aeteobatus narinari*); six marine catfish taxa (*Ariopsis seemanni, Bagre panamensis, B. pinnimaculatus, Cathorops furthii, Notarius kessleri, Sciades dowii*); the Pacific bumper (*Chloroscombrus orqueta*), Pacific ilisha (*Ilisha furthii*); the blue and yellow bobos (*Polydactylus approximans, P. opercularis*), and the sciaenid species identified such as corvinas (*Cynoscion albus* and *C.*

phoxocephalus) and croakers (*Menticirrhus panamensis*, *Ophioscion typicus*, *Paralonchurus dumerilii*).

Some species, however, eschew turbid water plumes frequenting clearer water around sandy beaches, islets and deeper water at the seaward edge of the estuary. These are: Pacific moonfish (*Selene peruviana*), green jack (*Caranx caballus*), barracuda (*Sphyraena*). The Panamanian grunt (*Pomadasys panamensis*) and brassy grunt (*Orthopristis chalceus*) live in deep water over sand-gravel substrates where it is often present in enormous shoals. It was probably caught with hook and line fishing from boats (Cooke personal communication 2006). Although such species are taxonomically not prominent as a group, they were important: the Pacific moonfish represents 15% of the MNI of the three sampled units (N=138) and 20% of the NISP (number of identified [diagnostic] specimens). Cooke and Tapia (1994a: Table 4) report that this species was once caught with tidal traps near Panama City.

4.4.2.1.2 Summary of LS-31

The historical morphology, archaeofauna, and material culture coincide in suggesting that LS-31 was located very near the active marine shoreline between ca A.D. 550 and 700. Probably it was a *bona fide* fishing village like many modern settlements along Parita Bay (e.g., Boca de Parita, El Rompío, and Monagre). But this pattern of coastline settlement is very ancient. Monagrillo, which is only 7 kilometers away, is obviously an antecedent settlement. These data reinforce my hypothesis that the La Villa river valley communities had become economically and politically established between

A.D. 550 and 700. The location of LS-31 is very similar to that of La Mula-Sarigua during the La Mula phase (200 B.C.–A.D. 250): near a productive estuary and sandy beaches, thus providing an ideal situation for its inhabitants to exploit, and mobilize coastal resources—e.g., salted fish, shellfish, and perhaps salt (e.g., Cooke 1992, Cooke and Ranere 1999; Cooke and Jiménez 2004). This type of coast-inland exchange system has been documented for the Santa María drainage where Cooke has argued that the coastal sites of Vampiros-1 and 2 provisioned inland Sitio Sierra with salted fish, since 70% of the fish consumed at this site were of marine origin (Carvajal and Cooke 2007; Cooke and Ranere 1999). The problem with La Mula-Sarigua is that when it was a costal site the albina and salt flats do not seem to have been there.

I propose another hypothesis relevant to exchange systems, namely that LS-31 provided inland villages, not only marine and coastal foods, but also raw materials for the manufacture of shell ornaments. My excavations recorded worked shell fragments of several taxa, e.g., *Anadara, Melongena, Spondylus,* and *Strombus*, which were widely used around Parita and Panama bays for the production of costume items. During the Cubitá phase there is evidence that the production of shell ornaments, which was identified at LS-3 at the end of the La Mula phase, expanded, as witnessed by finds of shell ornaments all around Panama Bay (including Playa Venado). In theory, it is possible that LS-31 was politically linked with or dependent upon the nucleated village at LS-3, only 5 kilometers away. But the available evidence for craft production and exchange relationships in this region is not yet precise enough to validate such an idea. Although the shell workshop at LS-3 vouches for specialized knowledge that was probably managed by few people in the community (Mayo 2004; Mayo and Cooke, 2005), the acquisition of raw materials and the distribution of finished artifacts could have been handled through kinship networks without centralized control. At the same time, the fact that the largest quantity of shell beads have been recorded with people who appear to have played a special ritual role suggests that shell artifacts responded to the kind of behavior that Briggs (1989) observed at Sitio Conte: the most important people were identified by having larger numbers or better crafted goods than those that were owned by people of lesser position.

4.4.2.2 LS-24

Name: Finca Tito Castillo

UTM coordinates: 569344E 875246N (Station R087)

District: *Corregimiento* Santa Ana Arriba in Los Santos district

Estimated area: 36 hectares (type 2)

Function: undetermined

Occupation phase: Tonosí phase (Middle Ceramic B)–Macaracas phase (Late Ceramic B)

Description: Site LS-24 is located 5 kilometers southeast of the modern village of Los Santos, at the edge of El Lagartillo Creek in the district of Santa Ana Arriba (Figure 4.4). The site is outside the survey universe, but was included in the PARLV catalog, because it is considered a significant pre-Columbian village not far from the southern bank of the La Villa River. The site was brought to my attention by Eduardo Gonzalez who worked in the area building fences for Mr. Tito Castillo, son of Germán Castillo who is the owner of the coastal field 19ls where site LS-31 is located.

The landscape around LS-24 consists of hilly terrain with open grasslands that today are used primarily for cattle grazing; there are a few patches of forest. The archaeological components of this site include low raised mounds and scattered midden features distributed over an area of 36 hectares. I did not undertake a sample collection, but I noted the presence of abundant Cubitá, Conte and Macaracas style pottery and worked *Anadara sp* shell fragments. From the highest point of LS-24 (at 30 m.a.s.l), I was able to sight the coastal mangrove 4 kilometers from the site. Access to the coast is possible through El Lagartillo Creek, which borders the site and empties into the Parita Bay.

4.4.2.3 CHI-6

Name: El Auditorio

UTM coordinates: 564883E 0879218N (Station R0007)

District: Chitré

Estimated area: 18 hectares (type 2)

Function: preparation of stone tools

Occupation phase: Cubitá phase (Middle Ceramic C)–? Late Ceramic

Description: Site CHI-6 is located north of the Nestlé Dam, 130 meters west of Cerro Juan Gómez. Its bounded to the southwest by a paleovalley that divides the neighborhoods of El Encanto and El Auditorio in the Chitré district, Herrera. The

PARLV first visited the area in May of 2001, during a one-day motorboat survey of the La Villa River to identify sites buried under alluvial deposits. When we reached the Nestlé Dam and examined the northern (Herrera) banks, we recorded scattered shell and lithic debris close to the river margins and the highly eroded hills southwest of Cerro Juan Gómez (Figure 4.8). After systematic survey in January of 2002, the area was classified as a separate type 2 site on the southwest periphery of LS-3.

Site CHI-6 is characterized by a highly eroded topsoil and a natural exposure of quartz outcrops and crystals. In the majority of cases, the quartz accumulations were associated with worked and unworked flakes and chunks of fossilized wood. A few chipped and ground stone tools made of other materials, including axes, scrapers, graving tools, and notched tools were also documented but at a limited number of collection stations. The scarce ceramics consisted mostly of non-diagnostic forms from the Middle Ceramic and Late Ceramic periods. Among the few diagnostic pieces, a Culebra appliqué-style sherd is illustrated on Figure 4.26b. This type belongs to the Cubitá phases (Ichon 1980; Sánchez 1995).

Shell accumulations were identified close to the edge of the La Villa River on the tops of small hills. In contrast with the middens on the southeastern flanks of Cerro Juan Gómez, they were small and scattered. The shell sample includes 18 specimens from four zones: the estuary, the mangrove swamp, intertidal zone, and offshore (Appendix 2: Table XV). Sixty-one percent of the shell specimens from CHI-6 were collected from the single mound feature identified on the summit of a rolling hill west of Cerro Juan Gómez (Figure 4.26c). This sample is dominated by the presence of *Iphigenia altior* (naturally

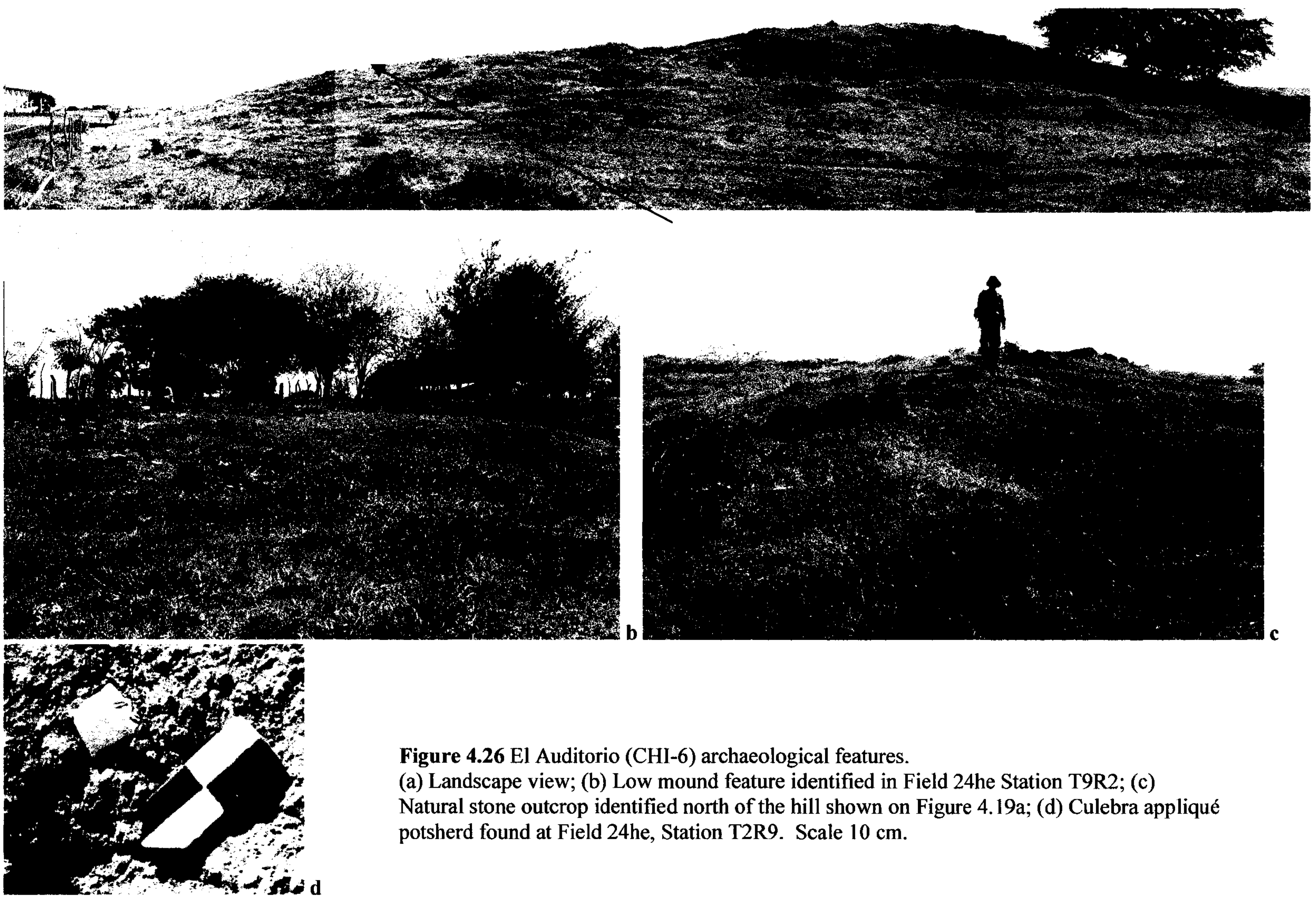


Figure 4.26 El Auditorio (CHI-6) archaeological features.
(a) Landscape view; (b) Low mound feature identified in Field 24he Station T9R2; (c) Natural stone outcrop identified north of the hill shown on Figure 4.19a; (d) Culebra appliqué potsherd found at Field 24he, Station T2R9. Scale 10 cm.

found in mud), *Natica* (found in mudflat) *Tivela* (from sandy beach), and *Polymesoda* (from brackish water). These taxa were used for human consumption. Only two worked fragments were recovered: one representing *Iphigenia altior,* and the other an *Anadara.*

Aside from the quartz outcrops, the only other distinctive feature identified at CHI-6 was a stone alignment identified on the western side slope of a rolling hill between Stations T2R10 and T1R10, field 24he (Figure 4.26c). The alignment was initially thought to represent a cultural feature; however, after a thorough examination, it was determined that it is a natural stone outcrop.

I classify CHI-6 as a type 2 site that covers 18 ha on the western periphery of LS-3. It was occupied from the end of the Middle Ceramic (Tonosí and/or Cubitá phases) and the beginning of the Late Ceramic Period. Nonetheless, the prevalence of stone tools and debris is unusual. Also noteworthy is that fact that I did not document a metate, mano, or any other kind of grinding stone tool at the site. It seems therefore that this site was used for the preparation of jasper and fossilized wood tools.

4.4.2.4 LS-8

Name: unnamed

UTM coordinates: 564382E 878547N (Station R398)

District: Los Santos

Estimated area: 24 hectares (type 2)

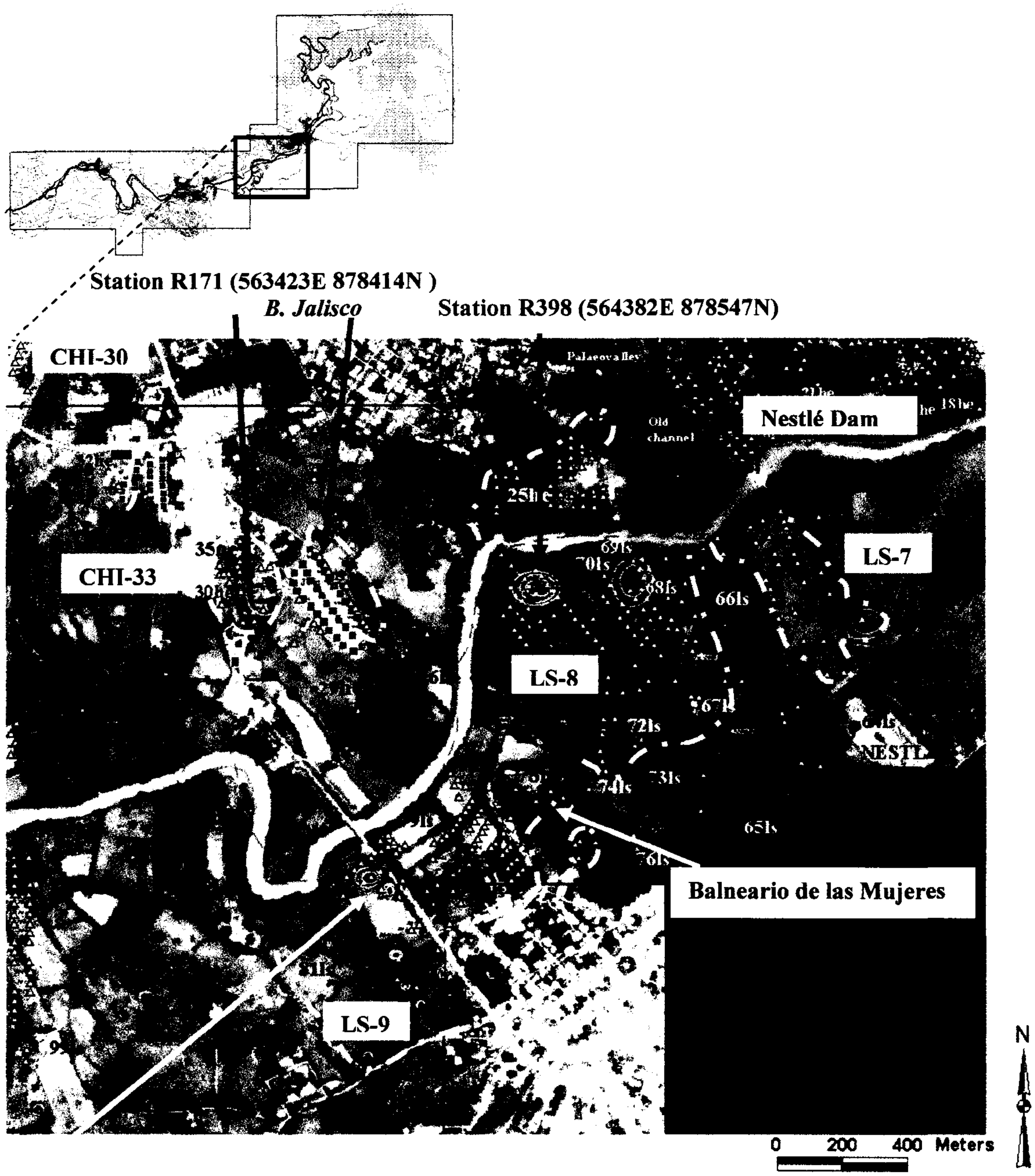
Function: habitation

Occupation phase: Tonosí phase (Middle Ceramic B)–Parita phase (Late Ceramic

C), Colonial Period

Description: Site LS-8 is located to the northeast of the township of La Villa de Los Santos, bounded by El Encanto residential zone on the northern (Herrera) banks of the La Villa River, and a large oxbow lake to the southeast. At the site center are two hillocks (less than 3 meters high) outlined by outcrops of large volcanic rocks (Figure 4.27). These hills are located on a broad alluvial terrace 40 meters from the actual river margins. When the PARLV visited this site, intensive looting and cultivation had exposed extensive midden deposits containing diagnostic pre-Columbian pottery dating from the Tonosí to the Parita phases, chipped and ground stone tools, flakes of fossil wood, shell, and vertebrate remains. Human remains in the walls of looter pits suggest that Pre-Columbian people also engaged in mortuary activities at this site. Major concentrations of artifacts were found on and close to the mounds. We collected a few artifacts at the edge of the oxbow lake, most of them in its southern-most sector. A local resident informed me that this particular section of the river was known as "Balneario de Las Mujeres" (the Ladies Bathing Place) when it functioned as the principal channel of the river sixty years ago (Figure 4.27).

Our attempts to define the boundaries of LS-8 were hampered by river cut off, alluviation processes, and encroachment of the La Villa and Chitré urban settlements. The fact that La Villa town residents told us that they had found pre-Colombian artifacts in their backyards suggests that the site extended farther south, beyond the survey universe. The continuous exposure of surface artifacts indicates that LS-8 covered at least 24 hectares. A few artifact remains were identified on the Herrera banks



Station R476 (563796E 877509N)

▲	Station with cultural material
O	Mound
- -	Limits of surface material scatter
……	Limits of field
72ls	Field number

Figure 4.27 Type 2 and type 3 sites in the intermediate valley between Cerro Juan Díaz (LS-3) and Las Huertas (LS-10)

immediately north of LS-8, but the density is not as prominent as on the Los Santos banks.

From the 1,053 analyzed pottery sherds from LS-8, 62% (n=634) correspond to miscellaneous and undiagnostic forms assigned a wide chronological range between the Cubitá phase of the Middle Ceramic and the Macaracas phase of the Late Ceramic, 10% (n=104) to the Late Ceramic, and 0.4% to the Middle Ceramic. Among the diagnostic sherds, Cubitá is the most abundant style, representing 20% (n=205) of the total sample, followed by the Conte (4.4%) and Parita (1.3%) styles. A few Tonosí (n=8) and Macaracas (n=5) sherds were also found, indicating that LS-8 was occupied continuously between the Tonosí and Parita phases. The height of its occupation occurred, however, during the Cubitá phase when the site reached its maximum extent. The complete absence of El Hatillo phase pottery suggests that LS-8 may have been abandoned prior to the conquest, although, as I have already indicated, regional archaeologist are unsure how many pottery categories this term comprises.

A colonial component for LS-8 is evident by the recovery of a glass ball and the stamped rim of a Spanish *botija* (Figure 4.28). The botija is a large oval shaped jar used to transport all sorts of merchandize, often labeled imprecisely, as an "olive jar" (see Avery 1997). These data indicate that LS-8 was resettled long after the foundation of La Villa de Los Santos (Castillero 1971, 1995). Of the two objects, only the rim has chronological significance. Its profile and diagnostic circular imprints resembles that of a jar rim recovered from an unidentified 1622 shipwreck excavated in Tampa, Florida (*cf.* Avery 1997: Figure 20).

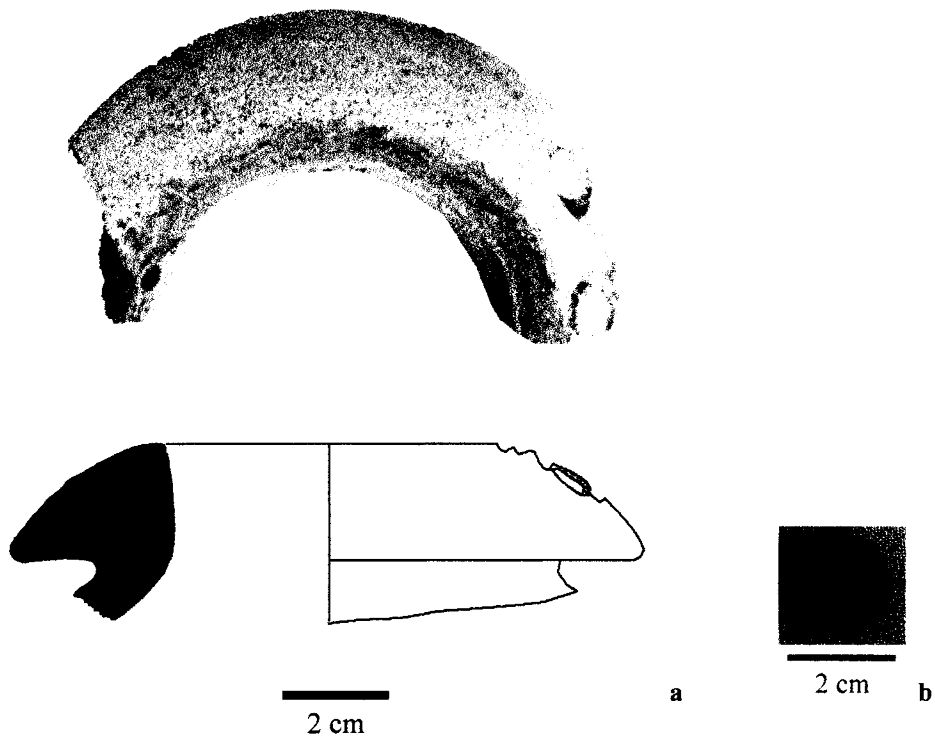


Figure 4.28 Colonial artifacts from site LS-8.
(a) Spanish *botija* neck with two diagnostic circular imprints, cat 69ls-F10, Site LS-8, Station T1R5 (*cf.* Avery 1997: Figure 20; Brizuela 2002: Type A; Griggs 2005: Figure 95); (b) glass ball.

Botija necks with similar profile only without the marks have been recovered in other Panamanian sites. Griggs (2005: 161) found at least one rim at DO-46 on the Caribbean slopes of Coclé. Which he attributes to the turn of the seventeen century when the Spaniard Juan López de Sequeira ventured into the region to expel a population of Coclé Indians and exploit the placer gold deposits in the region (Griggs 2005: 9). At the Spanish Colony of Panama Viejo Álvaro Brizuela and Tomás Mendizábal found at least 54 whole botijas inside a water well (*pozo de agua*) dated between A.D. 1580–1617 and located on the grounds of the *Casa Terrín* (Brizuela 2002; Brizuela and Mendizábal 2001). Based on the classification provided by Brizuela for the Panama Viejo botijas, the neck fragment found at LS-8 may correspond to the type 1 rim belonging to large Type A jar whose heights range between 37 and 44 cm (Brizuela 2002: 152). According to Brizuela, the Type A jars were restricted to the upper most levels of the well, meaning that their chronological deposition is closest to the year 1617, when the well is concealed and no longer in use. Based on these comparisons it seems appropriate to date the reoccupation of LS-8 to the turn of the seventeenth century.

4.4.2.5 LS-9

Name: unnamed

UTM coordinates: 563796E 877509N (Station R476)

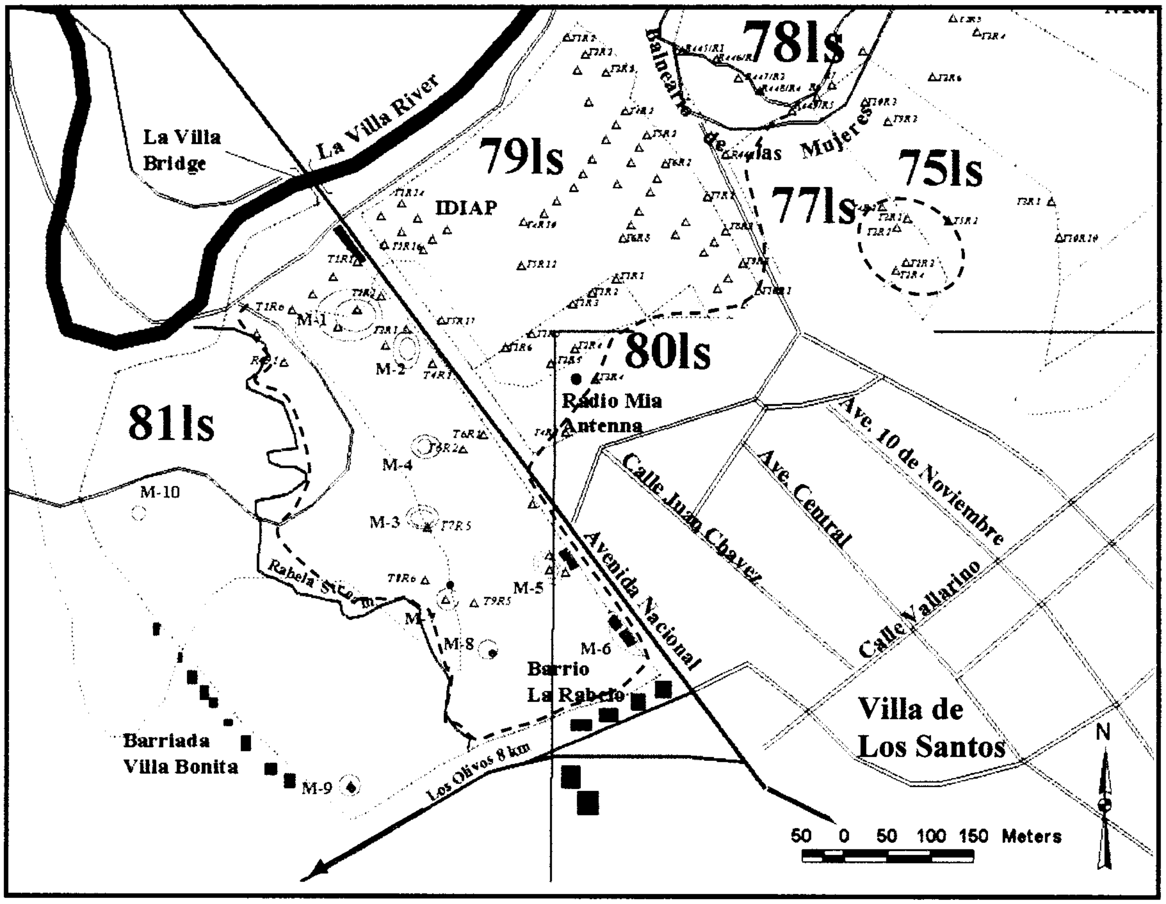
District: Los Santos

Estimated area: 39 hectares (type 2)

Function: habitation, ceremonial (?)

Occupation phase: Tonosí phase (Middle Ceramic B)–Conte phase (Late Ceramic A, post-Colonial Period

Description: Site LS-9 is located immediately south of the La Villa Bridge in the northwestern section of La Villa de Los Santos, between El Balneario de Las Mujeres and the neighborhoods Villa Bonita and La Rabelo (Figure 4.29). LS-9 is bisected by the Avenida Nacional, an extension of the Pan-American Highway, which leads to the southern Azuero Peninsula. The eastern side of the site, between the agricultural fields of the *Instituto de Investigación Agropecuaria de Panamá* (IDIAP) and the *Radio Mia* antenna, yielded the largest concentration of diagnostic artifacts including Aristide, Conte, and Parita style ceramics and various chipped stone tools and flakes. The western



Δ	Station with cultural material
O	Mound
■	Structure
– –	Limits of surface material scatter
……	Limits of field
81ls	Field number

Figure 4.29 Site LS-9 plan view

sector contains 10 prominent hillocks clustered in an area of 20 hectares. The largest hills, M-1, M-2 and M-3, measured 40 to 70 meters in diameter and were up to 3 meters high. Two of the hillocks adjacent to the highway (M-2 and M-6) were partially destroyed by road construction and housing development (Figure 4.29). Other smaller mounds measured no less than 20 meters in diameter and less than half a meter in height were identified on the southwestern periphery of the site and are thought to have been artificially built up. The largest surface material accumulations were documented on the western side of LS-9 between Mounds 1 and 4. These include marine shells, Late Ceramic Period pottery, manos, and legged metates. According to the land owners, large accumulations of shell and ceramic debris appear whenever the fields are plowed, more abundant than what we observed and collected.

Despite the fact that local residents noted that all fields between El Balneario de Las Mujeres and LS-8's mounds had exposed abundant pre-Columbian pottery, our intensive collections did not yield evidence of continuous accumulation of archaeological remains. It is possible that future excavations will determine that LS-8 and LS-9 formed part of a single site rather than two separate ones.

4.4.2.6 LS-11

Name: Finca Los Olivos

UTM coordinates: 558907E 876761N (Station R663)

District: *Corregimiento* Los Olivos in Los Santos district

Estimated area: 20 hectares (type 2)

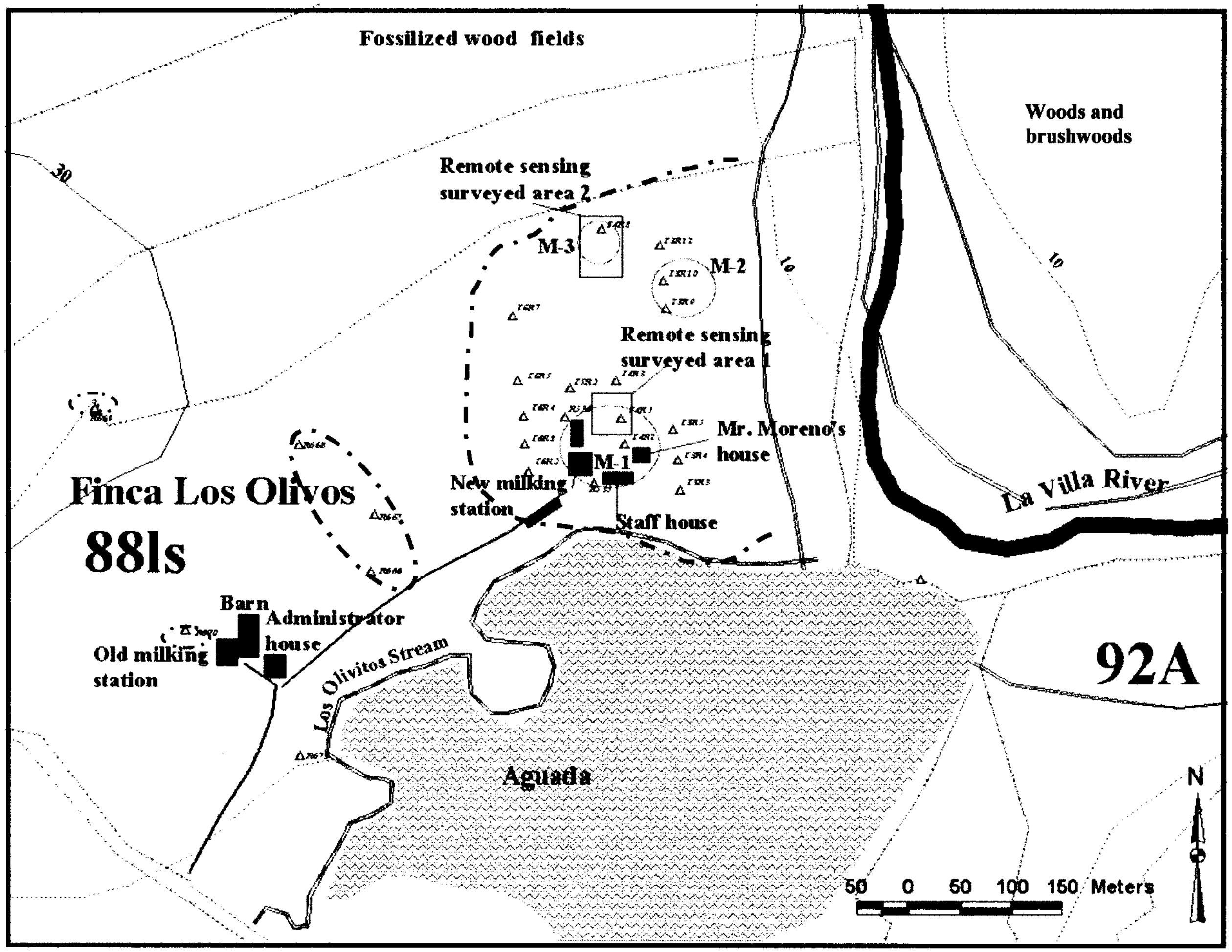
Function: habitation, cemetery (?)

Occupation phase: Tonosí phase (Middle Ceramic B)–Macaracas phase (Late Ceramic B)

Description: Site LS-11 is located 5.5 kilometers from the urban center of La Villa de Los Santos in the precincts of *Finca Los Olivos* owned by Rodolfo Moreno (Figure 4.30). The site is located on a narrow alluvial plain bound by rolling hills to the west and the La Villa River to the East. Low mound features are located adjacent to the river and abandoned meanders. I visited the area after field assistant Darío Rodriguez informed me that pre-Columbian vessels and human burials had been unearthed during the construction of a grade B milking station in 1999, the headquarters for the field staff, and Mr. Moreno's ranch house (Figure 4.31). These structures were built on top of a large pre-Columbian mound feature, Mound 1, measuring 70 by 90 meters and 2 meters high. These works exposed large amounts of polychrome pottery, stone tools, and unworked marine shells.

A particularly striking feature of Mound 1 was a distinctive cluster of ground stone stools, specimens of marine snail, *Melongena patula* and *Anadara* bivalves, and other shell specimens. Two other mounds, Mound 2 (64 meters in diameter) and Mound 3 (45 meters in diameter), were found 100 meters to the north of Mound 1, but with fewer artifacts.

I estimate that LS-11 attained a maximum size of 20 hectares. This opinion is based on the physical distribution of cultural material, the above ground features, and the distribution of archaeological material. I hypothesize therefore that LS-11 represents a



▲	Station with cultural material	– –	Limits of surface material scatter
O	Mound	••••••	Limits of field
■	Structure	88ls	Field number

Figure 4.30 Finca Los Olivos (LS-11) plan view

type 2 village occupied between the Tonosí and Conte phases, perhaps even until the Macaracas phase.

The northern fields of LS-11 are characterized by the natural presence of large chunks of fossilized trees trunks (Figure 4.31b). Fossilized wood flakes are ubiquitous in the La Villa valley lithic samples. This raw material proved to be an important resource for the production of tools beginning in the Cubitá phase. Large deposits of fossilized wood knives and wedge-like tabular implements have been documented at the LS-3 shell workshop dated to the Cubitá phase (Operation 8) and Parita phase midden deposits in the hill summit (Operation 31; Mayo 2004: Plates 68, 78, 91–92; Mayo and Cooke 2004). The fact that natural clusters of fossilized tree trunks are widespread west of the Cerro El Tamarindo make it likely that Los Olivos functioned as the main source of acquisition. Several taxa of marine shells were found at LS-11 including taxa that frequent sandy beaches (*Donax, Tivela argentina)*, intertidal mudflats (*Dosinia, Iphigenia altior, Natica unifasciata, Polinices panamaensis*), and the low intertidal zone (*Anadara grandis, Melongena patula*). It seems likely therefore that the inhabitants of villages like LS-11 would have obtained salt, salted fish, and marine shells in exchange for fossil wood or tools made from this material. The presence of whitetail deer bones in the small samples indicates that the site was most likely surrounded by patchy vegetation with open areas for these animals to browse.

My field observations suggest that the abundance and location of trunks of fossil wood at LS-11 and in the vicinity of Los Olivos are the result of natural processes. Our pedestrian survey did not yield any evidence that this particular area might have been

a

b

Figure 4.31 Finca Los Olivos (LS-11) archaeological features.
(a) Mound 1 on top of which is a Grade B milking station, the field owner and the staff housing are built. (b) The northern fields adjacent to Finca Los Olivos are covered with large chunks of fossilized tree trunks.

used for burial. The possibility that the fossilized tree trunks at LS-11 may have had a funerary function is suggested, however, by comments made by Matthew Stirling (1950: 246) who, during a helicopter survey, noted the use of petrified tree logs as grave markers in a pre-Columbian cemetery near Santiago, Veraguas Province.

4.4.2.7 LA-28

Name: Finca la Flora

UTM coordinates: 555724E 877164N (Station R416)

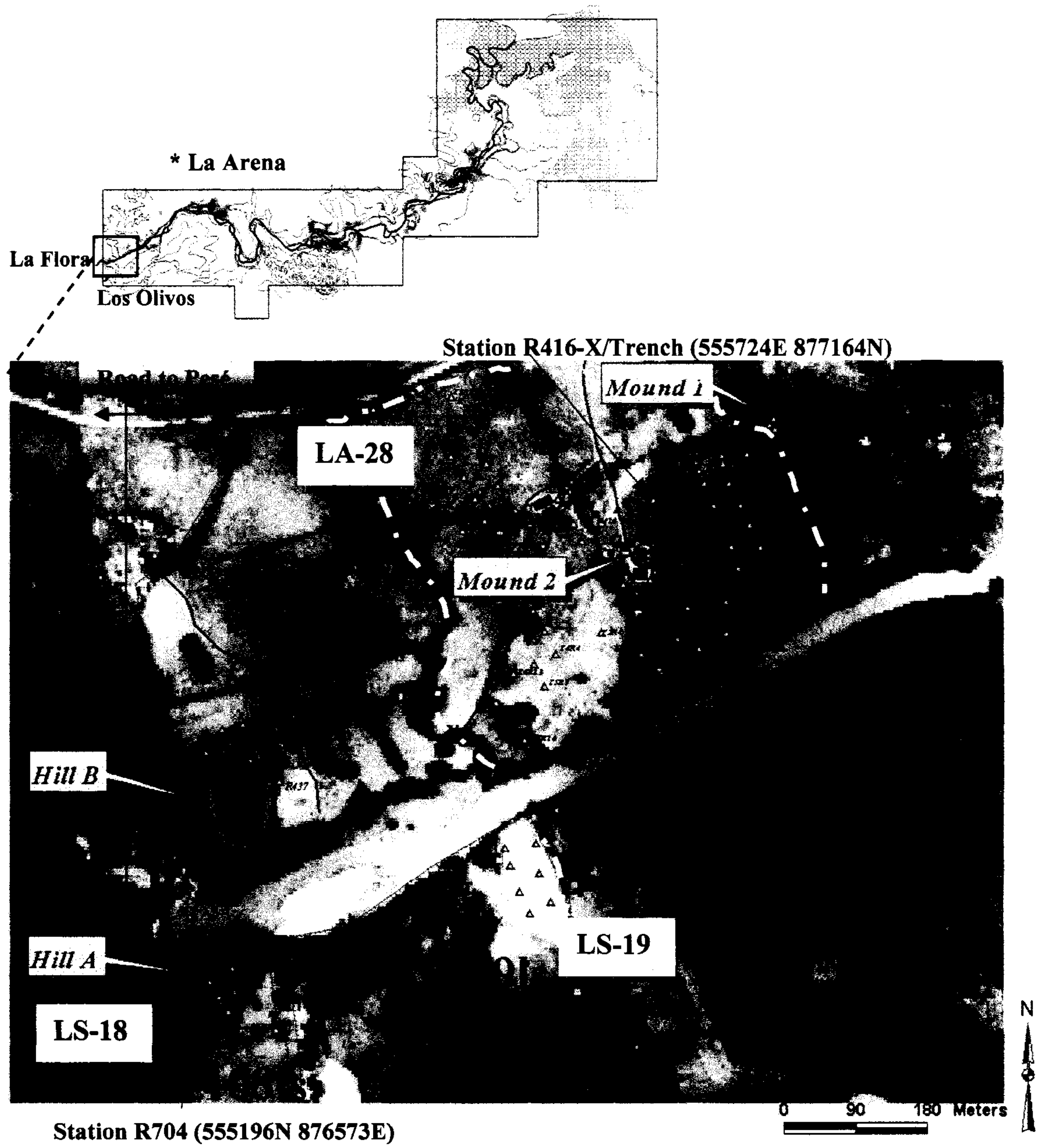
District: *Corregimiento* La Arena in the Chitré district

Estimated area: 20 hectares (type 2)

Function: habitation

Occupation phase: Tonosí phase (Middle Ceramic B)–post-Colonial Period

Description: Site LA-28 is located on the precincts of *Finca La Flora* a 40-hectare cattle ranch owed by Mr. Zósimo R. Corro. The ranch is 13.2 kilometers in a straight line from the mouth of the La Villa River and 3 kilometers west of *Finca Los Olivos*, LS-11 (Figure 4.32). The site sits on a 300-meter wide alluvial terrace on the Herrera side of the La Villa River bounded by a series of rolling hills running parallel to the river and the road that leads to the town of Pesé from La Arena. As at Finca Los Olivos (LS-11), LA-28 is characterized by the presence of low mound features partially destroyed by the construction of stables and house structures. Cultural material is clustered particularly around a 2 meter-high mound (labeled Mound 2), on top of which Mr. Corro had built his summer home and swimming pool. Adjacent to Mound 2 was a smaller mound now



▲	Station with cultural material	— · —	Limits of surface material scatter
○	Hillock	……	Field boundaries
70he	Field number		

Figure 4.32 Balneario Los Olivos (LS-18) and Finca La Flora (LA-28) aerial photo

occupied by the administrator's house. The cultural assemblage in this area included marine shells, pre-Columbian and post-Colonial pottery, flaked stone, axes, manos, and metates. Two hundred and fifty meters to the northeast lies a culturally modified hillock (Mound 1) where the PARLV also collected marine shells and post-Colonial artifacts.

During our first visit to Finca La Flora, the fortuitous excavation of a shallow trench opened for the installation of an underground electric fence between Mounds 1 and 2 exposed abundant ceramics and stone tool fragments (Figure 4.33b). The trench measured about 220 meters in length, 20 cm wide, and 20 cm deep (Figure 4.33c). Taking advantage of the situation, eight-collection stations separated at 30-meter intervals were set along the trench and materials collected from the dirt piles. The identification of incomplete Parita style vessel at Station R416-X encouraged us to expand the excavation area and expose the deposit. Twenty-three centimeters below the surface we found the monochrome body of a plate adhering charcoal fragment, which returned a date of 1310 ± 110 B.P., cal. A.D. 545 (685) 980 (Beta-170997, Appendix 1). The sample was collected within a level that contained an incomplete Conte Red bowl, burnt clay fragments, whitetail deer bones and teeth, and stone polishing tools (Figure 4.33c). This date is consistent with current estimates for the beginning of the Conte phase.

The remaining open areas of Finca La Flora were surveyed using transects, while arbitrary collection stations were set in the vicinity of Mounds 1 and 2. The identification of Aristide, Cubitá, Conte, Macaracas, Parita, and El Hatillo ceramics along with Spanish and El Tigre style wares indicate that La Flora was continuously settled from the Tonosí

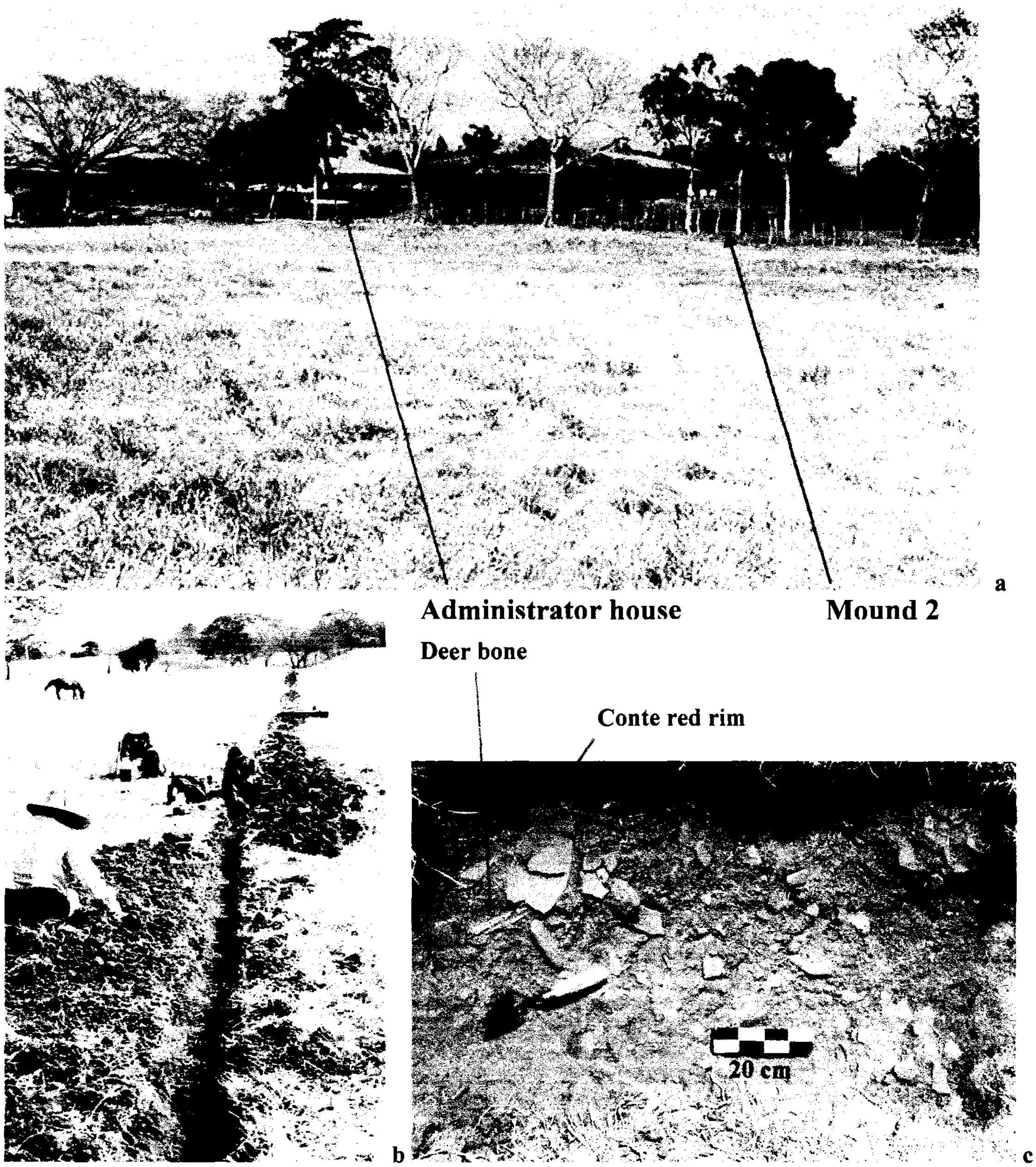


Figure 4.33 Finca La Flora (LA-28) archaeological features
(a) Mound 2 at Finca La Flora. On top of the mound is Mr. Zocimo Corro summer house. Next to it are administrator house built on top of a second smaller mound; (b) A 240-meter long trench opened for the installation of an electric fence (see Figure 4.24: Station R416); (c) Station 416-X deposit found at 20 cm below the surface and associated with a radiometric date of 1310 ± 110 B.P., cal. A.D. 545 (685) 980 (Beta-170997). The deposit contained a Conte red bowl rim, polishing stone tools, white tail deer remains and burnt clay fragments.

phase (Middle Ceramic B) until post-Colonial period. In the vicinity of Mound 2 and all along the construction trench we collected red and yellow jasper flakes, weathered chunks of these materials, basalt axes, manos, metate fragments, pebble polishers, and flake tools, some apparently used as scrapers. According to local geologist Alberto Ruiz (personal communication 2001), the basalt stone used for the ground stone tools is common in the region of Cerro de Las Minas located 50 kilometers up river. Richard Cooke warns us, however, "that cobbles of basalts could easily wash down the river forming blanks at different spots. Only through chemical analyses we could determine their source, and even so, it would be difficult to distinguish river-borne from quarried material, unless the sizes of the cobbles in the rivers precluded axe-making, but his experience indicates that it did not" (Cooke personal communication 2006).

The jasper and fossilized wood, on the other hand are naturally more abundant in the area. Therefore, flaked stone tools may have been one commodity that was exchanged by the inhabitants of the 20-hectare village La Flora for non-local products such as marine shells from the coast and ground stone tools from the piedmont.

4.4.3 Type 3 sites: Hamlets

4.4.3.1 LS-32

Name: unnamed

UTM coordinates: 567560E 878781N

District: *Corregimiento* Santa Ana in Los Santos district

Estimated area: 8 hectares

Function: preparation of stone tools/ salt processing (?)

Occupation phase: Conte phase (Late Ceramic A)

Description: Site LS-32 is located 1.5 kilometers East of LS-3, on the southeastern margin of the estuary and adjacent to a small stream that connects to the *albina* (Figure 4.34–4.35). The landscape around the site is characterized by the presence of highly eroded and isolated low hills sparsely covered by xerophytic vegetation (Figure 4.36a–b). The topsoil is highly reflective red clay covered by siliceous stones (jasper or chert), quartz, lithic debitage, and eroded pottery (Figure 4.36c). Our survey also documented accumulations of burnt clay fragments and stones forming circular features (Figure 4.36f-i). Ceramic scatters are found in the vicinity of these features, but are not directly associated with them. There is a possibility that these features functioned as hearth features, but more research needs to be done.

The identification of a few diagnostic Conte and La India type ceramics suggest LS-32 was sporadically settled by the beginning of the Late Ceramic A Period. The presence of reworked stone flakes (jasper and fossilized wood) and core fragments suggests that the region was used, perhaps for the acquisition and preparation of stone tools. Given the natural exposure of evaporated salt and close proximity to modern saltpans, it is possible that sections of LS-32 may have served also to process salt.

4.4.3.2 LS-22

Name: Santa Cruz

UTM coordinates: 566352E 878117N (Station R337)

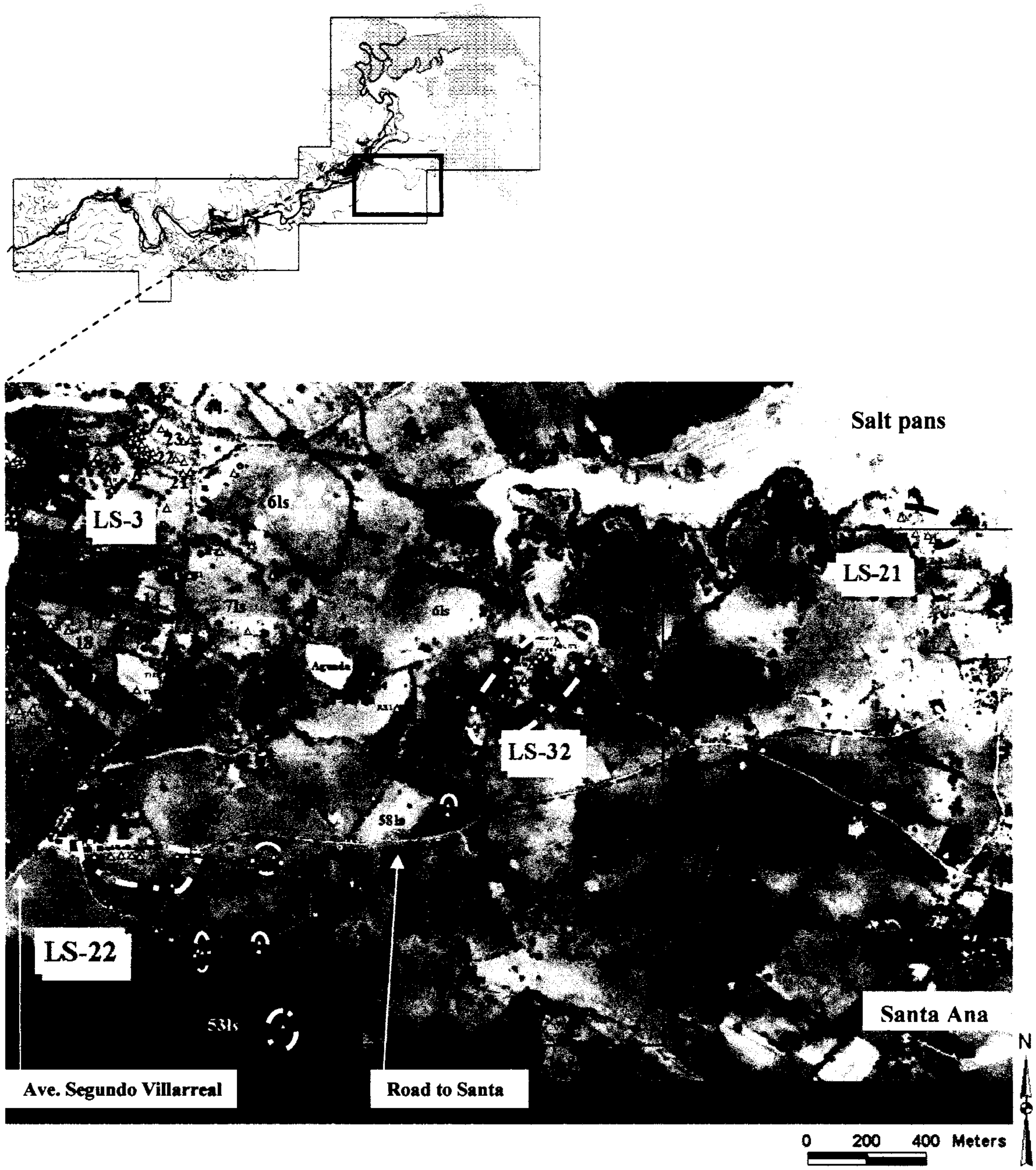
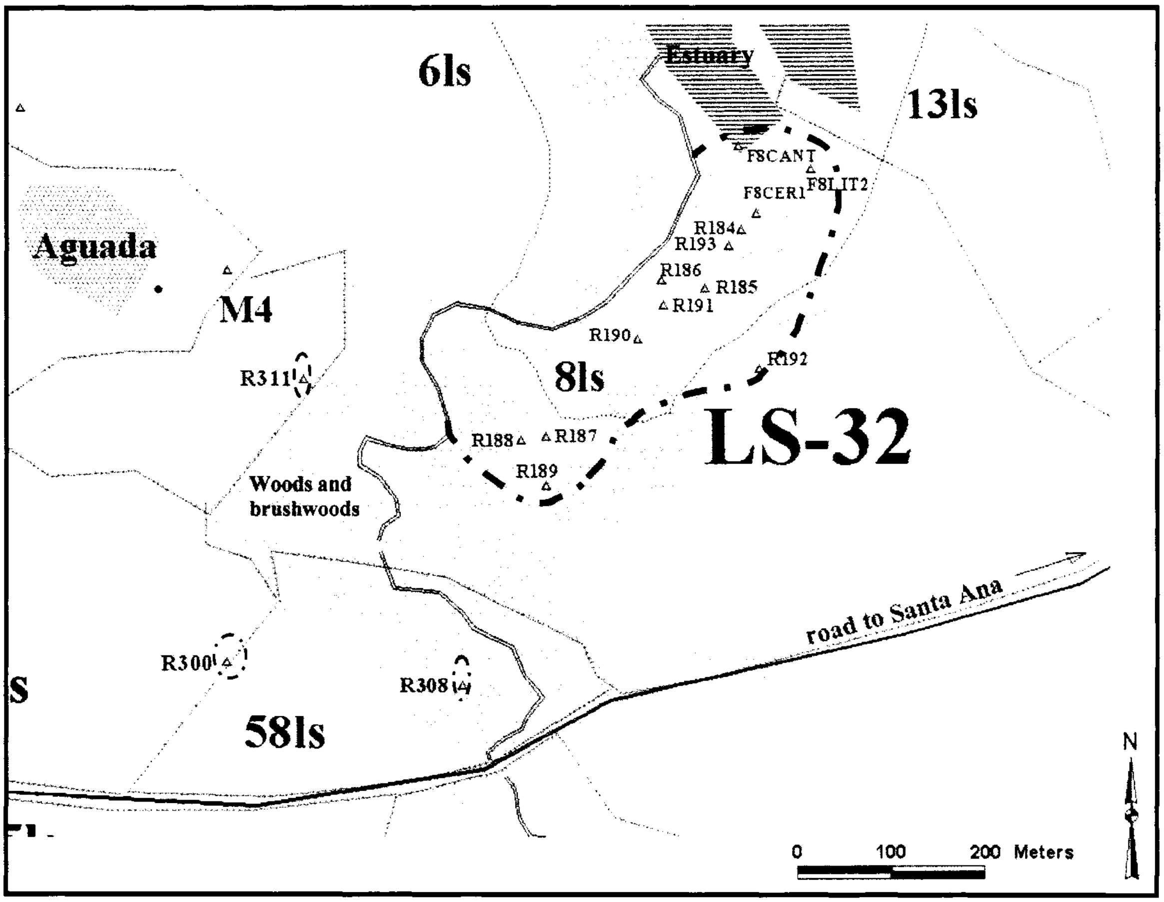


Figure 4.34 Sites LS-22, LS-32 and LS-21 aerial photo



Station with cultural material	Limits of surface material scatter
Low mound feature	Limits of field
58ls Field number	

Figure 4.35 Site LS-32 plan view

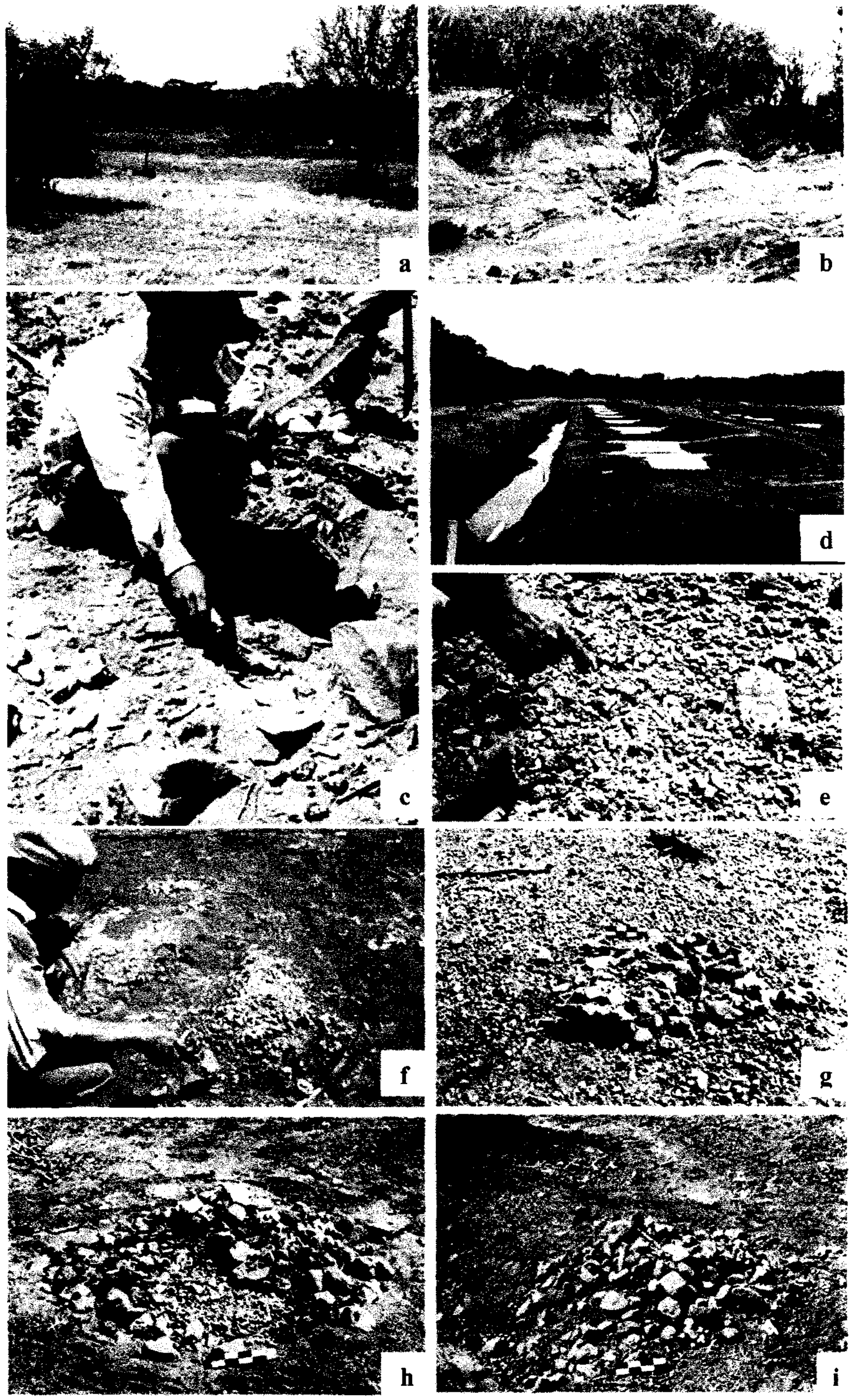


Figure 4.36 Sites LS-22 and LS-32 landscape and archaeological features.
(a-b) Estuary defining the boundaries of LS-32; (c) Conte style plate identified at Station F8CER1; (d) Modern s*alinas* (slat flats) north of LS-21; (e) Reflective red clay topsoil covered with quartz crystals Site LS-21; (f) Exposure of burnt clay accumulations at LS-32; (g-i) Three different stone features identified between Stations R185, R186 and R191 respectively (see Figure 4.35). Scale 20 cm.

District: Los Santos

Estimated area: 6 hectares (type 3)

Function: unknown

Occupation phase: Cubitá phase (Middle Ceramic C)

Description: Site LS-22 is located at the intersection of Avenida Segundo Villarreal and the road that leads to the town of Santa Ana, 1.2 kilometers south of LS-3 and 700 meters from LS-32 (Figure 4.34). The site was defined by the presence of scattered potsherds, lithic debitage, shell, and vertebrate remains in the fields adjacent to the *Barriada Santa Cruz*. The few diagnostic potsherds collected belonged to the Cubitá style, which suggests the presence of isolated houses from the last phase of the Middle Ceramic Period.

Residents of the Barriada Santa Cruz informed the PARLV that the name of the neighborhood stems from the facts that this area of Los Santos' suburbs was once also known as Santa Cruz. It is also possible that the name survives from the prefix given to the 1558 Indian reduction of *Santa Cruz de Cubitá* (see Chapter 3). The presence of Spanish objects on top of Cerro Juan Díaz has motivated archaeologists and historians to equate this ephemeral settlement with LS-3 (Carvajal *et al.* 2006; Castillero 1995). Neither our material analyses nor field notes point to the presence of colonial artifacts at LS-22. Given the geographic situation of LS-22 between Los Santos and LS-3, however, it would be logical that the name of Santa Cruz survived in the area from colonial times even though the location of the Indian reduction town was not where we locate site LS-22. One possibility is that the people of the pueblo de indios used the fields were LS–22 is located for their cattle (Cooke personal communication 2006).

4.4.3.3 LS-7

Name: Represa La Nestlé

UTM coordinates: 565269E 878351N (Station R263)

District: Los Santos

Estimated area: 11 hectares (type 3)

Function: preparation of stone tools

Occupation phase: Middle Ceramic–Late Ceramic

Description: Site LS-7 is located south of the Nestlé factory, on the eastern margins of La Villa de Los Santos and 1.3 kilometers southwest of LS-3 (Figure 4.4). The archaeological evidence consists of scattered stone tools and flakes, unworked shell, and ceramic potsherds. The artifacts are concentrated agricultural fields belonging to the Nestlé company and a quarried hill in the northeastern precinct of field 52ls (Figure 4.27). The high concentrations of stone debris suggest that the area housed small workshops for the preparation of stone tools.

4.4.3.4 CHI-33

Name: IDAAN

UTM coordinates: 563423E 878414N (Station R171)

District: Chitré

Estimated area: 4 hectares (type 3)

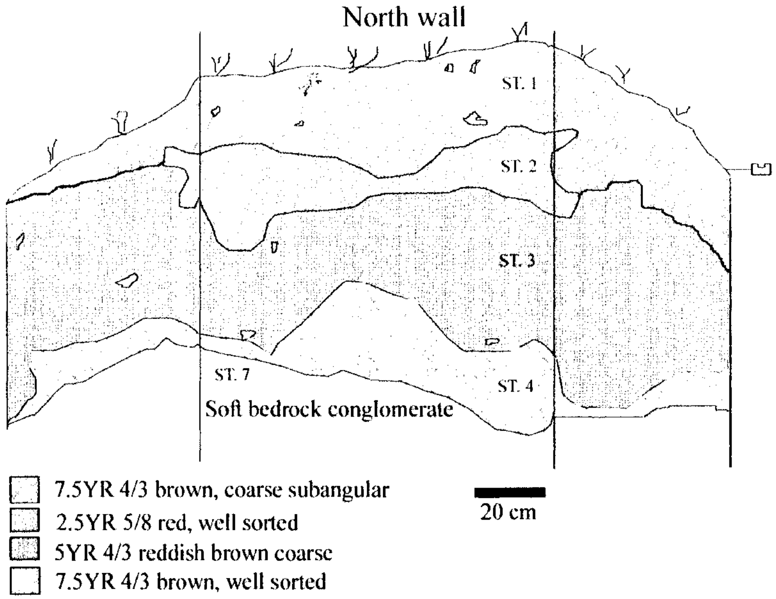
Function: habitation, shell-bearing midden

Occupation phase: Conte–Parita phase (Late Ceramic A–C)

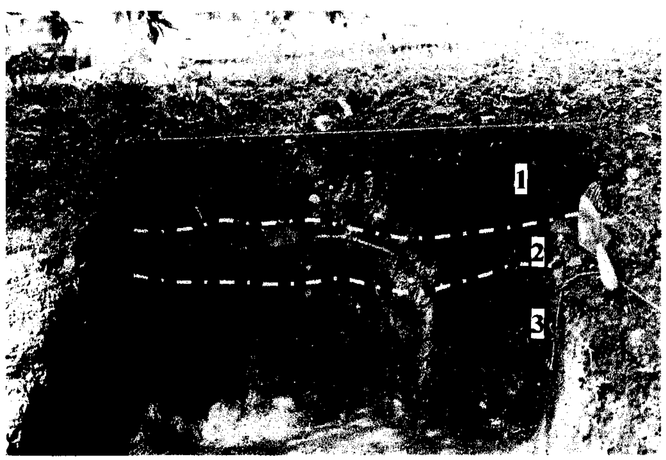
Description: CHI-33 lies six hundred meters north of LS-9. It is situated on a large flat hill on the eastern side of the Avenida Nacional where the Water Board (IDAAN) has its headquarters (Figure 4.27). The construction of the IDAAN building and water tank in the 1970s and the residential development known as *Barriada Jalisco* in the early 2000s destroyed large sections of this type 3 site. In spite of the damage caused by these extensive works, open areas at the foot and summit of the hill where the IDAAN is located as well as the backyards of the Barriada Jalisco houses, contained extensive pre-Columbian middens as well as ceramic and lithic clusters on the ground surface.

4.4.3.4.1 Test excavations at CHI-33

The identification of a large and deep midden deposit with Late Ceramic Period pottery behind the IDAAN water tank, encouraged the opening of two (1-m^2) test units (Station R170 and R171) to compare the marine shell taxa found here with those documented at other sites (Figure 4.37). While opening these units, IDAAN employees informed the PARLV that the construction of the company's second structure and tank exposed large quantities of pre-Columbian polychrome pottery. No one knew, however, what has happened to the artifacts. But while undertaking surface sampling of the adjacent field 35he, Mr. Hilario Tello (a local resident and IDAAN employee) showed the PARLV the only two complete vessels recorded from CHI-33. These were a Parita



a



c

Figure 4.37 IDAAN (CHI-33) excavation units. (a–b) Profile of station R170 opened behind the water tank of the IDAAD Company. Stratum 5 and 6 are not exposed on the profile; (c) Profile of Station R171.

style jar of the Ortiga type (Ladd 1964: 82–94) and a monochrome bowl with a zoomorphic appendage (see Chapter 6: Figure 6.43 a–b). Mr. Tello is said to have discovered the vessels in 1999 while opening a septic tank about 100 meters northwest of the foot of the IDAAN hill. Mr. Tello did not mention what was found inside the vessels but stated that some bones—presumably humans—were found inside the pit. Based on Ladd's (1964) study from site El Hatillo, it is possible that the vessels presented to us came from a funerary context, considering that these jars were sometimes used as burial urns.

Station R170 (563414E 878354N) was placed on the sloping section of the midden between the water tank and the IDAAN headquarters. This excavation unit showed that the midden deposits were stratified into 7 layers within a 90 cm deep profile (Figure 4.37a). The uppermost layer, stratum 1, is a 20–25 cm thick brown (7.5YR 4/3) poorly sorted clay layer with abundant organic material and marine shells. Stratum 1 covered a layer of well sorted clay, labeled stratum 2. This second layer was red (2.5 YR 5/8) colored and very uneven (Figure 4.37a). At its deepest point, stratum 2 reached close to 25 cm in depth. Beginning in stratum 2, the organic material decreased while the amount of marine shells increased. Immediately under, stratum 3, a reddish brown (5YR 4/3) layer of coarse sediments with some clay content, ranged between 30 and 40 cm in depth. The next layer, stratum 4, is a mottled deposit of brown (7.5YR 4/3) colored clay, mixed with the gray (7.5 YR 5/1) bedrock conglomerate. This was also a very irregular deposit which lay above what appeared to be remnants of the light gray colored soft bedrock conglomerate (Stratum 5–7). All these layer yielded large quantities of marine shells. The few artifacts recovered corresponded to undecorated Late Ceramic Period pottery sherds, an axe fragment, and a hammer stone.

Station R171 (563423E 878414N): a second 1 m^2 test unit located in an undisturbed area of the IDAAN parking lot (Figure 4.37b). Here the shell-bearing midden was stratified in three layers. The surface layer, Stratum 1, is a 15-cm deep dark reddish brown (5YR 3/2) coarse sediment layer. The next layer, stratum 2, is a 8–15 cm thick deposit of dark reddish brown (5YR 3/3) poorly sorted sediments with some clay content. Both surface layers contained abundant marine shells, a few vertebrate remains and diagnostic polychrome pottery sherds from the Macaracas and Parita style of the Later Ceramic Period. The last cultural layer, stratum 3, is a 50 cm deep dark reddish brown (5YR 3/3) to yellowish red (5YR 5/8) coarse sediment deposit with high clay content. Stratum 3 lay immediately above a gray (10YR 6/1) colored soft bedrock conglomerate.

4.4.3.4.2 Stations R170 and R170 cultural deposits

Fragments of marine shell and animal bones scattered through Station R170 and R171 cultural deposits gave some information about diet. The pit opened at Station R170, for example, contained 21 specimens of marine shells from the sandy beaches, mangrove swamp, intertidal and offshore zones (Appendix 2: Table VIII). *Donax* and *Tivela* bivalves from the sandy beach dominate the sample. All of the specimens seem to have been used for human consumption, only one *Iphigenia altior* bivalve was found polished on its inferior margin.

A smaller shell sample was recovered at Station R171. This included 22 marine shell taxa unevenly distributed throughout the three identified strata (Appendix 2: Table IX). The sample, although smaller, was dominated by the same specimens collected at R170. The unit also contained two worked shell fragments from *Melongena patula* and *Iphigenia altior*.

The pit at station R170 contained 12 specimens of white-tailed deer scattered in five of the seven strata, a single specimen of an agouti *(Dasyprocta punctata),* and a black iguana (Appendix 3: Table VII). Fish remains were limited to one specimen each of quite large individuals (3–4 kg) of the brown sea catfish (*Sciades dowii*), and tripletail (*Lobotes surinamensis*). A bone from a large (~0.6 kg) puffer fish (*Tetraodontidae*) was not identified to genus.

Station R171 also yielded diagnostic remains of fish, reptile and mammals (Appendix 3: Table VIII). The single fish bone belonged to a hammerhead shark, probably *Sphyrna lewini*. Other vertebrates included whitetail deer, nine banded armadillo, paca (*Agouti paca)*, cottontail rabbit (*Sylvilagus*) and the carapace and plastron fragments of two freshwater turtles (*Kinosternon scorpioides* and cf. *Trachemys*; Appendix 3: Table VIII).

In spite of their small size and concomitant low taxonomic diversity, the faunal samples from CHI-33 provide useful data on animal procurement. The recorded species were all reported in the much larger samples recovered at sites LS-3 and LS-10. The marine shells represent taxa that frequent inter-tidal mud-flats and sandy beaches. The four fish species enter shallow estuarine waters and tidal rivers. Agoutis and pacas need forest cover. Their presence alludes to hunting in mature forest remnants.

4.4.3.4.3 Site CHI-33 summary

Overall, the information provided by the IDAAN employees and surface collection, and test excavation indicate that the height of CHI-33 occupation occurred between the Conte and Parita phases of the Late Ceramic Period. I infer from these data that this 4-hectare site formed part of a regional cluster of villages and hamlets bound by type 1 settlements—LS-3 and LS-10. Site CHI-33 may have been larger. Site CHI-33 is 300 meters from the present-day riverbank and is less than 100 meters from the nearest abandoned meander. It is possible, however, that at the time of its pre-Columbian occupation its boundaries extended as far as the river margins and as far north as the Barriada Jalisco.

4.4.3.5 LA-29

Name: unnamed

UTM coordinates: 556765E 878312N (Station R446)

District: *Corregimiento* La Arena in the Chitré district

Estimated area: 9 hectares (type 3)

Function: habitation

Occupation phase: Tonosí phase (Middle Ceramic B)–El Hatillo phase (Late Ceramic D), Post-Colonial Period

Description: Site LA-29 is located 3.6 kilometers southwest of the modern town of La Arena, and 1.2 kilometers southwest of LS-15 (Figure 4.4). Like other sites documented west of Cerro El Tamarindo, the landscape in its vicinity is characterized by longitudinal hills running perpendicular to the course of the La Villa River. Archaeological evidence was clustered on a hill summit between fields 71he and 74he (Figure 4.38).

Figure 4.38 Site LA-29 landscape

The material assemblage included polychrome ceramics, legged metates and polished axes. All these artifacts exceptionally diagnostic and well preserved. Unfortunately, I identified this important site on the last day of survey and thus was unable to define its total site size with a significant degree of confidence. My current estimate of 9 hectares is based on surface collections. Given its proximity to La Chilonga, is most likely that LA-29 functioned as a satellite hamlet to LS-15.

4.4.3.6 LS-18

Name: Balneario Los Olivos

UTM coordinates: 555196N 876573E (Station R704)

District: *Corregimiento* Los Olivos and La Arena in Los Santos and Chitré districts respectively

Estimated area: 8 hectares (type 3)

Function: boundary site and/or ritual center (?)

Occupation phase: Parita phase (Late Ceramic C)–El Hatillo phase (Late Ceramic D), post-Colonial Period

Description: Fourteen kilometers upstream from the mouth of the La Villa River is a locality called the Balneario Los Olivos. The area is characterized by the presence of bedrock channels and water rapids, framed by two hillocks (labeled Hills A and B), which are covered with sedimentary and basalt outcrops and loose boulders (Figure 4.39). The presence of intentionally carved boulders each presenting unique features, suggests that the area played a special role—as a ritual center, a boundary site, or both.

Carved into one of the boulders on Hill A, located on the Los Santos side of the La Villa River, is a 3-meter long petroglyph with scrolls and an abstract anthropomorphic design typical of Gran Coclé art. The boulder is located on the west side of the hill, oriented in a north-south direction (Figure 4.39c). A "Corotú" (*Enterlobium cyclocarpum*) tree, located behind the boulder, could have altered the boulder's original position by root action (Figure 4.39d). In this case, the petroglyph would have originally faced the sky. The designs are percussion-incised in low relief, producing lines that are

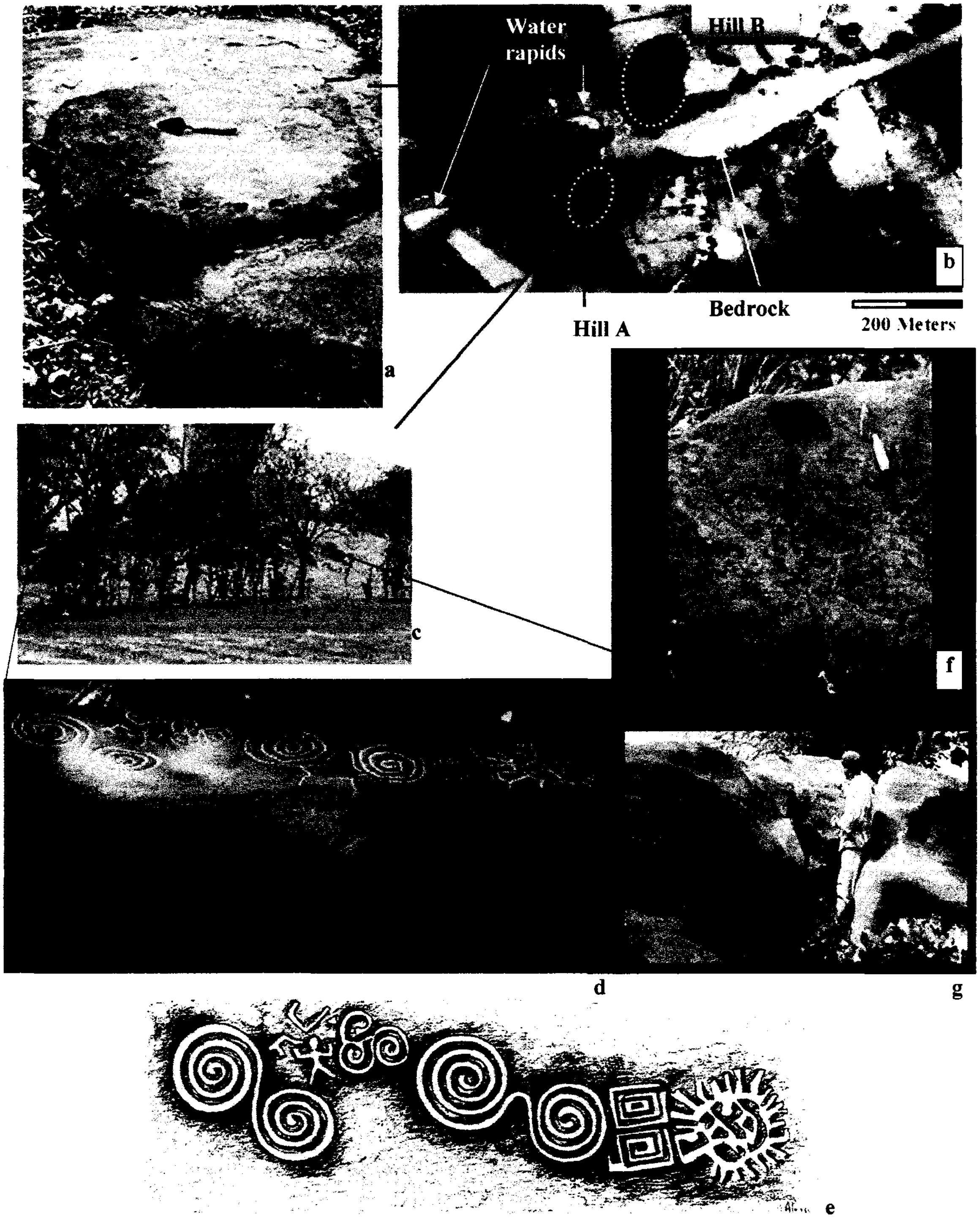


Figure 4.39 El Balneario Los Olivos (LS-18) archaeological features.
(a) Craved boulder found at the summit of Hill B; (b) Aerial photo showing the location of LS-18; (c) Photo of Hill B, LS-18; (d) Los Olivos petroglyph; (e) Drawing of Los Olivos petroglyph by done by Alexis A. de Isaza based on a negative rubbing or *frotagge* done by Julia Mayo and Celestino Rodriguez. (f-g) Second carved boulder found at Hill A.

2-cm thick and less than 1-cm in depth. The composition is perfectly centered on a relatively flat section of the boulder and consists of three types of scrolls, an anthropomorphic figure, and an icon with an apparent solar or snake symbol (Figure 4.39e). From north to south, the first icon is an S-shape scroll with three loop spirals on both ends. In Gran Coclé iconography, this scroll type is commonly depicted on Conte and Macaracas style polychrome ceramics where it is used as a filler element for composite motifs or painted on the chest and abdomen of hybrid human-animal shaman representations (*cf.* Labbé 1995: Table 3n). Next is an abstract human figure with raised arms and open legs. Similar anthropomorphic representations carved on large boulders have been documented in the Chiriquí highland (Künne 2003: Figure 93 and 94), the Díquis sub-region of Gran Chiriquí (Zilberg: Figure 23.3), and most recently in the Pacific watershed of Coclé (Mayo and Mayo 2007: Figure 1). In the context of Gran Coclé tradition, the image resembles the abstract stylized human figures painted on the Tonosí style double shaped jars (*cf.* Ichon 1980: Figure 39; Sánchez and Cooke 1998: Figure 5). Next to this anthropomorphic design is a Y-shaped scroll with simple spirals at its three extremities, similar to the ones depicted on Conte style ceramics and stone stamps from LS-3 (*cf.* Díaz 1999: Plates 5i & 6c–d). The Y-shaped scroll was also used to paint the human body, to judge from life-like modeled polychrome vessels of seated humans (*cf.* Cooke and Sánchez 2004b: Figure 6). In the land of Escoria there was a special group of elder warriors who went to battle with their chests and arms decorated with "linked chains and other ties."[8]

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[8] *En este Escoria había una generación de indios muy mayores que los otros y en calidad: entre ellos eran*

At the center of the rock is a scroll with convergent spirals. This type of scroll is commonly depicted on Gran Coclé polychrome ceramics and also on hammered gold artifacts, characteristic of the earliest style of isthmian metallurgy—Bray's "Initial Style" (*cf.* Ichon 1980: Figure 56; Lothrop 1942: Figures 59, 64 & 91a; Sánchez and Cooke 1998: Figure 2g; see also Bray 1992). Next to it are two square scrolls, which resemble those depicted on Parita and El Hatillo style polychrome vessels. The final element is a sphere outlined by perpendicular lines, which could be a solar symbol or perhaps a snake symbol reminiscent of the one illustrated on a La Mula style potsherd from LS-3 (*cf.* Cooke *et al.* 2003a: Figure 2 c). Enclosed within the sphere is a stylized saurian creature with a Y-shape scroll element as part of its body. It is feasible that the scroll elements in the petroglyph are representations of resting snakes—an interpretation given by Helms (2000) to similar motifs on polychrome ceramics.

Overall, then the elements depicted on the Los Olivos petroglyphs have parallels with motifs depicted on other artistic media in Gran Coclé between A.D. 200 and 1400. In Gran Coclé art, however, the parts are temporally less diagnostic than the whole, since individual traits are often used in all the successive designs styles. Therefore, it is not possible to assign a specific phase to the Balneario Los Olivos petroglyph. Although petroglyphs are widespread in Panama and elsewhere in the Intermediate Area, few attempts have been made to compare their designs and motifs with those of other media or to interpret them objectively. Eva Harte, who was not a professional archaeologist,

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caballeros y tenían gran presunción de valientes: eran labrados todos los pechos y brazos con unas cadenas de eslabones y otros lazos (Andagoya 1994: 34).

proposed that the designs on Panamanian petroglyph most likely portrayed religious, artistic, and historical significance. She hypothesized that the motifs and designs carved on boulders in Panama were created by spiritual leaders to represent "ideas", or record notable events—disasters and times of prosperity—, suggest warnings of danger, direction, clan movements, bravery in battle, and skill in hunting (Harte 1959: 62–63). Through the petroglyphs, she adds, prehistoric artists were also able to portray the local fauna and landscape. Interestingly, Harte notes that none on the Panamanian petroglyphs she studied show animals introduced by the Spaniards (e.g., horses) indicative that these are pre-Columbian in age.

Currently, Spanish archaeologist Julia Mayo is documenting the location and composition of petroglyphs at sites on the Pacific watershed of Coclé province, including some located near the Sitio Conte burial ground (Lothrop 1937; Cooke *et al.* 2000). She is attempting to establish a relative chronology by comparing engraving techniques and designs content and arrangement, with geography and topography using a GIS-based method (Mayo and Mayo 2007). Tentatively, Mayo proposes that those petroglyphs, which have abstract curvilinear and geometric motifs, like the one the PARLV documented at the Balneario Los Olivos exhibit parallels with polychrome pottery that characterizes the period A.D. 250–1400 (Tonosí through Parita phase). Her observations therefore is consistent with my assessment of the Balneario Los Olivos petroglyph. Mayo notes that petroglyphs found on her survey in Coclé province, which have scroll or spiral designs, are often found adjacent to rivers or streams and she believes that this relationship is not fortuitous (Mayo and Mayo 2007). In Gran Chiriquí, in contrast, similar depictions have been associated with mountains. Researchers have proposed that they may be maps (Künne 2003: 231; Quilter and Blanco 1995).

Outside the isthmus, the scroll depictions have been attributed celestial connotations (e.g. Harte 1959). In their analysis of gold work and "Chibchan" identity, Hoopes and Fonseca (2003: 67) note that the Kogi of northern Colombia associate the twisted loop objects with solstices, equinoxes, and lunar phases. Although it is feasible that the Balneario Los Olivos petroglyph may have had similar connotations, more analytical and contextual research on petroglyphs is required to evaluate such idea.

I propose that additional social factors could be involved with the positioning of there ubiquitous objects. The designs on the Balneario Los Olivos petroglyph could have represented the kin group *devisa* (or emblem) used by the ancestors of Parita to establish a boundary marker, called *mojón* by the earliest Spanish chroniclers of isthmian life (see Cooke and Sánchez 2004c: endnote 215).

A second carved stone was identified on the southernmost section of the summit of Hill A, 15 meters from the petroglyph I have just described (Figure 4.39c). The worked stone is wedged between two large boulders, and consists of a circular depression measuring 18 cm in diameter and 6 cm deep (Figure 4.39f). The location of this carved stone and the presence of the carved depression, suggest that poured liquids were part of the ritual ceremonies enacted here. These would have fallen into the depression and drained down the rock, through a narrow channel, which was pecked into the base of the depression (Figure 4.39g).

Hill B is located on the Herrera margins of the Balneario Los Olivos, about 500 meters from Mound 2 at LA-28. It is located on higher ground than Hill A, and is visible from it. On its summit we found a sedimentary rock, which is one of several such boulders scattered across the hill, currently about half of it is buried. We noted eleven circular depressions somewhat evenly space around the edge of its flat top surface (Figure 4.39a). These are all that remains of a once more extensive design. These markings are similar to the minute marks on a clock, and are different from anything else reported in this region. They are no larger than 6 cm in diameter and no deeper than 3 cm. Due to time constraints we did not make any attempt to reconstruct the design nor estimate the total number of depressions if they went all around the boulder. Its function is uncertain. Clemency Coggins (personal communication 2006) suggests a calendric function. This is not unreasonable but much more work would be needed to prove it.

The only surface artifacts found in the immediate vicinity of the Balneario Los Olivos petroglyph were monochrome potsherds with a paste composition that is typically found on many categories of Parita phase pottery (Sánchez personal communication 2001). Four of these potsherds were collected at Hill A, and another five from the riverbed. Denser concentrations of artifacts were identified at the base of Hill B. Among them, were two highly eroded El Hatillo polychrome sherds, as well as undecorated Late Ceramic and post-Colonial pottery, suggesting the area continued to be used throughout colonial times.

To sum up, I propose that the Balneario Los Olivos petroglyph may have had a social-cum-territorial function. A *mojón* in Spanish is a boundary stone or landmark. In an early sixteen century document the Spanish captain Pedrarias Dávila noted "chiefs whose boundaries confine with one another set up their limits with marked boundary stones each one within its own territory" (in Jopling 1994: 21, my translation). In the Barú Region of Gran Chiriquí, Payson Sheets notes that most petroglyphs are found in areas between pre-Columbian villages as if defining territorial markers (Sheets personal communication to Quilter and Blanco 1995: Footnote 2). I argue that these boundary stones aim to carry social significant information that identifies the group that carved them.

The topography and geography of site LS-18 is consistent with a frontier location. In fact, it could represent the southwestern-most frontier of *Parita's* chiefdom (Figure 1.2) since it lies where most scholars believe the boundary of *Parita's* chiefdom ran, based on their readings of contact-period chronicles (e.g. Cooke 1993b: Figure 1, Helms 1979: Figure 6; Sauer 1966: Figure 27). The presence of rapids in the area would have forced people, coming from both directions, to stop and continue their journey, for at least 1 kilometer, by land. The Balneario Los Olivos is also the closest point from the La Villa River to important sites in the Parita valley, such as El Hatillo (7 km), Site 355 (4.4 km), and Site 363 (3.4 km). Other sites in the Parita valley such as HE-1 and HE-2 are located closer, however, to LS-15 at 4.3 and 4.5 kilometers respectively (Figure 4.4). In this context, it is interesting that Haller's survey in the Parita valley did not report any carved boulders at or near El Hatillo, which he interpreted as the primary social-cum-ceremonial center of this valley and, arguably, the entire chiefdom of Parita. Future excavations of sites such as LS-18 and neighboring LA-28 and LS-15 may change our views of the paramountcy of El Hatillo as a ritual center.

4.4.4 Type 4 sites: Isolated dwellings or activity areas

The sites I have classified as type 4 correspond to small clusters of artifacts (e.g., pre- and post-Columbian ceramics, lithics, colonial ware, shells), which were found isolated from the larger surface scatters. I identified a total of eighteen clusters of this nature, for example, river bed during the ebb tide; near small streams or abandoned meanders; at the edge of the high tidal flats and estuary inlets; at the base of large hills, and at the periphery of nuclear settlements and hamlets (Figures 4.4). These small artifact scatters may, in fact, be simply the remnants of isolated dwelling or activity areas. Since I was unable to analyze the artifacts collected at these sites my descriptions are brief and based primarily on field observations.

4.4.4.1 LS-5

Name: unnamed

UTM coordinates: 566394E 882928N (Station LS5)

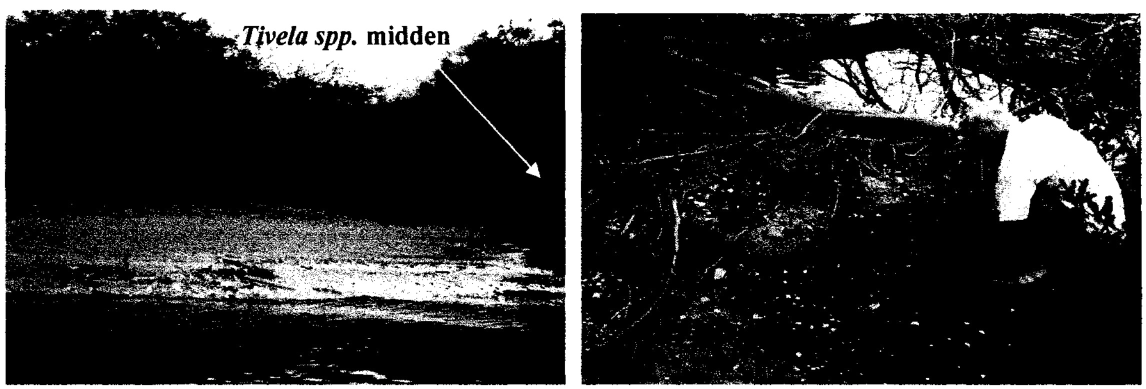
District: Los Santos district

Estimated area: 10 m^2 (type 4)

Function: shell-bearing midden

Occupation phase: Monagrillo phase, Early Ceramic A (?)

Description: Site LS-5 is characterized by the presence of a shallow (20 cm) midden located on an exposed beach in the mangrove swamp, 1.5 kilometers from the mouth of the La Villa River. The midden was spotted by Richard Cooke during a one-day motorboat survey of the La Villa banks (Figure 4.40). The shell-bearing middens yielded in its large majority *Tivela* shells, which frequent sandy beaches and bars. On the beach, and in a stratum that seemed to correlate with the midden although it was located 80 cm from it, we identified three gritty ceramic potsherds, which, according to Cooke's field observations, correspond to the Monagrillo complex (*sensu* Willey and McGimsey 1954). These are body fragments of open vessels with weathered surfaces exposing coarse quartz sand particles. Lying on the beach, we also found a split cobble of coarse siliceous stone used bilaterally as hammer stone.



a b

Figure 4.40 Site LS-5.
(a) Exposed beach on the Mangrove swamp; (b) Richard Cooke gathering a sample from the *Tivela* sp. midden.

In Chapter 2, I stated that Monagrillo represents Gran Coclé's earliest ceramic complex (Table 2.3). It was first documented by Willey and McGimsey (1954) at the Monagrillo-type site (HE-5), HE-18, and Zapotal (HE-15/PR-32), which are located at 7, 6, and 21 kilometers respectively to the northwest of LS-5 (Figure 4.4). Monagrillo ware is simply made with coiling and scraping techniques. Vessel shapes comprise simple bowls and collarless jars moderately well fired but poorly oxidized. They also exhibit dense medium-grained paste structure and unpolished surfaces (Willey and McGimsey 1954: 58). Monagrillo vessels lack appendages and their decorative elements are limited to punctate or incised linear designs (Figure 2.3). Calibrated ^{14}C dates associated with the Monagrillo complex range between cal. 3800–1200 B.C. (Cooke 1995: 180). Because there is still confusion regarding the earlier dates from the Monagrillo-type site, Cooke (1995: 180) proposes an alternative 2-sigma time span of cal. 2900–1200 B.C. for this complex. For a style as long-lived, Monagrillo wares does not show any abrupt changes, rather it remained "technologically and conceptually conservative" throughout its production period (Cooke 1995: 179).

Although further excavations are necessary to confirm a Monagrillo phase occupation at LS-5, its geography is coincident with an occupation at this time since it appears to be located on an ancient strand-line whose topography recalls that of the Monagrillo-type site, located to the north (Figure 4.4). Geomorphological and malacological investigations at the Monagrillo-type site have established that people settled here when the site was right on the beach where *Tivela* clams would have been abundant. Through time, the abundance of *Tivela* declines as the site retreated from the sea in response to coastal sedimentation (Clary *et al.* 1984; Hansell 1979).

4.4.4.2 CHI-25

Name: Puerto El Agallito

UTM coordinates: 565895E 883227N (Station PTO)

District: Chitré district

Estimated area: 100 m^2 (type 4)

Function: unknown

Occupation phase: Cubitá phase (Middle Ceramic C)

Description: Site CHI-25 is located at *Puerto El Agallito* a natural beach used for fishing. It is 600 meters west of LS-5 and 1.2 kilometers from the coast (Figure 4.4). We found this site during the above-mentioned motor boat survey as we noticed Cubitá style pottery eroding from the exposed riverbank under 90 cm of alluvium. Using the estimates of coastal progradation suggested by Clary *et al.* (1984), I infer that CHI-25 represents the remnants of a coastal site settled during the Cubitá phase of the Middle Ceramic Period, which has been heavily modifies by more recent geomorphological events as well modern cultural activities.

4.4.4.3 LS-23

Name: unnamed

UTM coordinates: 566946E 880995N (Station R158)

District: Los Santos district

Estimated area: 0.2 hectares (type 4)

Function: unknown

Occupation phase: Middle Ceramic B–C, Colonial

Description: Site LS-23 is located two and a half kilometers inland from CHI-25 (Figure 4.4). During an ebb tide, we found highly weathered pre-Columbian ceramics and Spanish earthen wares on a cobble beach at the edge of fields 30ls and 31ls (Figure

1.4b). Aerial photographs and topographic maps show that the river has changed course in this section, suggesting that the artifacts found embedded in the cobble beach are probably not *in situ*. Perhaps the artifacts were washed down from farther inland, conceivably north of LS-3, as Spanish wares were found near historically active meanders north of Cerro Juan Díaz.

4.4.4.4 LS-4

Name: Camaronera

UTM coordinates: 567682E 880704N (Station R138)

District: Los Santos district

Estimated area: 0.24 hectares (type 4)

Function: unknown

Occupation phase: Middle Ceramic Period

Description: Site LS-4 is at the edge of the dirt road that leads to the *Camaronera* or shrimp farm located 1 kilometer from La Villa river mouth (Figure 4.4). The site is defined by small scatters of Middle Ceramic Period pottery including some diagnostic Cubitá phase body sherds identified at the edge of a historic meander.

4.4.4.5 LS-26

Name: unnamed

UTM coordinates: 568066E 881308N (Station R120)

District: Los Santos district

Estimated area: 10 m^2 (type 4)

Function: unknown

Occupation phase: Cubitá phase (Middle Ceramic C)

Description: Site LS-26 was defined by a small sample of Middle Ceramic Period pottery collected at the edge of a paleomeander, 200 meters north of LS-4 and 800 meters east of LS-23 (Figure 4.4).

4.4.4.6 LS-21

Name: Cantera Santa Ana

UTM coordinates: 568849E 879275N (Station R127)

District: Los Santos district

Estimated area: 0.9 hectares (type 4)

Function: acquisition and preparation of stone tools

Occupation phase: N/A

Description: The Cantera Santa Ana (LS-21) is a pre-Columbian lithic quarry located on the southern edge of the high tidal flat, 1.4 to the northeast of LS-32, and 2.8 kilometers east of LS-3 (Figure 4.33). It is located on a relative flat area covered by xerophytic vegetation. The topsoil is composed of a highly reflective red clay covered with quartz crystals and siliceous stones (Figure 4.36e). Currently sections of the quarry are now being used as a trash dump.

Prior to the PARLV survey, site LS-21 was visited by George Pearson who was searching for Paleoindian sites, which he did not find along this section of the Parita Bay littoral. Most of the material scattered across the quarry represents manufacturing debris, particularly angular chunks, and secondary and tertiary decortication flakes broken off cobbles found *in situ.* These mostly represent siliceous rocks (primarily banded red and pink jasper, with occasional chalcedony). Quartz crystals were also present together with retouched artifacts include perforating tools made of fossil palm wood, and a jasper graving tool. The absence of chronologically diagnostic tools makes a temporal placement difficult; but the site is likely to have been used mostly during the Middle and Late Ceramic Period. At first glance, LS-21 seems to have been use on temporary basis for the acquisition and preparation of stone tools.

4.4.4.7 LS-27

Name: unnamed

UTM coordinates: 565691E 877848N (Station R349)

District: Los Santos district

Estimated area: 100 m^2 (type 4)

Function: habitation (?)

Occupation phase: Late Ceramic Period–Colonial Period

Description: Site LS-27 is located south of the Nestlé company headquarters in La Villa de Los Santos. This site is defined by the presence of small scatter of undiagnostic Late Ceramic and Contact Period pottery.

4.4.4.8 CHI-30

Name: La Terminal

UTM coordinates: 562772E 879130N (Station R234)

District: Chitré district

Estimated area: 0.9 hectares (type 4)

Function: Undetermined

Occupation phase: undetermined

Description: Site CHI-30 is located on the fields adjacent to the Bus Terminal in Chitré, north of the Circunvalación Avenue (Figure 4.4). The site was defined by the presence of a few scatters of ceramic sherds, marine shells, stone flakes, and quartz crystals identified at the base of 1-meter deep trench and across fields that had been leveled for urban development. These are the remnants of possibly isolated short-lived dwellings.

4.4.4.9 CHI-34

Name: Represa IDAAN

UTM coordinates: 559779E 878090N (Station R303)

District: Chitré district

Estimated area: 0.7 hectares (type 4)

Function: activity area

Occupation phase: Late Ceramic

Description: Site CHI-34 is located on the northern (Herrera) banks of the La

Villa River adjacent to an area of rapids known locally as the IDAAN Dam (Figure 4.4). Evidence consists of small shell-bearing middens and small sample of pottery sherds.

4.4.4.10 LS-14

Name: Cerro El Tamarindo

UTM coordinates: 561717E 875559N (Station R592)

District: Los Santos district

Estimated area: 10 m^2 (type 4)

Function: habitation (?)

Occupation phase: undetermined

Description: Site LS-14 is outside our field universe (Figure 4.4). The site was defined based on the presence of small pottery scatters and shells collected on the southern base of Cerro El Tamarindo.

4.4.4.11 LS-13

Name: Finca Abel Moreno

UTM coordinates: 559836E 875547N (Station R612)

District: Los Santos district

Estimated area: 0.2 hectares (type 4)

Function: habitation (?)

Occupation phase: Middle Ceramic Period

Description: Site LS-13 is located 2 kilometers west of LS-14 and immediately south of the main road that leads to the villages of El Bongo and Los Olivos. A small sample of pottery sherds and flakes was collected from a section of the ranch owned by Abel Moreno, which was being prepared for planting rice. Before the area was flooded, Mr. Moreno kindly permitted me to survey the area, which yielded a few diagnostic Cubitá phase pottery sherds. To the east of the plowed field is a hillock bounded by large outcrops and basalt boulders. Very few artifacts were found on top of the hill. A brief examination of the lithic material did not revealed evidence of retouched artifacts. In sum, it seems that LS-13 represents an isolated dwelling site.

4.4.4.12 LS-12-A & 12-B

Name: unnamed

UTM coordinates: 559880E 876742N (Station R589)

District: *Corregimiento* Los Olivos, Los Santos district

Estimated area: 0.7 hectares (type 4)

Function: habitation (?)

Occupation phase: Middle Ceramic–Late Ceramic

Description: Sites LS-12-A and LS-12-B are located 800 meters to the east of LS-11, at the foot of Cerro El Tamarindo towards the southwest (Figure 4.4). I interpret the small samples of ceramics, basalt adzes, and highly eroded burnt clay floors that we found there as the remains of small dwelling areas.

4.4.4.13 LS-16-A & 16-B

Name: unnamed

UTM coordinates: 556797E 877516N (Station R696); 556804E 877288N (R697)

District: *Corregimiento* Los Olivos, Los Santos district

Estimated area: 400 m^2 and 0.9 hectares respectively (type 4)

Function: habitation

Occupation phase: Middle Ceramic–Late Ceramic, Colonial Period (?)

Description: Sites LS-16-A and LS-16-B are located on the southern margins of the La Villa River, 1.3 kilometers to the southwest of LS-15 and 1.7 kilometers to the northeast of LS-18. I interpret them as two small habitation zones measuring respectively 400 m^2 and 0.9 hectares in area (Figure 4.4).

Site LS-16-A was defined by the presence diagnostic Cubitá phase pottery at the edge of dried out water holes. At Station R696, located on a high terrace ~6 meters above the riverbed, a land slide had exposed a wall profile with fragments of burnt clay underneath strata that had been apparently exposed to fire and contained abundant charcoal (Figure 4.41). Taking advantage of the clean profile, I collected three samples for thin section analysis: one from a zone intermediate between strata 2 and 3, and two samples from stratum 4, a pit-shaped deposit (Figure 4.41). The first sample confirmed that stratum 2 is composed of coarse clay fragments overlaying a compact clay deposit, which appears to have been exposed to fire (Stratum 3). The sample from stratum 4 is from the upper most levels, which contained small briquettes of clay, apparently the remnants of a floor (Figure 4.41c).

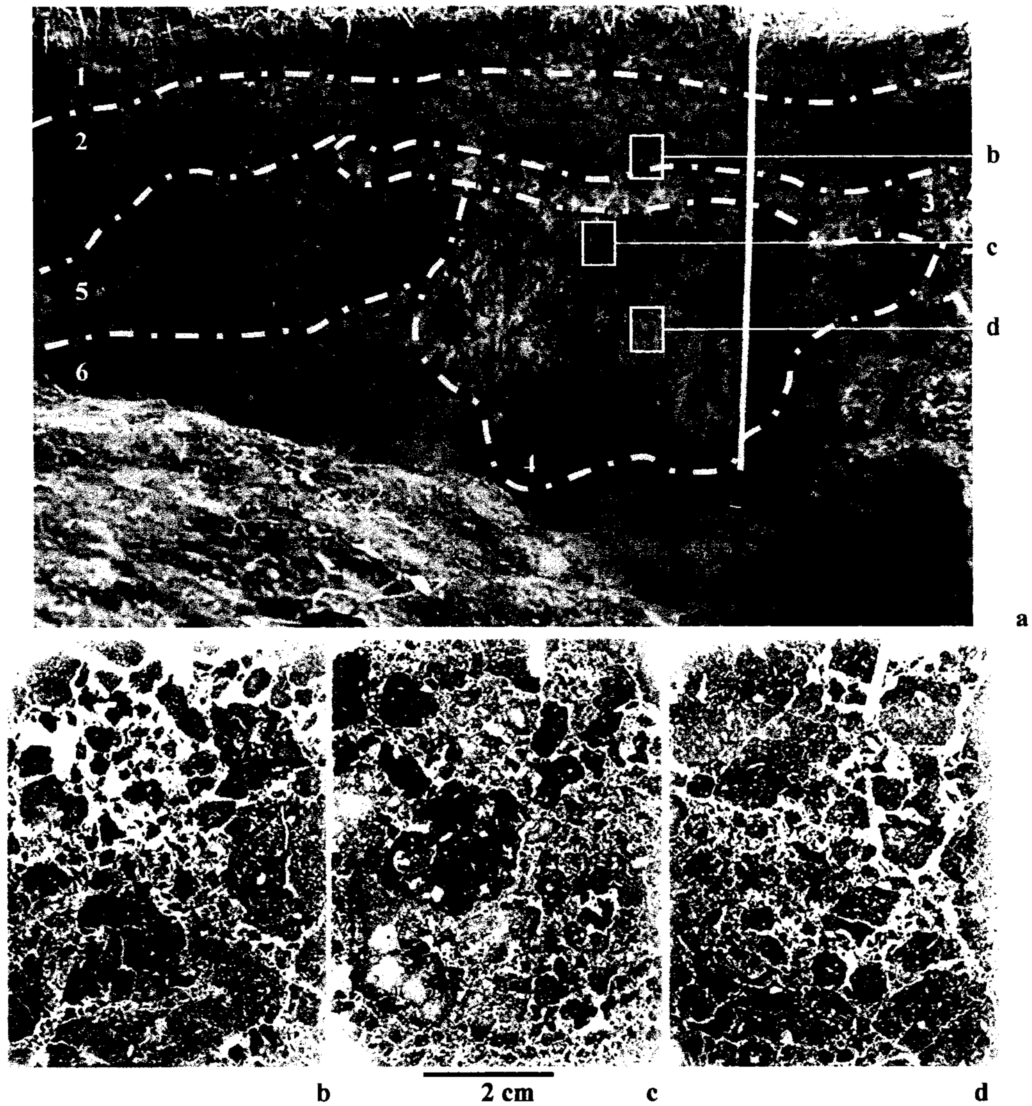


Figure 4.41 Site LS-16-A, Station R696.
(a) Station R696 north wall profile: <u>Stratum 1</u> Humic layer, brown (7.5YR 4/4) clay; <u>Stratum 2:</u> brown (7.5YR 4/3 and 4/4) coarse clay deposit; <u>Stratum 3:</u> strong brown (7.5 YR 5/6 with streaks 7.5 YR 5/8) compact clay layer apparently expose to fire; <u>Stratum 4</u>: brown (10YR 4/3) clay; <u>Stratum 5</u>: dark brown (7.5YR 3/2) coarse clay; <u>Stratum 6</u>: Yellowish red (5YR 5/6) sandy clay.
(b) thin section sample taken between Stratum 2 and Stratum 3; (c) thin section sample taken from Stratum 3 exposing yellowish red (5YR 5/8) clay briquettes; (d) thin section sample taken from Stratum 4.

Figure 4.42 Site LS-16-B, Slab metate

The thin section shows that the briquettes are oriented in different directions. This means that they were not *in situ,* but more likely redeposited after the structure for which they belonged was destroyed. There is also evidence that the briquette fragments had been exposed to fire, but the heat had only altered the surface, which was yellowish red colored, and not the basal sections, which show darker colors. The upper surface presents also a polished surface appearance, most likely the result of regular sweeping and water exposure (Goldberg personal communication 2003).

The unit in which the clay fragments were found consists of a very coarse clay deposit with charcoal inclusions (Figure 4.41). A few undiagnostic body sherds were collected on the western wall immediately under stratum 3. A charcoal sample from stratum 3 (western wall) collected in 2003 by Thomas Bullard returned an AMS date result of 140 ± 40 B.P., cal. A.D. 1650–1710, 1720–1880, 1910–1950 (Beta-178027, Appendix 1). Once again, the results were more recent than expected. Even though Bullard took good care in collecting the sample we suspect it got contaminated with more recent charcoal. Overall, Site LS-16-A represents an isolated dwelling site dating to the Cubitá phase of the Middle Ceramic Period, possibly resettled in colonial times.

Two hundred and fifty meters to the Southwest of LS-16-A is LS-16-B characterized by the presence of several looted and bulldozed hillocks exposing Late Ceramic Period polychrome pottery, lithic flakes, and stone grinding tools. Among the latter was what appears to be a slab metate pre-form (Figure 4.42).

4.4.4.14 LS-19

Name: Unnamed

UTM coordinates: 555613E 876691N (Station R710)

District: *Corregimiento* Los Olivos, Los Santos district

Estimated area: 0.9 hectares (type 4)

Function: habitation

Occupation phase: Middle Ceramic–Late Ceramic

Description: LS-19 is a dwelling site located on a high terrace on the southern margins of the La Villa River characterized by the presence of diagnostic Cubitá phase pottery and a few polychrome fragments from the Late Ceramic Period (Figure 4.34b). The material clustered in a small plowed field (labeled 109ls) located 400 meters east of El Balneario Los Olivos and immediately across the southwestern periphery of LA-28.

4.4.4.15 LS-20

Name: Unnamed

UTM coordinates: 555197E 876390N (Station R712)

District: *Corregimiento* Los Olivos, Los Santos district

Estimated area: 40 m^2 (type 4)

Function: activity area

Occupation phase: Undetermined

Description: Site LS-20 is located 279 meters south of El Balneario Los Olivos (Figure 4.4). Defined by the presence of isolated undiagnostic pottery body sherds and an irregular shaped mano.

4.4.4.16 LS-17

Name: Finca Los Pilones

UTM coordinates: 556327E 875965N (Station R703)

District: *Corregimiento* Los Olivos, Los Santos district

Estimated area: 1 hectare

Function: unknown

Occupation phase: undetermined

Description: The Finca Los Pilones is located on the northern periphery of the village Los Olivos next to the Los Olivitos Stream (Figure 4.4). Mr. Gilberto Mendoza Rodríguez chose Los Pilones (in English "mortar") as the name of his ranch because of a series of postholes-like features carved into the metamorphic rock outcrops (Figure 4.43).

These are indeed cultural features, but their function is unknown. These features, however, are not unique to Finca Los Pilones. On the northern (Herrera) margins of LS-3 there are at least two boulders at the base of the river channel, visible at ebb tide, with similar carved posthole-like features. Perhaps, as the modern Spanish name suggest, these surfaces were used for grinding either food (i.e., seeds, nuts) or even for pulverizing rock for gold-working. Another salient feature of this site is the presence of materials of paleontological interest. The ground surface of site LS-17 is also covered by outcrops of metamorphic rock, which have exposed fossil bivalve shells and fish impressions, as well as fossilized tree trunks including palms (Figure 4.43c).

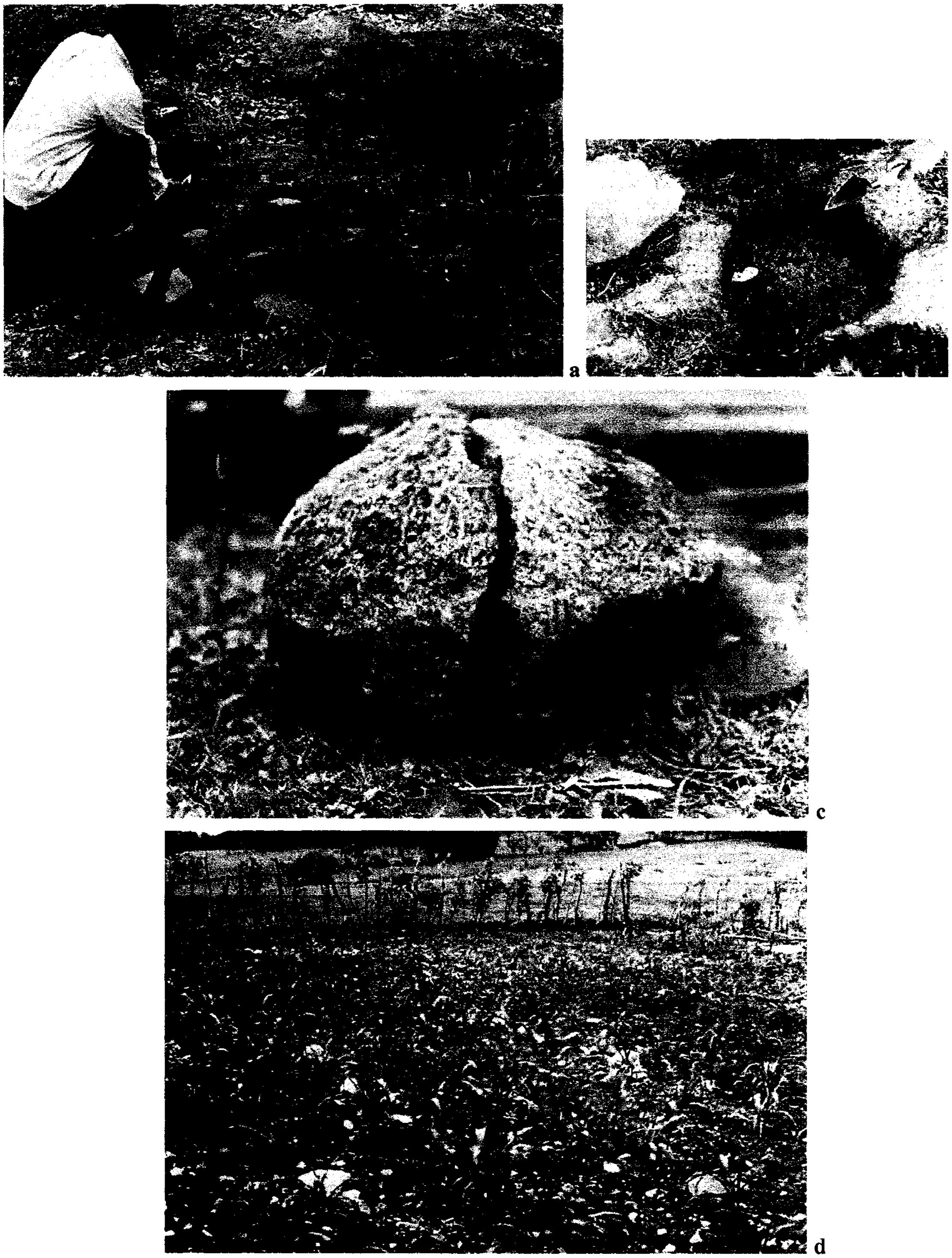


Figure 4.43 Site Los Pilones (LS-17) landscape and archaeological features.
(a) Post-hole shaped features, named "*Pilones*" by the locals. These holes are carve into metamorphic rock their depths varies from 5 to 20 cm deep; (b) Pilón close-up ; (c) Fossilized palm tree trunk; (d) Plowed fields with fossil rocks.

4.5 Summary

Documents written by Spanish soldiers and officials during the subjugation and early settlement of the central Pacific plains of Panama state that a man who has come to be known as *Parita* ruled over a chiefdom whose territory comprised the lower valleys of the La Villa and Parita rivers, which flow into the southern portion of Parita Bay. The prominent archaeological site of Cerro Juan Díaz (LS-3), which was the focus of a ten-year archaeological project (1992–2002), was located within this chiefdom on the coastal plain of the La Villa River. Noticing that the size and geographic location of Cerro Juan Díaz suggested it may have been a special regional site, Cooke (1993b) proposed fourteen years ago that is was likely to have been one of the two principal settlements of *queví Parita*, which are frequently mentioned in the chronicles (as the "new" and "old" settlements). Although some topographic details recorded by contact period chronicles supported Cooke's claim, no information was then available about the location and size of other pre-Columbian villages in the lower La Villa Valley. Therefore, the role of Cerro Juan Díaz in the social and political organization of this chiefdom was highly conjectural.

My original interest in designing the PARLV was to provide field data to address Cooke's hypothesis and fill in the considerable gaps in our knowledge about the population history of a particularly productive area of the Pacific coast of Panama where Spanish documents describe a chiefdom society with dense populations and settlements having over a thousand people. They also allude to abundant and agricultural resources, and plentiful salt, which was a vital commodity in the tropics.

Prior to the PARLV, various studies had demonstrated that the culture area that interested me (after 200 B.C. identifiable as Gran Coclé) was continuously occupied since the Late Glacial Stage 11,500 B.C. Evidence of Paleoindian hunter-gatherer, and early agricultural Preceramic, and Early Ceramic sites occurred in a variety of habitats from the Parita Bay to the continental divide and the humid forests of the central Caribbean foothills of Coclé province. Prior to the third millennium B.C. the settlement pattern of the Pacific foothills and cordillera was characterized by small and scattered (< 0.1 ha) communities that subsisted on hunting, gathering, and fishing between the 11,500 and 6000 B.C., and horticulture after 7000 B.C. (Table 2.1). Subsequent changes in the settlement pattern are linked to simultaneous changes in the subsistence system—particularly the intensification of maize and root-crop farming (Cooke 2005; Cooke and Ranere 1992c: 293–294; Linares 1977a; 1980a; Linares *et al.* 1975; Linares and Sheets 1980; Piperno and Pearsall 1998; Ranere and Cooke 1996). As agriculture led to intensive modification of the arboreal vegetation and soil degradation, people were forced to move to the productive bottomlands and began to nucleate near riverine areas (Cooke and Ranere 1992c; Haller 2004; Hansell 1988; Ichon 1980; Linares 1977b; Linares *et al.* 1975). Preceramic and Early Ceramic sites such as Cerro Mangote and Monagrillo, now realized to be settlements occupied by farming people, included the same type of grinding tools, indicating a cultural continuum.

Despite the early introduction of agriculture, it is not until 200 B.C. that permanent villages became evident in Gran Coclé and Gran Chiriquí, and after A.D. 1 in Gran Darién. These changes in settlement patterns were accompanied by technological improvements in pottery production, the use of prismatic blades, and well-made grinding tools. The specialized production of costume items made of spiny and pearly oysters shells develops reaching its maximum use ca. A.D. 200–700. In addition, metallurgy is introduced from Northern Colombia, but soon adopts the local and complex iconography depicted in other artistic mediums.

Two of the earliest nuclear villages known for Gran Coclé are located in the area covered by *Parita's* chiefdom—La Mula-Sarigua (PR–14) and Cerro Juan Díaz (LS-3). The PARLV and the *Proyecto Arqueológico del Río Parita* (PARP) directed by Mikael Haller yielded very little data, however, on the earliest settlements. Haller found a bifacial thinning flake (Haller 2004: Figure 2.9), but nothing was reported for the La Villa River. The PARLV survey and CJDP excavations indicate that the growth of LS-3 did not occur in isolation. Desjardins' excavations at Operation 5 uncovered significant quantity of fine quality La Mula pottery that had accumulated at the base of the Cerro Juan Díaz southern "platform", indicating that the Los Santos banks of LS-3 were occupied quite intensively during La Mula phase of the Middle Ceramic B Period (Table 4.3). During this phase, we estimate that LS-3 covered about 6 hectares if not more. The 2-sigma radiometric dating results of cal. 200 B.C. to A.D. 405 obtained from the base of one of the richest and most complex graves excavated by the CJDP—Feature 16—indicates that the grave belongs temporally to the latter half of the La Mula or earlier part of the Tonosí phase, even though it did not contained diagnostic pottery. The evidence also shows that the initial occupation of LS-3 is coeval with the apogee of La Mula-Sarigua. Elsewhere in the La Villa and Parita valleys, the occupation consisted of small, scattered hamlets of less than 1 hectare (see also Haller 2004: 110–113). Although it is tempting to suggest that La Mula-Sarigua "spawned" LS-3, there is no supporting data for this thesis (Cooke personal communication 2006). The fact that Cerro Juan Díaz contains early burials with fine artifacts—made of gold, carved shell, bone, stone, and animal teeth—is very important. Coeval cemeteries at India, El Indio, La Cañaza, El Cafetal, and Venado Beach, which include similar grave offerings, suggests these objects were initially used to define the social identity of individuals based on their age, gender and occupation, or based on ritual activities, such as shamanism and curing. It is not until the Late Ceramic Period that these objects acquire "the exoteric role" needed by the "self-aggrandizing behavior of wealthy male adults" (Cooke 2005: 154). This is most visible in the rich mortuary deposits from Sitio Conte (A.D. 750–950) and El Hatillo after A.D. 900 (Briggs 1989; Bull 1965; Cooke *et al.* 2000, 2003a; Ladd 1964; Lothrop 1937; Hearne and Sharer 1992); the carved stone statues from El Caño and Barriles, and sixteen century warfare (Cooke *et al.* 2003a; Espinosa 1994a: 56–57; Oviedo 1944, VII: 306–307; Cooke 2005: 154).

The period between the Cubitá and Conte phase (A.D. 550–950) is also important because it is when the first signs of a settlement hierarchy become apparent. For the lower La Villa River, I defined a linear stream configuration with four-levels of settlements (Figure 4.4), while Haller's concurrent survey of the River Parita defined a tri-partite settlement system (Haller 2004: 75, 110). In the case of the La Villa River, the pattern was influenced by the local topography and social factors. The earliest and longest settled sites are located in prominent hills adjacent to the rich alluvial bottomlands. Their geographic location most likely permitted the control of commodities transported along the river, protection from river overflow, and oversight of any attempted assault. Although, the pattern remained almost the same through the end of the Late Ceramic Period, the density and geographic distribution of artifacts and above ground features, reveal that the site boundaries waxed and waned through time. The diachronic changes in settlement patterns and population growth will be further addressed in Chapter 6.

The overall settlement configuration reported for the La Villa valley corresponds with the sixteenth century chroniclers' descriptions of densely populated villages separated by extensive cultivated fields of maize, manioc, and squash. Sites LS-3 and LS-10 seem to have dominated the coastal plain landscape from the Cubitá to the Parita phase. Their internal layout indicates they started off small as separate villages and hamlets unifying themselves through time to form larger type 1 nuclear settlements with dwelling areas, middens, cemeteries, and specialized workshops. Other smaller sites seem to have had specialized functions such as stone tool preparation stations (e.g., LS-21 and LS-32) identified at the edge of the estuary and high-tidal flat. The physical landscape and cultural assemblage of LS-31, on the other hand, suggests it functioned as a *bone fide* fishing village from which inland communities presumably obtained salted fish, shells—for food consumption and the crafting of personal jewelry—and perhaps salt, given their proximity to the high tidal flats.

Southwest of LS-10 is Cerro El Tamarindo, a longitudinal chain of hills that serves as a natural boundary between the coastal plains and the upper reaches of the

PARLV survey universe. This section of the lower La Villa River region is characterized by rolling hills and elevated alluvial terraces. Here, the settlement occupation appears ephemeral when compared with that of the coastal plain. The only nuclear settlement in the area, LS-15, emerged as such after A.D. 1100, along with the type 2 village LA-28, and type 3 hamlet LA-29. The presence of petroglyphs and carved boulders at LS-18, on the other hand, suggests a boundary/ceremonial site in the westernmost section of the PARLV survey universe.

Excluding the circular arrangement of stone-lined-pit "ovens" excavated by the CJDP at LS-3, and the carved boulders found at LS-18, none of the other La Villa River sites, show apparent use of stone construction or carved stone monuments. Further excavations and geophysical surveys are necessary, however, to confirm my statements. Most recently, two separate surveys conducted by Julia Mayo and John Griggs documented pre-Columbian sites with stone-walled terraces at La Pintada, Cerro Cerrezuela, El Cercao, (Mayo *et al.* 2007) and sites along the rivers Belén, Coclé del Norte, and Indio in the Coclé Province (Griggs 2005; see also Cooke 2005). Sites with more impressive architecture have been reported in the Central Atlantic watershed of Costa Rica—Guayabo, Las Mercedes, and La Cabaña—and the Díquis Sub-Region of Gran Chiriquí—e.g., Rivas Site (Fonseca 1981 1992; 1991; Quilter 2004; Snarskis 1992; see also Cooke 2005; Hoopes 2005). The fact that only a small number of Panamanian sites contain evidence of cobble stone pavements, stone column alignments (El Caño, Sitio Conte), platforms and special stone monuments (La Pitahaya, Barriles) has led researchers to suggest that these sites functioned as the special meeting places where chiefs from several provinces congregated to affirm common ancestry, perform pre-war rituals, and conduct games (Cooke 1984a, 2004b; Cooke *et al.* 2003a; Linares 1977b, 1980a; Lothrop 1937; Redmond 1994). Sites such as El Hatillo, which lack stone architecture and statuary, served as the final resting place for influential adult males during the last phases of the Late Ceramic Period (Cooke *et al.* 2003a; Haller 2004). Geographically, El Hatillo also corresponds to the location of *queví Parita's* old settlement (Cooke 1993b; Haller 2004). On ethnohistoric grounds, site Cerro Juan Díaz is the best candidate for the location of *Parita's* new settlement, but as I will discuss in Chapter 6, the low frequency of contact period artifacts inhibits me from proving it. As a matter of fact, evidence for the contact period in the lower La Villa valley is quite scarce compared to previous periods. Evidence from the last occupation phase of LS-3 is more consistent, however, with the Colonial period postdating A.D. 1550.

Chapter 5

Remote Sensing Prospections at the Lower La Villa Sites

5.1 Introduction

Geophysical or remote sensing prospections are non-invasive techniques that allow archaeologists to identify the exact location of culturally generated features in the subsurface. In certain contexts, and depending upon the geophysical technique used, the patterns created by archaeological features are easy to recognize as anomalies compared to surrounding background readings. These anomalies can be measured using passive or active techniques. Passive techniques measure the natural properties of the matrix, while active techniques involve the injection of an electrical current or radar energy into the earth to record a response to subsurface characteristics (Kvamme 2000). Electrical currents can be injected directly by inserting electrodes into the earth, or electrostatically using poles in the air near the ground surface. The PARLV used magnetometry (a passive technique), complemented by resistivity and electro-conductivity (active techniques). Eric Vrba (Department of Archaeology at Boston University) and Alexis Mojica (Department of Physics at the University of Panama/University of Paris 6) conducted the geophysical surveys. Alexis Mojica also helped to process the final data and analysis.

5.1.1 Magnetic survey

A *magnetic survey* measures variation in the earth's total magnetic field across an area (Kvamme 2000: 357). Local variations recorded by magnetic readings depend on the natural levels of magnetic minerals in the soil—basically the three oxides of iron hematite, magnetite, and maghaemite—or the cultural enhancement of magnetic minerals (Dabas and Tabbagh 2000; Kvamme 2000). Magnetic surveys of sites like those in the La Villa valley are ideal for detecting features that have been created by fire, such as burnt clay surfaces, kilns, and hearth features, because they enhance the magnetic properties in the soil. Fire reduces the hematite to magnetite, then upon cooling, the magnetite is partly preserved and partly reoxidized to maghaemite (Dabas and Tabbagh 2000: 336). Filled-in features, like pits and ditches, may also generate magnetic responses recognizable in a survey.

The readings produced by magnetic surveys are measured in nano-Tesla/meter (nT or 10^{-9} Tesla). The depth to which measured features are detectable depends on the strength of the magnetic anomaly and the susceptibility of the material. The depth can also vary depending on the distance between the sensors and ground surface and between the sensor spacing. In archaeological contexts, these are usually confined to the first 2 meters, although they can go as deep as 3 meters (Kvamme 2000).

For the magnetic survey, Vrba used a Geometrics G-858 MagMapper Portable Caesium Vapor Gradiometer owned by the Department of Archaeology at Boston University (Figure 5.1d). This instrument is capable of recording large amounts of data in a short period of time (1 meter/second). On average, it took twice as long to clear the fields of brush than it took the surveyor to collect the data. The surveyed fields were divided into 20 by 20 meter grids, and surveyed using meandering transects. The sensors were separated at 0.75 centimeters. Measurements were taken every meter along

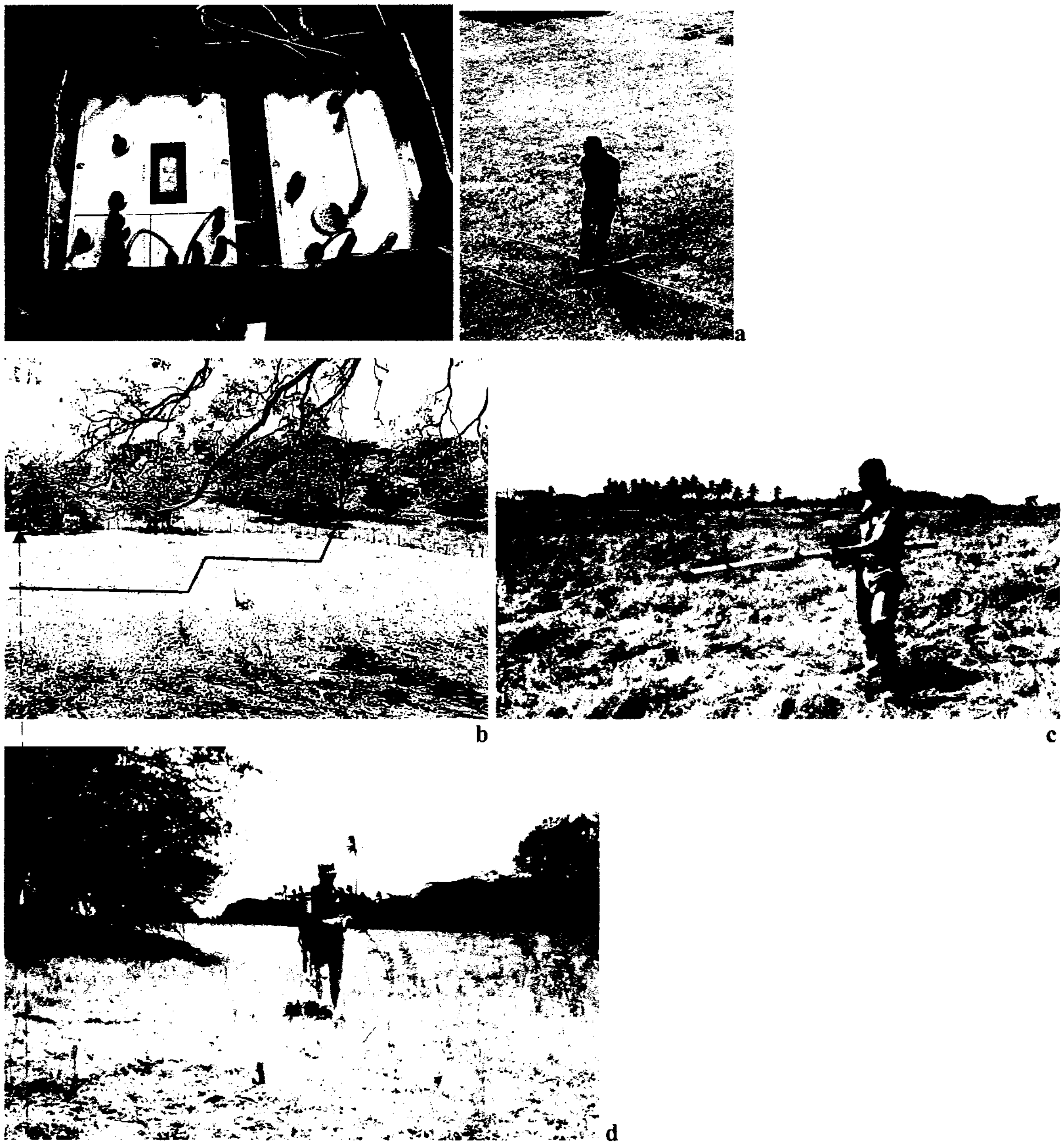


Figure 5.1 Remote sensing equipment used during the PARLV survey.
(a) Geo-resistivity meter *Centre National de la Recherché Scientifique* (CNRS) used by Alexis Mojica during the survey of a low mound located at Station R455 on the northeastern foothills of Cerro Juan Díaz, site LS-3; (b) Total area covered by the magnetic survey of Station 455, LS-3; (c) Alexis Mojica surveying Mound 1 at LS-31 with a Slingram EM-31 Conductivity meter; (d) Using a portable Caesium Vapor Gradiometer (G-858 by Geometrics) Eric Vrba surveys the low mound at Station 455, LS-3. Photos a and b courtesy of Alexis Mojica.

traverses distanced one meter apart. In the laboratory, the data were downloaded into MagMap96 software and processed using Golden Software Surfer 8. For the data manipulation, Mojica used low pass filters provided by Surfer 8 software to emphasize high-frequency changes and smooth statistical noise.

5.1.2 Electrical resistivity

Electrical resistivity measures variations in the capacity of the subsurface to conduct electrical current. A number of factors may influence the resistivity values, including moisture content, soil type, soil particle structure, and dissolved ion content (Clark 1996; Kvamme 2000). Buried archaeological features (walls, pits, etc) and their surrounding matrix (soil, clay, sand) absorb moisture in different ways, creating different levels of current flow (Dabas *et al.* 2000: 165). In this sense, a stone-line or brick feature, such as walls or cobbled paved floors, are typically more resistive than a pit or a ditch feature, for example.

A resistivity survey involves the use of four electrodes, two (A and B) to inject the current into the ground, and the other two (M and N) to measure the voltage. The ratio of voltage to current yields the resistance, which is measured in Ohm-meter (Ωm) (Kvamme 2000: 358). There are several resistivity meter configurations that have had archaeological applications (i.e., Clark 1990). For the PARLV survey, Mojica used a pole-pole (bipole or twin) electrode configuration developed explicitly for archaeological prospections. In this configuration a pair of electrodes (A and M) was moved around the survey grid with a second pair of electrodes (B and N) kept 35 meters apart (Figure 5.1a). Electrodes A and M were separated by 1 meter and the data also collected every meter.

The PARLV survey used the Geo model resistivity meter built at the *Centre National de la Recherché Scientifique* (CNRS), France (Figure 5.1a). Although the meter functions within a range of 18 to 450 milliamperes (mA), the current applied during our survey was limited to 18 mA. The field data were then processed using the Wallis algorithm and the WUMAP program developed by Jeanne Tabbagh at the University of Paris 6. The Wallis logarithm has proven useful for balancing or "equalizing" the overall appearance of an images produced by remote sensing surveyed data (Scollar *et al.* 1986: 630; 1990). The algorithm works best with data containing a wide range of anomaly strengths (Scollar *et al.*1990: 508–512). The algorithm uses local statistics to transform the output of a pixel in relation to the statistics of its surroundings (see Scollar *et al.* 1990: 174–175). In the process the dark and light parts of the selected area are pushed towards the middle range of grays, an operation that is repeated for every pixel in the image. In this way the algorithm helps filter the image noise and enhances the contrast of archaeological features without increasing the contrast of other parts of the picture.

5.1.3 Electro-conductivity

A *Conductivity survey* or *Electromagnetic Induction meter* measures the ground's electric conductivity in millisiemens (mS) per meter (10^{-3} siemens). Unlike resistivity meters, the conductivity meter induces an electromagnetic field through non-invasive means. For the PARLV, Mojica operated a Slingram EM-31 electromagnetic (EM) conductivity meter (Figure 5.1c). This model uses separate transmitting and receiving coils to transmit radio-frequency energy into the ground. When a current is sent into the ground, it generates a secondary magnetic field, which is then sensed and measured by the receiving coil (Kvamme 2000: 362). The signal is determined by the electric and magnetic components of the earth matrix and buried features. In this case, the buried features that present high electric resistance—accumulations of stones and dry sand—are generally low conductors of electricity, while low-resistance features—pits and ditches—are high conductors of electricity. It is important to note that electromagnetic meters are also very sensitive to metals, both ferrous and non ferrous.

The EM-31 model operates at a frequency of 9.8 kHz, and its coils were separated at 3.66 meters allowing greater depth penetration. The depth of the measurements depends on the orientation of the coils, whether perpendicular or parallel to the ground surface. For the PARLV survey Mojica set the vertical dipole at 4 meters, and the horizontal dipole at 2 meters. Although our conductivity surveys proved more time efficient in terms of data collection and space coverage, the magnetic and resistivity surveys yielded better results for our archaeological needs.

5.2 Previous studies

5.2.1 Belén River, Caribbean Coast

The application of geophysics in Panamanian archaeology is relatively new and has focused primarily on colonial sites. The first published study was by archaeologists from Ships of Exploration and Discovery Research (SEDR) during their search for

Christopher Columbus' caravel *La Gallega* at the mouth of the Belén River (Figure 3.1). Eyewitness accounts state that Columbus was forced to abandon the vessel and the outpost of Santa María de Belén after an indigenous attack in April of 1503. To locate the wreckage, SEDR archaeologists used a Littlemore Engineering 7702 proton magnetometer. The magnetic survey was taken in an inflatable boat, guided by two survey stations located ashore (Keith *et al.* 1990). The survey's objective was to identify anomalies characteristic of a wooden-hulled shipwreck carrying ferrous materials and ballast stones. The initial test discovered, however, that the river's magnetic characteristics were very complex. The magnetic gradient across the river mouth (East-West) yielded evidence of a geologic fault underlying the river bed. It also revealed the unexpected presence of pockets of magnetite concentrated in the vicinity of a sand spit, which yielded erratic readings near the river mouth. In spite of these problems, three anomalies revealed signatures typical of a wooden-hulled shipwreck and another three associated with isolated iron objects. After unfruitful attempts to test excavate two of the anomalies archaeologists concluded that the equipment brought to the site was inadequate to dig out the deep, loose sediments of the Belén River (Keith *et al.* 1990: 132). A second test was performed using a prototype of an acoustic subsurface probe (ASP), built by Applied Sonic Inc. for SERD's search of *La Gallega.* To evaluate the ASP's ability to image ballast, an inclined test mound of stones was buried inside a trench. Above the mound of stones, SERD archaeologist built an aluminum pipe frame to guide the inflatable boat carrying the ASP for test readings. Once it was determined that the ASP was capable of imaging stones buried up to 2 meters, a small survey was conducted on the North Bay of the Belén River. The experiment yielded a sonar signature similar to the test ballast mound buried 60 cm below the river bed. Although the anomalies were not tested, the results were encouraging because it was the first remote sensing survey with an archaeological objective.

5.2.2 Panama Viejo, Pacific Coast

In the late 1990s, archaeologists from the recently established Patronato de Panama La Vieja (PPALV) teamed with geophysicists from the University of Panama to incorporate remote sensing surveys into their research program (Rovira 2001, 2002; Pastor *et al.* 2001). Panama Viejo is the first Spanish colonial city founded on the Pacific coast of the Americas in A.D. 1519 (Table 3.1; Figure 2.2). The occupation of Panama Viejo lasted until 1671 when the buccaneer Henry Morgan attacked it and burned it down. After the attack, Panama Viejo is abandoned and in A.D. 1673 the city is relocated 10 kilometers to the west in a defensible peninsula, known as the *Casco Antiguo* or "old town" (Jamieson 2002: 49, Ward 1993: 172–175). Today, the periphery of Panama Viejo has been taken over by uncontrolled urban development, and its center is divided by Cincuentenario Street. Due to the high rate of traffic and vandalism, the Panama Viejo ruins are gradually deteriorating—in some cases the walls of structures are no longer standing. The PPALV created a master plan to prop and consolidate endangered structures, and generate architectural, ethnohistoric, and archaeological studies of a multicomponent site with a rich pre-Columbian and colonial history.

As part of the archaeological investigations, geophysical prospections were conducted using resistivity, conductivity and magnetometry methods to test their potential at the site. The high rate of moving vehicles, presence of transformers, power lines, buried cables, and volcanic and ferric debris posed several challenges. Nevertheless they were still able to gather useful information. Resistivity surveys detected a colonial stone-paved road adjacent to the *Puente del Rey* (Pastor *et al.* 2001: Figure 6), and led to the discovery of anomalies associated with pre-Columbian features at the *Casa Morelos* complex (Martín-Rincón 2002a). A magnetic survey west of *San Francisco Convent* revealed evidence of buried walls that were not corroborated by conductivity surveys of the same area (Pastor *et al.* 2001: Figures 9 and 10). A conductivity survey conducted on the grounds of the *Casa Alarcón* revealed anomalies associated with colonial walls and streets that a magnetic survey of the same area failed to detect due to the presence of volcanic material (Pastor *et al.* 2001: Figures 12 and 14).

According to Pastor (*et al.* 2001: 60), among all of the geophysical techniques applied at Panama Viejo, resistivity yielded the best results. Complementary excavations opened at the *Casa Morelos* complex proved that the detected anomalies corresponded to colonial and pre-Columbian burials and two oval houses, one of them defined by an alignment of cobble stones (Martín-Rincón 2002a). The initial applications of remote sensing in Panama Viejo proved to be a powerful tool for mapping buried structures and targeting potential areas for excavation.

5.2.3 El Caño, Coclé

In 2005, Alexis Mojica and Julia Mayo applied geophysical prospections to the upper reaches of Coclé province in order to survey pre-Columbian sites with stone walls and subterranean features. They used a Geometrics G-858 MagMapper Portable Caesium Vapor Gradiometer magnetic and a Geo model resistivity meter. Their results have been very encouraging, especially at the large ceremonial precinct of Sitio El Caño in Coclé, the only archaeological park in the country (Figure 2.2). The total area covered by the El Caño magnetic survey included 3.41 ha of the ceremonial precinct, while the resistivity prospection extended to 2892 m^2 (Mojica *et al.* 2007). Magnetic survey detected linear anomalies parallel stone-paved causeways on the eastern edge of the site and circular anomalies adjacent to the principal mound features located at the site center (Mojica *et al.* 2007*:* Figures 6–7). The resistivity survey revealed correlative trends with the magnetic data. The few areas of overlap revealed the same linear anomalies as the magnetic data. Test excavations revealed that the linear anomalies correspond to unpaved causeways and drainage features (Mojica *et al.* 2007: 124). It is unknown, however, if the circular anomalies correspond to the same type of features.

Overall, the geophysical prospections of the El Caño ceremonial precinct have been very useful for mapping subsurface features and targeting potential areas for future excavations. With the sponsorship of the Panamanian bureau of science and technology (SENACYT) Julia Mayo is currently creating a center of multidisciplinary research center at El Caño Park and expects to continue the geophysical prospections in the near future.

5.3 Remote Sensing prospections in the lower La Villa sites

The objective of complementing the PARLV settlement survey with remote sensing was to test its potential when studying pre-Columbian sites in a dry tropical environment, where the majority of archaeological features are made-up of perishable materials. Throughout the settlement survey, the PARLV documented relatively intact above ground features (e.g., low mounds, modified hills) that posed interesting challenges for geophysical prospection. Drawing from the results of the CJDP excavations, I was interested in identifying areas that would reveal anomalies characteristic of burnt floor surfaces, burials, ovens or perhaps stone structures. I selected locales that included low mounds and leveled open areas adjacent to mounds and hills from five sites: two sites in the coastal plain (LS-3 and LS-31) and three upriver (LS-11, LS-15 and LS-18). Five different features were selected for survey from LS-3, one from LS-3, two from LS-11, one from LS-15, and two from LS-18. Only three of the surveyed features, however, revealed anomalies of interest for archaeology.

5.3.1 Magnetic and resistivity surveys in the eastern foothills of Cerro Juan Díaz (LS-3)

A low mound located on the northeastern base of Cerro Juan Díaz (Station R455, 566128E 879457N), thought to represent an accumulation of living floors, was selected for complementary magnetic and resistivity surveys. The mound measures 20 meters in diameter and about 30-cm in height. It was divided by a wire fence, so only half of it was surveyed (Figure 5.2). Five grids of 20 by 20 meters were surveyed with the magnetometer. Meanwhile, a smaller area of 10 by 20 meters, adjacent to the southwest corner of the grid, was surveyed with the resistivity meter. The magnetic survey was conducted in April 2002, and the resistivity survey was performed in January 2003.

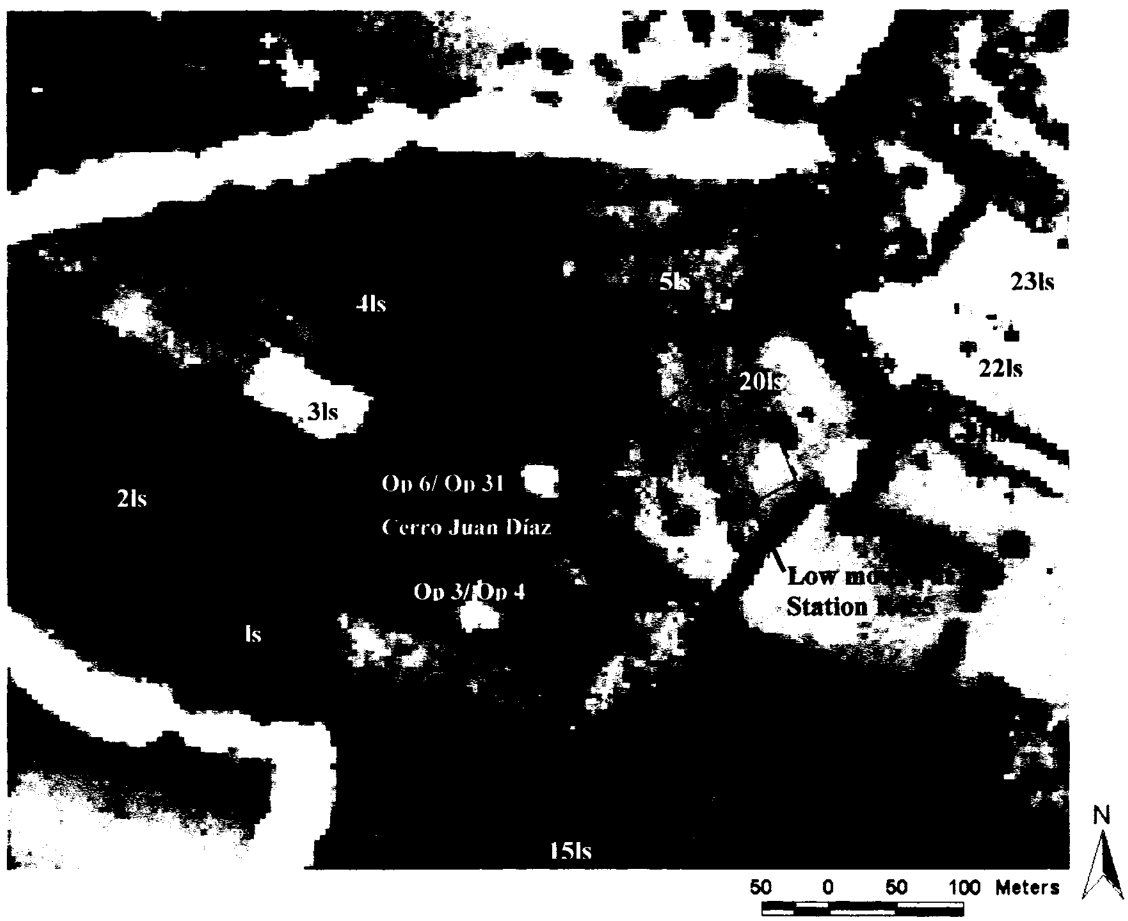


Figure 5.2 Cerro Juan Díaz aerial photo showing the location of Station R455 where the PARLV conducted complementary magnetic and resistivity surveys of a low mound on a leveled section of northeastern foothills. Also shown are the excavation units by the CJDP at the hill summit (Operations 6 and 31) on the southern section of the hill (Operations 3 and 4).

For analysis, the magnetic gradient data were interpolated with a grid-node interval of 0.25 by 0.25 meters in Surfer 8. To emphasize high-frequency changes and smooth statistical noise the data were then filtered through a linear convolution filter, which is a low pass filter. The resistivity data, on the other hand were processed using the Wallis algorithm and the WUMAP program. Subsequently, the resistivity grid was reoriented to the geographic north using the program Transrot (Figure 5.3). The rotation was not possible with the magnetic data because we did not have enough coordinate points to perform the operation.

Anomalies **A, B** and **C** on the magnetic map are profile errors produced by the surveyor and do not have any relationship with an archaeological feature (Figure 5.3). Anomaly **D** on the apparent resistivity map and anomaly **E** on the vertical magnetic gradient reveal evidence of two polygonal features measuring 8.8 by 13.5 m and 12.9 by 14 meters respectively (Figure 5.3). In the case of anomaly D, a resistivity pseudo-section[1]—a survey of the same linear area at different depths done to examine the vertical relationships between sediments, features, and stratigraphy (Kvamme 2000: 361)—shows a leveled floor surface less than a meter deep (Figure 5.4). Only the small circular feature on the southeast corner, with resistance readings close to 200 ohms, reached greater depth. Based on its geometry, depth, and reading, anomaly D is thought to represent the remains of fired clay floor with a pit oven on its edge. Numerous fire-hardened clay floors have been documented by the CJDP at different excavation units opened on the opposite side of the hill.

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[1]For the pseudo-section Mojica used a linear resistivity array w/ multiplexer and multiple probes.

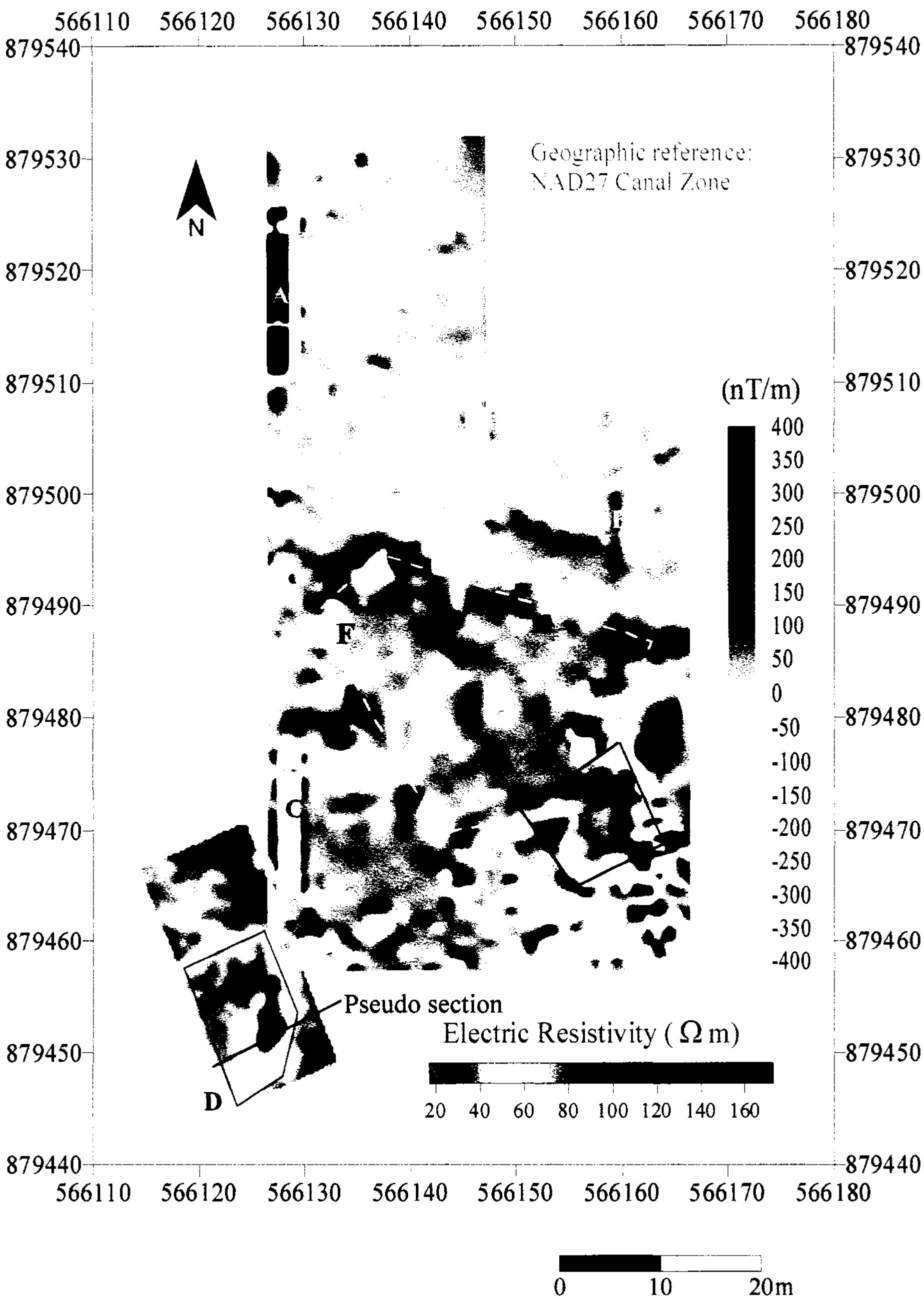

Figure 5.3 Vertical gradient of the treated magnetic field and apparent resistivity of a low mound feature at Station R455, on the northeastern flanks of Cerro Juan Díaz.
Caesium Vapor Magnetometer (G-858) and Geo-Instrument (CNRS).
Anomalies **A, B** and **C** on the magnetic map are profile errors. Anomalies **D** and **E** define two polygonal shaped surfaces measuring 8.8 by 13.5 m and 12.9 by 14 m respectively. These anomalies could represent the remnants of house floors or midden features separated by 30.5 meters distance. The polygon which defines Anomaly **F** exposes different punctual and large anomalies with high magnetic fields. Total magnetic data 25,237. Total resistivity data 208.

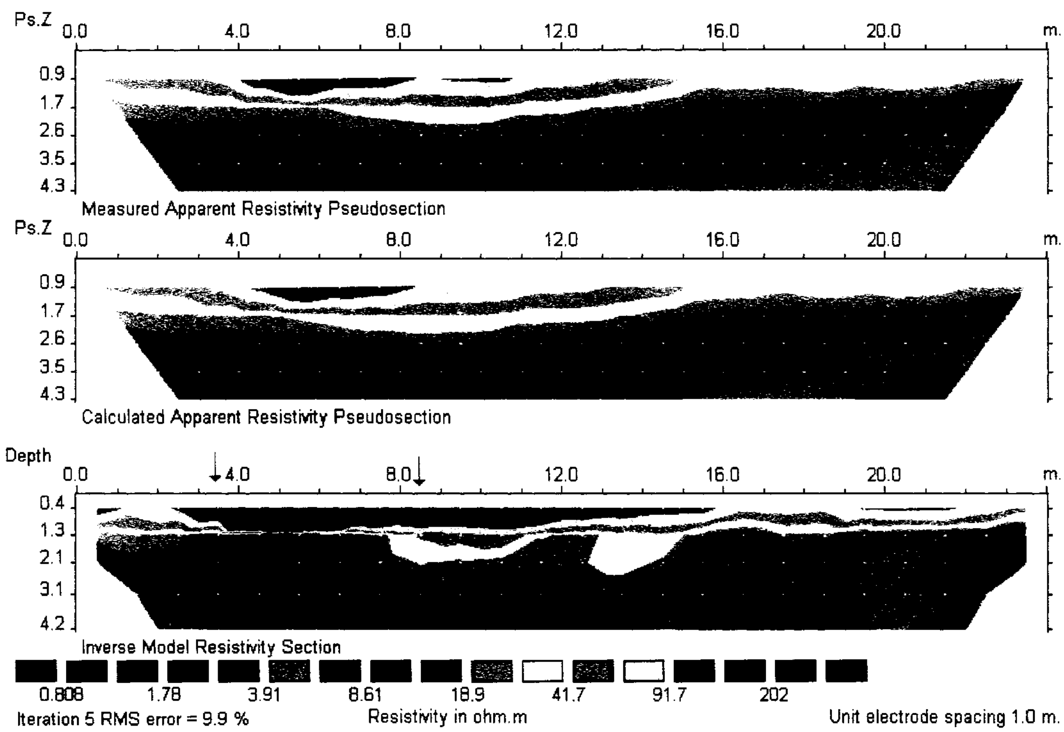

Figure 5.4 Resistivity pseudo-sections of a low mound at Station 455, Cerro Juan Díaz (LS-3). Arrows point to the location of Anomaly D. See Appendix 6 for a diagram of the survey area and field data.

In 1994 I had the opportunity to excavate the remains of a fire-hardened clay floor (Feature 70, Operation 3) measuring 5–14 cm thick. The floor was cut by several shallow interments and a pit oven (Feature 101) dated to A.D. 1030–1300 (Beta-18221, Appendix 1). Both floor and oven were buried under 30 cm of midden deposits and at least the pit oven exhibited dimensions similar to the circular feature identified by the resistivity survey at the edge of anomaly D.

In 2002 Diana Carvajal performed density experiments on the clay floor fragments of the mortuary house she discovered at Operation 6. The test revealed that the floor surfaces had been exposed to temperatures above 1,000° Celsius. According to

Carvajal, the high temperature was probably reached through several firing events and the addition of manure as a temper agent to the clay (Carvajal, personal communication, 2002). Considering the archaeological evidence, anomaly D characterizes a burnt clay surface, perhaps with a burnt post hole or a pit oven, similar to Feature 101 from the CJDP Operation 3. A modern example of a pit oven and hardened clay floor was identified along the river edge during the course of the PARLV survey (Figure 5.5).

Figure 5.5 Modern pit oven identified on the river edge during the PARLV survey. Notice that the surface around the oven is composed of fire-hardened irregular blocks of clay (photo by Eric Vrba).

Similar to the clay floor surfaces identified in archaeological contexts, the surface around to the modern pit oven was hardened through the constant heat exposure. The hardened clay surface is shallow and its top-surface was relatively smooth. This smooth appearance could be a result of the regular sweeping and foot traffic.

In the magnetic map, anomaly **E** is of particular interest (Figure 5.3). Its dimension and high magnetic field measurements points to the presence of a second fired clay floor, perhaps the remnant of a dwelling structure. Unlike anomaly D, the location of this second polygon feature corresponds to the lowest level of the surveyed grid, not associated with a low mound feature. The distance that separates these anomalies is 30.5 meters. At this point is it impossible to discern if these features are from the same time period or not. The surface collection indicates the area was continuously occupied from La Mula phase of the Middle Ceramic until the Parita phase of the Late Ceramic Period.

The polygon defining anomaly **F** corresponds to an alignment of large features with a magnetic fields ranging between 200 and 250 nT (Figure 5.3). The polygon is about 10 by 30 meters. Due to its relatively large area, it is difficult to correlate with anomalies D and E. Because of the high magnetic field, the anomalies may correspond to isolated volcanic boulders or middens with a high content of burnt material.

Overall the geophysical surveys undertaken at Station R455, LS-3 helped me identify two polygonal features, though to represent the remains of dwelling structures. In the case of anomaly D, its location coincides with that of the low mound documented on the southeastern corner of the grid (Figure 5.2). The resistivity pseudo-section of anomaly D revealed that the floor surface was leveled and less than a meter deep. In this regard the results seem to indicate that the floor feature at station R455 represents a single event feature rather than an accumulation of living floors.

5.3.2 Magnetic and conductivity surveys of Mound 1, Site LS-31

Another locality selected for geophysical prospection was Mound 1 (Station R457), located on the precincts of Finca Germán Castillo, at site LS-31. Measuring 60 by 95 meters and about 1.5 meters high, Mound 1 is one of four irregular shaped mounds identified on the northeast side of the second beach ridge (BR2) documented by Bullard (Figure 4.21). The mound was subdivided into grids of 20 square meters to facilitate data collection. Eleven grids covering an area of 4,400 square meters were surveyed using the magnetometer, while a slightly larger area covering 6,000 square meters was surveyed with the conductivity meter. For the analysis the vertical magnetic gradient data were interpolated with a grid node interval of 0.25 by 0.25 m in Surfer 8 and filtered with a linear convolution filter. The process was done to smooth statistical noise. To process the conductivity data Mojica used the Wallis algorithm and the WUMAP program. The results of the surveys revealed valuable correlative information, allowing us to select areas for test excavation (Chapter 4: 213–226).

On the northeast and southwestern corners of the surveyed grid, the horizontal magnetic dipole showed two anomalies with high magnetic fields, anomalies **A** and **C** (Figure 5.6). Only anomaly **A** is shown on the magnetic gradient map, because the conductivity map covers a slightly larger area. In both cases, the area where anomalies were documented corresponds with the sloping sections of the mound. In order to define the type of feature depicted by anomaly A we opened a small excavation unit, *Operation 19-2ls*, on the southwestern section of the survey grid between Mound 1 and Mound 2 (Figure 4.21). The excavation revealed that the sloping section between the mounds was

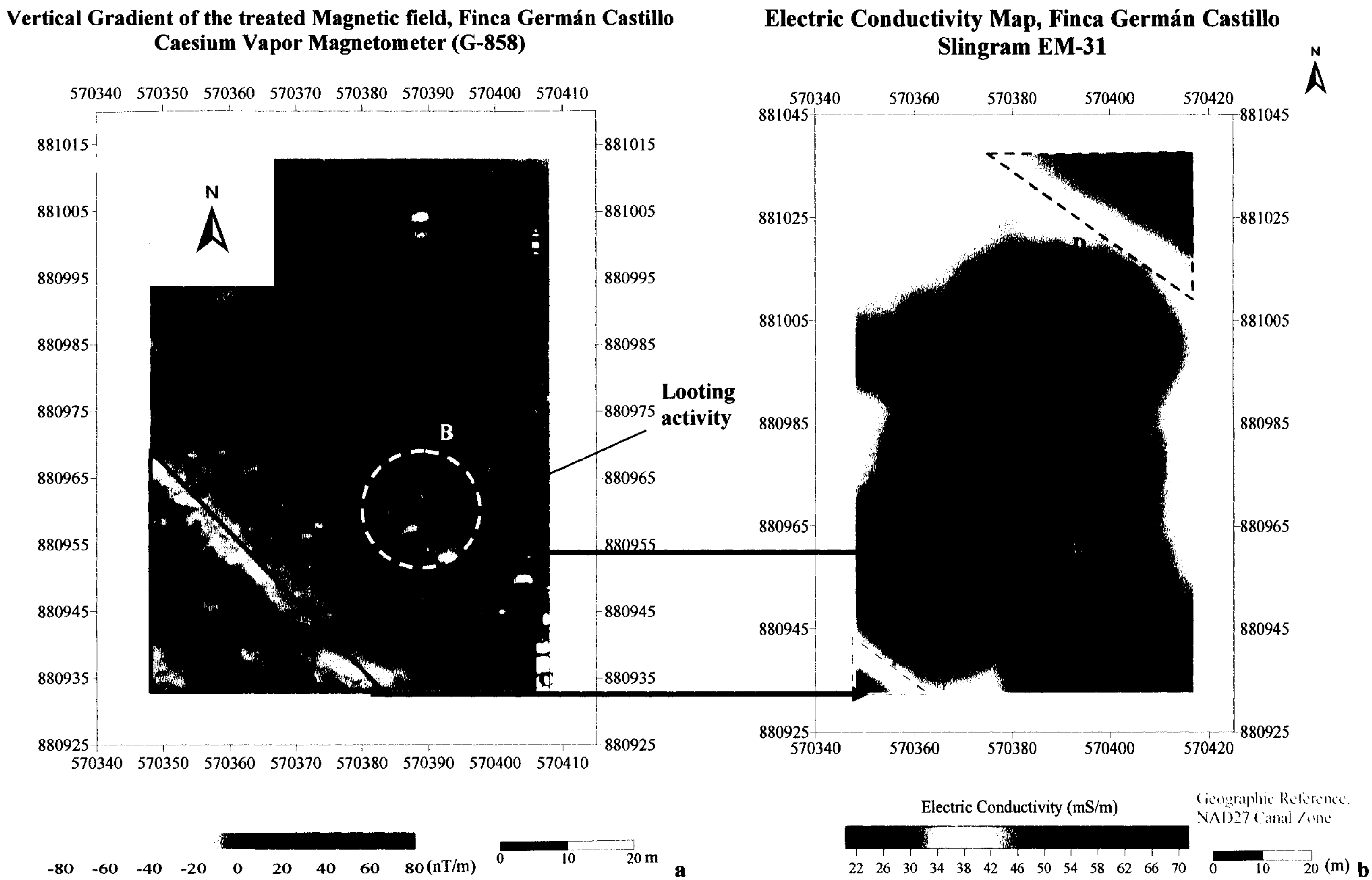

Figure 5.6 Correlation of the vertical magnetic gradient and horizontal magnetic dipole, Mound 1 at LS-31.
(a) The vertical magnetic gradient data was interpolated through a grid of 0,25 x 0,25 in Surfer 8 and passed through a low linear convolution filter;
(b) Horizontal magnetic dipole.

composed of loose sand deposits. Furthermore, given the subtle color changes of the sediments, it was difficult to define the unit's stratigraphy. At 60 cm below the ground surface, we began to identify small pockets of fine-grain sand with abundant black particles that adhered to our trowels (Figure 4.24b). Some of these pockets resembled posthole features, measuring up to 10 cm in diameter. Using a Mössbauer spectrometer to the sediment samples of these feature, Juan Jaén from the *Centro de Investigaciones con Técnicas Nucleares, Universidad de Panamá,* concluded that there were partially oxidized magnetite in the sand (Appendix 5). The presence of magnetite explains the erratic magnetometer readings in this particular area of LS-31. This was not the first time magnetite has affected magnetic surveys in Panama. A proton magnetometer survey performed by the Ships of Exploration and Discovery Research Program at the mouth of Rio Belén, on the Caribbean Coast (while searching for Columbus' caravel Gallega) resulted in erratic readings near a sand spit. A mineralogical analysis of the sediments revealed that the erratic readings were caused by the presence of pockets of magnetite concentrated near the sand spit (Keith *et al.* 1990: 132).

Anomaly **B** in the magnetic gradient map defines an area of recent looting activity, which was revealed by the magnetic survey, but not by the conductivity survey (Figure 5.6). Anomaly **D,** on the other hand results from a profile error not related to any archaeological feature.

Two excavation units, *Operation 19-1ls* (2 by 2 meter) and *Operation 19-3ls* (two 1 by 1 meter columns), were opened close to anomaly **B** where surface collection stations had revealed a significant number of ceramic potsherds. *Operation 19-1ls* and *Operation*

19-3ls exposed well-stratified midden deposits, which had accumulated during the Cubitá phase. However, no obvious pockets of magnetite were discovered in this section of the mound. It is likely that the higher magnetic readings are the result of larger concentrations of ceramic and burnt material present in both units.

In January of 2003—six months after the PARLV field season ended—Mojica returned to LS-31 to survey using the resistivity meter. However, the soils at this ancient coastal settlement were too dry to emit any electrical current and survey the area successfully.

5.3.3 Magnetic and conductivity surveys at Field 102ls, Site LS-15

The area selected for survey at LS-15 was a low hill, close to the La Villa banks, atop which were several hillocks between Field 102ls and 103ls (Figure 4.18). The mounds were covered with a dense accumulation of polychrome ceramics, ground stone tools, and faunal remains, indicating an area of intensive activity. The studied area covered 50 by 100 meters and was surveyed with both a magnetometer and a conductivity meter. The magnetic gradient data were interpolated with a grid-node spacing of 0.50 by 0.50 m in Surfer 8, filtered with a linear convolution filter and rotated using Transrot. The conductivity data on the other hand were processed using the Wallis algorithm and WUMAP program. The results of the surveys revealed some correlation information between the magnetic and conductivity data (Figure 5.7).

On the northeastern side of the conductivity map there is well defined anomaly with high electric conductivity which continues to the north of the hill toward the river.

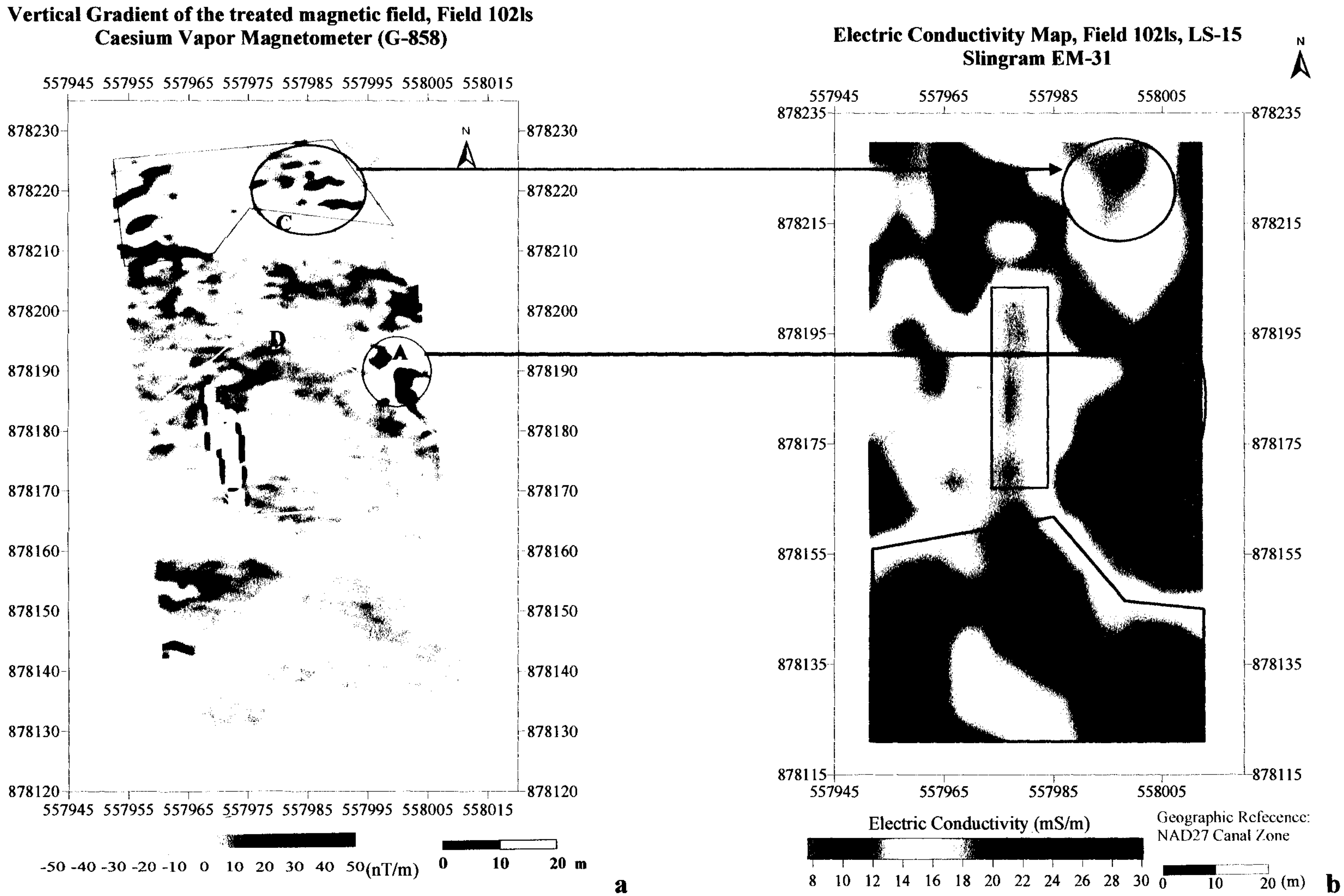

Figure 5.7 Correlation of the vertical magnetic gradient and horizontal magnetic dipole, Site LS-15.
(a) The vertical magnetic gradient data was interpolated through a grid of 0,50 x 0,25 in Surfer 8 and passed through a low linear convolution filter;
(b) Horizontal magnetic dipole.

The zone is related to anomaly **A,** exposing high-magnetic readings in the range of 30 to 50 nT/m (Figure 5.7). Unfortunately, there is no clear definition in either map of structure layouts or any sort of alignment. However, due to plowing and recent looting, the grid surface yielded dense accumulations of manos, metate fragments, adzes, stone polishers, shells, and ceramics. A second anomaly in the central section of the conductivity map also is well defined and oriented in a north-south direction. Assuming that the anomaly is a product of recent excavations, this activity did not seem to affect the magnetic properties of the area, since the magnetic map does not show any correlative trends. Like anomaly A, anomaly **B** did not yield correlative information on the electromagnetic map either. Although defined by a high magnetic field, the conductivity map of the zone exhibits low-electric conductivity. Furthermore our pedestrian survey did not reveal any apparent surface disturbance, suggesting that the zone could still present an intact archaeological feature.

Anomaly **C** on the magnetic map is a profile error. Anomaly **D,** on the sloping section of the hill reveals interesting alignments which could be associated with cultural features. Finally, anomaly **E** shown on the southern section of the conductivity map coincides with the area defined by the basal portion of the hill. This last anomaly is associated with the natural topography of Field 102ls. The area outside the grid and adjacent to anomaly E exposed soft bedrock conglomerate, which was due to plowing and recent bulldozing activity.

5.4 Conclusions

The results of our remote sensing surveys were encouraging. However, I agree with Pastor *et al.* (2001) that resistivity—although time consuming—is the most appropriate method for surveying sites in dry tropical environments like the La Villa valley. Our magnetic surveys also yielded significant information, but in coastal sites like LS-31, as at the mouth of the Belén River (Keith *et al.* 1990) the natural exposure of ferromagnetic minerals such as magnetite caused erratic readings that hindered the detection of archaeological anomalies. Our fruitless attempt to conduct resistivity surveys at LS-31 is due to the timing (during the dry season) in which the prospection took place rather than the method's potential. During the days of our visit to this coastal site the ground was too dry and our ability to record accurate readings was prevented by high contact resistance at the ground surface.

Of the three methods tested, conductivity was the most time efficient, but by itself yielded the least useful data for our needs. Although some correlative trends between the conductivity data and vertical magnetic gradient were apparent, anomalies corresponding to archaeological features were difficult to identify. These challenges were mostly a result of the greater depth capabilities of the conductivity meter, combined with the fact that most archaeological features in the La Villa valley are found at a depth of less than 2 meters.

Our surveyed areas were also relatively small because I wanted to test potential features at a large number of sites. The features selected for prospection included low mounds, hills with gentle slopes, leveled areas adjacent to the mounds and hills, and alluvial terraces. Based on the CJDP research and PARLV surface sampling, these features potentially could reveal evidence of burnt clay floors, stone alignments features, kilns, pit ovens, and/or burials. In the case of the low mound surveyed at LS-3, the resistivity map and pseudo-section profile suggest the presence of a shallow polygonal anomaly characteristic of burnt clay floors, like the ones discovered by the CJPD in the different excavation units opened at the summit and southern side of Cerro Juan Díaz. A second polygonal anomaly of similar dimensions was also documented by the magnetic survey at the base of the hill. I intended to conduct excavations at LS-3 and LS-15, but before I had permission from the land owners, heavy rains impeded any attempt to test the results of our survey. The only site that could be tested at this time was LS-31 located in an ancient coastal zone between the estuary and high tidal flats (*albinas*). During the last two weeks of May 2002, while the districts of Los Santos, Chitré, La Arena and Los Olivos were hit by heavy thunder storms, the *albinas* remained relatively dry late in the afternoon. This allowed me to remain in the area long enough to open three test units. Through our survey and further chemical experiment we proved that the high magnetic field at the edge of the mound was most likely due to the presence of magnetite. While the on the southern slopes of the mound the excavation units revealed middens with a wide diversity of marine fish, birds and shells to be discussed in Chapter 7. Based on the evidence, LS-31 probably functioned as a *bona fide* fishing village, similar to the line of sites located by Cooke and Ranere in the *albina* de El Tigre in Coclé (Weiland 1984: 44).

The PARLV remote sensing tests, like the ones undertaken in the Belén River, Panama Viejo, and El Caño provide hopeful alternatives to future pre-Columbian archaeological studies in the dry tropics. We can only hope that more funded projects will allow non-invasive methods to test sites and plan future excavations. As for the PARLV surveys, I hope one day to return to the sites and test the anomalies identified at LS-3 and LS-15.

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GRADUATE SCHOOL OF ARTS AND SCIENCES

Dissertation

THE ANCESTORS OF PARITA:

PRE-COLUMBIAN SETTLEMENT PATTERNS IN THE LOWER LA VILLA RIVER VALLEY, AZUERO PENINSULA, PANAMA

by

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Chapter 6

Diachronic Changes in La Villa Settlement Patterns

6.1 Introduction

The artifact assemblage documented by the PARLV consisted almost exclusively of pottery and stone tools. The only objects that invite interpretation as costume or sumptuary items are a few ornaments made of shell and bone. No metal was found, even though we know that this technology had been introduced by the La Mula phase of the Middle Ceramic A Period (Table 2.1; Cooke *et al.* 2000; 2003b). This is not surprising since a surface survey that sampled mostly domestic refuse would not normally yield such items, frequently found in the CJDP excavations at LS-3 (Cooke 2004a, 2004b; Cooke and Sánchez 1998; Cooke *et al.* 2003a). It is expected that the future excavation of type 1 and type 2 sites such as LS-8, LS-11, LS-10, LS-15 and LA-28 will yield features and artifacts relevant to the study of status and rank.

Our surveys and excavations also produced a large collection of animal remains, both invertebrate and vertebrate, which were used by the local pre-Columbian and historic communities for food, and to make tools and costume items.[1] The results of the faunal analysis, and my preliminary interpretations, are presented in Chapter 7.

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[1] The analyses of the artifact and zooarchaeological collections were undertaken in the field laboratory headquarters of the Cerro Juan Díaz Project (CJDP) and the *Proyecto Arqueológico del Río La Villa* (PARLV) in Los Santos during the field seasons of 2001–2002, and at STRI's Paleoecological Research Center in Panama City between July of 2002 and January of 2003. While I focused on the ceramic identifications, specialists from STRI and CJDP helped me with the analysis of the faunal and human remains. Richard Cooke and Máximo Jiménez (from STRI) undertook a preliminary analysis of vertebrate remains; Diana Carvajal (CJDP/ University of Calgary) made the shell identifications; and Claudia Díaz (CJDP) analyzed the human remains. The chipped and ground stone tools were not analyzed; therefore, my comments on them are general, based primarily on field notes and laboratory observations made by Richard Cooke, Anthony Ranere, and Alberto Ruíz.

Prior studies of the artifact assemblages of the culture area of Gran Coclé identified many categories of pottery and stone tools, which can be assigned to specific phases with varying degrees of precision. For this reason, I made ample use of these diagnostic artifacts to assign a temporal estimate to each site in relation to the regional chronological sequence (Table 2.3). This information enabled me to evaluate diachronic changes in the settlement history of the lower Parita river valley, and to compare the patterns I observed with information obtained by archaeological surveys in other river catchments bordering Parita Bay.

6.2 The PARLV pottery collection

The copious PARLV pottery collection comprises sherds and semi-complete vessels that are typical of the pottery tradition that evolved in Gran Coclé (Cooke and Sánchez 1998, 2004: 17; Cooke *et al.* 2000). Pottery appeared in the regional record during the third millennium B.C. The earliest ceramic complex, Monagrillo, is dated between 2500 and 1200 B.C. (Cooke 1995, 2005). The polychromy and imagery for which the Gran Coclé tradition is best known did not appear until the end of the first millennium B.C. when the first of the sequential painted styles (La Mula) materialized (Isaza 1993).

Several studies have summarized the development of Gran Coclé pottery through time. The first detailed descriptions were those of Lothrop (1942) who analyzed the large collection he recovered at Sitio Conte (PN-5) identifying a polychrome style, which he assigned to two phases—"Early Sitio Conte" and "Late Sitio Conte"—and describing bichrome, monochrome and modeled wares. Lothrop noted that non-polychrome wares often employed the same vessel shapes as the painted wares. He proposed that the Sitio Conte pottery assemblage spanned 190 years (A.D. 1330–1520) basing his estimate on the stratigraphic sequence of graves and assuming that the latest were coeval with Spanish contact. Subsequent studies that took advantage of radiocarbon dating and/or stratified refuse deposits modified Lothrop's chronology identifying, not only earlier and later styles of painted pottery, but also more simple, antecedent complexes, e.g., Monagrillo and Sarigua (Ladd 1957, 1964; Willey and Stoddard 1954; Willey and McGimsey 1954).

Temporal and spatial refinements to Lothrop's scheme began to appear in literature as soon as the radiocarbon dating method demonstrated that the Conte polychromes were likely to have been earlier than Lothrop originally thought by 500 to 1000 years (Linares 1968; Lothrop 1959; Baudez 1963). This revision process continued through the 1970s when Richard Cooke surveyed sectors of the Coclé province (Cooke 1972, 1976b, 1976c) and Alain Ichon the eastern and southern sectors of the Azuero Peninsula (1980). This work improved archaeologists' knowledge about spatial variability in ceramics across Gran Coclé, a research topic that urgently needs to be addressed with physical analyses of clays and pigments.

Particularly important changes and additions resulted from Hansell's dissertation research at La Mula-Sarigua (PR-14; Hansell 1987, 1988), Isaza's analysis of materials excavated by Cooke at Sitio Sierra (AG-3) in 1970–75 (Isaza 1993), and Sánchez's preliminary description and analysis of pottery recovered in the initial stages of the CJDP

(Sánchez 1995). Hansell and Isaza defined a new polychrome style, La Mula, which appears to anchor the Gran Coclé tradition in time. Sánchez defined a style intermediate between the Tonosí and Early Conte styles, to which he assigned the term Cubitá.[2]

The pottery descriptions included in all the above references make use of classificatory categories, which are standard in New World archaeology, i.e., "wares", "types", "varieties and sub-varieties", and "styles." Some descriptions also concentrate on classifying "modes," i.e., appendages, bases, and applied decoration, which do not always coincide with other categories that tend to focus on painted decoration such as "type", "variety" and "style" (e.g., Sanchez 1995). The use of these terms over sixty years has by no means been uniform; but bearing in mind the temporal readjustments to which I have just referred to, there is a fair degree of harmony among published sources.

From the perspective of the PARLV survey, it was important that I focused on those established classificatory categories, which made the best sense from a temporal point of view. Obviously, when one is dealing with mostly surface-collected materials, and mostly potsherds, rather than whole vessels, erosion of surfaces and extreme fragmentation limit the precision of the identifications. That is why my classificatory categories of pottery have variable temporal precision. For example, the types that Sánchez (1995) defined for the Cubitá polychrome style are, for the most part, quite firmly anchored temporally between ca. A.D. 550 and 700. When they are well preserved they can be confidently identified. When their surfaces are eroded, however,

[2] Alain Ichon (1980) identified groups of sherds and vessels that he considered transitional between Tonosí and his Joaquín style pottery (the local equivalent of Early Conte; see Table 2.3). The Cerro Juan Díaz excavations led to the regrouping and renaming of some of Ichon's categories based on radiocarbon dated sherd samples (Sánchez 1995).

they can be confused with La Mula, and Tonosí polychromes, but are often distinguishable from sherds belonging to later styles (Conte and Macaracas). This is because the full palette[3] of Gran Coclé polychromy did not develop until the Early Conte style—made famous by Lothrop's excavations at Sitio Conte. This style is now dated between about A.D. 700 and 950 (Cooke *et al.* 2000). For this reason, many painted sherds that could not be assigned to styles, types and varieties, could be assigned to period (i.e., Middle or Late Ceramic). Similar differences in temporal precision affect non-painted "wares." For example, a group of red-painted plates has a rim form that is also used on Conte style polychromes (Lothrop 1942: 135–142). These are firmly anchored to the Conte phase of the Late Ceramic period. Other red wares, however, such as "Escotá" and "Girón Red" (Ladd 1964; Cooke 1972) or "La India Red' (Ichon 1980) appear to span a wider period.

Sometimes modes and pastes can be temporally informative. For example, a paste that fires brick-red and often has homogenous (probably crushed rock) particles, is not used during the Middle Ceramic period, but becomes frequent in the Late Ceramic period. This probably reflects a growing regional specialization in pottery manufacture across Gran Coclé although, without physical analyses of clays and tempers, there is no way we can prove this at the moment. The presence of sherds with these pastes in the PARLV samples allowed me to place them temporally in the Late Ceramic period even when I could not identify temporally more precise styles. In the same way, certain

[3] Microscopic analyses requested by Lothrop (1942) suggested that the pigments used by this time were derived from inorganic materials readily available in the region: red, purple, and brown hues were obtained from red ochre and red hematite and/or limonite; black from manganese minerals; and white from kaolin clay (Lothrop 1942: 13; Linares 1977b).

categories of handles are sometimes clearly assignable to a period. A heavy handle placed horizontally in the upper body of large neckless vessels is stratigraphically associated with Parita and El Hatillo vessels from the Late Ceramic Period. Sometimes these handles are very abundant. Hansell (1988) proposed that their distribution at La Mula-Sarigua may have been related to the use of the high tidal flats that grew up in front of this site, for boiling down salt.

My analysis of the PARLV pottery samples uses the most recent re-evaluations of the spatial and temporal divisions of the Gran Coclé ceramic tradition, which divides the sequence into three main periods (Early, Middle and Late) and subdivided into 12 ceramic phases, 22 ceramic styles, 40 types, and more than 40 varieties (Table 6.1). The current references are: Cooke *et al.* 2000, 2003a; Hansell 1988; Isaza 1993; Mayo 2004; Sánchez 1995, 2000. Earlier monographs that I consulted continually are: Cooke 1972; Lothrop 1942; Ladd 1964; Ichon 1980. The ceramic descriptions that follow are intended to provide a general background on the styles and other classificatory categories collected by the PARLV. The name of a phase and ceramic style may coincide with that of the site or region where it was first discovered. This does not imply, however, that such pottery categories were necessarily approximate in space with the geographic terms used to identify them typologically—a fact that for a long time led to considerable confusion regarding real boundaries on the isthmus (Cooke 1972, 1976). For example, the Monagrillo phase is named after the earliest dated ceramic complex discovered at Monagrillo-type site (HE-5) located in the *albina* El Tigre, Parita Bay (Willey and McGimsey 1954), but is now known to have been used well beyond the coastal lowlands

Table 6.1
Gran Coclé Ceramic Typology

Period	Complex	Style	Type	Variety
Colonial	Mendoza	El Hatillo Limón (Caribbean) Spanish wares	Mendoza	Varieties A-C
Late Ceramic D	El Hatillo	El Hatillo	Mendoza El Hatillo polychrome	Varieties D-E Jobo, Espalá, Achote
Late Ceramic C	Parita	Parita	Parita polychrome Jobero Biscuit	Anón, Caimito, Níspero, Ortiga, Yampí
Late Ceramic B	Macaracas	Macaracas	Macaracas polychrome Red Buff Ware Smoked Ware	Higo, Pica-pica, Cuipo
Late Ceramic A	Conte	Conte	Conte polychrome Conte red Red Line Buff and Red Buff La India Red Smoked Ware	
Middle Ceramic C	Cubitá	Black over red group Black & red/ white Black & white/red Monochrome group Cubitá red Modeled decorated group	Ciruelo Guábilo Cábimo Nance Marañón Sigua Caracucho Espabé red Juncal Harino Guachapalí Madroño Zumbo Arcabú Quira Macano Culebra appliqué	Ciruelo, Jagua, Gallito Varieties 1-3 Sangrillo white lines Sangrillo white dots Cocobolo
Middle Ceramic B	Tonosí	Tonosí trichrome Infiernillo Tiñidero Aristide	Black & white/red Black/white or Cream Cocobó Girón Escotá	

Table 6.1 (continued)

Period	Complex	Style	Type	Variety
Middle Ceramic A	La Mula	Aristide La Mula	Escotá (early forms) Painted group Plastic decorated group	 La Mula trichrome Minitas Manzanillo Castillo
Early Ceramic C	Agallito	El Agallito		
Early Ceramic B	Sarigua	Sarigua Plain Guacamayo	Sarigua plastic decorations	Appliqué Shell Stamped Punctuated Striated
Early Ceramic A	Monagrillo	Monagrillo	Monagrillo	Plain Red Incised Thin yellow

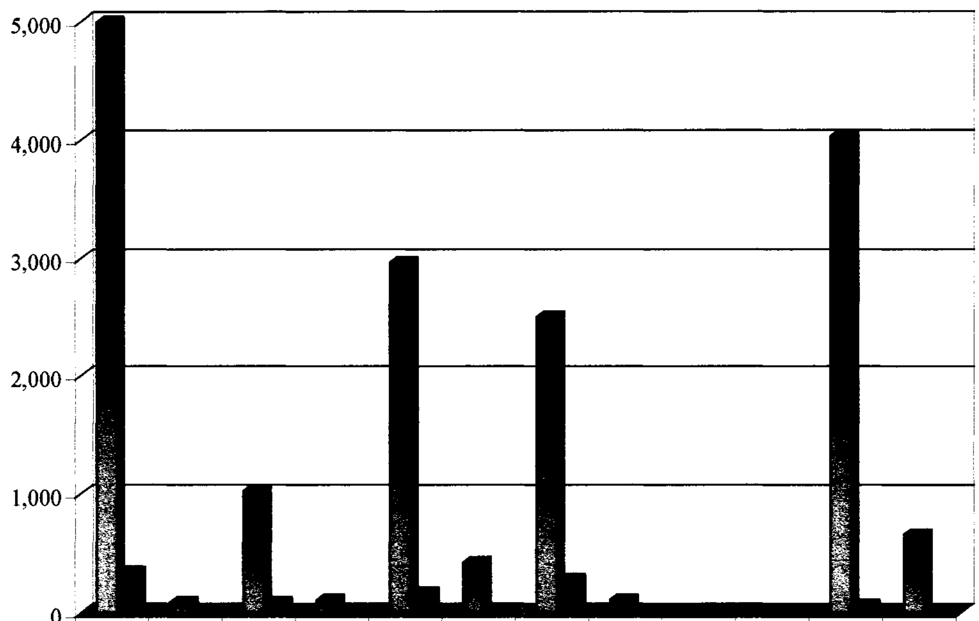
of the Azuero Peninsula (Griggs 2005). Ichon (1980) thought the Tonosí polychromes were first developed in the Tonosí river valley at the south of the Azuero Peninsula (Figure 2.1) whereas they are now known to have a considerably wider distribution (*cf.* Ichon 1980; Cooke and Sánchez 2003).

Although the first Early Ceramic phase (Monagrillo) is quite well anchored in time, there follows a poorly understood period of about 700–1000 years (Early Ceramic B–C). Temporal precision improves with the advent of the La Mula polychrome style, which has now been associated with 27 dates at stratified sites (Appendix 1). The best-defined periods of the sequence are the Middle and Late Ceramic with phases that range between 150 and 300 hundred years (Table 6.1). These phases have been defined with reference to stratigraphic excavations, seriation, and radiometric dates.

Because of its great abundance and time constraints I was only able to analyze about 60% of the total PARLV pottery collection. The analyzed sample comprises: (1) 17,043 artifacts from 991 surface collection stations set at 12 sites and (2) 18,585 artifacts from eight excavation units opened at four sites (Figure 6.1). We also recovered 11 incomplete vessels, 12 complete vessels, 2 effigy whistles, and 2 ceramic spindle whorls.

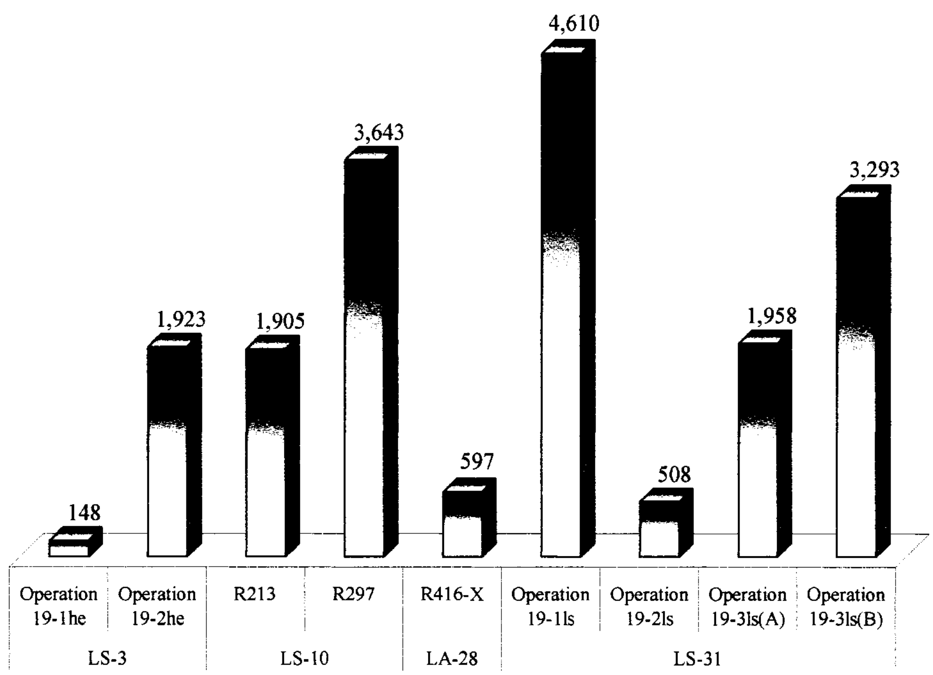
Only 16% of the analyzed surface collection is typologically diagnostic (Table 6.2). The remaining 84% of the sample cannot be assigned objectively to a category representative of a particular phase, but is appropriate for attribution to longer periods. In such cases I looked at the overall characteristics—paste, temper, treatment, decoration—in order to assign them to more general categories: Middle Ceramic B–C (sherds sharing characteristic of Tonosí and Cubitá phase pottery), Late Ceramic A–C, Late Ceramic C–D, and Colonial Period. The undiagnostic sherds and miscellaneous body forms that exhibit characteristics shared by several styles from the Cubitá through Macaracas phase were grouped together under the heading Middle/Late Ceramic (Table 6.2).

The high frequency of miscellaneous sherds and non-diagnostic forms in relation to diagnostic ones repeats itself in the excavated samples (Tables 4.4–4.10; see also Carvajal 1999: Table 18; Sánchez 1995: 120–122). The frequency of the different pottery styles and their variants per site, including the number of collection stations, is given in individual tables set for each ceramic phase.



	LS-3	CHI-6	LS-8	LS-9	LS-10	LS-11	LS-15	LS-18	LS-22	LS-23	LA-28	LA-29
No. potsherds	5,085	90	1,025	110	2,967	423	2,503	111	4	35	4,031	659
No. stations	341	3	89	4	168	5	282	2	3	3	71	20

a



b

Figure 6.1 PARLV pottery collections.
(a) Sample from surface collections (Total sample 17,043 from 991 collection stations).
(b) Sample from controlled excavation units (Total sample 18,585). See also Tables 4.4–4.10.

Table 6.2
Frequency of pottery sherds from the surface collections from twelve sites in the lower River La Villa

Site No. collection stations	LS-3 341	CHI-6 3	LS-8 89	LS-9 4	LS-10 168	LS-11 5	LS-15 282	LS-18 2	LS-22 3	LS-23 3	LA-28 71	LA-29 20	Total 991		
Ceramic complex														**%[1]**	**%[2]**
Colonial Period	30		7	5	6		567	44		26	701	5	**1,391**	**8**	
Late Ceramic C–D							1,331	58			2,645		**4,034**	**24**	
El Hatillo	3						2	1				9	**15**	**0.1**	**0.5**
Parita	102		13		25		15	8			179	37	**379**	**2**	**13**
Late Ceramic A–C	231	4	104		1,097	11	573			4	451	553	**3,028**	**18**	
Macaracas	67	1	5	1	65		6		1		9	22	**177**	**1**	**6**
Conte	129		45	8	848	117	4			2	42	29	**1,224**	**7**	**42**
Middle/Late Ceramic	4,021	84	634	87	679				3				**5,508**	**32**	
Middle Ceramic B–C	135		4	1	18					2			**160**	**1**	
Cubitá	326	1	205	6	187	292	2			1	3	2	**1,025**	**6**	**35**
Tonosí	30		8	2	42	3	3				1	2	**91**	**0.5**	**3**
La Mula	11												**11**	**0.1**	**0.4**
Total	**5,085**	**90**	**1,025**	**110**	**2,967**	**423**	**2,503**	**111**	**4**	**35**	**4,031**	**659**	**17,043**		
%	**30**	**0.5**	**6**	**0.6**	**17**	**2**	**15**	**0.6**	**0.02**	**0.2**	**24**	**4**			

[1] Percentage of total sample
[2] Percentage of typologically diagnostic sherds

6.3 Diachronic Changes in La Villa Settlement Patterns

The PARLV surface collections and test excavations suggest that most sites in the lower La Villa valley are multicomponent and in part coeval with settlement occupation of Cerro Juan Díaz (LS-3). Most sites, however, post-date the Tonosí phase of the Middle Ceramic C Period (Table 4.2).

In Chapter 2 it was noted that humans first arrived in the area at the end of the Late Glacial Stage and that their cultural remains have been located at La Mula-Sarigua, Sitio Nieto, and Vampiros-1 (AG-145). It would be logical to assume that the lower La Villa valley was traversed or settled by people during this early period given the proximity of La Mula-Sarigua and Sitio Nieto (Figure 2.2). However, I did not record Paleoindian or Early Pre-Ceramic artifacts in our survey universe. In the northern Parita Valley Haller found a bifacial thinning flake, which is either Paleoindian or Early Preceramic (Haller 2004: Figure 2.9).

6.3.1 Early Ceramic A, Monagrillo Phase (2400–1200 B.C.)

Only site LS-5, situated on an exposed beach at the mangrove swamp, provides evidence of crudely fired sherds, perhaps grit-tempered, perhaps using dirty clay, which may correspond to the Monagrillo Plain type *sensu* Willey and McGimsey (1954: 58–61). As stated in Chapter 4, the Monagrillo complex is characterized by simple globular and sub-globular bowls and collarless jars lacking appendages, some of which are decorated with simple punctate or incised linear designs (Figure 2.3). Thin red lines or band designs were used, but only in the later period of their production.

Although isolated, the geographic situation of LS-5 correlates with that of other Early Ceramic sites formerly documented along the littoral of Parita Bay (Figure 4.4). It is possible that others lie buried under the alluvium or other geomorphological features related to the active meandering system at the La Villa delta. Other investigators also suggested that poor visibility of early sites in the Santa María and Parita valleys may be partly a function of burial by evolving landforms in coastal deltas (Clary *et al.* 1984; Haller 2004).

I did not find evidence on the PARLV pottery sample for occupation in the La Villa valley during the approximately one thousand years that elapsed between the Monagrillo and La Mula phase (200 B.C.). However, a few sherds recovered during the CJDP excavations on the southern flanks of Cerro Juan Díaz suggest that people were living on this site during the Early Ceramic B Period (Table 6.1; Cooke and Sánchez 2003a: 17). This material includes the rims of plates with deep incisions that were originally filled with a white substance, probably calcium carbonate (Cooke and Ranere 1992c: Figure 9m; Hansell 1988: Figure 37 k; Isaza, 1993: Figure 5). Sánchez provisionally assigned this vessel type to the El Agallito complex, which he defined on the basis of a shallow refuse lens at La Mula-Sarigua (context '242S417E'). This produced two calibrated marine shell dates whose 2-sigma range is cal. 760–415 B.C. (Beta-6016) and cal. 500–200 B.C. (Beta-21898; Appendix 1).

6.3.2 Middle Ceramic A, La Mula Phase (200 B.C.–A.D. 250)

The La Mula phase is characterized by improving crafting standards in pottery and stone tools. Some La Mula phase pottery types are very well made, with carefully selected clays that are either temper-less or have very fine anti-plastic. Surfaces are well smoothed and polished, including the interiors of vessels with closed mouths. These technical advances are exemplified by a group of vessels known as La Mula trichromes (Hansell 1988: 160–161; Isaza 1993: 88–93). These large globular jars with open collars are decorated with (1) thin vertical black lines running from the rim to the neck, (2) circumferential black lines painted around the neck, and geometric and/ or stylized zoomorphic motifs, and (3) designs painted in black and black and red over the natural color of the paste or a red or white slipped surface (Figure 6.2). Zoomorphic motifs include painted serpents, amphibians and birds, which bear resemblances to others found in the gold and shell work of later periods (Figure 6.2; Cooke *et al.* 2003a). Coeval with La Mula trichrome vessels, artisans developed a variety of collared jars with incised, grooved, or punctate line designs known in the literature as Minitas, Manzanillo and Castillo varieties (Ichon 1980: 45–77).

La Mula style pottery has been associated in firm stratigraphic contexts at La Mula-Sarigua, Sitio Sierra, and Cerro Juan Díaz, around the Parita Bay littoral. It was also identified at 12 sites in the Tonosí Valley[4] (Ichon 1980: 45–77), at Isla Carranza site in the Charges Basin (Cooke 1976: Figures 3–4), and Las Huacas in the Gulf of Montijo (Cooke 1976: Table 1). Las Huacas is the only site professionally excavated in Gran Coclé where complete La Mula urns have been discovered, all of them in mortuary contexts (Figure 6.2).

[4] In the Tonosí valley La Mula corresponds to Ichon's Javillo ceramic complex of the Búcaro phase.

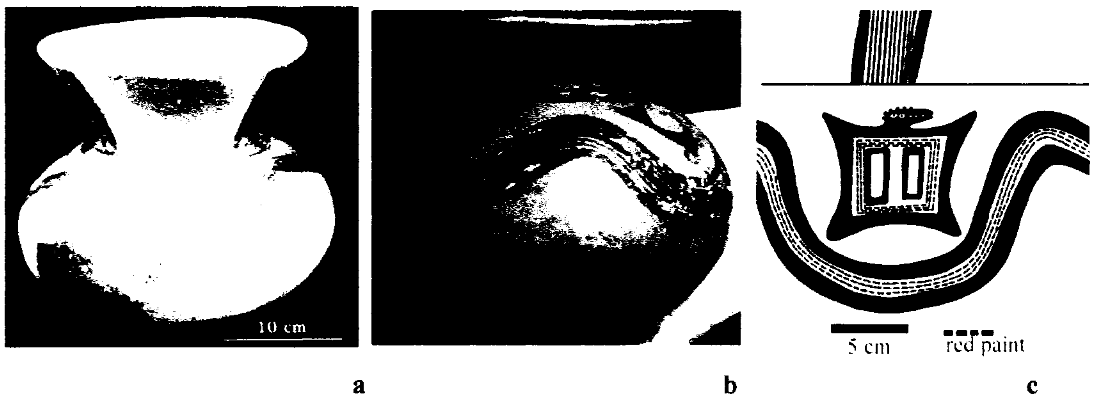


Figure 6.2 La Mula style jars from Las Huacas, Veraguas (200 B.C.–A.D. 250).
(a) Height 38 cm; (b) Height 42 cm; (c) Drawing from the exterior of La Mula jar from Las Huacas (Museo Antropológico de Panama, Photographs courtesy of Richard Cooke; drawing by Ilean Isaza, original in Isaza 1993: Figure19).

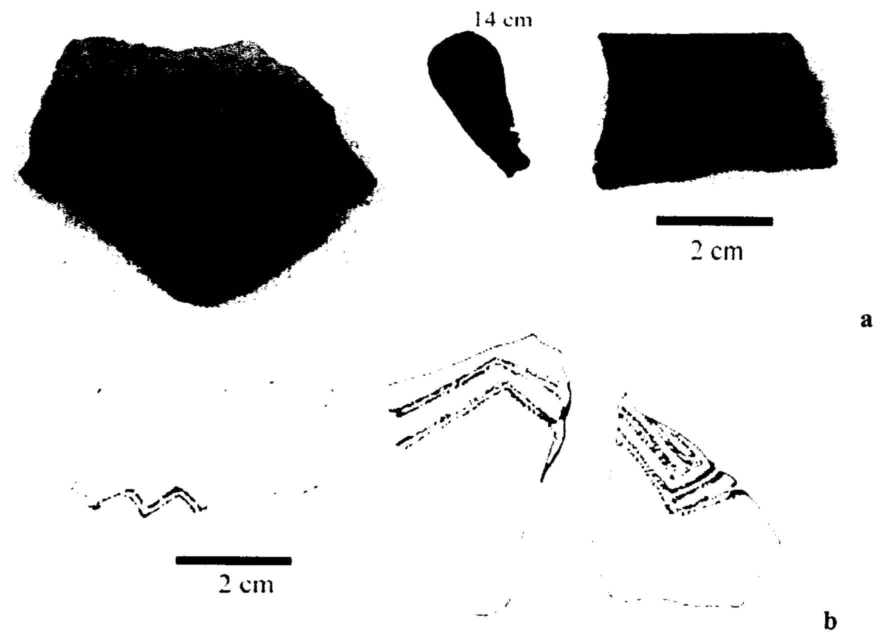


Figure 6.3 Plastic decorated La Mula potsherds from LS-3.
(a) cat 19he-F32 and cat 19he-F33, Operation 19-2he, Stratum 3, N 75–80 cm (*cf.* Ichon 1980: Plate XI k; Sánchez 1995: Figure 118b; Cooke and Ranere 1992b: Figure 8g). (b) cat 20ls-F1, cat 20ls-F2, cat 20ls-F3, Station R6 (*cf.* Sánchez 1995: Figure 118a-k; Ichon 1980: Plate XI l-m).

La Mula phase ceramics from the La Villa valley were collected at locales that had been heavily disturbed, either by heavy machinery excavation, looting activity, or surface erosion. The samples from both surface collection and excavation units include fragments of La Mula trichrome and Minitas incised jars (Tables 4.5, 4.7, and 6.3). These diagnostic pieces similar to samples reported from La Mula-Sarigua, Búcaro (TI-22) in the Tonosí Valley, as well as those documented by Sánchez from Cerro Juan Díaz Macrostratum C (*cf.* Figure 6.3 with Cooke and Ranere 1992c: Figure 8g; Ichon 1980: Plate XI k–m; Sánchez 1995: Figure 118a–k).

Table 6.3
Frequency of La Mula phase pottery sherds from the PARLV surface collections

Site	LS-3 CJD	LS-3 CJG	LS-3 CT	Total	*%
No. Stations	2	2	2	**6**	
La Mula					
La Mula trichrome	1	2		**3**	**25%**
Plastic decorations	7		2	**9**	**75%**
Total	**8**	**2**	**2**	**12**	

* Percentage of La Mula varieties

Given the small size and scattered distribution of diagnostic La Mula ceramics, it is difficult to determine accurately the extent of the La Mula phase occupation in the lower La Villa valley. At LS-3 insufficient La Mula ceramics were exposed on the surface to plot their continuous distribution, unlike at La Mula-Sarigua where extensive deflation exposed large amounts of surface pottery (i.e., Haller 2004: Figure 4.1; Hansell 1988). The CJDP recovered a larger and well-preserved sample of La Mula complex pottery in an excavation (Operation 5) located on the purported ritual platform and its talus, on the southern side of Cerro Juan Díaz (Figure 4.6a). Smaller samples were also documented throughout different Operation units. Therefore, it is likely that the surface finds grossly under-estimate the density of La Mula phase occupation. Judging from the distribution of La Mula ceramics reported by the CJDP and PARLV survey, I propose that during this period people lived in small hamlets at the base and flanks of Cerro Juan Díaz covering a minimum area of 6 hectares (Figure 6.4).

Separate finds from the northern Herrera banks and the results of test excavations at Operation 19-2he (Table 4.5) suggest that a smaller group of people lived on the southern side of both Cerro Juan Gómez (2.6 ha) and Cerro Tello (1 ha). The distances that separate these hamlets from Cerro Juan Díaz are 200 and 500 meters respectively (Figure 6.4).

Farther inland, the only other area that yielded evidence of La Mula phase occupation was Station R297 in Las Huertas Los Pozos, on the Herrera banks of LS-10 (Figure 6.4). During the cleaning of a looter pit and the test unit opened adjacent to it, a small number of Minitas incised type sherds, belonging to the La Mula complex, were found, along with varieties of the Escotá type, which occurred coevally with La Mula polychromes at Sitio Sierra (Isaza 1993). All this La Mula phase pottery was present in the fill of a stratum dominated by Late Conte ceramics (Figure 4.16).

In conclusion, I propose that human settlement in the lower La Villa valley during this phase focused on the coastal plain just as it did in the neighboring Parita valley (Haller 2004). The only site with substantial evidence for this period is Cerro Juan Díaz where the initial growth of the site was probably influenced by its location in the coastal valley for planting crops in the rich alluvial soils and for using the river for the transport of materials and goods.

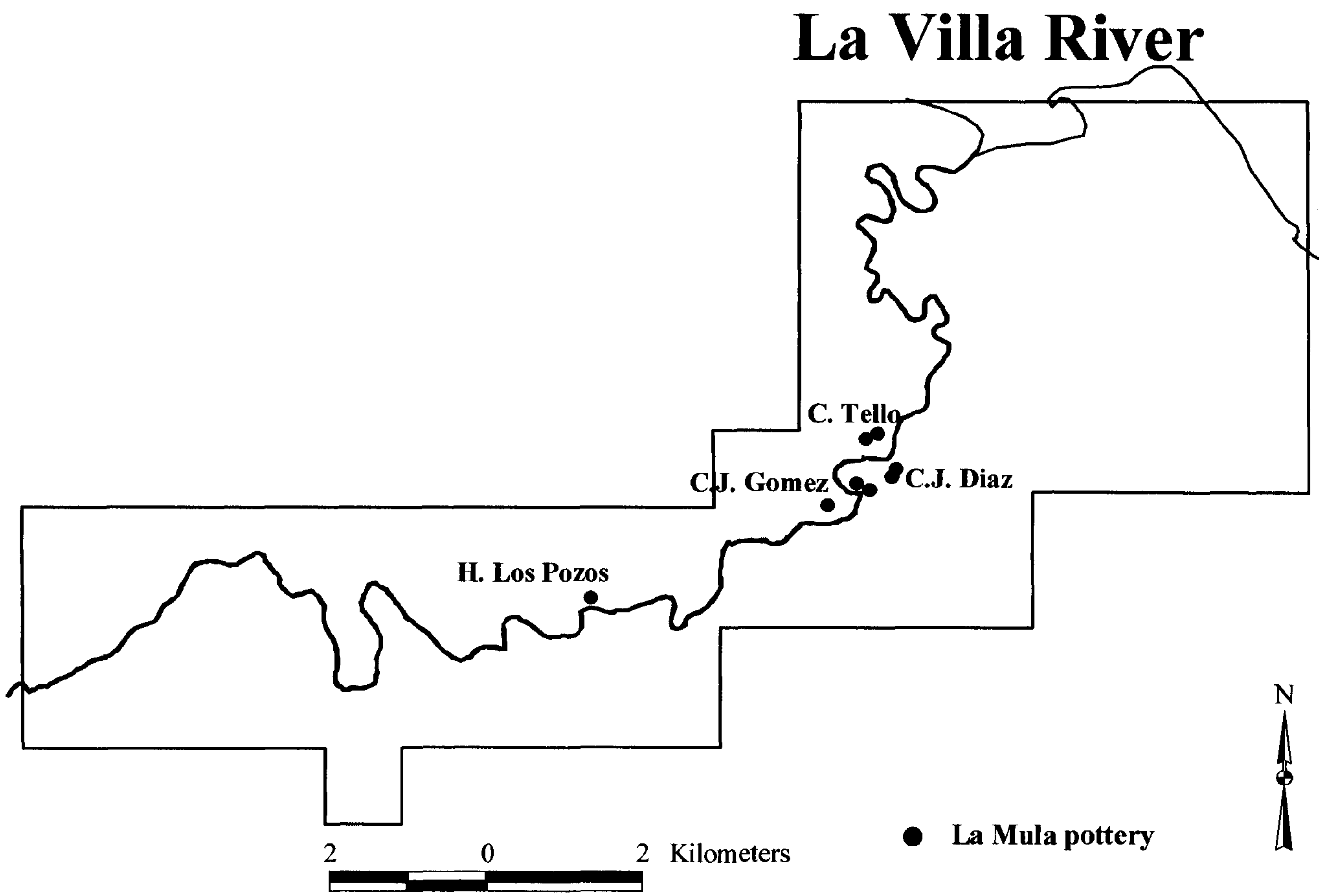


Figure 6.4 Distribution of La Mula phase pottery in the Lower La Villa valley

Another facet of social behavior that is intimated by the finds at LS-3 is ritual. Preliminary data suggest that it was during the La Mula phase when the platform on the southern edge of Cerro Juan Díaz was prepared by leveling and perhaps intentional consolidation of the talus slope. This construction seems to have taken several generations to complete. If so, it represents the first communal work reported in Gran Coclé. Once finished, sections of the earthen platform were set aside for community burials and ritual beginning in A.D. 100. Although none of the earliest graves excavated by the CJDP on the ritual platform has been directly associated with La Mula style vessels, a multiple grave designated Feature 16, which contained several individuals buried secondarily in bundles, is coeval with part of the Middle Ceramic A Period (Chapter 4: 163–164).

6.3.3 Middle Ceramic B, Tonosí Phase (A.D. 250–550)

The painting style that succeeds La Mula in the regional sequence is the Tonosí style, first defined by Ichon (1980) at sites in the southern sector of the Azuero Peninsula. Polychrome (really trichrome) vessels were made with well-sorted clays and are often covered with a thick white slip, which tends to have a grayish hue. Often the light slip color makes a striking contrast with pastes that oxidize a dark brownish-orange color. Well-smoothed surfaces retain a high luster when in good condition. The predominant vessel forms used to carry painted designs include open bowls with flaring or flat-topped rims (called 'La Bernardina' by Ichon) and double-bodied vessels, originally called *vases doubles* (Figure 6.5).

Figure 6.5 Tonosí trichrome jars from the Tonosí Valley (AD 400-550).
(a) Double shaped jar depicting anthropomorphic figure with a mask of spread wing eagle; (b) Globular jar depicting geometric and serpent designs also seen in La Mula and Aristide styles; (c) Double shaped jar illustrating a scene of humans erecting a structure or carrying a log (Museo Antropológico de Panama, photos courtesy of Richard Cooke).

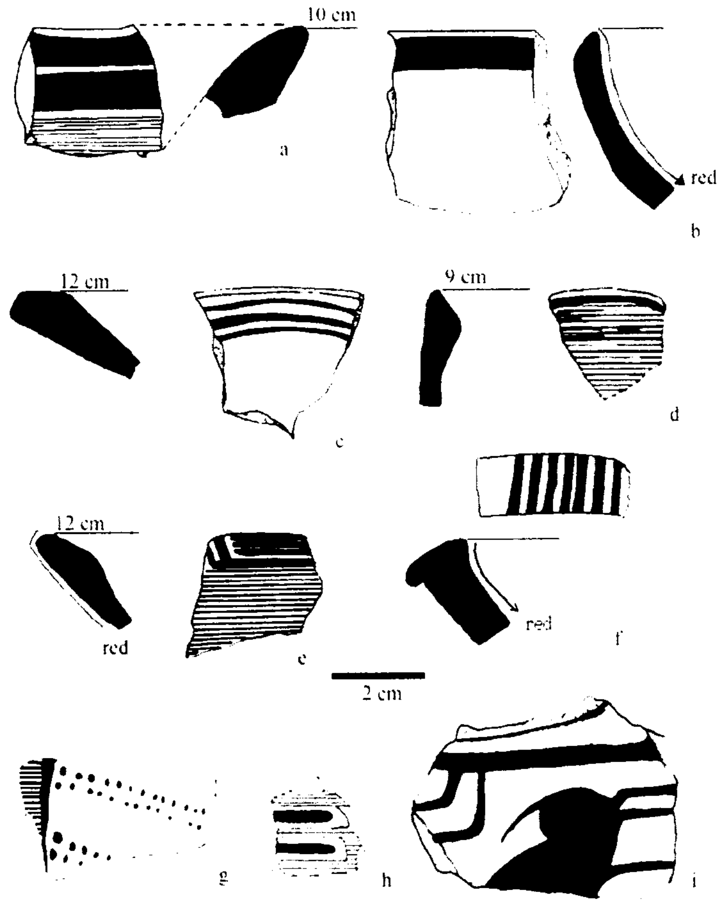


Figure 6.6 Tonosí style rims and body fragments from LS-3 and LS-10.
(a) Tonosí black and white over red rim cat 44he-F2, Station R263, site LS-10; (b) cat 44he-F11, Station R262, site LS-10; (c) cat 9he-F57, Station T3R7, site LS-3; (d) cat 33Bhe-F31, Station R213 Stratum 3 N 85-95 cm, site LS-10; (e) La Bernardina cat 33Bhe-F88, Station R213 Stratum 4, site LS-10; (f) cat 33he-F10, Station R214, site LS-10; (g) jar fragment with painted decoration on the exterior, cat 33he-F2, Station T6R1, site LS-10; (h) plate fragment with painted decoration on the interior of the vessel, cat 33he-F3, Station T6R1, site LS-10; (i) upper portion of a close jar vessel, cat 44he-F19, Station R263, site LS-10.

Designs and motifs are drawn with precision using a combination of two colors over slipped surfaces: black and red over white or black and white over red. They make use of geometric and zoomorphic images, and for the first time in the Gran Coclé record, representations of human figures (Figure 6.5–6.6). These are depicted in a very abstract manner. Some groups of figures appear to represent social activities such as dancing, shamanistic ritual, and group work. Some individuals brandish sticks or spears, while others appear to be directing activities (Figure 6.5c; Sánchez and Cooke 1998: 89–90). The association of stick-bearing human figures and people lifting heavy elongated objects is suggestive of games at a ritual precinct.

Another innovation that heralds later developments is the use of more than one kind of animal figure in the same motif as if to deceive the eye: when viewed from one side the image has one appearance, e.g., a bird, but when viewed from above, it look like a scorpion (Cooke 2004a: Figure 8). The double-bodied vessel in Figure 6.5a, on the other hand, shows a human figure with a mask of spread wing eagles. The use of zoomorphic icons could be associated with group affiliation or with mythical animal ancestors (see Cooke 2004b: 273).[5]

When Tonosí trichrome ceramics were first discovered, they were found primarily in mortuary features where they were used as containers for food offerings or as urns for infant burials. These same graves also contained the earliest evidence in Panama of personal adornments made of carved bone, carved shell, agate, serpentine, and *tumbaga.*

[5] By way of example, the Bribis and Cabéraces, related native American polities that live in Costa Rica, still retain memories of ranked clans named after a mythical personage, place, plant, or animal (Cooke 2005: 160; Cooke and Sánchez 2003b: 8, 2004c: 33; Helms 1994: 55, 2000; Stone 1961).

These sumptuary items depict many geometric forms and animal images that also occur on Tonosí trichrome pottery.

It could be argued that the technological dexterity and stylistic sophistication of the Tonosí pottery complex, as well as the excellence of coeval cast metal ornaments and other portable objects carved from marine shells and stone, constitutes evidence for increasing craft specialization during the Middle Ceramic B. I pointed out earlier, however, that similar technological innovations are apparent in the earlier La Mula phase. In Feature 16 at Cerro Juan Díaz, several well-crafted personal ornaments made out of marine shells, pearls and stone were found, in addition to a copper ring (Cooke and Sánchez 1998). Besides, we still do not know which people or communities made the pottery, nor indeed any of the other items that share the same imagery. Distinguishing between one person per household or group of households with knowledge of specific crafts and groups of craftsmen making particular sets of objects, is methodologically feasible, but is beyond the scope of the current data base. Regionally, archaeologists hesitate to associate Tonosí trichrome pottery with specific ritual functions because recent analyses show that pre-Columbian communities in Gran Coclé made use of polychrome pottery on a regular basis discarding "fine" wares in the most ordinary refuse heaps (Sánchez 2000a). Peter Briggs (1989) used cluster analysis to order the Tonosí phase grave units studied by Ichon comparing them with the later burials at Sitio Conte. He concluded that the association of funerary offerings of exceptional artistic value with adolescents and infants is a pattern more akin to egalitarian than complex ranked societies.

Before Ichon defined the Tonosí polychromes, another painted pottery style—Aristide—that clearly antecedent to the Conte style was described by John Ladd (1964) based on sherd collections excavated by Gordon Willey, John East, and Charles McGimsey at Cerro Girón (AG-2; Willey and Stoddard 1954) and others excavated by the Peabody Museum team at Sitio Conte (Ladd 1957). Excavations in stratified middens showed that it was clearly antecedent to the Conte style. In 1972, Cooke redefined Aristide and provided its final typology based on samples he excavated at Sitio Sierra and La Herradura (PN-14) sites in Coclé (Cooke 1972; see also Isaza 1993).

Aristide vessels exhibit poorer manufacturing standards than Tonosí vessels: clays are coarser and more heterogeneous, firing control is more irregular, and surface finish of lesser quality. Cooke (1972) divided Aristide into three types: (1) Escotá, spherical collared jars and incurved bowls, which are decorated on the upper half of their rounded or beveled exteriors; (2) Girón, bowls or sub-globular collared jars on which painted designs are restricted to flattened rims or lips, and (3) Cocobó, open bowls with interior decoration (Figure 6.7). On all three types, designs are painted in black on the natural surface color or red slip. They employ one or more geometric motifs, e.g., radial and circumferential lines, chevrons, triangles with a concave hypotenuse, crosshatching, inverted T's, and scalloped elements. The designs are always symmetrically arranged by zones, but their outlines are irregular (Figure 6.8). All the motifs are also employed on Tonosí polychromes but with different color schemes and standards of execution.

Eleven radiometric dated contexts at Sitio Sierra containing Aristide ceramics indicate that this style was made between cal. B.C. 190–A.D. 630 (AA-3240, AA-3241,

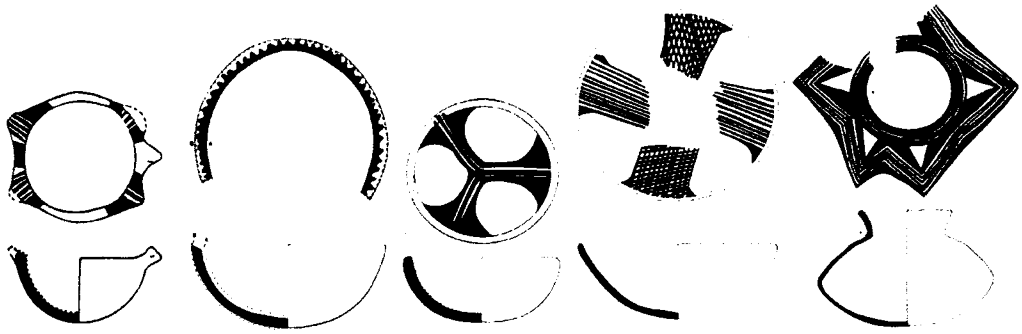


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Figure 6.7 Aristide style vessel reconstructions from Sitio Sierra cemetery 75/B-D and Context B/3 (B.C. 200–A.D. 650).
(a) modeled Girón bowl with radial lines defined by truncated triangles with concave hypotenuse; (b) Girón bowl with scalloped element decorations; (c–d) Cocobó bowls with radial and crosshatched designs defined by triangles with concave hypotenuse; (e) Escotá collared jar with chevron decoration. Dotted lines in profile show extent of red paint (After Isaza 1993: Figures 59a, 58a, 61b, 62 & 55 respectively).

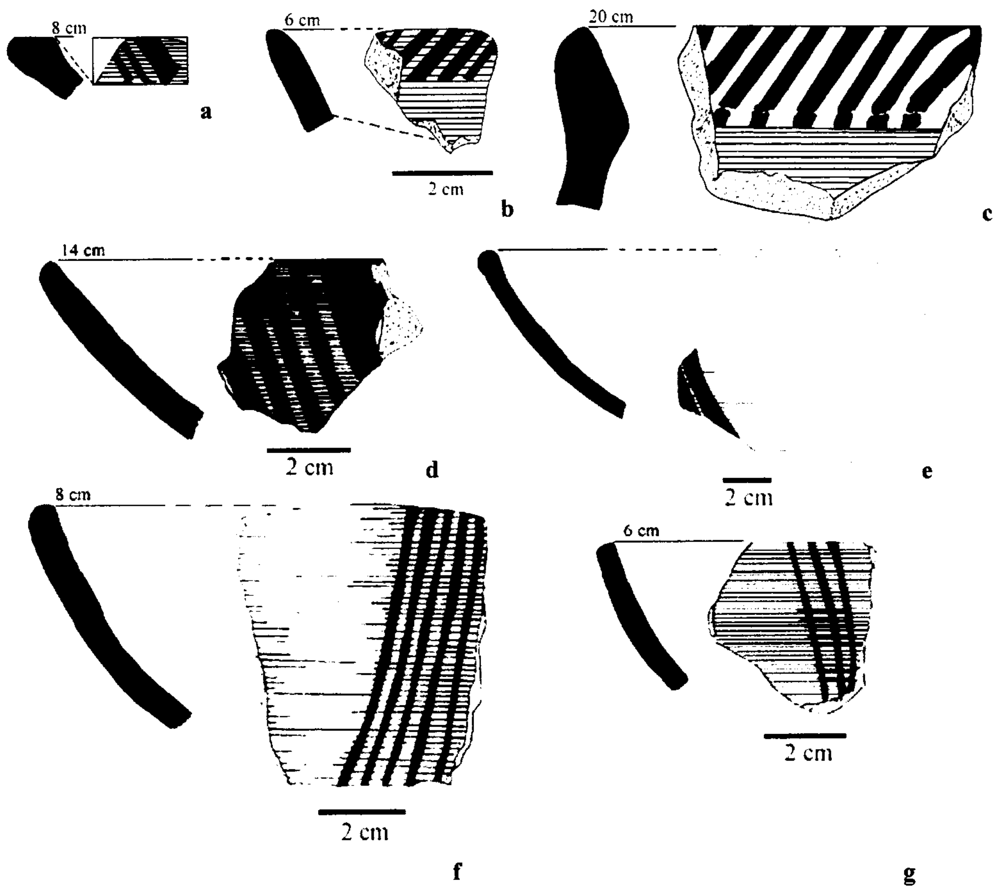


Figure 6.8 Aristide Girón and Cocobó rims from the La Villa valley.
(a) cat 44he-F10, site LS-10, Station R263, Huertas La Isleta; (b) cat 18he-F6, Cerro Juan Gómez; (c) cat 18he-F5, Station R108, Cerro Juan Gómez; (d) cat 33he-F4, site Huertas Los Pozos (e) cat 33he-F7, Huertas Los Pozos; (f) cat 33he-F8, Station T4R2; Huertas Los Pozos (g) cat 33Bhe-F30, Station R213 Stratum 3, N85–95 cm, Huertas Los Pozos.

Beta-46402, I-8556, I-18613, I-9701, I-9702, I-9703, Gif-2346; Isaza 1993: Table 1).

The contextual distribution of Aristide ceramics at Sitio Sierra, suggests that Escotá was the longest produced type (cal 200 B.C.–A.D. 600), while Girón and Cocobó types lasted from 100 B.C.–A.D. 500 (Isaza 1993: Table 10). Clearly, then, some varieties belong to the La Mula phase, while others are associated stratigraphically with the Tonosí trichrome style (Table 6.1). For example, in Macrostratum C at Cerro Juan Díaz, the Girón material consists primarily of small collared and red-slipped jars decorated on the rim with oblique black lines. Cocobó sherds are also frequent (Sánchez 1995).

When Ichon (1980) described the Tonosí trichrome style from samples he collected at 13 sites in the Tonosí valley, he proposed that it was produced only in south and west of the Azuero Peninsula. Since few occurrences of Tonosí pottery had been documented north of the Santa María River, Ichon (1980: 203) also suggested that sherds found at Sitio Conte and Sitio Sierra were imports from the south. Recent evidence from Cerro Juan Díaz indicates, however, that Tonosí trichrome pottery, which is abundant in Macrostratum C (Sanchez 1995), is likely to have been produced along the southern coast of Parita Bay as well as in the Tonosí and neighboring valleys (Cooke and Sánchez 2003a: 18).

It is beyond the scope of this dissertation to resolve the considerable problem of geographic and temporal variation within the Aristide complex. My *Licenciatura* thesis (Isaza 1993) contributed towards improving our knowledge of temporal subdivisions, while Sánchez's on-going analyses of the LS-3 ceramics is adding yet more details.

Suffice the reiteration that the Tonosí phase pottery collected by the PARLV, which comprises 0.5% of the total analyzed surface collection (Table 6.2), includes materials assignable to both the Tonosí and Aristide complexes. Although the typological categories assigned to this phase were reported at more sites, most of them were collected at sites on the coastal plains. The sample includes vessel shapes and painted motifs documented at Cerro Juan Díaz and Sitio Sierra (Figures 6.6–6.8). In the case of the Aristide style, the only painted designs identified in the sample were parallel radial lines, crosshatching and chevrons. Early forms of Escotá type sherds were found only at sites LS-3 and LS-10 close to the collection stations where La Mula ceramics were recorded. The Girón type, on the other hand, was more widely distributed throughout the valley, being identified at seven sites (Table 6.4). Although the Cocobó variety was only registered at LS-10 (Figures 6.8 d–g) it is important to note that the CJDP recovered many Cocobó sherds in excavated units that contained abundant Tonosí pottery (Sánchez 1995).

Table 6.4
Frequency of Tonosí phase pottery from the PARLV surface collections

Sites	LS-3	LS-8	LS-9	LS-10	LS-11	LS-15	LA-28	LA-29	Total	%
No. Stations	21	3	1	11	3	2	1	1	**43**	
Tonosí complex										
Tonosí trichrome	4	2		13				1	**20**	**22**
Black & white/ red				3					**3**	**3**
Black/ white or cream	7	5		9	2			1	**24**	**26**
Aristide complex										
Cocobó				9					**9**	**10**
Girón	12	1	2	7	1	3	1		**27**	**30**
Escotá	7			1					**8**	**9**
Grand Total	**30**	**8**	**2**	**42**	**3**	**3**	**1**	**2**	**91**	

More Tonosí complex sherds were recovered in our samples than Aristide, including bowl and jar fragments (Table 6.4). They were readily distinguished by their paste and thick cream slipped surfaces. Most of the sherds had geometric designs often painted in black over the characteristic thick white or cream slip (Figure 6.6).

The geographic distribution of Tonosí phase ceramics suggests that, between about A.D. 250 and 550 already established settlements had expanded their boundaries while new equidistantly spaced villages and hamlets had emerged along the banks of the La Villa River. In the case of LS-3, for example, PARLV surface collections made on the periphery of Cerro Juan Díaz show a wider distribution of diagnostic pottery. Therefore, I estimate that the settlement occupation around the Cerro Juan Díaz (LS-3) spans 20 hectares (Figure 6.9). The settlement of Cerro Tello, 400 meters to the north, also increased to 17 hectares, while the occupation of Cerro Juan Gómez in the southwest, does not surpass the 2 hectares (Figure 6.10). During this same period a 15-ha village, site LS-8, rises 1.8 kilometers southwest of LS-3 (Figure 6.9). This means that during the Tonosí phase three type 2 villages were present in the coastal plain of La Villa valley (Figure 6.10).

At Las Huertas (LS-10) we identified Tonosí phase pottery at three localities—Huertas Los Pozos (4 ha), Huertas La Isleta (1 ha), and Huertas Arriba (9.5 ha), which I interpreted as type 3 settlements (Figure 6.9). Small samples of Tonosí phase pottery were collected at five additional sites: LS-9, LS-11, LS-15, LA-28, and LA-29. Based on the distribution of diagnostic Tonosí pottery and associated Middle Ceramic period sherds I estimate a mean size area of 0.95 hectares for these sites (Figure 6.10).

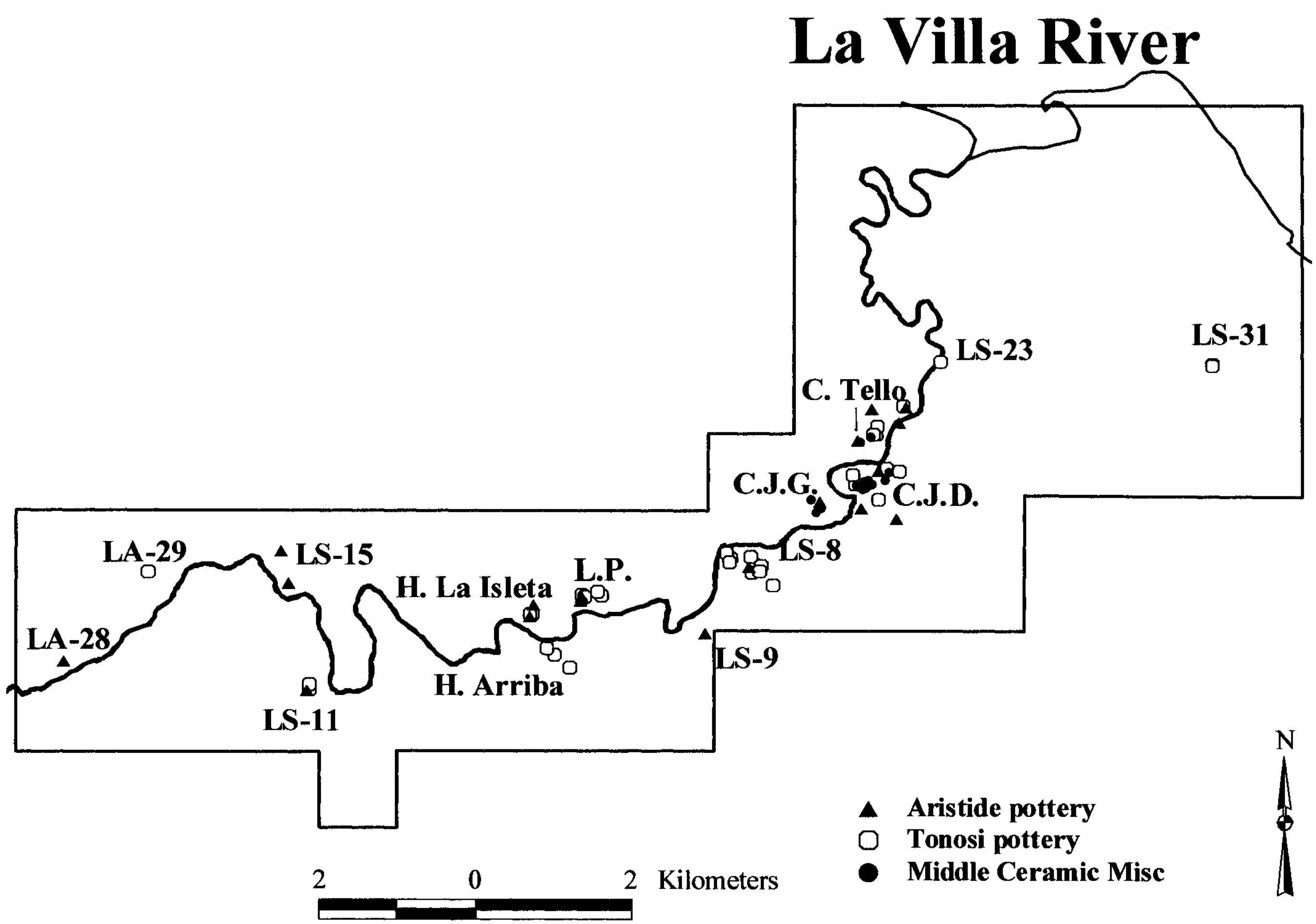


Figure 6.9 Distribution of Tonosí phase ceramics in the lower La Villa valley

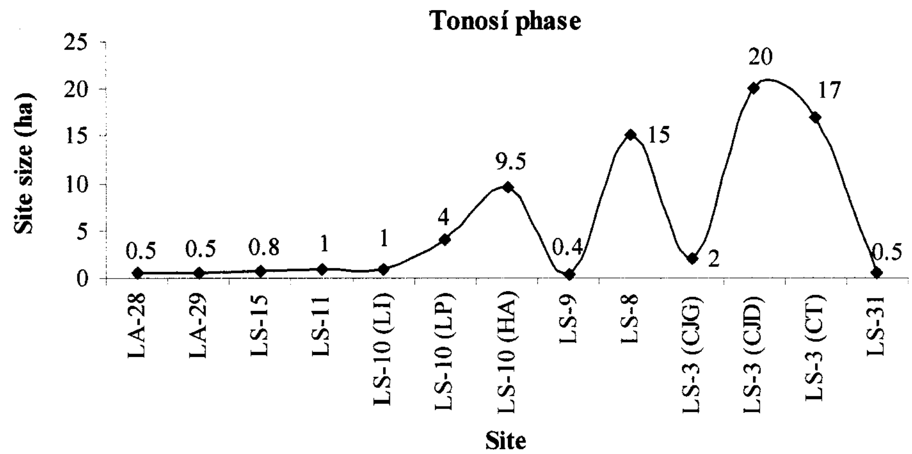


Figure 6.10 Settlement size during the Tonosí phase

The gradual incremental growth of sites during the Tonosí phase suggests normal demographic processes. The pattern I observed along the La Villa River coincides with the increase of sites reported by Haller (2004: 66–72) in the Parita River and the gradual depopulation of La Mula-Sarigua (Hansell 1988). This event seems to be related to changes in the coastal geomorphology. Although it is possible that the growth of LS-3 may be linked to the local displacement of people from the Parita Valley to more productive lands and established villages as Haller (2004: 111) suggests, we still lack supporting data. As noted earlier, certain features at LS-3 show that this site was already regionally important during the La Mula phase. The southern edge of the central hill was used as a specially prepared burial ground for a few individuals who possessed high quality funerary goods and seem to have had special occupations. The only feature excavated by the CJDP that incorporates mostly Tonosí phase pottery is the unit Sánchez (1995) describes as Macrostratum C, a fill deposit that he found around the edges of Cerro Juan Díaz. Tonosí and Aristide complex pottery dominated in this deposit (Cooke and Sánchez 1998). When radiocarbon dates run on charcoal included in the fill are compared with the typology of the included ceramics, it seems that this fill was deposited late in the Tonosí phase, between ca. A.D. 400 and 550 (Sánchez 1995).

One of the burial features in the group of interments stratified under the group of stone-lined features, described in Chapter 4, may refer to the Tonosí phase. This is Feature 1, which has not been dated radiometrically, is earlier than a cylindrical burial (Feature 2) in which nine human dentin samples returned dates with a 2-sigma range of cal. 390 B.C.–A.D. 660 (Beta-147876-77, Beta-224780–224781, Beta-224783–224786, Beta-224788; Appendix 1; Figure 4.6c). The principal occupant of Feature 1 was buried with mortuary arts that Cooke (2004b) interpreted as the attire of a shaman or curer. The two ceramic incense burners recovered in this feature belong to a type reported by Ichon in Tonosí phase contexts, while two hammered gold-copper plaques have a counterpart at El Cafetal where burials were associated with a C^{14} date of cal. A.D. 260–665 (Gif-1641).

6.3.4 Middle Ceramic C, Cubitá Phase (A.D. 550–700)

The ceramic complex that defines the last phase of the Middle Ceramic Period is Cubitá. Some varieties now included by Sánchez in the Cubitá complex were originally assigned by Ichon (1980) to the Tonosí complex. In 1995 Luís Sánchez proposed, however, that the Cubitá painted style was chronologically significant, basing his opinion on analyses of sherds included in stratified features at Cerro Juan Díaz and on comparisons with funerary vessels recovered in the 1950s at Playa Venado (Sánchez

1995; Cooke and Sánchez 1998; Sánchez and Cooke 2000).

From a technological and stylistic perspective, Cubitá represents a less homogeneous complex than Tonosí (Sánchez 1995). It employs a wider range of vessel forms, uses a greater variety of clays, and exhibits less homogeneity in surface treatment. The number of vessel shapes and decoration techniques also increases (Sánchez 1995). The degree to which this characteristic has chronological, geographic or social significance, is not yet clear. The possibility that production became increasingly localized, or specialized with regards to vessel type or function, requires physical analyses, which have not yet been undertaken. Modeled and painted anthropomorphic jars make their first appearance during the Cubitá phase (Sánchez and Cooke 1998: 91).

Sánchez's typology is complex, but it merits synthesis because Cubitá phase pottery is abundant in the PARLV collections. He identifies three painted, four monochrome, and six modeled categories (Table 6.1). The painted group employs black, red and light-colored pigments displayed in many different combinations (Cooke and Sánchez 2000: 7). There are close correspondences between chromatic schemes, motifs and designs, and specific vessel shapes. For example, the widespread type known as Ciruelo comprises deep bowls, some of them of a very large size (>40 cm diameter), with black-on-red painted varieties (Ciruelo, Jagua, Gallito; Figure 6.11a, 6.12a–b). A black and red on white variant includes the Guábilo and Cábimo open bowls (Figure 6.11b, 6.12c–f); and Nance globular bowls and jars (Figure 6.11c). Another variant, Caracucho, includes vessels decorated with black painted motifs framed by thick white lines on a red background (Figure 6.11d).

Cubitá continues the trend exhibited in the Tonosí trichromes of arranging motifs and designs between thick lines or groups of thin lines, the latter often circumferentially arranged. As a general rule, painted motifs are framed by thicker lines that form rectangular panels. Designs are often devoted to a central theme that incorporates a human figure, a frog, saurian[6], turtles, or birds with spread-eagled wings (Sánchez and Cooke 1998: 91). These are depicted with variable degrees of abstraction and realism. Serpent forms are not as widely depicted as on La Mula and Tonosí painted vessels.

An important feature is the appearance of a scroll design which Lothrop (1942) labeled the "YC scroll." Often used cursively, it is a well-known characteristic of the subsequent Conte style (Figure 6.11c). To judge from its use on anthropomorphic modeled jars, painted in both Cubitá and Conte styles, the YC scroll was widely used as body paint applied with ceramic roller stamps. It may well be the design that drew the attention of Spanish soldier Pascual de Andagoya (1994: 34), who noticed that the warriors of chief Parita's neighbor and enemy Escoria went to battle with their chests and arms "decorated with linked chains and other ties" (see Chapter 4: Footnote 8).

The Cubitá monochrome and plastic decorated groups are also characterized by close correspondences between vessel shapes, decoration, and appendages. The monochrome group includes Espabé and Juncal bowls (Figure 6.13), Cubitá Red, Espabé, and Harino collared jars (Figure 6.14). All monochrome type vessels feature well-polished surfaces and a thin red slip. A fourth type of collared jar is the Guachapalí "Rojo-Agamuzado," with strap-handles (*asas de cinta*). The feature that distinguishes

[6] Lizard or crocodilian shaped figure.

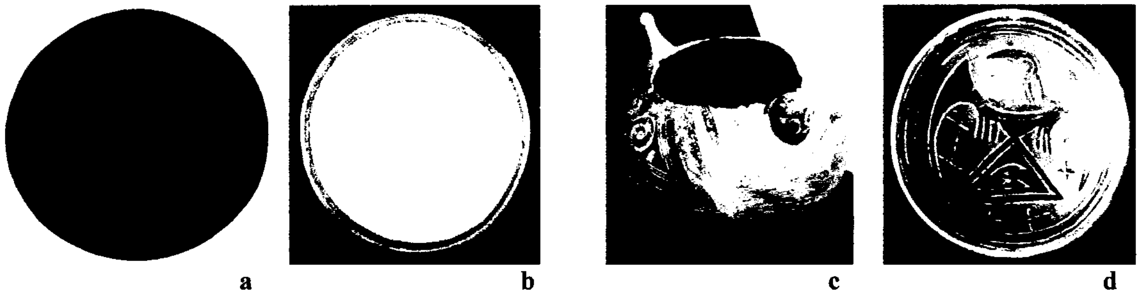


Figure 6.11 Cubitá style vessels from Cerro Juan Díaz (A.D. 550–700).
(a) Ciruelo type depicting a geometricized turtle figure on the interior of an open bowl; (b) Guabilo type with circumferential black lines painted over the interior cream slip of an open bowl with red slip on the rim and exterior, (c) Cubitá Nance modeled jar showing a representation of the night monkey (*Aotus trivirgatus*), and YC scroll design; (d) Caracucho type depicting a stylized bird with spread wings inside an open bowl (Photos courtesy of Richard Cooke).

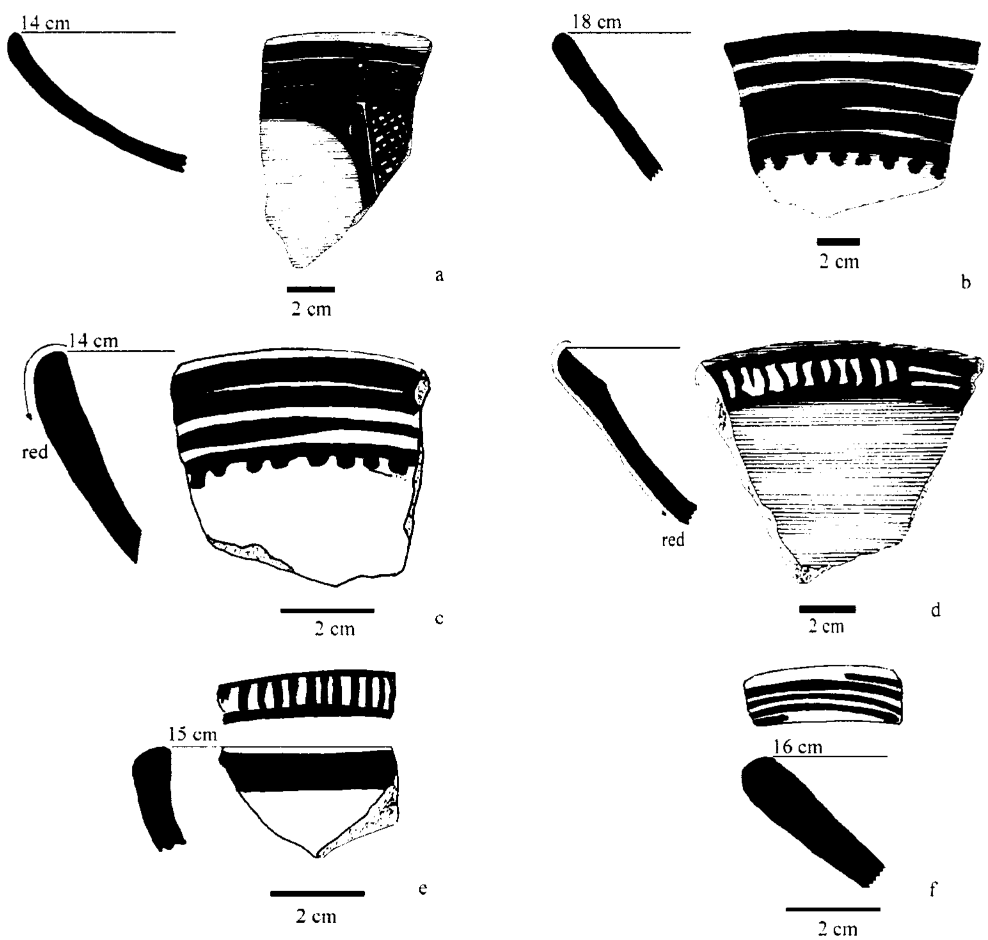


Figure 6.12 Cubitá style rims (A.D. 550–700).
(a) Ciruelo rim cat 69ls-F8, site LS-8, Station T1R6; (b) Ciruelo rim cat 21ls-F5, site LS-3, Station R2; (c) Guabilo rim cat 44he-F17, Site LS-10, Station R263; (d) Cábimo rim cat 71ls-F30, site LS-8, Station T4R6 (*cf.* Ichon's La Bernardina); (e) Cábimo variety 2 rim, cat 71ls-F31, site LS-8, Station T4R6; (f) Cábimo rim cat 2he-F4, Site LS-3, T1R8 (Drawings by Alexis A. de Isaza).

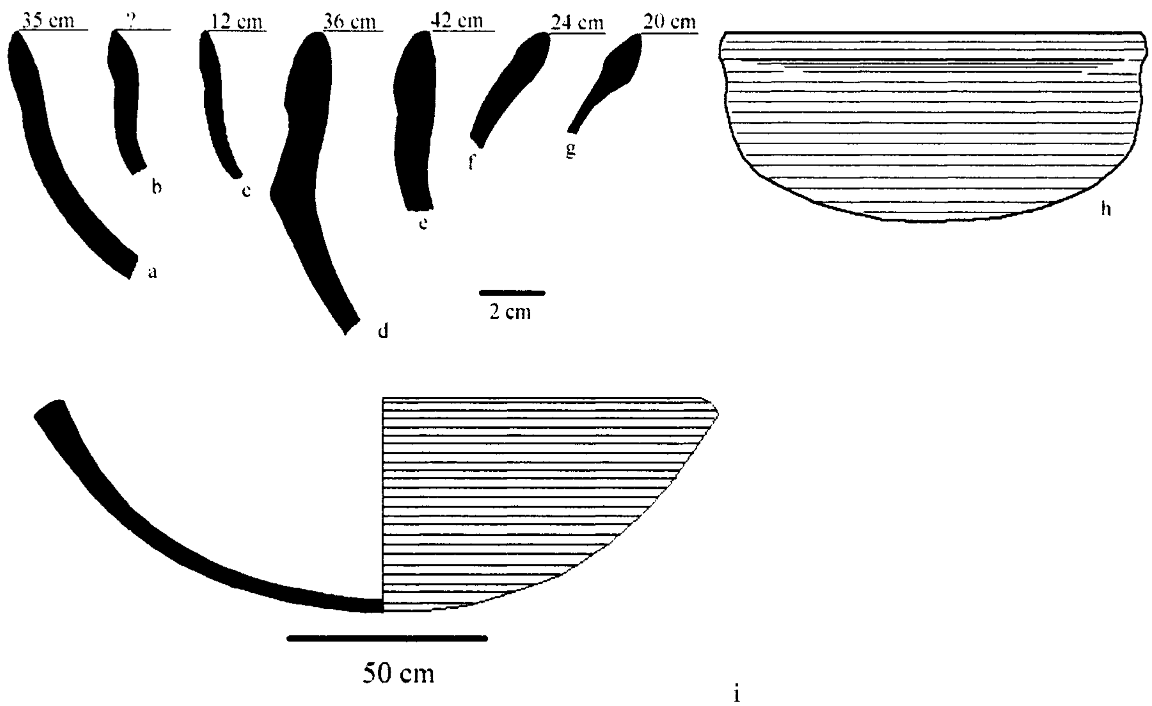


Figure 6.13 Juncal red (A.D. 400–500) and Espabe (A.D. 400–550) reconstructions and rim profiles types identified in the lower La Villa valley.
(a) Juncal rim redrawn from Sánchez 1995: Figure 68ñ;
(b) Juncal rim redrawn from Sánchez 1995: Figure 68p;
(c) Juncal rim, cat 33Bhe-F40, Site LS-10, Station R123, Stratum 4 N 130;
(d) Juncal rim cat 44he-F3, Site LS-10, Station 263;
(e) Juncal rim redrawn from Sánchez 1995: Figure 68y;
(f) Juncal rim cat 33Bhe-F35, Site LS-10, Station R213, Stratum 3 N 80 cm;
(g) Juncal rim redrawn from Sánchez 1995: Figure 68v;
(h) Juncal bowl reconstruction redrawn from Sánchez 1995 Figure 68 c;
(i) Espabé Cocobolo bowl with flattened lip reconstruction redrawn from Sánchez 1995: Figure 115b.

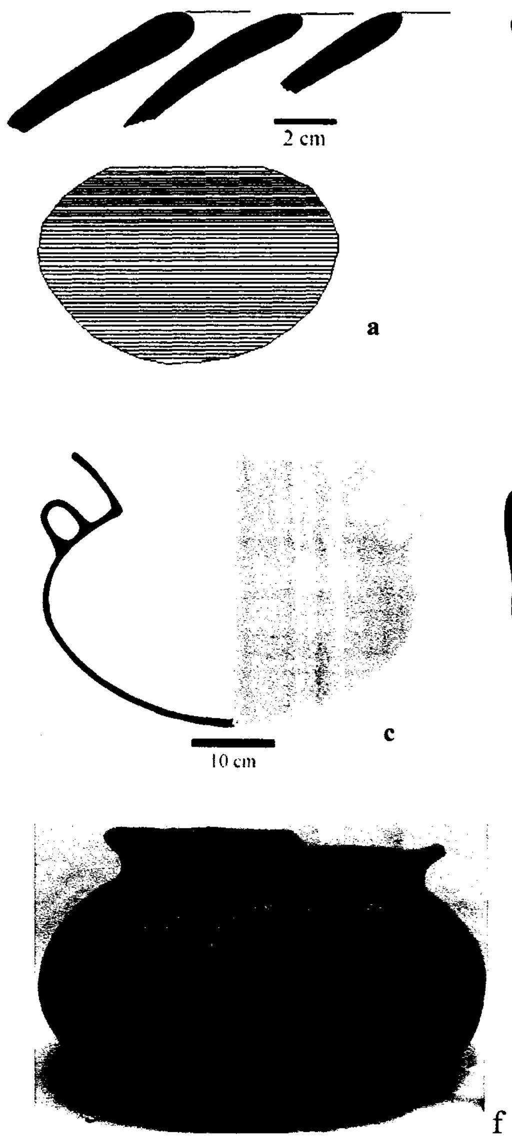


Figure 6.14 Cubitá and Guachapalí type jars
(a) Espabé red (A.D. 400–550) collarless jars reconstruction modified from Sánchez 1995: Figure 113;
(b) Cubitá Red jar with short neck and elongated strap handles modified from Sánchez 1995: Figure 64a;
(c) Espabé Red jar with tall neck and short lace handles modified from Sánchez 1995: Figure 109;
(d–e) Guachapalí style jars with lace handles (A.D. 550–700) modified from Sánchez 1995: Figure 92;
(f) Harino type jar (A.D. 550–700) cat 82ls-2169, Site LS-10, Station R518.

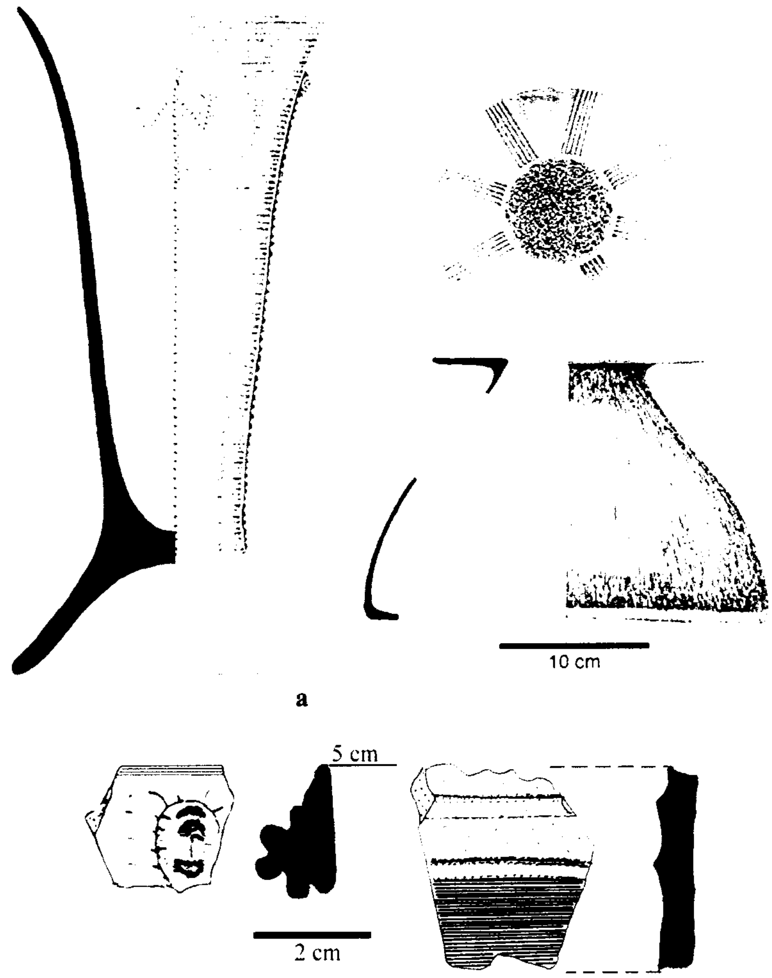


Figure 6.15 Cubitá plastic decorated group.
(a) Arcabú chalice (A.D. 400–650) vessel reconstruction reprinted and modified from Sánchez 1995: Figure 100a; (b) Zumbo jar (A.D. 400–650) reconstruction reprinted from Sánchez 1995: Figure 03;
(c) Culebra appliqué (A.D. 550–700) rim with applied raised strips of clay adorned with grooves at the edge of the rim, cat 44he-F29, Site LS-10, Station R268 (*cf.* Lothrop 1942: Figure 448c);
(d) Body section of a Culebra appliqué chalice presenting the raised circumferential bands that divide the upper unpolished portion of the vessel from the polished and red slipped lower section, cat 71ls-F25, site LS-8, Station T3R3.

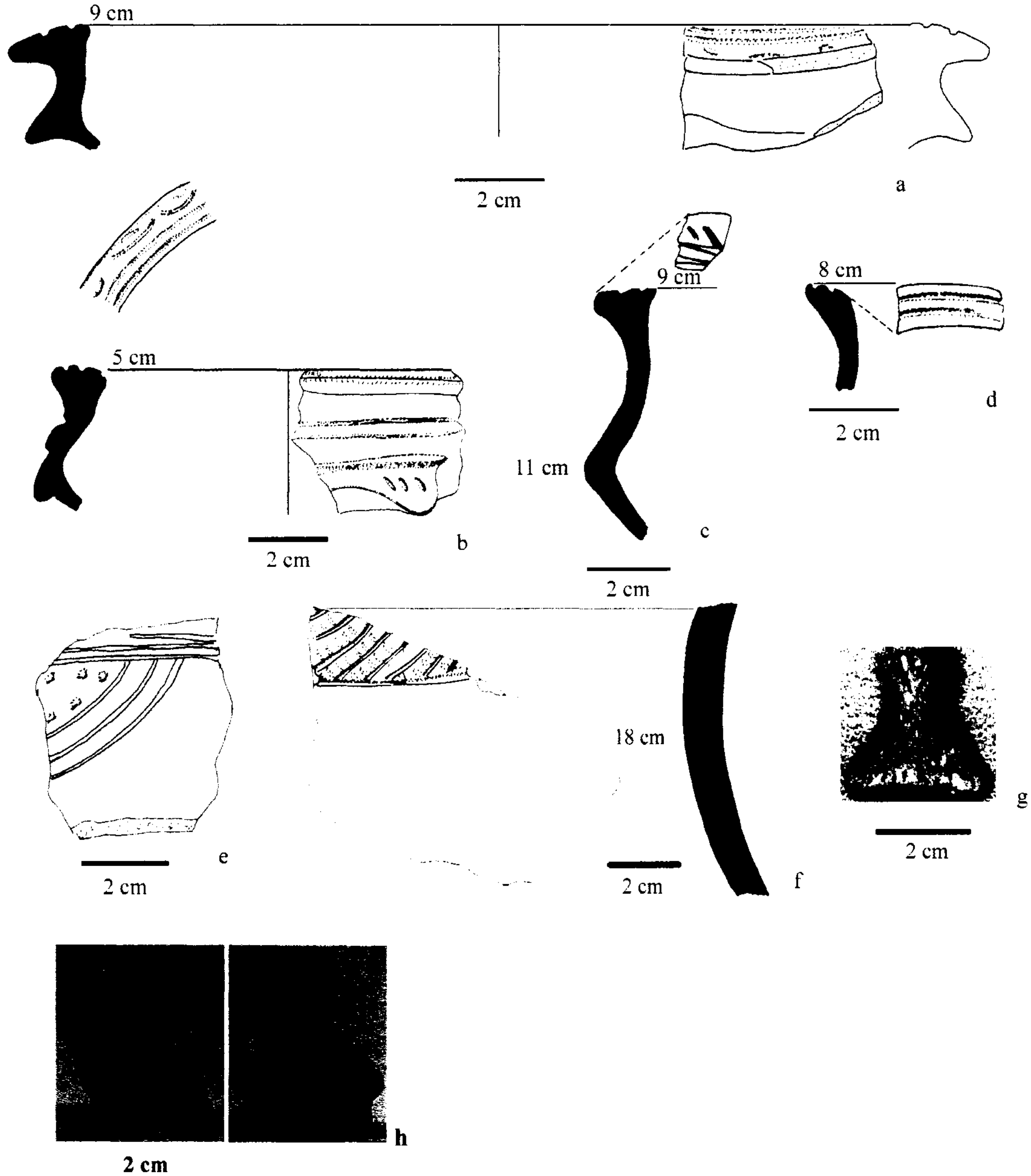


Figure 6.16 Macano type rims and body sections (A.D. 550–700)
(a) Macano linear stippled rim, cat 33he-F6, Site LS-10, Field 33he, Station T10R7;
(b) Macano linear stippled rim cat 21ls-F4 (LS-3, Field 21ls, Station R3;
(c) Macano rim, cat 87ls-F22, Site LS-10, Field 87ls, T2R9;
(d) Macano rim, cat 33he-F5, Site LS-10, Station T3R2;
(e) Macano body section, cat 71ls-F27, Site LS-8, Station T6R4;
(f) Macano body section, cat 18he-F4, Site LS-3, Station T1R5;
(g) Tail section of a zoomorphic Macano whistle, cat 16he-F1, Site LS-3, Station P6;
(h) Zoomorphic Macano linear stippled whistle, cat 88ls-F1, Site LS-11, Station R600.

Guachapalí from other monochrome types is its red band decoration, created by dribbling red paint down the sides of the vessel's exterior body over the natural cream color of the vessel (Figure 6.14d–e). This type of decoration continues into the subsequent Conte style and is depicted on bowls, plates and jars, known in the literature as Red Line Ware (Ladd 1964; Lothrop 1942).

The modeled group includes the Arcabú, Culebra, Madroño, and Quira types with appliqué decorations, and the Macano and Zumbo types with incised decorations (Figures 6.15–6.16). Sánchez (1995: 297–355) proposed that some of the monochrome and plastically decorated types within the Cubitá complex are of a shorter duration than painted varieties. For example, he estimated that Espabé and Madroño types were produced from A.D. 400 to 550, while the Arcabú and Zumbo time span lasted from A.D. 400–650.

Cubitá complex ceramics represent 6% of the total analyzed surface sample collection and 35% of the typologically diagnostic sherds (Table 6.2). The largest collections were recovered at LS-3, LS-8, LS-10 in the coastal plain and site LS-11 located west of Cerro El Tamarindo (Table 6.5). Cubitá was the most diagnostic complex documented at Operation 19-1he and 19-2he at LS-3 (Tables 4.4 and 4.5). It was also the dominant ceramic complex reported from Operations 19-1ls, 19-2ls, and 19-3ls excavated at LS-31 near the coast (Table 4.8–4.10). The units opened at site LS-10 (Stations R213 and R297), however, yielded a slightly lower percentage of Cubitá ceramics in relation to Late Ceramic complexes (Tables 4.6 and 4.7).

Overall, our sample includes all the Cubitá types and varieties defined by Sánchez (1995). Ocular inspection suggests that these share the same technological and morphological characteristics, indicating that they were likely to have been produced or acquired locally. Fifty-nine percent of the Cubitá phase pottery sample corresponds to sherds with bi - or trichrome painted designs: Ciruelo with its three varieties Ciruelo, Jagua and Gallito, is the most frequent, followed by Guábilo and Nance (Table 6.5, Figure 6.12). The Cubitá category corresponds to the miscellaneous body sherds and rim sections that can be assigned to either Ciruelo, Cábimo and Guábilo types based on their shape, surface treatment, and paste characteristics (Sánchez 1995: Figures 43c, f–g, 41c–d, 42b–ch, 44a & 55g).

The monochrome categories, which comprise 37% of the Cubitá complex sample, are dominated by the presence of Guachapalí, Cubitá Red, Espabé and Juncal ceramics (Table 6.5). Although the Harino type sample is small, it is the only monochrome type that includes a semi-complete vessel (Figure 6.14f). The vessel was found at the edge of a looter pit, Station R518 at LS-10.

The modeled group comprises 3% of the Cubitá complex sample and is dominated by the Macano type, which is present at four sites (Table 6.5; Figure 6.16). Included in the Macano sample is a small tail fragment of a modeled whistle, found on a low mound at the eastern base of Cerro Juan Gómez, which by this period is part of site LS-3 (Figure 6.16g) and a complete modeled bird-shaped whistle discovered at the base of Mound 1 at site LS-11 (Figure 6.16h). Several Macano whistles and figurines were also recovered during the CJDP excavations (see Sánchez 1995: Figure 98).

Table 6.5
Frequency of Cubitá phase pottery from the PARLV surface collections

Sites	LS-3	CHI-6	LS-8	LS-9	LS-10	LS-11	LS-15	LS-23	LA-28	LA-29	Total	%
No. Stations	76	1	28	1	21	4	1	1	1	1	135	
Cubitá complex												
Ciruelo - Ciruelo	60		51		28	5					**144**	**14**
Ciruelo - Jagua	2		1		3						**6**	**0.6**
Ciruelo - Gallito	1										**1**	**0.1**
Guabilo	9		10		7						**26**	**2.5**
Cábimo	1		5		1	1					**8**	**1**
Nance	8		11	1	5						**25**	**2**
Caracucho	4		3		2						**9**	**1**
Caracucho - Sangrillo	1				3						**4**	**0.4**
Cubitá Red	20		21		2						**43**	**4**
Espabé Red	14		7	1	2	1					**25**	**2**
Espabé - Cocobolo			2								**2**	**0.2**
Juncal Red	5		3	1	4	1					**14**	**1**
Harino	1				1^{+}						**2**	**0.2**
Cubitá (misc. rims & bodies)	140		60		3	177	2		3	1	**386**	**38**
Monochrome misc.	24		12		76	104		1		1	**218**	**21**
Guachapalí	19		16	3	44	2					**84**	**8**
Zumbo	3				1						**4**	**0.4**
Arcabú	1										**1**	**0.1**
Quirra			1								**1**	**0.1**
Macano Linear Stippled	12		1		4	1^{*}					**18**	**2**
Madroño	1										**1**	**0.1**
Culebra Appliqué		1	1		1						**3**	**0.3**
Grand Total	326	1	205	6	187	292	2	1	3	2	**1,025**	
%	32	0.1	20	1	18	28	0.2	0.1	0.3	0.2		

$^{+}$ Incomplete globular jar; * zoomorphic whistle

The small sample of Arcabú, Madroño and Zumbo types was geographically restricted to the earliest settled areas at LS-3 and LS-10. Our surface finds were confirmed with excavation data, as samples of Arcabú, Madroño and Zumbo ceramics were found at Operation 19-1he and Operation 19-2he, LS-3 (Tables 4.4. and 4.6) and Station R297, LS-10 (Table 4.7). The Culebra appliqué type whose estimated chronology lasted the length of the Cubitá phase, on the other hand, was identified at both early and later sites like CHI-6, LS-8, and LS-10 (Table 6.5).

The distribution of diagnostic Cubitá Phase pottery points to rapid population growth and increases in the size of individual settlements by the end of the Middle Ceramic C period (Figure 6.17). These developments are more visible on the coastal plain where a dense and widespread distribution of Cubitá found on and around low mound features with shell-bearing middens (Table 6.2). There is also evidence that the floodplain between Cerro Juan Gómez and Cerro Tello, on the Herrera banks of LS-3, was being settled. LS-3 expanded to include the northern (Herrera) banks of the La Villa River and a single nuclear settlement of 132 hectares in size developed (Figure 6.18). A similar pattern of agglutination was observed at Las Huertas where the floodplain between Huertas Los Pozos and La Isleta shows initial signs of being settled leading to the emergence of a type 2 (23-ha) village on the Herrera banks of LS-10. On the other hand, the settlement occupation at Las Huertas Arriba, on the Los Santos banks of LS-10, spans 51 hectares during the Cubitá phase. Together, the neighboring villages at Las Huertas form a nuclear settlement of 118 hectares in size (Figure 6.18). In the estimate I include the area currently affected by meander cut-off. Site LS-8, in the valley

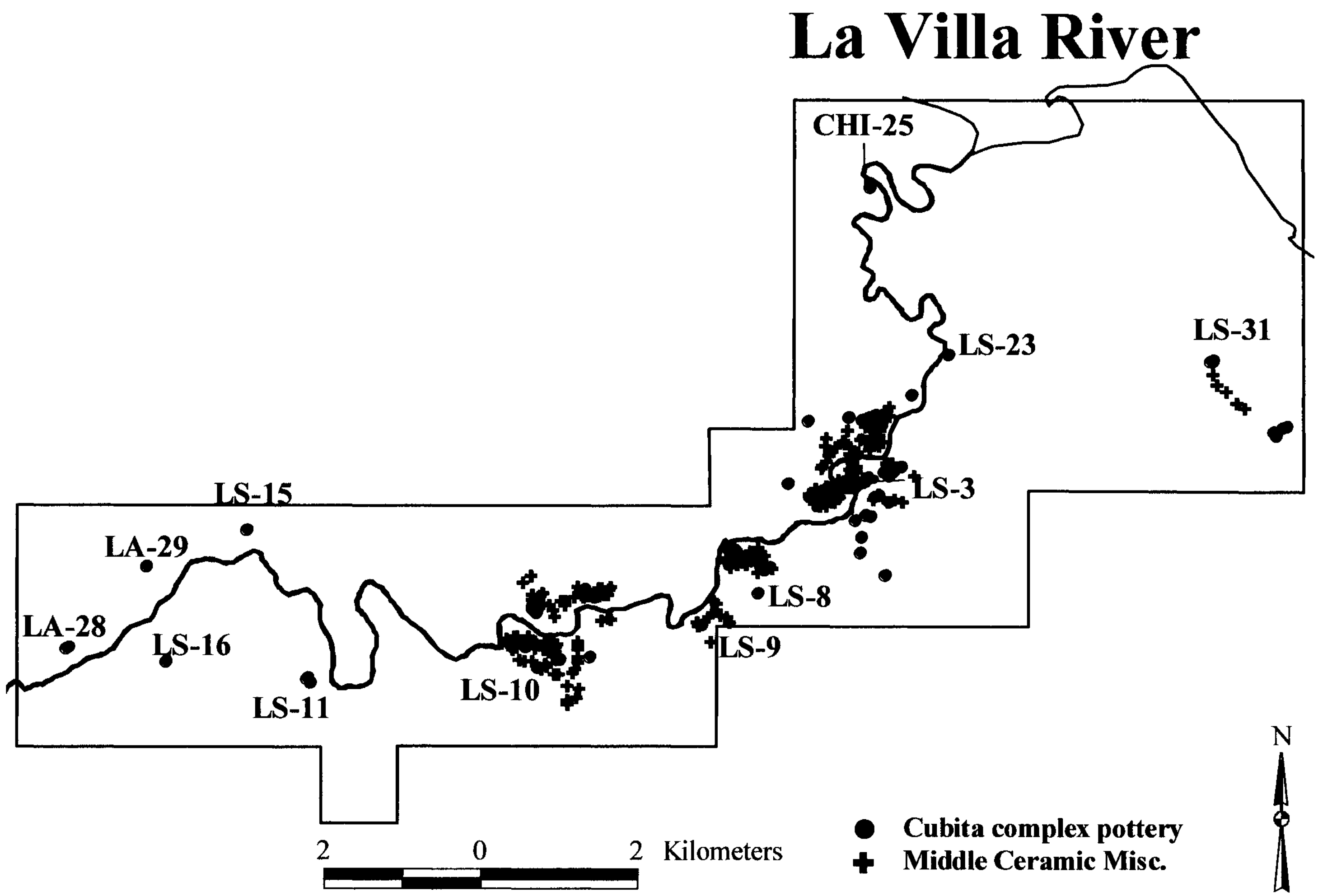


Figure 6.17 Distribution of Cubitá phase pottery in the lower La Villa valley

bottomlands between LS-3 and LS-10, reached its maximum size of 24 hectares. All three sites—LS-3, LS-8 and LS-10—are equidistantly spaced at about 2 kilometers from each other.

The second largest sample of Cubitá ceramics comes from site LS-11 in the upper River La Villa valley (Table 6.5). It was obtained at Mound 1, a 70 by 90-meter feature whose size and artifact density suggests it was the center of cultural activity from the Tonosí phase through the early phases of the Late Ceramic Period (Figure 4.30). During the Cubitá phase, the estimated site size for LS-11 was 5 hectares, making it a type 3 site (Figure 6.18). Other type 3 sites are LS-9 and LA-28, which are of similar size and also exhibit mound features. They produced fewer Cubitá ceramics (Table 6.5). Cubitá sherd samples from sites, CHI-6, LS-23, LS-15, and LA-29 cover less than a hectare. Therefore, I interpret them as isolated type 4 sites (Figure 6.18).

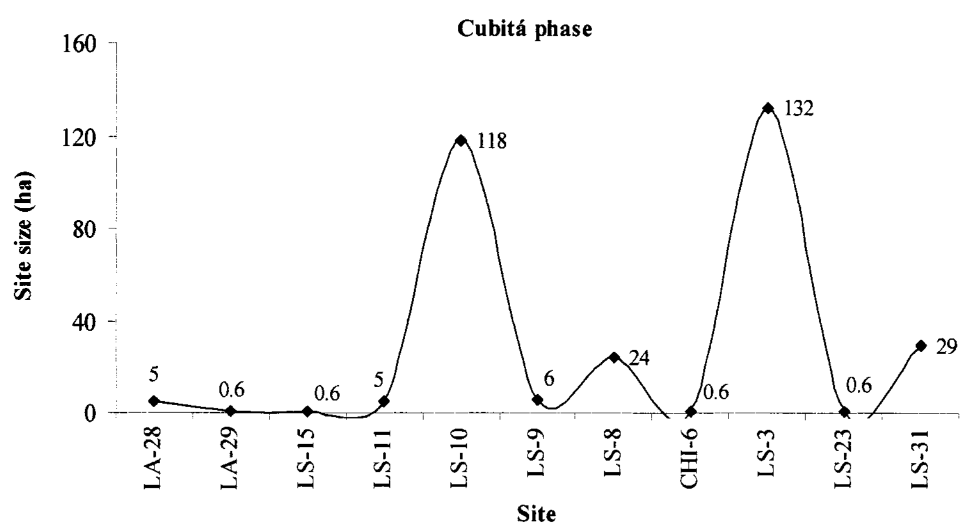


Figure 6.18 Settlement size during the Cubitá phase

It is illuminating to compare developments during the Cubitá phase in my survey universe with data recovered by Haller in the Parita valley where a 7-fold increase in population is inferred for this phase (Haller 2004: 75, Tables 2.1 and 5.3). It would appear, then, that it was during the Cubitá phase (A.D. 550–700) when the lower reaches of both the Parita and La Villa river valleys attained the dense populations and regular distribution of villages that were described by the Spanish in the early sixteenth century. There is a noticeable difference between these two valleys, however. While in the Parita valley, Haller (2004) documents the emergence of a three-tiered site hierarchy headed by a single site, in the La Villa valley, I observed a 4-tiered settlement hierarchy with two sites, LS-3 and LS-10, being at the apex of the hierarchy (Figure 6.18). These very large and nucleated sites are located 4 kilometers apart and share the characteristic of being positioned on the most prominent hills along the La Villa River. The flat areas in between were occupied by smaller communities living in type 2 villages and type 3 hamlets the location of which remains stable, although their boundaries wax and wane through time.

6.3.5 Late Ceramic A, Conte phase (A.D. 700–950)

The polychrome style that defines the beginning of the Late Ceramic Period is Conte, originally described by Samuel Lothrop (1942: 12–74) as "Sitio Conte Polychrome." The Conte style encompasses the early and later variants described by Lothrop. Lothrop based his descriptions of this style on pottery found in graves at Sitio Conte. This 4-hectare cemetery provided the first unambiguous signs of social inequality and wealth in Gran Coclé. Among the 101 graves excavated by Lothrop and Mason were a few, which had very large numbers of mortuary goods (Briggs 1989). They contained hundreds of broken polychrome vessels that outlined graves or served as "bedding" for the remains of individuals accompanied by sumptuary and costume items made of gold, carved bone and resin, and stone. According to Linares (1977b: 60), the pottery vessels appear to have been crafted "hurriedly" for the occasion, to serve as "objects of display during the funerary rites." Cooke, on the other hand, suggests that these were the vessels used during the funeral feast (Cooke personal communication 2007).

The fact that most of the sexed and aged individuals from Sitio Conte graves were adult males, many of them associated with bundles of stingray spines, blades, and celts, suggest this was a special cemetery reserved for individuals that achieved a special status as warriors and, perhaps, ritual practitioners (Briggs 1989: 72–77; Cooke 2004a; Cooke *et al.* 2000, 2003a; Linares 1977b). Among them were wealthy individuals who had received special burial treatment and who possessed certain categories of mortuary arts, which people of lesser station did not—i.e., embossed gold helmets, cuffs, greaves, disks, plaques, and carved manatee bone and whale ivory pendants decorated with the same motifs depicted on the polychrome vessels (Briggs 1989, 1993; Cooke *et al.* 2000, 2003a; Lothrop 1937).

Although a few excavated cemeteries in Panama yield evidence of status differences among individuals, none compares to the opulence of Sitio Conte interments (Briggs 1989, Cooke 2005: 159–160; Cooke *et al.* 2000; 2003a.). In contrast, the majority of the sexed individuals found in grave features excavated by CJDP at LS-3 during the Conte and subsequent Macaracas phase were adult females and children including neonates and children less than 5 years of age (Cooke *et al.*2000; Díaz 1999). Their grave offerings were sparse, never exceeding 20 items with an individual and including food; ornaments made from shell, bone, and stone; and a few polychrome vessels. This last feature shows that people of modest means used polychrome vessels, but not in the same number as more important people. Polychrome ceramics have been found also in domestic contexts—dwellings and midden deposits—at several sites including those reported by the PARLV (see also Carvajal 1999; Sánchez 2000a).

Despite being the most publicized polychrome style of the Gran Coclé tradition, only two radiometric dates are associated specifically with Conte ceramics. The first comes from site AG-73 in Coclé, where a charcoal sample associated with a small Conte Red jar returned an AMS date of cal. A.D. 650–880 (Beta-46389). The PARLV provided the second date from Finca La Flora (LA-28) in the lower La Villa valley: a charcoal sample attached to a monochrome sherd found in the same context as a semi-complete Conte Red bowl was dated to cal. A.D. 545–980 (Beta-170997; Figure 4.33c). This date is consistent with prior estimates of the duration of the Conte phase.

One of the salient features of the Conte polychrome is the addition of a new hue (purple or bluish-purple) to the polychrome palette. Distinctive vessel forms also appear, particularly plates with lips that are thickened on the exterior (the so-called "drooping" lips); bowls with lightly out-flaring walls; annular and/or low pedestal bases; and bottle-like vessels that Lothrop called "carafes". The use of spouted jars and both anthropomorphic and zoomorphic effigy vessels, which entered the pottery tradition in the former Cubitá phase, intensified (Figure 6.19).

These kinds of vessels were either painted, in three or four colors—Conte Polychrome—or simply red slipped—Conte Red (Figures 6.19–6.23). Monochrome types coeval with the Conte polychrome are the Buff, Red Buff, Paneled Red, Red-Line, La India Red, and Smoked Wares (Ladd 1964; Lothrop 1942). "Smoked" pottery has a dark surface color, the result of firing at intentionally reduced temperatures. The technique appeared in the Cubitá phase with the Macano type. The PARLV collected only a few samples of Red-Line, La India Red[7], and Smoked potsherds (Figures 6.23–6.25).

Painted decorations on Conte polychromes incorporate geometric elements formerly used in the Aristide, Tonosí, and Cubitá styles, and add distinctive new painted zoomorphic motifs and modeled animal forms (e.g., turtles). The preference for a pure white slip and clays that oxidize a light grey or yellowish-grey color clearly distinguish the Conte style from earlier and later styles in the Gran Coclé tradition facilitating its identification in sherd lots.

According to concepts of symmetry established on earlier painted styles, vessel backgrounds are divided into geometric sections each of which is defined by a black line or groups of lines. These subdivisions or "panels" can be circular, semi-circular, quartered or rectangular (Cooke 1985; Lothrop 1942). Animal and human figures are often centered and free of the geometric elements that Lothrop described as "fillers."

[7] La India Red was studied by Alain Ichon (1980) and appears to be a regional (Azuero) variant.

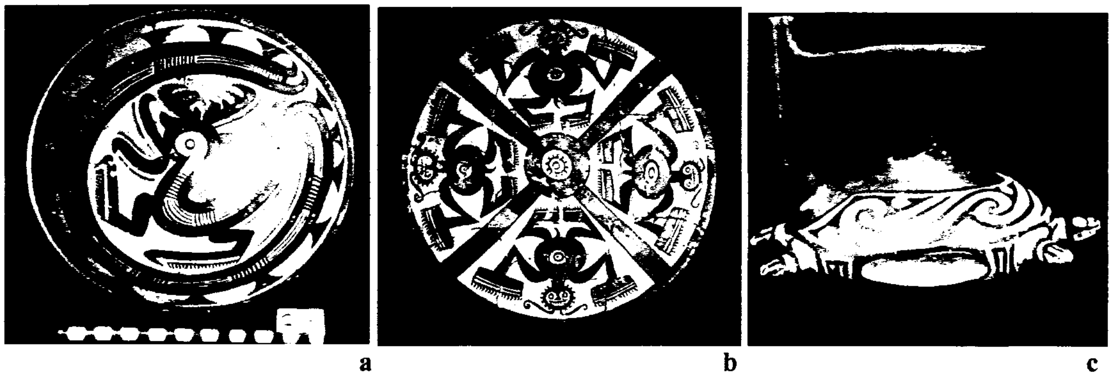


Figure 6.19 Conte style vessels (A.D. 700–850) from Sitio Coclé.
(a) Hybrid representation of a deer with snake like body painted on the interior of a plate, (b) turtles displayed in subdivided panels inside a flaring bowl, (c) Spouted effigy jar in the shape of a turtle decorated with Y scroll designs (Photos courtesy of Richard Cooke).

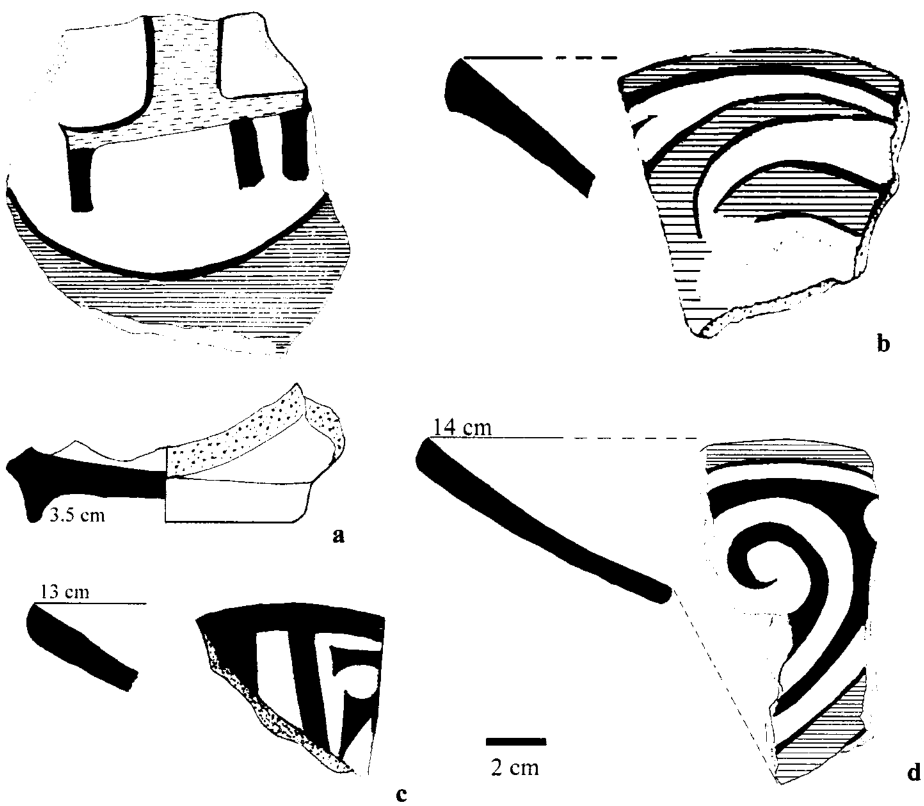


Figure 6.20 Conte polychrome pottery from Station R568, Site LS-10.
(a) annular base, cat 87ls-F11; examples of rims with drooping-lips, (b) cat 87ls-F47; (c) 87ls-F3; (d) cat 87ls-F18 (drawings by Alexis A. de Isaza).

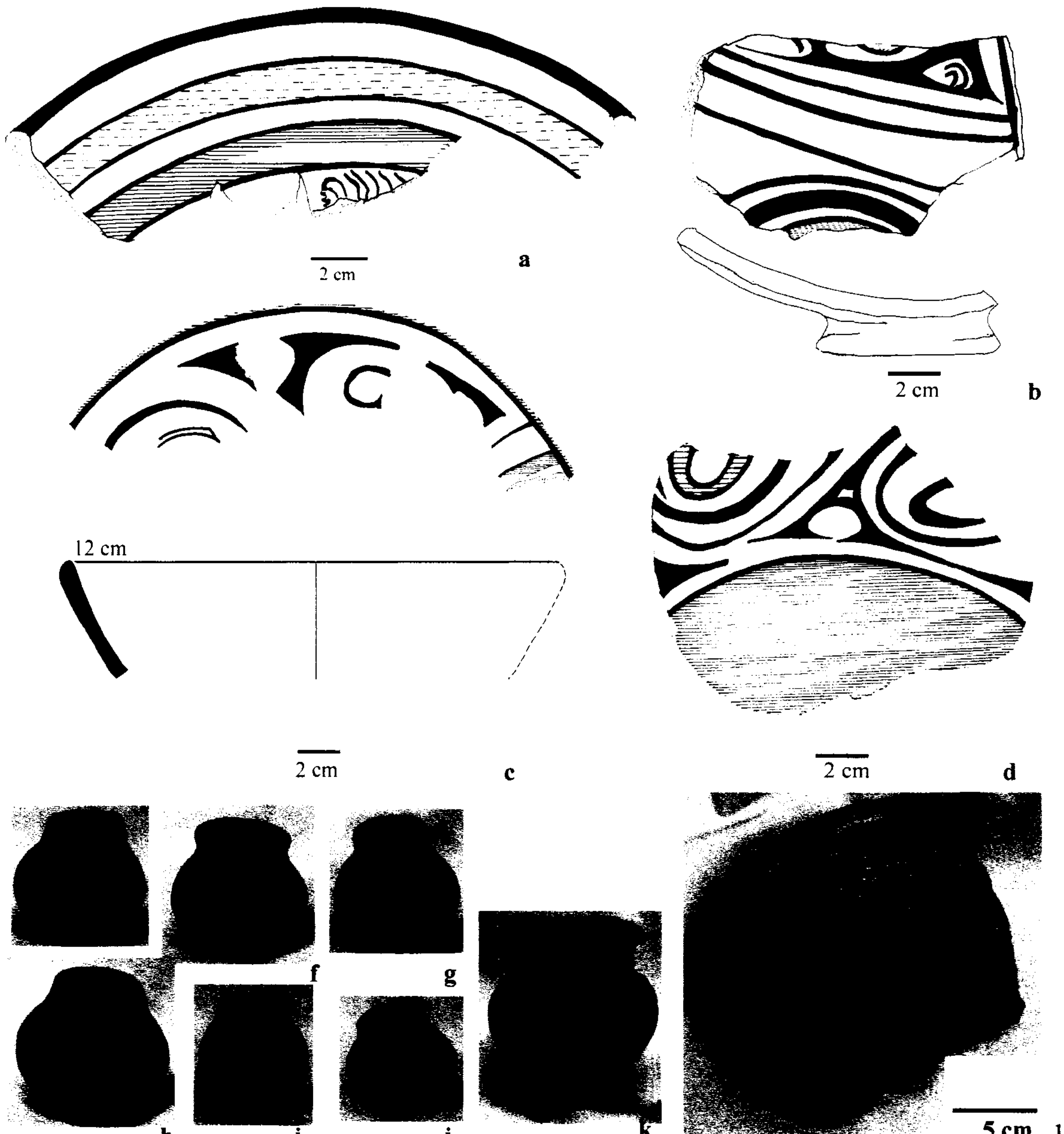


Figure 6.21 Late Conte-Macaracas vessels from Station R297, Site LS-10.
(a) Late Conte-Macaracas (?) bowl, cat 33Bhe-F64, Stratum 1, N 20 cm;
(b) Early Conte bowl cat 33Bhe-F63 from the looter pit fill;
(c) Late Conte/or Macaracas (?) cat 33Bhe-F61, Stratum 2, N 45 cm.
(d) Y scroll design painted on the exterior of a globular shaped jar, Conte style, cat 33B-he-F83, Stratum 3, N65 cm;
Late Conte polychrome and monochrome cups:
(e) cat 1762 Stratum 1, N 30 cm; (f) cat 1765, Stratum 1, N 20 cm; (g) cat 1759, Stratum 1, N 20 cm; (h) cat 1773 looter pit wall Stratum 1; (i) cat 1771, Stratum 1, N 20 cm; (j) cup cat 1756, Stratum 1, N 20 cm; (k) cat 1776, Stratum 1, N 30 cm; (l) Late Conte/Macaracas cat 1744, Stratum 1, N 10 cm. Vessels a, e-l present features and decoration elements present in both Conte and Macaracas styles (*cf.* Lothrop 1942 Figures 74, 138, 176a, and 453a; see also Cooke 1972: 100).

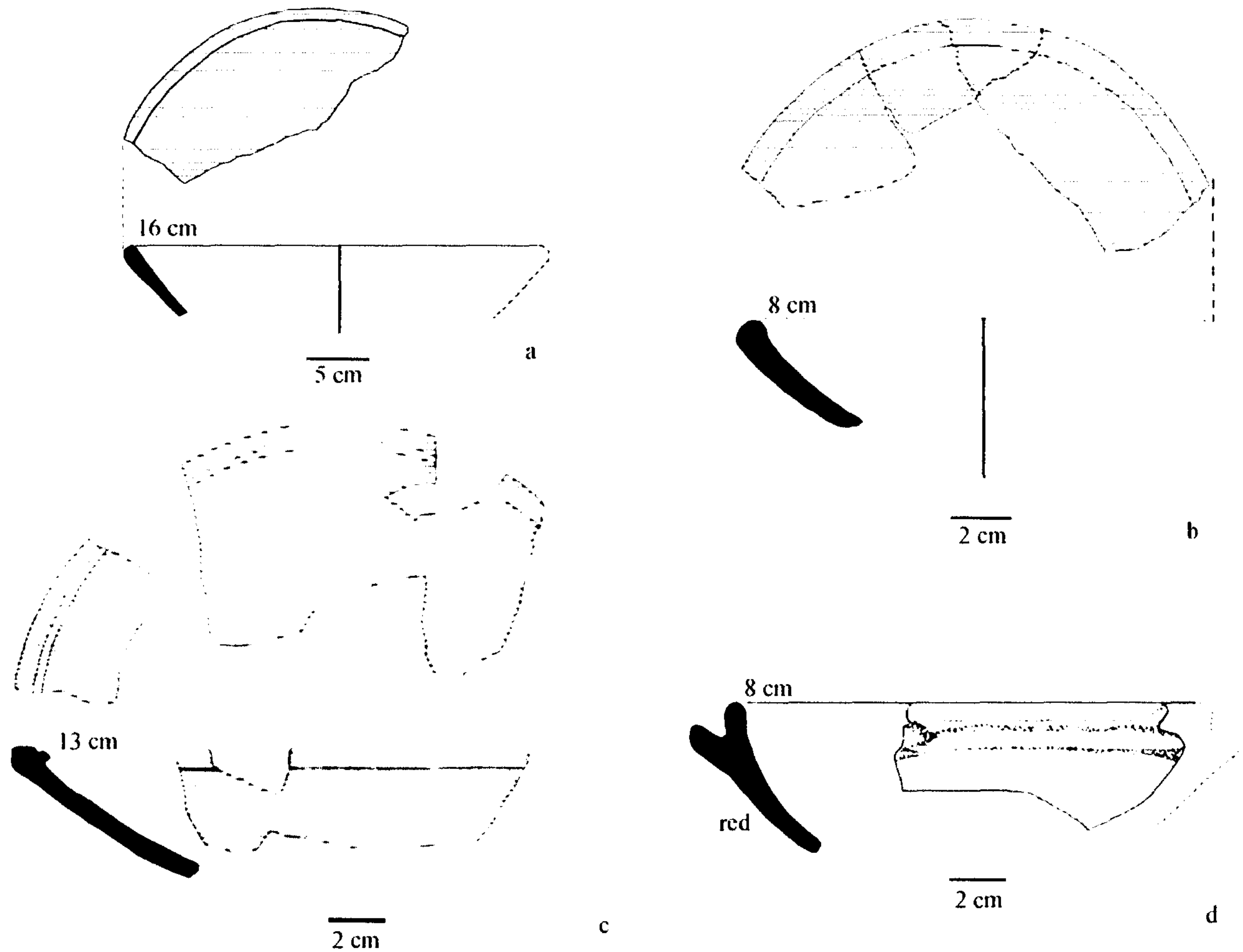


Figure 6.22 Red monochrome plate reconstructions.
(a) Macaracas rim, cat 19he-F29, Site LS-3, Station R118;
(b) Incomplete Conte Red bowl, cat 9he-F61, Site LS-3, Station T3R6;
(c) Conte Red bowl with incised lip, cat 87ls-F4, Site LS-10,Station R568;
(d) Conte red bowl with flange, cat 13he-F1, Site LS-3, Station R71 (Drawings by Alexis A. de Isaza).

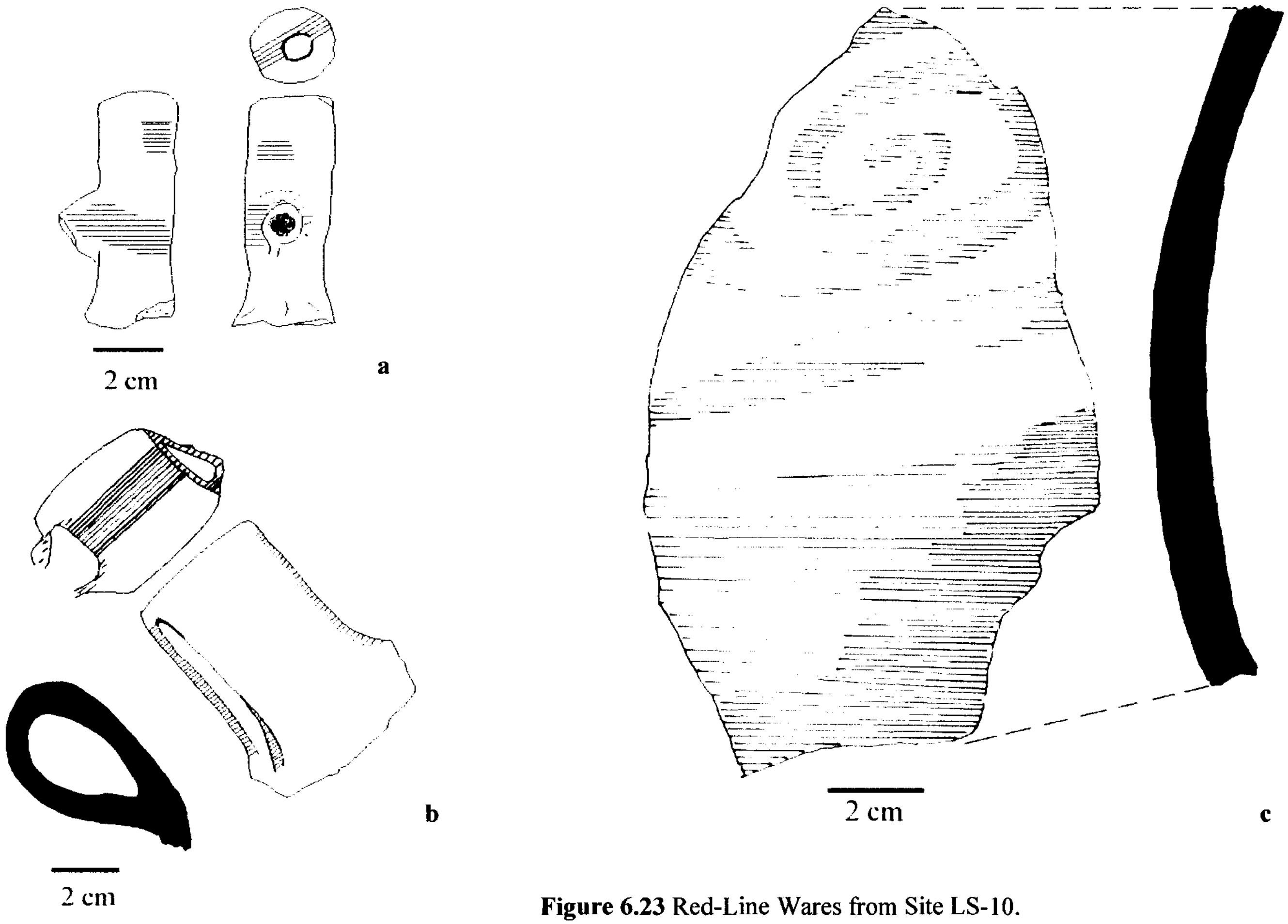


Figure 6.23 Red-Line Wares from Site LS-10.
(a) spout cat 33Bhe-F82, Station R297 looter pit fill;
(b) lace handle from an incense burner cat 87ls-F21, Station T4R6;
(c) body fragment from a jar found at LS-3, cat 21ls-F7, Station R5.
Drawings by Alexis A. de Isaza.

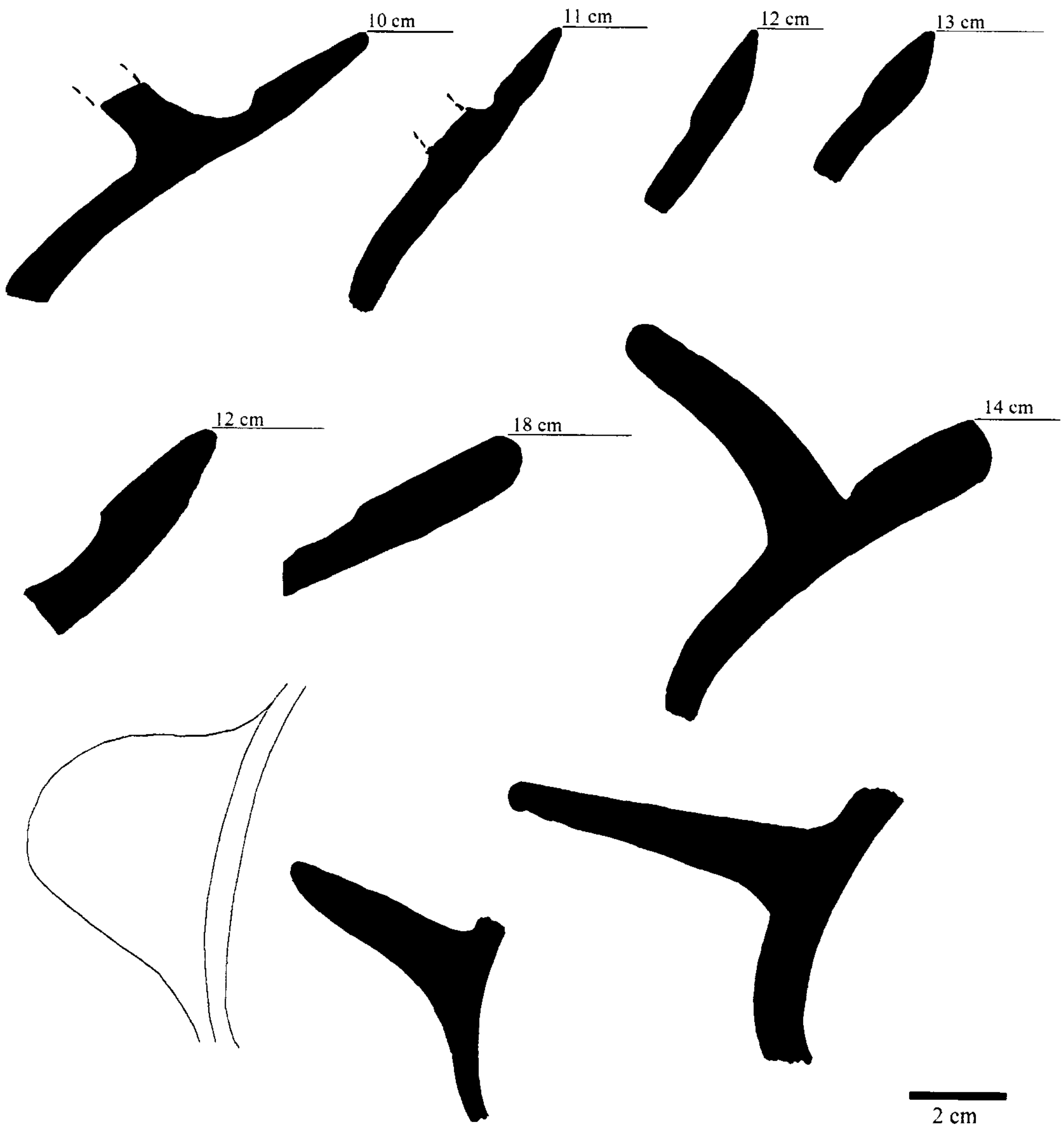


Figure 6.24 La India Red rims and body sherds with handles from Station R297, Site LS-10 (*cf.* Ichon 1980; Figure 63j).

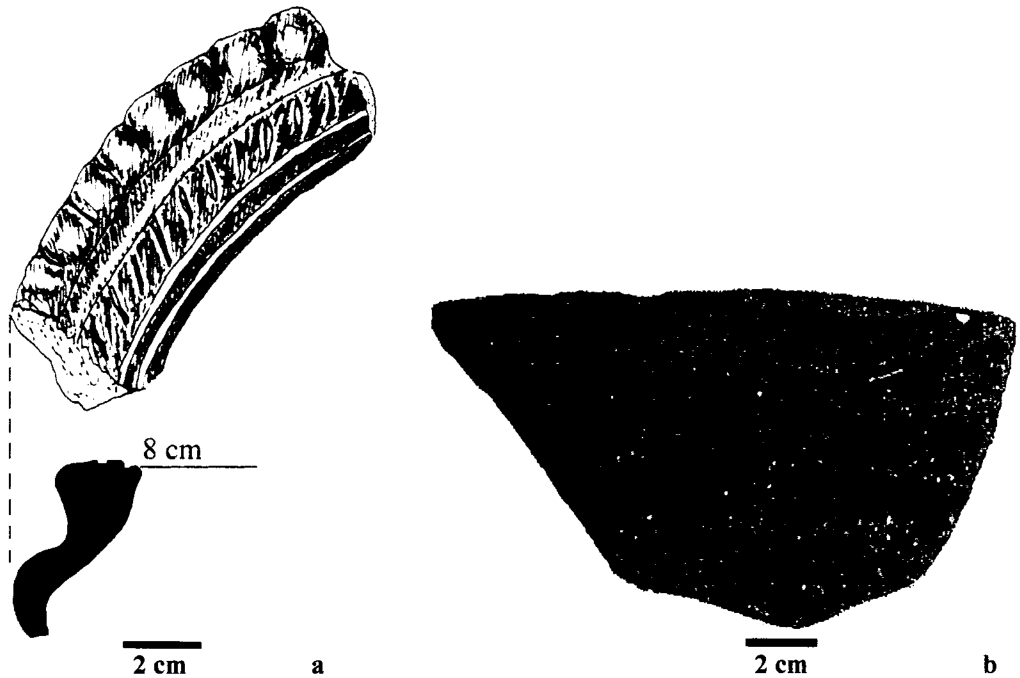


Figure 6.25 Smoked ware rims collected at the base of the river at LS-23.
cf. Ichon's *Tiñidero Brun* (a) cat 31ls-F4 (*cf.* Ichon 1980: Figure 84h); (b) cat 31ls-F3.

On polychrome vessels, the red and purple pigments are always used as fill colors outlined in black, while white or red pigments are regularly used as a slip (Figure 6.19; Cooke 1985; Lothrop 1942). Pottery painted in the Conte style makes ample use of scroll motifs, mostly variants of the "YC" combination, which, as stated before, made their first appearance in the Cubitá style. The reconstructed vessels in Figure 6.21 b–d, for example, show partial sections of the Y-scroll. Other common motifs used in the Conte style include realistic and stylized representations of animals, e.g., saurians, snakes, birds, scorpions, crabs, frogs, toads, fish, turtles, and deer (Figure 6.19 a–b). Also prevalent are images that combine features of humans and animals, particularly crocodiles, birds, and snakes.

The only partially complete vessel in our sample that shows a zoomorphic design, is a Late Conte flaring bowl excavated from a test unit at station R297, Site LS-10 (Figure 6.21l). It depicts a turtle with a human-like body. Geometric motifs are more frequent in our sample, e.g., scrolls and claw-like designs (*cf.* Labbé 1995: Table 1 s–w).

Conte phase pottery painted with red or reddish-purple lines on a light ground ("Red-Line Ware") continues the tradition of Guachapalí although slips tend to be thicker and white or cream in color. Their designs vary from simple tear-drop elements and red bands to geometric and anthropomorphic design elements that are common on the polychrome ware (e.g., Lothrop 1942: 131–143). The PARLV sample only includes examples of red-banded decorated globular jars, and few appendages, including a lace type handle and a spout (Figure 6.23).

The PARLV Conte phase pottery sample comprises 7% of the total surface collection and 42% of the typologically diagnostic sherds, being larger than Cubitá by a very small margin (Table 6.2). My decision to classify sherds as Conte was based on the presence of diagnostic painted features like the Y and C scrolls, claws, distinct paste color (ranging between white and pink, although red is also possible), and thick white slip.

Much of the sample (42%) consists of undecorated or highly weathered sherds, which nevertheless exhibit morphological and technological characteristics of the Conte style (Table 6.6). Conte polychrome sherds represent 44%. Monochrome types include Conte Red (9%), Red Line (3%), and La India red (1%; Figure 6.22–6.25).

Table 6.6
Frequency of Conte phase pottery from the PARLV surface collections

Sites	LS-3	LS-8	LS-9	LS-10	LS-11	LS-15	LS-23	LA-28	LA-29	Total	%
No. Stations	51	21	4	67	3	3	1	10	6	**167**	
Late Conte/Macaracas	21			11						**32**	3
Conte Polychrome	107	30	7	364	4	1		7	20	**540**	44
Conte Red	8	4		67	3			16	8	**106**	9
Red Line Ware	6	6		26	1					**39**	3
La India Red		2	1	8				2		**13**	1
Smoked							2			**2**	0.2
Miscellaneous	8	3		383	109	3		17	1	**524**	43
Grand Total	**129**	**45**	**8**	**848**	**117**	**4**	**2**	**42**	**29**	**1,224**	
%	**11**	**4**	**1**	**69**	**10**	**0.3**	**0.1**	**3**	**2**		

The geographic distribution of Conte ceramics across the PARLV survey universe points to a continuing growth of preexisting villages and hamlets. Conte phase pottery was most prevalent at site LS-10 (69%), followed by LS-3 (11%), and LS-11 (10%). It is significant to note that these three sites all reached their maximum settlement size during the Conte phase. The site size estimates are defined by plotting together the occurrence of diagnostic Conte ceramics and the undecorated or highly weathered sherds that exhibit morphological and technological characteristics of the Conte style (Figure 6.26).

I estimate that during the Conte phase, LS-3 expanded to cover 162 hectares, while LS-10 reached 167 hectares in size. Both sites continued to occupy the apex of the settlement hierarchy (Figure 6.27). LS-8 maintained the size it had acquired during the Cubitá phase, while LS-9 reached 9 hectares in size. Up river, sites LS-11, LS-15, and LA-28 also grew to 20, 12, and 20 hectares respectively. Site LS-29 experienced a substantial growth reaching 6.9 hectares in size. Isolated ceramic finds from LS-22, LS-23, and LS-32 (which I was not able to include in my analysis) point to the presence of small activity areas or dwellings on the coastal plain (Figure 6.27).

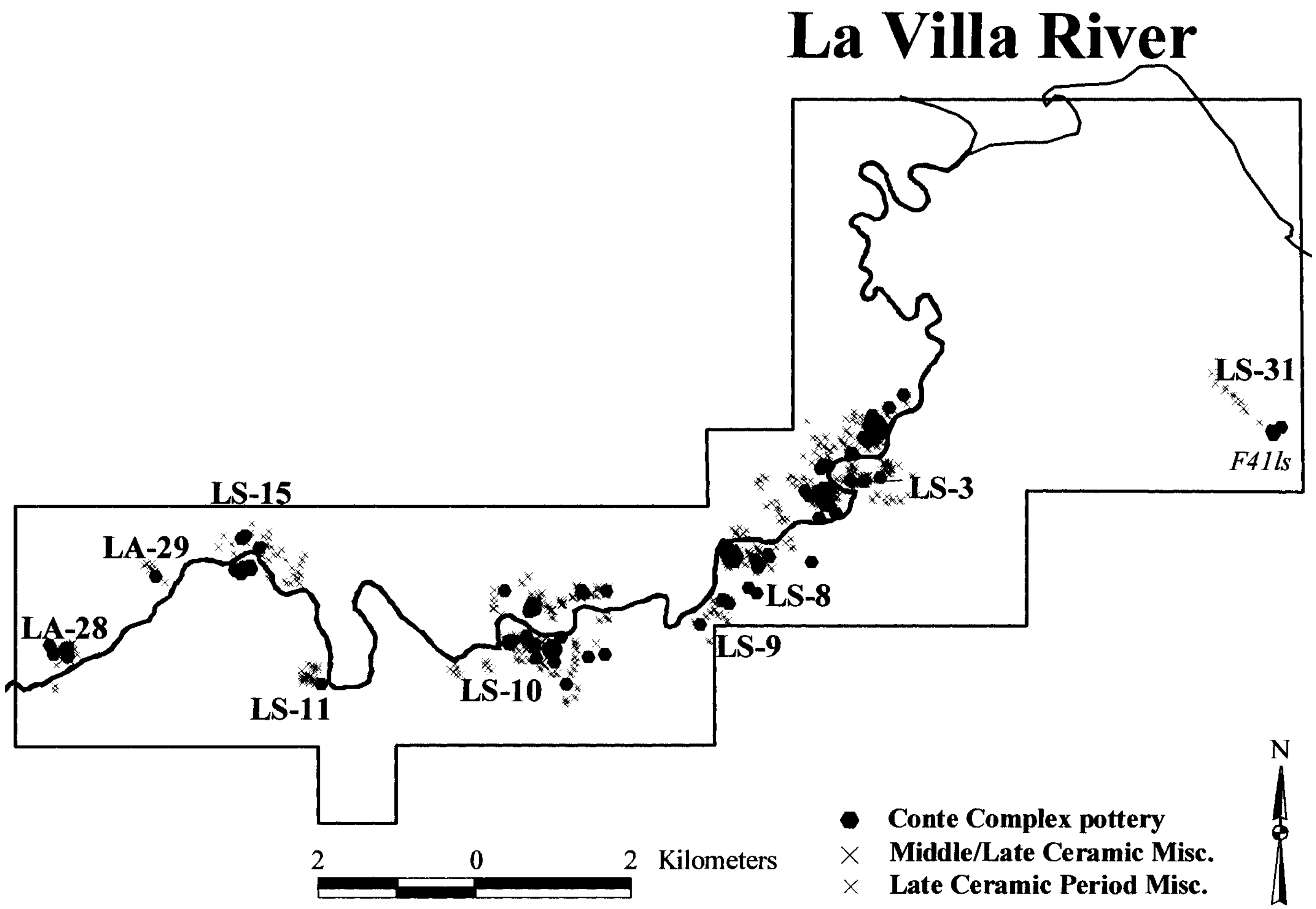


Figure 6.26 Distribution of Conte phase pottery in the Lower La Villa valley

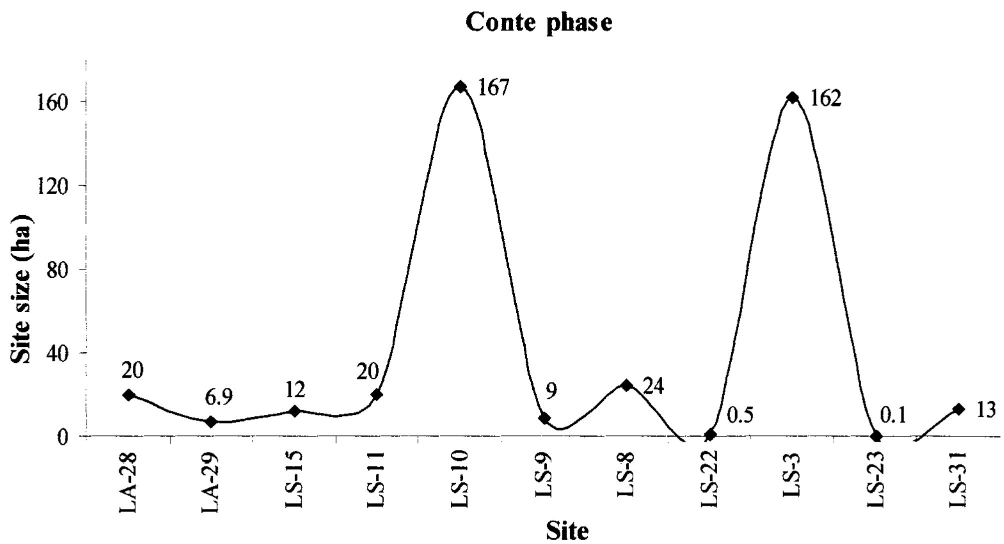


Figure 6.27 Settlement size during the Conte phase

The increasing concentration of people in large nuclear settlements across the Cubitá and Conte phases is not unique to the La Villa valley. Doris Weiland (1984) documented a similar situation in the lower reaches of the Santa María valley and so did Haller for the Parita valley. Most of the Late Ceramic Period sites in the Santa María valley, for example, consist of large nuclear villages (~45 ha in size), most of them located near the coast (Weiland 1984: 46). The exception is AG-73, a 45-hectare village, located 12 kilometers from the coastal plain and 1 kilometer from the Estero Salado River. For the Parita valley, Haller notes an increase in the number of sites in the vicinity of El Hatillo (HE-4), the most populated and largest site in the valley that is located 18 kilometers from the coast (Haller 2004: 81–82).

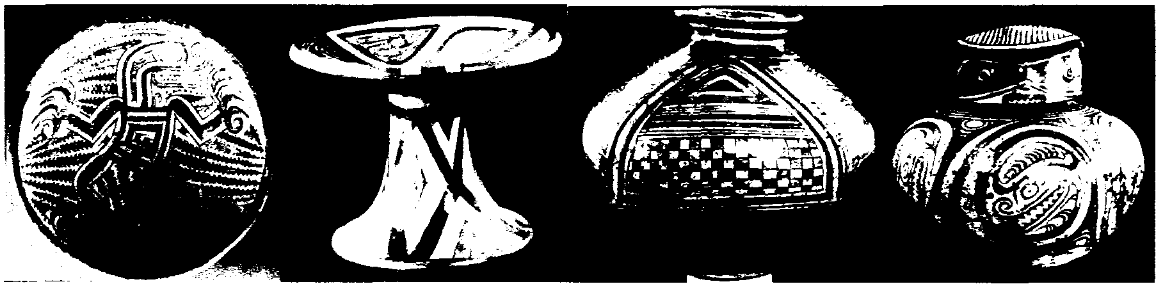
There are also sharp differences between the La Villa and Parita settlement patterns. While Haller argues that the site of El Hatillo continued to be at the apex of a three-tiered settlement hierarchy in the Parita valley, in the La Villa valley two nuclear settlements, LS-3 and LS-10, located 4 kilometers apart, continued to be by far the largest sites.

Haller experienced the same problem as I did in regard to the high proportions of pottery that is diagnostic to period, but not to a single phase. At El Hatillo, sherds that could be assigned to the Late Ceramic, i.e., anywhere between A.D. 700 and 1520, covered a much larger area than the area assigned to the Conte phase occupation (45 ha against 19.5 ha). There is no way of knowing when El Hatillo attained its maximum size on the basis of these data. Even with this much larger size estimate, however, El Hatillo is still considerably smaller than type 1 nuclear settlements in the La Villa river valley, which have a mean size of 164.5 hectares. Type 2 villages average 21.3 hectares, type 3 hamlets 10.2 hectares, and type 4 sites 0.3 hectares. On my survey, 32% of the total sample corresponds to miscellaneous pottery sherds that exhibit characteristics shared by several styles from the Cubitá through Macaracas phase (Middle Ceramic C–Late Ceramic B). Since their distribution was wider, continuous, and at times associated with mounds or middens I extended the site boundaries beyond the limits of the diagnostic Conte phase pottery.

6.3.6 Late Ceramic B, Macaracas phase (A.D. 950–1100)

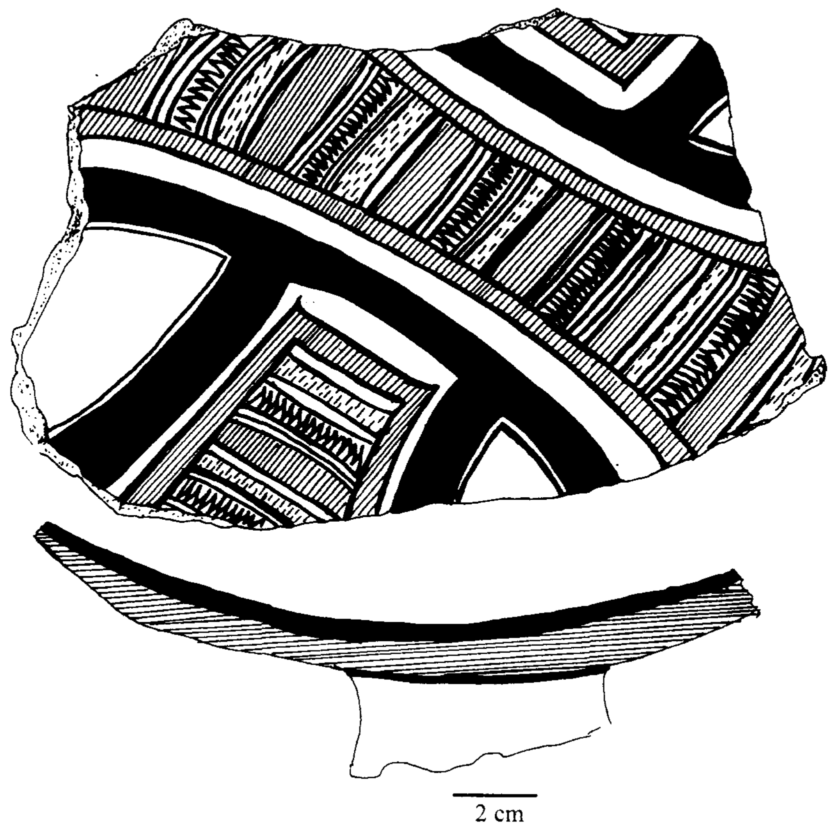
Lothrop (1942) divided the "Sitio Conte Polychromes" into two phases, Early and Late, basing his decision on the distribution of ceramic traits in stratified grave groups. He also identified a style that he thought was not of local origin. This style shared iconographic features with late Conte vessels, but its designs were executed with much finer lines. When Ladd (1964) analyzed funerary pottery and stratified sherd lots from sites on the Azuero Peninsula, including El Hatillo, he identified vessels very similar to Lothrop's "foreign style A" from Sitio Conte (Lothrop 1942:119). Ladd grouped this material into two varieties (Pica-pica and Higo) within a new style, which he named Macaracas . A third variety "Cuipo" was added . The differences among the three varieties are based on distinct decorative elements restricted to specific vessel shapes (Figures 6.28–6.35).

Distinguishing between the Late Conte and Macaracas painting styles is not always easy (particularly in sherd lots) since they share many motifs and designs typical of a stylistic gradation in time (Cooke 1985, Labbé 1995, Sánchez 2000a). In very general terms, Macaracas vessels seem more expertly crafted with more carefully executed designs. The bluish hues are often more violet, perhaps because Macaracas pottery tends to use pastes that fire reddish or orange rather than whitish or yellowish (Figure 6.28). The degree to which these differences are conditioned by local availability of clays and pigments, however, has not been empirically determined. The diagnostic externally thickened lips of shallow plates (the "drooping-lips") are replaced by rounded lips often decorated with alternating bands of red, purple, and white hues outlined by narrow black lines, as if depicting coral snake patterns (Figures 6.28a–b; 6.31, 6.32d–e, g–h; Lothrop 1942: 81). Annular bases give way to tall out-flaring pedestals commonly painted with diamonds, ribbons, chevrons, or crosshatching designs (Figure 6.28b, 6.30d, f). A second type of support common in the Macaracas style is the cylindrical pedestal generally red slipped and decorated with pierced openings (e.g., Figure 6.30g).



a b c d

Figure 6.28 Macaracas style vessels (A.D. 950–1100) from Coclé sites.
(a) Higo pedestal plate; (b) Pica-pica pedestal plate; (c) Higo Jar with angular shoulders and narrow neck; (d) Cuipo effigy vessels (Photos courtesy of Richard Cooke and INAC).



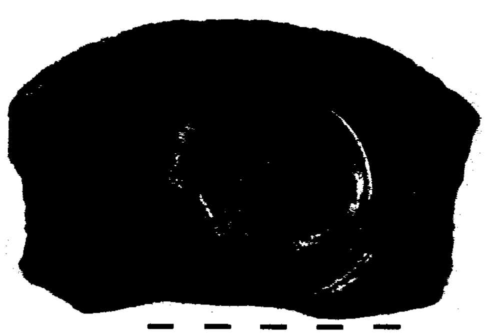


Figure 6.29 Macaracas Pica-pica pedestal plate. cat 71he-F21, Site LA-29, Station T2R5. The plate depicts a cruciform panel arrangement with broad red bands defined by black lines and zigzag fill elements *cf.* Ladd 1964: Figure 37f; Lothrop 1942: Figure 477b (Drawing by Alexis A. de Isaza).

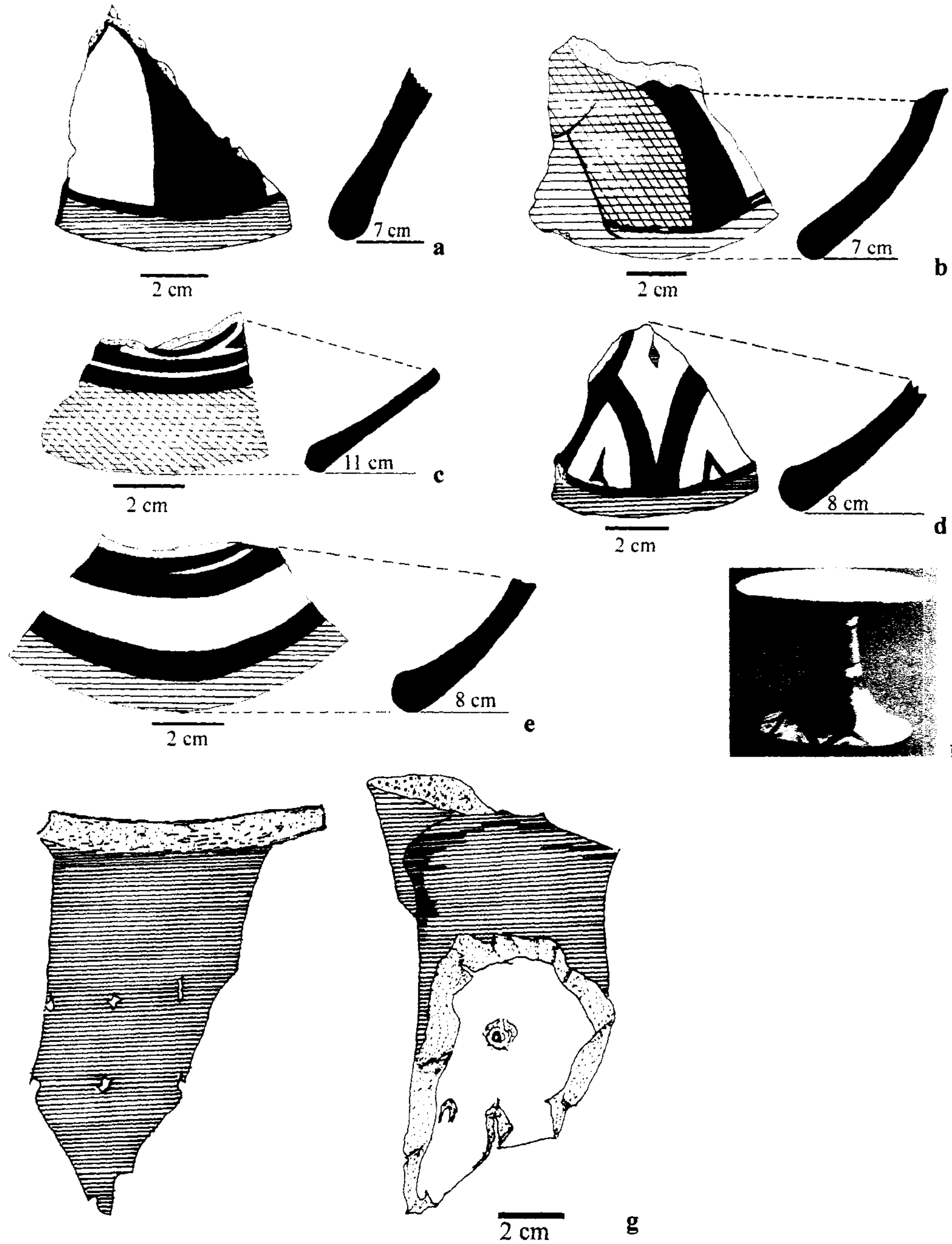


Figure 6.30 Macaracas and Parita style pedestals from Sites LS-3 and LA-29.
(a) Níspero pedestal, cat 9he-F20, Site LS-3; Station T5R10;
(b) Ortiga pedestal, cat 9he-F 12; Site LS-3, Station R035;
(c) Níspero, cat 71he-F1, Site LA-29, Station T2R2;
(d) Pica-pica, cat 6he-F4, Site LS-3, Station T3R9;
(e) Níspero or Anón pedestal, cat 71he-F2, Site LA-29, Station T2R2;
(f) Transitional Macaracas-Parita pedestal plate
(d) red slipped Macaracas pedestal with hollow decoration, cat 22ls-F2, Site LS-3, Station T2R9.
(Drawings by Alexis A. de Isaza, photo by Richard Cooke).

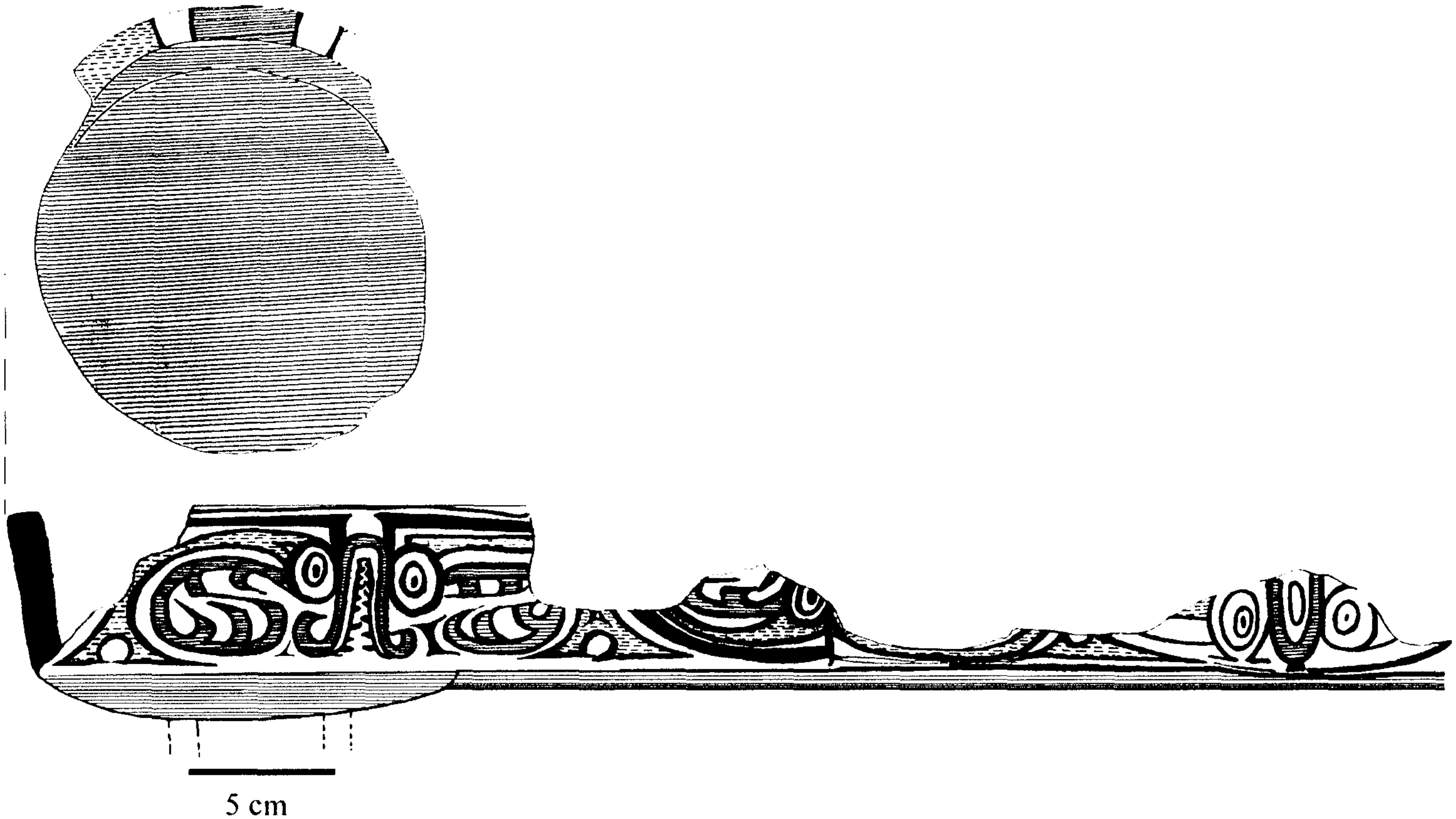


Figure 6.31 Macaracas Pica-pica bowl from Station R679c, Site LS-15.
The exterior body depicts a split face of a crocodilian with crab claws cat 102ls-F1 (Drawing by Alexis A. de Isaza, *cf.* Lothrop 1942: Figure 173.

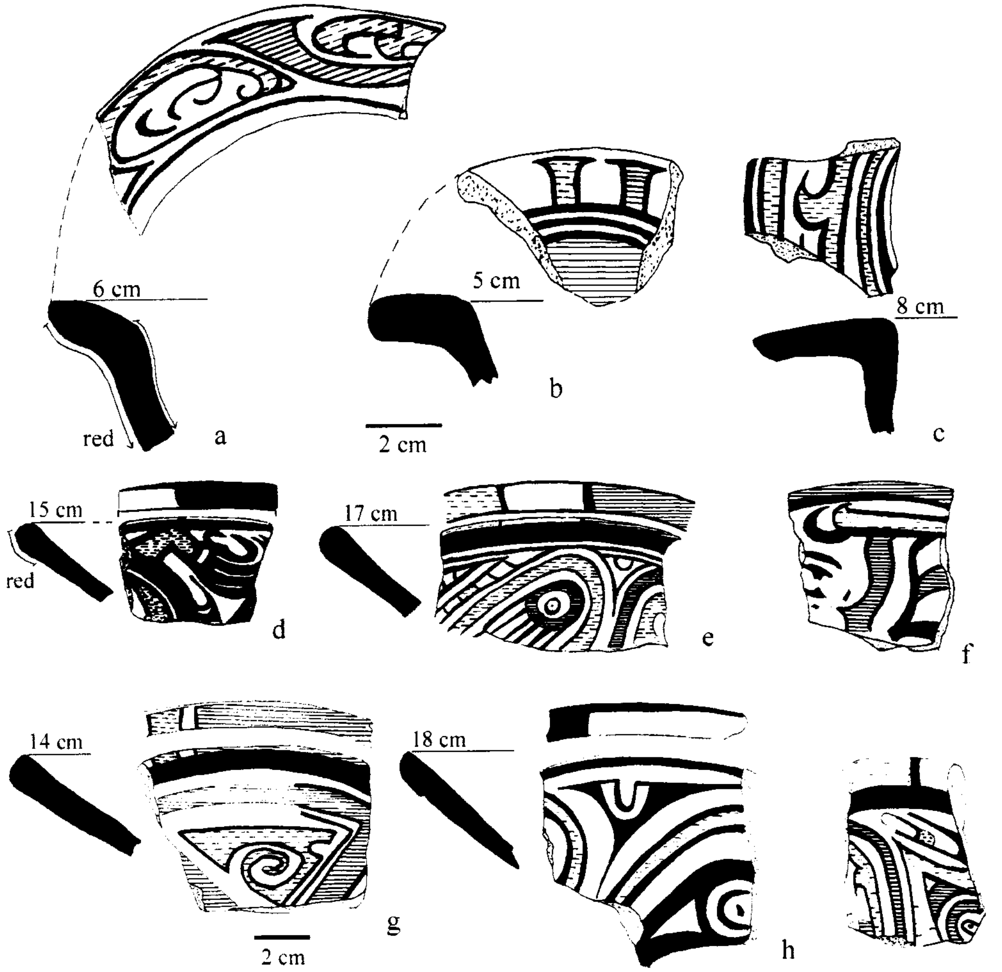


Figure 6.32 Macaracas Pica-pica and Higo rims.
(a) Pica-Pica jar rim cat 33Bhe-F62, Site LS-10, Station R297 PH fill;
(b) Pica-pica jar rim cat 19he-F35, Site LS-3, Station R118;
(c) Pica-pica jar rim cat 44he-F26, Site LS-10, Station R267. These jar rims show claw scrolls painted in alternating purple and red colors and defined by narrow black lines (*cf.* Lothrop 1942: Figure 196a-b);
(d) Higo rim showing claw element with an opposing talon cat 87ls-F2, Site LS-10, Station R568;
(e) Higo rim showing eye element, cat 87ls-F5, Site LS-10, Station R568;
(f) Pica-pica rim cat 82ls-F10, Site LS-10, Station R527;
(g) Pica-pica rim cat 87ls-F37, Site LS-10, Station R529;
(h) Pica-pica rim cat 87ls-F40, Site LS-10, Station T4R10;
(i) Pica-pica rim cat 44he-F23, Site LS-10, Station R260.
Note that the lip of rims **d** through **i** are decorated with coral snake pattern.
Rims **d, f** and **i** show different styles of claw, and rims **g** and **h** show scrolls design elements. Drawings by Alexis A. de Isaza.

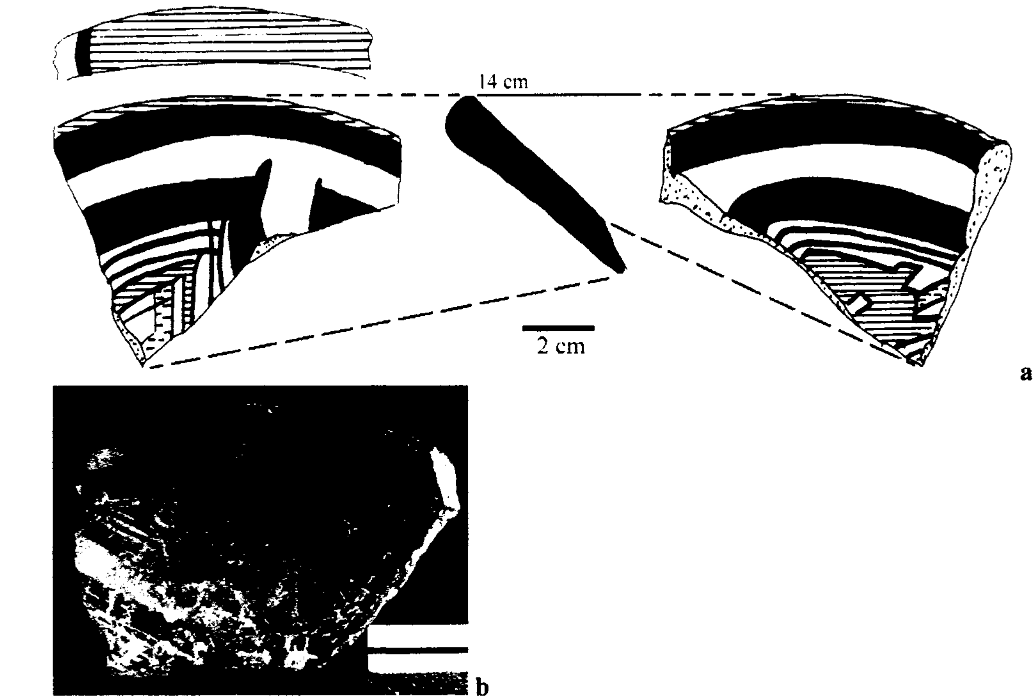


Figure 6.33 Macaracas Higo rims
(a) Flaring plate rim with decoration on both sides, cat 87ls-F48, Site LS-10, Station R529.
(b) Rim showing the face of a saurian in profile inside a triangular panel. The rim was found by a resident of Los Olivos near the LS-11 site and given to Professor Aris Calderón.

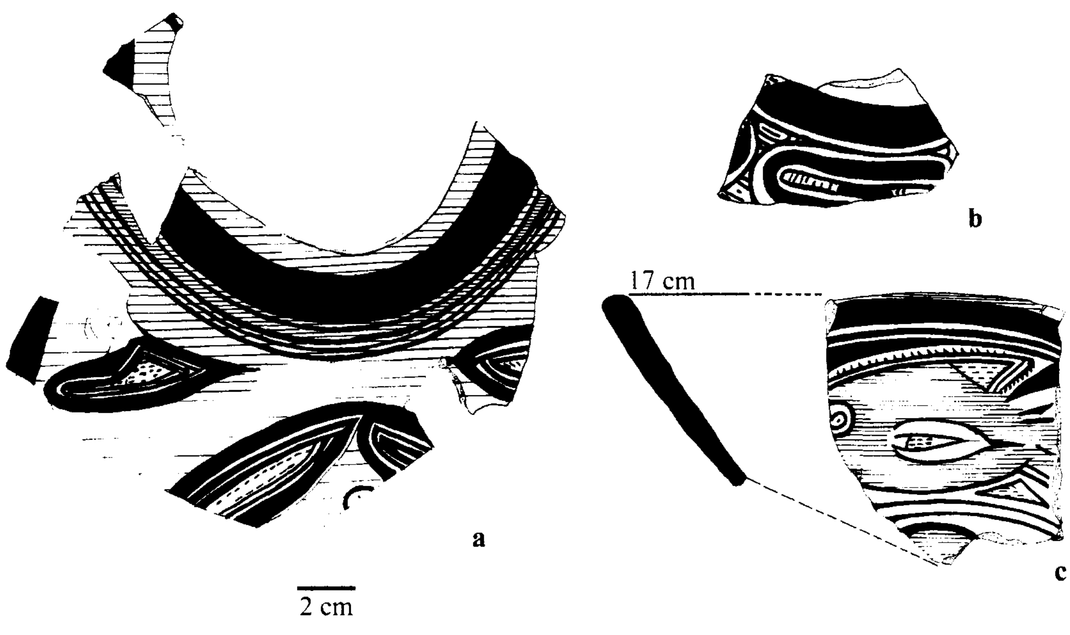


Figure 6.34 Macaracas Cuipo jar and flaring bowl fragments from Station R529, Site LS-10.
(a) cat 87ls-F33; (b) cat 87ls-F39; (c) cat 87ls-F36 (*cf.* Lothrop 1942: Figure 461a & 462a').
Drawings by Alexis A. de Isaza

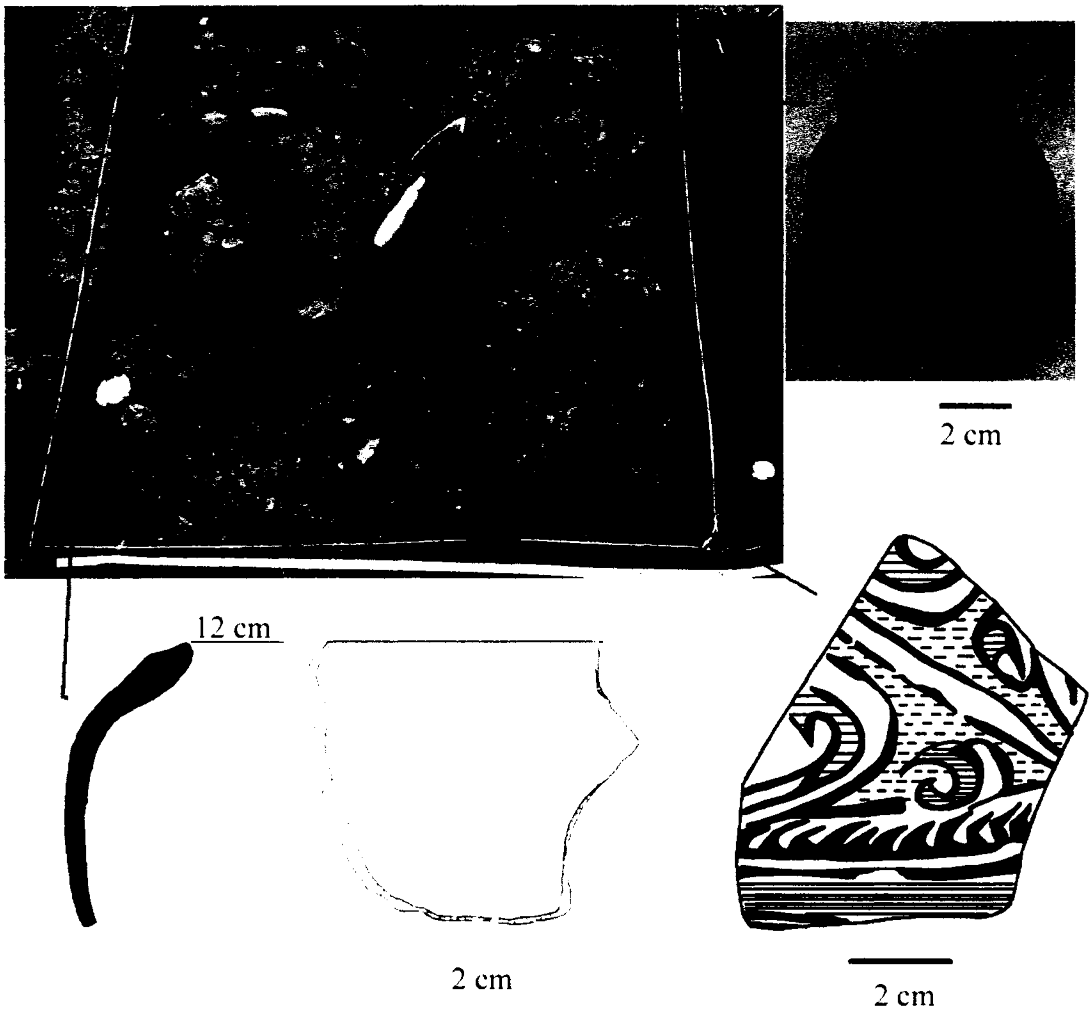


Figure 6.35 Shallow Macaracas deposit identified at Station R118, Site LS-3.
(a) cat 19he-F36; (b) cat 19he-F4; (c) cat 19he-F5. A charcoal sample attached to a polychrome rim illustrated in Figure 6.31b yielded a date of 1190 ± 40 BP, cal. A.D. 720 (870) 960 (Beta-170996).

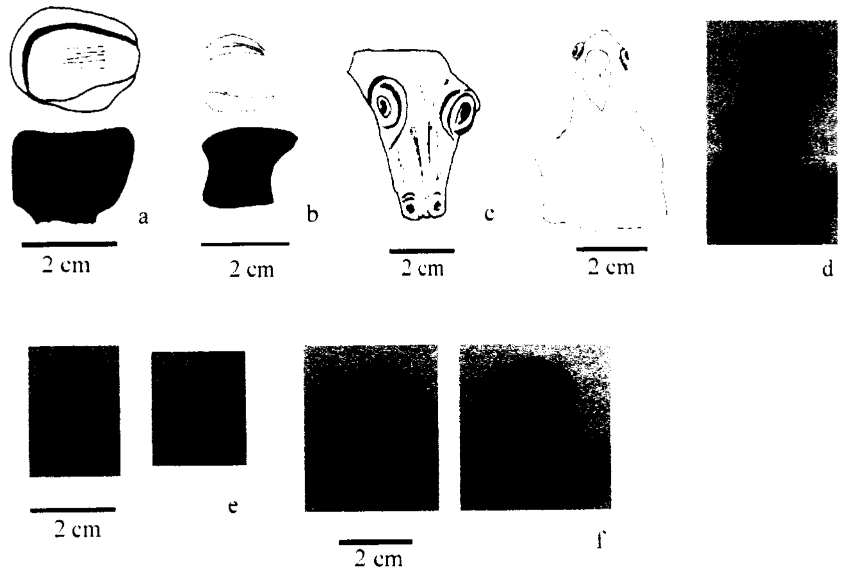


Figure 6.36 Miscellaneous Red Buff and Red Line zoomorphic appendages.
(a) Red line appendage cat 70ls-F8, Site LS-8, Station T1R10;
(b) Red Buff appendage cat 15ls-F1, Site LS-3, Station R1;
(c) Red Buff Crocodile head appendage cat 33Bhe-F71, Site LS-10, Station R297 looter pit fill (*cf.* bicephalous crocodilian *tumbaga* pendant in Cooke *et al.* 2003a: Figure 8a);
(d) Red Buff appendage cat 60he-F1, Site LS-15, Station T5R5;
(e) Red Buff appendage cat 33Bhe-F69, Site LS-10, R297 looter pit fill; an identical appendage was found inside the fill of Stratum 1 of the excavated deposit.
(f) Red Buff appendage cat 33Bhe-F99, Site LS-10, Station R297 looter pit fill.

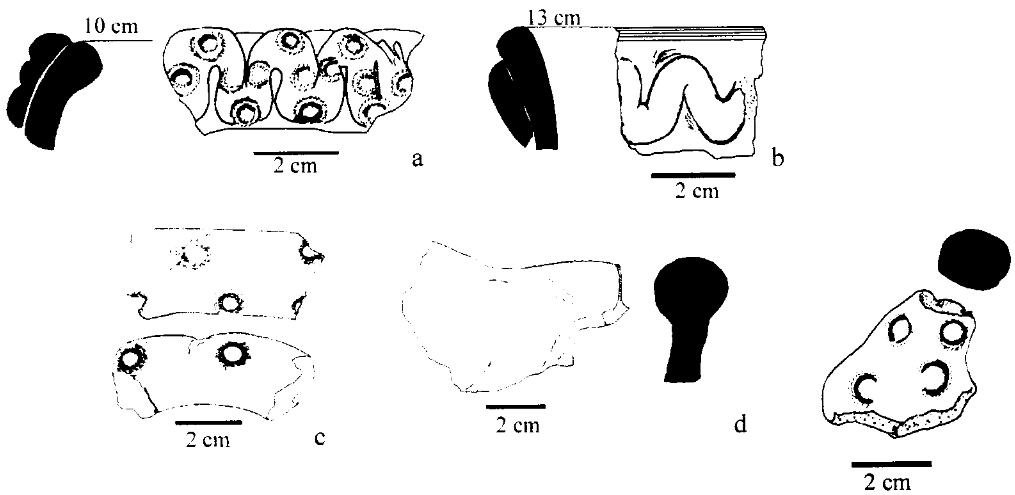


Figure 6.37 Buff and Red-Buff appendages and plastic decorated rims associated with both Macaracas and Parita phase polychrome wares.
(a) Buff rim with modeled zoomorphic decoration cat 78ls-F19, Site LS-8, Station R1 (*cf.* Ladd 1964: Figure 52b); (b) Red Buff rim cat 71ls-F36, Site LS-8, Station T3/T4 PH1;
(c) Buff handle cat 70ls-F4, Site LS-8, Station T2R5;
(d) Red Buff handle cat 70ls-F6, Site LS-8, Station T2R7 (*cf.* Ladd 1962; Figure 52d).
(e) Red Buff handle cat 70he-F64, Site LA-28, Station R416-A.

The Macaracas phase also saw the introduction of new vessel forms, such as the cylindrical bowl found on the wall of a looter pit at LS-15 (6.31). Jars with angular shoulders and narrow necks also became common (Figure 6.28c). In burial contexts, these kinds of jars are often found with their necks intentionally cut off (e.g., Cooke *et al.* 2000: Figures 8.3c, 8.9a). More effigy vessels seem to have been produced during the Macaracas phase than the previous Cubitá and Conte phases (Figure 6.28d; see also Lothrop 1942: Figures 201–208).

A salient feature of the iconography of Macaracas vessels—one that began to prevail in the Late Conte style—is the frequent depiction of saurians (often with humanoid bodies). These are depicted in horizontal or erect poses (Figure 6.28a). Fish images increase in frequency (especially forms interpreted as stingrays and hammer-head sharks). Bird, crabs and insect images also occur (Figure 6.31; see also Labbé 1995: Tables 3 & 4). These zoomorphic representations are often depicted in pairs and in active motion (Labbé 1995: 43).

Another frequent feature of Macaracas painted pottery is the arrangement of the central theme of the vessel into two to four black-banded panels (Figures 6.28b, 6.33). Filler elements are often used so much that they appear to saturate the central biomorphic image. This is exemplified by the stylized representations of stingray spines, that adorn humanized saurian images (Figure 6.28a). The use of elements such as YC scrolls, becomes extremely stylized (Figure 6.32g). Other element motifs that prevail on Macaracas vessels include: stylized claws, a combination of claw and eye elements, spindles, leaf, and Z-shaped motifs (Figures 6.29, 6.31–6.34; see also Labbé: Table 3;

Ladd 1964 Figures 37f-g & 38a; Lothrop 1942: Figure 477b–c).

Current evaluations suggest that the Higo and Pica-Pica varieties defined by Ladd are earlier developments than the Cuipo variety. Two of Sitio Conte's richest graves, 26 and 74 in Briggs' (1989) system, are also considered among the most recent at this site, due to the presence in them of several vessels, which are assignable to Ladd's Higo and Pica-pica varieties (Lothrop 1937: Figures 245 and 246; Hearne 1992: Figure 1.8; see also Briggs 1989; Linares 1977b).

The first indication of the radiometric age of Macaracas style pottery was provided by finds of Pica-pica plate sherds in the fill of two graves at the Miraflores site (CHO-3), located in the valley of the River Bayano (Figure 2.2), 300 kilometers east of Parita Bay (Cooke 1976a). Their paste and design suggest, intuitively, that they originated in the Azuero Peninsula. Two dates were obtained from charcoal samples recovered near the floors of the two graves yield a 2-sigma range of cal. A.D. 670–A.D. 1030 (I-7309 and I-7310; Cooke *et al.* 2000). This time span is consistent with radiocarbon dates acquired in the second burial horizon at Cerro Juan Díaz. Carbonized food materials adhered to a red painted urn fragment from Burial 51, Operation 4, at Cerro Juan Díaz returned a date of cal. A.D. 800–A.D. 1030 (Beta-121156–121157; Cooke *et al.* 2000: Table 8.1). Another charcoal sample associated with a small polychrome Macaracas jar in Burial 44 (Operation 4) yielded cal. A.D. 775–1015 (Beta-121162; Cooke *et al.* 2000: Figure 8.9e; Sánchez 2000b: Figure 9). In both burials, the polychrome varieties were identified as Pica-pica. A third grave in the same excavation unit, Burial 4, contained a Cuipo urn associated with a more recent charcoal date of cal.

A.D. 985–1220 (Beta-121164; Cooke *et al.* 2000: Figure 8.9a). This date, coupled with the fact that no Cuipo variety vessel was reported at Sitio Conte tombs, gives support to the hypothesis that this variety is a more recent development within the Macaracas style. It also suggest that Sitio Conte stopped functioning as a macro-regional necropolis for selected adult males by the second half of the Macaracas phase (Linares 1977b: 58; see also Cooke *et al.* 2000: 167, 172, 2003a: 126–128).

Evidence from the El Hatillo site points to the emergence of a new regional center located in the valley of the River Parita (Cooke *et al.* 2003a: 137; Haller 2004: 88–94). This hypothesis is based on the fact that El Hatillo is the only other known site in Gran Coclé where individuals were buried with sumptuary goods similar to those recorded at Sitio Conte (Cooke *et al.* 2003a: 128, 136). There is as yet no evidence at El Hatillo for the above-ground quasi-monumental features, such as stone columns and cobble stone pavements, which characterize the Sitio Conte-El Caño site complex (Cooke 1993b; 2004b: 275). There are arrangements of mounds, however, that contain many burials between clay floors. Unfortunately, most graves at El Hatillo were excavated by amateurs who provided only general information on the most valuable finds (i.e., Bull 1965; Dade 1972; Mitchell and Acker 1961). These reports, together with Ladd's (1964) material analyses, and Mikael Haller's recent survey show that the mounds were constructed and used as burial features from A.D. 900 until Spanish contact. Exactly when graves with a rich assemblage of gold work (Biese 1967; Cooke and Bray 1985) were deposited, is not clear although the iconography of many of the splendidly crafted artifacts suggest a correspondingly late date.

Sherds assignable to the Macaracas complex comprises 1% of the total PARLV surface collection and 6% of the typologically diagnostic sherds (Table 6.2). A few incomplete vessels found next to looter pits and in exposed walls along dirt roads are included in this sample (Figures 6.29–6.30, 6.34). Most of the collected material comprise monochrome (33%) and weathered polychrome sherds (31%) whose characteristics allude to their belonging to either the Pica-pica or Higo varieties (Table 6.7). The most diagnostic and widely distributed variety is Pica-pica (12%); two semi-complete vessels were recovered (Figures 6.29 and 6.30). Less frequent were the Higo (4%) and Cuipo (6%) varieties, which were identified at specific areas of sites LS-10 and LS-3, where looters had opened large pits and exposed diagnostic material from multiple periods.

A shallow Macaracas deposit was identified in the middle of a dirt road (Station R118) south of Cerro Juan Gómez on the Herrera banks of LS-3. A sample of carbonized material found attached to the Pica-pica rim illustrated in Figure 6.32b returned an AMS date of 1190 ± 40 B.P., cal. A.D. 720–960 (Beta-170996; Appendix 1). This date is remarkably consistent with the Miraflores (CHO-3) dates (Appendix 1). In the same deposit, we identified other polychrome and monochrome sherds, as well as a complete Red Buff cup with annular base (Figure 6.35). The unit opened at Station R297 also yielded a few whole monochrome and polychrome vessels, some of them presenting modes typical of both Conte and Macaracas ceramic categories (Table 4.7).

Table 6.7
Frequency of Macaracas phase pottery from the PARLV surface collections

Site	LS-3	CHI-6	LS-8	LS-9	LS-10	LS-15	LS-22	LA-28	LS-29	Total	%
No. Stations	6	1	3	1	13	3	1	2	4	**34**	
Macaracas/Parita Red Buff	2		1	1	5	2	1	6	1	**19**	**10**
Buff ware	1	1			1					**3**	**2**
Macaracas Polychrome	16		2		32	3		1	2	**56**	**32**
Higo	1				6					**7**	**4**
Pica-pica	6		1		10	1*			3*	**21**	**12**
Cuipo	2				9					**11**	**6**
Whole cup	1									**1**	**.5**
Miscellaneous	38		1		2			2	16	**59**	**33**
Grand Total	**67**	**1**	**5**	**1**	**65**	**6**	**1**	**9**	**22**	**177**	
%	**38**	**1**	**3**	**1**	**37**	**3**	**1**	**5**	**12**		

* Includes an incomplete vessel

The incomplete vessels in Figure 6.21a, for example, show design elements and rim forms shared by both styles. Similarly the plate in Figure 6.21-l contains a rim form typical of the Conte style but the design is more characteristic of Macaracas. Luís Sánchez considers it to be typical of the gradation between Late Conte and Early Macaracas. The ceramic component in this ritual deposit at Station R297 resembles material excavated from graves 5 and 26 at Sitio Conte (*cf.* Lothrop 1942; Figures 74, 138, 176a, and 453a). A charcoal sample from the center of the deposit fill of station R297 returned an AMS date of 420 ± 40, cal. A.D. 1425–1620 (Beta-170995, Appendix 1). Unfortunately, the date is not compatible with the ceramic assemblage in station R297, whose typological characteristics point clearly to a considerable earlier time range.

The group labeled Macaracas/Parita corresponds to the few miscellaneous Red Buff and Buff types whose chronological range spans the periods between the Macaracas and Parita phases. Here I include the modeled decorated rims, body sherds, and appendages some of them illustrated in Figures 6.36–6.37. In domestic contexts excavated by the CJDP at LS-3, the zoomorphic handles like the modeled bird heads illustrated in Figure 6.36 are associated with Macaracas but more so with Parita style ceramics (Sánchez personal communication 2006). The same has been reported for the rims and handles with "snake" or "worm" applied decoration and reed punctuation (Figure 6.37). Similar finds from El Hatillo site were associated, however, with Parita and El Hatillo style polychrome vessels.

The low frequency of diagnostic Macaracas ceramics in the PARLV surface collections seems to suggest that sites are getting smaller (Figure 6.38). This pattern may be related to the fact that the accurate assignation of surface-collected potsherds becomes increasingly difficult. Aware that this situation may be more apparent than real I combine the geographic distribution of both diagnostic Macaracas pottery and the miscellaneous pottery sherds that exhibit characteristics shared by several styles from the Late Ceramic A–C to estimate the site sizes. By doing so I noticed that the nuclear settlements at LS-3 and LS-10 seem to be once again subdivided into different activity areas. For the Macaracas phase, I estimate that LS-3 reduces in size to 86 hectares, while LS-10 reduces to 87 hectares (Figure 6.39).

Site LS-8 also experienced a substantial size decrease and by the Macaracas phase it covered 12 hectares in size. Our sample from sites up river is even smaller. This pattern could be skewed by the limited number of lots selected for the analysis. Our field records document the presence of a large accumulation of polychrome ceramics, particularly on the Los Santos banks of LS-15, and an extensive distribution of

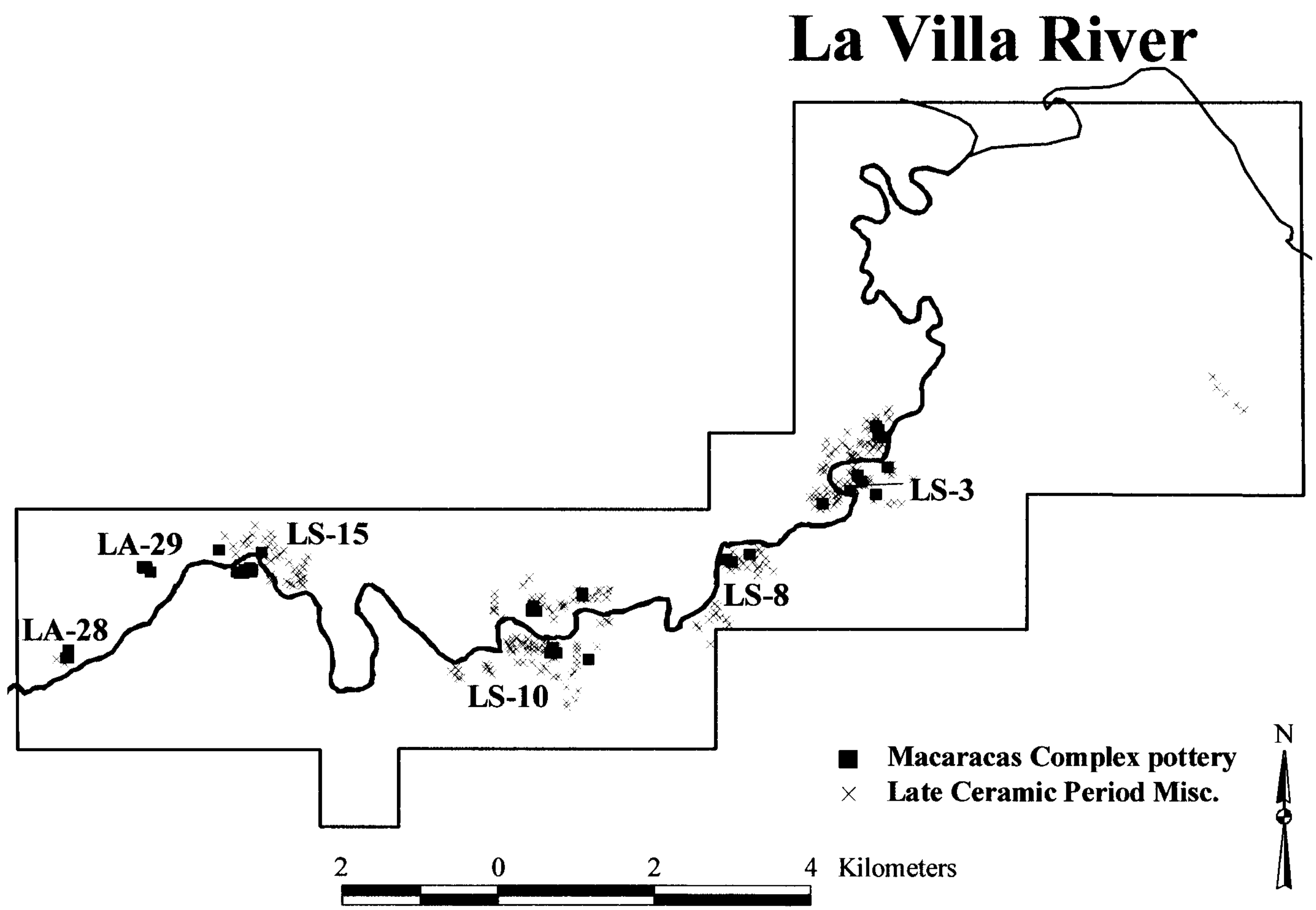


Figure 6.38 Distribution of Macaracas phase pottery in the Lower La Villa valley

monochrome Late Ceramic pottery from LS-11 and LA-28 associated with Macaracas polychrome sherds. Taking this into consideration, I estimate that by the Macaracas phase the boundaries of LS-15 increased to 26 hectares, while LA-28 settlement boundaries decreased to 9-ha and LA-29 slightly decreased to 6 hectares (Figure 6.39).

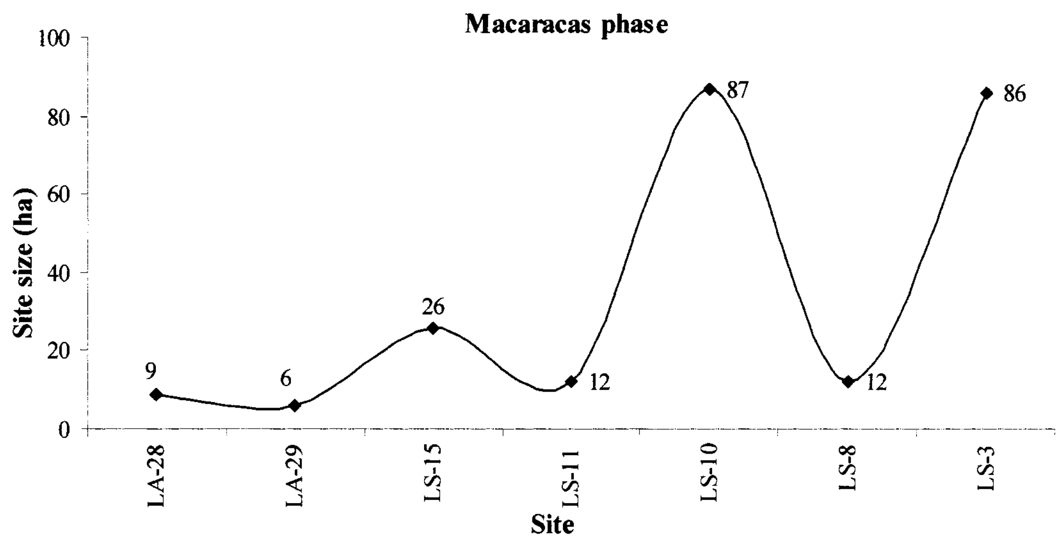


Figure 6.39 Settlement size during the Macaracas phase

The reduction in size of the La Villa nuclear settlements, LS-3 and LS-10 is consistent with the settlement reduction noticed by Haller at El Hatillo. Concomitantly, our data point towards a decrease in the number and size of the La Villa hamlets, there is a decrease in the number of second and third order sites in the Parita valley. Haller notes, however, that during the Macaracas phase the average size of Parita valley second order sites increased by 40% and the third order site size increased by 50% (Haller 2004: 86–87). Interestingly, despite the overall settlement size reduction seen in both valleys, the average site size of the La Villa valley sites continues to be larger than that reported in the Parita valley. Beginning in the Macaracas phase, sites on the upper reaches of the valley begin to experience gradual growth as some coastal plain settlements slowly decreased in size.

6.3.7 Late Ceramic C, Parita phase (A.D. 1100–1400)

The polychrome style that defines the Late Ceramic C period is Parita, formally defined by Ladd on the basis of funerary wares and stratified sherd lots collected by Stirling and Willey from several sites in the Parita valley (Ladd 1964: 66–67). Earlier in the history of Panamanian archaeology, Macaracas and Parita vessels had been reported by William Holmes (1884–85: Figures 214–215) and Grant MacCurdy (1911: Figures 255, 257–258, Plates XLIV, XLV) from looted tombs near Bugaba in Gran Chiriquí. Though Holmes and MacCurdy considered these polychrome vessels to be anomalous, they assumed that they were made in Chiriquí.

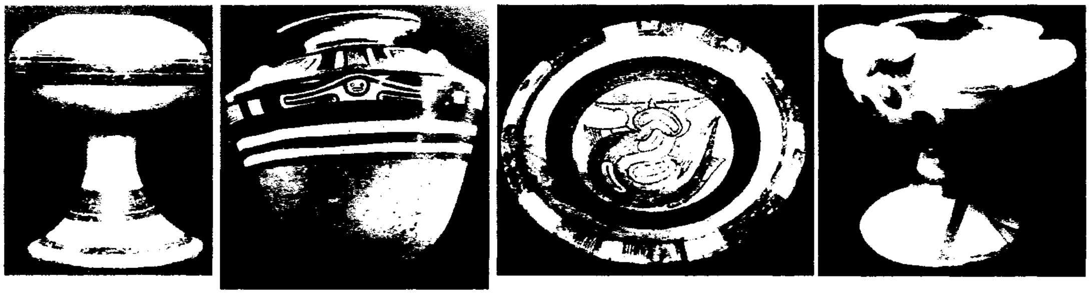
When Ladd defined the Parita polychrome style he subdivided it into five varieties: Anón, Níspero, Caimito, Ortiga, and Yampí, basing his opinion on the differential use of decorative elements by specific vessel shapes. Vessels of the first three varieties are decorated with geometric designs painted in black over a cream slipped surface; only the decorated portion of the vessel presents a highly polished surface (Figure 6.40a, d, 6.41a, c). In the Ortiga and Yampí varieties, vessels are polished all over. Designs are painted in black, red, and purple over a reddish brown or orange-red slip (Figure 6.40b–c). From a strictly stylistic point of view, Ladd considered the Ortiga and Yampí varieties to represent the transition between the Parita style and its successor, the El Hatillo, the last of the four Late Ceramic Period styles (Carvajal *et al.* 2006, Cooke 1972).

Overall, the Parita style includes all vessel forms typical of Macaracas. The most significant differences are seen in the use of the pedestal bases, which are proportionally taller, and used on a wider variety of vessels such as the Anón style *tecomates*[8] and Níspero effigy vessels illustrated in Figures 6.40a, d. Jars with angular shoulders acquired more of a pear-shaped silhouette in the Parita style, their collared necks present flaring rims sometimes supported by human figures (Figure 6.40b, 6.42a, c; see also Ladd Figure 26). Another appendage feature introduced on the Parita jars is the nubbin handle modeled and painted like a frog. These handles are frequently attached to the upper body of Ortiga jars (Figures 6.40b, 6.43f, 6.44a).

The use of four hues continues in the Parita polychrome; but the purple hue is not only more violet than on former styles, but is also used more sparingly, dropping out of use by the end of the phase. Cooke (1985: 38) suggests that either the mineral source was exhausted or the technique used to obtain the purple color was simply lost.

The Parita style is noteworthy for its geometrization of its designs in comparison to the earlier Macaracas and Conte styles, whose designs present a more curvilinear aspect. Broad generalizations such as this, of course, must be evaluated carefully because we are dealing with gradations rather than hiatuses. The use of animal motifs is also recognizably different on the Parita style, with regard not only to the choice of animal models, but also the degree of realism.

[8] Gourd-shaped bowls



a b c d

Figure 6.40 Parita style vessels (A.D. 1100–1400) from Coclé province.
(a) Anón pedestal *tecomate* (gourd-shaped vessel) showing geometric design elements; (b) Ortiga jar with angular shoulders and nubbin handles decorated with a stylized turtle depiction; (c) Yampí plate illustrating a hammer-head shark; (d) Níspero effigy vessel depicting a king vulture *Sarcoramphus papa* (Photos courtesy of Richard Cooke and INAC).

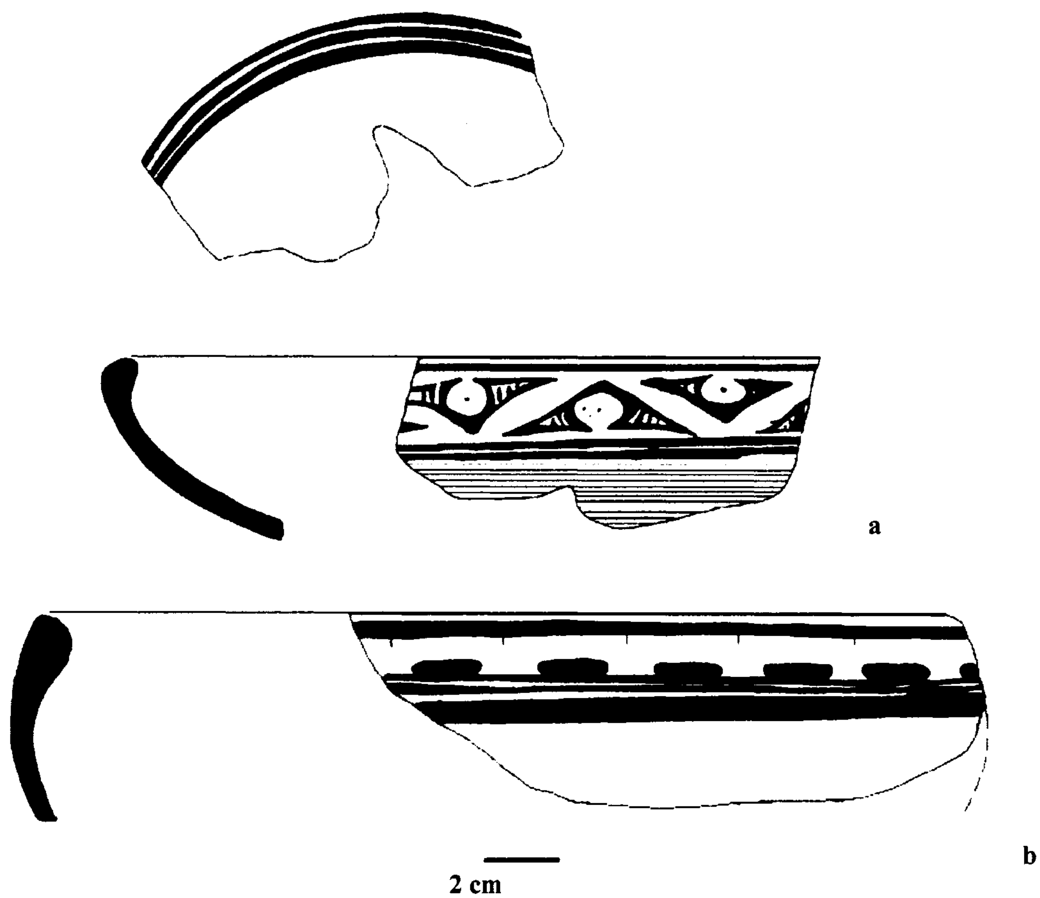


Figure 6.41 Parita Anón bowls from Station R035, Site LS-3.
(a) Open bowl decorated with V shaped design elements painted in black over cream, cat 9he-F8;
(b) Open bowl decorated with circumferential lines and hemispherical blobs painted in black over cream, cat 9he-F60 (*cf.* Ladd 1964: Plate 3c).

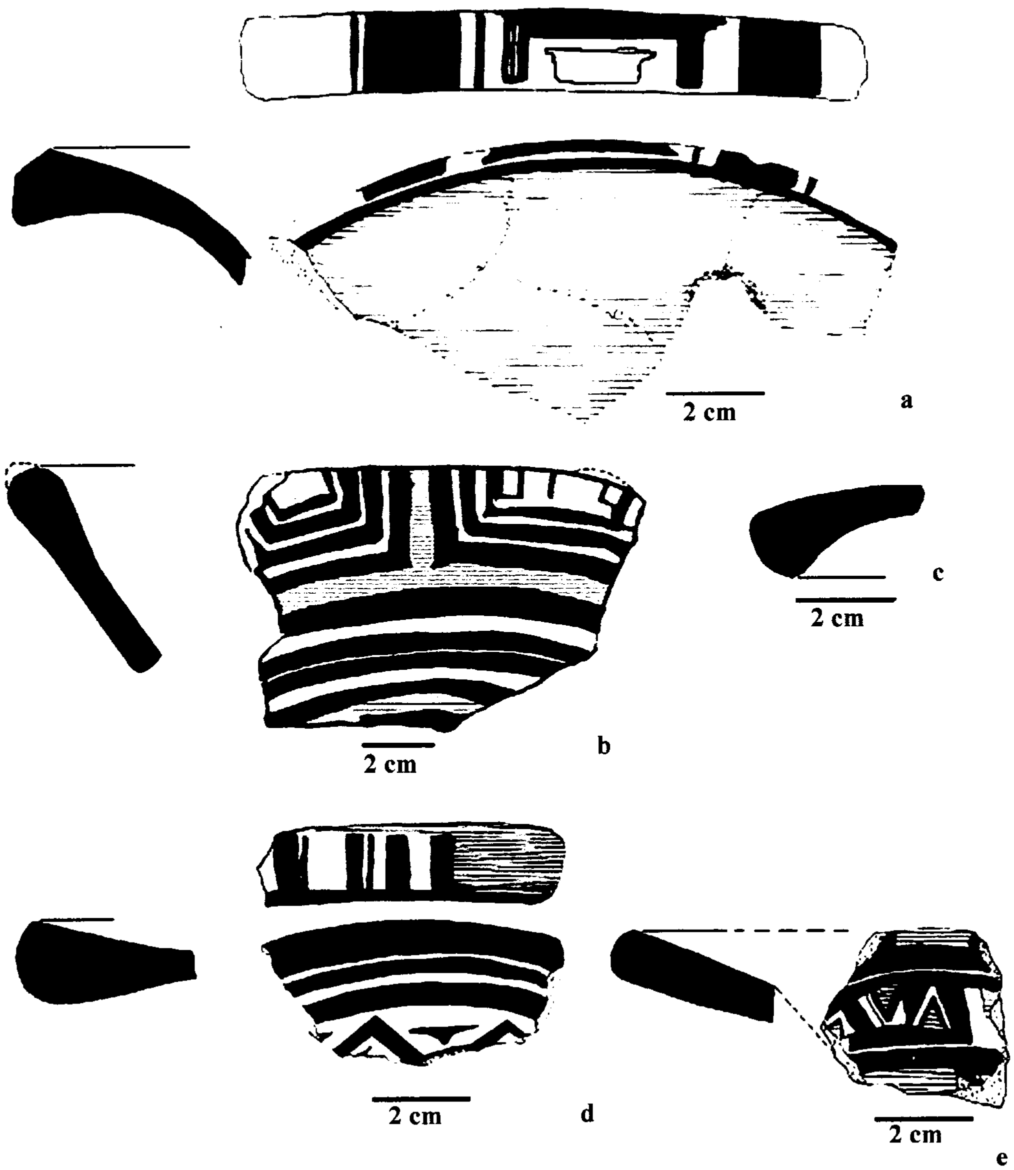


Figure 6.42 Ortiga rims.
(a) Flaring collar rim from a jar, cat 87ls-F25, Site LS-10, Station T3R10 (*cf.* Ladd 1964: Figure 26f); (b) Open plate rim, cat 9he-F59, Site LS-3, Station T3R6 (*cf.* Mendoza var. D Cooke 1972: Figure 22);
(c) Flaring collar rim, cat 9he-F23, Site LS-3, Station T5R8;
(d) Plate rim, cat 9he-F44, Site LS-3, Station T3R8;
(e) Plate rim, cat 9he-F76, Site LS-3, Station PH1.
(Drawings by Alexis A. de Isaza).

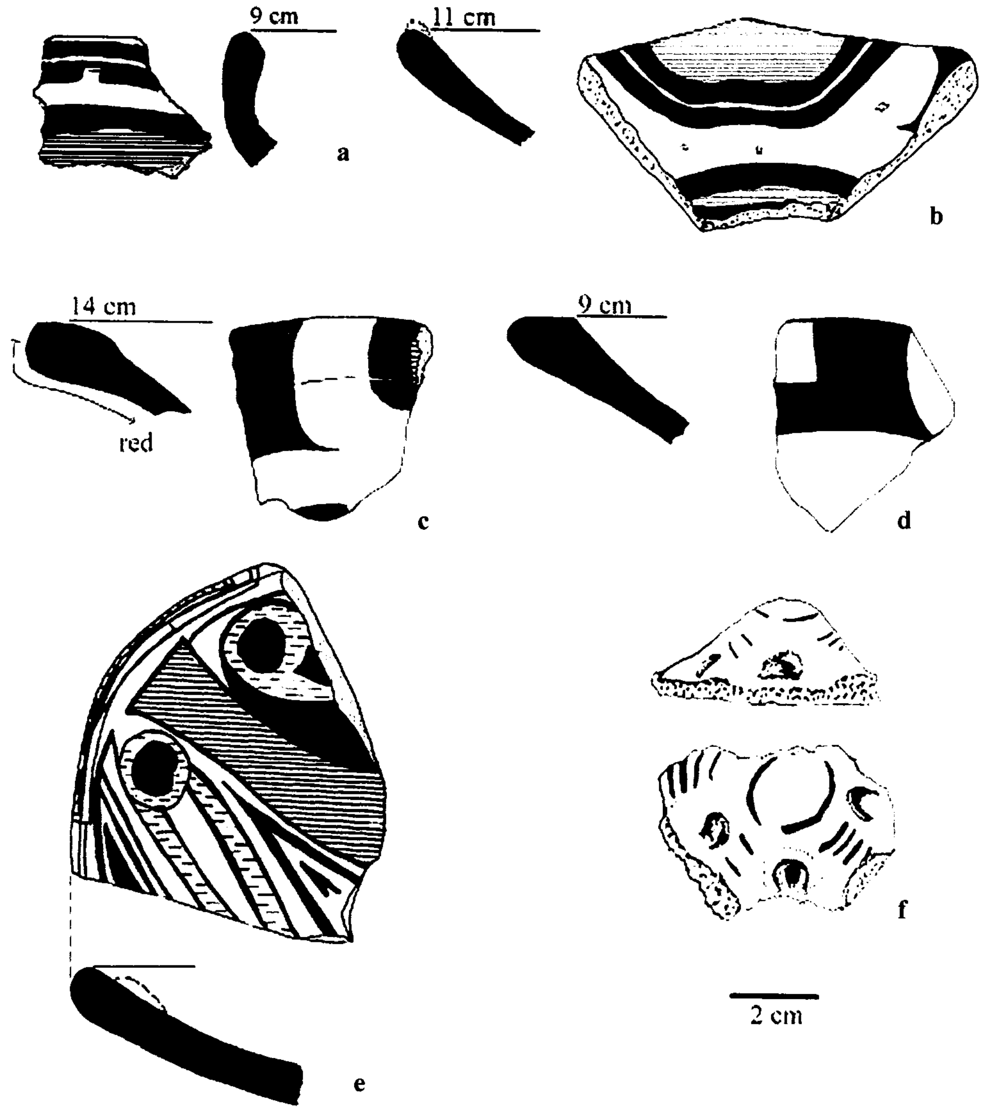


Figure 6.43 Parita style rims.
(a) Anón rim, cat 9he-F46; LS-3, Station T3R6;
(b) Yampí rim, cat 9he-F34 (*cf.* Mendoza variety D in Cooke 1972: Figure 23); LS-3, Station T2R5;
(c) Yampí rim, cat 87ls-F38; LS-10, Station R529; (*cf.* Mendoza variety D in Cooke 1972: Figure 24a);
(d) Yampí rim, cat 71he-F18, LA-29, Station T2R2 (*cf.* Ladd 1964; Figure 24a);
(e) Parita plate rim, cat 14he-F1; LS-3, Station T2R1; (f) Ortiga nubbin appendage, cat 6he-F1, LS-3, Station T3R9 (Drawings by Alexis A. de Isaza).

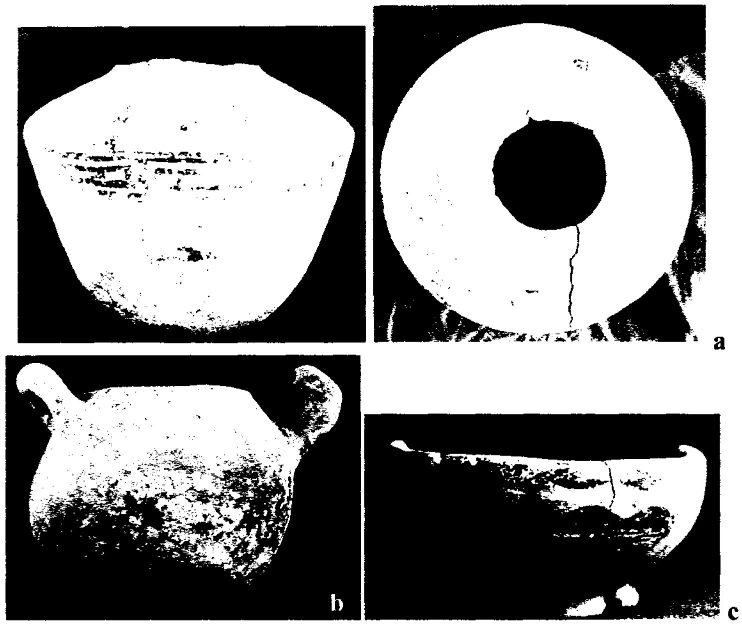


Figure 6.44 Parita style vessels.
(a) Parita Ortiga jar with nubbin handles painted as *Leptodactyllid* frogs and intentionally cut neck;
(b) Parita style bowl with zoomorphic handle in the shape of a snake head (*cf* Ichon's Jobero Biscuit);
(c) Anón bowl with annular base. This third vessel was found by a *huaquero* who gave it to a local potter from Los Olivos. Presumably it comes from the neighborhoods of Finca Los Olivos, LS-11.

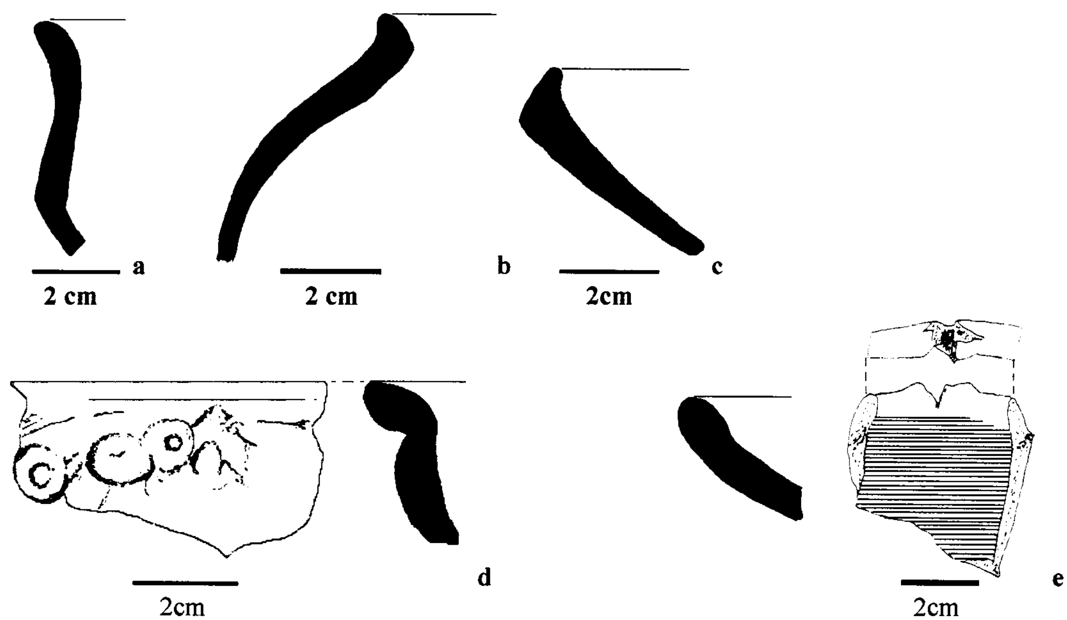


Figure 6.45 Red Buff rims associated with Parita phase polychrome wares (*cf.* Ichon's Jobero Biscuit).
(a) cat 70he-F73, Site LA-28, Station R416-A (*cf.* Ichon 1980: Figure 106 8);
(b) cat 70he-F75, Site LA-28, Station R416-A (*cf.* Ichon 1980: Figure 104 7);
(c) cat 70he-F21, Site LA-28, Station R416-X, N 25–35cm (*cf.* Ichon 1980: Figure 106 1-2);
(d) cat 33Bhe-F85, Site LS-10, Station R297 looter pit fill (*cf.* Ichon 1980: Figure 110c);
(e) Red Buff rim with slashed node, cat 44he-F25, Site LS-10, Station R260.

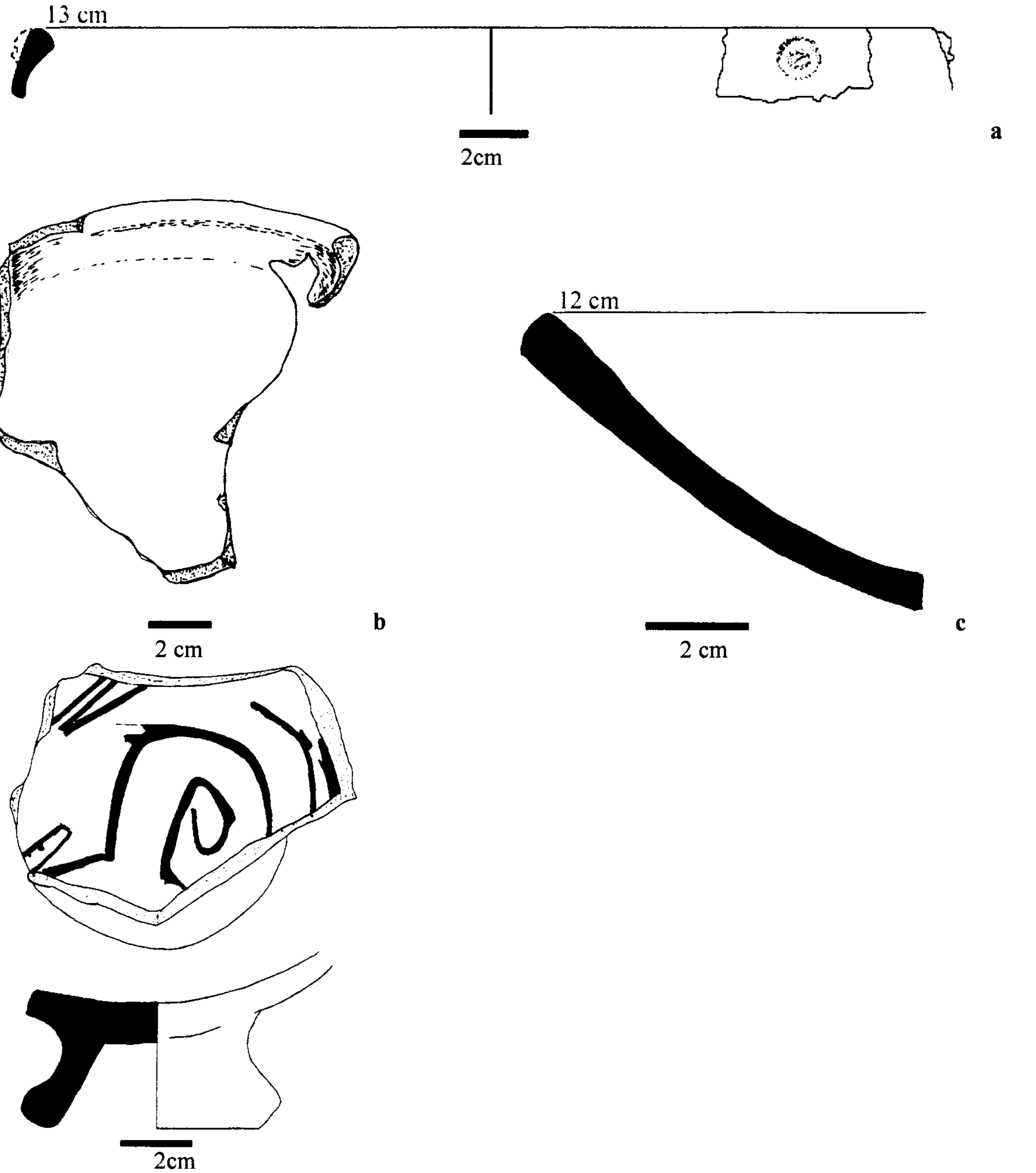


Figure 6.46 Pottery sherds and pedestal from Station R416-X, Site LA-28.
(a) Red Buff ware, cat 70he-F15, from the ground surface (*cf.* Ladd 1964: Figure 56b);
(b) *cf.* Jobero Biscuit rim, cat 70he-F30, level N 0–20 cm;
(c) Conte red rim found associated with carbon sample, cat 70he-F70, level N 20 cm;
(d) Pedestal plate, cat 70he-F20, level N 25–35 cm (*cf.* Barrancón Ichon 1980: Figure 114).

The central theme of Yampí pedestal plates, for example, is a hybrid creature that combines characteristics of the stingray and the hammerhead shark (Figure 6.40c). Quite life-like representations of the king vulture (*Sarcoramphus papa*), turtle, and stingray dominate the sample of zoomorphic effigy vessels (Figure 6.40d; Cooke 1985, 1998; Sánchez 2000; Figure 6.40d). The saurian images typical of the Macaracas style are practically absent surviving only as abstract relics of the original biomorph. From a more subjective point of view, painted decorations are more austere. They tend to use fewer fill-elements typical of the Macaracas style or lack them entirely. The compositions continue to be well balanced, outlined by black lines and inside panels.

The Parita style comprises 2% of the total studied surface sample and 13% of the typologically diagnostic sherds (Table 6.2). The sample includes each of the following varieties: Anón (3%), Ortiga (3%), Níspero (3%), and Yampí (3%), and a single example of the Caimito variety (Table 6.8; Figures 6.40–6.44). The majority of the diagnostic sherds in the sample are from sites LS-3 and LA-29. The category “Parita polychrome” (45%) includes sherds that were either too eroded or their designs too fragmentary to assign to a specific variety. The other 43% of the sample classified as miscellaneous corresponds to the undecorated body sherds and appendages recognized as Parita based on distinct paste and temper components.

The small sample of diagnostic Buff and Red Buff sherds collected at LS-10 and LA-28 include globular jar rims decorated with slashed nodes (Figure 4.12f, 4.26a), unslipped bowls with angular bodies, and modeled vessels (Figure 6.45). The last two seem to be closely related to Ichon’s Jobero Biscuit monochrome type from southern

Azuero Peninsula (*cf.* Ichon 1980: Figure 104 106, 110). In this analysis I am considering these modes coeval with the Parita polychromes.

Table 6.8
Frequency of Parita phase pottery from the PARLV surface collections

Sites	**LS-3**	**LS-8**	**LS-10**	**LS-15**	**LS-18**	**LA-28**	**LA-29**	**Total**	
No. Stations	28	8	8	11	2	11	8	76	
Parita									**%**
Anón	6	2					1	**9**	**2**
Caimito							1	**1**	**0.3**
Níspero	2	2		2			4	**10**	**3**
Ortiga	6		1				2	**9**	**2**
Yampí	2		2	1		2	2	**9**	**2**
Parita polychrome	54	8	20	11		30	24	**147**	**39**
Buff/Red Buff			2			4		**6**	**1**
Miscellaneous	32	1		1	8	143	3	**188**	**50**
Total	**102**	**13**	**25**	**15**	**8**	**179**	**37**	**379**	
%	**27**	**3**	**7**	**4**	**2**	**47**	**10**		

Although relatively more examples of Parita pottery were found on our surveys than Macaracas, their surface distribution is more restricted in space. But it follows the Macaracas phase trend of clustering on hills and high terraces. Midden CH at LS-3, for example, is an extensive Parita phase shell-bearing midden, which covers large areas of Cerro Juan Díaz (Chapter 4: 169). The PARLV registered similar midden deposits on the southern flanks of Cerro Tello and along the western base of Cerro Juan Gómez, on the Herrera banks of the La Villa River opposite to Cerro Juan Díaz. Our collections from the low-lying areas between Cerro Juan Gómez and Cerro Tello yielded only a few miscellaneous body sherds associated with Parita polychrome. I interpret this distribution to represent a substantial settlement size reduction in the size of LS-3 and its fragmentation into two type 2 villages (38-ha and 19-ha) distanced 594 meters apart

(Figure 6.47). In other words, LS-3 reverted to the settlement pattern it exhibited during the Tonosí phase.

A similar pattern of a reversal to segmented settlement was documented at site LS-10, where Parita phase pottery clustered on high terraces and hill summits. At this site, Parita ceramics at the locality identified as Las Huertas Arriba (on the Los Santos bank of the river), covered 37 hectares; at Las Huertas La Isleta (on the northern Herrera bank) they covered 2 hectares, and at Huertas Los Pozos, 6.5 hectares (Figure 6.48).

At station R213 at Huertas Los Pozos within the boundaries of site LS-10, I had the opportunity to excavate the partial remains of a Parita-phase feature left exposed in the walls of a looter's pit. This feature included at least 5 incomplete vessels: two polychrome—one Anón, one Ortiga—and three monochrome Red Buff jars (Figure 4.12). A charcoal sample attached to the underside of a small red monochrome sherd returned a date of 1170 ± 110 B.P., cal. A.D. 655 (880) 1040 (Beta-170994).

Although the pottery found in this feature is typologically consistent with the Parita phase, this date falls within the time-range of estimated for the Macaracas phase. Since the charcoal sample was collected at the base of the feature and under the fragmented Parita style vessels, it is possible that the monochrome sherd to which it was attached belonged to a previous deposit subsequently covered by the broken Parita vessels.

Overall, 13% of studied ceramics from the Station R213 unit were classified as Parita, followed by Cubitá (3%), Conte (2%) and Macaracas (0.1%; Table 4.6; Figure 4.14). The remaining pottery from the unit corresponded to miscellaneous body sherds

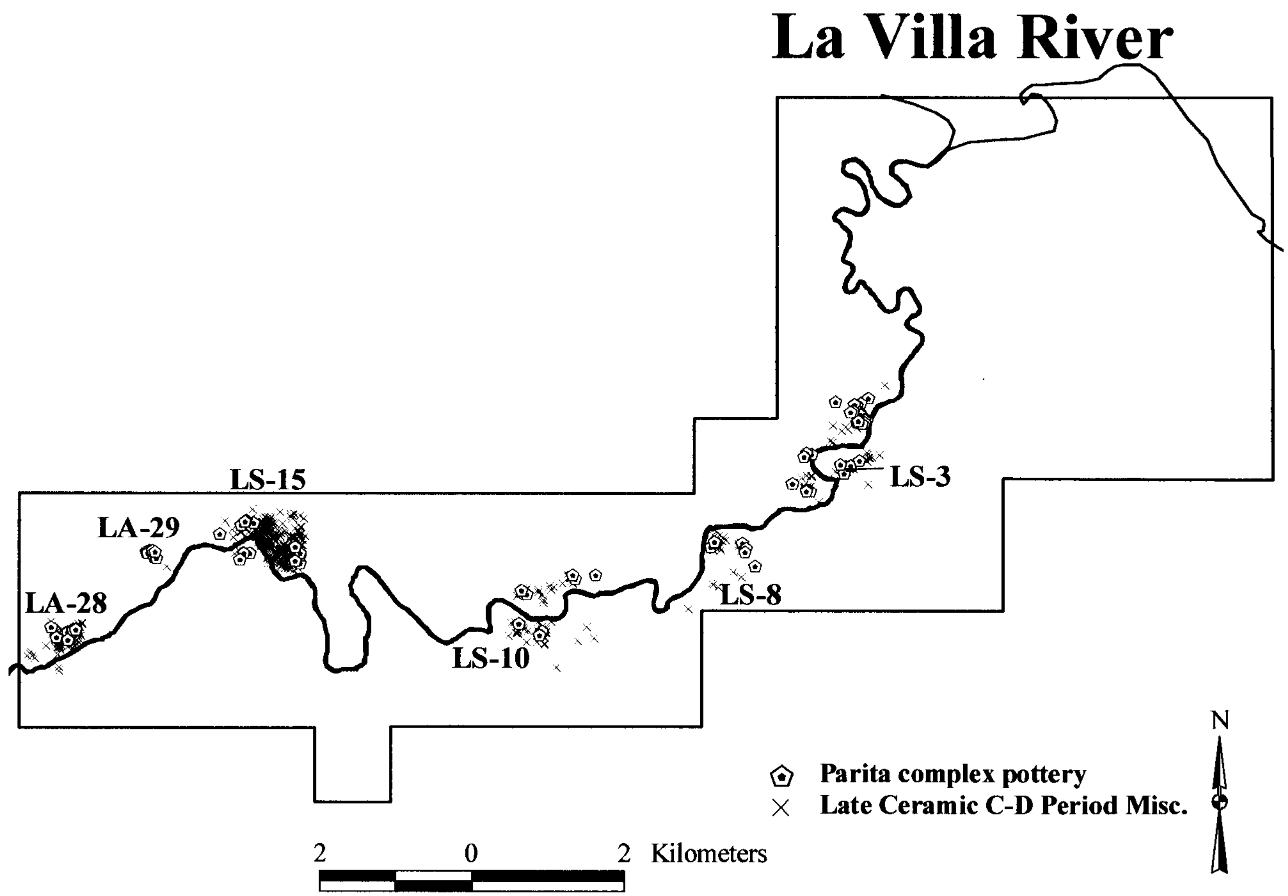


Figure 6.47 Distribution of Parita phase pottery in the Lower La Villa valley

assigned to a wider chronological range Middle/Late Ceramic (10%) and Late Ceramic Period (71%). It is possible the Parita phase feature excavated at R213 formed part of a burial feature, but human remains were identified only in the fill left by the looters and at the base of the column where we began to notice fill from a looter's pit caving in from the opposite side of the wall (Figure 4.13).

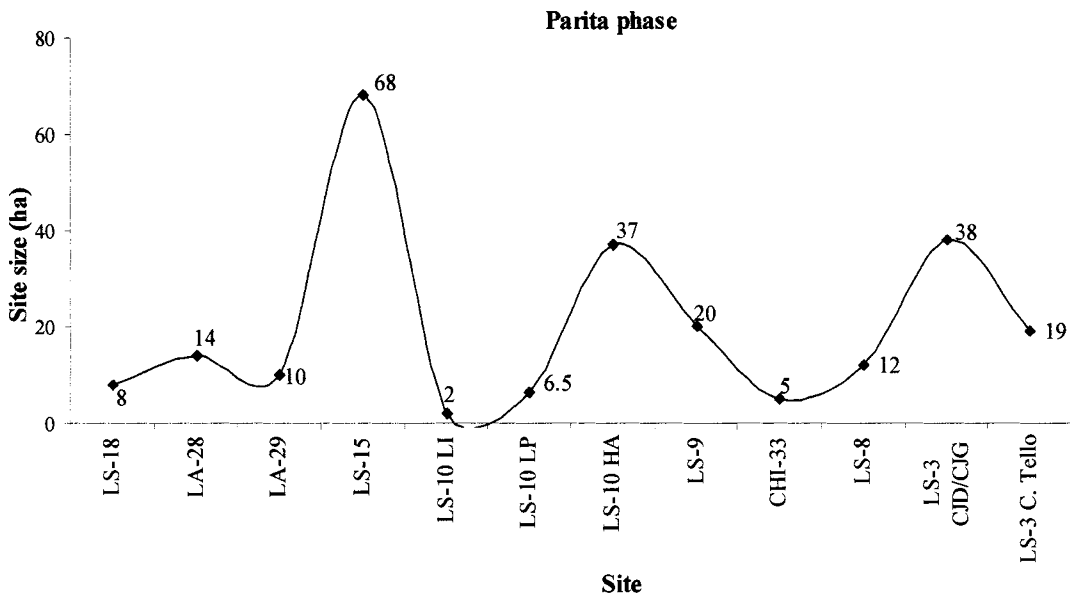


Figure 6.48 Settlement size during the Parita phase

The distribution of Parita pottery at LS-8 indicate that the site boundaries remained constant with respect to the Macaracas phase. A second site in the intermediate valley that exposed Parita phase deposits is CHI-33. The two jars illustrated in Figure 6.44a–b, for example, were found by a local resident when he excavated a septic tank at the base of the hill currently occupied by the Water Board (IDAAN) installations. In the same area, the PARLV documented widespread shell middens associated with Macaracas and Parita style ceramics. I was unable to analyze CHI-33 pottery and therefore cannot include it in this study, but I do want to emphasize that our field notes indicate that CHI-33 together with LS-8 and LS-9 were settled through the Parita phase.

West of Cerro El Tamarindo, sites LS-15, LA-28, and LA-29 yielded a large sample of Parita phase pottery, together with monochrome and highly eroded miscellaneous body sherds, rims and appendages that can be assigned to a broader period (Late Ceramic C–D). Based on the distribution of Parita phase pottery I estimate that site LS-15 reached 68 hectares (Figure 6.48). LA-29 and LA-28 also present a settlement size expansion of 10 and 14 hectares respectively (Figure 6.48).

The Parita phase witnessed the emergence of site LS-18, an 8-hectare site on the westernmost edge of our survey universe. I assume that this site was first occupied during this phase because surface collection stations only yielded Parita, El Hatillo, and post-contact ceramics on the riverbed and at the base and summit of the two hillocks that bound *El Balneario Los Olivos*. Site LS-18 also presents the only evidence in our survey universe for petroglyphs (Figure 4.39). Given the short distance that separates LS-18 from LA-28 (336 meters) it is also possible that both sites formed part of a larger settlement, which was perhaps established at the western boundary of Parita's chiefdom, and used perhaps as a frontier site.

LS-18 is located 8 kilometers to the northwest of El Hatillo where, according to Haller (2004), mortuary activity for high-ranking individuals intensified during the Parita phase. It is possible that this site's growth in space and the signs for settlement nucleation in the surrounding area, are causally related to El Hatillo's growing ceremonial importance. Although Haller (2004: 95–99) does not report an overall settlement size increase of Parita valley sites during the Parita phase, he does note a 1.5% increase in the number of third order sites and 1.2% increase in the number of second order sites. The majority of these sites clustered in the upper reaches of the Parita valley near El Hatillo ritual center.

6.3.8 Late Ceramic D, El Hatillo phase (A.D. 1400–1522)

The last ceramic style of Gran Coclé Late Ceramic Period is El Hatillo. It was formally defined by Ladd (1964) based on the mortuary ceramic assemblage from the El Hatillo site (Stirling 1949: 394; Willey and Stoddard 1954; Ladd 1964).

Although it is clear that this polychrome style evolved from Parita, there are major differences between them. Purple paint, for example, is no longer used and the zoomorphic designs undergo changes, both in terms of variety of animal motifs and their prominence on designs. Other main differences include the abstraction and reduction of the space employed by painted biomorphic motifs and extreme geometricization of the painted design. Characteristic vessel shapes of El Hatillo style include angled shoulder bottles, globular and sub-globular bottles, pedestal plates, and effigy bowls with short pedestals modeled in the shape of a bird or crocodile (Figure 6.49; Ladd 1964: Figure 7; Labbé 1995: Figure 52–53). Prominent painted designs of El Hatillo include meander motifs (or Greek-key patterns), simple or geometric S-scrolls, and abstract animal representations (Figure 6.49a, c, 6.50a; Ladd 1964: Figures 12–13; Ladd 1964: Figures 9–10). Other painted motifs, such as the suspended points and T-shape motifs are reminiscent of the Aristide and Cubitá styles of the Middle Ceramic Period (Isaza 1993;

Labbé 1995).

According to Ladd, there is clear stratigraphic evidence for the terminal pre-Columbian position of the El Hatillo funerary assemblage at the site of the same name. Another reason for assigning it an immediately pre-contact position is a radiocarbon date of 415 ± 90 B.P., cal. A.D. 1395–1660 (I-367), which was published by Ladd (1964: 151; see also Biese 1967: 207). This was provided by a sample submitted by a looter (Philip Dade), supposedly from a deep grave at the El Hatillo type site. The artifacts associated with it, however, were never published (Cooke *et al.* 2003b: Footnote 39).

A terminal pre-Columbian position for the El Hatillo style was confirmed by Cooke in the early 1970s during a site survey in the western sector of Coclé province (mostly within the territories of the contact-period chiefdoms of Natá and Escoria, see Figure 3.1). Cooke's surface collections demonstrated that large numbers of sites contained only painted pottery stylistically linked to the Parita and El Hatillo styles defined by Ladd (Cooke 1972: 69–99). Because Cooke's samples consisted entirely of sherds (a large proportion of which were eroded) he opted for grouping them within a Mendoza polychrome group. Another reason for considering this pottery a distinct category at this time was its inferior standard of manufacture in relation to Ladd's Parita and El Hatillo assemblages, i.e., defective firing, and design elements that were not skillfully drawn. Subsequently, Cooke *et al.* (2003b: 18–21) speculated that these deficiencies may have been symptoms of social stress related to contact with the Spanish, such as the disruption of the trade links that provided clays and pigments or the reversion to household-based production.

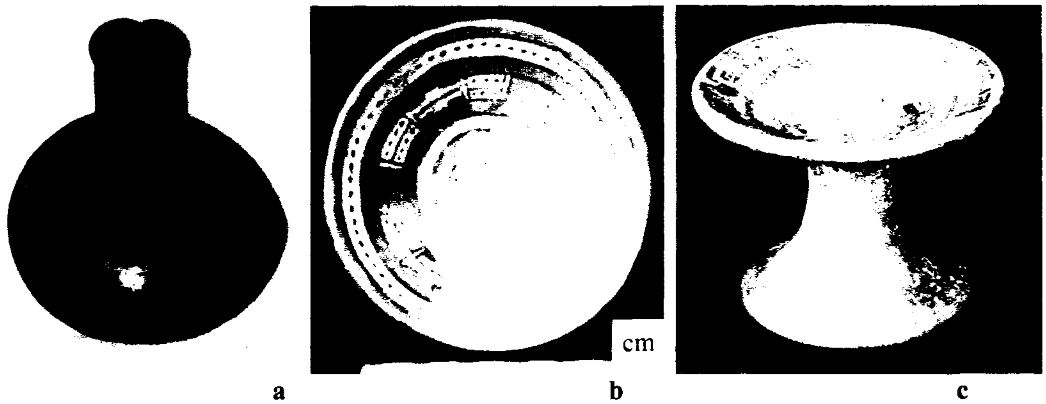


Figure 6.49 El Hatillo style vessels (A.D.1400–1520).
(a) sub-globular bottle showing meander and stylized S scroll motifs; (b) Mendoza (Variety C) pedestal plate decorated on the interior with single rows of dots, delineated with circumferential lines and red bands and rectangular panels (without provenience); (c) El Hatillo pedestal plate decorated with meander motifs (Photos courtesy of Richard Cooke and INAC).

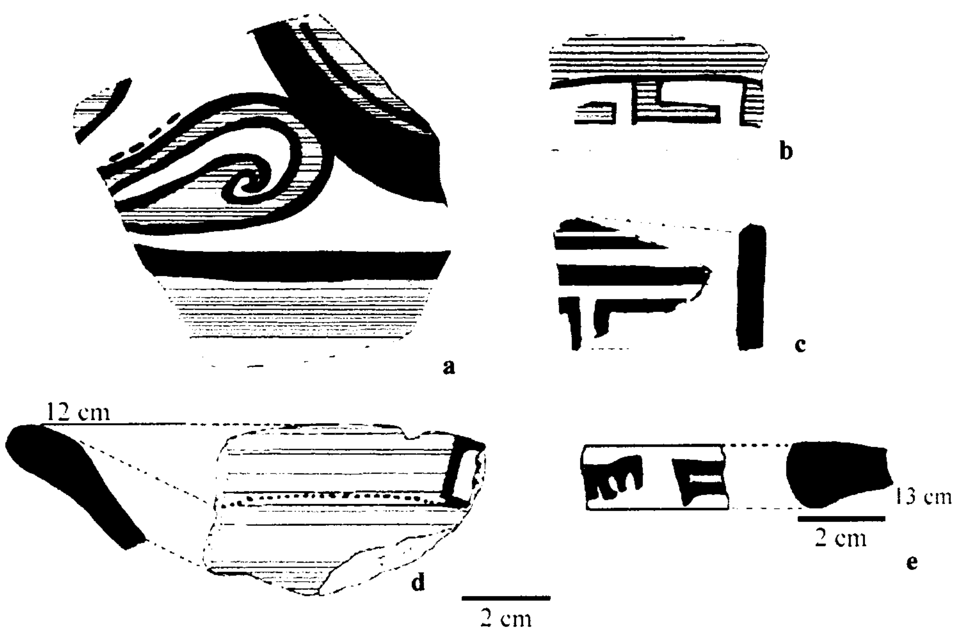


Figure 6.50 El Hatillo and Mendoza pottery.
(a) El Hatillo jar fragment showing an S-scroll motif, cat 9he-F56, Site LS-3, Station T5R10 (*cf.* Ladd: 1964: Figure 16c; Cooke 1972: Figure 25);
(b) Meander pattern painted in red over white on the interior of an El Hatillo plate fragment, cat 72he-F1, Site LA-29, Station T1R3 (*cf.* Ladd 964: Figures 8l, 12n;
(c) El Hatillo body sherd with exterior design painted in black over cream, cat 71he-F71, Site LA-29, Station T2R3;
(d) Mendoza S-shaped rim, cat 71he-F16, Site LA-29, Station T2R3 (*cf.* Cooke 1972: Figure 5g);
(e) Mendoza (Variety E) rim, cat 71he-F14, Site LA-29, Station T2R3 (*cf.* Cooke 1972: Figure 21).
Drawings by Alexis A. de Isaza.

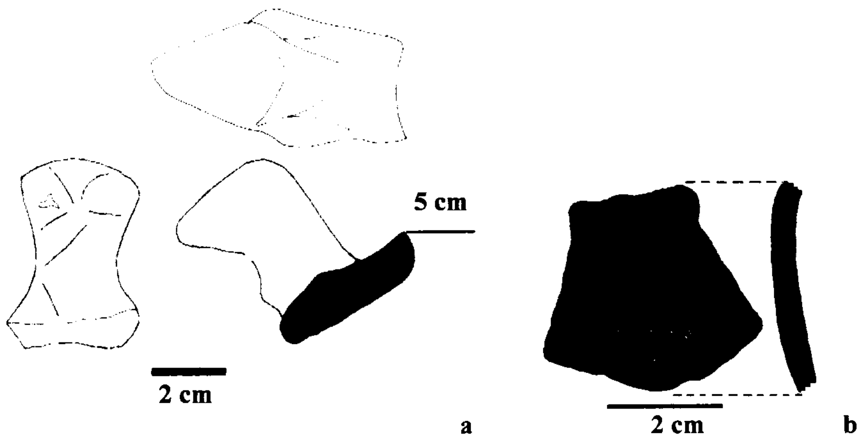


Figure 6.51 El Hatillo pottery sherds.
(a) effigy handle in the shape of a bird's head, cat 6he-F2, Site LS-3, Station T3R9 (*cf.* Ladd 1964: Figure 7p; (b) El Hatillo jar fragment, cat 70he-F19, Site LS-18, Station R444.

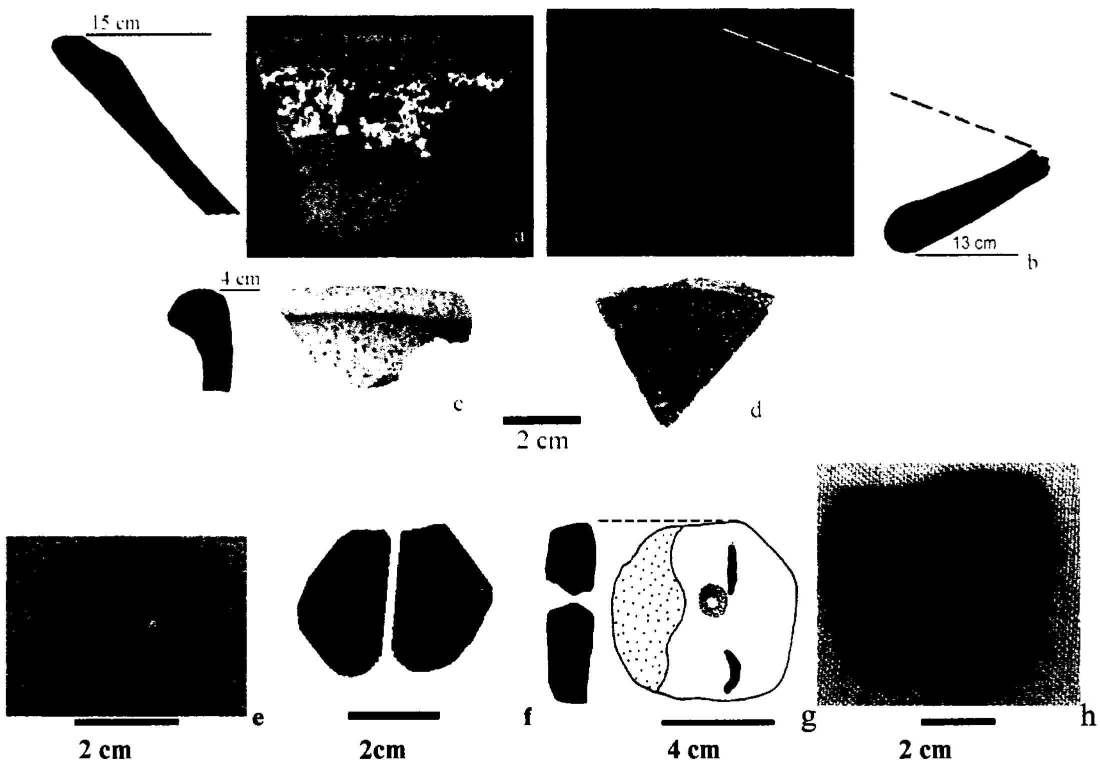


Figure 6.52 Mendoza, Spanish wheel-thrown pottery, and spindle whorls.
(a) Mendoza rim, cat 58he-2168, Site LS-15, Station T4R4 (*cf.* Variety C in Cooke 1972: Figure 15d; Cooke *et al.* 2003b: Figure 2d);
(b) El Hatillo pedestal, cat 71he-F2, Site LA-29, Station T1R2;
(c) *Bizcocho* type rim, cat 58he-f6, Site LS-15, Station T4R6, (*cf.* Cooke *et al.* 2003b: Figure 5a);
(d) Spanish wheel-thrown pottery sherd, cat 58he-2172, Site LS-15, Station T4R7;
(e) Late Ceramic spindle whorl, cat 16he-2427, Site LS-3, Station R093-B;
(f) Late Ceramic spindle whorl, cat 58he-F10, Site LS-15, Station T45R4 (*cf.* Haller 2004: Figure 6.11);
(g) Late Ceramic period pottery sherd with a central perforation, cat 21ls-F1, Site LS-3;
(h) Late Ceramic perforated pottery sherd, cat 70he-F100, Site LA-28, Station R416-B.

The most prominent and frequent motif derived from biomorphic models on Cooke's Mendoza pottery, was an angular and very stylized version of the saurian head that first became prominent on the Macaracas Higo and Pica-Pica varieties (Cooke 1998d: Figure 4.5e). This ubiquitous motif (named "Variety A" by Cooke) was the clearest link with the El Hatillo style. In western Coclé, it was most frequently recorded painted on panels arranged concentrically around the interior of red-painted bowls generally with short pedestals. Two other design varieties employed geometric designs without obvious biomorphs: (1) parallel lines bound by truncated triangles (Variety B; Isaza 1993; Figure 10b), and (2) rows of black dots delineated by parallel lines arranged in circumferential panels either below the interior rim or on the whole interior surface and pedestal bases—Variety C (Figure 6.49b; see also Cooke 1976; Cooke *et al.* 2003b). Cooke's original description of the Mendoza group pottery identified two other categories, which he labeled "varieties D and E". These showed stylistic affinities closer with Ladd's Parita style assemblage, than with El Hatillo: (1) plates—often with long polychrome pedestals—whose flattened lips with nubbins and interior designs were reminiscent of Ladd's Yampí variety (Variety D), and (2) flaring rims with geometric designs on their flattened exteriors, which were similar to the rims of large polychrome jars grouped by Ladd into his Ortiga variety (Variety E; Cooke 1972: 71).

Being the most recent style, one would expect El Hatillo to be abundant at all sites in the PARLV assemblage, but this is not the case. The El Hatillo ceramic sample is small compared with earlier polychrome types. This situation contrast noticeably with the results of Cooke's survey in western Coclé where Mendoza pottery proved to be widespread.

Explaining the situation in the La Villa valley and its discrepancy with western Coclé is not easy using the current data base. The following alternatives seem viable explanations: (1) the production of polychrome ceramics declined before the Spanish conquest resulting in proportionally fewer painted sherds in ceramic samples, (2) its use was restricted to special social groups (Cooke *et al.* 2003b: 16), (3) modern agricultural activities and development have had a negative impact on the most recent pre-Columbian deposits, (4) the typology for the Parita and El Hatillo pottery complexes has been less well defined than for earlier complexes. It would be helpful to have Spanish descriptions of the fine pottery produced at the settlements they subjugated, but we do not. The chroniclers of conquest make reference to brightly colored textiles and baskets, which may well have depicted the same geometric designs seen on pottery (Cooke 1985). Their descriptions of pottery refer only to their practical uses as storage receptacles. The one exception is Fernández de Oviedo's reference to and sketch of a vessel placed on the apex of the roof of a native-style dwelling at Natá in 1527 (Oviedo 1944, VIII: 6). Two vessels found at Cerro Juan Díaz are compatible with these descriptions (Cooke and Sánchez 2004c: Figure 5g). Their painting style and paste characteristics allow attribution to either the Parita or El Hatillo styles—another indication of the difficulties inherent in separating them based on currently published criteria.

Another reason for the El Hatillo pottery's being infrequent at Azuero Peninsula settlements may be related to the social repercussions of Spanish invasion and colonization. Particularly relevant are the Mendoza plates with "variety A–C" designs

(Figure 6.49c, 6.50d). In recent publications, Cooke has suggested that these plates were probably produced for a generation or two after contact. They are most frequently identified at or near early Spanish settlements, e.g., (1) at sites SE-3 and SE-4 near Santa María de Belén, where Christopher Columbus established a short-lived outpost on the Caribbean coast (Cooke *et al.* 2003b: 21); (2) at El Caño where Cooke recorded Spanish glass beads in pre-Columbian burial urns (Cooke *et al.* 2000); (3) at sites NA-2–NA-3, NA-5–NA-8, which are all located within the present-day urban limits of Natá where a Spanish presence was established between 1516 and 1522 (Breece 1997; Cooke 1972; Cooke *et al.* 2003b: 18); (4) at Panama Viejo (A.D. 1519–1671) on the Pacific coast where a Mendoza style plate was found covering a burial urn (Mendizábal 2004: Figure 3.17); (5) at the Capacho shelter (PN-62) on the Caribbean slopes of Coclé, which was used for burials in urns, one of which was covered by a Mendoza style plate that alternates Variety A and Variety C motifs (Cooke *et al.* 2003b: 21; Griggs 2005: Figure 256). In the last case, the Mendoza plate was directly associated with a Limón vessel (A.D. 1300–1640), a recently described monochrome ware that was produced in the Caribbean watershed of Coclé province (Griggs 2005: 158). The geographic distribution, and the technological and stylistic differences between Limón and Mendoza pottery led Griggs to propose that each one was made by a different group of people. The makers of the Limón pottery were the "Coclé Indians", who are recorded in Spanish chronicles as living in the Caribbean watershed during the first years of the seventeenth century (Griggs 2005: 367; see also Chapter 3: Footnote 24). The Mendoza style, on the other hand, was manufactured at sites located near Natá—or having trade relationships with this Spanish town—, across the Pacific coast and foothills of Coclé and Veraguas (Griggs 2005: 365)[9].

Another important site where Mendoza plates were reported and where other pottery types indicate a very late pre-Columbian origin for this settlement, is Bajo Chitra (Cl-4), located in the Pacific foothills of Veraguas northwest of Lake La Yeguada (Figure 2.2). On ethnohistoric and archaeological grounds, Cooke associates Bajo Chitra with the primary center of *queví Esquegua*, who forced out of his territory the soldiers of Gaspar de Espinosa in 1519 fighting with stones and spears made of black palm (Cooke 1993b; Cooke *et al.* 2000: 170, 2003b: 19–21).[10]

Overall, El Hatillo complex represents a mere 0.1% of the studied PARLV surface sample and 0.5 % of the typologically diagnostic sherds (Table 6.2). Sixty percent of the diagnostic pottery comes from site LA-29 including several rims and body sherds characteristic of the Mendoza plates (Table 6.9; Figure 6.50b–e). The few diagnostic sherds from LS-15 and LS-18 that still retain parts of their painted decoration (Figure 6.51b, 6.52 a–b) were found in association with monochrome or highly eroded sherds thought to be closely related to Parita and El Hatillo polychrome styles (Table 6.2). The same general area exposed sherds of Spanish earthenwares and pottery similar to the El Tigre and La Arena complexes described by Willey and McGimsey (1954: 80) at sites in the high tidal flats of Herrera (Figure 6.53).

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[9] Out of a total of 55 Caribbean sites that included Mendoza pottery, 8 sites exposed direct association with Limón pottery (Griggs 2005: Figure 33). Up to now, no Limón pottery has been reported on the Pacific Coast of Gran Coclé.

[10] A charcoal sample collected in a small test pit that contained Mendoza and coeval Cortezo monochrome pottery proved to be less than 300 years in age (Beta-12436; Cooke *et al.* 2000: 170, 2003b: 21).

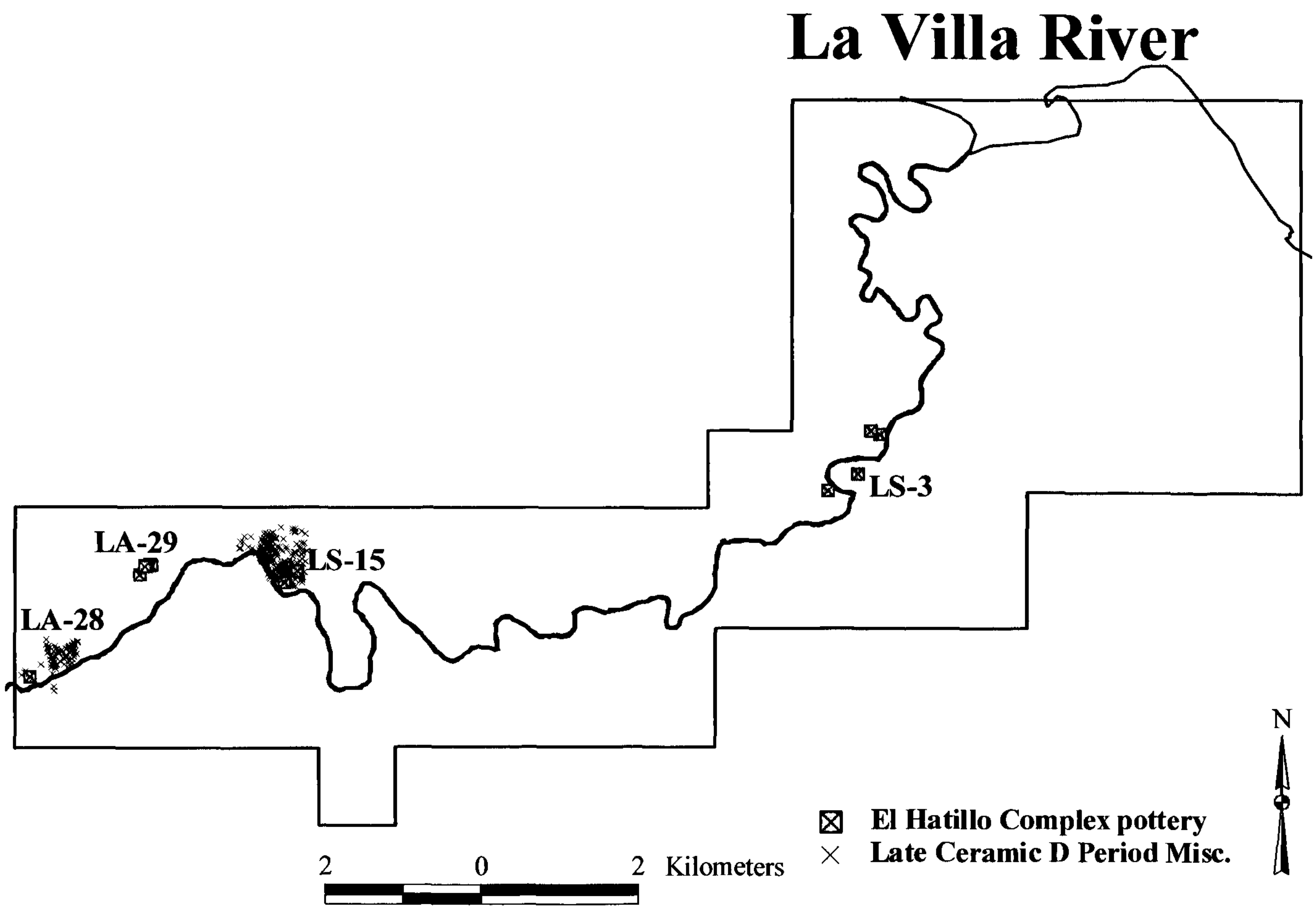


Figure 6.53 Distribution of El Hatillo phase pottery in the Lower La Villa valley

Table 6.9
Frequency of El Hatillo phase pottery from the PARLV surface collections

Site	LS-3	LS-15	LS-18	LA-29	Total
No. stations	3	2	1	5	**12**
El Hatillo polychrome	2		1	4	**7**
Spindle whorl	1	1			**2**
cf. Mendoza variety		1		5	**6**
Total	**3**	**2**	**1**	**9**	**15**
%	**20**	**13**	**7**	**60**	

Our collection from LS-3 yielded only two diagnostic El Hatillo sherds: the body section of a jar showing a simple S-scroll motif similar to Ladd's Jobo variety (Figure 6.50a) and a modeled handle from an effigy vessel (Figure 6.51a). Both sherds were found at Cerro Tello, on the northern (Herrera) banks of this site.

The surface association of Mendoza and Spanish pottery and the presence of post-contact hand-made pottery at LS-15 constitute evidence for a continuing indigenous occupation in my survey universe at a time when all the coastal plain settlements seem to have been abandoned (Table 6.9). Therefore this find is relevant to the hypothesis proposed by Cooke *et al.* (2003b: 23), that the scarcity of Mendoza type plates south the Santa María River may be related to differences in the nature and timing of contact between native peoples and the Spanish between about 1515 and the 1550—particularly the maintenance of pre-Columbian crafting traditions by Hispanicized native women around Natá, and its rapid extinction in Azuero, where Spanish activities concentrated on slaving and cattle ranching settlement until after the foundation of the Villa de Los Santos in 1558.

Another indication of a late pre-Columbian occupation—although not necessarily

El Hatillo phase in time—is the presence of trapezoidal-shaped ceramic spindle whorls. One was found on the eastern base of Cerro Juan Gómez (Figure 6.52e). The other trapezoidal spindle whorl was found at site LS-15 (Figure 6.52f) where it was associated with Late Ceramic C–D and post-Colonial monochrome wares (Table 6.9).

Spindle whorls are important for our evaluations of pre-Columbian economy because Spanish chronicles give a clear indication that cotton cloth was an important commodity (see Chapter 3). The finest and most colorful decorated cotton clothes, shrouds, and hammocks were said to be made in the chiefdoms of *Natá* and *Parita* (Espinosa 1994c: 66, 69; Oviedo 1944, VIII: 4–5). Site NA-7 near Natá is one of the few in Gran Coclé to have yielded significant numbers of ceramic spindle whorls (Breece 1997; Cooke 1972: 285–286; Cooke and Sánchez 2004b: 63; Cooke *et al.* 2003b: 22).[11] Mikael Haller collected trapezoidal-shaped pottery spindle whorls at second and third order sites in the Parita Valley in association with Cubitá through El Hatillo phase pottery (Haller 2004: Figure 6.11). Ladd, on the other hand, illustrates a spindle whorl from a unit at El Hatillo that contained only Parita and El Hatillo pottery (Ladd 1964: Figure 54f). While Sánchez illustrates a smaller size spindle whorl from a Cubitá phase context at LS-3 (Sánchez 1995: Figure 119i). Cotton fibers attached to the suspension ring of a gold pendant from a Macaracas phase grave from LS-3 are the only recorded occurrence of this important plant at a pre-Columbian site (Chapter 3: 112).

The associations between the trapezoidal spindle whorls found at LS-3 and LS-15 and other kinds of ceramic objects suggests that these were most likely used for spinning

[11] PARLV surveyors noted the presence of cotton plants at the edge of the estuary near site LS-4 (Figure 4.4).

cotton and production of textile items during the last phase of the Late Ceramic Period. Body sherds with a central perforation, of which some examples were found, may also have been used as spindle whorls, but their chronological range is much wider (Figures 6.52g–h).

To sum up, the settlement pattern exemplified by finds of pottery I attributed to the last pre-Columbian phase (El Hatillo) in the lower La Villa valley contrasts significantly from that of earlier phases (Figure 6.53). It is difficult to explain this situation with current data. One the one hand, the PARLV sample of El Hatillo pottery is so small that is impinges upon the confidence with which settlement sizes can be inferred exclusively from diagnostic material. Perhaps what is happening is that I am not identifying correctly the most recent pottery produced in my survey universe or that I am making distinctions between Parita and El Hatillo that are chronologically less precise than those I made for earlier style. Although Carvajal *et al.* (2006) had hypothesized that the El Hatillo phase occupation at LS-3 was slight, Sánchez' most recent evaluation of cross-site pottery sample from Cerro Juan Díaz suggests that the occupation of the area in proximity to the hill itself was more intense than previously thought (Cooke personal communication 2006).

In spite of these limitations, my working hypothesis is that LS-3 declines considerably in size during the El Hatillo phase being subdivided into three hamlets of less that 1 hectare in size (Figure 6.54). Site LA-29, where we identified the largest concentration of diagnostic pottery, was reduced to 2.6 hectares in size. The high incidence and distribution of miscellaneous Late Ceramic C–D pottery at LS-15 and LA-

28 suggests that their settlement boundaries span 33 and 13 hectares respectively between about A.D. 1100 and 1520, while LS-18 is estimated to have maintained the same size from the Parita phase (Figure 6.54).

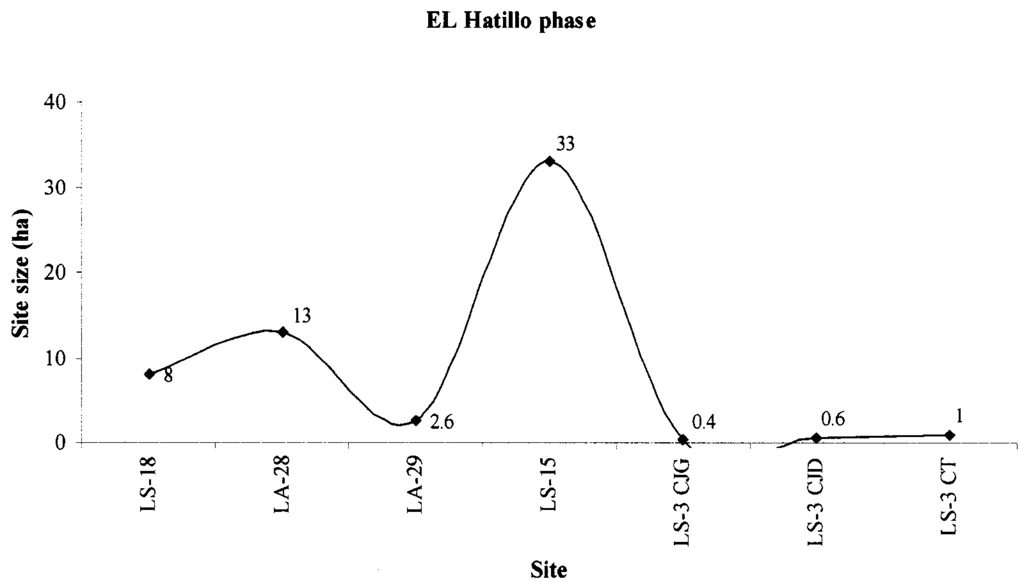


Figure 6.54 Settlement size during the El Hatillo phase

The decrease in the number of settled sites coupled with a general reduction in settlement size reduction documented by the PARLV for El Hatillo phase in the lower La Villa valley is consistent with the situation reported in the Parita valley. Despite settlement size reduction, however, the mortuary pottery assemblages indicate that the El Hatillo type-site was as a burial center for presumably high status individuals (Haller 2004: 106). In fact, the largest and richest grave excavated by Stirling and Willey at El Hatillo—Find 10—dates to El Hatillo phase. Among the burial goods were carved manatee bone batons, and more than 50 bottles, effigy vessels, and urns (Ladd 1964: 245–246). Interestingly, among the human remains found within the urns from Find 10 were mandibles without skulls and perforated human incisors, a facet of mortuary behavior that recalls the strange Parita phase deposit of upturned vessels with human maxillae and mandibles lacking teeth, which was excavated by the CJDP on the summit of Cerro Juan Díaz, LS-3 (Figure 4.6e). No other Parita or El Hatillo phase feature found at LS-3 compares to those excavated at El Hatillo. In fact, most of LS-3 third and fourth mortuary phase features consist of very simple shallow interments placed in primary extended position with few, if any, offerings. This leads me to suggest that site LS-3 along with LS-8, LS-9, and LS-10 played a less important role in the politics and economy of the lower La Villa valley during and after the second half of the Parita phase ca. A.D. 1400. On the contrary, sites located west of the Cerro Tamarindo were attracting more people and attaining greater importance.

Was the growth of sites LS-15, LA-28, and LA-29 in the upper valley influenced by the emergence of the El Hatillo ritual center? Although I believe that this is a tenable proposition, other factors should be taken into consideration. The carved boulders at LS-18, for example, suggest that this site may have been located at the boundary between the historic chiefdom of Parita and territories controlled by other social groups or even chiefdoms. Sites LS-18, LA-28 and LS-15 are all located at the closest point between the La Villa River and the main villages in the Parita valley, i.e., HE-2, El Hatillo, 355, and 363 (Figure 4.4). Therefore I propose that this region would have been not only the principal route of communication among these important settlements, but also the major supply line for important resources located upstream, such as basalt, lavas and chalcedony used for crafting manos, metate, mortars, adzes, and projectile points. An additional factor that may have influenced settlement growth west of Cerro El Tamarindo is the natural occurrence there of fossilized wood. This material was an important resource for the crafting of utilitarian cutting tools particularly during the last two phases of the Late Ceramic Period when its use intensified.

In Chapter 3, I summarized the ethnographic data available for Parita Bay chiefdoms at the time of the Spanish contact. I pointed out that descriptions of the historic chiefdom of *Parita* provide information about its regional political influence, settlement location, and wealth. Based on these sources I estimated that the province of *Parita* would have spanned an area of approximately 381 km^2, its coastal domain would have covered 26.64 km, and its zone of influence about 1,846 km^2 (Figure 1.3). Within this territory there is also mention of two principal settlements, which the Spaniards named the *Asiento Viejo* on the valley of the Parita River and the *Asiento Nuevo* located at some distance from the coast on the valley of the La Villa River. According to Helms (1979: 59), the core of *Parita's* chiefdom would have been the River Parita and the lower banks of the La Villa River a later acquisition. In 1993 Cooke proposed that the location of *Parita's Asiento Viejo* may have been in fact site El Hatillo and Cerro Juan Díaz the location of the *Asiento Nuevo* (Cooke 1993b: 114). According to Haller (2004: 103), the available data for the Parita valley seem to support Cooke's proposal. What the PARLV data suggests is that there is an inland shift of settlement concentration. In addition to the above-mentioned factors that might have influenced this shift, we know that by A.D. 1515 raiding was intense. This could reflect the growing insecurity at coastal sites exposed to canoe-borne raiding.

6.3.9 Colonial Period (A.D. 1522–1821)

The Colonial Period lasts from A.D. 1522 (the founding of Natá) until 1821 when Panama declared independence from Spain, and voluntarily joined Gran Colombia. In Chapter 3, I made use of ethnohistoric accounts to briefly describe sixteenth century Panamanian chiefdoms and the devastating effects of the Spanish conquest. There I stated that the Pacific coastal chiefdoms of Panama had been subjugated by the end of the 1530s. By this date population decline was so abrupt that the Spanish were forced to import native American men and women, not only from other regions of Panama, e.g., the pre-contact territory of the Cueva, but also from outside the isthmus, e.g., Nicaragua and Venezuela to compensate the drastic decline of local populations, which in turn affected the productivity of the *encomienda* system. By 1530, there were many more "natives" in Natá than Spaniards, and the Spanish crown complained that the Spanish men were cohabiting with native women. These Spanish male-Amerindian female relationships were frequent and occurred as soon as the Spanish arrived. Alarmed by this situation, the Church and the Crown passed the New Laws (*Leyes Nuevas*), which ostensibly (if not in practice) abolished the *encomienda* system, and provided for the establishment of reductions of surviving native people (now culturally hybridized) into *pueblos de indios*. In the Azuero Peninsula, two of such settlements were established between 1556 and 1561, both within the region previously controlled by *queví Parita*: Santa Cruz de Cubitá (1556) along the La Villa River (then known as *Río Cubitá*) and Santa Elena de Parita (1561) in the valley of the River Parita (Jopling 1994: 336). In 1558 Francisco Vásquez, a Natá colonist, led 17 families to the valley of the La Villa

River to establish a new township (La Villa de Los Santos) close to the native *pueblo de Indios de Cubitá,* to take advantage of their cheap labor and take over their land (Castillero 1995: 72–73). After a visit to the region in 1569, Viceroy Francisco Toledo ordered the colonists who had taken over lands allocated to the reductions of *Parita* and *Cubitá* to relocate their houses and to regroup these *pueblos* into a single town. It is not known if the viceroy's instructions were followed (Castillero 1995: 73), but what is certain is that the men and women of *Cubitá* ended up working for the La Villa colonists (Chapter 3: 131). After 1580 there is no mention of them.

Pottery, which I assign to the Colonial period, comprises 8% of the total studied sample (Table 6.2). The majority was collected at sites LS-15 and LA-28 (Table 6.10). The sample includes materials that definitely represent Spanish colonial occupation, including a few sherds from Spanish *botijas* and other kinds of wheel-thrown pottery including eighteen-century majolica. Other materials belong to the Republican (post-Colonial period) represented by nineteen century English printed wares. I also found sherds of hand-made pottery (Figures 6.55–6.61), which has been grouped into various categories by different specialists: El Tigre and Olá Ware (Willey and McGimsey, 1952; Cooke 1972), *Hispano-Indígena* or *Criollla* (Rovira 1984, 2001b; Linero 2001).

It is noteworthy that all the Spanish-made pottery from the coastal plain comes from the Los Santos banks of the river between La Villa de Los Santos and site LS-23 (Table 6.10). The largest concentration of Colonial wheel-thrown pottery was collected on the riverbed next to a recently cut-off meander at LS-23 (Figure 4.4). It appears that these artifacts, which consist primarily of large body fragments from Spanish *botijas,* had been redeposited by the river (Figure 6.55 c–d). A jar (Figure 6.57a) was found exposed on the riverbed by local resident Julio Ríos, while canoeing north of the Cerro Juan Díaz. The shape of the vessel suggests that it is historic, but its paste is similar to that of many pre-Columbian vessels. Therefore, it is likely that this particular piece was made locally according to the requirements of Spanish colonists. Other wheel-thrown pottery such as the fragments illustrated in Figures 6.52c–d, 6.55a–b and 6.56a share similarities with the Spanish wheel-thrown pottery discovered by the CJPD on the summit of Cerro Juan Díaz (*cf.* Cooke *et al.* 2003b: Figure 5). Cooke *et al.* (2003b: 24) note that, even though most of the Spanish made pottery found by the CJDP does not allow for a precise chronology, the paste is characteristic of the "*Bizcocho*" or bisque-type pottery, an unglazed coarse earthen ware produced during the first half of the sixteenth century (Deagan 2002: 43). The exterior surfaces of the PARLV-like samples are smooth and buff colored, while their interior surfaces present a green hue (Figures 6.52d, 6.55a–b).

Table 6.10
Frequency Colonial period pottery from the PARLV surface collections

Site	LS-3	LS-8	LS-9	LS-10	LS-15	LS-18	LS-23	LA-28	LA-29	Total	%
No. Stations	4	1	1		4		3	1	3	17	
Spanish *Botijas*		1	3		5		13			22	1.6
Wheel-thrown p.	3				11					14	1
Majolica	2									2	0.1
Hispano-Indígena	17	6		4	489	43	13	122	5	699	50
El Tigre					5	1		22		29	2
cf. El Tigre	1			1	48			557		607	44
English printed W.	7		2	1	9					19	1.3
Total	**30**	**7**	**5**	**6**	**567**	**44**	**26**	**701**	**5**	**1,391**	
%	**2**	**0.5**	**0.3**	**0.4**	**41**	**3**	**2**	**50**	**1**		

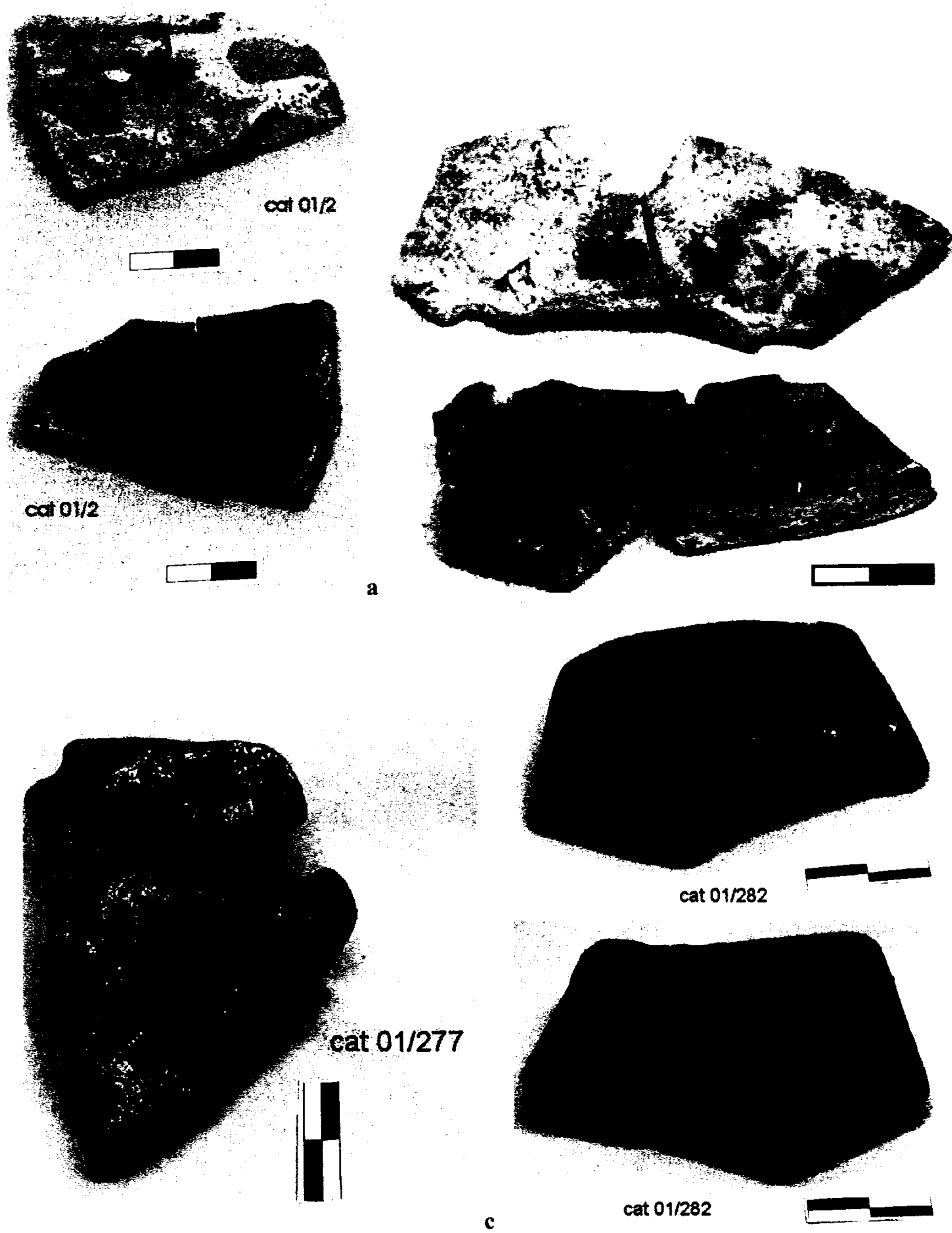


Figure 6.55 Colonial period pottery.
(a) Spanish ware, cat 1ls-01-2, Site LS-3, Station T1R3;
(b) Spanish ware, cat 36ls-01-142, North of LS-3, Station R2;
(c) Large body section of a Spanish *botija* with perforations found at ebb tide on an exposed cobble beach along the River La Villa banks, cat 31ls-01-277, Site LS-23, Station R158
(d) Exterior and interior body fragment of a Spanish *botija* found on an exposed cobble beach, cat 31ls-01-282, Site LS-23, Station R157.

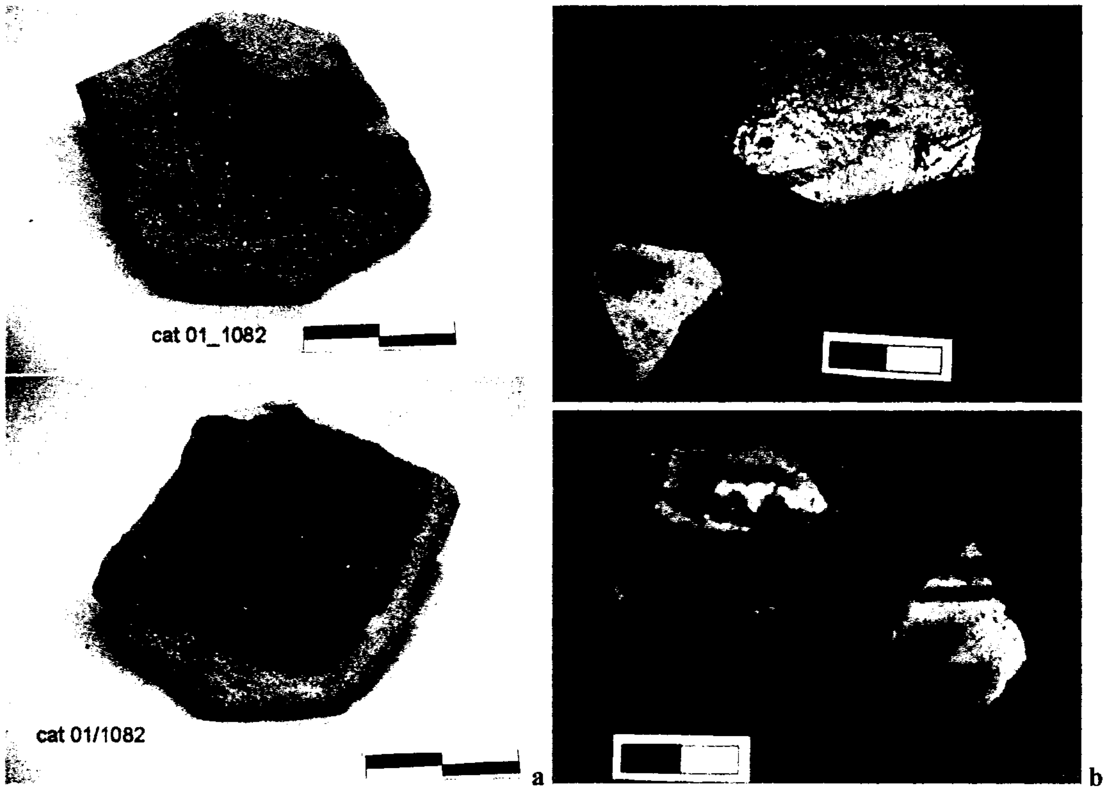


Figure 6.56 Spanish wheel-thrown pottery and eighteen-century majolica.
(a) Interior and exterior section of a Spanish *botija*, cat 01-1082, Field 17ls, Station R1M1;
(b) Majolica, cat 01-9, Field 1ls, Station T2R4.

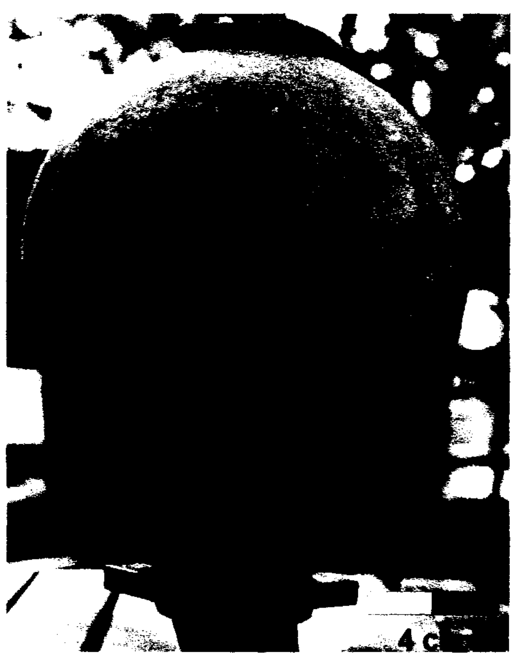


Figure 6.57 Jar found on the banks of the River La Villa by local resident Julio Ríos.

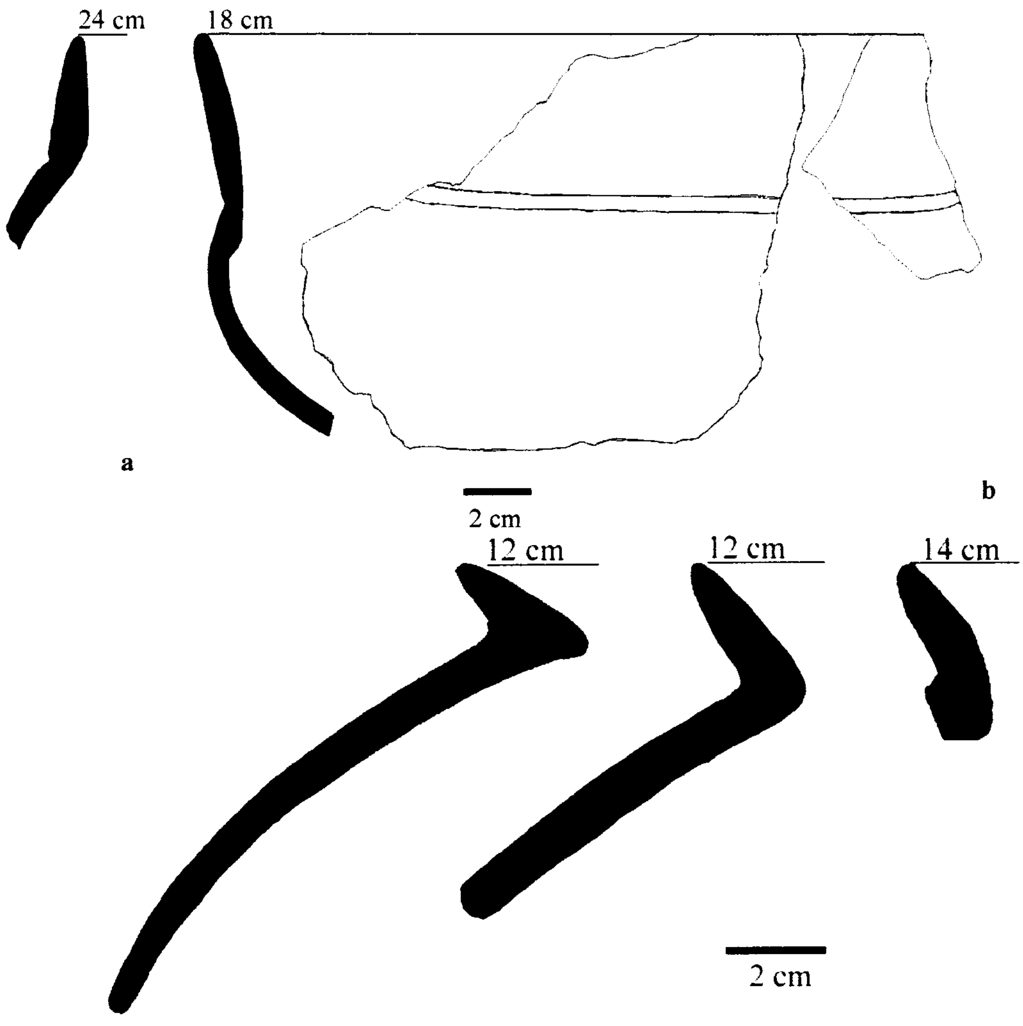


Figure 6.58 Hispano-Indígena pottery.
(a) El Tigre jar rim, cat 70he-F39, Site LA-28, Station R415-B, *cf* Rovira 1984: Figure 8h
(b) El Tigre jar rim, cat 70he-F45, Site LA-28, Station R413-B
(c) El Tigre jar rim, cat 70he-F36, Site LA-28, Station R413-B
(d) El Tigre jar rim, cat 70he-F35, Site LA-28, Station R413-B
(e) El Tigre jar rim, cat 70he-F44, Site LA-28, Station R415-B

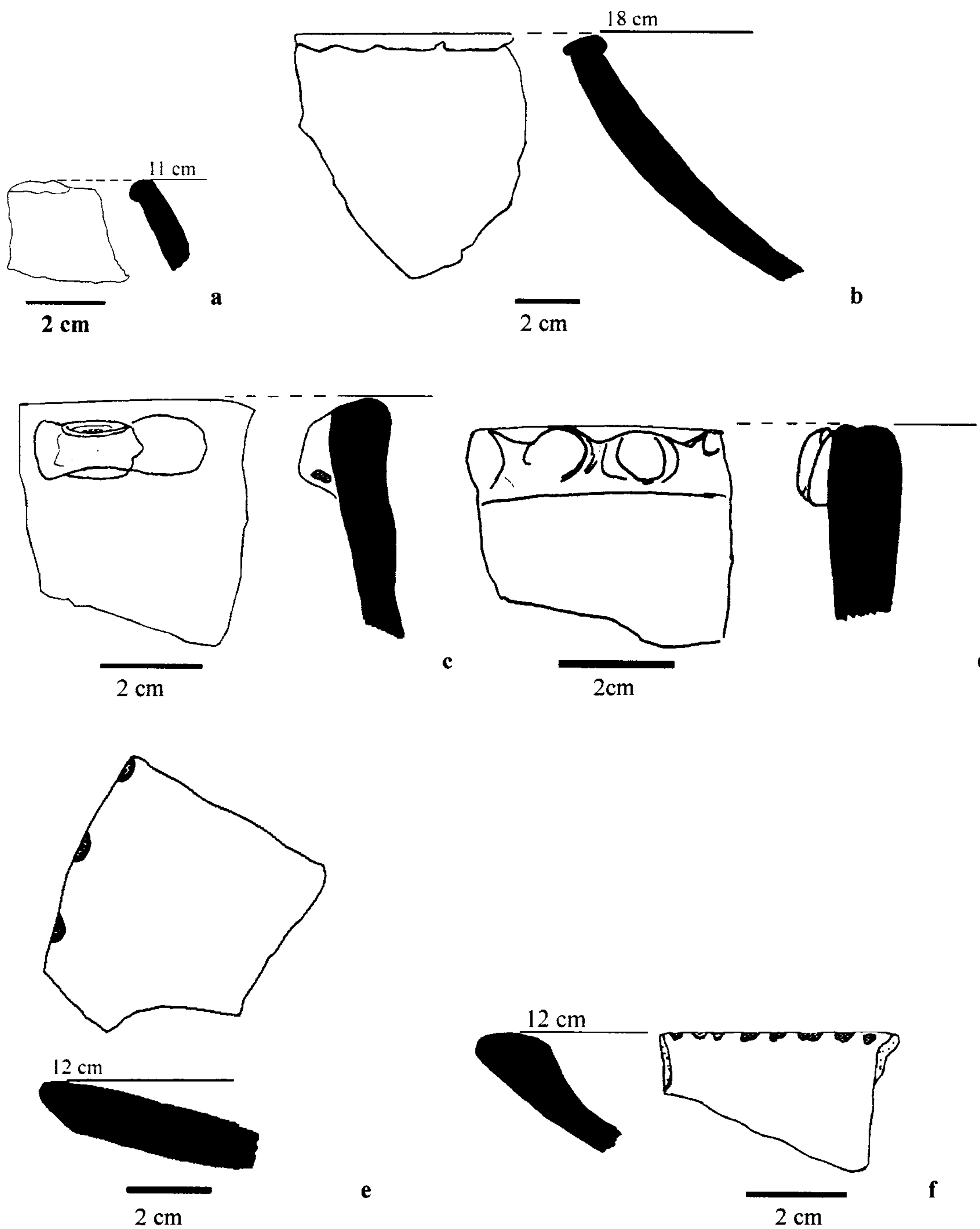


Figure 6.59 Hispano-Indígena pottery.
(a) El Tigre rim, cat 70he-F40, Site LA-28, Station R415-B, *cf.* Rovira 1984: Figure 7-2
(b) El Tigre rim, cat 87ls-F35, Site LS-10, Station T5R15, *cf.* Rovira 1984: Figure 7-4
(c) El Tigre rim, cat 58he-F12, Site LS-15, Station T1R1/T2R1
(d) El Tigre rim, cat 58he-F13, Site LS-15, Station T1R2, *cf.* Rovira 1984: Figure 7-5
(e) El Tigre c*omal* rim, cat 70he-F37, Site LA-28, Station R413-B
(f) El Tigre rim, cat 70he-F32, Site LA-28, Station R413-B

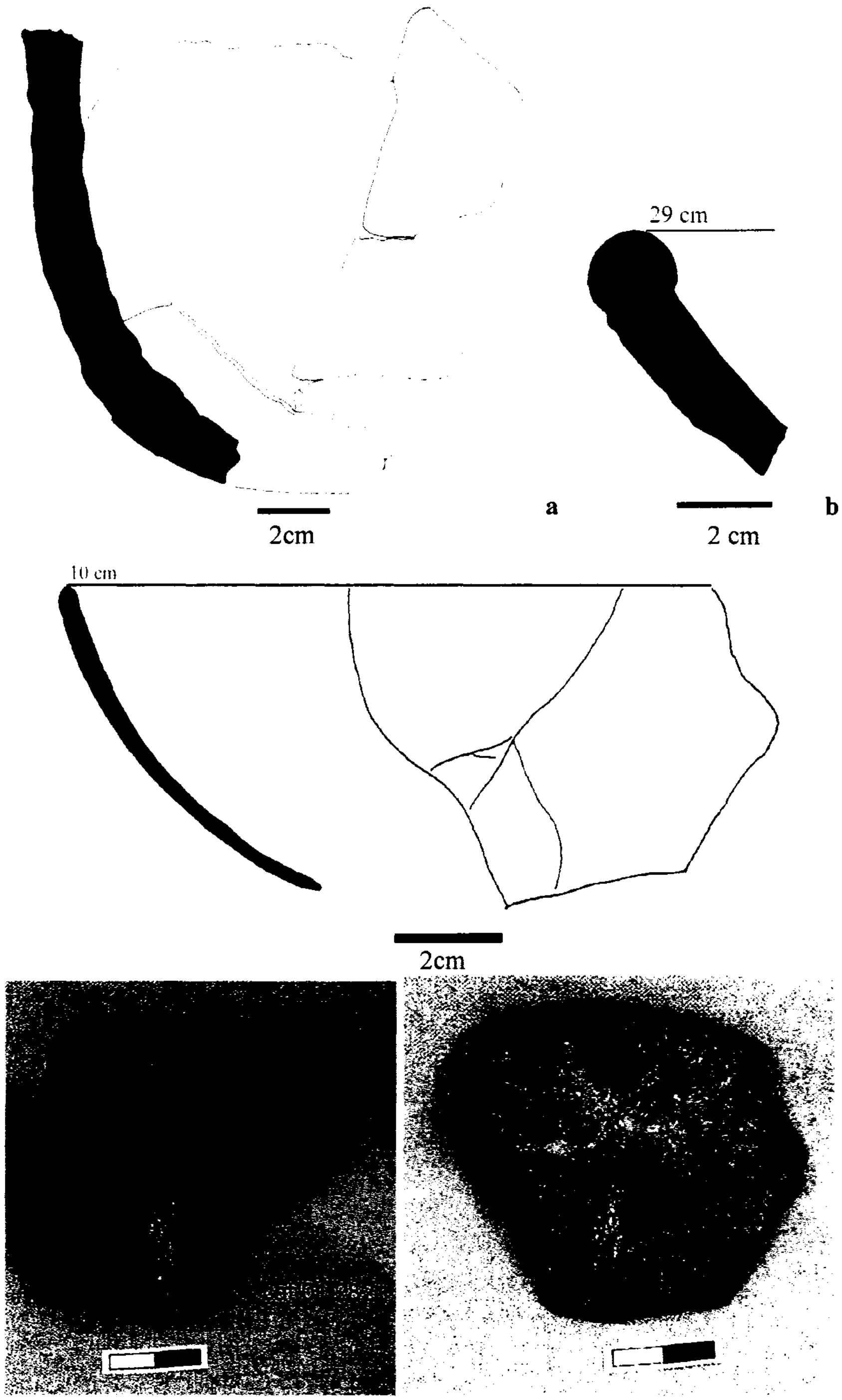


Figure 6.60 Hispano-Indígena pottery.
(a) cat 70he-F50, Site LA-28, Station R413-B
(b) cat 70he-F42, Site LA-28, Station R415-A
(c) Unclassified bowl fragment, cat 31ls-01 282, Site LS-23, Station R158

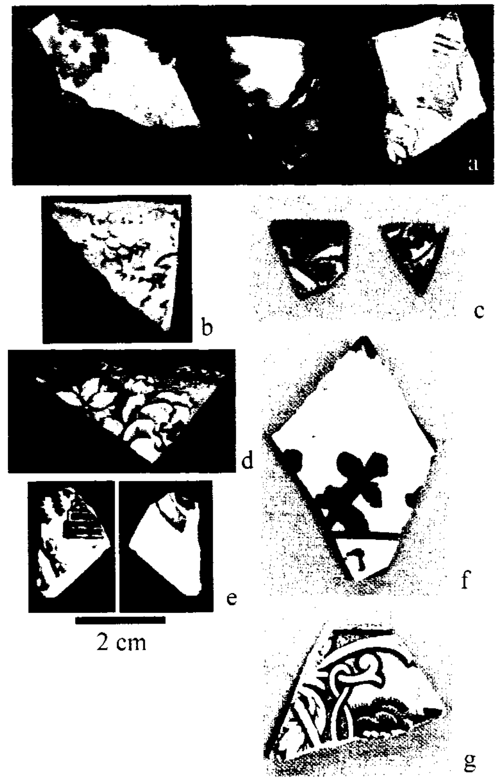


Figure 6.61 Nineteen-century English Printed Wares.
(a) cat 3065, Cerro Juan Gómez, Field 16he;
(b) cat 01-31, Cerro Juan Díaz, Field 1ls-Station T3R3;
(c) cat 88ls-01-524, Site LS-9, Station T4R1;
(d) cat 99ls-01-957, Site LS-10, Station T2R11 (ca. 1820–1830);
(e) cat 58he-2268, Site LS-15, Station T11R1, decorated with willow pattern;
(f) cat 87ls-01-755, Site LS-10, Station T10R13;
(g) cat 58he-2869, Site LS-15, Station T21R2.

The colonial wheel-thrown pottery from site LS-15 (Figure 6.52c–d), in the upper valley, was found in the same area where Mendoza (Figure 6.50d–e), El Tigre (Figure 6.58–6.60), and nineteenth-century English printed pottery (Figure 6.61e, g) were identified (Figure 6.62). The fact that this site continued to be settled during the Colonial period is very significant. Once again, the pattern for post-contact sites that I observed in the La Villa River differs from that reported by Haller (2004: 107) along the

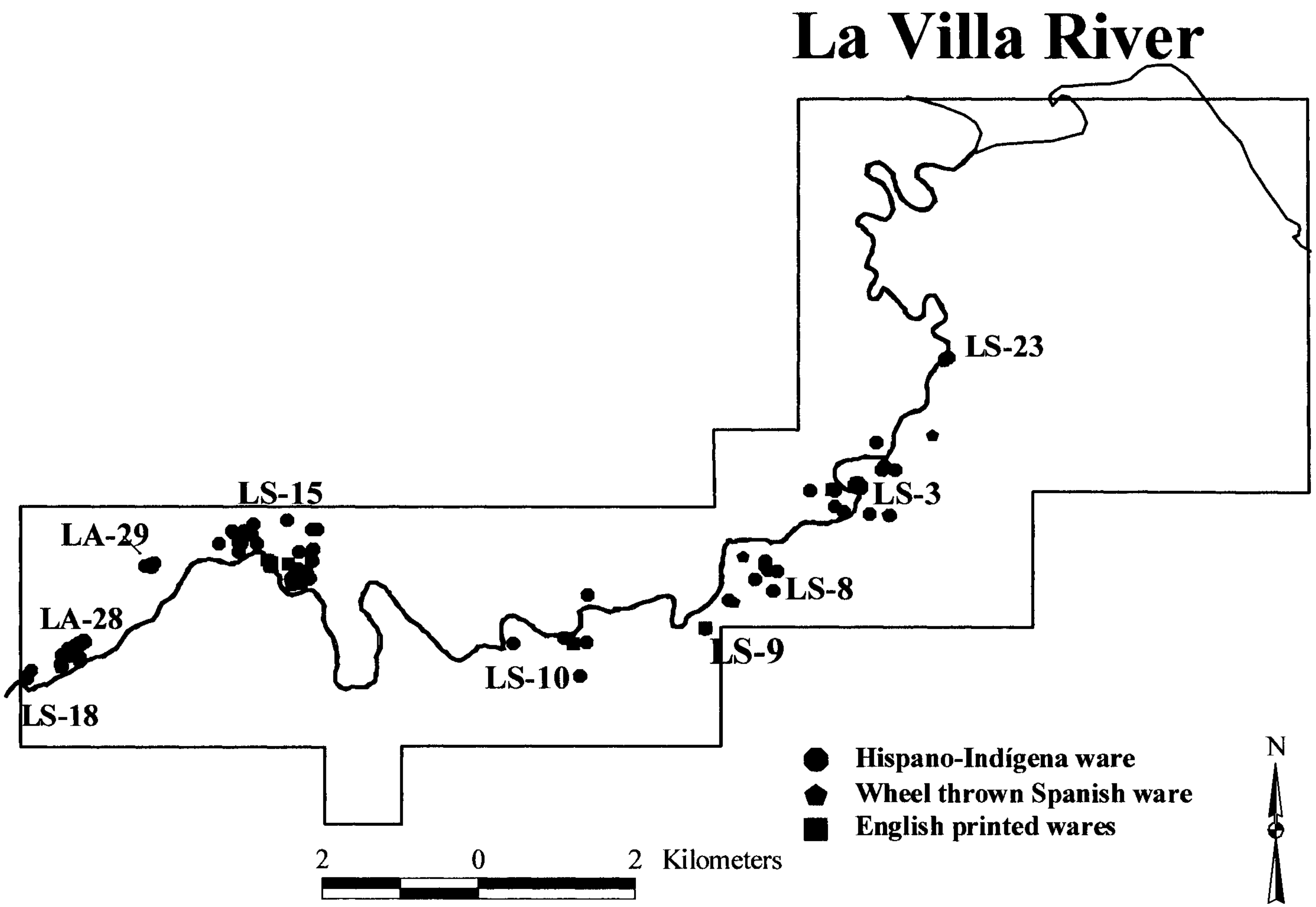


Figure 6.62 Density distribution of Colonial period pottery and printed wares

River Parita, where the Colonial period occupation focused near the Town of Parita, founded in A.D. 1581 in an area, which received only sparse settlement in pre-Columbian times. At the moment it is difficult to determine whether LS-15 represents an area where people from the *Cubitá* and *Parita* reductions were relocated or the vestiges of a colonial "*estancia*" (or ranch) where Spanish officials brought native Americans and forced them to work as slaves. For example, a document dated to A.D. 1540 reports that Francisco Pérez Robles, auditor from the Castilla de Oro court, trafficked "free Indians" sending them to the *estancia* of his son-in-law, Hernán Sánchez de Badajoz, located on the River Parita. From the *estancia* Badajoz's overseer, Juan Díaz, relocated these "Indians" by sending them to the Spanish soldiers in Veraguas and other parts of the Azuero Peninsula (Jopling 1994: 229–238).

The resettlement of sites on the periphery of La Villa de Los Santos seems to date to the seventeen century. At LS-8, for example, we collected a diagnostic olive jar neck with engraved circular marks (Figure 4.28). The rim profile resembles those found on the uppermost levels of a water well (ca. A.D. 1617) located on the grounds of the *Casa Terrín* at Panama Viejo (Brizuela 2002; Brizuela and Mendizábal 2001; Chapter 4: 236). A similar olive jar neck from DO-46, on the Caribbean watershed of Coclé province, is dated to the turn of the seventeen century, when Juan López de Sequeira ventured into the territory occupied by the Coclé Indians on the Caribbean watershed to exploit placer gold mines (Griggs 2005: 9). Two small fragments of *majolica* collected on the northern base of Cerro Juan Díaz (Figure 6.56b) exhibit similarities with material found in the 1980s at the *Casco Antiguo* of the new city of Panama (Rovira 1984). At the time of these excavations, this *majolica* was labeled 'Panama polychrome' even though it was a type not found at Panama Viejo (Rovira 1984: 286–287; 2001c: 302). The production of Panamanian *majolicas* had ended by the 1670s because of the destruction of Panama Viejo. Therefore, Rovira (personal communication 2006) suggests that they belong to the eighteenth century and are likely to be of Andean origin.

Our Hispano-Indígena pottery sample includes a few diagnostic sherds that resemble the El Tigre complex (A.D. 1650–1955), which was originally defined by Willey and McGimsey based on samples excavated from fire pits and refuse deposits at the Bocreta (HE-11) and the Monagrillo-type site, both located on the *albina* El Tigre in the Parita Bay (Willey and McGimsey 1954: 80–83, 120–121). The pottery often called Hispano-Indígena in Panama and the Caribbean is a hand-made, low fired, and coarse-tempered utilitarian earthenware that includes a wide variety of vessels forms. It tends to share the mode of placing a strip of clay around the exterior rim, which is pinched, incised or punctuated. The few diagnostic forms included in the PARLV sample correspond to large El Tigre collared jars with tall and vertically oriented necks, or jars with more constricted openings and short everted necks (Figure 6.58). Other diagnostic forms include open round bowls and plates with modeled decoration: either incised rims or applied strips of clay with undulating designs placed horizontally below the exterior side of the rim (Figure 6.59). The bulk of the Hispano-Indígena pottery sample comes from sites LS-15 and LA-28 in the upper valley (Table 6.10). A smaller sample was collected at LS-3, LS-8, LS-10 and LS-23 on the coastal plain, and LS-18 and LA-29 in the upper valley.

The geographic distribution of Hispano-Indígena pottery is widespread throughout Panama being documented at sites in Darién (Cruxent 1958); the Costa Arriba de Colón (Drolet 1980); Panama Viejo (Long 1967); Casco Viejo (Rovira 1984); Chame (Bull 1959); Veraguas and Coclé plains (Cooke 1972); Sixto Pinilla (HE-1) in Herrera (Ladd 1964: Plate 17); and Chiriquí Coast (Rovira 1984). In terms of esthetics and technology, the Hispano-Indígena Ware resembles modern pottery produced in the town of La Arena, in Herrera (Figure 1.2). Interestingly, La Arena is located 3 and 5 kilometers from sites LS-15 and LA-28, respectively, two of the sites that yielded the largest sample of hand-made Hispano-Indígena pottery. This leads me to suggest that the La Arena pottery production developed *in situ* from the pottery making traditions from the colonial period. Other modern pottery producing villages in the region sharing the same tradition are El Silencio in Penonomé, El Cristo in Aguadulce and Barranco Colorado in Olá (Rovira 1984: 288).

6.4 The PARLV stone tools

The PARLV stone-tool collection was not formally analyzed. I find it important, however, to provide a preliminary description of this material and other diagnostic tools identified during the cataloging process, because of Julia Mayo's (2004) discovery in the collection of a specialized tool assemblage used in the crafting of shell items.

The assemblage of stone tools collected by the project includes artifacts associated not only with the production of shell items, but also with food preparation, and woodworking. The tools are categorized as chipped, ground, and polished stone, based on their material sources. A total of 739 collection stations yielded stone tools, making up 40% of the total number of stations yielding artifacts. In the majority of cases, the stone tools were associated with Middle and Late Ceramic Period pottery. Only one artifact, a split cobble used bilaterally as hammer stone was linked with a Monagrillo phase, site LS-5. Future analyses may confirm this Early Ceramic Period association.

6.4.1 Chipped stone artifacts

The chipped stone group is the most ubiquitous in the lower La Villa valley, it is present in 61% (n=454) of the collection units that yielded stone tools. The bulk of the material consists of decortication flakes, blade-like flakes, chunks, nodules, cores, and a few diagnostic points, perforators, scrapers, and hammers made of coarse siliceous stones (jasper, chalcedony, and chert). There is also evidence for cutting tools, scrapers, and perforators from fossilized wood. The source materials for the siliceous stones and fossilized wood are found in both La Villa and Parita river valleys. The largest and best-studied bank of chalcedony is located in the center of the La Mula-Sarigua site (Figure 4.4; Hansell 1988). Another source of jasper and chalcedony is found in the district of Macaracas in Los Santos.[12] Other sources are in París de Parita and Chepo de las Minas in Herrera. It is possible that some stone was transported downriver from their original sources. Our survey also documented outcrops of small siliceous stone and quartz east of the river at sites LS-21 and LS-32 where there is visible evidence of the acquisition and

[12] This second source was documented by Mayo (2004: 179) based on personal information provided by Alberto Ruíz. In her dissertation, Mayo states that the source is 6 kilometers from Cerro Juan Díaz, but this is incorrect. The Macaracas district is located bout 20 kilometers from the coast.

preparation of stone tools during the early phases of the Late Ceramic period (Figure 4.4). The principal source for fossilized wood is west of the Cerro El Tamarindo, but tabular fragments and flakes of fossilized wood occur throughout the valley, with the densest concentrations at sites LS-3, CHI-6, LS-10, and LS-15 (Figure 6.63).

Despite the abundance of chipped stone, only a few diagnostic tools could be securely associated with a particular cultural period. The oldest are unifacial stemmed "La Mula points", so-called because of their frequency in La Mula phase (200 B.C.–A.D. 250) deposits in Azuero, Coclé, and Veraguas (Hansell 1988; Ranere and Cooke 1996). La Mula points are described as multipurpose tools crafted from carefully prepared cores and modified to be used as scrapers, spokeshaves, gravers, perforators, or knives (Cooke and Ranere 1984: Figure 7; Hansell 1988: 105–112; Ranere and Cooke 1996: 67, 75). In the survey universe, these tools were identified at LS-3, CHI-6, and LS-15 (Table 6.11). The sample from LS-3 includes at least three points, one perforator, and a graving tool (Figure 2.4), which according to Cooke (personal communication 2002) share strong similarities with the points collected by the PSM at SA-27 in Veraguas. It is also important to note that finds of La Mula points at LS-6 and CHI-6 are consistent with the presence of La Mula style pottery on the southern flanks of Cerro Juan Gómez, while it also provides evidence for a La Mula phase occupation at LS-15 in the upper valley.

The second diagnostic tool type are round wasted blade cores and nodules of siliceous stone, which functioned as pre-forms for keeled-hammers (*sensu* Mayo 2004: 209–213; see also Mayo and Cooke 2004: 150–151). In Mayo's excavations at Cerro Juan Díaz, the keeled-hammers were found in association with the production of shell

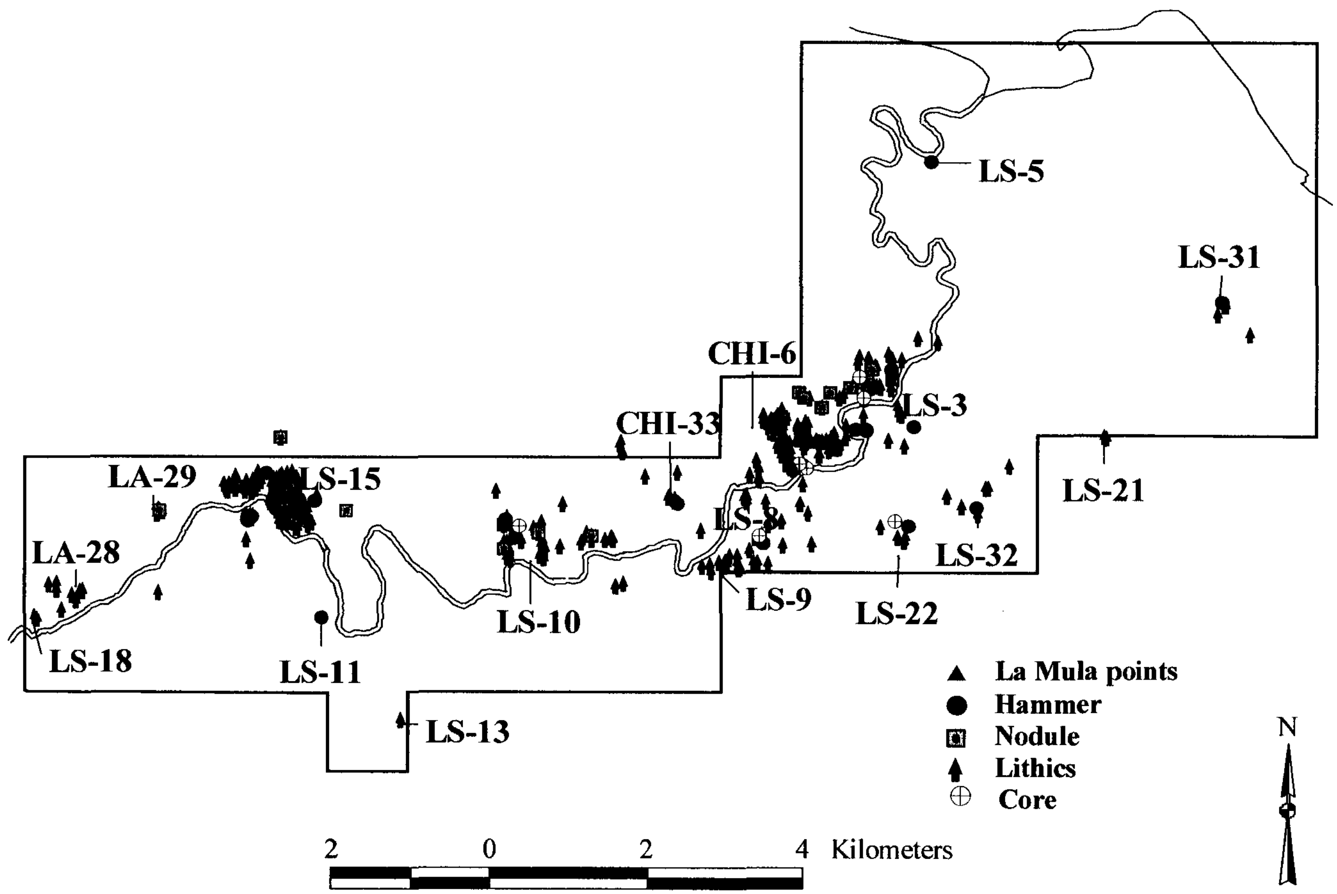


Figure 6.63 Distribution of chipped stone tools in the lower La Villa Valley

Table 6.11
Distribution of stone tools in the lower La Villa Valley

	Sites on the Coastal Plain													Site West of Cerro El Tamarindo							
Sites	**LS-3**	**LS-4**	**CHI-6**	**LS-7**	**LS-8**	**LS-9**	**LS-10**	**LS-21**	**LS-22**	**CHI-30**	**CHI-33**	**LS-31**	**LS-32**	**LS-11**	**LS-12**	**LS-13**	**LS-20**	**LS-15**	**LS-16**	**LA-28**	**LA-29**
No. stations	**170**	**2**	**75**	**9**	**43**	**23**	**85**	**2**	**10**	**6**	**21**	**10**	**9**	**12**	**1**	**5**	**2**	**214**	**1**	**26**	**11**
Chipped Stone tools																					
Expedient pointed tool	4		2		1		1	1				1						4		1	1
Hammers	8		8		1		2		3		4	1		1				6		1	
La Mula tools	4		1															1			
Scrapers	6		5		4	2	2	3	3			2	2					8		1	
Splitting tool	1								1				1								
Spokeshaves	1		1																		
Pointed flakes	11	1	6			1	2	2	2									6		1	
Flakes	53	1	46	2	14	12	27	2	6	5	7	2	1			1		108	1	6	4
Fossilized wood flakes	15	1	9	3	4		15	2	3		1	4	1					27		5	
Cores, Chunks, Nodules	12		9	1	3		6	1	2									20			1
Quartz slab																		1			
Cobbles	11		3		2		1											4		3	1
Ground stone tools																					
Manos	17				6	4	10			1	1	4		4			1	30		3	2
Legged metates	15				3	5	14		1		4	1	2	5				11		3	3
Slab metates																		5	1		
Mortar (*cf.*)																		2			
Pestle	1				1	1												7		1	1
Pestle (*cf.*)																		1			1
Polished stone tools																					
Axes	2		1		3		7								1			13		3	3
Polisher	5						7			1	1			1				9		3	4

items during the Cubitá phase (A.D. 550–700). The ubiquity of flakes, chunks, cores, pre-forms, and finished tools indicated that the hammers were actually produced at the workshop together with other specialized stone tools made from jasper, chalcedony, and fossilized wood (Mayo 2004: 226–227).

Keeled-hammers are characterized by the presence of a flat surface used to hold the tool with the hand (during direct percussion) or as a platform for indirect percussion (Figure 6.64). Parallel to the flat platform is the active side of the hammer, which exposes a semi-circular profile resembling a ship's keel (Mayo 2004: 210). Occasionally these tools are so battered that they acquire a circular profile (Figure 6.64d). Mayo (2004: 210) classified keeled hammers in two groups based on their weight: light-weight hammers or "*martillos livianos*" (weighing less than 150 g) and heavy-weight hammers or "*martillos espesos*" (weighing between 150–286 g). In her opinion, the size and weight of the hammers are related to the types of percussion techniques used to break shells of different sizes and resistance (Mayo 2004: 211). Large and structurally dense species such as *Strombus galeatus* snails, for example, would have required the use of heavy weight hammers to produce the initial shell blanks. While the smaller, but still dense species, such as *Conus*, required use of light-weight hammers. Other tools used included jasper and chalcedony scrapers, blade-like flakes, perforators, spokeshaves, and gravers made of fossilized wood.

The majority of the PARLV Keeled-hammers and pre-forms correspond to the heavy type, based on Mayo's typology. Their geographic distribution in the La Villa valley is quite interesting, since our preliminary assessment indicates that most of them

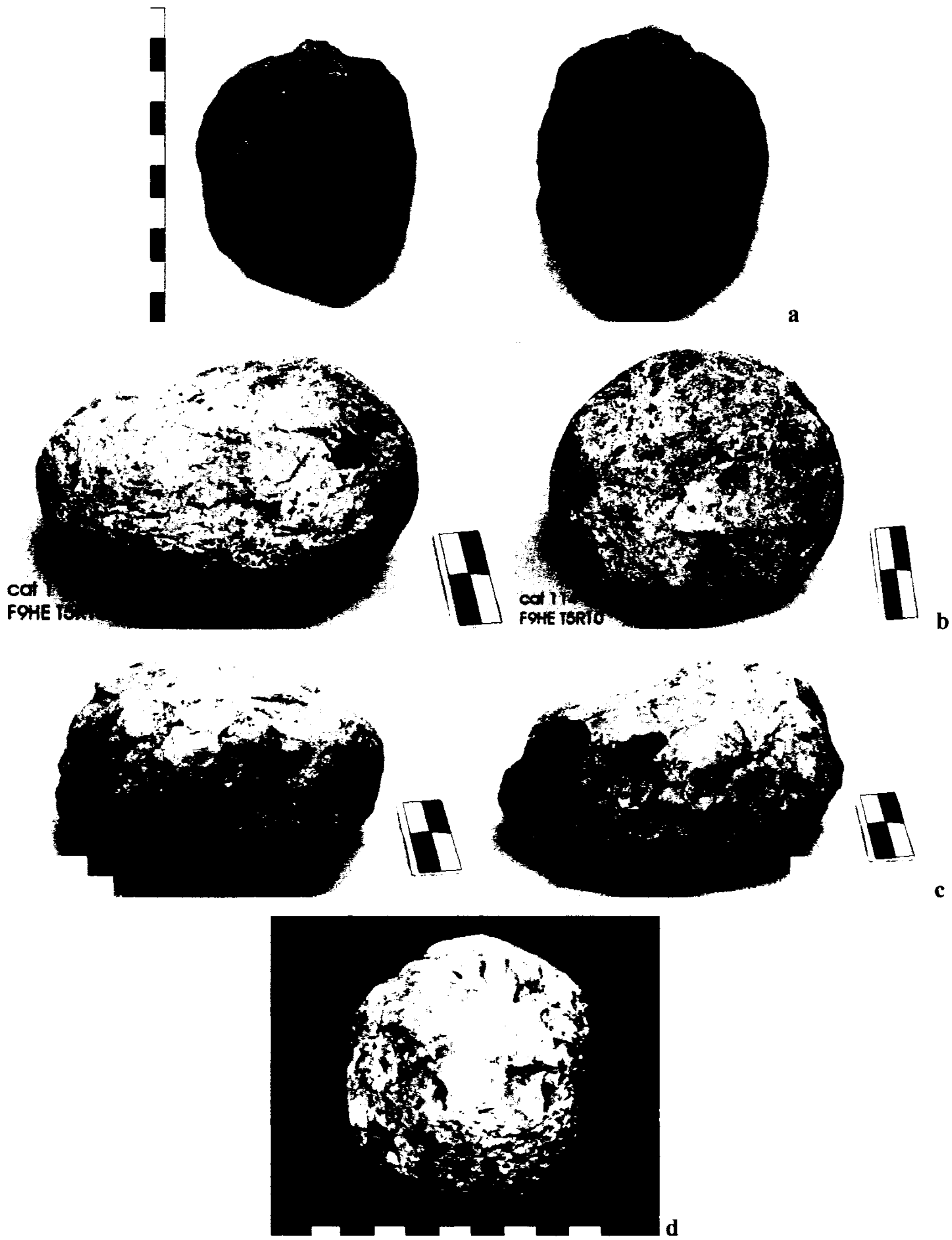


Figure 6.64 Keeled-hammers.
(a) Wasted blade core re-used as circumferential hammer stone, cat 11s-1061, Site LS-3, Station T3R1 (Weight 260 g, Length 8.3 cm , Width 7.1 cm, Thickness 3.8 cm; *cf.* Mayo 2004: Plate 86); (b) Nodule of siliceous material circumferential battering, cat 9he-114, Site LS-3, Station T5R10. Scale 4 cm (W: 628 g, L: 9.8 cm, W: 9.2 cm, T: 5.3 cm); (c) Wasted core of coarse siliceous stone of circumferential shape, cat 15he-451, Site LS-3, Station T5R17 (W: 534 g; L: 9.5 cm, W 9.2 cm, T: 4.8 cm); (d) Hammer of coarse siliceous stone well used circumferentially, cat 103ls-1161, Site LS-15, Station R679 (W: 507g, L: 8.4 cm, W: 7cm, T: 6 cm).

were found at or near LS-3 (Figure 6.63). The hammer illustrated in Figure 6.64a, for example, was collected by Mayo about 30 meters southwest of the workshop on the first day of the PARLV survey. Additional nodules and wasted cores with circumferential battering were collected on the Herrera banks of LS-3 (Figure 6.64b–c), which may in fact point to the presence of additional workshops.

Other diagnostic stone tools include the round-shaped hammers, which resemble "*picadores*" or roughening stones used to abrade the grinding surfaces of metates (Figure 6.64d). In the lower La Villa valley, these tools are commonly found associated with painted pottery from the Middle and Late Ceramic period.

The surface distribution of stone flakes, cores, and nodules of jasper, chalcedony, and fossilized wood in our survey universe, indicates that crafting chipped stone tools in La Villa households was a common practice. Because most of the material debris of jasper and chalcedony is concentrated on the Herrera banks of the river, I propose that La Mula-Sarigua was the source for the material before it was exhausted. The smaller outcrops at sites LS-21 and LS-32 were also exploited, but at a smaller scale and during the Late Ceramic period.

6.4.2 Grinding tools

Our grinding tool sample includes manos, metates, *cf.* mortars and *cf.* pestles, which were registered in 20% (n=150) of the station units that yielded stone tools (Table 6.11; Figure 6.65). Our catalog and field notes indicate that manos were by far the most ubiquitous grinding tool registered. At least four basic forms are present: oval,

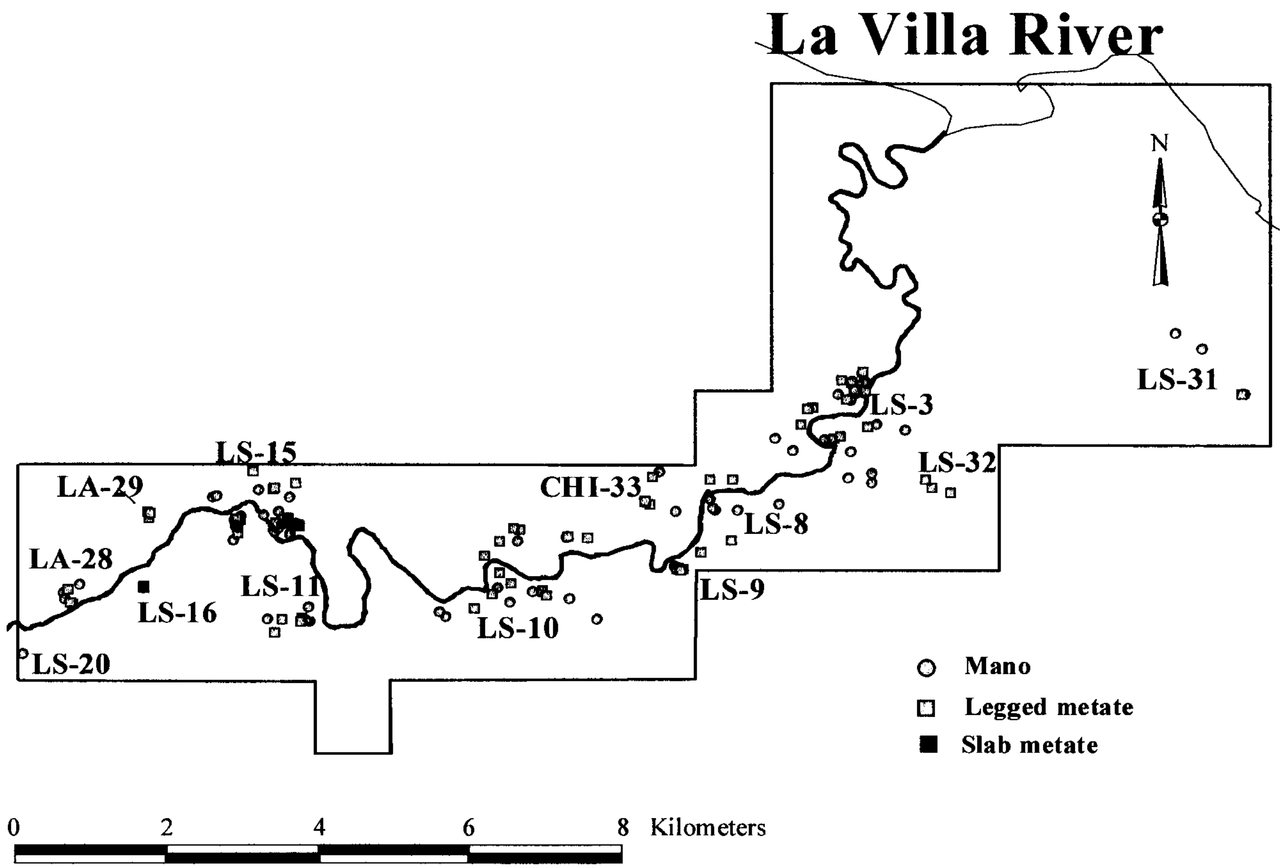


Figure 6.65 Distribution of ground stone tools in the lower La Villa Valley

cylindrical, spherical, and bar shaped manos with a lip (Figure 6.66). The latter type is associated with legged metates from the Late Ceramic period (Figure 6.66c). Similar manos were documented by Haller in the valley of the River Parita (Haller 2004: Figure 6.7) and by John Griggs at the La Peguera (LP-16) site at the middle course of the Coclé del Norte River (Griggs 2005: Figure 46).

Only two types of metates are present in our survey universe: legged and slab. So far, there is no evidence for rimmed legless "breadboard" metates characteristic of the Early Ceramic period (Table 2.1). Morphologically the Gran Coclé legged metates are very simple. They may have three or four leg supports with either tapered or straight profiles (Lothrop 1937: 96; Haller 2004: 145). In the majority of cases, the three-legged metates present an oval-shaped grinding platform with a slightly concave profile, but there are some examples where the grinding surface is rectangular (i.e. Ladd 1964: Plate 123). The grinding platform of the four-legged metates, on the other hand, is often rectangular with a slightly concave profile. Some Gran Coclé legged metates may even have carved decorations, but these are not common and when they do appear are usually simple in design.

Although none of the legged metates reported by the PARLV depicted carved designs, during the course of the PARLV second field season a Chitré resident did allow me to photograph a four-legged metate, which had carved in relief the head, legs, and tail of a turtle along the outer edge (Figure 6.67). The artifact was a gift from a family member, who obtained it in the Parita valley. Stylistically, the un-provenienced metate resembles the one illustrated by Lothrop from Sitio Conte (*cf.* Lothrop 1937: Figure

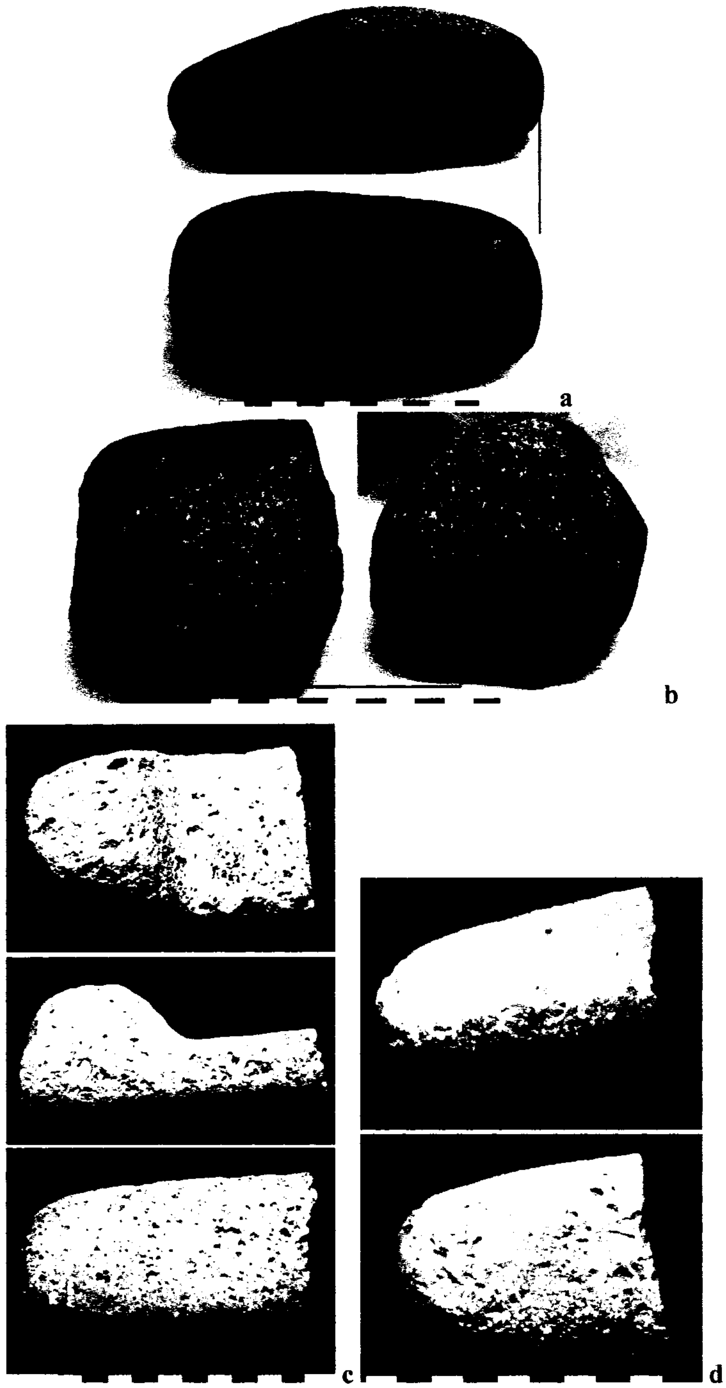


Figure 6.66 PARLV manos.
(a) Oval-shaped mano highly polished on one facet, cat 11s-01-280, Site LS-3, T3R1; (b) Cylindrical mano made from diorite, cat 9he-73, Site LS-3, Station T1R8; (c) Fragment of a bar mano presenting a lipped profile and evidence of use ware on both facets, cat 81ls-01-496, Site LS-9, Station T2R2 (*cf.* Griggs 2005: Figure 46; Haller 2004: Figure 6.7); (d) Polished oval mano, cat 87ls-01-679, Site LS-10, Station T2R8.

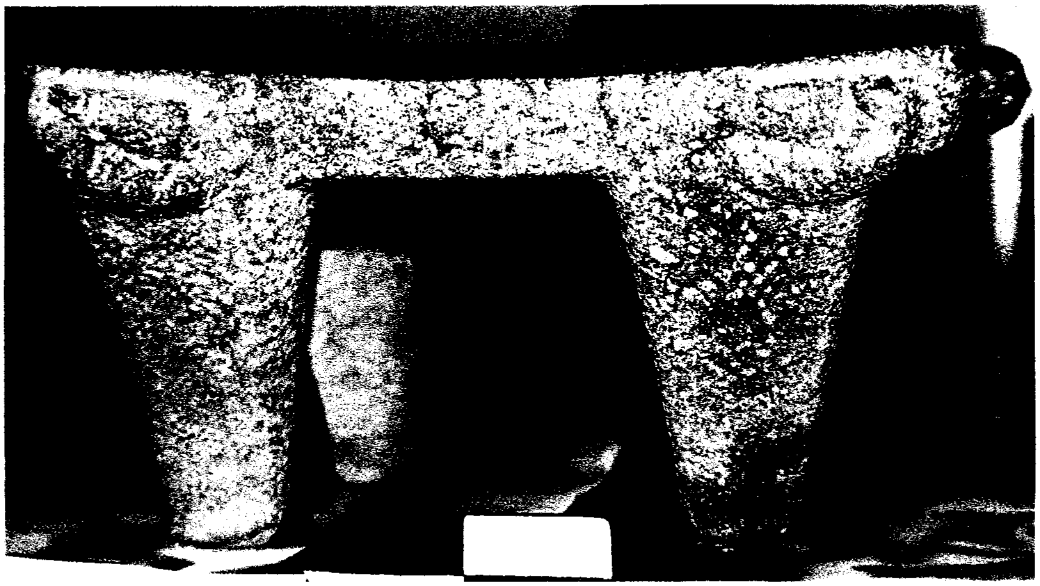
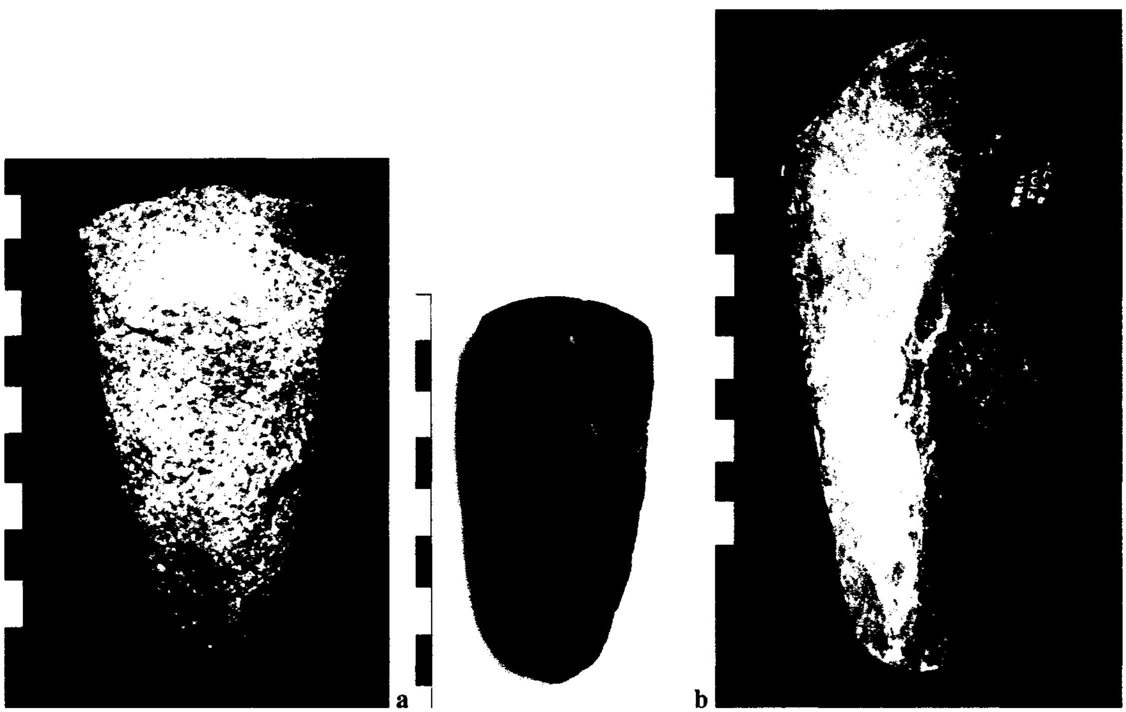


Figure 6.67 Carved relief four-legged metate.
Unknown provenience (Scale 10 cm)



a b c

Figure 6.68 PARLV Polished stone tools.
(a) Trapezoidal shaped axe, cat 93ls-01-826, Site LS-12, Station 588;
(b) Trapezoidal shaped axe, cat 103ls-01-1046, Site LS-15, Station R679C, Stratum 3;
(c) Axe pre-form, cat 103ls-01-1009, Site 15, Station R679.

62b–c). Ladd, on the other hand, illustrates another type of carved metate discovered at the base of a 4-meter deep shaft grave (Find 49) in Sixto Pinilla (HE-1), Parita valley (Ladd 1964: Plate 23b). It consists of a three-legged metate with a rectangular grinding platform (46.5 cm long). The carved decoration is on the underside of the grinding surface depicting 13 stone rings resembling birds' heads attached to the platform by neck and beak, and a low relief lizard on one side of the metate (Ladd 1964: 201, Plate 11c). Above this metate, the remains of 32 individuals were found along with a red slipped sub-globular collared jar decorated with undulating narrow black lines typical of the Sigua type pottery of the Cubitá complex (*sensu* Sánchez 1995: 196–198). Because of this association, I suggest carved relief metates were introduced at the same time that the breadboard metates were replaced with legged ones, during the Middle Ceramic period, and that legged metates apart from being domestic tools were used in ritual contexts. The best example comes from Feature 94 at Cerro Juan Díaz (Figure 4.6d) where the ritually killed legged metate accompanying an adult female was covered in maize (and only maize) starch (Piperno and Holst 1998).

When we compare these grinding stones with those form other sites in Panama it is evident that these tools were used primarily for preparing maize flour. A breadboard metate at La Mula-Sarigua, which is attributed to the La Mula phase (ca. 200 B.C), produced starch of maize, manioc, lerén (*Calathea*) and native yam Dioscorea (Piperno and Holst 1998). At Sitio Sierra, maize predominates in macrobotanical samples. Eight to twelve-rowed varieties with large floury kernels were used throughout this village's occupation from ca. 250 B.C.–A.D. 1520 (Cooke 1984a). At this site a group of carbonized maize kernels was found alongside an adult male buried around A.D. 395–635 (Beta-46402) appears to have been an intentional offering (Cooke 1984a: 285; Dickau 2005: 156; Isaza 1993: 81-82).

Therefore, I propose that the wide distribution of manos and metates throughout the La Villa valley is indicative that maize was widely used in the lower La Villa valley communities. Other important crops documented in the archaeological record and mentioned by the Spanish chroniclers are manioc and squash. Starch grain evidence for manioc from Zapotal (HE-15/PR-32), Aguadulce (AG-13) and the Monagrillo-type site shows that this crop was being prepared since the Late Preceramic and Early Ceramic A Periods (6000–1200 B.C.). The Spanish Captain Gaspar de Espinosa, on the other hand, eulogized the "melons" (squash) of *Parita's* chiefdom as being the "best and tastiest" that he had tried in the Americas (Chapter 1: Footnote 4). Carbonized squash remains have not yet been reported in the La Villa Valley, but squash pollen and phytoliths of *Cucurbita* are widespread at Sitio Sierra (Dickau 2005). This suggests that this was an important crop during the La Mula phase and continuing through the contact period.

The materials selected to produce the manos and legged metates collected by the PARLV include andesite, diorite, and granite, which are all available in the Montuoso Region in the upper reaches of the La Villa valley (Ruíz, personal communication 2002). Unlike the chipped stone sample, we did not identify areas with production debris for either manos or metates, which suggest that these artifacts were produced elsewhere and brought to the La Villa sites as finished products.

The slab metates are characterized by their unmodified 'boulder-shaped base' and well-defined grinding surface with a concave profile (Figure 4.42). They were crafted from andesite and diorite available in the upper reaches of the La Villa valley. Unlike the legged metates, they have not been documented in burial features, which may indicate their function was purely domestic.

In the La Villa valley, slab metates were only documented at LS-15 and LS-16B, where they were found associated with Parita, El Hatillo, and El Tigre style pottery. This occurrence suggest, that slab metates were a more recent type introduced during the last phases of the Late Ceramic and continued in use through the Colonial period. They are widely distributed at archaeological sites in Gran Darién (Cooke 1976a; Drolet 1980). Maybe this style of metate was introduced into the region by Cueva women indentured to Spanish men whose names are recorded in some lists of *encomendados* at Azuero haciendas.

6.4.3 Polished stone tools

The PARLV polished stone-tool sample includes polished stone axes (Figure 6.68), and pebble polishers made of basalt, andesite, and granite. Compared with the other stone-tool groups, the geographic distribution of axes and polishers in the lower La Villa valley is limited being documented at only 55 collection units (Figure 6.69).

Polished stone-axe technology dates back to the third millennium B.C., coeval with intensification of slash-and-burn agriculture and the introduction of ceramics (Table 2.1). The earliest evidence comes from the Calaveras Shelter (LP-8) on the Caribbean slopes of Coclé where John Griggs discovered pear-shaped axes and axe fragments of

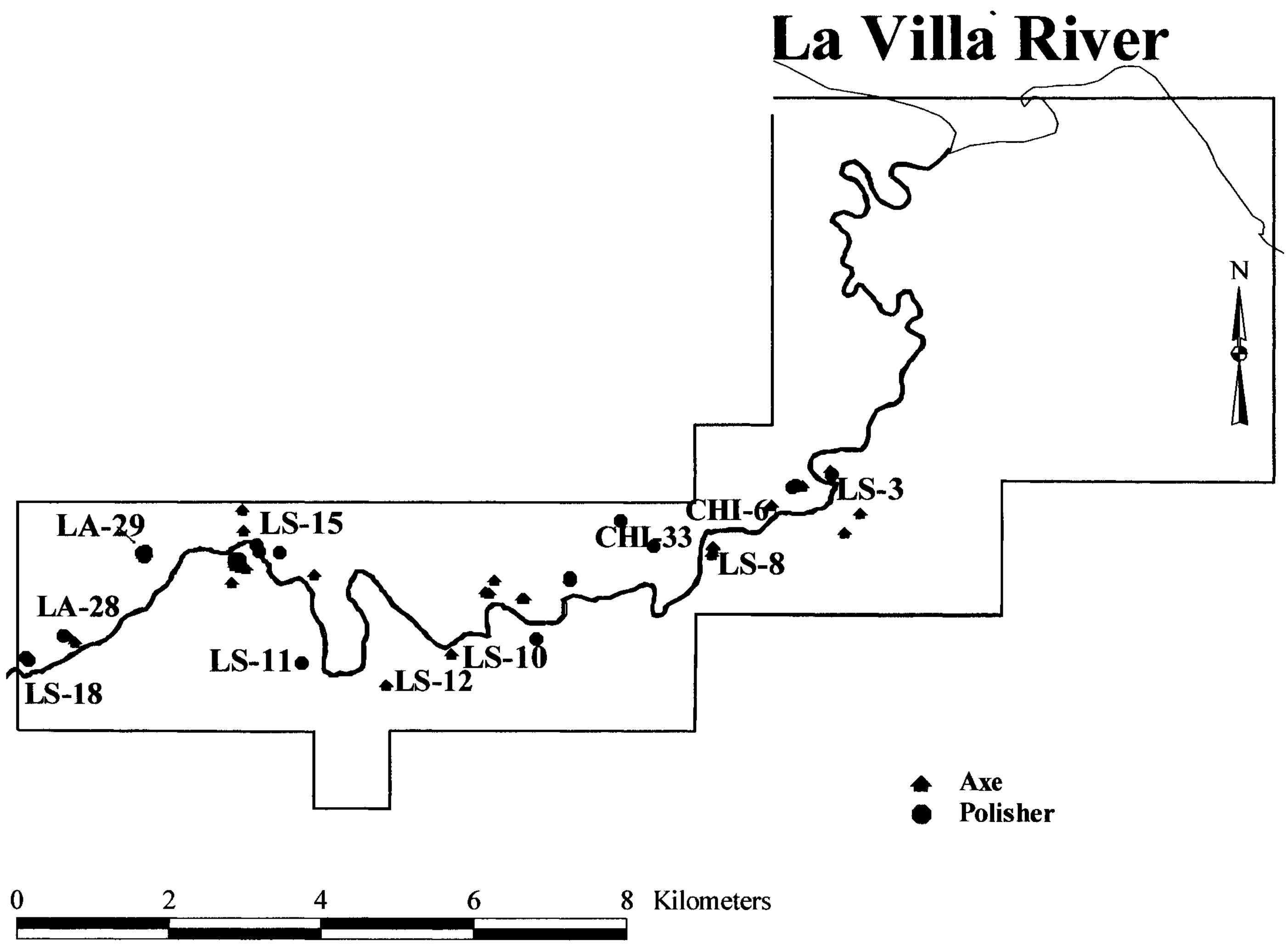


Figure 6.69 Distribution of polished stone tools in the lower La Villa Valley

fine-grained volcanic rock in Early Ceramic deposits (Griggs 2005: 172). Prior to Griggs' discovery, the evidence was limited to a crude axe from the Carabalí shelter (SF-9) and axe flakes from Cueva de Los Ladrones (LP-1), in both cases from Late Preceramic levels (Ranere and Cooke 1996: 70). At coastal settlements, such as La Mula-Sarigua, however, pear-shaped axes were directly associated with first millennium B.C. pottery, while the trapezoidal shaped axes were associated with pottery postdating the Tonosí phase of the Middle Ceramic Period (Table 2.3; Hansell 1988: 207; Haller 2005: 148). Cooke (1977a) reported pear-shaped axes in graves at Sitio Sierra, which dates ca. A.D. 100–500 (see also Isaza 1993: 83). Numerous pear-shaped axes were found in cache deposits at Sitio Conte (Lothrop 1937: Figure 53–55). Haller (2004: 149) corroborated this association during his survey of the lower Parita river valley. Interestingly, Mayo (2004: 215) only documented trapezoidal axes at the Cerro Juan Díaz workshop, which is harmonious with the established chronology for these tools.

Our preliminary observations indicate that the majority of the PARLV polished stone-axe sample correspond to the trapezoidal type (Figure 6.68). At least one distal end of a pear-shaped axe has been recorded. A few examples of pre-forms and unpolished axe fragments may provide evidence that axe re-shaping was taking place at some sites, but this has to be substantiated with a formal analysis of the collection.

The CJDP excavations yielded large samples of polished axes and materials produced by breakage and re-sharpening, but only those from the shell workshop excavated by Mayo have been studied. Mayo's (2004: 214–215) analyses give evidence that basalt axes and adzes were crafted and re-shaped at the site. The adzes and axes were linked to woodworking functions. During the contact period, these tools were fundamental in the production of dugout canoes, as well as for agricultural and domestic activities. As mentioned in previous chapters, archaeologist have also argued that polished basalt and andesite axes recorded at La Mula-Sarigua, Sitio Sierra and Cerro Brujo in Bocas del Toro were imported in an unfinished state from highland stone sources where they were preliminarily fashioned into blanks. Griggs (2005: 240–269) discovered two sites in the central cordillera of Coclé on the Caribbean slopes, at which axes were cut down to blanks and perhaps traded to lowland sites. Furthermore, Griggs suggests that the regional importance of one of these sites, Cerro Hacha (LP-11) where he recorded stone walls and terraces, was due to the exchange of unfinished axes.

6.4.4 Summary

The PARLV stone-tool assemblage indicates that different types of activities took place within the villages; these include food preparation, woodworking, and the production of costume items made from shell and bone. The distribution of silica-rich stone and fossilized wood flakes, chunks, and nodules, particularly in nuclear settlements and type 2 villages, suggests that the small-scale production of chipped tools took place at these sites. On the other hand, the lack of production debris for polished stone tools, as well as manos and metates, suggests that these artifacts were produced beyond the areas covered by our survey and brought to the lower La Villa as semi-finished or finished products.

6.5 Population estimates

The preliminary analysis of diagnostic ceramics and stone tools has allowed us to locate the areas of major cultural activity and define diachronic changes in settlement patterns in the lower La Villa valley. To complement this information, I will postulate the size of the pre-Columbian population and correlate this with the estimates other researchers in neighboring valleys and cultural areas.

Calculating prehistoric population densities is a complex procedure; nevertheless it remains a fundamental tool for testing ideas of cultural complexity. Various archaeologists have attempted population estimates for parts of Panama, based on their research. Sigvald Linné, for example, proposed the first population estimate after his survey and excavations of Pearl Island sites. He proposed that the pre-Columbian population of the Pearl Islands Archipelago, which covers a total area of 334 km^2, did not surpass 3000 people (Linné 1929: 72). Interestingly, Linné's estimate is consistent with the 9.2 people/km^2 density estimate projected by historian Kathleen Romoli for the Cueva province of which the Pearl Islands formed part (Romoli 1987: 33; Cooke 1998c, 2005; see also Chapter 3: 102).

After intensive surveys of the Chiriquí highlands Linares and Sheets (1980: 54) estimated that prior to the eruption of the Volcan Barú (A.D. 600–A.D. 1000) the pre-Columbian population for Volcán Barú and Cerro Punta was 2,432 people (density of 39 people/km^2). For the valley of the Santa María River, Cooke (1998c) projected that the contact period population for the chiefdom of *Escoria*, which covered about 176 km^2 reached 7800 people (density: 44 people/ km^2). He based this estimate on the size and distribution of nucleated villages along the lower course of the river Santa María.[13]

Recently, Mikael Haller (2004) implemented a new method of estimating population looking at the relationship between the surface collection area and the density of diagnostic pottery from each ceramic phase or "density-area index per century: DAI/C" (Drennan *et al.* 2003b; Haller 2004: 35).[14] The absolute population estimates generated by this method, although very conservative, provided a new perspective in looking at the diachronic changes in population growth (Figure 6.70). During the La Mula phase (200 B.C.–A.D. 250), for example, Haller estimates that a maximum of 197 people were living in the lower Parita valley, 75% of which clustered at or near La Mula-Sarigua (Haller 2004: 62). During the subsequent Tonosí phase (A.D. 250–550) he estimates a slight decrease with 158 people dispersed in small hamlets all throughout the valley. A rapid population growth occurs during the Cubitá phase (A.D. 550–700) when a three-tiered settlement hierarchy first emerged (Figure 6.70). During this phase, he estimates a maximum of 1190 people for the whole valley. What follows is a gradual decline and stabilization of the population growth. It is not until the Parita phase (A.D. 110–1400), however, when the population once again rose (1164 people) and suffered an

[13] Cooke used an average population of 600 people per village, for 13 villages equidistantly spaced 3 kilometers apart along the Santa María River (Weiland 1994; Cooke 2005: 157).

[14] To define the maximum and minimum population values per DAI/C, Haller (2004: 119) began by comparing the information from his first-order site, El Hatillo, with that from the chiefly *bohío* of *Natá*. In 1519, Espinosa (1994a) had estimated a population of 1500 for Natá, but no reference was given as to how the people were dispersed in the landscape. Two separate surveys (Cooke 1972; Breece 1997) of Natá, however, provided different size estimates, with Cooke's estimate at 400 ha and Breece's at 100 ha (Table 2.2). With this information, Haller projected that the population density of Natá ranged between 3.75 and 15 people/ha. He proceeded by multiplying the Natá density values with the estimated area occupied at El Hatillo during each ceramic phase. The results were then divided by the corresponding DAI/C values for each phase coming up with an estimate of 13 (minimum) and 52 (maximum) people per 1.0 DAI/C (Haller 2004: 119).

abrupt decline with only 513 people living in the valley just prior to the contact period (Figure 6.70).

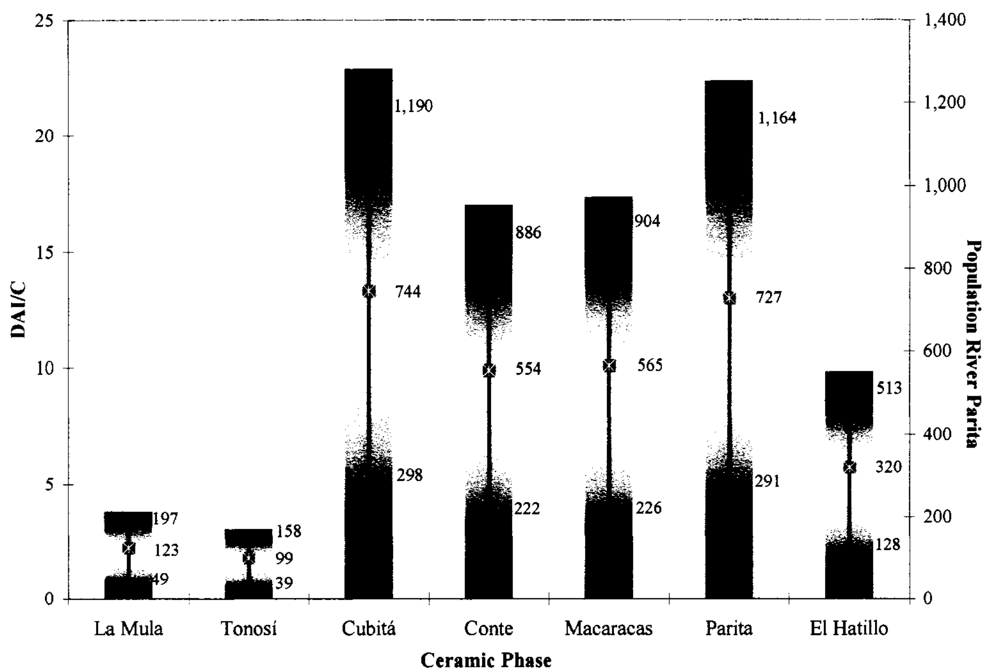


Figure 6.70 Population estimates for the Parita Valley (based on Haller 2004: Table 5.3)

6.5.1 The pre-Columbian population of the lower La Villa valley

One advantage that the PARLV and PCJD data offers is the identification of several floor features (Table 6.12). The magnetic and resistivity surveys conducted on the northern base of Cerro Juan Díaz identified at least two polygonal features measuring 8.8 by 13.5 meters and 12.9 by 14 meters, spaced 30 meters apart (Figure 5.3). At least one of these two features (Figure 5.3: Anomaly D) may outline the remains of fired clay floors similar to the ones CJDP archaeologists excavated on the opposite side of the hill.

Table 6.12
Population estimates for Cerro Juan Díaz (LS-3) floor features

Ceramic Phase	**Description**	**Floor area**	**Area (m^2)**	**People ($6/m^2$)**
Cubitá	CJDP, Op-1 elliptical floor	2 x 5 m	10	1.7
Cubitá	CJDP, Op-8 workshop	6.5 x 7 m	38	6
Parita	CJDP, Op 6 mortuary house	20 m diameter	62.83	10.5
(?)	PARLV, R455 Anomaly D	8.8 x 13.5 m	118.8	20
(?)	PARLV, R455 Anomaly E	12.9 x 14 m	180.6	30

The Cubitá phase elliptical feature excavated at Operation 1 measured 10 m^2. This feature was 30 meters from Operation 8, where Mayo cleared 38 m^2 of the Cubitá phase shell workshop also defined by an elliptical-shaped burnt clay surface (Mayo 2004: Figure 8). The Parita phase mortuary house found at the hill summit, on the other hand, was round and measured 20-meter diameter (Table 6.12). With the available information, it is evident that the size of structures may have varied according to their function and even period of occupation. Using an estimate of one person per six square meters of floor space (see Curet 1997: 363) the Cubitá phase average single-family dwelling must have housed between two and six people, while structures larger than 50 m^2 could have served for non-residential function e.g., community meeting houses, mortuary houses. Since the dimensions of the Cerro Juan Díaz' domestic floor features correspond with the floor area defined for other archaeological sites, e.g., Pittí-Gonzalez in the Chiriquí highlands and Sitio Sierra in the Santa María valley, I use Linares' 2500 m^2 average measurement for individual houses with associated gardens and unused areas (Linares and Sheets 1980: 53). With this information, the population values for Cerro Juan Díaz would have ranged between 6 and 24 persons per hectare (mean 15p/ha). To calculate the population I used the mean size of each type-site documented in the lower

La Villa valley during the different ceramic phases. The mean site area was then multiplied by the projected population values proposed for Cerro Juan Díaz (Table 6.13). The population estimates for each ceramic phase were then added up to provide the absolute population estimate for the lower La Villa valley per ceramic phase. To provide some comparison with the average estimate projected for the Parita Valley, the absolute population estimate was then divided by the length of time of each ceramic phase (Figure 6.71).

Table 6.13
Pre-Columbian Population estimates for the lower La Villa valley

Ceramic Phase	Type site	Mean site Size (ha)	Min 6p/ha	Max 24 p/ha	Mean
El Hatillo	Type 2 (n=4)	19.5	117	468	293
	Type 3 (n=1)	2.6	16	62	39
	Type 4 (n=2)	0.5	3	12	8
Parita	Type 1 (n=1)	68	408	1,632	1,020
	Type 2 (n=4)	28.5	171	684	428
	Type 3 (n=7)	8.2	49	197	123
Macaracas	Type 1 (n=2)	86.5	519	2,076	1,298
	Type 2 (n=1)	26	180	720	450
	Type 3 (n=4)	9.75	59	234	146
Conte	Type 1 (n=2)	164.5	987	3,948	2,468
	Type 2 (n=3)	21.3	128	511	320
	Type 3 (n=4)	10.25	62	246	154
	Type 4 (n=2)	0.3	2	7	5
Cubitá	Type 1 (n=2)	125	750	3,000	1,875
	Type 2 (n=2)	26.5	159	636	398
	Type 3 (n=3)	5.3	32	127	80
	Type 4 (n=4)	0.6	4	14	9
Tonosí	Type 2 (n=3)	17	102	408	255
	Type 3 (n=4)	3.8	23	91	57
	Type 4 (n=5)	0.56	3	13	8
La Mula	Type 3 (n=3)	3.2	19	77	48
	Type 4 (n=1)	0.6	4	14	9

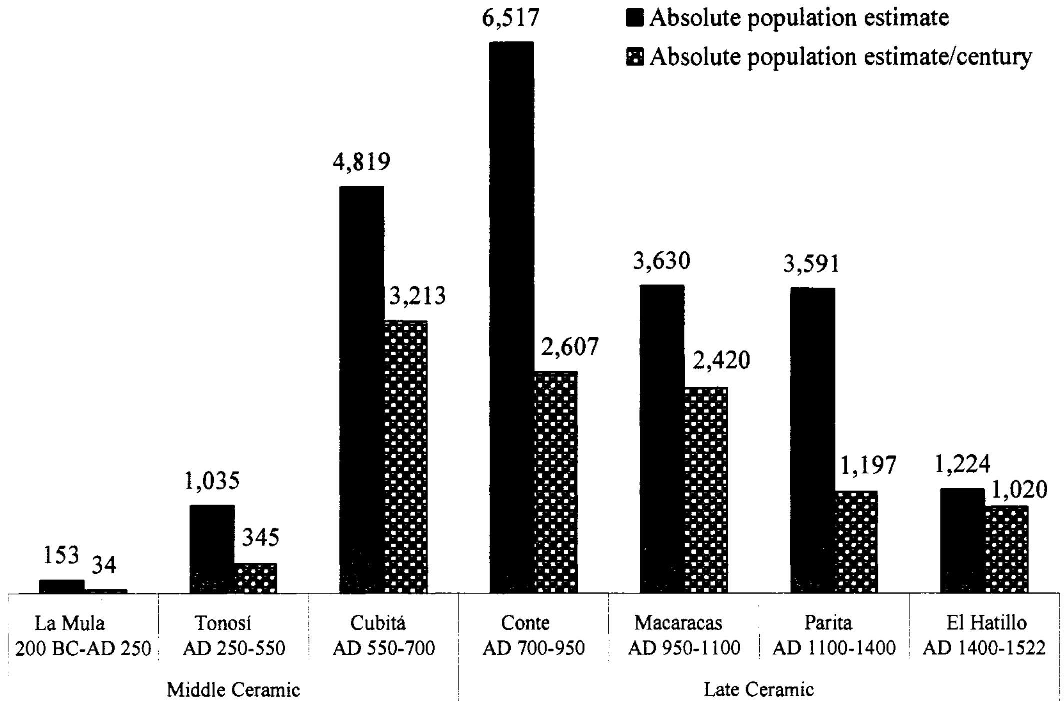


Figure 6.71 Pre-Columbian population estimates for La Villa Valley

6.5.2 Conclusions

The result of our exercise substantiates the sixteenth century chroniclers' descriptions of a densely occupied La Villa River. We also noted that, although all major sites from which cultural artifacts have been analyzed present a long history of occupation, their boundaries expanded and contracted through with the rate of population growth.

Although our estimate contrast with those projected for the neighboring Parita Valley, we did find correlative trends in the rate of population growth. Beginning in La Mula phase (200 B.C.–A.D. 250) we have a maximum of 153 people living in the lower La Villa, most of which clustered around Cerro Juan Díaz. By the Tonosí phase there is a 9.6% increase in population with 1467 people disperse in villages and hamlets all along the river valley. During the Cubitá phase there is a 3.2% increase in population, which resulted from the emergence of two type 1 sites and the growth of its neighboring type 2–4 sites. By this time, we estimate that about 4819 people live the valley. Most of the population continues to cluster in the coastal plain (Table 6.13).

The maximum population growth is recorded during the Conte phase when we estimate a maximum of 6517 people. What follows is a period of gradual population decline as people seem to abandon the coastal settlement and there is an inland shift of settlement nucleation. By the Macaracas phase, we estimate that the valley was occupied by a maximum of 3660 people and during the Parita Phase by about 3591 people. The decline in population is more abrupt during El Hatillo phase with 1224 people.

Overall, our data reveals that even though the lower La Villa sites are being occupied for long periods, there are episodes of settlement abandonment or population decrease, a practice that was documented by the Spanish chroniclers. This just proves that to look for signs of permanence among the Panamanian chiefdoms is to completely misunderstand them "since their status and power were based on the impermanent occupation of shifting positions" (Linares 1977b: 76).

Chapter 7

Invertebrate and vertebrate fauna from the lower La Villa River

7.1. Introduction

Archaeofauna studies have quite a long history in Panama. Lothrop's and Mason's work at Sitio Conte (PN-5) recovered many artifacts made of animal-derived materials, describing and identifying them carefully. These researchers paid little attention, however, to bone found in non-mortuary contexts (Briggs 1989; Lothrop 1937:16). Later investigators who studied stratified middens were concerned mostly with marine mollusks; since they did not screen sediments, they made only cursory mention of vertebrate bone (e.g. Linné 1929; McGimsey 1956; Willey and McGimsey 1954). Since the 1970s the careful recovery and identification of faunal remains has become an integral component of most research projects in Panama. These efforts have been aided by the improvement and enlargement of the comparative skeleton collections housed at the Smithsonian Tropical Research Institute (STRI). Archaeofauna studies, together with paleobotanical and geomorphological investigations, have provided important information about past regional environments, human dietary preferences, and temporal changes in subsistence activities (Borgogno and Linares 1980; Carvajal 1999; Cooke 1984: 299, 1992a, 1992b; 1998c, 2001b: 52, 2005; Cooke and Ranere 1999; Cooke and Sánchez 2004c, Cooke and Ranere 1989; 1992a; 1992c, 1999; Cooke *et al.* 2007a, 1996; Hansell 1979; Jiménez 1999; Jiménez and Cooke 2001; Linares 1976b; Linares and White 1980; Ranere and Hansell 1978; Willey and McGimsey 1954; Wing 1980).

The procurement of animals in pre-Columbian Panama formed part of a mixed subsistence economy in which one can assume that, from the Late Preceramic Period onwards, tending gardens and agriculture provided the bulk of the carbohydrates and, more arguably, the largest proportion of calories in the regional diet (Table 2.2). Animals and their materials also played important roles in non-subsistence activities. Bones teeth and antlers were used for making many kinds of tools, musical instruments and ornaments (Cooke 2004a, 2004b; Lothrop 1937).

Pottery, stone, bone, ivory and other media from Gran Coclé portray animals with variable degrees of realism permitting the identification of biologically meaningful taxa with different levels of taxonomic precision (see Cooke 1984b, 1998d, 2004a). Specialists have proposed that certain animal images are related to social affiliation and organization (Cooke 2004a, 2004b; Linares 1977b), and also to cosmology and myth (Cooke 1998d; Helms 1977, 1995, 2000). This seems reasonable for two reasons. First, some modern day groups living in Costa Rica retain memories of ranked clans named after mythical animal, plants and places (Chapter 6: Footnote 5). Second, certain animal images prevail in certain regions e.g., crocodiles around Parita Bay and large felines in Gran Chiriquí (Cooke 1998d). Some animals seem to have been important both for food and on a symbolic or ritual plane. The white-tailed deer, for example, was the most commonly hunted large mammal on the Pacific watershed of Gran Coclé (Cooke and Ranere 1992; Cooke *et al.* 2007a, 2007b). But its frequent portrayal on art objects suggests it was also cognitively important (Cooke 1992b, 2004a; Helms 2000). On the other hand, some species e.g., monkeys, sea turtles, and crocodiles, appear more frequently on art objects than in the Parita Bay archaeofauna samples. This suggests that these still widespread taxa were rejected locally for food even though they may have been present on the pre-Columbian landscape (Cooke 1992b; 2004b; Cooke *et al.* 2007a).

7.2 Gran Coclé archaeofauna

The sampled archaeofauna from the Gran Coclé culture region comes from a small area—the environs of Parita Bay on the central Pacific. This area is seasonally very arid, with long dry seasons. It was occupied continually by humans since the Late Glacial Stage. Not surprisingly, the terrestrial animal species most prevalent in the sampled middens are not those usually acquainted with large forest tracts, but rather with riverine gallery woods, dry forest remnants, second growth, coastal habitats, freshwater swamps, agricultural fields and grassy tracts. The preference shown by the white-tailed deer (*Odocoileus virginianus*) for anthropogenic landscapes with dense thickets or woods alongside open areas and field is well-known (Cooke and Ranere 1992c; Piperno and Pearsall 1998). Other terrestrial animals that were frequently hunted around Parita Bay are black and green iguanas (*Ctenosaura similis* and *Iguana iguana*), opossum (*Didelphis marsupialis*), armadillo (*Dayspus novemcinctus*), cottontail rabbit (*Sylvilagus brasiliensis*), paca or tepescuintle (*Agouti paca*), and raccoon (*Procyon lotor*). Their presence in pre-Columbian middens is related, in part, to habitat availability. The Late Preceramic site of Cerro Mangote exemplifies this situation (Figure 2.2).

Like that of many other coastal sites in Parita Bay, the settlement occupation of Cerro Mangote, is linked to the geomorphologic transformations of the coast and sea level changes. Today the Cerro Mangote is 8 kilometers from the coast, but according to

John Barber's (1981) facies change model, it was first occupied around 6000 B.C., when the coast was only one to two kilometers from the active coastline. By the time the site was abandoned (ca. 4000 B.C.) the coast had prograded one kilometer (see also Cooke 1984: 299; Cooke and Ranere 1992a: Table 1, 1999). The vertebrate and invertebrate fauna samples from Cerro Mangote are consistent with Barber's model. More than half of the bird species reported in its middens are most frequent in the coastal habitats (estuaries, sandy beaches, tidal flats and coastal lagoons)—e.g., white ibis (*Eudocimus albus*), willet (*Catoptrophorus semipalmatus*), yellowlegs (*Tringa flavipes*), and whimbrel (*Numenius phaeopus*; Cooke and Ranere 1992b: 36). Even the non-aquatic bird sample includes species that frequent shoreline environments in lower Central America e.g., yellow-crowned parrot (*Amazona ochrocephala*), white-winged dove (*Zenaida asiatica*), and ruddy ground-dove (*Columbina tlapacoti*; Cooke and Ranere 1992b: 36). Additional confirmation of the importance of nearby coastal habitats for hunting is the unusual abundance of raccoon (*P. lotor*) remains in Cerro Mangote middens. This species is particularly abundant in coastal mangroves in Central America. It occurs in most other Panamanian archaeofauna, but in considerable smaller numbers (Cooke and Ranere 1992b; Cooke *et al.* 2007b). Although animals used for food were acquired locally, the presence of manatee (*Trichechus manatus*) ribs at Cerro Mangote is definite evidence for the transport of some animals from the Caribbean coast (Cooke and Ranere 1992b). At later sites, e.g. Sitio Conte and El Hatillo, ornaments carved out of manatee bone were deposited in graves (Ladd 1964; Lothrop 1937).

Some mammal species that were targeted by hunters in the lowland Neotropics have irregular or low representations in the sampled Parita Bay dietary archaeofauna, e.g., collared peccary (*Tayassu tajaçu*), agouti (*Dayprocta punctata*), and monkeys (Cebidae). Others, such as white-lipped peccary (*Tayassu pecari*), tapir (*Tapirus spp.*), sloths (Bradypodidae) and coatis are absent or have been only tentatively identified. This situation gives credence to the hypothesis that pre-Columbian communities around Parita Bay obtained most of their food in nearby habitats with a very long history of human disturbance.

Sixteenth-century Spanish chroniclers described the river valleys that emptied into Parita Bay as fertile land with extensive agricultural fields and an abundance of wild game, birds, and reptiles, as well as coastline with numerous sandy beaches, fisheries and natural salt flats.[1] They were particularly impressed by the abundance of fish and the ease with which they could be captured in large numbers. In the province of *Tabore*, off the coast of Chame Bay (Figure 3.1) Espinosa witnessed the collection of 2,000 *arrobas* (23,000 kilograms) of fish captured in less than two hours using nets, noting "the abundance was such that there appeared to be more fish than water" (Espinosa 1994a: 57). This is an interesting account considering that in Cueva language Panama means "place of abundant fish" (Cooke and Tapia: 1994b: 287).[2] Fifteen leagues (66 km) east

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[1] *De Natá hasta Guararí... la costa muy gentil y casi toda playa muy bastezada de pescado y caza infinita de cuervos y ansares y pavos que de verdad se hallaron en los Bohíos de Natá en sus despensas hasta trescientos venados en cecina antes más que menos; y la más hermosa carne de comer que nunca se vió* (Espinosa 1994a: 55).

...Toda esta tierra (es) de la provincia de París...muy bastecido de toda comida de indios y de muchos pescados así de la mar como de los ríos y mucha caza así de salvagua como de volatería y muy proveída de sal a lo menos las provincias de Cherú y Natá y París a donde hallamos las salinas las más hermosas y más aderezadas que se ha visto (Espinosa 1994a: 57–58).

[2] Pedrarias Dávila, on the other hand, describes Panama as a "fishing village on the coast of the south sea" (in Jopling 1994: 21).

of *Tabore*, while Espinosa camped at *Natá* the Indians would come in from the coast with crabs and fish in order to exchange them for maize.[3] The Spanish chronicles also describe the preservation of fish, shellfish, and game by salting, drying and smoking (Sauer 1966: 244). Driving towards the Monagrillo-type site I witnessed how families living in Boca de Parita still sun-dry fish prepared in brine tanks, a custom that still practiced by other Parita Bay coastal communities living at El Rompío and Aguadulce.[4] Salted fish is sold to inland communities living in Coclé, Herrera, and Veraguas (Cooke 2001; Cooke and Sánchez 2001: 28; Zohar and Cooke: 1997).

It is possible that these practices are ancient around Parita Bay. Archaeofauna from inland sites such as Cueva de los Ladrones (3000-1000 B.C.) and Sitio Sierra (300 B.C.-A.D. 600) indicate that their inhabitants consumed fish and shellfish from the coast (Cooke 1995: 179). Seventy percent of the fish consumed at Sitio Sierra, for example, corresponds to marine species. The top-ranked marine fish in Sitio Sierra's middens are the Pacific thread-herring, brassy grunt, and Pacific moonfish. These are all shoaling taxa that do not exceed 300 grams in weight and avoid the turbid water plumes of the estuarine mixing zone (Cooke and Ranere 1999: 116). This implies that marine fish were brought to the site from more than 15 kilometers if we consider the river meanders.

Cooke and Ranere (1999) noted certain differences in fish species abundance between the archaeofauna of Late Preceramic Cerro Mangote and those of the Early and

[3] *En este tiempo iban y venían muchos indios chorigras, con cangrejos y pescado a rescatar maíz al real de manera que andaban por las calles del real vendiendo su mercadería, y aun se ponían en la plaza a rescatarla y venderla* (Espinosa 1994a: 49).
[4] Between 1995 and 1996 Irit Zohar (Tel Aviv University) directed a middle range study on the impact of fish preservation through salting and drying, and butchering methods practiced by modern fishing families living in Boca de Parita, Aguadulce, and El Rompío (see Zohar and Cooke 1997).

Middle Ceramic. They inferred that fishing strategies changed sometime between these periods, shifting from an emphasis on large individuals of fish such as catfish, snook and toadfish, which were caught in littoral marine habitats, to a preference for small shoaling species whose capture would have required gill-nets and watercraft (Cooke 1992a: 2; Cooke and Ranere 1999). Considering the 12-kilometer distance that separates Sitio Sierra from the coast, Cooke and Ranere (1999) proposed that specialized fishing villages were most likely responsible for supplying this and other inland settlements with dried fish. The best candidates for such a role are the Vampiros-1and 2 (AG-145) shelters and AG-125 located at the mouth of the Santa María River along which Sitio Sierra is situated (Cooke *et al.* 2007a: Figure 2). Recent research indicates that these shelters would have been located right on the coast between 200 B.C. and A.D. 250, the period during which most of the fish remains were deposited there (Carvajal and Cooke 2007). The earliest structures and refuse dumps at Sitio Sierra belong to the same period.

Sixteenth-century Spanish chroniclers witnessed the exchange of smoked and salted fish and shellfish between and within the different chiefdoms (see for example Oviedo 1944, VIII: 21 in Chapter 3: Footnote 11). In Chapter 3, I mentioned that the inland chiefs *Comogre* and *Pocorosa* were known for controlling fishing along the Caribbean coast and supplying their villages with fish[5] (see also Cooke and Sánchez 2001: 21, 28; Helms 1979: 43; Sauer 1966: 244). Throughout the isthmus people seem to

[5] *...entrando la tierra adentro hasta doce leguas, está un cacique que se dice Comogre y, otro que se dice Pocorosa, están tan cerca de la mar el uno como el otro; tienen mucha guerra con los otros, en toda la tierra tiene cada uno dellos un pueblo y dos a la costa de este mar, de donde se mantienen de pescado la tierra dentro* (Balboa 1994: 24).

have focused on fish for its abundance and because it required less work than hunting wild game which were also consumed, but in smaller amounts (Oviedo 1944, VIII: 16).

7.3 La Villa Valley archaeofauna: Preliminary comments

Prior to the PARLV research, the Cerro Juan Díaz Project (CJDP) excavations provided large and taxonomically diverse samples of invertebrate and vertebrate fauna (Carvajal 1998; Cooke 2004a, 2004b; Cooke and Jiménez 2004; Jiménez, 1999; Jiménez and Cooke 2001, Cooke *et al.* 2007a, 2007b). These samples were recovered in kitchen middens, on the floors of structures, and in funerary features. Many materials found in graves had been fashioned into tools and ornaments (Cooke 1998, 2004a, 2004b).

During the CJDP excavations, faunal materials were recovered in the field over a 0.125 inch flat wire mesh. In addition, column samples were taken in selected features for sieving with water over finer screens. The taxonomic and quantitative analyses of these materials has not been completed. Analyses of all vertebrate categories found in samples taken from five midden contexts over a 0.125 inch screen indicates that fish are the prevalent vertebrate class when number of identified specimens (NISP) and minimum numbers of individuals (MNI) are used as proxies for abundance (Cooke *et al.* 2007a: Table 3; Jiménez 1999). Analysis of the one sub-sample of vertebrate remains recovered with water over a 1.5 mm mesh demonstrate that many very small fish were taken (<100g body mass). Their dietary input was considerable, and must be factored in to the final assessment of animal food procurement at this site (Jiménez 1999). When MNI's are converted to estimated body masses, the predominance of fish diminishes. Obviously, the average body mass of fish is considerably less that that of the most frequently taken mammal (white-tailed deer). An adult deer, for example, can provide over 25 kilograms of meat. Even so, it is reasonable to infer that the procurement of marine fish provided meat and fat on a more regular basis than did the hunting of terrestrial vertebrates (Jiménez and Cooke 2001: 8).

7.3.1 Fish

Currently analyzed data from the CJDP excavations indicate that the inhabitants of Cerro Juan Díaz (LS-3) focused fishing activities on marine species that frequent two biotopes: (1) the middle estuary (Day *et al.* 1999), i.e., intertidal mudflats, mangrove channels and tidal sections of rivers where the water column is usually turbid, and (2) clear water near rocks, and over sand and sand-and-rubble bottoms. An underwater survey of the substrates around Isla Villa, a rocky islet located 10 km east of the La Villa river mouth, has not been undertaken (Figure 7.1). It is possible, however, that there are remnant patches of coral reefs here. This islet may have been the favored habitat of green jack (*Caranx caballus*), Spanish mackerel (*Scomberomorus sierra*) and hound needlefish (*Tylosurus cocodrilus*).

Ranked in order of preference the middle estuary group of fish species comprises two sea catfish (Ariidae)—Seemann's sea catfish (*Ariopsis seemanni*) and congo sea catfish (*Cathorops fuerthii*)—,the Pacific bumper (*Chloroscombrus orqueta*), threadfins (*Polydactylus spp.*), spotted puffer (*Guentheridia formosa*), point-nosed croaker (*Ophioscion typicus*), and white-fin weakfish (*Cynoscion albus*; Jiménez and Cooke

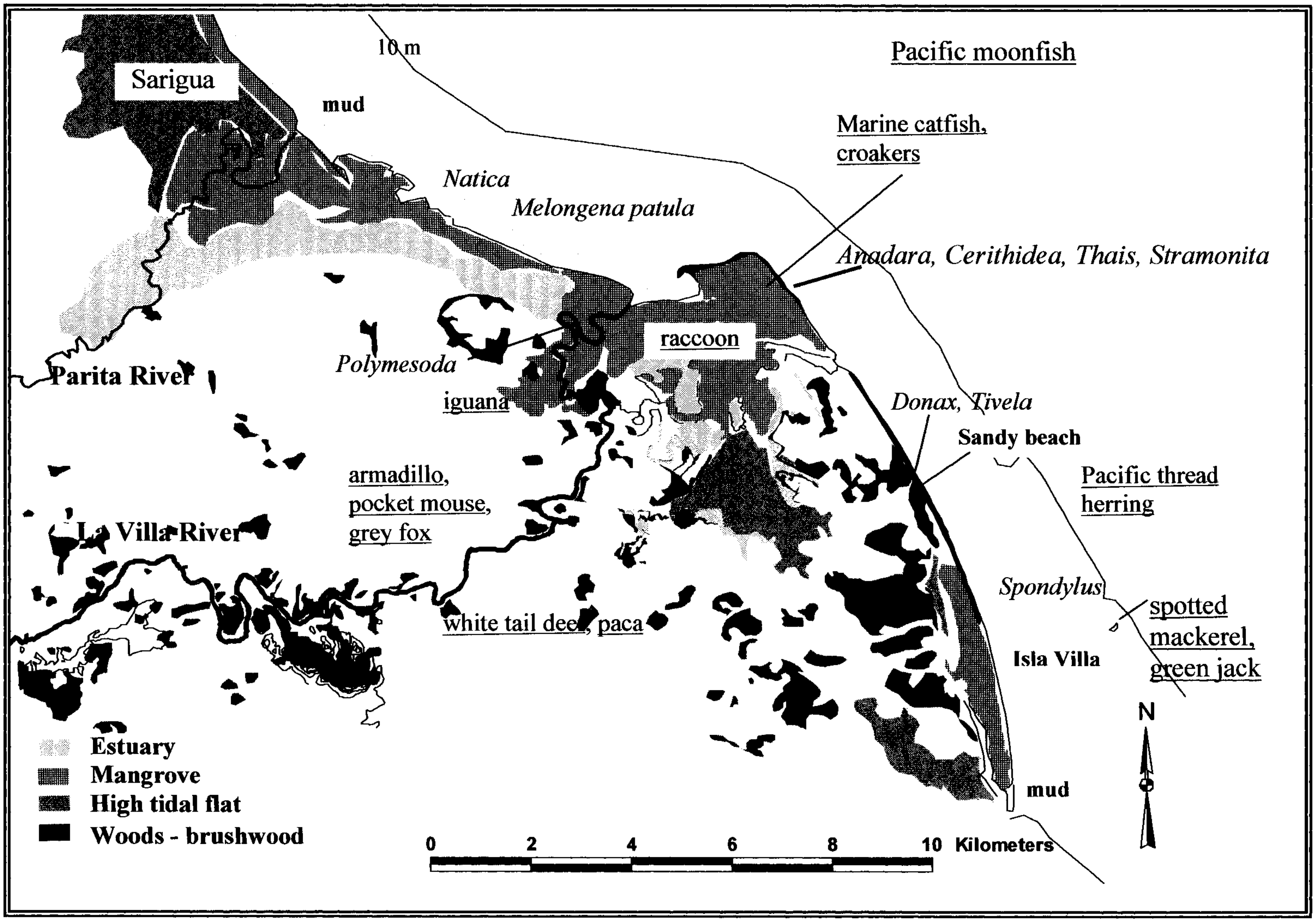

Figure 7.1 Biotopes exploited by the pre-Columbian inhabitants of the lower River La Villa

2001: 9). The commonest species in the second "clear water" group are: Pacific moonfish (*Selene peruviana*), Pacific thread-herring (*Opisthonema libertate*), Panamanian grunt (*Pomadasys panamensis*), brassy grunt (*Orthopristis chalceus*), spotted mackerel (*Scomberomorus sierra*), and chili sea catfish (*Notarius troschelii;* Jiménez and Cooke 2001: 14). The last species occasionally enters the turbid estuary, especially in pre-adult stages.

Another salient feature of the CJDP ichthyofauna is the low yields of fresh water species. The remains of one freshwater eel (*Sternopygus dariensis*) was found in a unit dating between A.D. 300–700. On the other hand, five freshwater species were recorded in a unit dating between A.D. 1000–1300 (Jiménez and Cooke 2001: 9–10). As Jiménez and Cooke (2001) note, this slight increase in the number of freshwater fish identified in the most recent units is consistent with seaward progradation of Parita Bay shoreline. The pre-Columbian inhabitants of this village did not venture up-river to fish.

The CJPD also recovered important information on shellfish consumption and its procurement for the specialized production of costume jewelry and tools, for which I will provide more details in the following sections.

7.3.2 Terrestrial vertebrates

The terrestrial vertebrate sample recovered by the CJDP includes anurans: (frogs and toads), reptiles (marine and freshwater turtles, snakes, lizards and crocodiles), birds, and mammals. Two frog species are present: the giant toad (*Bufo marinus*) and thin-toed frog (*Leptodactylus insularum*); three snake taxa (Colubridae, *Boa constrictor*, Viperidae); four species of lizard (*Ameiva* spp., green iguana and black iguana (*Iguana iguana*, *Ctenosaura similis*), and basilisk lizard (*Basiliscus basiliscus*); two crocodiles: the American crocodile (*Crocodylus acutus*) and Cayman (*Caiman cocodrilus*); sea turtles (Cheloniidae), including black or green turtle (*Chelonia*) and two freshwater turtles: the mud turtle (*Kinosternon scorpioides*) and pond slider (*Trachemys scripta*); 91 species of birds; and 27 species of mammals (Cooke *et al.* 2007a: Table 1).

The most common mammals identified in the CJPD archaeofauna are by rank order of abundance: white-tailed deer, opossum, paca or tepescuintle, cottontail rabbit, and nine-banded armadillo. The high rank of the opossum may be related to its commensal behavior. Cooke (personal communication 2007) points out the body part distribution of this ubiquitous and omnivorous mammal suggests it may have been killed as vermin rather than used for food.

The low frequency of agouti and collared peccary is consistent with the pattern observed at other Parita Bay sites suggesting that these species were rare in the region. Squirrels (*Sciurus*) are the only obligate arboreal mammals in the CJDP samples. As I pointed out in the introduction to this chapter, monkey bones are not present in *middens*; neither are sloth bones. It is possible that these taxa were rejected for food given the fact that today sloths, white-faced capuchins (*Cebus capucinus*) and howler monkeys (*Alouatta* spp.) are present in remnant forest patches on the Azuero Peninsula (Cooke *et al.* 2007a). The absence of tapir, brocket deer (*Mazama* spp.) and white-lipped peccary suggests that mature forests were not subject to hunting visits. The absence of coati remains in a very large mammal bone sample taken over the entire excavation area is another salient aspect. Coatis were widely used by the Maya for food in well-inhabited areas such as Cozumel Island (Hamblin 1984). Determining the degree to which these distributions were conditioned by historical ecology (i.e., the antiquity and extent of human disturbance), dietary preferences, intra- and inter-community aggression, weaponry, social rank and ritual is, of course, a difficult task in an area where no bone accumulations resulting from non-human activities have been recorded (Cooke *et al.* 2007a).

Dog remains are more frequent at Cerro Juan Díaz than at other Parita Bay sites except Sitio Conte. Remains found in middens consist mostly of broken teeth (often perforated) and paw bones (metapodials, podials, and phalanges). In the sample of perforated animal teeth found in Cerro Juan Díaz (LS-3) graves, dog teeth are second in abundance to puma canines (Cooke *et al.* 2007a: Table 5). Some dog tooth necklaces at Sitio Conte are made of hundreds of perforated canines, premolars, and incisors (Briggs 1989; Lothrop 1937). This pattern suggests that domestic dog were not consumed for food unlike in Mesoamerica and the Caribbean (Hamblin 1984: 100–121; White *et. al.* 2004). If dogs were not a dietary resource they were probably used for hunting. Cooke and Ranere (1989, 1992b) have argued that hunting with dogs is likely to have impacted local mammal faunas differentially; the agouti, for example, is more susceptible to hunting with dogs than the paca or tepescuintle. Dogs are also useful for tracking down pumas and jaguars and keeping them at bay.

Both species of iguanas were used for food at LS-3 in considerable numbers. In all sampled excavation units, the green iguana outnumbers the black species, a situation that suggests that riverine forests were the focus of hunting activity. In one excavation unit, however (Operation 31), the black iguana is twice as frequent as the green (Cooke *et al.* 2007a). More than 5000 iguana bones were found in this unit. Although the biometric analysis of these iguanid materials has not been completed, Cooke (personal communication 2007) points out that the small size of the individuals represented suggests that iguanas were perhaps kept in cages for fattening in this part of the site. Farming iguanas has recently become popular in Panama and Costa Rica.

Second in abundance in the reptile sample are two freshwater turtles—the scorpion mud turtle and pond slider. The former species is found in many aquatic habitats. It buries into the wet mud during the dry season and can be captured by using sticks to locate the carapaces. The pond slider is also widespread in freshwater habitats. Both species were widely used for food at other Parita Bay sites.

Crocodilian bones and teeth in middens are scarce, and were not an important food source. A few perforated teeth were recovered in graves. Both the American crocodile and cayman are present.

Sea turtle remains are also infrequent consisting mostly of carapace fragments, which appear to represent very few individuals. This pattern is typical of other Parita Bay archaeofauna.

7.3.3 Birds

The CJDP bird sample includes over 90 species. Many of these are today characteristic of lowland savannas with scant or patchy arboreal vegetation near coastal habitats (Cooke *et al.* 2007a). But there are some notable contrasts to modern avian distribution. The macaw (*Ara*), for example, is the commonest bird genus at the site, over 100 elements having been found. Macaws are no longer present in the lowland wooded savannas of Panama although scarlet macaws (*Ara macao*)—a species definitely present at LS-3—survive on protected Coiba Island (Figure 1.1) while few scarlet and great green macaws (*Ara ambigua*) remain in forested habitats in the south-west Azuero Peninsula (Gwynne and Ridgely 1993). The crimson-fronted parakeet (*Aratinga finschi*), blue-footed booby (*Sula nebouxi*), great curassow (*Crax rubra*) and crested guan (*Penelope purpurascens*) are not present today in the vicinity of LS-3. The great curassow and crested guan are species sensitive to human hunting and forest fragmentation (Cooke *et al.* 2007a). It is possible that these species were obtained from beyond Parita's chiefdom. It is also possible that crested guan were kept in cages to be fattened before slaughter since several guan bones are from young individuals (Cooke *et al.* 2007a). The "pheasants" (*faisanes*) seen by Espinosa's troops at *Natá* were probably guans or *chacalacas*, which are still called "*paisanas*" locally (Cooke *et al.* 2007a).

Boobies are rarely seen near the coast when not nesting. Recently, however, Olson (1997: 71) reports a single sighting of the blue-footed booby nesting at Isla Villa (Figure 7.1). The long bones of these and other coastal species, including the magnificent frigate-bird (*Fregata magnificens*), were cut and polished at LS-3 to make tubular ornaments for aprons and gorgets. Osprey claws (*Pandion haliaetus*) were deposited in graves (Cooke 2004b: Figure 8c; Cooke *et al.* 2007a). This suggests that aquatic, diving birds had a special value probably because of their fishing habits (Cooke *et al.* 2007a). A blue-footed booby cranium and beak were reported by Tomas Mendizábal (2004: 149) in a grave at Panama La Vieja. Macaws, parrots, and parakeet were most likely kept as pets, for ritual and ceremonies, or for their brightly-colored feathers (Cooke 1984b, 2004a; Cooke *et al.* 2007a).

7.4 PARLV archaeofauna

The PARLV recovered invertebrate and vertebrate remains at several sites, in some cases in large quantities. The ancestors of *Parita,* like many other communities located along Parita Bay, took advantage of the accessibility of animal protein within their site catchments focusing particularly on the productivity of inshore coastal habitats and adjacent wooded savannas. This assertion is based on the large variety of marine shell taxa and the terrestrial and marine vertebrates identified in middens of different sizes and in different geographic settings along the lower La Villa River. It is also evident that each site on the margins of the La Villa had stations where people processed and discarded large amounts of animal waste (Figure 7.2–7.3). Abandoned dwelling areas, such as one tested with magnetic and resistivity surveys at the base of Cerro Juan Díaz, were covered with refuse deposits including shell, giving the appearance of a "shell mound."

The following analysis is based on identifications of the molluskan fauna performed by Diana Carvajal (Appendix 7) and the vertebrate fauna studied by Máximo Jiménez and Richard Cooke using the comparative skeleton collection housed at STRI in Panama (Appendix 8). The identifications were assigned, when possible, to the most

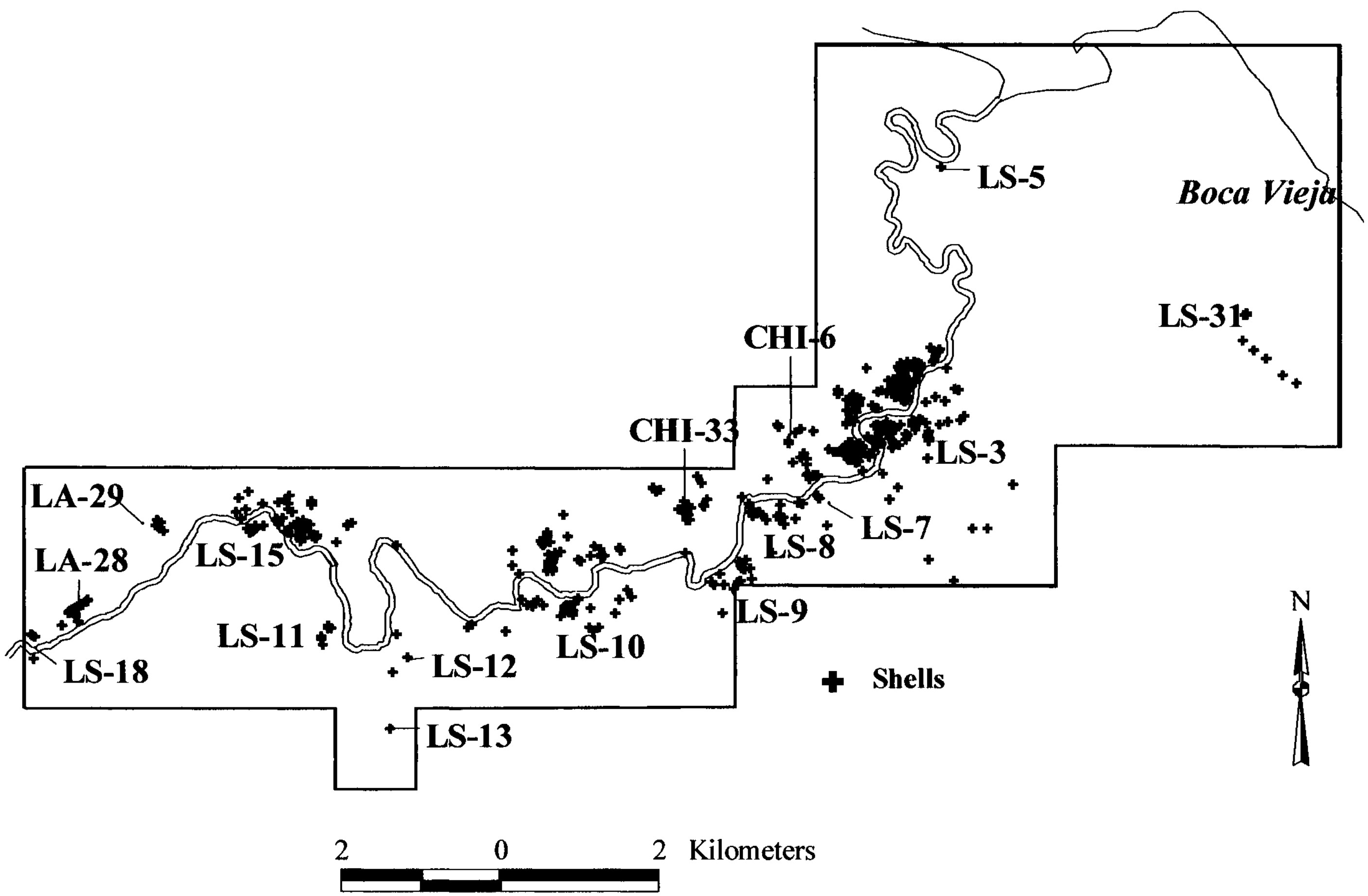

Figure 7.2 Distribution of the PARLV invertebrate archaeofauna

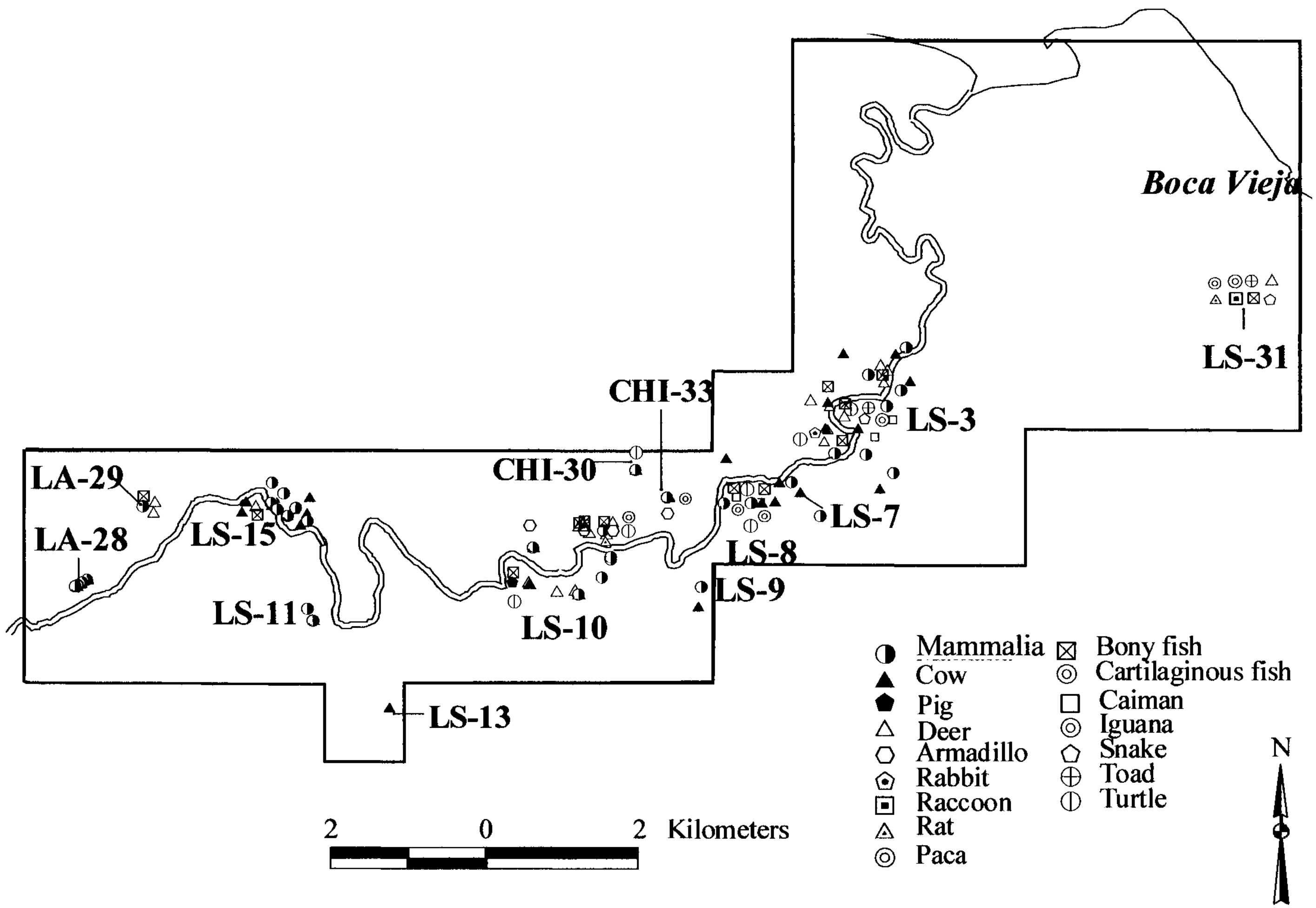

Figure 7.3 Distribution of the PARLV vertebrate archaeofauna

precise category in the taxonomic scale: class, family, genus, subgenus (only for mollusks), and species.

Attempting to identify fish bones to species is particularly important for some of the most important fish families in the Parita Bay archaeofauna—e.g., the marine catfish (Ariidae), croakers (Sciaenidae), and grunts (Haemulidae)—because, even if the large majority of species in each family lives inshore, their habitat preferences, feeding practices, and age-group behavior vary significantly at the species level (for a thorough discussion of the matter see Cooke and Jiménez 2004). By understanding each species' natural behavior and the relationship with other we can reconstruct the regional environment, the dietary preferences of *Parita's* ancestors, the distance these resources traveled, and the methods used to procure animals for food and materials (Cooke 1992a, 2001b; Cooke and Jiménez 2004; Cooke and Ranere 1999; Cooke and Tapia 1994a, 1994b).

To measure the relative abundance of the different animal remains collected by the PARLV, four units of comparison were taken into consideration:

(1) **ubiquity** or the number of collection stations from which each taxon was recovered.

(2) **number of identified (diagnostic) specimens** or NISP, that is the total number of skeletal body parts in the case of vertebrates, and total number of whole and partially complete valves and gastropod bodies.

(3) **minimum number of individual** (MNI) of each species present in the sample.

(4) **biomass** or sum of the inferred live weight of all the individuals in each taxon.

The biomass estimate for the vertebrates is based on the size of reference specimens present at STRI's comparative skeletal collection. The mollusk biomass, on the other hand, was calculated using the total weight of counted and uncounted shells for each taxon. Each method provides useful information, but at the expense of ignoring valuable data from the other. Ubiquity, for example is most useful for determining the popularity and spatial distribution of different species in the sample. The NISP and MNI, on the other hand, are most useful in defining the relative importance of different animals. The biomass helps measure the mass of edible meat from different species. By combining all four methods one can better understand the contribution of each species to the diet or other aspects of pre-Columbian social life—including crafts, trade, and ritual. I should warn the reader that this should be considered a preliminary assessment since a more detailed evaluation was not possible due to the limited funds for analysis.

7.3.2 Mollusks

In Appendix 9, I present a list of the different shell specimens collected during the survey of the lower La Villa valley and their site-by-site distribution. Not all the shells were quantified and weighed. I base this analysis on a sample of material collected at 320 surface stations most of them located on the Herrera banks of 12 of the PARLV sites (Appendix 2: Tables XII–XXII). This represents 63% of the total stations containing shells. I also include shell samples from nine excavation units opened at LS-3, LS-10, LS-31, and CHI-33 (Appendix 2: Tables I–IX), and two shovel test pits opened at LS-10 and CHI-30 (Appendix 2 Tables: X–XI). For the shell identifications, Carvajal used

Keen's (1971) "Sea shells of Tropical West America" catalog and modern reference samples housed at the Center of Paleoecology and Archaeology, STRI.

The shell sample from surface collections stations and excavation units includes 83,374 individual shell specimens (NISP), weighing a total of 252.35 kilograms. According to Carvajal, 36 shell families are represented, comprising 27 genera, 19 species of pelecypods, 22 genera and 26 species of gastropods. In addition, Carvajal quantified 31 *Pulmonata* land snails, 17 barnacles (Cirripedia) marine crustaceans and a few fragments of coral (Appendix 7). Ninety-one percent of the sample comes from the excavation units, while the remaining nine percent was from the surface collection (see Appendix 2 for individual quantitative summaries of PARLV Molluskan fauna per site and excavation unit).

7.4.1.1 Natural habitat

The ancestors of *Parita* seem to have focused shell procurement on three main biotopes: (1) coastal areas subject to tidal action; (2) the mangrove swamp; and to a lesser extent (3) the hard rocky substrata and coral reef areas (Figure 7.1). The first biotope includes four principal habitats: (1) sandy beaches; (2) intertidal mudflats; (3) the middle low tidal zone with soft substrates of mud or sand; and (4) the lower intertidal zone with firm substrates.

The dominant **sandy beach** shells are *Tivela* sp., *T. argentina*, and several species of *Donax* clams (*D. asper, D. carinatus, D. dentifer, D. ecuadorianus, D. panamensis).* Clams of the genera *Tivela* and *Donax* represent 64% and 7% NISP respectively of the total sample (Table 7.1). *Tivela* clams, for example (Figure 7.4a), are naturally found in high-energy substrates where the waves break (Appendix 7). *Donax* clams (Figure 7.4b) are also found on sandy beaches and in bays where their shallow burrows are constantly washed out by the heavy waves (Keen 1971: 234). They reach smaller sizes than *Tivela* clams. The other three sandy beach taxa that are present in the sample are *Cardites laticostata, Cassis (Semicassis) centiquadrata* and *Conus (Pyroconus) patricius*, but very few specimens were documented. Several species of cone shells, including *Conus patricius*, were quite frequently used at Cerro Juan Díaz to make personal ornaments (Cooke personal communication 2007).

The **intertidal mud group** follows in importance, comprising 10% of the total mollusk sample with 16 genera and 16 species. The sample is dominated by clams of the genus *Polymesoda* (5%), which frequent muddy substrates in the shallow oligohaline sections of tidal rivers. They also occur in completely fresh water. The species *P. boliviana* is definitely present (Table 7.1). Second in abundance (3%) is a gastropod (*Cerithidea valida*) which lives in brackish mud or entirely out of the water on reeds and twigs. Other well represented intertidal mud taxa are the *Tellina* and *Mactrellona* (bivalves), and *Polinices* and *Malea* gastropods (Table 7.1). The least represented specimens from the group are *Tagelus, Fasciolaria, Mytella, Olivella, Terebra robusta, Carditamera radiata, Solen,* and *Prunum* all of which are found in mudflats (Appendix 7). Perforated *Terebra robusta, Olivella* and *Prunum* shells were recovered in funerary features excavated by the CJDP.

Table 7.1
Most common mollusks in the PARLV sample
Includes both surface and excavation samples

Genus and species	Ubiquity	NISP	%	Biomass
SANDY BEACH				
Cassis (Semicassis) centiquadrata	6	70	0.08%	100
Donax dentifer	13	303	0.4%	341.5
Donax	34	5,596	7%	2,521
Donax panamensis	28	6,985	8%	4,264
Tivela	50	27,053	32%	16,863
Tivela (Tivela) argentina	59	26,723	32%	35,906
INTERTIDAL MUD				
Cerithidea	7	522	0.6%	193
Cerithidea valida	24	2,354	3%	2,215
Mactrellona	6	32	0.04%	58.9
Malea ringens	9	26	0.03%	111
Mytella	3	312	0.4%	39.4
Olivella (Lamprodoma) volutella	9	29	0.03%	64.1
Polinices	12	40	0.05%	83.3
Polinices (Polinices) panamaensis	22	65	0.08%	490
Polinices (Polinices) uber	12	29	0.03%	202
Polymesoda	65	1,881	2%	1,499
Polymesoda (Neocyrena) boliviana	73	2,393	3%	4,864
Tagelus	11	28	0.03%	19.8
Tellina	14	557	0.7%	328
LOW INTERTIDAL ZONE				
Anadara (Larkinia) grandis	122	320	0.4%	17,664
Dosinia	51	1,227	1.5%	2,004
Dosinia dunkeri	34	571	0.7%	2,100
Iphigenia altior	56	916	1%	3,194
Natica	35	713	0.8%	569
Natica (Natica) unifasciata	75	2,045	2%	5,120
MANGROVE				
Anadara	163	114	0.1%	5,426
Anadara (Anadara) tuberculosa	35	132	0.2%	752.6
Iliochione subrugosa	21	67	0.08%	188.7
Melongena patula	58	155	0.2%	20,644
Stramonita biserialis	10	91	0.1%	262
Tellina (Eurytellina) laceridens	8	204	0.2%	458
Thais (Thaisella) kiosquiformis	21	399	0.5%	546
FIRM INTERTIDAL SUBSTRATES				
Pitar (Lamelliconcha) paytensis	16	37	0.04%	117
Protothaca	40	505	0.6%	712
Protothaca (Leukoma) asperrima	15	162	0.2%	489

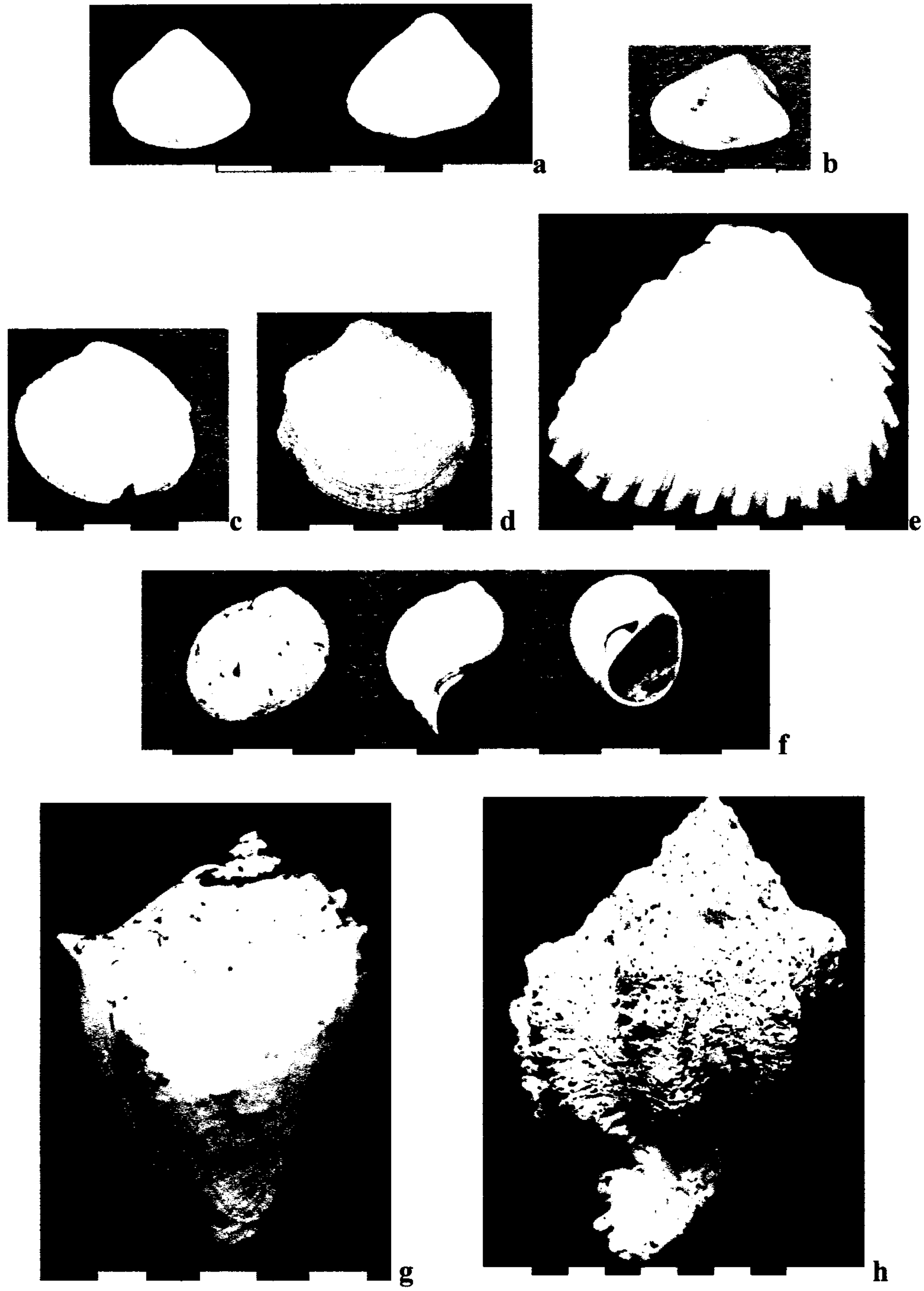

Figure 7.4 Shells from the PARLV collection.
Shells from sandy beaches: (a) *Tivela argentina* (b) *Donax* sp.
Shells from firm intertidal substrates; (c) *Protothaca* sp.;
Shells from the low intertidal zone found in mud or sand; (d) *Iliochione* sp.; (e) *Anadara grandis;* (f) *Natica unifasciata*; (g) *Melongena patula*;
Shells from offshore (h) *Hexaplex brassica.*

The **low intertidal zone group** comprises 7% of the total sample with 8 genera and 10 species (Table 7.1). The dominant taxa are two clams: *Dosinia dunkeri* (0.7%) and *Iphigenia altior* (1%), and a snail: the *Natica unifasciata* (2%; Figure 7.4f). All three species live on either sandy beaches or intertidal mud flats. *Dosinia dunkeri* can also be found offshore to depths of 55 meters, *I. altior* to depths of 11 meters (Keen: 1971: 178, 239) although it is unlikely that they were collected in water this deep.

The next most commonly registered species in the low intertidal zone group are *Anadara (Larkinia) grandis* (0.4%) and *Melongena patula* (0.2%). *Anadara grandis* (Figure 7.4e), the largest of the Panamic Province[6] ark shells, lives in mudflat or on sandbars at the outer edge of the tidal range. On the other hand, *Melongena patula* (Figure 7.4g), a large gastropod, is found in sand and mud substrates. Other species of ark shell represented in the PARLV sample are *A. similis, A. multicostata,* and *A. perlabiata,* which are found in sandbars at extreme low tide or dredged in shallow waters. The least represented taxa from this group are *Iliochione* sp. and *Cardita* sp.

The last group from the coastal biotope comprises shells found in **firm intertidal substrates,** represented by the Venus shells *Pitar (Lamelliconcha) paytensis* and *Protothaca (Leukoma) asperrima*. Together they comprise less than 1% of the NISP (Table 7.1).

The **mangrove swamp sample** represents 1% NISP, with 6 genera and 5 species identified. The most frequent species are two gastropods: *Thais (Thaisella) kiosquiformis*

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[6] A biotic province that extends from the Magdalena Bay (25°N) in Baja California, México to Punta Aguja (6°S), Peru. The seaward extension includes the Galapagos archipelago and neighboring offshore islands (Keen 1971: 4; Skoglund 2001: 1)

(0.5%), and *Stramonita biserialis* (0.1%), and a clam *Anadara tuberculosa* (0.2%; Table 7.1). *Anadara tuberculosa* is found in mangrove swamps preferentially at the base of red mangrove (*Rhizophora*) roots (Appendix 7). *Stramonita biserialis* is generally found attached to rocks and *T. kiosquiformis* to oysters or in muddy areas attached to rocks. Less frequent mangrove swamp taxa are *Littorina, Ostrea palmula,* and *Olivella,* which live attached either to mangrove roots or to rocks.

Pre-Columbian people collected shells at different stages of their growth, although medium-sized individuals were preferred. Carvajal notes that occasional occurrence of small individuals of species such as the *Mactrellona exoleta, Iliochione subrugosa*, *Tagelus (Tagelus) dombeii,* and *Tellina (Eurytellina) laceridens* shells could reflect accidental collection due to their habitat association with targeted shell specimens, such as the *Anadara* sp., and *Melongena patula.* Some of the shell species also play specific roles in molluskan trophic ecology (Carvajal 1998). *Natica*, for example, is a carnivorous snail that uses smell for locating its prey, generally venerid clams (*Iliochione, Dosinia, Megapitaria,* and *Tivela*), the genus *Donax* and *Tellina.* Other predatory snails in the PARLV collection are the *Polinices, Stramonita,* and *Thais*, which poison their bivalve victims before eating them (Claasen 1998: 37). *Littorina* snail feeds off algae, while the large *Melongena patula* feeds on shells of the genus *Tagelus* also known as the "jackknife clams." *Conus* and *Olivella* paralyze clamshells of the genus *Iliochione, Tagelus,* and *Tellina* (Carvajal 1998).

The excavations at Cerro Juan Díaz documented the use and manufacture of small personal adornments made out of several marine shell species. The genera most frequently used for ornaments found in sampled grave units belonging to the La Mula, Cubitá and Early Conte phase, are thorny oysters (*Spondylus*) and pearly *Pinctada* oysters (Carvajal 1998; Mayo 2004, Mayo and Cooke 2004a; Sánchez 1995; Sánchez and Cooke 1998). On the other hand, the large marine gastropod, *Strombus galeatus,* is the species that produced the majority of manufacturing debris and broken ornaments in a circular feature deposited during the Cubitá phase, which was described by Julia Mayo (2004; see also Mayo and Cooke 2004a). Thorny oysters are naturally found attached to **rocky substrata or coral** in moderate deep waters. Pearl oysters are also found on firm substrates, but occur in inter-tidal as well as sub-tidal zones. Fragments of these species were very scarce in the PARLV surface collections and excavation units. Cooke (1998c) proposed that *Spondylus* shells, which eschew estuarine waters, were probably obtained from coral reefs located at distances in excess of 50 kilometers from Cerro Juan Díaz, such as Isla Iguana at the southern tip of the Azuero Peninsula or on the Pearl Islands where Linné (1929) perceptively noted that *Spondylus* and *Pinctada* shells were absent from midden debris. Recently, however, Carvajal noted the presence of relict populations of *Spondylus calcifer* on Isla Villa (see also Cooke and Sánchez 2001: 33–34; Cooke *et al.* 2003a: 153). In view of post-Holocene transformations and rate of sedimentation at the mouth of the La Villa, it is possible, as Cooke and Sánchez (2001: 34) proposed, that during the Middle Ceramic period the waters surrounding this rocky islet were clear of suspended sediments making it an ideal place for the thorny and pearly oysters to live. If this was the case, the fisher folk and divers that collected these shells did not have to go far from the coast to obtain these species or the other shellfish that require clear water columns (e.g., *Jenneria pustulata*). All the other shell species identified by Carvajal can still be found on the sandy beaches and mudflats near Monagre and El Rompio and the mangrove swamps between Boca Vieja and the River Parita (Carvajal 1998: see also Mayo 2004).

7.3.2.2 Procurement methods

Using ethnographic analogy and personal observations, Carvajal (1998) proposed that the pre-Columbian inhabitants of Cerro Juan Díaz or site LS-3 would have used several methods of shell collection. She proposes that intertidal shells naturally found in shallow sand and mud were most likely collected using expedient digging tools, made of perishable material—e.g., wood—requiring little effort to make. Specimens of the genus *Donax, Tivela, Iliochione,* and *Tagelus* can be extracted using a digging tool. A stronger tool—e.g., chisel—is necessary to detach specimens of the genus *Littorina, A. tuberculosa, Cerithidea, Stramonita,* and *Thais* from the mangrove roots (Carvajal 1998: 64). The collection of these and other estuarine species typical of tidal estuaries and rivers—*Iphigenia, Mytella,* and *Polymesoda*—was presumably carried out during the ebb tide.

Carvajal also proposes that the variation and/or standardization of shell sizes sheds light on the procurement methods. She argues that low variability of shell size points to hand collection, which selects for individuals of similar sizes. Greater heterogeneity of sizes, on the other hand, suggests unselective collection using digging tools or baskets particularly in areas where there is low visibility such as in mud and sand

(Carvajal 1998: 65–66). The latter situation seems to apply to the PARLV samples since they exhibit considerable size variation (Carvajal personal communication 2003).

Many ethnographic accounts describe shellfishing as a task performed primarily by women and children (e.g., Claassen 1998: 223; Moss 1993: 632). This could have been the case for many of the species collected in the intertidal zone or mangroves. The procurement of large numbers of spiny and pearly oysters, however, would have required the skill of divers in order to extract them from the deep coralline substrata where they live. According to Peter Martyr d'Anghera (1912, I: 299) divers in the Bay of Panama were trained from infancy to gather shellfish and pearls (see Helms 1979: 15). If we are correct in interpreting mortuary offerings as signs of an individual's identity based on gender, age and occupation, this fact may help explain why pre-Columbian interments of women, children or sub-adult males are often accompanied with elaborate shell ornaments—e.g., Features 16 and 94 from Cerro Juan Díaz (Figure 4.6d; Cooke and Sánchez 1998: Figure 5d-h, 6a, c-d). In Mesoamerica, these associations have been interpreted as symbolic of life, water, and fertility (Andrews IV 1969; Fearer Safer and McLaughlin Gill 1982; Novella 1995; cited by Isaza 2004; Isaza and McAnany 1999).

7.4.1.3 Geographic distribution and the social uses of shells

The most frequently recorded marine shell genus in the La Villa valley is *Anadara* sp. and the most frequent species in this genus *Anadara grandis* (Figure 7.4e). *Anadara* was present in 163 of the collection stations from 15 sites, while *A. grandis* was found in 122 collection stations from 13 sites (Table 7.1). The second most frequent species is *Natica unifasciata* (75 collections, 9 sites), followed in order of abundance by *Polymesoda boliviana* (73 stations, 10 sites), *Tivela argentina* (59 station, 9 sites), and *Iphigenia altior* (56 stations, 11 sites). The last four are smaller taxa used primarily for food (Carvajal 1998; Mayo 2004: 64). A few *Tivela* and *Iphigenia altior* clams from our sample had their inferior margins polished. Carvajal suggests that this could be a result of these shells' being used for polishing the surface of ceramic vessels (Carvajal personal communication 2003). Large *Melongena patula* conchs were also common particularly in type1 sites and Site LS-29.

Anadara materials were found in association with cultural materials from all periods, being particularly abundant in association with the Late Ceramic period pottery. *Anadara grandis* and *Melongena patula* were present in a wider variety of settings than those of *Tivela* and *Polymesoda* clams, which predominate in midden features. This is very interesting, considering that *Anadara* and *Melongena* provide more edible mass of meat than the popular sandy beach clams. I propose therefore that they were procured for non-dietary functions, e.g., the crafting of tools and ornaments. Throughout the valley and at several stations, particularly from sites LS-3, LS-10, and LS-31 we found complete and partially complete *Anadara* and *Melongena* shells, some of which showed evidence of being worked (Figure 7.5). We also collected prepared shell fragments and a few pre-forms of what Mayo (2004) labeled as "counterfeit-teeth pendants" made from the ventral margin valves of adult *Anadara grandis* shells (Figure 7.5a), as well as whole *Anadara* valves which were presumably used as hammers (Figure 7.5b). A Cubitá phase burial at Cerro Juan Díaz contained several such counterfeit teeth made of *Anadara* (Feature 41,

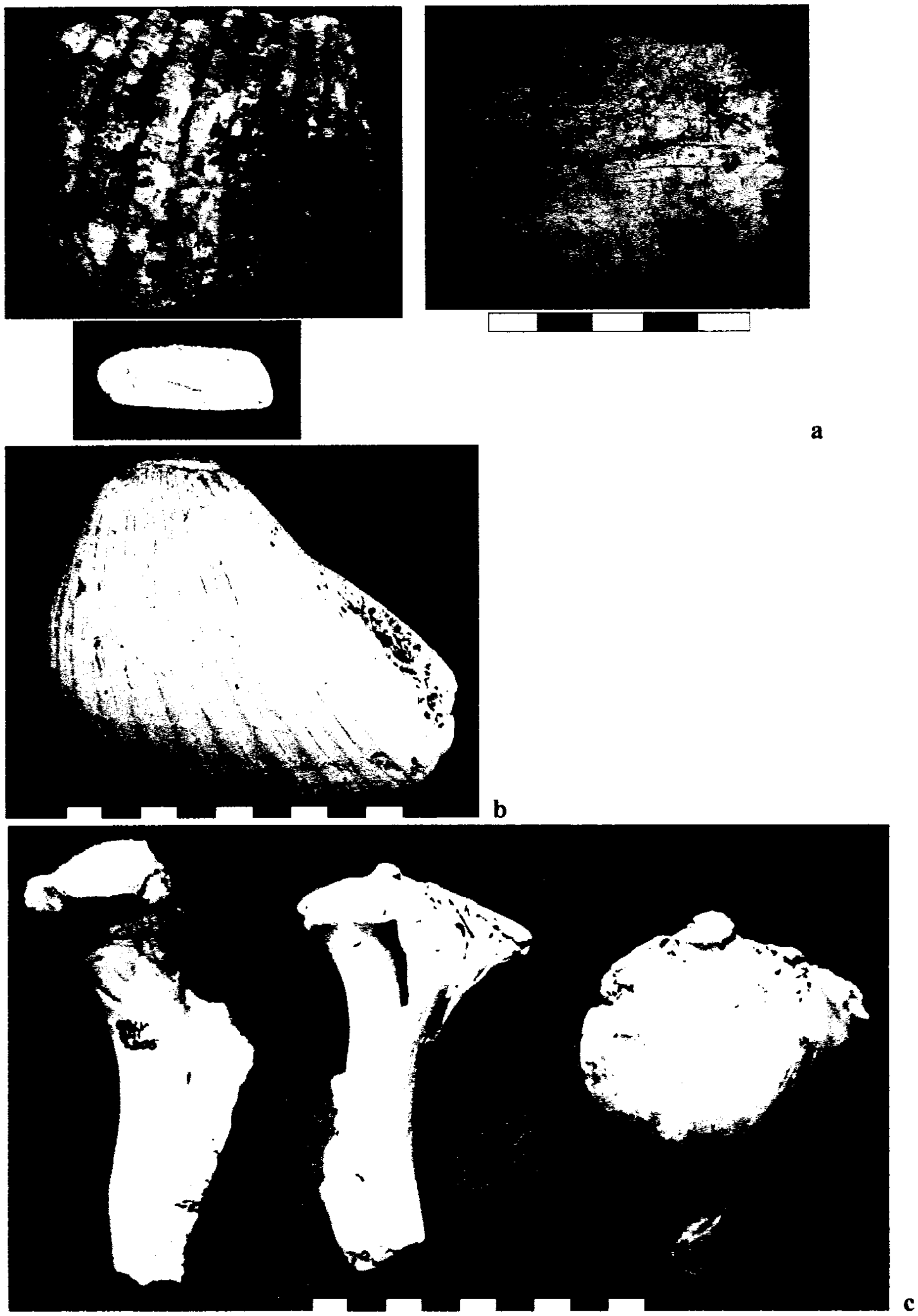

Figure 7.5 worked *Anadara* sp. and *Melongena patula* shells.
(a) Anterior and posterior sections of a nodular fragment of *Anadara sp.,* and a pre-form of a counterfeit teeth pendant from an *Anadara* shell. cat 3132 and cat 3190, Stations R456-28/29 and R456-1, Site LS-3 (*cf.* Mayo 2004: Plate 13; Mayo and Cooke 2005: Figure 10).
(b) *Anadara sp.* possible hammer, cat F39he-2006, Site LS-10, Station T18R4.
(c) Melongena patula shells with missing body whorls found at a coastal site near Monagre Beach, cat 41ls-01-299, Station R205, Field 41ls (*cf. Strombus gigas* hammers documented by O'Day and Keegan 2001: Figure 7).

Operation 3).

A large number of *Melongena patula* fragments exhibit symmetrical cut marks on their whorls or had their body whorls completely removed leaving only the columella[7] exposed (Figure 7.5c). In some cases the worked columella resemble the expedient *Strombus gigas* hammer tools documented by O'Day and Keegan for coastal sites on the northern West Indies (*cf.* O'Day and Keegan 2001: Figure 7). Mayo states, however, that at the Cerro Juan Díaz shell workshop, the body whorls of *Melongena* and *Strombus galeatus* were used to produce geometrically shaped beads and a more complex ornament form she labeled "*cuenta de bastón*" or baton-shaped pendant (Figure 7.6a). Because the workshop contained whole shells, shell debitage, pre-forms, and finished objects, Mayo was able to reconstruct crafting techniques and stages in the manufacture of specific ornaments. She was also able to infer the functions of specific stone tools in the manufacturing process. In the case of the baton-shaped pendants, the fracture profiles in all the pre-forms are straight, leading her to suggest that they were prepared through indirect percussion (Mayo 2004: 124). Mayo also noted that different pre-form shapes led to the production of different types of beads and pendants: the rectangular blanks measuring on average 4.2 by 1.7 cm and 0.7 cm in thickness were ultimately shaped into the baton pendants, while the square blanks were used for the discoidal beads or *chaquiras*. In 62% of the cases, the structure of the pre-form exposed the characteristic rib features of the *Strombus galeatus* conch, while 35% of the pre-forms showed a structure typical of *M. patula*.

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[7] The columella is the axis of coiling of a tightly spiraled gastropod (Keen 1971: 911).

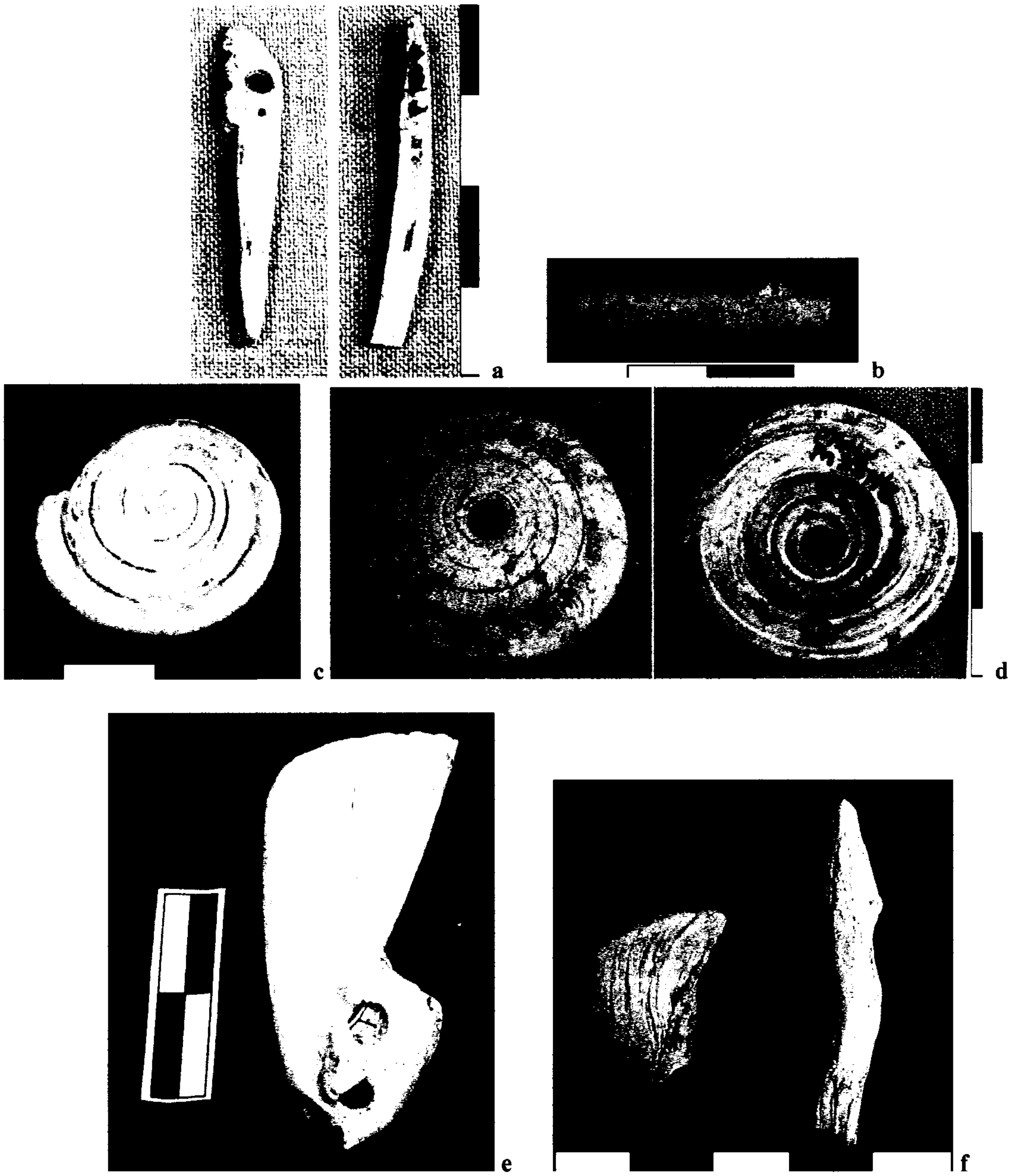

Figure 7.6 Shell ornaments and tools from the PARLV collection.
(a) "baton-shaped pendant" cat 9he-77, Station T2R4, Site LS-3 (*cf.* Mayo 2004: Plate 24; Mayo and Cooke 2005: Figure 9; Roosevelt 1979: Plate 8a);
(b) *Spondylus* tubular bead cat33Bhe-1918, Site LS-10, Station R213;
(c) *Conus sp.* blank cat58he-2601, Site LS-15, Station T36R7;
(d) *Conus sp.* disk pendant cat 35he-1469, Site CHI-33, Station R226;
(e) Worked columella of an *Strombus galeatus* catF15he-645, Station R095, Site LS-3 (*cf.* O'Day and Keegan 2001: Figure 11);
(f) Worked columellas specimen is unknown, cat F33B-he-1870, Station R297, LS-10.

Alain Ichon discovered several baton-shaped shell pendants in several La Cañaza phase graves, in the Tonosí valley (Ichon 1980: Figure 86 c, h, 87k). These are similar to the ones produced at Cerro Juan Díaz workshop and to an example collected by the PARLV on the Herrera banks of LS-3. Anna Roosevelt (1979: Plate 8; Figure 38) documented the same kind of pendant wrought in gold from an unprovenienced site supposedly near Parita, Herrera.

Other marine shell species used for crafting costume jewelry at the Cerro Juan Díaz workshop studied by Mayo are: *Conus patricius, Spondylus calcifer, Pinctada mazatlanica,* and *Oliva* (Mayo 2004: 103), all of which are present in low numbers in the PARLV sample. The most common items produced from *Conus patricius* are discoidal pendants crafted from the shell's spire. Drills were also made with the columella (Mayo 2004: Plate 31). Three of the five *Conus* shells from the PARLV sample were shaped into discoidal pendants, which also resemble spindle whorls (Figure 7.6c-d). Despite the abundance of *Spondylus* beads discovered in Cerro Juan Díaz graves, only one *Spondylus* ornament was identified by the PARLV. This is a tubular bead found during the cleaning of a looter pit at Station R213, LS-10 (Figure 7.6b). We also collected a few *Oliva* tinklers and other unworked *Olivellas* particularly from the test-excavation units opened at sites LS-31 and CHI-33.

With regard to the temporal and geographic distribution of shells, sandy beach taxa (i.e., *Donax, Natica,* and *Tivela*) are notably abundant in coastal plain middens associated with Tonosí and Cubitá phase pottery from the Middle Ceramic period. In the upper-valley villages, where the majority of middens yielded Late Ceramic pottery, the most frequent taxa are *Anadara, Polymesoda boliviana, Dosinia dunkeri,* and *Melongena patula*. It is possible that these preferences are associated with changes of the coastal environment, but because I did not excavate middens from settlements west of Cerro El Tamarindo, it is difficult to prove this with the available data.

7.4.2 The vertebrate fauna

Remains of vertebrates were found at 77 surface-collection stations and in the 9 excavation units opened at LS-3, LS-10, and CHI-33 (Appendix 3). This represents 76% of the total units containing faunal remains. According to the preliminary analysis undertaken by Jiménez and Cooke, this sample includes two amphibians, thirteen mammal taxa (including two modern domesticates: cow and pig), ten reptiles (four snakes, three turtles, two iguanid lizards, and a crocodilian), seven bird genera, six cartilaginous fish genera, and 20 teleost ("bony fish") families comprising 49 genera and 66 species (Appendix 8).

The largest and most diverse archaeofauna comes from two coeval shell-bearing middens tested at LS-31 (Operations 19-1ls and 19-3ls) and the Herrera banks of LS-3 (Operation 19-2he). We recovered smaller samples from units tested at site LS-10 (Field 33he, Station T4R2) and CHI-33 (Stations R170 and R171) and the fill of two other features excavated at Stations R213 and R297, LS-10 (Appendix 3). In all excavation units, the sediments were screened in the field using a fine metallic sieve measuring 0.0625 inch (1.6 mm). Due to the large volume of small bones from LS-3 and LS-31 excavation units, the sediments left on the screen were taken to the laboratory and water sieved using a 0.0197 inch (500 micrometers) metal sieve. This allowed the recovery of numerous fish vertebra and a few rodents, birds, and amphibian bones.

Although the surface collection is small, it is important because it provides information on the use of animals across the sample universe. In some cases information about environmental setting can be inferred from the presence of vertebrate taxa.

7.4.2.1 Mammals

Large mammal remains dominate the PARLV terrestrial vertebrate collection. The majority of diagnostic bones belonged to bovines (*Bos*) and deer (Figure 7.7). The cow, of course, is a European domesticate introduced immediately after Spanish contact. The largest concentration of cow bones was found along the shallow trench opened by the field owners of Finca La Flora at Site LA-28 (Figure 4.33b, 7.3; Appendix 3: Table XV). This same area yielded large amounts of Hispano-Indígena and *cf.* El Tigre ceramics (A.D. 1650–1955). These associations are therefore chronologically and culturally consistent. At other sites where cow and pig were recovered, their physical condition suggests that they are modern, since bovine mortality is very high in this seasonally arid area. It is important to point out, however, that bovine, pig and chicken (*Gallus gallus*) bones were found in the in the most recently cultural deposits at Cerro Juan Díaz, in contexts that suggest an early Colonial age.

The white-tailed deer is the most ubiquitous native mammal in the PARLV collection stations being present in 33 of the collection stations from 10 sites (Appendix 10). This species also is ranked first in abundance representing 19% of the NISP of mammal bones (Figure 7.7). The troops of Pedrarias Dávila noted that deer were particularly abundant in the province of *Parita*, but only the commoners consumed deer meat. According to Espinosa the *queví* and lower tier chiefs—*tibas* and *sacos*—were like Dominican or Carthusian monks who did not eat red meat, only fish and iguanas.[8] This information is not consistent with the fact that deer, fish, and iguanas formed a trio of foods that the *quevís* offered to entertain and/or appease the Spaniards (Espinosa 1994c: 68).[9]

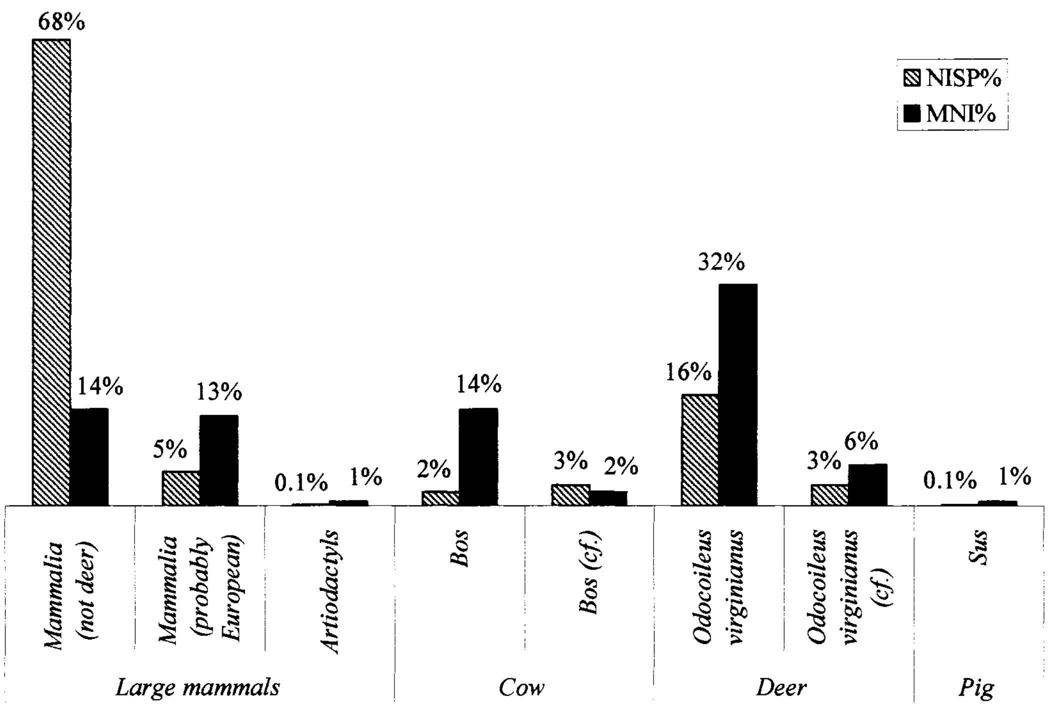

Figure 7.7 Rank order of the PARLV large mammals from surface collections

[8]... ***es tierra de mucha caza,*** *así de cuatropea como* ***son infinitos venados,*** *tanto que andan juntos de 30 en 30 y de 40 en 40, y de puercos y aves? de la tierra y de volatería y pavos y ánsares y perdices y palomas; hay en el muchos leones y tigres y de otros animales salvajes, aunque* ***el dicho cacique y principales e indios de la dicha provincia son como frailes dominicos o cartujos que no comen carne ninguna de ninguna manera ni condición que sea, salvo pescado e iguanas,*** *aunque tienen los venados y caza sobrada en la tierra* (Espinosa 1994a: 65; see also Medina version 1913: 203) (my emphasis).

[9] For further discussion on food taboos see Cooke 1992b, Cooke and Ranere 1992a: 48; Cooke *et al.* 2007a; Sauer 1966.

Our deer sample comprises almost all skeletal body parts: antlers, sections of the skull, thoracic and pelvic areas, long bones and forefoot parts. The majority of the deer remains correspond to adult individuals whose biomass range between 30 and 40 kilograms (Appendix 3). Young deer were consumed as well, but in smaller numbers.

Smaller mammals, although less frequent, include the nine-banded armadillo (*Dasypus novemcinctus*), cottontail rabbit (*Sylvilagus brasiliensis*), agouti (*Dasyprocta punctata*), paca (*Agouti paca)*, grey fox (*Urocyon cinereoargenteus*), raccoon (*Procyon*), dog/coyote (*Canis*), pocket mouse (*Liomys*), and two Murid rodents: the short-tailed cane rat (*Zygodontomys brevicauda*) and rice rat (*Oryzomys* sp.; Figure 7.8). The pocket mouse likes fairly tall vegetation near clear areas and human dwellings; the grey fox frequents scrubby areas with open vegetation and does not enter thick woods; while the armadillo is adaptable in its habitat requirements (Appendix 8).

Armadillos need plenty of earth to make burrows and are particularly abundant in and around second growth vegetation in seasonally dry forest, secondary growth, and cultivated fields. The cane and rice rats (*Oryzomys* and *Zygodontomys brevicauda*) live in ditches and grasslands. Their presence in other pre-Columbian middens is attributed to their propensity to enter human settlements to eat stores of agricultural produce (Cooke and Ranere 1992b: 41).

The cottontail rabbit likes scrubby vegetation and second growth to hide in, but needs grass to feed on. It is a very common species today in pastures and degraded habitats. The paca needs thick vegetation and is found in mature second growth, dry woods and gallery forest. The agouti is similar to the paca in its habitat preferences but is noticeably more abundant around gardens near wooded habitats than the paca, while the raccoon (*P. lotor*) is particularly abundant in the coastal habitats of Pacific Panama, especially the mangroves, due to the abundance of crustaceans. With the exception of the dog, armadillo, and paca, most of the smaller mammal bone remains in our samples come from the test excavation units.

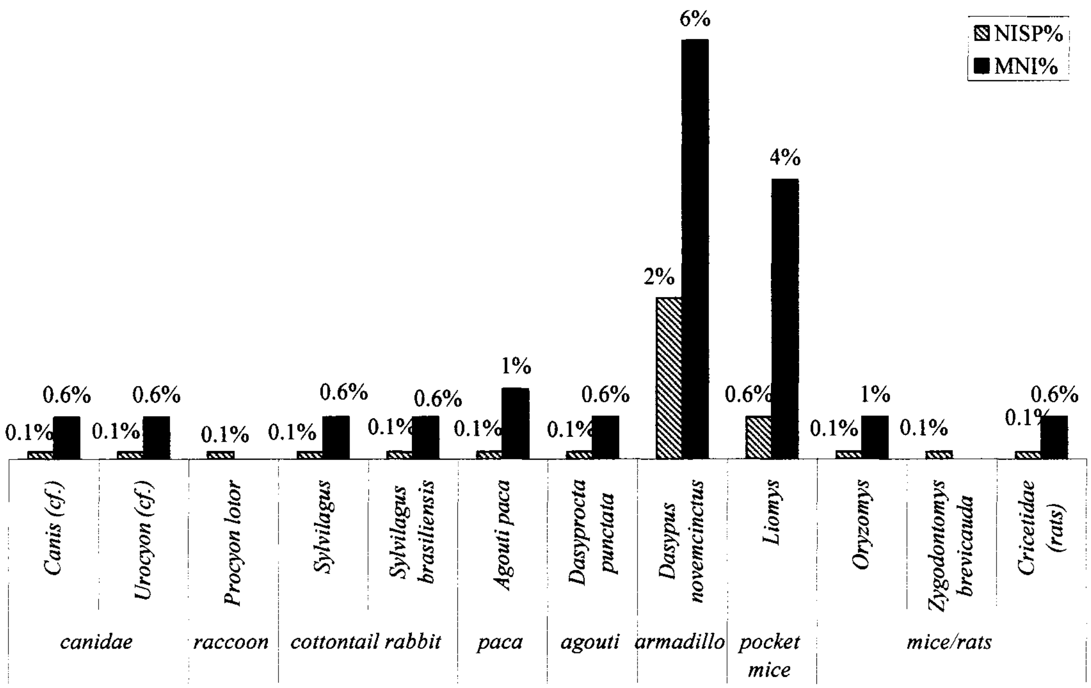

Figure 7.8 Rank order of the PARLV small mammals from surface collections

The PARLV sample also includes the long bone possibly from a dog (*Canis*).[10] Dog remains have been found at several Panamanian sites, but their bones are rare in kitchen middens. I mentioned above that necklaces with several hundred perforated dog

[10] This could be either dog or coyote. In the latter case, it should be noted that the coyote (*C. latrans*) is considered a recent species being first recorded in Panama in 1981 (Cooke *et al.* 2007a: Table 1, Footnote f).

canines were recorded at the high status Sitio Conte site (Lothrop 1937: Figure 33). They were found in smaller numbers in graves at Cerro Juan Díaz (LS-3), Playa Venado and sites in the Tonosí Valley (Cooke 2004b: 278–280). Cooke (1998c: 70) argues that the morphological heterogeneity of dog remains suggests that different sizes of dogs were kept in the region and the pre-Columbian inhabitants kept them in large numbers. If they were not eaten, it is likely that they were kept as guards or hunting dogs (Cooke 1979, 1984 Cooke *et al.* 1985: 16; Cooke and Ranere 1989). Perhaps the dog, in their role as a hunting companion, had a special status together with other non-edible mammals such as the puma, jaguar, ocelot, and monkeys whose teeth also have been discovered in direct association with adult males or young adults inside mortuary contexts. In such cases, the associations have been interpreted as a reflection of the individual's occupation—e.g., shaman or curer—rather than their rank or status in society (Cooke 2004b: 278; Cooke *et al.* 2003a: 117–118).

Contact-period ethnohistoric documentation for the isthmus does not verify the use of dog hunting. Most written references to hunting refer to deer and peccaries (Andagoya 1994: 31; Anghera 1912, I: 407; Oviedo 1944, VIII: 16). One chronicler (Andagoya 1994: 31) observed that Cueva chiefs used hunting reserves—or *cotos*—to which they went during the dry season to hunt deer, since it was the best time to drive the game using fire, which enabled mass slaughter.[11] Methods for capturing birds are also described (Footnote 1).

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[11] "Fire was set on the windward side and since the plants grew tall the fire was great. Indians were placed in file at a position where the fire would come to a stop. The deer, massed in their flight and blinded by the

It is possible that hunting preferences in the Parita Bay chiefdoms were influenced by weapon choice (Cooke 1984a: 298). Arboreal animals (except squirrels) are scarce in regional archaeofauna samples. Sloths, monkeys and coatis are absent in middens. This situation is consistent with the fact that the bow-and-arrow seems to have been of limited use in contact-period Panama. For example, Oviedo (1944, VII: 300) clearly states that the Cueva were not bowmen, but rather used spears in violent encounters and for hunting. Sometimes the spears were thrown with *atlatls*.

Based on the natural behavior of smaller mammals taxa identified in the PARLV sample, I propose that their procurement is likely to have taken place not far from the sites in the riverine gallery forest or mangrove.

7.4.2.2 Fish

Although mammals dominate in terms of ubiquity in the surface collections, the PARLV are noticeably more numerous in excavated bone samples. They are also considerably more diverse in terms of the number of species represented (Appendix 8). Although the sample is geographically uneven, it is more informative from a taxonomic point of view than the mammal sample for which very few taxa were securely identified. Out of the 33,763 fish bones recorded in our samples only 7% received complete taxonomic analysis due to the large number of bones (Table 7.2). For Cooke (personal communication 2007) this is a respectable sample given the difficulties of identification

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smoke, were thus driven by fire to the place where indians were waiting with their dart throwers and stone points so that few creatures escaped" (Andagoya 1994: 31, translation by Sauer 1944: 244).

Table 7.2
Most common fish in the PARLV sample
Includes both surface and excavation samples

Taxa	Ubiquity	NISP	%	MNI	%	BM	%
Osteichthyes (counted)	9	31,403		?			
Perciformes	1	1		?			
Albulidae (bonefish)							
Albula neoguinaica	4	27	1%	10	2%	1,875	0.5%
Ariidae (catfish)	8	597	25%	7	1%	19,700	5%
Ariopsis seemanni	2	32	1%	13	2%	3,070	1%
Bagre panamensis	3	20	1%	11	2%	2,145	0.6%
Notarius kessleri	4	20	1%	11	2%	5,250	1%
Sciades dowii	5	35	1%	17	3%	41,500	11%
Bagre pinnimaculatus	6	57	2%	16	3%	13,550	4%
Cathorops	6	71	3%	6	1%	2,190	0.6%
Cathorops furthii	6	134	6%	31	6%	5,825	2%
Belonidae (needlefish)	1	8	0.3%	2	0.4%		
Strongylura	3	17	0.7%	6	1%	820	0.2%
Tylosurus	2	42	2%	9	2%	2,425	0.7%
Tylosurus cocodrilus	1	1	0.04%	1	0.2%	1,800	0.5%
Carangidae (jack)	1	6	0.3%				
Caranx caninus	4	33	1%	16	3%	5,175	1%
Chloroscombrus	3	19	1%	5	1%	250	0.1%
Chloroscombrus orqueta	2	22	1%	7	1%	275	0.1%
Oligoplites altus	1	31	1%	2	0.4%	1,200	0.3%
Selene peruviana	8	378	16%	47	9%	4,555	1%
Selene	2	129	5%				
Clupeidae (thread-herring)							
Opisthonema libertate	1	4	0.2%	1	0.2%	125	0.03%
Opisthonema libertate (cf.)	3	101	4%	12	2%	1,500	0.41%
Haemulidae (grunt)	2	35	1.5%				
Orthopristis chalceus	3	25	1%	12	2.3%	1,305	0.4%
Pomadasys panamensis	7	67	3%	21	4%	4,460	1%
Pristigasteridae (ilisha)							
Ilisha furthii	4	39	2%	15	3%	3,725	1%
Polynemidae (bobo)							
Polydactylus opercularis	4	28	1%	15	3%	3,900	1%
Tetraodontidae (puffer)	1	1	0.04%	1	0.2%	600	0.2%
Guentheridia formosa	5	39	2%	19	4%	6,725	2%
ELASMOBRANCHII	2	64	3%	?			
Carcharhinidae (shark)							
Carcharhinus	3	4	0.2%	4	1%	5,700	2%
Carcharhinus leucas	2	2	0.1%	2	0.4%	4,400	1%
Rhizoprionodon longurio	2	6	0.3%	4	1%	5,250	1%
Sphyrnidae (hammerhead)							
Sphyrna	3	4	0.2%	2	0.4%	100,450	27%
Sphyrna lewini	2	4	0.2%	3	0.6%	1,900	0.5%
Sphyrna lewini (cf.)	3	4	0.2%	3	0.6%	4,350	1%
Dasyatidae (stingray)	1	1	0.04%	1	0.2%	2,000	0.5%
Dasyatis longus (cf.)	1	5	0.2%	1	0.2%	3,000	1%
Myliobatidae (eagle ray)							
Aeteobatus narinari	1	2	0.1%	1	0.2%	3,000	1%
Urolophidae (round ray)							
Urotrygon	1	3	0%	1	0.2%	125	0.03%

and time constraints. It is estimated that about 70% of the studied sample is diagnostic to Family or below.

When the diagnostic sample is rank ordered by the NISP, the sea catfish (Ariidae) family dominates, representing 42% of the bony fish remains. The marine catfish are represented by 5 genera and 9 species. They are followed in rank by the jack (Carangidae) family (27%) represented by 6 genera and 10 species; the thread-herring (Clupeidae) family (4%) with one species; the grunt (Haemulidae) family (6%) with 3 genera and 5 species; and the croaker (Sciaenidae) family (2%) comprising 9 genera and 14 species. The remaining 19% of the diagnostic sample belongs to 16 different families, comprising 36 genus and 39 species. The cartilaginous fish sample includes three sharks and three rays (Table 7.2).

In terms of habitat preferences, it seems that La Villa valley communities focused their fishing activities on the middle and upper sections of the estuary, since 88% of the studied fish sample correspond to inshore marine taxa that frequent the estuary and/or enter the tidal river (Figure 7.1). The remaining 12% correspond to species that avoid the turbid water plumes of the mixing zone of the estuary.

The following descriptions are based on (1) Jiménez and Cooke's report for the PARLV presented in Appendix 8 and (2) published data on pre-Columbian fishing from Parita Bay (Cooke 1992a, Cooke and Ranere 1999), Cerro Juan Díaz (Jiménez 1999; Jiménez and Cooke 2001) and Cooke's middle-range research on traditional fishing techniques still being practiced in Parita Bay.

7.4.2.2.1 Inshore marine species that frequent the estuary and enter the tidal river

I begin by describing the habitats of the most numerous and popular inshore fish families identified: the catfish (Ariidae), grunts (Haemulidae), and croakers (Sciaenidae) whose habitat preferences and feeding behavior vary considerably at the species level (Appendix 8). Marine fish species that frequent estuaries and tidal rivers are: Seemann's sea catfish (*Ariopsis seemanni*), brown sea catfish (*Sciades dowii*), Tuyra and congo sea catfish (*Cathorops tuyra, C. fuerthii*), long-barbelled sea catfish (*Bagre pinnimaculatus*), chihuil sea catfish (*Bagre panamensis*), longspine grunt (*Pomadasys macracanthus*), and purplemouth grunt (*P. bayanus*; Figure 7.1). The Panamanian grunt does not enter rivers, but rather is found in fairly deep water in the outer zone of the estuary. The purplemouth grunt spends its adult life in completely fresh water and comes down to the river mouth to spawn with the first floods. The armed croaker (*Bairdiella* armata) can be found at the river mouth. The brown sea catfish is particularly abundant around mudflats and mangroves, and also enters the oligohaline stretches of rivers. As an adult, the tuyra sea catfish is commonly found in the fresh water and oligohaline section of rivers where it feeds on *Polymesoda* clams, but its congener, the gloomy catfish (*C. hypophthalmus*), which was not identified in the PARL samples, feeds on plankton (Cooke and Jiménez 2004: 30). The chihuil sea catfish prefers muddy bottoms, while the Seemann's sea catfish is very protean, being found in all inshore marine habitats including tidal rivers. The brassy grunt (*Orthopristis chalceus*) avoids mudflats and the mouth of the river preferring the sand and gravel bottoms of coastal waters. The Panamanian grunt also prefers sand and gravel bottoms, while the white grunt (*Haemulopsis leuciscus*) can be found over sandy or muddy bottoms. The chili sea catfish (*Notarius troschelii*) is the marine catfish species in the sample that hangs furthest off shore (Appendix 8).

In addition to the above mentioned taxa, 27 less inshore teleosts from 15 different families were recorded infrequently: Boulenger's toadfish (*Batrachoides boulengeri*), Panamanian flounder (*Cyclopsetta panamensis*), five members of the Carangidae or jack family (*Caranx otrynter, Oligoplites altus, O. refulgens, Selene brevoorti, Trachinotus kennedyi*), four snook (*Centropomus nigrescens*, *C. unionensis*, *C. medius*, *C. robalito*), Pacific fat sleeper (*Dormitator latifrons*), Pacific ladyfish (*Elops affinis*), Peruvian mojarra (*Diapterus peruvianus*), tripletail (*Lobotes surinamensis*), two snappers—the spotted rose (*Lutjanus guttatus*) and dog snapper (*L. novemcinctus*)—a mullet (*Mugil*), the Gilbert's flounder (*Citharichthys gilberti*), two threadfins (*Polydactylus approximans, P. opercularis*), Pacific ilisha (*Ilisha furthii*), three corvinas or weakfish (*Cynoscion albus, C. phoxocephalus, C. squamipinnis*), two anchovies (*Anchoa* sp. and *Lycengraulis poeyi*) and fang-jaw eel (*Echiophis brunneus*).

The cartilaginous fish sample includes bull shark (*Carcharhinus leucas*), Pacific sharpnose shark (*Rhizoprionodon longurio*), scalloped hammerhead (*Sphyrna lewini*), long-tailed stingray (*Dasyatis longus*), round ray (*Urotrygon*), and spotted eagle ray (*Aeteobatus narinari*). These species are all found in shallow inshore waters. The bull shark frequently runs up-river to freshwater lakes.

In sum, the PARLV fish sample confirm the predominance of inshore fish species, most of which frequent estuarine waters. For example, the longjaw leatherjack (*O. altus*) is a benthopelagic fish that penetrates the estuary and tidal river. The Pacific sabretooth anchovy enter the estuary in very large shoals. Both the Gilbert and Panamanian flounders, although found in estuaries are more frequent on the soft bottom of trawling grounds and bays. Boulenger's toadfish and tripletail regularly enter the tidal river. Cooke and Tapia (1994a: 105) note that the black snook (*C. nigrescens*) is one of the few marine fish specimens in the Parita Bay archaeofauna that enter fresh water to a considerable distance from the sea. The other genetically marine fish specimens that are present in the sample and can be found in fresh water are the Pacific ladyfish, Peruvian mojarra, Gilbert's flounder, Pacific Ilisha, white corvina, tuyra catfish, Seemann's catfish, and the Pacific crevalle jack (Appendix 8).

The shortjaw leatherjack (*O. refulgens*) and spotted rose snapper prefer sandy beaches, while the blue and yellow threadfin move in large shoals over mudflats, but tend to congregate in clear channels near sandy beaches. According to Cooke (1992a: 37), both threadfins can be easily fished using tidal weirs. Other PARLV shoaling taxa include the chihuil, congo, tuyra, and many-rayed sea catfish, the armed and tuza croakers, and the swordspine croaker. Cooke also reports (1992a: 36) that the Pacific fat sleeper can be so numerous in mangrove channels, lagoons, salt pools, and ephemeral fresh water ponds that it can be fished using nets, baskets or even hands. Other specimens that frequent the mangrove channels include the little snook (*C. robalito*), needlefish (*Strongylura*), chocolate flounder (*Cyclopsetta querma*), and longspine grunt. The fang jaw eel (*Echiophis brunneus*) is a demersal fish that inhabits sandy and muddy bottoms, from shallow waters to 10 meters.

Other fish specimens recorded by the PARLV, which enter the Parita Bay estuaries, are the Panama kingcroaker (*Menticirrhus panamensis*), highfin croaker (*Micropogonias altipinnis*), and steeplined drum (*Larimus acclivis*). The Pacific smalleye croaker (*Nebris occidentalis*) seem to avoid the estuary as an adult, but as a juvenile can be found on the surf zone of coastal waters and coastal lagoons where it can be fished with throw-nets (Appendix 8). I should point out that there are no real lagoons in Parita Bay, although there may have been in the past (Cooke personal communication 2007).

7.4.2.2.2 Clear water species

The last major fish group in the PARLV sample includes species that swim in clear water columns at the edge of the estuary, but may opportunistically move into the estuary when salinity and/or the visibility is high. In this group, Cooke includes 15 species from nine different families, by order of abundance : Pacific moonfish (*Selene peruviana*), Pacific thread-herring (*Opisthonema libertate*), crocodile needlefish (*Tylosurus cocodrilus*), Pacific bonefish (*Albula neoguinaica*), spotted mackerel (*Scomberomorus sierra*), chili sea catfish mentioned above, barracuda (*Sphyraena*), boccone corvina (*Cynoscion praedatorius*), Pacific and Panama spadefish (*Chaetodipterus zonatus* and *Parapsettus panamensis*), green jacks, *Caranx caballus*), and the purse-eye scad (*Selar crumenophthalmus*).

The Pacific moonfish is a small taxon that swims in coastal waters up to at least 50 m depth (Appendix 8). Generally, it forms schools near the bottom but as juveniles can be found near the surface. The Panama spadefish is a demersal fish, which swims over coral reefs and rocky bottoms. According to Cooke and Jiménez (2204: 33), the Panama spadefish, brassy grunts, Pacific moonfish, thread-herring, and bumpers, all enter the estuary during the dry season using currents of clear water. There are records that the Pacific moonfish was caught with tidal traps near Panama City (Cooke and Tapia 1994a). The Pacific crevalle jack (*Caranx* caninus), on the other hand, is extremely protean. Very large adults tend to hang out around reefs and in deep clear water offshore; but small animals (<1 kg), which are the ones present in these samples, frequent estuaries, being commonly in turbid water and at the mouth of the tidal rivers. Two other species, which swim in large shoals and prefer clear water currents, are the green jack and the spotted mackerel. They tend to avoid the turbid water of the middle and upper estuary but will make feeding forays close inshore over sandy beaches where they can be caught in tidal traps (Figure 7.1).

The Pacific thread-herring is a shoaling fish that swims near the surface of coastal and offshore waters avoiding turbid water plumes. According to Cooke (1992a: 38), it enters the outer section of the estuary where there is swallow water and it can be gill-netted in large numbers especially during the dry season. The rose snapper prefers sand and gravel substrates a way offshore, and can be fished with hook-and-line together with the Panamanian grunt (Cooke and Jiménez 2004: 32). Juvenile and small adult of the dog snappers, which were only identified tentatively in the PARLV sample, will swim up-river into completely fresh water (Cooke and Tapia 1994).

7.4.2.2.3 Fishing methods

In general, the archaeoichthyofauna collected by the PARLV corresponds closely to archaeological fish bone samples previously documented at other pre-Columbian sites in the lower valleys of the Parita and Santa María rivers. The most ubiquitous and numerous fish species collected by the PARLV—the Pacific moonfish, congo sea catfish, Pacific thread-herring, Panamanian grunt, long-barbelled sea catfish, brown sea catfish, and spotted puffer (*Guentheridia formosa*)—are also among the top ten ranked species documented by the CJDP at Cerro Juan Díaz (LS-3), as well as those reported by Cooke at Cerro Mangote, La Mula Sarigua, Monagrillo, Sitio Sierra, and Vampiros-1 (*cf.* Table 7.2; Cooke 1992a: Table X; Cooke and Jiménez 2004: 22–25; Cooke and Ranere 1999: Table 1; Jiménez and Cooke 2001). The PARLV data reinforce Cooke's (1992a, 2001b) hypothesis that pre-Columbian fisher-folk from Parita Bay focused on the middle and uppers sections of the estuary where fish could be easily caught using stationary fish traps similar to surviving ones used by artisanal fisher folk in the lower reaches of the Santa María and Pocrí rivers (Cooke and Tapia 1994a, 1994b).

The use of intertidal traps and weirs is recorded in sixteenth century ethnohistoric accounts.[12] According to Oviedo (1944, III: 210), traps made of stakes and canes were often set in reefs and sections of the coast subject to tidal action. Fish weirs, presumably of pre-Columbian age, were reported by Sigvald Linné at three sites on the Pearl Islands:

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[12] *El manjar mas ordinario de los indios é á que ellos tienen grande afiçion, son los pescados de los rios é de la mar: é son muy diestros en las pesquerías é artificios que se usan.... pescan algunos con caña, de la mesma manera los indios los haçen con varas delgadas é domales é quales convierten para ello, é con cuerdas é volantines é con redes de algodón é muy bien hechas, lo mas continuamente. Y también con corrales é atajos hechos á mano de estacadas en los arreçifes, donde la mar en las costas crece é mengua y en partes á esto apropriadas; y también desde sus canoas ó barcas* (Oviedo 1944, III: 210; See also Chapter 3: Footnote 13).

Site 2 on Saboga, Site 4 on Viveros, and a site located in the Gulf of San Telmo on the south end of the Isla del Rey (Linné 1929: Figure 30). These were semi-circular stone-wall features, arranged so that they filled with water at high tide and trapped fish that are easy to catch during the ebb tide (Linné 1929: 104). An on-going survey of a neighboring island (Pedro González) has located several more stone corrals (Cooke personal communication 2007).

Additional fishing methods described in the contact-period chronicles include the use of nets made of cotton, henequen, or sisal (*cabuya*), and hook-and-line. Folks from the Island of Taboga, near Panama City, are said to have used sticks to catch needlefish that seasonally approached the coast to escape the sharks.[13] Ferdinand Columbus describes the use of canoes for fishing along the rivers of the Caribbean coast of Veraguas (Cooke and Sánchez 2001: 39).

Despite the importance of fishing and the abundance of fish remains in pre-Columbian kitchen middens, very few Panamanian sites have yielded evidence of fishing gear e.g., fish hooks, or net or line sinkers. The sites that have yielded such evidence include Site 2 in Saboga, Pearl Islands (Linné 1929: 80), La Pitahaya in Chiriquí (Sheldon 1980: 459), site PC001 in the Costa Arriba de Colón (Drolet 1980: Figure 24), and LS-3 in our study area (Mayo 2004: Plate 102 and 103). The evidence from LS-3 includes small perforated stones and stones with binding marks resembling line weights. They were found in the refuse layer that covered the floor of the shell workshop

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[13] *....se acercaban agujas paladares a la playa en ciertos meses é tras ellas, muchos tiburones é marraxos... para se los comer. E vienen las agujas huyendo de la playa hasta tierra... é pónense en banda los indios con sendos palos en las manos é matan a palos muchas della* (Oviedo 1849 cited by Cooke and Sánchez 2001: 39).

excavated by Julia Mayo. Mayo's find coupled with the large number of fish bones from clear water taxa—e.g., Panamanian grunt, Pacific moonfish, and boccone corvina—collected from the numerous test units opened at the site (Cooke and Jiménez 2004: 31) reinforces the idea that La Villa fisher folk were venturing offshore in dugout canoes to fish using nets and/or hook-and-line. *Parita's* ancestors had the advantage that the La Villa River is on the southern section of the bay where the turbid water plumes are narrower than at the center. Because of this they did not have to travel far from the coast to obtain species that stay away from river mouths and mudflats (Cooke and Jiménez 2004: 31). It is likely that some of the clear water species and others that frequent deeper inshore waters, such as the Panamanian grunt and spotted rose snapper, were fished in proximity to Isla Villa where Carvajal noted the existence of a population of *Spondylus calcifer*. The Panamanian grunt is the fourth commonest marine fish species reported by the CJDP at LS-3 (Cooke and Jiménez 2004: Figure 7; see also Jiménez 1999; Jiménez and Cooke 2001). According to Cooke, it is highly unlikely that it was fished in the estuary proper. Based on the presence, frequency, and natural behavior of these fish species I suggest that boats and hook-and-line were the most proper methodology used to fish these clear water taxa on this stretch of the Panamanian coast.

7.4.2.3 Amphibians and reptiles

The PARLV archaeofauna includes a few reptile remains (Figure 7.9). Colubrid and viperid snakes are present, including the vine-snake (*Oxybelis*), and boa (*Boa*). The vine snake is arboreal and frequents riverine or secondary forest and gardens (Appendix

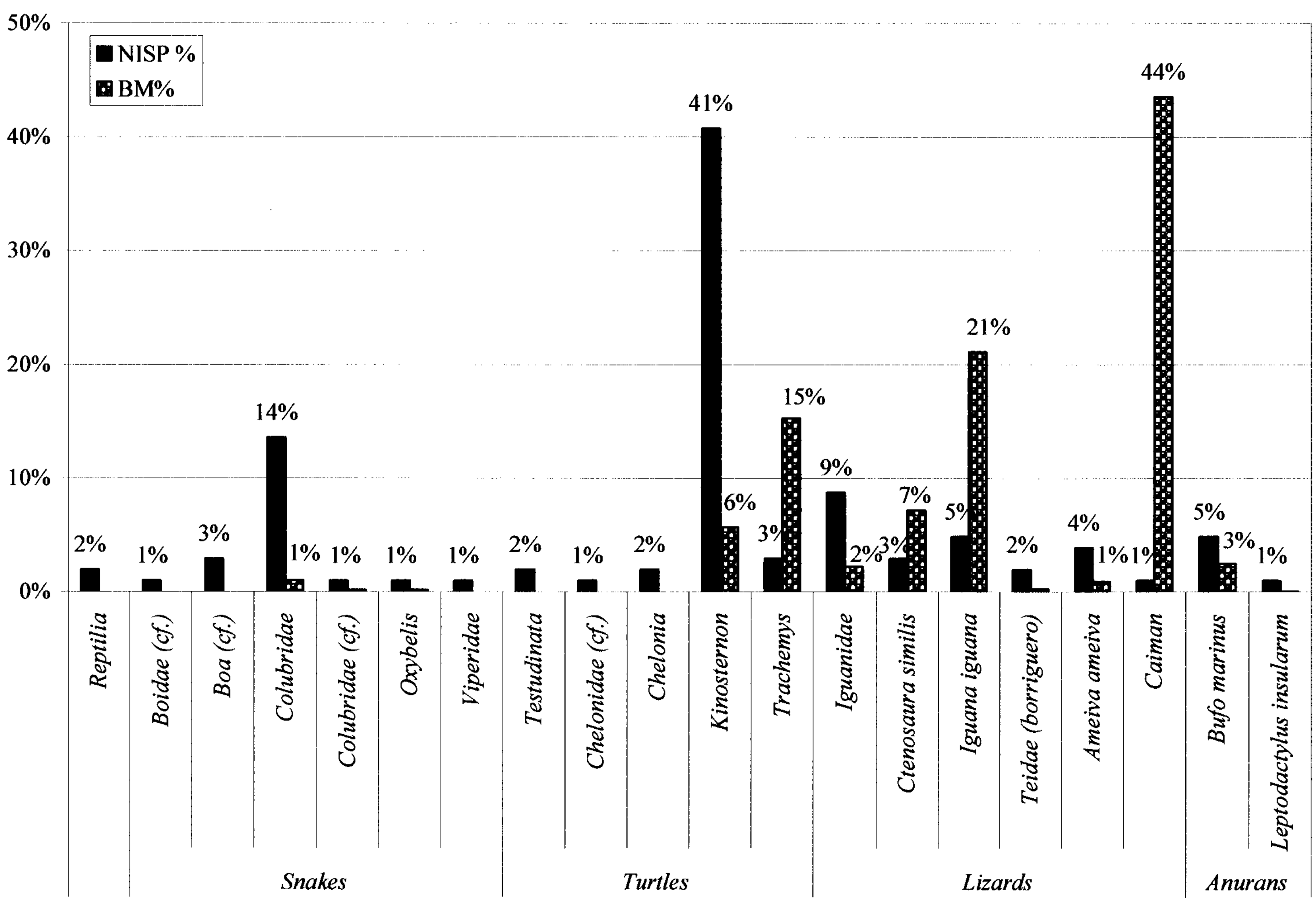

Figure 7.9 Rank order of the PARLV herpetofauna by NISP and Biomass

8). Poisonous viperid snakes have a broad habitat preferences being found even in the high mountains. In Panama this family includes pit-vipers (*Botrops*), commonly known as "*equis*" or "*patoca*" (Cooke personal communication 2007).

The turtle sample includes the pond slider (*Trachemys scripta*) and mud turtle (*Kinosternon scorpioides*), which frequent fresh water habitats, and the green turtle (*Chelonia*) that is found in coastal waters worldwide. Of the three, the mud turtle is the most common in the surface collection stations between sites LS-3 and LS-10 (Appendix 10).

The two lizards identified correspond to the black and green iguana (*Ctenosaura similis, Iguana iguana*). The first is a littoral species that frequents mangroves and rocky areas. The green iguana, on the other hand, is arboreal and lives in riverine environments and secondary forests. Three elements are referred to the cayman (*Caiman cocodrilus*) a species that is found in lowland wetlands and riverine habitats. These were collected from station units set between site LS-3 and LS-10 in the coastal plain.

The two amphibian specimens in the sample also favor riverine environments. *Leptodactylus insularum* frogs live in grassy areas, ponds, marshes, and river edges. The marine toad (*Bufo marinus)* breeds in ponds and marshes, but can be abundant around human habitation sites because of its omnivorous habits. Both amphibians were identified in kitchen middens excavated at site LS-3 and LS-31. Cooke (1989) argues that there is evidence for intentional human use of the two frog species at Sitio Sierra, a village site that is coeval with LS-3. His opinion is based on a taphonomic study of anuran bones at this site and on his interpretation of ethnohistoric and ethnographic evidence. Both these anuran are ubiquitous at LS-3. Although Cooke has not yet evaluated the taphonomy and contextual distribution of these remains, it is likely that both species were taken to the site as food or for ritual use (Cooke *et al.* 2007b).

7.4.2.4 Birds

The PARLV bird sample is very small (Appendix 8). Only ten bird bones were recorded from Operation 19-2he, LS-3 and Operations 19-1ls and 19-3ls, site LS-31 (Appendix 3). The sample includes species naturally found in marshes and forest edge environments. The solitary sandpiper (*Tringa solitaria*), collected at LS-31, is migratory (usually present July–April) preferring fresh water marshes. The only other specimen registered at the site is a ground dove (*Columbina*). The three Panamanian ground-dove species frequent gardens, secondary forest edges, and open areas with low vegetation.

Our sample from LS-3 includes three different bird taxa: wattled jaçana (*Jacana jacana*), a bird of fresh water swamps and ponds with floating vegetation, a species of hawk (*Buteo*), and the groove-billed ani (*Crotophaga sulcirostris*), a gregarious and abundant black cuckoo that lives on the forest edge, in open ground areas, and gardens.

With the exception of the wattled jaçana, all the bird remains collected by the PARLV were already reported previously by the CJDP at LS-3 (Cooke 2004a; Cooke *et al.* 2007b).

7.5 Geographic distribution and dietary contributions of the PARLV archaeofauna

The PARLV terrestrial vertebrate fauna is broadly consistent with the environmental setting described for the lower valley of the La Villa River during the sixteenth-century, i.e., a wooded savanna with gallery forest, farmed and fallow fields, and a shoreline adjacent to estuaries, mangroves and sandy beaches. Since most of the animal species identified in the samples are still prevalent in Parita Bay, it is evident that people did not have to travel far to obtain animal produce. Before addressing the issue of animal procurement, I will pause for a moment to talk about the geographic distribution and dietary contributions of the different animals species collected during the PARLV survey.

The PARLV recovered few animal remains on the surface. More than half the sites—e.g., LS-7, LS-9, LS-11, LS-13, LA-28, CHI-30—yielded samples that included only bone remains of unidentifiable mammals, cow, and/or white tailed deer (Appendix 10). The PARLV research team collected some remains from small mammals, fish, and/or reptiles during the pedestrian survey. These occurred primarily in areas exposed by looting activity or surface erosion or in areas were we later opened shovel test-pits and larger excavation units—e.g., sites LS-3, LS-8, LS-10, LS-15, LA-29, LS-31, and CHI-33 (Appendix 3: Table I-VIII). To best measure the relative importance of animal classes, I compare samples from fine-screened excavation units at LS-3 and LS-31. By examining the species diversity and NISP, it is evident that fish were by far the most frequently consumed vertebrates.

The following descriptions are organized by site, beginning with those located in the coastal plain—LS-3, LS-31, LS-8—and continuing with those located father inland sites—LS-15, LA-29.

7.5.1 Site LS-3

In addition to the large mammal vertebrates, the surface collection sample from site LS-3 yielded evidence of marine catfish, white corvina, fang jaw eel, green turtle, dog, and cayman (Appendix 3: Table IX). We collected bones from eel, dog, and cayman remains on high fluvial terraces in three different stations. The green turtle is represented by remains of its carapace or plastron collected together with undiagnostic mammal bones at the base of a Late Conte plate fragment from Station R118 (Figure 6.35). In this case it was uncertain whether these were the remains of a ritual feature or the base of a midden that had been completely destroyed by the opening of a dirt road.

Catfish and corvina vertebrae were found together with deer remains at the summit of a shell-bearing midden (Station R071) when we sampled a 40-cm^2 area using a trowel (Figure 4.7c; Appendix 3: Table IX). As a result, we collected 419 shells (300 MNI) from 14 different species. The majority of shell species from Station R071 come from firm intertidal substrates (e.g., *Protothaca*), the Low Intertidal zone (*Anadara sp., Iphigenia,* and *Natica*) and mangrove environments (*Anadara tuberculosa*). This sharply contrasts to the dominance of sandy beach clams present at other middens to described below.

Thirty meters south of Station R118 we opened two test units—Operations 19-1he and 19-2he—at the edge of road cut that had exposed a shallow shell-bearing midden that accumulated during the Cubitá phase (Figure 4.9). The first unit, as I explain in Chapter 4, yielded only a few undiagnostic fish and mammal bone fragments together with 60 NISP of shells from 5 different species (Appendix 2: Table I). In this case, the dominant shell taxa are *Tivela* and *Donax* clams. Operation 19-2he yielded 4,879 bone specimens. These include the remains of a marine toad and marsh frog, six mammals (whitetail deer, grey fox, a murid rodent, the spiny pocket mouse, nine-banded armadillo, and cottontail rabbit), a marsh and mud turtle, black iguana and borriguero, a colubrid and boa snake, three bird genera (hawk, ani, and wattled jaçana), and 49 species of inshore marine fish from 19 different families (Appendix 3: Table I). Coupled with the vertebrate fauna we collected 8,235 NISP (3,954 MNI) of shells from 15 species of bivalves and 9 species of gastropods (Appendix 2: Table II).

Operation 19-2he archaeofauna are very interesting because they invite comparison with samples from coeval features excavated by the CJDP on the opposite side of the river. From the 4,428 quantified bony fish remains, only a sub-sample of 1,290 (29%) received complete taxonomic analysis. When we combine the complete analyzed units from Stratum 2 and 5, we see that 871 (67%) of the fish were diagnostic and only 419 (32%) non-diagnostic (Table 7.3). When diagnostic fish families from this excavation unit are rank ordered by MNI the jack, marine catfish, grunt, threadfin, and puffer dominate. From these five families, the one that yielded the most species was the catfish, followed by the jack and grunt (Figure 7.10). The percentages of the top 10 fish species from Operation 19-2he compare well with the top 10 species reported by CJDP from middens features dating between A.D. 300–700 and A.D. 1000–1300 (Figure 7.11b). Interestingly, the first ranked species in all three samples is the Pacific moonfish or *S. peruviana* representing between the 12% to 16% of the total MNI. The rank order of the other fish species in all threes samples varies. The Pacific thread herring

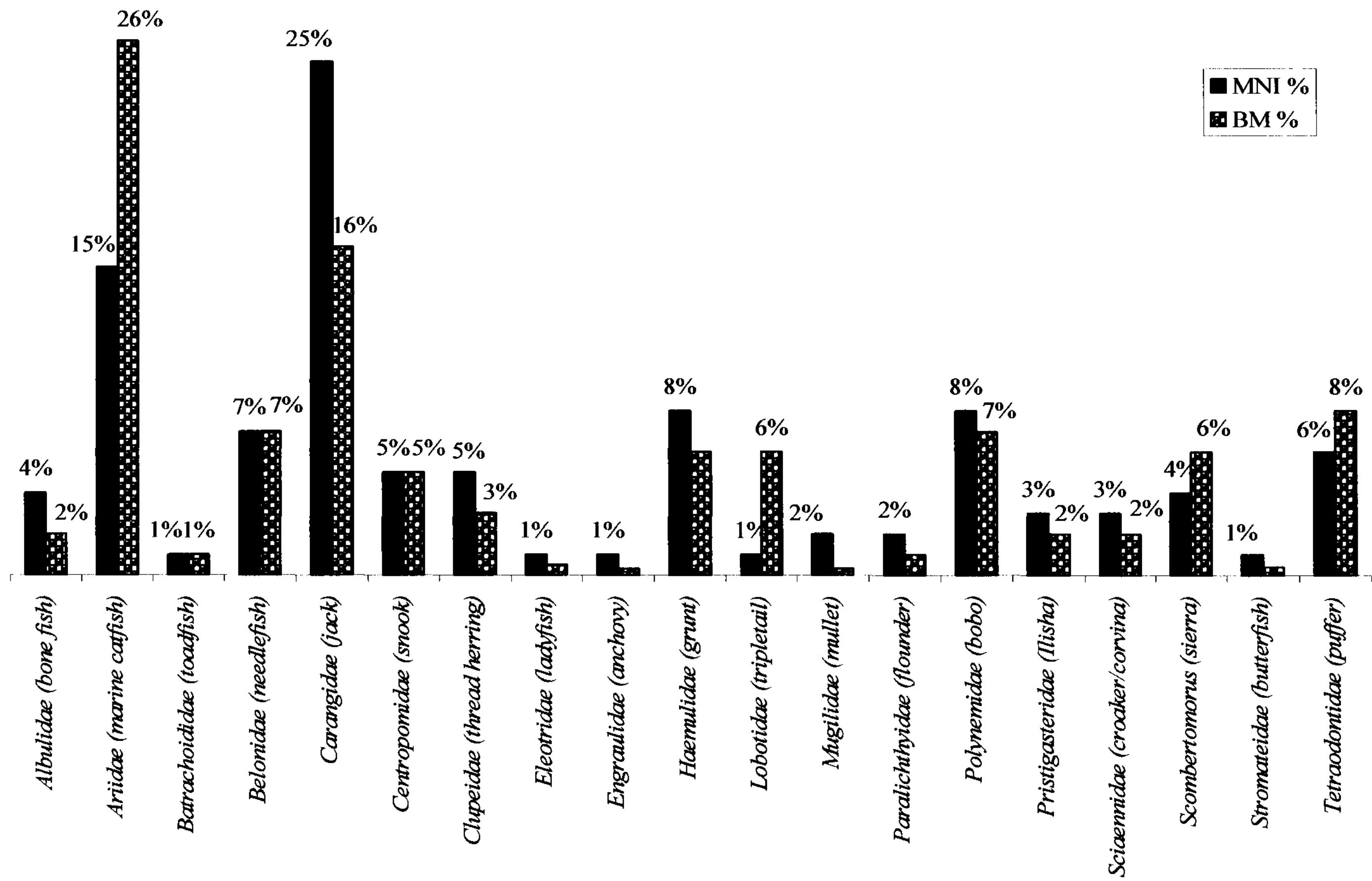

Figure 7.10 Rank order of fish families by MNI and biomass, Operation 19-2he, Site LS-3

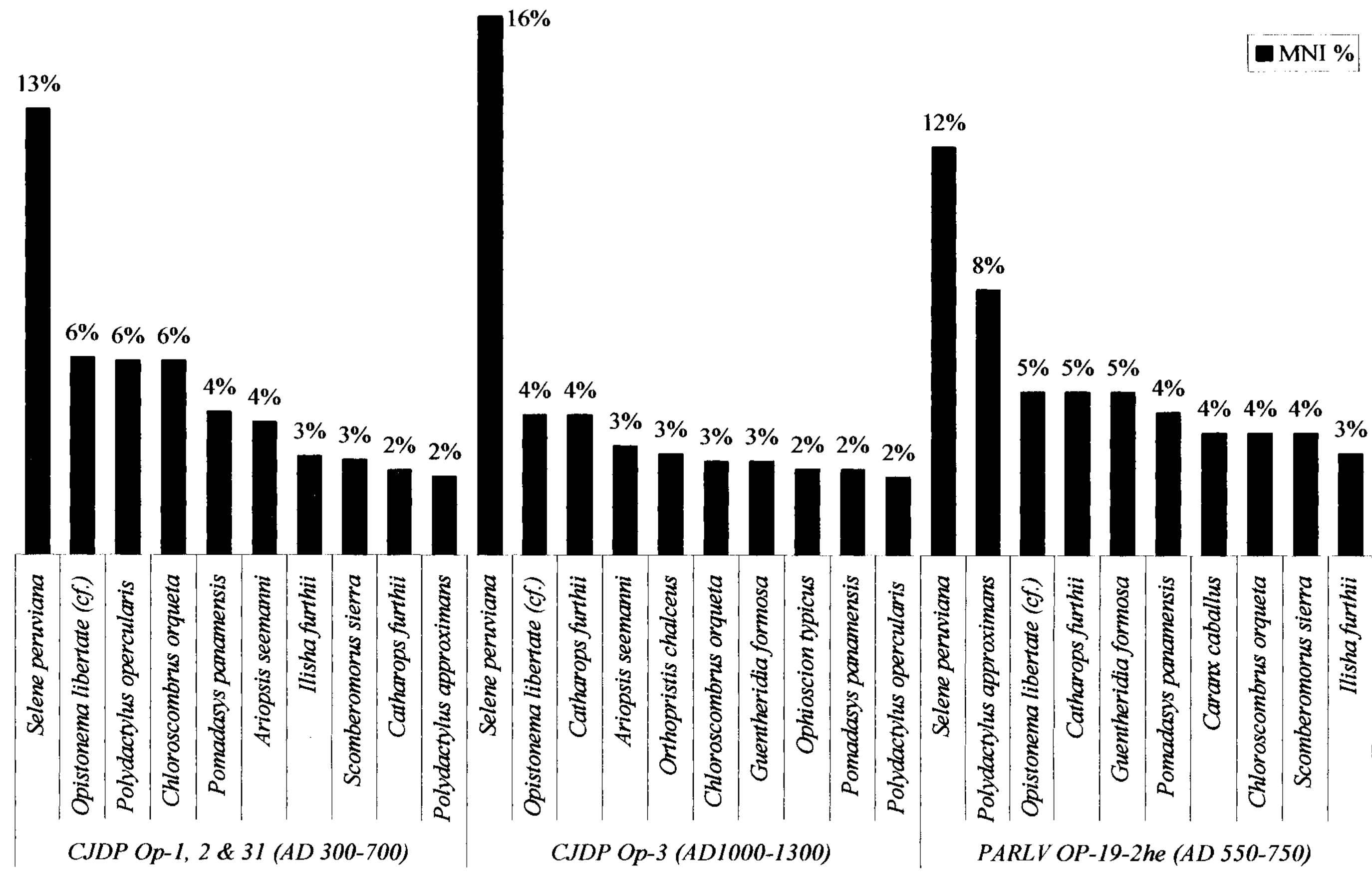

Figure 7.11 Top ranked fish species from Cerro Juan Díaz (LS-3) middens.
Comparison of MNI percentages from the top 10 bony fish species from Cerro Juan Díaz middens dating between A.D. 300–700 and A.D. 1000–1300 (after Jimenez and Cooke 2001: Figure 7) and the top ten fish species from Operation 19-2he excavated by the PARLV on the opposite side of the river at Cerro Juan Gómez. CJDP Op-1, 2 & 31 MNI=1,020; CJDP Op-3 MNI= 445; Op. 19-2he MNI=170

(*O. libertate*) is ranked third at Operation 19-2he with 8%, while it is ranked second from the midden features excavated by the CJDP. A similar situation occurs with the congo sea catfish, and Panamanian grunt (*P. panamensis*).

In sum, Operations 19-1he and 19-2he archaeofauna indicate that fishing along with shellfish collection were the most common activities on the Herrera banks of LS-3. The mammals, anurans, lizards, and reptiles, as explain above, are all species that frequent anthropogenic habitats. The presence of the groove-billed ani is indicative of an environmental setting comprised open ground areas with gardens. The wattled jaçana points to the presence of nearby ponds or fresh water swamps. The fish sample is dominated by species that frequent the estuary and could have been fished using tidal traps—the large majority members of the marine catfish family. Also present are fish that prefer clear water currents—e.g., Pacific moonfish, Pacific thread-herring, green jack, and needlefish. In addition, the shell sample reflects mass collection methods in different coastal environments such as the sandy beach for the collection of *Donax* and *Tivela* clams, the mangrove for *Thais* and *Stramonita* snails, and brackish estuarine waters for *Polymesoda* clams (Figure 7.12).

When we compare the NISP, MNI, and biomass of the different animal classes collected at Operation 19-2he it is evident that LS-3 inhabitants favored the consumption of marine fish and shellfish regardless of their lower dietary yields. Here the mammals contributed 72% of the estimated edible meat, followed by the bony fish with 18%, the mollusks contributed 6%, the sharks and rays 3%, and the anurans, birds, and reptiles together contributed only 1% (Table 7.3). The deer and rabbit were the major contributors of game meat, while the marine catfish and jack families, the sharks and rays were the major source of fish meat. Perhaps this bias is a result of dietary prohibitions observed by the Spaniards in the Province of *Parita*, the fact that hunting was not a specialized activity, and/or the geographic situation of LS-3 so close to the coast and the presence of specialized fishing villages such as LS-31.

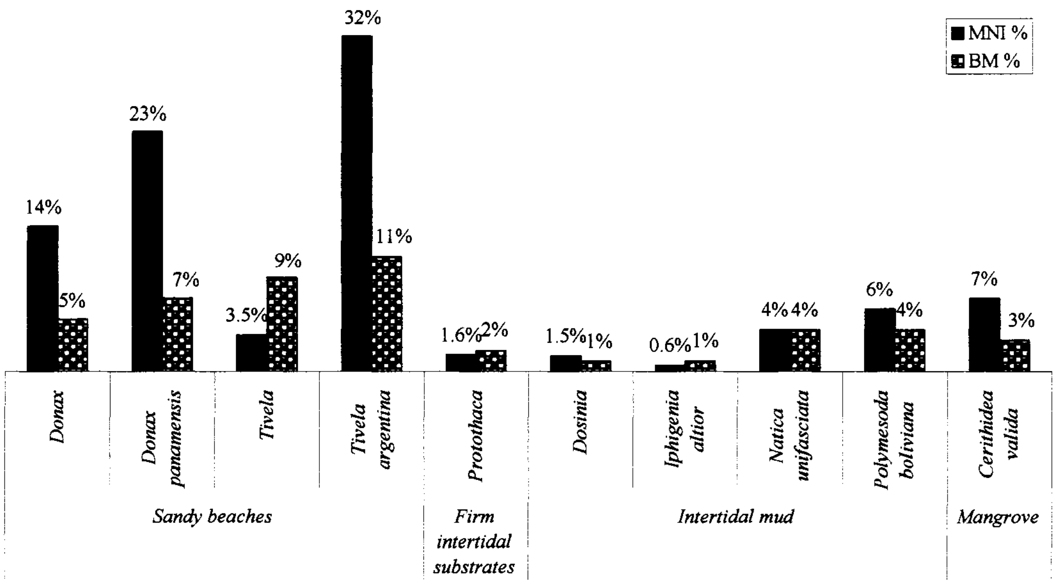

Figure 7.12 Top ranked shell species from LS-3 units (A.D. 550–750). MNI= 4,010; BM= 12,071 g.

Table 7.3
Dietary contributions of Operation 19-2he archaeofauna, Site LS-3

Class	NISP	MNI	BM
Aves	4	4	485
Anurans	4	3	285
Reptiles	29	15	1010
Mammals	34	14	150,990
Bony fish	871	170	38,190
Cartilaginous fish	8	5	675
Mollusks	8,235	3,954	11,978

7.5.2 Site LS-31

Site LS-31 archaeofauna suggest that this site was closer to the active shoreline when it functioned as *bona fide* pre-Columbian fishing village. To test the results of a magnetic and conductivity survey the PARLV opened three test units (Operations 19-1ls, 19-2ls, and 19-3ls) on the southern section of Mound 1. The excavation revealed that a 2-meter deep midden deposit covered the mound at its deepest point. Based on ceramic typology, the midden accumulated during the Cubitá phase (A.D. 550–700) of the Middle Ceramic C Period. Because of the great abundance and taxonomic complexity of fish remains, only a small sample was selected for complete taxonomic analysis, the rest were quantified and weighed under the heading Osteichthyes (Appendix 3: Tables IV and V). The studied sample from Operation 19-1ls includes 14,992 NISP bones, but only 14 bones were hand-picked and identified taxonomically. This unit also yielded 16,072 NISP of shells from 22 bivalve and 16 gastropod species (Appendix 2: Table V). The diagnostic vertebrate sample includes the remains of one marine toad, two birds (the migratory solitary sandpiper and ground dove), 3 teleosts (chihuil, congo sea catfish, and steeplined drum); an unidentified shark, a spiny pocket mouse, white-tailed deer, and one iguana (Appendix 3: Table IV).

Operation 19-3ls yielded 13,936 NISP of vertebrate remains. A sub-sample representing 7% was identified taxonomically. The diagnostic vertebrate sample includes 57 taxa (Appendix 3: Table V). In addition, there were 21,703 NISP of shells from 21 bivalves and 18 gastropod species (Appendix 2: Table VII). Among the non-aquatic vertebrates from Operation 19-3ls, Jiménez and Cooke report the presence of a spiny pocket mouse, rice rat, white-tailed deer, three snakes (colubrid, vine, and viper). These species are at home in scrubby littoral vegetation and around human settlements. The fish sample includes 38 marine species that enter tidal rivers, and another 6 species that eschew turbid water columns. In the first groups we have the Pacific sharpnose and scalloped hammerhead sharks, spotted eagle ray, long tailed stingray, five species of catfish (Seemann, chihuil, long-barbelled, congo, and Kessler's sea catfish), Pacific bumper (*Chloroscombrus orqueta*), Pacific ilisha, blue and yellow threadfin, white corvina, and cachema weakfish. The second group includes the Pacific moonfish, green jack, barracuda, Panamanian and brassy grunts, and the Chili sea catfish.

Overall, the sub-sample of ichthyofauna from LS-31 exhibits a pattern very similar to that reported for LS-3. At the family level, the marine catfish, jack, grunt, and croaker/corvina dominate with the most number of specimens and biomass (Figure 7.13). When we rank-order the species by the MNI three species dominate: the Pacific moonfish, congo, and chihuil sea catfish (Figure 7.14). It seems that in spite of low biomass yields, the Pacific moonfish dominates indicating that there was a cultural preference for this small shoaling taxa.

The shells from LS-31 equally reflect a mosaic of habitat exploitation that range from the high-energy beaches to mudflats and mangrove swamps. Only four species, dominate in terms of MNI and biomass: *Tivela argentina, Natica*, *Cerithidea,* and *Polymesoda* (Figure 7.15). Larger shell species that would have provided more meat—*A. grandis, Melongena,* and *Strombus*—were also collected, but their numbers are so small that it leads me to suggest that they were collected for other purposes. In fact, 1.2

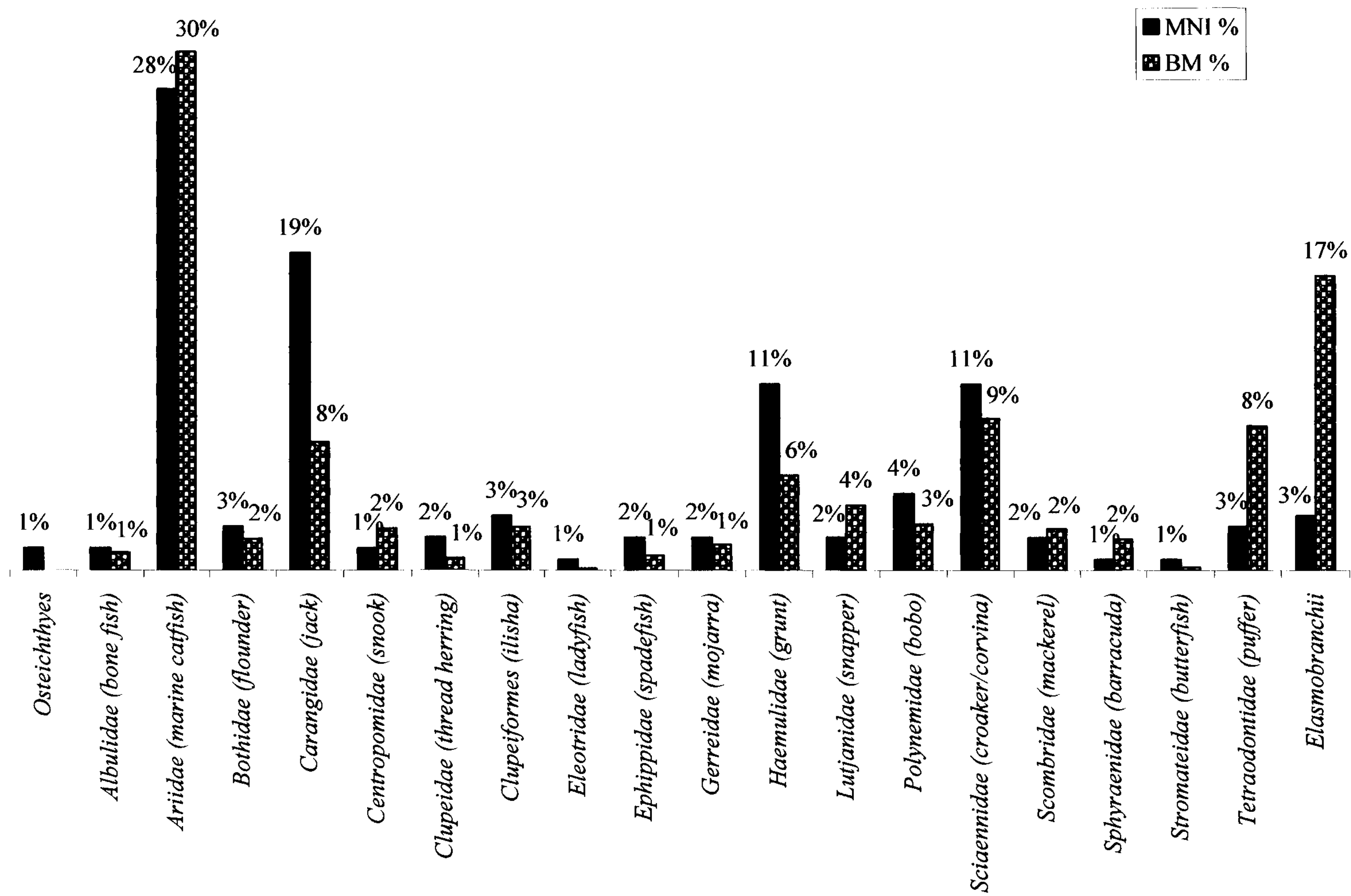

Figure 7.13 Rank order of fish families by MNI and biomass from site LS-31 excavation units. MNI= 156; BM= 55,310 g

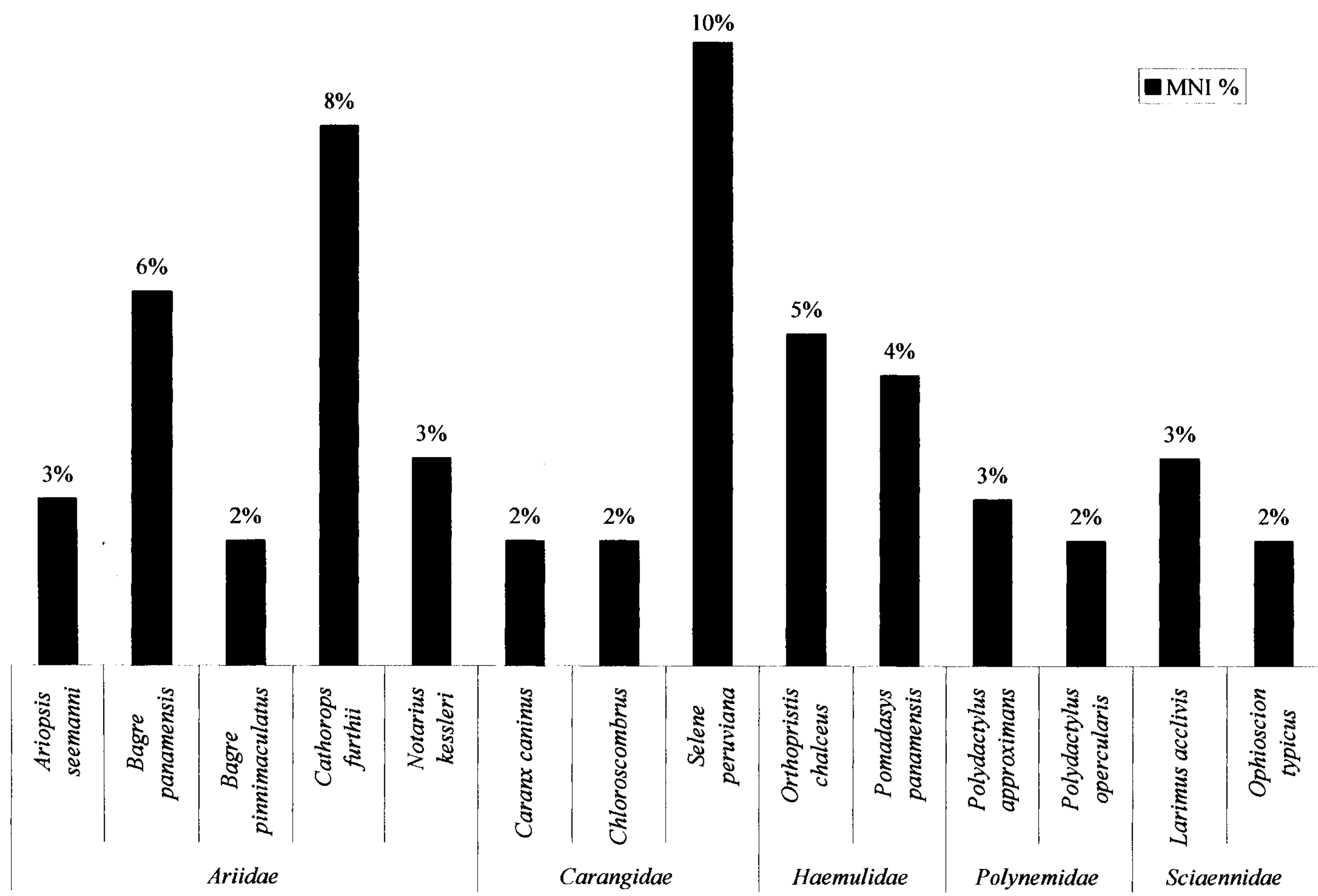

Figure 7.14 Top ranked bony fish species from site LS-31 excavation units (A.D. 550–750).

kilometers southeast of the test excavation opened at LS-31, a shell-bearing midden identified in Field 41ls contained worked samples of these shell species. The most ubiquitous were the *Melongena patula* with symmetrical cut marks and missing body whorls (Figure 7.5c). Perhaps specialized fishing villages such as LS-31 and Field 41ls were responsible for supplying inland settlements with dried fish and shellfish for food as well as raw materials for the specialized production of stools and ornaments.

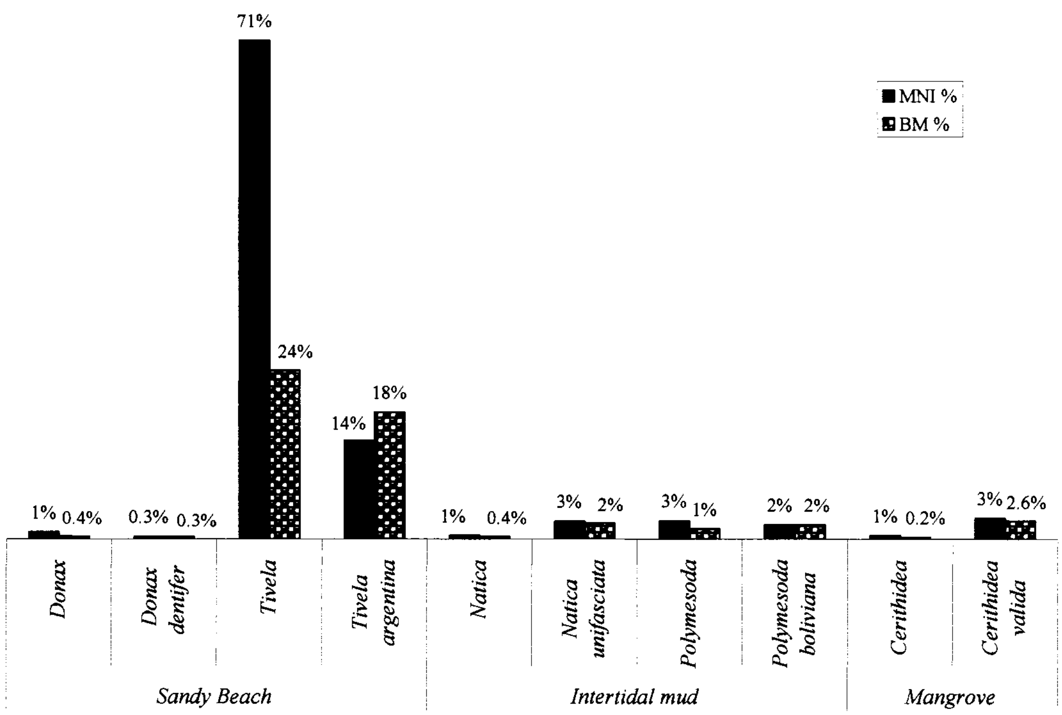

Figure 7.15 Top ranked shell species from LS-31 units (A.D. 550–700). MNI= 28,002; BM= 62,396 g.

In term of dietary contributions, the current estimated biomass values for shellfish is higher than that estimated for the taxonomically identified fish (Table 7.4). Regardless of these differences, it is obvious that LS-31 inhabitants focused on a coastal way of life and that game hunting occurred, but less frequently than at inland settlements.

Table 7.4
Dietary contributions of Operations 19-1ls–19ls-3 archaeofauna, Site LS-31

Class	Op. 19-1ls NISP	MNI	BM	Op. 19-3ls Sq. A NISP	MNI	BM	Op. 19-3ls Sq. B NISP	MNI	BM
Aves	3	3	180						
Anurans	2	1	300						
Reptiles	2	2	200	2	2	80	5	3	80
Mammals	6	4	70,040	7	4	150			
Bony fish	14	14	1,285	4	3	260	920	134	44,415
Cartilaginous F	48		?				31	5	9,550
Mollusks	16,072	13,132	25,585	10,252	6,690	17,075	11,451	8,251	19,677

7.5.3 Site LS-8

The archaeofauna from site LS-8 include six different species of teleosts (blue bobo, needlefish, Panamanian grunt, Pacific bonefish, bumper, and moonfish), two sharks (bull and scalloped hammerhead), white tailed deer, and mud turtle (Appendix 3: Table XII). Since most of the fish species from the LS-8 collection prefer the outer edge of the estuary and were found at sites LS-3 and LS-31, it is possible that they were either obtained from coastal fishing villages such as LS-31 or at inland markets in larger villages such as LS-3. An interesting feature of the LS-8 fauna sample is the presence of two worked bones. The first is the vertebra of a 2.5 kg bull shark worked into a discoidal bead (Figure 7.16c). The second worked bone is the medial section of a white-tailed deer femur (left) cut at the distal end to form a tubular object similar to the one illustrated in Figure 7.16a.

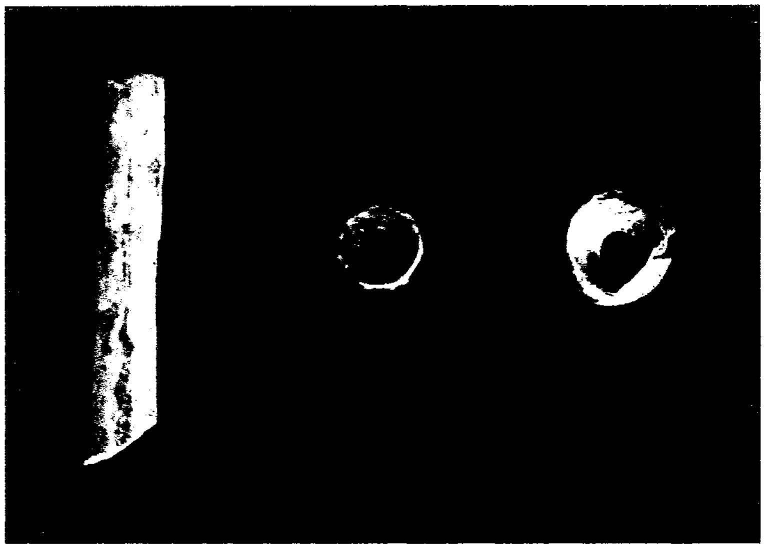

Figure 7.16 PARLV worked bone.
(a) Cut and polished tubular objects made from a long bone of a small mammal, cat 2038, Station R213, Site LS-10; (b) Discoidal bead made from the vertebra of a scalloped hammerhead shark, cat 3425, Operation 19-3ls Stratum 1, Site LS-31; (c) Discoidal bead made from the vertebra of a bull shark, cat 2213 Station P16, Site LS-18 (Photo by Richard G. Cooke).

7.5.4 Site CHI-33 archaeofauna

The surface collections from site CHI-33 yielded deer and armadillo remains (Appendix 3: Table XVI). Additional vertebrate and invertebrate samples were provided by two test pits opened at Stations R170 and R171 in a shell-bearing midden accumulated during the Conte and Parita phases (ca. A.D. 700–1400). The unit at Station R170 yielded 45 NISP of bones from six different taxa: white-tailed deer, agouti, black iguana, brown sea catfish, tripletail and a puffer fish (Appendix 3: Table VII). The second unit opened at Station R171 yielded bones (70 NISP) from whitetail deer, nine-banded armadillo, paca, cottontail rabbit, a hammerhead shark, and two freshwater turtles (Appendix 3: Table VIII). The presence of the paca and agouti are interesting because they allude to hunting near gallery forests. The scarcity of fish remains at CHI-33 is surprising given the size of the test unit.

The shell sample from site CHI-33 is far more impressive than the vertebrate fauna. Station R170, for example, yielded 21,118 NISP of shell from 15 bivalves and 10 gastropod species (Appendix 2: Table VIII). Although 70% of Station R170 shells correspond to *Tivela argentina* clams (Figure 7.17), in terms of species variety there is a greater diversity of intertidal mud shells, e.g. *Dosinia dunkeri, Iphigenia altior,* and *Natica unifasciata* (Appendix 2: Table VIII).

The unit at Station R171 yielded 2,040 NISP of shells from 15 bivalves and 7 gastropod species (Appendix 2: Table IX). Similar to Station R170, the sample is dominated by the presence of *T. argentina* clams (57%), followed by *Dosinia*, *I. altior* and *N. unifasciata* (Figure 7.17).

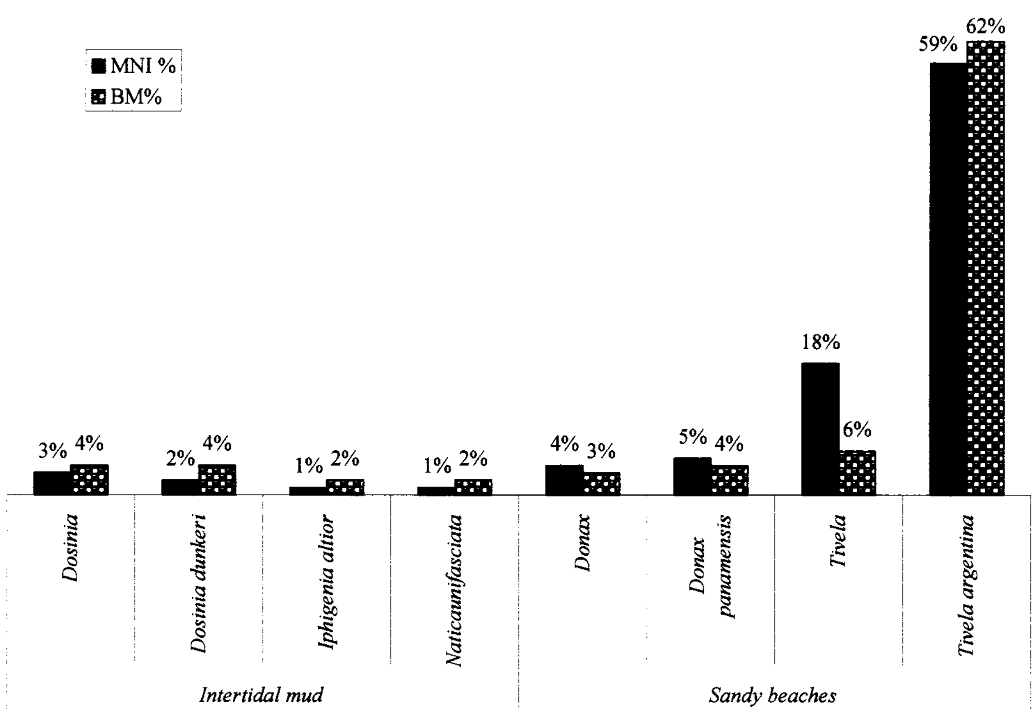

Figure 7.17 Top ranked shell species from Site CHI-33 excavation units (A.D. 700–1300). MNI= 14,182; BM= 34,140 g.

Site CHI-33's archaeofauna, like those from other sites, reveals a combination of different activities: hunting in remnants of wooded areas, at or near agricultural plots, and the acquisition of fish and shellfish from the coast. It also shows that the procurement of shellfish was favored over other animal protein (Table 7.5).

Table 7.5
Dietary contributions of Station R170 and R171 archaeofauna, Site CHI-33

Class	R170			R171		
	NISP	MNI	BM	NISP	MNI	BM
Reptiles	1	1	800	4	4	2,600
Mammals	41	8	212,500	65	8	100,650
Bony fish	3	3	6,800			
Cartilaginous fish				1	1	3,600
Mollusks	21,118	12,918	30,468	2,040	1,264	3,672

7.5.5 Site LS-10

Site LS-10 is located two kilometers west of LS-8. Surface collections at LS-10 contained evidence of nine-banded armadillo, white-tailed deer, pond slider, 8 species of fish (three marine catfish, one jack, ilisha, threadfin, grunt, and needlefish), and two European taxa: cow and pig (Appendix 3: Table X). A 20-cm^2 (50 cm deep) shovel test pit opened at the top of a hillock at Field 33he, Station T4R2 yielded 618 NISP of vertebrate bones (Appendix 3: Table X). The sample came from a shell-bearing midden that accumulated during the Tonosí and beginning of the Cubitá phases (ca. A.D. 250–550). It included the remains of a mud turtle, green iguana, armadillo, paca, white tailed deer, spiny pocket mouse, two sharks (bull and Pacific sharpnose), and 36 different species of bony fish. The fish sample is dominated by the presence of six species of marine catfish (chihuil, long-barbelled, congo, tuyra, chili and brown sea catfish), five jacks (longjaw leatherjack, blackblotch pompano, and the Pacific crevalle, bumper and moonfish), three snooks (bigeye, black, and humpback), yellow threadfin, spotted puffer, and the Pacific ilisha. Coupled with the fish remains, the test pit yielded 7,650 NISP of shells from 16 species of bivalves and 13 gastropods (Appendix 2: Table XI). Interestingly the dominant species in the unit is the *Donax panamensis* clam from the sandy beach, followed by *N. unifasciata, Tellina, Mytella* clams, and *C. valida* snails from the intertidal mud and *C. valida* from the mangrove (Figure 7.18).

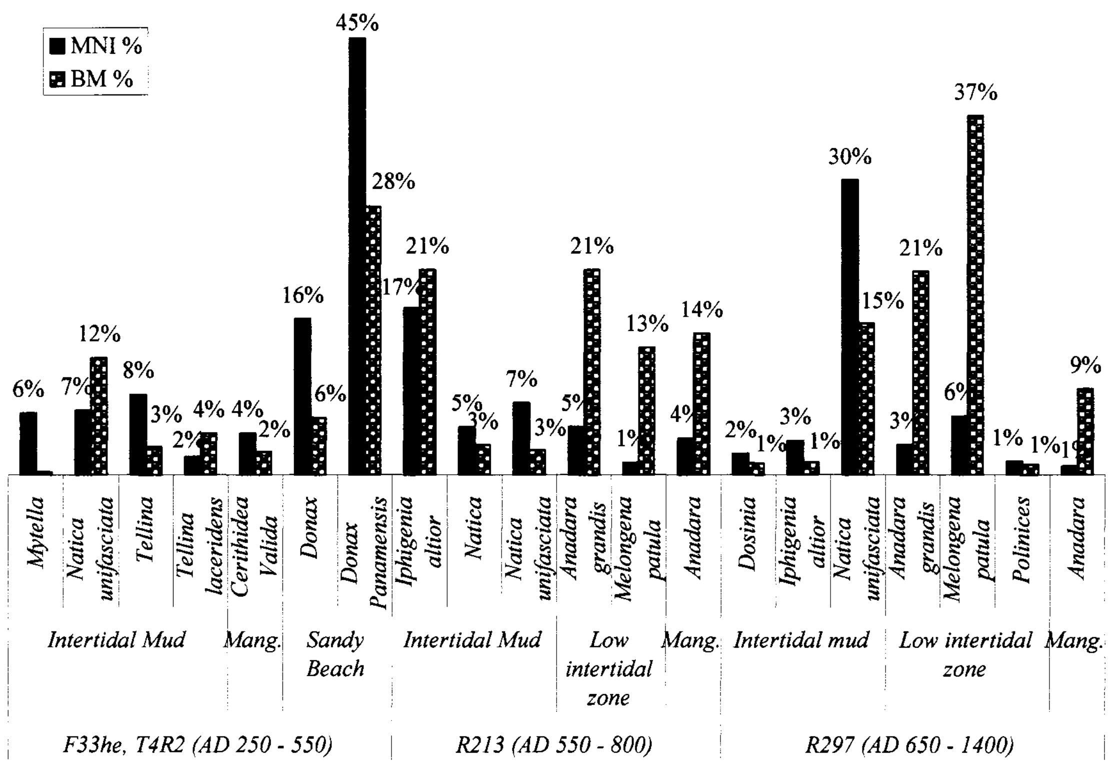

Figure 7.18 Top ranked shell species from Site LS-10 excavation units.
F33he, Station T4R2 MNI= 4,614; BM= 6,904g; R213 MNI= 82, BM 666g; R297 MNI=234, BM= 2097g.

The fill of two ritual features found at Stations R213 (A.D. 650–1400) and R297 (A.D. 550–800), about 200 meters west of Station T4R2, also yielded faunal remains.

The bone sample from Station R213 includes 89 NISP from 11 different species including while-tailed deer, nine-banded armadillo, green iguana, two catfish (the Seemann's sea and many-rayed sea catfish), two croakers (armed and swordspine), Pacific moonfish, bigeye snook, Panamanian grunt, and spotted puffer (Appendix 3: Table II).

The shell sample from station R213 was equally small with 91 NISP from 6 bivalves and 4 gastropod species (Appendix 2: Table II). In this case the dominant shell samples includes mudflats and mangrove swamp taxa—e.g., *Anadara grandis, Melongena patula, Natica,* and *Iphigenia* (Figure 7.18). Some of the shells and one long bone showed signs of being worked (Figure 7.16a). The tubular *Spondylus* bead illustrated in Figure 7.6b for example comes from the looter pit adjacent to the unit.

At Station R297, we collected 222 NISP of animal bones (Appendix 3: Table III). The majority consist of white-tailed deer. We also found the remains of green turtle, a black iguana, five catfish (Seemann, congo, Kessler, brown, and long-barbelled sea catfish), estuary toadfish, threadfin jack, bigeye and black snooks, purplemouth grunt, fang jaw eel, swordspine croaker, spotted puffer, Pacific moonfish, and tamboril anillado (*Sphoeroides annulatus*). With the exception of the last two species, most fish taxa from Station R297 could easily have been caught somewhere along the river mouth. Coupled with the vertebrate sample, the unit returned an NISP of 253 shells from 9 bivalves and 10 gastropod species (Appendix 2: Table III). Station R297 shell sample also is biased toward the same mudflat and mangrove species identified at station R213 (Figure 7.18).

Although the site LS-10 archaeofauna is small, the bias toward marine organisms is strong even though their contribution to the diet is less than that of terrestrial animals (Table 7.6). This bias could be attributed to several factors: (1) the relative proximity of LS-10 to the productive estuary; (2) regional dietary prohibitions; (3) the fact that hunting was not a specialized activity.

Table 7.6
Dietary contributions of Station F33he, T4R2, R213 and R297 archaeofauna, Site LS-10

Class	F33he, Station T4R2			F33B-he, Station R213			F33B-he, Station R297		
	NISP	MNI	BM	NISP	MNI	BM	NISP	MNI	BM
Aves				2	1	700			
Reptiles	5	5	2,200	1	1	1,000	4	2	550
Mammals	200	7	100,050	76	11	210,000	158	13	300,000
Bony Fish	404	93	88,175	10	10	5,640	60	48	53,675
Cartilaginous fish	9	6	8,450						
Mollusks	7,650	4,614	6,904	91	82	666	253	234	2,096

7.5.6 Sites LS-15 and LA-29

The archaeofauna collections from sites west of the Cerro El Tamarindo consist, for the most part, of white tailed deer, undiagnostic mammals and cow. Only two sites in the upper river valley yielded evidence of additional species, LS-15 and LA-29. Site LS-15 sample includes remains of brassy grunt, thread-herring, congo sea catfish, and a white-tailed deer found inside the Macaracas pica-pica bowl retrieved from the exposed wall of a looter pit (Figure 4.19d).

The second site that yielded additional animal remains other than deer and cow is LA-29. The evidence consists of a white corvina vertebra found in an eroding midden feature together with *Protothaca, Tellina, Tivela, Natica, Anadara, Dosinia, Iphigenia, Ostrea* and *Pitar* shells. Interestingly and in spite of the distance that separates LS-15 and LA-29 from the coast, we did not collect a single freshwater fish nor shell species.

7.6 Interpreting the PARLV archaeofauna

Although the PARLV archaeofauna assemblage is taxonomically complex, some pattern can be observed at the regional level. In the first place, and in regard to the terrestrial fauna, the widespread distribution of vertebrate bones from species that prefer open grassy areas with trees, dry forest, and frequent anthropogenic habitats suggest that the pre-Columbian communities settled on the lower valley of the La Villa River did not travel far to procure wild game. This could have been because hunting was not a regular activity or is perhaps the result of dietary prohibitions such as the ones observed by the Spaniards at the time of contact. Communities living along the lower La Villa valley, like many other established around Parita Bay, favored instead the consumption of marine fish and shellfish. Fishing activities focused on the middle and uppers sections of the estuary where a wide diversity of marine fish species that frequent the oligohaline stretches of the coast and tidal river could have been easily fished using tidal traps and/or weirs. The presence fish that eschew turbid estuarine waters—Pacific moonfish, Pacific thread-herring, green jack, barracuda, Panamanian and brassy grunts, and the Chili sea catfish—on the other hand, suggest the use of dugout canoes to fish away from the coast using perhaps nets or hook-and-line. According to Cooke and Jiménez (2001) the most appropriate nearby habitat for acquiring these species would have been the edges of Isla Villa located 2.5 kilometers from the coast (Figure 7.1).

Mollusks were also an important food source and their shells were utilized for different crafts, including the production of personal ornaments and utilitarian tools. The shell samples from different excavation units reflect mass collection in different coastal environments that range from the sandy beaches, mudflats, mangrove swamp, and coral reef areas. Both Carvajal and Mayo report finding all the shell species collected by the PARLV survey near La Villa river mouth and Monagre beach. The geographic situation of La Villa river mouth, on the southern edge of Parita Bay where the water is less turbid and there are extensive sandy beaches, must have placed *Parita's* ancestors in an advantageous situation over the northern fishing communities. Their proximity to the rocky islet of La Villa, for example, allowed them exclusive access to the valuable thorny and pearly oysters natural of coralline environments. This pattern crystallized during a critical time when communities were defining themselves economically and politically at the end of the Middle Ceramic Period (A.D. 550–700).

Coupled with the rich coastal and estuarine resources, the southern portion of Parita Bay provided access to fertile arable lands, workable silica-rich stone outcrops, coral reefs, and salt flats. This must have allowed kin-based groups to control basic commodities as well as raw materials for the production of chipped stone tools and costume jewelry made from marine shells. This situation is best exemplify by the Cerro Juan Díaz sub-oven graves (A.D. 250–700), where individuals with special functions—shamans, curers, divers—had differential access to fine costume goods among them gold ornaments, large felid teeth, and costume jewelry made from *Spondylus, Strombus,* and *Pinctada* shells. This situation is harmonious with D'Altroy and Earle's (1985; Earle 1997) model of wealth finance.

Espinosa's accounts state that by A.D. 1517, chief *Parita* had control of 26.64 km of the Parita Bay coastline, where he had many fisheries, saltpans that produced high quality salt and the finest cotton garments (see Footnote 1). The chroniclers even provide references on storehouses where chiefs had food provisions including maize, dried and salted deer carcasses (Espinosa 1994a: 55), and fermented beverages made from manioc, yams, and maize (Anghera 1912, I: 219). The wide distribution of marine fish and shells throughout the lower La Villa valley provides further support to the widespread exchange of coastal and inland goods witnessed by the Spaniards.

In sum, the PARLV archaeofauna reveal a bias toward coastal-based subsistence. Perhaps this bias was three-fold. First, as Oviedo (1944, VIII) explained, it was practical because it required less work than hunting. Second, it allowed coastal villagers to exchange their resources with inland communities. Last, but not least, it must have must have enhanced the dietary well-being and hence demographic growth of *Parita's* ancestors.

Chapter 8

Summary and Conclusions

8.1 Introduction

The first Spanish accounts of the colonization of the central Pacific plains of Panama (ca. A.D. 1515–1522) mention an indigenous chief who has come to be known as *Parita.* The territory he controlled centered on the lower valleys of two small rivers, the Parita and La Villa, which empty into the bay that still bears *Parita's* name (Figure 1.3). According to these documents, *Parita* enjoyed some kind of paramountcy over neighboring chiefdoms one reason being his prowess as a warrior. Pascual de Andagoya, who was a soldier on Spanish Captain Gaspar de Espinosa's *entradas*, identified four nearby territories that *Parita* had "subjugated by war." Andagoya also attributes *Parita's* reputation to the defeat of a band of warriors from Nicaragua two years before the Spanish contact (Andagoya 1994: 35). Fernández de Oviedo makes a reference to *Parita's* having dominion over chiefdoms around Parita Bay. From these Spanish descriptions it is clear that chief *Parita's* influence transcended the boundaries of the territory over which he had direct political control.

Spanish descriptions of the extend of *Parita's* chiefdom are geographically quite precise (see Chapter 3: Footnote 19). Based on these assessments, I estimate that *Parita's* territorial domains would have covered 381 km^2 and his zone of political influence about 1846 km^2.

Within the boundaries of *Parita's* chiefdom lies the important archaeological site of Cerro Juan Díaz (or LS-3), located at the seaward margin of the lower La Villa river valley. A ten-year program of investigations (1992–2002) carried out by the Cerro Juan Díaz Project (CJDP) under the direction of Richard Cooke (STRI) documented many details about social, and ritual practices, subsistence, technology, and external contacts during the Middle and Late Ceramic periods (200 B.C.–A.D. 1522). Perusal of ethnohistoric records and the results of exploratory excavations led Cooke (1993b) to propose initially that Cerro Juan Díaz was the largest and most influential site in the La Villa Valley and, possibly, one of chief *Parita's* principal settlements at the time of contact—the *Asiento Nuevo,* or 'new settlement' mentioned in the Spanish chronicles. Espinosa stated that *Parita's* 'new settlement' was located near a rocky outcrop hill where the chief and his warriors regrouped after confronting Espinosa's troops in the valley of the La Villa River in 1517 (Espinosa 1994a: 51). This description is consistent with the topography of Cerro Juan Díaz.

One of the goals of the archaeological survey of the lower La Villa valley (PARLV) conducted for this dissertation was to test this hypothesis through the provision of field archaeological data that would shed light on the relevance of Cerro Juan Díaz to the history and social organization of the chiefdom of *Parita.* Spanish contact-period documents describe *Parita*'s chiefdom as being particularly populous and fertile drawing attention to large river-bank settlements and extensive cultivated land. A second goal therefore was to determine whether archaeological data confirmed these demographic observations. Third, I was interested in establishing the antiquity of human settlement in the lower La Villa valley and in tracing its diachronic development in relation to the social transformations of a regional society, that according to previous research at mortuary sites had shown evidence for increasing social differentiation in the last centuries of the pre-Columbian period culminating by at least AD 700 in a social hierarchy dominated by adult males who were able to amass considerable wealth.

Prior archaeological research around Parita Bay demonstrated that the chances of finding information about the antiquity, nature and historical development of pre-Columbian settlement were fairly good. One positive aspect of this region is the excellent preservation of organic remains, including human and animal bone and carbonized plant remains, which are prerequisites for reconstructing burial customs and subsistence, and by inference, social differentiation. Another advantage is the longevity and continuity of prehistoric human settlement in the environs of Parita Bay.

8.2 La Villa Valley settlement pattern

The field methodology employed in the PARLV survey was designed to provide data on settlement patterns in the lower La Villa valley focusing on the distribution of archaeological sites, their size, material components, internal differentiation and inter-relations. Bearing in mind that evidence for Paleoindian and Early Preceramic occupations has been found close to the PARLV survey area and that an important Early Ceramic site (Monagrillo, He-5) is located at the mouth of the neighboring Parita River, I expected to find some evidence for these early occupations. In spite of the intensity of the PARLV pedestrian survey only one site in the lower La Villa, site LS-5 (Figure 4.4), yielded a few ceramic sherds which appear to correspond to the Monagrillo complex (2400–1200 B.C.). Archaeologists who worked in the northern Santa María valley in the early 1980s described a similar situation. Their linear transects and purposive surveys found widespread Preceramic sites in eroded areas, but no evidence for sites older than the Middle Ceramic in alluviated river bottoms (Cooke and Ranere 1992c; Weiland 1984). It would be unwise to assume, then, that a lack of or low frequency of early sites is an accurate reflection of real settlement history and demographic growth. It remains to be seen whether intensive river-bank surveys during the height of the dry season would recover evidence for deeply buried settlements older than the Middle Ceramic period.

8.2.1 The Middle Ceramic Period (200 B.C.–A.D. 700)

Excluding the possible Early Ceramic site (LS-5), the first evidence for human occupation in the PARLV survey universe is referable to the La Mula phase (200 B.C.–A.D. 250) of the Middle Ceramic A Period (Table 2.3). During this phase, settlement occupation of the lower La Villa focused on prominent hills located on the coastal plain. The majority of the population concentrated at or near Cerro Juan Díaz (LS-3). At this site CJDP archaeologists revealed evidence that during this phase the southern flanks of the hill were intentionally modified in order to accommodate this space for ritual and mortuary activities. This work involved the reinforcement of the talus slope with stones and the leveling of an extended area that, once finished, served as a precinct for mortuary rites from A.D. 100–1100 (Table 4.3). On this platform a group of graves was found stratified underneath a circular arrangement of stone-lined features interpreted as ovens, whose construction occurred during the Cubitá phase (A.D. 550–700; Sánchez 1995). The distribution of mortuary arts in these features alludes to some level of social differentiation, interpreted as a reflection of the age and occupation of the deceased. Cooke and his colleagues have argued that the artifacts that exhibit the highest crafting standards are related to people who directed ritual activities, such as shamanism or curing (Cooke 1998d; Cooke *et al.* 2000, 2003a). Two graves received several secondary burials in packages, many of them containing small personal ornaments made of marine shells, pearls, and perforated mammal teeth. A copper ring found in one of these packages was associated with an individual whose dentin returned a radio carbon date cal. AD 130–370 (Beta-147880). This suggests then that metallurgy and shell-work had entered the regional inventory by the La Mula phase.

Current evidence also indicates that the first archaeologically visible occupation of Cerro Juan Díaz is coeval with the maximum extend of La Mula-Sarigua (PR-14) village, located 11 kilometers to the northwest at the mouth of the Parita Valley (Figure 4.4). Small pointed flakes with rudimentary stems, which have come to be known locally as 'La Mula' points (Figure 2.4), characterize the occupation at La Mula-Sarigua during this phase. Patricia Hansell (1988) argues that 'La Mula' points were manufactured at La Mula-Sarigua using a 5 ha outcrop of workable silica-rich chalcedony, which was subsequently distributed to other sites. Measurements suggest a considerable degree of standardization. The PARLV documented a concentration of 'La Mula' points, chunks, nodules, and cores of siliceous stones in specific areas within the boundaries of LS-3 (Figure 6.63). Whether this represents the import of raw material or finished points from La Mula-Sarigua or the activities of a local flint-knapper can only be determined by additional field research into raw material distribution and physical and chemical analyses.

During the Tonosí phase (A.D. 250–550), Cerro Juan Díaz grew substantially, while La Mula-Sarigua diminished in size suggesting the abandonment of the village—a situation that appears to have been due to both social and local ecological factors (Haller 2004, Hansell 1987, 1988). But the growth of Cerro Juan Díaz did not occur in isolation. The PARLV data allude to a linear stream configuration of equidistant spaced villages and hamlets throughout the lower La Villa valley during the Tonosí phase. Since coastal Cerro Juan Díaz was a sizeable site during the preceding phase, it seems likely that the inland expansion of settlement during the Tonosí phase corresponded to family groups moving up river in search of new and highly fertile soils along the river. I associate this pattern with the navigable conditions of the river, the local topography, and access to deep and fertile fluvial soils ideal for agriculture.

During the subsequent Cubitá phase (A.D. 550–700), I found evidence for a four-level site hierarchy. Most of the villages and hamlets occupied during the preceding phase experienced significant growth. Most of this growth corresponded to settlements in the coastal plains. A coalescence of the population is visible at sites Cerro Juan Díaz (LS-3) and Las Huertas (LS-10), which can now be ranked as type 1 nuclear settlements. These top-ranked sites were 4 kilometers apart (Figure 6.17). There was also a series of smaller type 2–type 4 site nearby, the largest being Site LS-8, located exactly at the mid-point between LS-3 and LS-10 on a high terrace adjacent to the river, northeast of the modern township of La Villa de Los Santos (Figure 4.4). In contrast to the coastal plain, the settlement occupation of the upper valley continued to be light, with hamlets no larger than five hectares in size.

Cerro Juan Díaz (LS-3) and Las Huertas (LS-10)—the top ranked settlements on the coastal plain—were positioned on prominent hills overlooking the river. These locations would have facilitated the monitoring of movements of people and commodities being transported along the waterway. They would also have provided protection from flooding, and opportunities for responding quickly to assault. This pattern is comparable to that documented by Alain Ichon (1980) in the Tonosí Valley on the southern Azuero Peninsula where settlements where Late Ceramic Period settlements are located on top of hills suggesting a defensive function. The La Villa settlement pattern also correlates with that documented in the lower Santa María valley where sites occupied during the Tonosí phase are equidistantly located at intervals of about 4 kilometers from the mouth to the zone of tidal influence. But they are located on low elevations rather than in positions that would have enhanced defense.

Another social factor that may have influenced the selection of these prominent hills is ritual. The data acquired by the CJDP at Cerro Juan Díaz indicate that this prominent hill was the focus of burial rites from the La Mula through the Parita phases. A salient feature of these activities is the contemporary burial of individuals prepared in primary and secondary modes, as well as a marked diversity of methods of burying the dead. As mentioned above, the southern talus of the hills was modified intentionally to accommodate the deceased. In others, the position of individual graves in discrete groups suggests social relations, i.e., clan or any other type of residential or descent group (Díaz 1999). A hypothesis that derives from this situation is that the primary burials represent people who lived and died at or near Cerro Juan Diaz. The secondary burials, on the other hand, may refer to people who lived in other settlements, their remains preserved, and then taken to Cerro Juan Díaz during the dry season when large community burials took place at the ancestral seat (Cooke *et al.* 1998). It is reasonable to suggest, therefore, that Cerro Juan Díaz, being the ancestral settlement and located on a large hill, remained the most important ritual center throughout the pre-Columbian period because it was the "home of the ancestors." There is some evidence from this region of Panama that hills were special places for burial, for example, Late Preceramic Cerro Mangote and Cerro Guacamayo, the latter of which Cooke (1995) has suggested was the burial ground for Early Ceramic peoples.

A counter to this argument is the fact that I recorded evidence for burials at LS-10, LS-8, LS-11, and LS-15. Excavations are called for at these sites to determine the antiquity, age and nature of funerary activities. If ritual of a scope and diversity similar to those recorded at LS-3 are in evidence, then the hypothesis that Cerro Juan Díaz was a regionally significant burial ground and an ancestral seat because of its temporal primacy, can be rejected.

8.2.2 Causes that influenced settlement growth in the lower La Villa Valley

The rapid growth of the lower La Villa sites during and after the Cubitá phase can be attributed, in my opinion, to several causes. I propose that an important factor was the agricultural potential of soils in proximity to recorded settlements. Captain Espinosa (1994c: 65) described the banks of both the Parita and, particularly, La Villa rivers as ideal for growing three important food staples: maize, manioc, and squash. Although the stone tool assemblage from the CJDP excavations has not yet been completely analyzed, manos and metates, and polished tools made of dark igneous rocks, are widespread and frequently show evidence for having been used *in situ.* An indication that maize was an important crop locally is provided by concentrations of maize (and *only* maize) starch on the surface of a legged metate in Feature 94 (Figure 4.6d; Piperno and Holst 1998). Carefully prepared and heavily used metates are ubiquitous in the PARLV stone tool sample. Comparisons with similar tools from other areas of Panama suggest that these tools were used primarily for preparing maize flour. Macrobotanical evidence from Sitio Sierra (AG-3) in the Santa María valley shows a large number of maize varieties. Eight to twelve-rowed varieties with large floury kernels were used throughout this village's occupation, ca. 250 B.C.–A.D. 1520 (Cooke 1984a). A cache of carbonized maize kernels placed alongside an adult male buried around ca. A.D. 535 (Beta-46402; Isaza 1993: 81–82) appears to have been an intentional offering (Cooke 1984a: 285; Dickau 2005: 156).

A breadboard metate at La Mula-Sarigua, which is attributed to the La Mula phase, produced starch of maize, manioc (*Manihot esculenta*), lerén (*Calathea*) and native yam Dioscorea (Piperno and Holst 1998). With the exceptions of the yam phytolith and/or starch grain, data indicate that all plants were under cultivation since the Late Preceramic Period (6000–2500 B.C.; Piperno and Pearsall 1998).

Captain Espinosa (1994: 65) also praised the "melons" (squash) of *Parita's* chiefdom as being the "best and tastiest" that he had tried in the Americas. Carbonized squash remains have not yet been reported in the La Villa Valley, but squash pollen and phytoliths of *Cucurbita* are widespread at Sitio Sierra. This suggests that this crop was important during the La Mula phase and through the contact period. These data provide indirect but relevant support to Espinosa's observations.

Consequently, I propose that maize, manioc, squash, other annual crops, fruit trees and palms (Dickau 2005) would have been planted all along the lower course of the La Villa River. The location of settlements on elevations may not only be for defensive purposes, but also to reverse and claim use of the fertile alluviated bottomlands for agriculture during the rainy season.

The frequency and distribution of terrestrial vertebrates from the CJDP and PARLV collections support the impression of a local environment that had been long-disturbed by human activities. Although the PARLV samples of reptiles, mammals, and birds are small, they confirm a number of features that Cooke and his colleagues have taken to be indicators of hunting and collecting animals for food mostly on anthropogenic and heavily farmed landscapes. The predominance of white-tailed deer, the presence of open-country mammals and birds—e.g., cottontail rabbits, grey foxes, and bobwhite quail—is consistent with a landscape that included wooded savanna, gallery woods, agricultural and fallow fields, and a mosaic of coastal habitats, i.e., mud flats, mangroves, tidal channels, high tidal flats, and sandy beaches. An implication of these data is that hunting and collecting terrestrial animals for food was limited to the site's environs. The documentary evidence points not only to the abundance and dietary popularity of the white-tailed deer, but also to the cultural manipulation of deer populations. Pascual de

Andagoya (1994: 31) observed, for example, that each Cueva chief possessed special hunting reserves where they would go hunt during the dry season. But in the chiefdom of *Parita* only the commoners consumed deer meat while the chief and lower tier chiefs consumed fish and iguanas. It is clear from zooarchaeological evidence from the La Villa valley and elsewhere around Parita Bay that everybody had access to deer meat. Perhaps the taboos witnessed by the Spanish referred to temporary prohibitions, i.e., that warriors were forbidden to eat meat before battles. Cooke *et al.* (2007a) suggest that the great quantity of well-preserved deer bones in some features at Cerro Juan Díaz and Sitio Sierra may be indicative of rapid use and burial and therefore collective activities such as feasting. More zooarchaeological details are needed, however, to confirm this hypothesis.

Since the sites recorded by the PARLV survey are located within reach of a small, but ecologically diverse and productive mangrove-estuary system with high yields of marine invertebrates and vertebrates, it is logical that these should have been very important food resources for communities situated along the lower La Villa River. Prior analyses of the molluskan and fish archaeofauna found in refuse features at Cerro Juan Díaz (LS-3), located 4 km from the active shoreline, show clearly that shellfish, crabs and fish food were acquired primarily from inshore estuarine habitats and the tidal river, but with additional input from sandy beaches and deeper, clearer waters off-shore.

The fact that the commonest marine fish species at LS-3 is the Pacific moonfish (*Selene peruviana*) is strongly suggestive of fishing over sand or sand-and-rubble substrates; the Panamanian grunt (*Pomadasys panamensis*), also quiet common, occupies a similar habitat (Figure 7.1). The first species can be caught in large numbers with land-based traps (Cooke and Tapia 1994). The latter species, however, avoids the turbid estuary and is likely to have been acquired by hook-and-line in deeper water using canoes . The same applies to species that prefer clear-water currents, such as the green jack (*Caranx caballus*), Spanish mackerel (*Scomberomorus sierra*) and hound needlefish (*Tylosurus cocodrilus*). Although these species will swim near shore especially if the water column is clear, they are more frequent and are present in larger shoals off shore (Appendix 8). This is why Jiménez and Cooke (2001) suggest that the most appropriate nearby habitat for acquiring these species would have been the edges of Isla Villa, located 2.5 kilometers from the coast (Figure 7.1).

An important result of the PARLV survey was the location of a site situated on what appears to have been an ancient strand-line (Finca Germán Castillo or LS-31). This site has all the characteristics of a *bona fide* fishing village topographically similar to pre-Columbian Monagrillo (He-5) and AG-125 (Cooke *et al.* 2007a) and also to modern fishing villages, such as El Rompío in Coclé and Boca de Parita in Herrera (Cooke and Tapia 1994; Zohar and Cooke 1997). Fish bones represent over 99% of the vertebrate sample collected from LS-31 excavation units (Table 7.4). The most frequent fish species are the Pacific moonfish, Chihuil sea catfish (*Bagre panamensis*), congo sea catfish (*Cathorops furthii*), the brassy grunt (*Orthopristis chalceus*), and Panamanian grunt (*Pomadasys panamensis*), a mix that shows that fishing concentrated on inshore waters, both turbid and clear (Figure 7.14).

Several sites located a considerable distance inland along the La Villa River contained marine fish bones in their middens. Las Huertas (LS-10), for example, located 7.7 kilometers inland reported 30 genera and 42 species of marine fish (Appendix 3: Table X). La Chilonga (LS-15) located 10 kilometers inland yielded three genera of marine fish including thread-herring (*Opisthonema libertate*) and brassy grunt (Appendix 3: Table XI) and Site LS-29, 12 kilometers from the coastline, yielded the vertebra from a white weakfish (*Cynoscion albus*) weighing over 1 kg (Appendix 3: Table XVII). The inland movement of fish was also documented in the Santa María valley. Seventy percent of the fish consumed at Sitio Sierra—located 12 kilometers inland—were of marine origin (Cooke and Ranere 1999). The thread-herring, Pacific moonfish and brassy grunt were the most frequently captured species (Cooke and Ranere 1999). Diana Carvajal and Richard Cooke are currently undertaking an in-depth taphonomic study of fish remains at the Vampiros rock shelters (AG-145), at the mouth of the Santa María; the site appears to have been reserved for preparing fish for inland transport during the La Mula phase (Carvajal and Cooke 2007). Although it is impossible to prove that LS-31 actually provisioned inland sites up the La Villa River, it is most probable that it did.

In addition to the vertebrate fauna, the PARLV mollusk collection suggest that the procurement of shellfish for food in the La Villa Valley focused on the coastal areas subject to tidal action; the mangrove swamp; and gravelly areas. The most common shell species in our sample are the *Polymesoda boliviana* clams from the tidal river, *Donax panamensis* and *Tivela argentina* clams from sandy beaches, and *Iphigenia altior* clams, all of which were used for food consumption (Table 7.1). The exception to the rule is

Anadara grandis from the mangrove, which was present in a wider variety of settings than the other four species listed above, but seems to have been used rather for the production of tools and costume items. Ironically, *Anadara* provides more edible mass of meat than the sandy beach clam this is so common in shell-bearing middens. Other shell species that provide large amounts of meat, but were used primarily for making ornaments are the *Melongena patula, Spondylus* and *Pinctada.*

In sum, I propose that access to deep and fertile fluvial soils ideal for agriculture and rich coastal resources provided the primary stimulus for the growth of the La Villa coastal plain sites during the Middle Ceramic period.

8.2.3 The Late Ceramic Period (A.D. 700–1522)

It seem as though the social and economic developments that stimulated the growth of coastal plain settlements during the Cubitá phase continued through the Conte phase (A.D. 700–950). The three top ranked settlements in this section of the valley—LS-3, LS-10, LS-8—reached their maximum settlement size (Figure 6.27). So did sites LS-11, LA-28 and LA-29 in the upper valley. I link the ascendancy of this second group of sites to the growing demand for local raw materials, such as fossilized wood, used in the production of many types of tools including knives, perforators, and wedge-shaped tabular implements. I propose that an additional factor that favored the development of these sites was their location on a main route up river towards the mountains of the Azuero Peninsula, likely sources of basalt and siliceous stone, and also placer deposits with gold ores (Figure 4.4). The closest gold deposits, for example, are located at Chepo de las Minas 45 kilometers from Parita Bay (Cooke *et al.* 2003a: Figure 3).

The increase in settlement nucleation of inland villages within the western part of our survey universe is consistent with the growth of the inland villages documented in the Parita Valley (Haller 2004). In the Parita Valley, however, this development appears to be linked to the emergence of El Hatillo (HE-4) as the primary site in the valley during the Cubitá phase. Haller (2004) argued that the influence of El Hatillo increased from the Macaracas Phase (A.D. 900–1100) until Spanish contact (A.D. 1515). The group of burial mounds at this site is unique in the territory attributed to *Parita*. It recalls the mound group at the El Caño site (NA-20) in the territory of chief Natá in Coclé (Cooke *et al.* 2000; Mayo 2007). This feature alludes to funerary rituals practiced at a special site. The fact that the burial mounds seem to have been built up in stages, with clay floors and hearths between burial events, gives support to this proposal. Although professional excavations (Ladd 1964) did not provide evidence for elite burials like those found at Sitio Conte (PN-5), several exquisitely crafted hammered and cast gold objects were found in graves at El Hatillo by looters (Biese 1967; Haller 2004). The style and iconographic content of the anthropomorphic figurines presenting double heads that are the most frequent artifacts in this sample point to local manufacture and a Late Ceramic age (Biese 1967; Bray 1992; Haller 2004).

Concurrently with El Hatillo's ascendancy, the top ranked settlements in the coastal plain of the La Villa Valley began to decrease in size, while one site—La Chilonga (LS-15)—in the upper valley experienced expansion, becoming a type 2 village

(Figure 6.39).

Another important change in settlement nucleation occurred during the second half of the Parita phase (A.D. 1295–1420) when the occupation of sites LS-3 and LS-10, formerly strongly nucleated type 1 sites, became spatially fragmented. Type 2 and 3 sites maintain their size. During this time La Chilonga (LS-15) develops into a type 1 (Figure 6.48). This development coincides with the emergence of a special function site at the Balneario Los Olivos (LS-18), located 3.5 kilometers west of La Chilonga. We located petroglyphs and carved boulders at LS-18. The significance of these features to the regional community may have been exclusively symbolic and religious. The topography and geography of site LS-18, however, is consistent with a frontier location: bounded by two hillocks overlooking water rapids, Site LS-18 is at the closest point between the lower La Villa and Parita Rivers (Figure 4.4). It also lies where most scholars believe the boundary of *Parita's* chiefdom ran (Cooke 1993b: Figure 1, Helms 1979: Figure 6; Sauer 1966: Figure 27). Therefore, the explanation I favor for the presence of prominent carved boulders at LS-18 is that they were boundary stones or landmarks, called *mojones* by the Spanish (Jopling 1994:21). One can envision their functioning as meeting places for special social events in which people from neighboring chiefdoms participated (e.g., corporate political alliances).

An alternative explanation for the growing demographic and social ascendancy of inland areas and of the site of El Hatillo is that increasing inter-chiefdom violence exposed coastal sites, such as LS-3 and LS-8, to attack. In this case an inland reorientation of the population can be interpreted as a response to the escalation of warfare. Evidence for violence and warfare in pre-Spanish Panama is much stronger in the documentary than in the archaeological record. In the Parita Bay chiefdoms and nearby zones the Spanish chronicles describe war bands, sites fortified with trenches and palisades, the enslavement and execution of prisoners, canoe-borne raids for sumptuary goods, and display of gold finery as symbols of leadership and military prowess. Although the mystification behind the Spanish conquest accounts must be taken into consideration, the chronicles do indicate a very competitive and martialized environment. We do not know how far the situation described in Panamanian chiefdoms goes back in time. The gold artifacts used by the wealthiest people buried at Sitio Conte were the same ones that symbolized captaincy in contact and early colonial times. Spaniards describe warriors in *Parita's* and *Pocoa's* chiefdom bedecked with gold finery (e.g., Oviedo 1853: 118). Therefore it is reasonable to infer that intra-chiefdom rivalry was well-established by the beginning of the Late Ceramic period.

8.2.4 Comparing the La Villa and Parita settlement patterns

When the lower La Villa settlement pattern reconstructed by the PARLV data is compared with the pattern recorded by Mikael Haller in the Parita Valley, several similarities and some important differences are apparent. One difference is the presence in the Parita valley of Paleoindian and Early Preceramic occupations. A workshop for making Clovis-like projectile points was recorded at La Mula-Sarigua. Un-fluted bifacial projectile points that post-date the Paleoindian technological tradition on stylistic grounds were also recovered (Cooke and Ranere 1992c; Ranere and Cooke 2003; Pearson 2002).

A second difference is the presence in the Parita Valley of a substantial Early Ceramic A settlement, i.e., Monagrillo (He-5), which was clearly a focal site where people hunted, fished and grew (or consumed) cultivated crops (Piperno and Pearsall 1998). One site found by the PARLV produced pottery that is probably Early Ceramic A in age, but it does not appear to have been as large a site as Monagrillo (HE-5).

A third difference is the fact that settlement continuity is apparent at La Mula-Sarigua in the Parita Valley from the Monagrillo phase to the Tonosí phase (Hansell 1988). One sherd recovered at Cerro Juan Diaz belongs to the El Gallito ceramic group, whose antiquity provisionally is assigned to the period 500–200 B.C (Cooke personal communication 2007). But the evidence for Early Ceramic settlement in the lower Parita Valley is much stronger. Throughout this dissertation I have cautioned, however, that geomorphological changes in the coastal zone are likely to have obscured early settlement. At this time it appears that human settlement prior to the Middle Ceramic period was more substantial in the Parita than in the La Villa Valleys. Although it is tempting to infer from the above that people "colonized" the La Villa valley from the Parita valley, this assumption is dangerous in light of the fact that archaeologists have not conscientiously looked for rock shelters or lithic sites in the Azuero Peninsula outside the coastal zone of Parita Bay.

Turning now to the similarities between the two sets of survey data, it is noteworthy that each valley shows evidence for a substantial La Mula phase site near the coast. La Mula-Sarigua at the mouth of the Parita Valley was clearly an important site during this phase. As stated above, its importance is likely to have been linked to the presence of a large bank of high quality chalcedony for making flaked stone tools such as the 'La Mula' points (Figure 2.4). Hansell (1988) and Haller (2004) disagree with respect to the size of the La Mula phase occupation at the site. In 1988 Hansell proposed a site size of 58 hectares, but more recently Haller (2004) reduced that estimate to 19 hectares (Table 2.2). They used different methods of evaluating site size and continuity in space. Because Hansell's evaluation was supported by extensive sub-surface testing and was undertaken before the affluence of tourists that led to widespread looting and site destruction, it is most likely that her estimate is more accurate.

It is difficult to evaluate the extent of the La Mula phase occupation at Cerro Juan Díaz (LS-3) because of the depth of the cultural deposits. The very large quantity of well-crafted La Mula group pottery that was found stratified at the base of a leveled platform at this site is evidence for important activities during the La Mula phase. One of these was ritual: at least one of the multiple grave features on this platform (Feature16 in the CJDP nomenclature) is firmly dated to the La Mula phase. It produced well-crafted metal and shell artifacts. One secondary package contained special articles (a copper ring, fine shell work, perforated puma and ocelot teeth, and two exquisite polished stone bars), suggesting that the owners had specialized roles or distinctive social status.

A second similarity concerns what appears to be a major population dispersal event. This occurs during the Cubitá phase (A.D. 550–700) of the Middle Ceramic Period, when the number of archaeological sites rises dramatically in both watersheds and the size of many of these sites is indicative of considerable populations and nucleation. The PARLV data indicate a four-tier settlement hierarchy while Haller suggests that there were three settlement tiers. The most notable difference between the two valleys is that, while settlement nucleation in the lower La Villa continues to focus on the coastal plain, the concentration of settlements in the Parita Valley has an inland trend. One reason for the situation in the Parita valley may be the abandonment of La Mula-Sarigua for environmental rather than social reasons. It is evident that during the La Mula phase this village was located at the marine edge and alongside extremely fertile latisols produced by an ancient marine terrace (Pedro Botero personal information to Richard Cooke 2007). By about A.D. 400 coastal progradation had led to the establishment of a high tidal flat seaward of the site. Hansell (1988) argued that La Mula-Sarigua became unsuitable for a permanent village during this time—a hypothesis that is consistent with the very low frequency of Tonosí and Cubitá pottery at this site. It is possible, therefore, that the settlement reorientation in the Parita Valley was influenced by the abandonment of the coast. Cerro Juan Díaz, on the other hand, was located far enough inland to have avoided this situation (Figure 4.4).

Both valleys experienced a second major settlement orientation during the Late Ceramic period. It appears, however, that this trend occurred at different times. In the Parita Valley, El Hatillo develops into a 'special ceremonial center' and two secondary centers rise not far from this site. In contrast, the La Villa valley data suggest a corresponding change during the second half of the Parita phase (A.D. 1295–1420) when population gravitates away from the coastal plain and towards the foothills, centering on a new settlement at La Chilonga (LS-15) in the western section of our survey universe (Figure 6.47). I suggested above that this trend may be related to the growing political ascendancy of El Hatillo and/or to the increasing danger of canoe-borne attacks stimulated regionally by accelerating social tension between chiefdoms or internally among social groups. Another hypothesis is that La Chilonga was established at the inland boundary of the historic chiefdom of Parita. Its location is consistent with ethnohistorical evidence for the boundaries of this chiefdom.

8.3 Accomplishments of the PARLV settlement survey

8.3.1 The role of Cerro Juan Díaz (LS-3) in regional society

The focus of this doctoral dissertation derived from archaeological research centered on a prominent archaeological site called Cerro Juan Díaz (LS-3). Extensive and destructive looting at this site had revealed the existence of mortuary features containing polychrome pottery and gold-work. The field project that Richard Cooke and the Panamanian Institute of Culture (I.N.A.C) devised in 1991 to counteract this destruction focused on evaluating the antiquity, subsistence, internal organization, and external relations of Cerro Juan Díaz by conducting long-term and extensive excavations.

When this work began, it was assumed that Cerro Juan Díaz was one of the largest and most important sites in the region–if not *the* most important. Obviously this assumption required immediate substantiation with archaeological field data. It was apparent from documentary evidence that the La Villa Valley was one of two rivers controlled by a single chieftain (*Parita*) on the eve of Spanish contact and that it was also well populated and amply cultivated. But no archaeological survey had ever been conducted there. The primary goal of my dissertation research was to identify the role of

Cerro Juan Díaz in the settlement history and social development of *Parita's* chiefdom, which was described by the Spanish soldiers who invaded it between A.D. 1515 and 1522 as being particularly populous, fertile, aggressive, and influential.

I defined my survey universe as 40 square kilometers of the lower valley, extending 3 kilometers across the banks of the La Villa River, from the coastal mangrove to 14 kilometers inland, on the assumption that this was where the bulk of the population would be located. Previous surveys performed in the Chiriquí highlands (Gran Chiriquí) and the Santa María River (Gran Coclé) had indicated that agricultural villages were located in close proximity to rivers.

The PARLV settlement survey confirmed that Cerro Juan Díaz (LS-3) was indeed a very large site—with contiguous communities extending farthest than the CJDP project had projected (e.g., Sánchez 1995). Accepting that the visibility of the earliest sites has been compromised by rapid alluviation and coastal progradation, it appears that Cerro Juan Díaz was the only major settlement during the La Mula phase (200 B.C.–A.D. 250), the time at which I begin to record major human settlement in the lower La Villa valley. It is during this phase that the CJDP documented some degree of social differentiation in mortuary features, exemplified by associations between a few individuals and groups of special artifacts interpreted as evidence for special occupations, such as curing or shamanism. The subsequent rapid growth of LS-3 is linked to its geographic situation and topography. The site was close enough to the coast to exploit inshore habitats with plentiful invertebrate and vertebrate food resources. The prominent position of the central eponymous hill also provided an excellent opportunity for monitoring the movement of people and goods along the coast. This situation favored the production of personal ornaments made of marine shells, an activity that has been documented by excavations (e.g., Mayo 2004). At the same time LS-3 was sufficiently far from the marine littoral to avoid the discomfort of wind-borne saline sediments, which today constitute a major impediment to settlement along the Parita Bay coast.

Cerro Juan Díaz (LS-3) grew to be a large site, but not the biggest in my survey universe. This is an interesting situation because it is the only site that has currently provided clear evidence for continuous mortuary activities that allude to its being a special burial precinct whose catchment may have extended well beyond the site's limits. Four kilometers inland, the site of Las Huertas (LS-10) developed into nuclear settlement during the Cubitá phase (A.D. 550–700) of the Middle Ceramic period. It seems to have become slightly larger than LS-3 during the Conte phase (A.D. 700–950) of the Late Ceramic Period A. By A.D. 1100 a third nuclear settlement, La Chilonga (LS-15), began to emerge in the upper valley in the westernmost section of the PARLV survey universe. We cannot demonstrate, however, that either site exercised control over an area larger than the hamlets and villages that adjoined them.

Certain details of the topography of Cerro Juan Díaz are consistent with documentary references to the rocky hill where chief *Parita* escaped after a martial encounter with Espinosa in 1517. In fact, Cooke (1993b) once proposed that this may have been the seat of the 'new settlement' of *Parita*. Current evidence from excavations suggests that there was a decline in the numbers of people living at this site after the second half of the Parita Phase (A.D. 1295–1420). In fact, CJDP archaeologist have not documented pre-Columbian activities after this phase. This situation is interesting in light of the observation made by Espinosa (1994: 50) that chief *Parita* had transferred his settlement from the Parita River (*Río de Asiento Viejo*) to the La Villa (*Río de los Mahizales*) ten years prior to the first Spanish *entradas* to Azuero. If Cerro Juan Díaz was the site of transference, the ten years of occupation left very little El Hatillo-phase material on the site.

PARLV survey data show that LS-3 diminished considerably in size during the Cubitá, Conte, Macaracas and Parita phases. There is no evidence that it was a politically or socially special site at this point in time, nor, indeed, at any moment after the La Mula phase when there is some evidence for social differentiation based on mortuary data.

Evidence from the last occupation phase of Cerro Juan Díaz is more consistent, however, with the Colonial period postdating A.D. 1550. Sherds of the distinctive Mendoza style, which is coeval with or slightly postdates the contact period, have not been recorded at the site (Cooke *et al.* 2003b). CJDP archaeologist did find, however, evidence of wheel-thrown sherds of Spanish pottery together with domestic cow, chicken and pig bones, and other European artifacts at the summit of the central hill. The pottery shares the characteristic of the "*Bizcocho*" or bisque-type pottery produced during the first half of the sixteenth century (Deagan 2002: 43). The evidence led CJDP archaeologists to suggest that this occupation equates with the *pueblo de indios de Santa Cruz de Cubitá*, established ca. A.D. 1556–1575 two and a half kilometers from the Spanish colonial La Villa de Los Santos (Carvajal *et al.* 2006; Castillero 1995: 82; Cooke *et al.* 2003b: 23). This hypothesis receives support from finds of extended burials without native artifacts, one of which was buried in a primitive stone-lined grave and returned a dentin date of cal. A.D. 1440–1640 (Beta-148204; Cooke *et al.* 2003b: 26).

The PARLV documented evidence of Mendoza wares, colonial wheel-thrown pottery, and *Hispano-Indígena* wares only at La Chilonga (LS-15). The fact that this site continued to be settled during the Colonial period is very significant. At the moment it is difficult to determine whether LS-15 represents an area where people from the *pueblo de indios* were relocated or the vestiges of a colonial "*estancia*" (or ranch) where Spanish officials brought "free Indians" to force them to work as "slaves."

In the coastal plain, however, the PARLV only documented evidence of occupation post-dating the foundation of La Villa de Los Santos (A.D. 1558) by which time all of the indigenous inhabitants were gone. The evidence consists of Spanish-made pottery from the Los Santos banks of the river between La Villa de Los Santos and site LS-23. The largest concentration of Colonial wheel-thrown pottery was collected on the riverbed next to a recently cut-off meander at LS-23. It appears that these artifacts, which consist primarily of large body fragments from Spanish *botijas,* had been redeposited by the river.

8.3.2 Settlement and demography in the lower La Villa valley

Another positive achievement of the PARLV survey was to confirm the settlement configuration described by the sixteenth century chroniclers. According to these documents, there were different-sized villages on both banks separated by extensive cultivated fields, which were planted with maize, manioc, and squash (Espinosa 1994c:

62, 64–65). CJDP excavation data have confirmed that maize was amply used at LS-3 while more detailed information from Early, Middle and Late Ceramic period sites give evidence for the cultivation of manioc and squash in the northern Santa María and Parita river valley. The ubiquity of the kinds of manos and metates that are associated with the preparation of maize flour at the PARLV sites is consistent with the widespread planting and consumption of maize. The largest concentrations were registered at type 1 and type 2 sites, e.g., LS-3, LS-8–LS-11, and LS-15 (Table 6.11; Figure 6.65).

Settlement analysis demonstrates that this pattern of river-bank settlements separated by empty areas, presumably used for cultivation, extends back to the Tonosí phase (A.D. 250–550) and continued until Spanish contact (A.D. 1515). The distribution of diagnostic artifacts (pottery and stone tools) shows that the boundaries of the majority of top ranked sites in the La Villa valley expanded and contracted through time, even though they were occupied during consecutive phases. The temporary abandonment and resettlement of villages is documented by the chroniclers. Helms (1979) argued that their descriptions suggest that Panamanian chiefs, their warriors, and entourages changed their residences constantly. The fact that there is no archaeological evidence for special residential precincts anywhere in Panama is interesting in this context. It is possible that Espinosa was describing a similar situation when he referred to *Parita's* 'old' and 'new' settlements. In this regard it is possible that the '*asientos*' or '*bohíos*' were not settlements but rather the "dwelling places of the family and personal servants of the chief" (Helms 1979: 8). There are, of course, other reasons why settlements are intermittently abandoned especially when chief were being hounded by Spanish conquistadors. Cooke *et al.* (2003b: 10) propose over-population, accumulation of waste, degradation of surrounding resources, and conflict.

8.3.3 The nature, organization, and antiquity of *Parita's* chiefdom

One of the most dramatic events described by the Spanish chronicles of the conquest and occupation of the isthmus is the interruption of *Parita's* burial preparations by Captain Espinosa and his soldiers at a smoking structure located somewhere along the River Parita in 1519.[1] Espinosa was so impressed by the fine funerary shrouds and the dazzling array of gold finery that he left us with detailed accounts (Espinosa 1994c: 63–64; Chapter 4: Footnote 22). It was this description that led Lothrop to infer that the richest graves he excavated at Sitio Conte referred to chiefs like *Parita* who had lived during the two decades prior to Spanish conquest. Since the Sitio Conte excavations *Parita* has come into history as the archetypical, rich Panamanian chief. Some details in contact-period documents suggest that *Parita* was paramount over the bay that today bears his name, having subjugated several neighbors "by war" (Andagoya 1994). His chiefdom is described as comprising the lower sections of the Parita and La Villa rivers. *Parita's* province adjoined that of his rival brother in-law *Escoria* to the north; *Usagaña* to the west; *Chicacotra*, *Quema,* and *Guararé* to the south (Andagoya 1994: 32–33; Espinosa 1994c: 66). This allowed *Parita* to control a large coastal territory extending up to 26.64 kilometers from the province of Guararé to the Santa María River and an overall zone of influence of 1,846 km^2 (Figure 1.3).

[1] According to Haller (2004: 103) the location where Espinosa interrupted *Parita's* burial rites correspond with the location of a site called Leopoldo Arosemena (HE-2; Figure 2.2).

One would expect that these indications of social rank, wealth and influence would be reflected archaeologically. The truth of the matter is that archaeological evidence for these correlates of chiefdoms is deficient over the area controlled by chief *Parita*.

Judging from the CJDP mortuary data, there seems to be evidence of social ranking as early as the La Mula phase, during which a select group of individuals had access to large numbers of finely crafted artifacts made of gold, carved shell, bone, stone, and animal teeth. Similar offerings were found at Sitio Conte's oldest graves (Lothrop 1937: Figure 33 and 207), and at the coeval cemeteries of La India (TI-1), El Indio (TI-18), La Cañaza (TI-9), and El Cafetal (TI-35) in the Tonosí Valley (González 1971; Ichon 1980), and Venado Beach near Panama City (Lothrop 1954). In all cases, the associations seem to define the social identity of individuals based on occupation—e.g., shamans or curers. It is only after A.D. 700 that social status based on rank becomes apparent in the archaeological record (Briggs 1993). Ironically, Cerro Juan Díaz graves that post date A.D. 700 do not yield evidence for high status people, or even for people with special occupations. Even so, there is evidence that certain sections of the hill were reserved for some kind of descent group (Díaz 1999). Unfortunately, the PARLV excavations did not yield evidence of intact burial features that might be of use in discussions of wealth and rank.

The settlement data indicate that beginning in the Cubitá phase (A.D. 550–700) the number of archaeological sites rises dramatically in both the La Villa and the Parita river valleys and the size of these sites is indicative of considerable population and nucleation. The PARLV data reveal a four-tier settlement hierarchy with nucleation focused on the coastal plain of the La Villa Valley, while Haller (2004) documents a three-tier settlement in the Parita Valley with settlement concentration inland. Very few La Villa valley sites show clear evidence of large-scale alterations to the landscape. Examples of this behavior are visible at LS-3 where a flat area on the southern slope of Cerro Juan Díaz appears to have been artificially leveled during the La Mula phase and at sites LS-9 and LS-10, which contain large earthen mounds arranged in flat open areas (Figure 4.12c). With the exception of the circular arrangement of stone-lined ovens excavated by the CJDP at LS-3, and the carved boulders found at LS-18, no other site in the La Villa Valley show apparent use of stone construction or carved stone monuments. We also lack evidence of walls or ditch-like features that would suggest the presence of defensive structures. Perhaps these were not necessary because the whole valley was under the domain of a single chiefdom.

The only site in the Parita Valley that shows evidence of mounds arranged in open spaces is El Hatillo. Based on material analyses (Ladd 1964), and survey data (Haller 2004), it appears that the mounds were constructed and used as burial places for wealthy individuals from A.D. 900 until Spanish contact (A.D. 1515). El Hatillo lacks evidence of basalt columns and the cobble pavements as those reported at the Sitio El Caño-Sitio Conte complex, which would place it as a pan-regional ritual center.

In sum, we can define the Middle Ceramic (200 B.C.–A.D. 700) as a period in which local communities were defining themselves economically and politically. The social events taking place during this period definitely shaped the type of chiefly society that emerged during the Late Ceramic, when social groups seem to invest their efforts in a 'network strategy' of accumulating personal wealth (Hoopes 2005: 7–8). The mortuary data from Cerro Juan Díaz suggest that ritual practitioners (e.g., shamans or curers) were the first to have differential access to finely crafted shells and gold ornaments. It is not until the Late Ceramic Period (A.D. 700–1522), however, that gold replaced the importance of shell and was used quantitatively to define the identities of very wealthy males who had achieved their status through war (see Briggs 1989). At contact, gold was an item of status identity used by the main chiefs and lower tier chiefs during battle so as to be recognized by their own men and their enemies (Oviedo 1853: 138; Cooke *et al.* 2003a: 120).

Gold together with salt, maize, salted fish, basalt, jasper, and cotton served as a valuable resource for chiefs to enhance their wealth and political power. Spanish chroniclers depict a situation in which chiefs were in constant conflict for the control of these resources. In times of peace, however, chiefs would engage in trading networks and feasting. References to storehouses where chiefs had food provisions including maize, dried and salted deer carcasses (e.g., *Natá*) demonstrate the ability of the chief to accumulate food provisions and offer big feasts to strengthen his political power.

Considering the above, the control of subsistence goods should not be taken lightly. Based on the available data I support the hypothesis that the hereditary office of the chief resulted from the ability of kin-based groups to control and mobilize local resources. The geographic situation of the lower La Villa and Parita river valleys provided differential access to several valuable resources: maize, manioc, salt, fish, cotton, venison, coral reefs, and workable siliceous stone outcrops. The valley environmental circumscription must have allowed kin-based groups to control subsistence goods and raw materials for the production of utilitarian stone tools and jewelry made from marine shells and animal bones. The close similarities in polychrome pottery and shell ornaments between the Cerro Juan Díaz graves and those from the Pearl Island sites, and Playa Venado near Panama City provide evidence of standardized craft production and established trade interaction with communities of the Panama Bay. The same is observed throughout the lower La Villa Valley where both pottery and stone tools share technological and morphological characteristics, indicating that they were produced or acquired locally.

Based on the wide distribution of marine fish and shells throughout the lower La Villa valley, I suggest that it was the exploitation of rich alluvial soils and coastal resources that stimulated the demographic, economic, and political growth of *Parita's* ancestors. This would help explain why at the time of Spanish contact, chief *Parita* was already in control of 26.64 kilometers of the Parita Bay coastline where he had multiple fisheries and produced some of the finest salt and most colorful cotton garments in the region (Espinosa 1994c: 66, 68). Archaeologically, the production of cotton garments in the valley of the lower La Villa may be traced back to the Conte phase (A.D. 700–950). Perhaps it was chief *Parita's* ambition to expand to the north that resulted in the skirmishes with his brother-in-law *Escoria* in A.D. 1515.

Alternative hypotheses for the emergence of chiefdoms in Central Panama, which include warfare (Redmond 1994b) and the control of esoteric knowledge (Helms 1976, 1979, 1994), are simply unsustainable with the current archaeological data. As stated above, we have no evidence for defensive features. Coupled with this fact, survey and excavation data indicate that most of the artifacts produced in the La Villa valley were crafted from raw materials that are traceable to areas within the sociopolitical catchment of *Parita's* chiefdom. The exceptions are a few animal products (birds), polished stone tubes, and a few metal objects. Even so, it is clear that the development of *Parita's* chiefdoms resulted from social and economic practices of an indigenous population that, even if receiving products and technologies (i.e., metallurgy) from outside the isthmus, soon adapted them to the local and complex iconographies that appeared during the Middle Ceramic Period. Considering the longevity and standardized traditions of Gran Coclé pre-Columbian art, it is difficult then to accept that people felt an urge to add foreign knowledge, although ethnohistoric data suggest that the production of gold items were sometimes undertaken under secret operation and therefore "esoteric" (Anghera 1912; Cooke *et al.* 2003a: 110, 135, 137–138, Helms 1992). It is also evident that gold was an item of display, which has been interpreted as the opposite of esoteric behavior (Cooke *et al.* 2003a: 94). A more feasible explanation for regular long-distance contacts between chiefdoms could be a "down-the-line" exchange between continuous settlements, a point of view more consistent with the linguistic and genetic data of modern-day Amerindian groups—living between Costa Rica and Panama—whose contact relations take place more often among nearest neighbors than distant ones.

Appendix 1
Radiocarbon Dates from archaeological sites in Panama

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Vampiros (AG-145)	Beta-167520	11550 + 140	12080–11980 (11520) 11950–11200 B.C.	Organic sediment	bifacial thinning
Vampiros (AG-145)	Beta-166505	8970 + 40	8260 (8230) 8200 B.C.	Charred material	bifacial thinning
Corona shelter (GE-5)	Beta-19105	10440 ± 650	11750 (10400) 8090 B.C.	Charcoal	bifacial thinning
Aguadulce (AG-13)	R-24531/2*	10675 ± 95	10869–10408 B.C.	Charcoal	bifacial thinning
Aguadulce (AG-13)	R-24531/1*	10529 ± 184	10879–9887 B.C.	Charcoal	bifacial thinning
Vampiros (AG-145)	Beta-5101	8560 ± 160	8170–8120 (7585) 7985–7300 B.C.	Charcoal	bifacial thinning
Cerro Mangote AG-1)	Y-458d	6810 ± 110	5930–5450 B.C.	Charcoal	Pre-Ceramic
Monagrillo (HE-5)	TEM-109	5495 ± 100	4530 (4340) 4050 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	SI-2841	5385 ± 95	4450 (4240) 3980 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	Y-585	4090 ± 70	2880 (2610) 2460 B.C.	Charcoal	Monagrillo
Ladrones Cave (LP-1)	TEM-119	4800 ± 100	3780 (3615) 3355 B.C.	*Crassostrea* Shell	Monagrillo
Ladrones Cave (LP-1)	TEM-124	4510 ± 100	3520 (3340, 3200, 3200) 2910 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	SI-2842	4405 ± 75	3350 (3020) 2890 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	TEM-208*	4350 ± 160	2920 (2550) 2110 B.C.	*Crassostrea* Shell	Monagrillo
Monagrillo (HE-5)	SI-2844	4235 ± 80	2900 (2850, 2820, 2675) 2475 B.C.	Charcoal	Monagrillo
Aguadulce (AG-13)	TEM-130	4210 ± 90	3070 (2865) 2590 B.C.	*Crassostrea* Shell	Monagrillo
Monagrillo (HE-5)	Y-585	4090 ± 70	2880 (2605) 2465 B.C.	Charcoal	Monagrillo
AG-145	Beta-224775	2270 ± 40	B.C. 1010 (910) 820	Left maxillary canine, infant	
Zapotal (HE-15)	Beta-21389	4010 ± 100	2345–1800 (2050) 1790–1785 B.C.	*Natica* Shell	Monagrillo
AG-66	SI-6238	3945 ± 115	2845 (2475) 2180 B.C.	*Crassostrea* Shell	Monagrillo
Ladrones Cave (LP-1)	TEM-122	3880 ± 80	2568 (2393 2386 2338) 2048 B.C.	Charcoal	Monagrillo

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Ladrones Cave (LP-1)	TEM-121	3860 ± 90	2655 (2445) 2180 B.C.	Shell	Monagrillo
Zapotal (HE-15)	Beta-20849*	3850 ± 70	2025 (1865) 1675 B.C.	*Protothaca* Shell	Monagrillo
Vampiros (AG-145)	Beta-5870	3800 ± 120	2570 (2210) 1900 B.C.	Charcoal	Monagrillo
Ladrones Cave (LP-1)	TEM-120	3770 ± 80	2510 (2287) 2014 B.C.	Shell	Monagrillo
Monagrillo (HE-5)	SI-2840	3615 ± 80	2200 (1960) 1750 B.C.	Charcoal	Monagrillo
Zapotal (HE-15)	Beta-21388*	3610 ± 70	1725 (1530) 1400 B.C.	*Anadara, Natica* Shell	Monagrillo
Zapotal (HE-15)	Beta-20850*	3520 ± 80	1660 (1430) 1220 B.C.	*Protothaca* Shell	Monagrillo
Calaveras rock shelter (LP-8)	Beta-143855	3450 ± 40	1770 (1700) 1620 B.C.	Carbonized wood	Monagrillo
Calaveras rock shelter (LP-8)	Beta-131423	3200 ± 50	1540 (1450) 1395 B.C.	Carbonized wood	Monagrillo
Calaveras rock shelter (LP-8)	Beta-131421	3210 + 60	1620 (1485) 1390 B.C.	Carbonized wood	Monagrillo
Calaveras rock shelter (LP-8)	Beta-131425	3300 ± 50	1695 (1540) 1450 B.C.	Carbonized wood	Monagrillo
Monagrillo (HE-5)	SI-2839	3485 ± 100	2105–1205 (1770) 2040–1530 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	I-2838	3385 ± 75	1885 (1685) 1510 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	I-9384	3325 ± 85	1860–1845 (1615) 1775–1420 B.C.	Charcoal	Monagrillo
Monagrillo (HE-5)	SI-2843	3245 ± 100	1745 (1510) 1300 B.C.	Charcoal	Monagrillo
Vampiros (AG-145)	SI-5687	3100 ± 60	1500 (1390) 1210 B.C.	Charcoal	Post Monagrillo
Aguadulce (AG-13)	TEM-126	2960 ± 80	1420 (1255) 1005 B.C.	*Crassostrea* Shell	Post Monagrillo
Carabali (SF-9)	Beta-19101	2920 ± 180	1530 (1115) 785 B.C.	Charcoal	Post Monagrillo
SE-111	Beta-19497	2855 ± 95	1300 (1005) 815 B.C.	Charcoal	Post Monagrillo
Vampiros (AG-145)	Beta-27591	2840 ± 70	794 (710) 400 B.C.	*Natica* Shell	Post Monagrillo
Vampiros (AG-145)	SI-5682	2820 ± 65	1140 (975) 825 B.C.	Charcoal	Post Monagrillo
AG-88	SI-6237	2685 ± 105	1150 (860) 725 B.C.	*Crassostrea* Shell	Post Monagrillo

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Aguadulce (AG-13)	TEM-107	2570 ± 95	965 (780) 510 B.C.	*Crassostrea* Shell	Post Monagrillo
Vampiros (AG-145)	Beta-27592*	2540 ± 90	415 (250) 25 B.C.	*Natica* Shell	Post Monagrillo
Aguadulce (AG-13)	TEM-125	2540 ± 70	860 (765) 535 B.C.	*Crassostrea* Shell	Post Monagrillo
La Mula-Sarigua (PR-14)	Beta-6016*	2820 ± 50	760 (620) 415 B.C.	*Crassostrea* Shell	Agallito
La Mula-Sarigua (PR-14)	Beta-21898*	2640 ± 60	500 (365) 200 B.C.	Marine Shell	Agallito
La Mula-Sarigua (PR-14)	Beta-12931*	2340 ± 70	165 B.C. (A.D. 15) A.D.160	*Tivela byronensis* Shell	La Mula
La Mula-Sarigua (PR-14)	Beta-12729	2270 ± 90	130 B.C. (A.D. 90) A. D. 290	*Protohaca asperrima, C. rugosa* Shell	La Mula
La Mula-Sarigua (PR-14)	Beta-12728*	2220 ± 70	10 B.C. (A.D. 140) A. D. 310	*Chione subrugosa* Shell	La Mula
Sitio Sierra (AG-3)	I-9704	2190 ± 80	395 (200) 20 B.C.	Charcoal	La Mula
Vampiros-1		2170 ± 40	370–100 B.C.	Charcoal	La Mula
Vampiros-1		2100 ± 40	200–10 B.C.	Charcoal	La Mula
La Mula-Sarigua (PR-14)	Beta-18863*	2190 ± 90	20 B.C. (A.D. 175) A.D. 405	*Natica unifasciata* Shell	La Mula/ Tonosí
Cerro Juan Díaz (LS-3)	TO-4627*	2090 ± 120	390 B.C. (A.D. 55) A.D. 215	Human (Bone) rib Feature 1, Ind. 3	
Isla Carranza	I-7729	2020 ± 155	390 B.C. (5 B.C.) A.D. 370	Charcoal	La Mula
Cerro Juan Díaz (LS-3)	Beta-224786	2220 ± 40	390 B.C. (240, 290, 360) 180	Human tooth protein Feature 2, Package 8	
Cerro Juan Díaz (LS-3)	Beta-131419	2020 ± 80	200 B.C. (30 B.C.) A.D. 135	Wood Charcoal	La Mula
Sitio Sierra (AG-3)	I-9702	2015 ± 80	190 B.C. (A.D. 1) A.D. 155	Charcoal	La Mula/ Tonosí
Sitio Sierra (AG-3)	I-9703	1975 ± 80	170 B.C. (A.D. 50) A.D. 230	Charcoal	La Mula/ Tonosí
La Mula-Sarigua (PR-14)	SI-5689	1970 ± 45	45 B.C. (A.D. 50) A.D. 130	Charcoal	La Mula
Cerro Juan Díaz (LS-3)	Beta-54983*	1950 ± 80	20 B.C. (A.D. 70) A.D. 135	Seed	La Mula

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
La India (TI-1)	Gif-1643	1930 ± 110	180 B.C. (A.D. 85) A.D. 370	Charcoal	La Mula
Sitio Sierra (AG-3)	AA-3241*	1880 ± 95	390 B.C.– A.D. 75	Human Bone collagen Burial 3	La Mula/ Tonosí
Cerro Juan Díaz (LS-3)	Beta-224778	1880 ± 40	A.D. 50 (120) 230	Human tooth protein Feature 16 package 1 (infant)	
Cerro Juan Díaz (LS-3)	Beta-54982*	1860 ± 170	205 B.C. (A.D. 145) A.D. 560	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	Beta-131420	1860 ± 70	A.D. 5 (135) 340	Wood Charcoal	La Mula
Sitio Sierra (AG-3)	I-9701	1835 ± 90	0 B.C. (A.D. 215) A.D. 410	Charcoal	Tonosí
Sitio Sierra (AG-3)	AA-3243*	1835 ± 90	365 B.C.–A.D. 115	Human Bone Burial 22	La Mula/ Tonosí
Cerro Juan Díaz (LS-3)	GX-25402*	1830 ± 40	A.D. 85 (215) 260	Wood Charcoal	La Mula
Cerro Juan Díaz (LS-3)	Beta-131417	1830 ± 50	A.D. 95 (235) 365	Wood Charcoal	La Mula
Cerro Juan Díaz (LS-3)	GX-25701*	1810 ± 50	A.D. 115 (230) 330	Wood Charcoal	La Mula
Cerro Juan Díaz (LS-3)	Beta-224781	1800 ± 40	A.D. 120 (230) 330	Human tooth protein Feature 2, Package 2	
Cerro Juan Díaz (LS-3)	Beta-147880	1780 ± 40	A.D. 130 (250) 370	Dentin Protein	
Sitio Sierra (AG-3)	Beta-148197	1770 ± 40	A.D. 140 (250) 380	Dentin protein	La Mula
Cerro Juan Díaz (LS-3)	Beta-54978*	1770 ± 110	A.D. 25 (250) 540	Plant Fibers	Tonosí
Mariato (MO-1)	M-1474	1760 ± 130	A.D. 110 (180) 490	Shell	Tonosí
Cerro Juan Díaz (LS-3)	Beta-131418*	1740 ± 40	A.D. 225 (265, 290 & 325) 405	Wood Charcoal	La Mula
Cerro Juan Díaz (LS-3)	Beta-54980	1730 ± 140	A.D. 5 (340) 630	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	I-18679	1730 ± 80	A.D. 120 (340) 530	Charcoal	Cubitá
Sitio Sierra (AG-3)	I-18613	1715 ± 90	A.D. 115 (360) 550	Charcoal	Tonosí
Mariato (MO-1)	M-1472	1700 ± 120	1 B.C. (A.D. 260) A.D. 550	Shell	Tonosí

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Cerro Juan Díaz (LS-3)	Beta-224779	1700 ± 40	A.D. 240 (350) 420	Human tooth protein Feature 16 package 14	
Sitio Sierra (AG-3)	AA-3240*	1680 ± 80	100 B.C.–A.D. 245	Human Bone Burial 17	Tonosí
Sitio Sierra (AG-3)	Gif-2346	1640 ± 90	A.D. 210 (395) 560	Wood Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	Beta-147876*	1640 ± 40	A.D. 340 (410) 430	Human tooth protein Feature 2, Package 2 sub inferior	
Cerro Juan Díaz (LS-3)	Beta-224780	1690 ± 40	A.D. 250 (380) 420	Human tooth protein Feature 2, Package 1	
Cerro Juan Díaz (LS-3)	Beta-148203	1630 ± 40	A.D. 350 (420) 530	Human dentin Op 7 T 1	Tonosí/ Cubitá
Cerro Juan Díaz (LS-3)	Beta-224783	1620 ± 40	A.D. 350 (420) 540	Human tooth protein Feature 2, Package 4	
Cerro Juan Díaz (LS-3)	Beta-46403*	1620 ± 60	A.D. 330 (430) 590	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	Beta-224784	1600 ± 40	A.D. 390 (430) 550	Human tooth protein Feature 2, Package 5	
Cerro Juan Díaz (LS-3)	I-18637	1570 ± 80	A.D. 340 (530) 650	Feature 94, Charcoal	Cubitá
Cerro Juan Díaz (LS-3)	Beta-224785	1570 ± 40	A.D. 410 (450, 460,480, 530) 580	Human tooth protein Feature 2, Package 6	
Cerro Juan Díaz (LS-3)	Beta-224788	1560 ± 40	A.D. 410 (540) 590	Human tooth protein Feature 2, Package 13	
El Cafetal (TI-35)	Gif-1641	1560 ± 100	A.D. 260 (535) 665	Bivalve shell	Tonosí
Cerro Juan Díaz (LS-3)	I-18672	1560 ± 80	A.D. 350 (535) 650	Charcoal oven	Cubitá
Sitio Sierra (AG-3)	Beta-46402	1560 ± 60	A.D. 395 (535) 635	Maize	Tonosí
Las Huacas	I-5983	1545 ± 100	A.D. 325 (545) 670	Charcoal	Cubitá
Cerro Juan Díaz (LS-3)	Beta-54979*	1530 ± 130	A.D. 245 (555) 770	Charcoal	Tonosí

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
El Indio (TI-18)	Gif-1642	1500 ± 100	A.D. 380 (590) 695	Bivalve shell	Tonosí
Cerro Juan Díaz (LS-3)	Beta-147878*	1500 ± 40	A.D. 450 (570) 640	Human tooth protein Feature 94, Ind. 36	Cubitá
Cerro Juan Díaz (LS-3)	Beta-54976*	1490 ± 60	A.D. 435 (600) 665	Charcoal	Tonosí
Mariato (MO-1)	M-1471	1480 ± 120	A.D. 240 (530) 730	Shell	Tonosí
Cerro Juan Díaz (LS-3)	TO-4594	1470 ± 90	A.D. 540 (610) 660	Maize	Cubitá
Sitio Sierra (AG-3)	I-8556	1475 ± 110	A.D. 375 (605) 770	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	Beta-147877*	1460 ± 40	A.D. 540 (620) 660	Human tooth protein Feature 2, Package 6	Cubitá
Cerro Juan Díaz (LS-3)	I-18287	1450 ± 80	A.D. 435 (630) 705	Charcoal oven	Cubitá
Cerro Juan Díaz (LS-3)	Beta-54975*	1450 ± 60	A.D. 530 (630) 680	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	I-18288	1440 ± 80	A.D. 440 (635) 760	Charcoal oven	Cubitá
Cerro Juan Díaz (LS-3)	Beta-54977*	1420 ± 50	A.D. 560 (645) 685	Charcoal	Tonosí
Cerro Juan Díaz (LS-3)	I-18638	1380 ± 80	A.D. 550 (660) 800	Wood Charcoal	Cubitá
Cerro Juan Díaz (LS-3)	I-18286	1380 ± 80	A.D. 615 (690) 890	Charcoal oven	Cubitá
Cerro Juan Díaz (LS-3)	I-18222	1370 ± 80	A.D. 555 (665) 855	Charcoal	Cubitá
Cerro Juan Díaz (LS-3)	I-18675	1330 ± 110	A.D. 540 (680) 970	Charcoal oven	Cubitá
La Flora (LA-28)	**Beta-170997**	**1310 ± 110**	**A.D. 545 (685) 980**	**Charcoal attached to a sherd R416-X**	**Conte**
AG-73	Beta-46389*	1290 ± 55	A.D. 650 (705) 880	Charcoal	Conte
Cerro Juan Díaz (LS-3)	Beta-121163	1260 ± 90	A.D. 640 (780) 990	Charcoal	Macaracas
Cerro Juan Díaz (LS-3)	I-18683	1240 ± 80	A.D. 650 (785) 985	Charcoal fill T115	Macaracas
LS-3	**Beta-170996***	**1190 ± 40**	**A.D. 760–960 (870) 720–740**	**Charcoal attached to a sherd R118**	**Macaracas Pica-pica**
Miraflores (CHO-3)	I-7309	1185 ± 80	A.D. 670 (875) 1015	Charcoal	Macaracas
Cerro Juan Díaz (LS-3)	Beta-121162	1180 ± 60	A.D. 775 (895) 1015	Carbonized tallo	Macaracas

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Las Huertas (LS-10)	**Beta-170994**	**1170 ± 110**	**A.D. 655 (880) 1040**	**Charcoal attached to a sherd R213**	**Pre-Parita**
Miraflores (CHO-3)	I-7310	1135 ± 80	A.D. 700 (900) 1030	Charcoal	Macaracas
Playa Venado	GrN-2200	1115 ± 65	A.D. 770 (905, 930, 945) 1020	Charcoal urn	
La Bernardina (TI-10)	Gif-1520	1100 ± 95	A.D. 705 (975) 1165	Charcoal	
Cerro Juan Díaz (LS-3)	Beta-121157	1110 ± 50	A.D. 787 (895) 1005	Carbonized food	Macaracas
AG-73	Beta-46390*	1035 ± 55	A.D. 895–1060 (1010) 1080–1155	Charcoal	Macaracas (?)
Cerro Juan Díaz (LS-3)	Beta-121156	1010 ± 60	A.D. 800 (975) 1030	Carbonized food	Macaracas
Guaniquito (TI-28)	GX-1545	955 ± 120	A.D. 870 (1040) 1285	Charcoal	
Cerro Juan Díaz (LS-3)	Beta-121164	950 ± 60	A.D. 985 (1035) 1220	Charcoal	Macaracas Cuipo
Nata (NA-8)	I-8382	875 ± 80	A.D. 1010 (1185) 1285	Charcoal	Macaracas
Cerro Juan Díaz (LS-3)	Beta-18221	820 ± 80	A.D. 1030 (1235) 1300	Charcoal	Pit Oven (R-101)
Cerro Juan Díaz (LS-3)	Beta-143066	790 ± 60	A.D. 1170 (1265) 1300	Wood Charcoal	Parita
Cerro Juan Díaz (LS-3)	I-18681	750 ± 80	A.D. 1165 (1275) 1400	Charcoal inside vessel #10 Op 31	Parita
Cerro Juan Díaz (LS-3)	I-18682	650 ± 110	A.D. 1195 (1305) 1450	Charcoal inside vessel #16 Op 31	Parita
Cerro Juan Díaz (LS-3)	Beta-133337	670 ± 40	A.D. 1275 (1295) 1395	Charcoal	Parita
AG-220	SI-6219	625 ± 65	A.D. 1275 (1315, 1350, 1385) 1430	Charcoal	Parita
Cerro Juan Díaz (LS-3)	Beta-133339	610 ± 50	A.D. 1285 (1315 & 1350 & 1390) 1420	Wood Charcoal	Parita
Cerro Juan Díaz (LS-3)	Beta-133338	600 ± 40	A.D. 1295 (1325 & 1345 & 1395) 1420	Wood Charcoal	Parita
Sitio Sierra (AG-3)	I-8381	920 ± 80	A.D. 980 (1055 & 1085 & 1150) 1270	Charcoal	El Hatillo

Appendix 1 (continued)

SITE	LAB ID NUMBER	CONVENTIONAL RADIOCARBON YEARS B.P.	2 SIGMA CALIBRATED DATES (INTERCEPTS)	TYPE OF SAMPLE	COMPLEX
Las Huertas (LS-10)	**Beta-170995***	**420 ± 40**	**A.D. 1425–1515 (1450) 1590–1620**	**Charcoal from R297 feature fill**	Date is too late
El Hatillo (HE-4)	I-367	415 ± 90	A.D. 1395 (1425–1530 &1555–1635) 1660	Wood Charcoal	El Hatillo
Bajo Chitra (CL-4)	Beta-12436	<300	< A.D. 1650	Charcoal	Mendoza
Las Huertas (LS-10)	**Beta-178028***	**250 ± 40**	**A.D. 1490–1660**	**Charcoal Paleochannel**	Date is too late contamination is suspected
Cerro Juan Díaz (LS-3)	Beta-148204*	360 ± 40	A.D. 1440 (1500) 1640	human tooth collagen Op7 T2	Colonial
LS-16	**Beta-178027***	**180 ± 40**	**A.D. 1650–1710 (1720–1880) 1910–1950**	**Charcoal**	Colonial
Monagrillo (HE-5)	Beta-46784	160 ± 50	A.D. 1650 (A.D. 1685–1950) 1955	Charcoal	El Tigre

* AMS Dates

Dates in bold are those added by the PARLV

Calibrations were provided by Darden Hood and Ron Hatfield of Beta Analytic Inc. to Richard Cooke, and are based on the Pretoria calibration procedure program (Cooke, Sanchez and Udagawa 2000: endnote 35).

This list is based on published and unpublished data provided by Richard Cooke. Published dates can be found in Cooke 1984a: Table 10.2, 1995, 2005; Cooke *et al.* 1998: Table 3; 2000: Table 8.1; 2003a, 2003b; Cooke and Pearson 2002; Cooke and Ranere 1984, 1992b; Cooke and Sanchez 1998: Figure 6; 2004c; Deevey et al.1959; Griggs 2005: Appendix 1; Ichon 1980; Isaza 1993: Table 1; Ladd 1964; McGimsey 1957; Pearson 2002; Sanchez 1995: Table 6b.

Appendix 2
Quantitative summary of PARLV Molluskan fauna
from excavation and surface collection units

Table I
Shell from Operation 19-1he, Site LS-3

Genus and Species Operation 19-1he	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 1					
Pelecypoda				42.3	28.82
Donax	7	7	3		2.06
Tivela	15	15	13.1		8.94
T. argentina	5	3	7.7		5.26
Cerithidea valida	2	2	3.5		3.05
Natica unifasciata	2	2	2.3		1.95
Stratum 2					
Pelecypoda				39.2	26.71
Anadara	1	1	2.5		1.72
Donax	2	2	0.4	0.9	0.90
Tivela	20	20	11.6		7.92
T. argentina	5	3	7		4.79
Cerithidea valida	1	1	0.8		0.60

Table II
Shell from Operation 19-2he, Site LS-3

Genus and species Operation 19-2 he	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 1					
Pelecypoda				63	42.92
Anadara	1	1	1		0.70
Donax	3		1		0.70
D. panamensis	1	1	1		0.70
Iphigenia altior	1	1	2		1.38
Polymesoda	2	1	1		0.70
Tivela	1	1	1		0.70
Stratum 2					
Mollusca				88	
Pelecypoda				3,912	2,664.09
Anadara	4	1	6.8		4.65
A. grandis		3	72.5		49.39
Iliochione	1		1		0.70
I. subrugosa	7	5	21.3		14.52
Donax	482	123	225	0.7	153.92
D. dentifer	16	15	27.6		18.81
D. panamensis	119	182	116		79.01
Dosinia	38	14	19.9	21.7	28.35
D. dunkeri	1	1	6.6		4.51
Iphigenia altior	7	5	21.3		14.52
Mactrellona			1		0.70
M. exoleta	1	1	6.8		4.65

Appendix 2, Table II (continued)

Genus and species Operation 19-2 he	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Mytella (cf.)				1.3	0.90
Mytella	5	1	1		0.70
Ostrea (cf.)		1		45	30.66
Pitar	1	1	1		0.70
Polymesoda	35		20		13.64
P. inflata (cf.)	1	1	8.4		5.74
P. boliviana	139	76	214		145.75
Protothaca	73	41	216		147.11
Tellina	13	3	3.9	2.8	4.58
Tivela	1089		635		432.45
T. argentina	474	257	554		377.29
Gastropoda	1		1		0.76
Cerithidea	32	32	7.5		6.72
C. valida	96	96	123		113
Littorina	1	1	0.8		0.57
Malea ringens	4	1	2.6		2.22
Melongena patula	2	1	127		116
Natica	38		19.9		18.10
N. unifasciata	86	56	180		165
Polinices	2	2	6.9		6.17
P. panamaensis	4	4	19		17.28
P. uber	1	1	4.4		3.88
Thais or *Stramonita*				0.9	0.66
S. *biserialis*	4	2	6.3		5.62
T. kiosquiformis	56	4	51.8	19.8	65.57
Pulmonata	12	1	1		0.76
Stratum 3					
Pelecypoda				1,101	749.80
Anadara	1		1		0.70
A. tuberculosa	1	1	5		3.42
A. grandis	1	2	29		19.77
Donax	421	64	174		118.51
D. dentifer	11	10	15		10.23
D. panamensis	452	311	417		284.00
Dosinia	29	18	49		33.39
D. dunkeri	2	1	13		8.87
Iliochione subrugosa	2	2	14		9.55
Iphigenia altior	8	2	17		11.60
Mactrellona	4	3	10		6.83
Mytella	11	1	2	9	7.51
Ostrea		1			7.51
Pinctada mazatlanica		1			0.70
Pitar paytensis	1	1	5		3.42
Polymesoda	39	22	28		19.09
P. boliviana	45	24	81		55.18
Protothaca	19	14	32		21.81
P. asperrima	2	2	13		8.87

Appendix 2, Table II (continued)

Genus and species Operation 19-2 he	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Tagelus	3	1	1		0.70
Tellina	23	1	24		16.36
T. laceridens	4	3	14		9.55
Tivela	551		423		288.08
T. argentina	191	101	286		194.78
Cassis	1	1	1		0.76
C. centiquadrata	2	1	1		0.76
Cerithidea	19		13		11.77
C. pulchra	2	2	3		2.59
C. valida	59	59	93		85.21
Nassarina	1	1	1		0.76
Natica	11		8		7.18
N. unifasciata	44	29	103		94.39
OLIVIDAE	2		1		0.76
Oliva	1	1	2		1.67
Polinices	1		1		0.76
P. panamaensis	1	1	2		1.67
Thais or *Stramonita*	1		1	3	3.51
S. biserialis	4	2	17	5	20.03
T. kiosquiformis	26	3	29	10	35.64
CIRRIPEDIA	3	1	16		
Feature 1					
Pelecypoda				916	623.81
Anadara				9.6	6.56
A. similis	1	1	7.6		0.02
Donax	205	110	154		104.89
D. dentifer	6	5	8.8		6.01
D. panamensis	140	76	130		88.55
Dosinia	9		12.6		8.60
D. dunkeri	3	2	16.7		11.39
Iliochione subrugosa	1	1	5.2		3.56
Iphigenia altior	19	14	108		73.57
Mactrellona exoleta	3	1	8.8		6.01
Mytella	2	1	0.7	3.9	3.15
Ostrea (cf.)		1		12.5	8.53
Polymesoda	36	16	26.2		17.86
P. boliviana	153	79	256		174.35
Protothaca	22		26.1	20	31.41
P. asperrima	12	7	63.5		43.26
Tellina	10	2	11.4	10.8	15.14
Tivela	482	105	405		275.82
T. argentina	134	69	197		134.18
Gastropoda			3.1		2.68
Cerithidea				1.5	1.22
C. pulchra	1	1	2		1.67
C. valida	53	53	69.5		63.64

Appendix 2, Table II (continued)

Genus and species Operation 19-2 he	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Fasciolaria granosa	1	1	7.5		6.72
Natica unifasciata	37	32	115		105
Thais or *Stramonita*				2	1.67
S. biserialis	4	1	3.4		2.96
T. kiosquiformis	15	3	29.2	12.8	38.39
CIRRIPEDIA	2	1	0.4		
Stratum 4					
Pelecypoda				1233	839.69
Donax	435	243	200		136.22
D. dentifer	27	20	34.3		23.38
D. panamensis	336	232	382		260.16
Dosinia	26	19	65.5		44.62
Iliochione subrugosa	1	1	4.1		2.81
Iphigenia altior	4	3	21.9		14.93
Mactrellona	2	1	3.2		2.20
Mytella	1	1	1.1	6.3	5.06
Ostrea (cf.)				0.8	0.56
Polymesoda boliviana	129	70	210		143.03
Protothaca	13	7	25.4		17.32
Tellina	26	16	34.5		23.51
Tivela argentina		785	740		503.96
Gastropoda	2		3.7		3.23
Anachis (cf.)	1	1	0.3		0.11
Cerithidea	20		10		9.02
C. valida	58	58	78.9		72.27
Littorina	1	1	1.5		1.22
Natica	5		2.9		2.50
N. unifasciata	37	30	92.3		84.57
Olivella volutella	1	1	0.3		0.11
Polinices	1		2.8		2.41
P. panamaensis	3	1	11.2		10.12
Stramonita biserialis	1	1	3.8		3.33
Thais kiosquiformis	1	1	2.6		2.22
Pulmonata	2	2	0.1		
Stratum 5					
MOLLUSCA				420	
Pelecypoda				532	362.31
Anadara	1		0.3		0.22
A. tuberculosa	1	1	9.8		6.69
Donax	223	18	129		87.87
D. dentifer	1	1	1.1		0.77
D. panamensis	230	117	210		143.03
Dosinia	13	8	22.1		15.07
Iphigenia altior	1	1	6.9		4.72
Mytella (cf.)		1		1	0.70
Ostrea (cf.)		1		3.4	2.33
Polymesoda	10		10.9		7.44
P. boliviana	24	13	34.1		23.24

Appendix 2, Table II (continued)

Genus and species Operation 19-2 he	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Protothaca	3	1	3.1		2.13
Tagelus (cf.)	1	1	0.6		0.43
Tellina	13	8	13.9		9.48
Tivela	222		183		124.64
T. argentina	78	46	120		81.74
Cerithidea valida	32	19	37.1		33.9
Natica	8		3.9		3.42
N. unifasciata	18	11	46.1		42.16
Polinices panamaensis	2	1	9.5		8.56
Terebra (cf.)	1	1	2.1		1.77
Stramonita biserialis	1	1	7.2		6.45
Thais kiosquiformis	12	1	17.1		15.54
Pulmonata	3	3	0.1		

Appendix 2 (continued)

Table III
Shell from Station R213, Site LS-10

Genus and Species Station R213	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Surface					
Pelecypoda				2.1	1.45
Dosinia	1	1	2.2		1.52
Dosinia dunkeri	1	1	7		4.79
Iphigenia altior	5	4	47.7		32.50
Protothaca	1	1	11.1		7.58
Tivela	1	1	2		1.38
Tivela argentina	1	1	1.8		1.24
Melongena patula	1	1	82.8		75.84
NATICIDAE				2.5	2.1
Natica unifasciata	1	1	2.2		1.85
Stratum 1					
Pelecypoda				18.5	12.62
Anadara	2	2	9.8	25.3	23.92
Iphigenia altior	1	1	0.6		0.43
VENERIDAE	2	2	3		2.06
Fasciolaria	1	1	3.5		3.05
Natica	1	1	1		0.76
Polinices	1	1	0.6		0.39
Stratum 2					
Pelecypoda				92.6	63.08
Anadara	1	1	11.3	25.8	25.28
Anadara grandis	1	1	53.5		36.45
Dosinia	3	2	5.2		3.56
Iphigenia altior	9	3	21.8	54.7	52.11
Protothaca	2	2	4.2	4.8	6.15
VENERIDAE	5	5	7.1		4.85
Gastropoda	3	3	7.6		6.81
Natica	13	13	10.3	1.1	10.30
Natica unifasciata	3	3	10.4		9.39
Polinices	2	2	7.1		6.3
Stratum 3					
Pelecypoda				26	17.72
Anadara				36.7	25.01
Protothaca				1	0.70
VENERIDAE	2	2	2		1.38
Natica				4.5	4
Natica unifasciata	2	2	3.2		2.78
Stratum 4					
Pelecypoda				10.6	7.24

Appendix 2, Table III (continued)

Genus and Species Station R213	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Anadara	2	2	25.6	6.5	21.88
Anadara grandis	1	1	24.9		16.97
Dosinia	1	1	3.7		2.54
Iphigenia altior	1	1	1		0.70
VENERIDAE	2	2	2		1.38
Natica	2	2	5.1		4.52
Natica unifasciata	1	1	2.7		2.32
Looter pit fill					
Pelecypoda				3	2.06
Anadara grandis	2	2	128.2		87.32
Dosinia dunkeri	3	3	15.3		10.44
Dosinia	2	1	9	2.4	7.78
Iphigenia altior	6	6	53.7		36.59
Solen	1	1	2		1.38
Melongena patula				11.5	10.40
Polinices	1	1	4		3.51

Appendix 2 (continued)

Table IV
Shell from Station R297, Site LS-10

Genus and species Station R297	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Surface					
Pelecypoda				3.9	2.67
Anadara				5.3	3.63
Iphigenia altior	1	1	3		2.06
Pitar	1	1	2.7		1.86
Melongena patula	1	1	120.9		111
Natica	2	2	2.5	0.8	2.87
Natica unifasciata	1	1	9.1		8.19
Thais	1	1	2		1.67
Stratum 1					
Pelecypoda				21.9	14.93
Anadara				56.8	38.70
Donax	1	1	0.3		0.22
Dosinia	1	1	1.8		1.24
Tivela			4.2		2.88
T. Argentina			5		3.42
VENERIDAE	2	2	1.7		1.18
Cerithidea			0.4		0.20
Melongena patula	5	5	143		131
Natica	6	6	4.8	5.6	9.39
N. Unifasciata	11	11	31.5		28.76
Polinices	2	2	6.6		5.9
P. panamaensis	1	1	8		7.18
P. uber	1	1	7.8		7
Thais kiosquiformis	3	3	6.1	0.2	5.62
Stratum 2					
Pelecypoda				24.3	16.57
Anadara				22	15
A. grandis	1	1	94.8		64.58
Dosinia	1	1	2.5		1.72
Protothaca	2	1	3.9		2.67
Tivela	1	1	0.5		0.36
Natica	7	3	2.6	2.5	4.52
N. unifasciata	3	3	10.2		9.2
Thais kiosquiformis	3	3	2.3	0.3	2.22
Stratum 3					
Pelecypoda				29.6	20.18
Anadara				1.3	0.90
Dosinia	3	3	4.5		3.08
D. dunkeri	2	1	9.6		6.55
Iphigenia altior	3	3	2.2		1.52

Appendix 2, Table IV (continued)

Genus and species Station R297	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Tellina	3	3	1.8	0.5	1.58
Gastropoda			2.3		1.95
Natica	13	13	6.8	5.5	11.13
N. unifasciata	6	5	11.7		10.58
Polinices	1	1	2.7		2.31
Thais kiosquiformis	3	3	1.5	1	2.13
Stratum 4					
Pelecypoda				1	0.70
Natica unifasciata			1.6		1.31
Stratum 5					
Pelecypoda				7.2	4.92
Iphigenia altior	1	1	5.3		3.63
Tagelus	1	1	1.4		0.97
Natica	2	2	1.8		1.49
N. unifasciata	5	4	10.2		9.52
Stratum 6					
Pelecypoda				3.2	2.20
Tellina	2	2	2.1		1.45
Natica unifasciata	1	1	5.8		5.16
Thais kiosquiformis	1	1	0.7		.48
Looter pit					
Pelecypoda				70.6	48.10
Anadara	3	2	74.5	108	124.30
A. grandis	8	6	547.2		372.66
Donax	1	1	1		0.70
Dosinia	11	4	26.7		18.20
Iphigenia altior	7	6	27.3		18.61
Protothaca				1.3	0.90
Tivela	3	3	4.3		2.95
Gastropoda	4	4	14.1		12.78
Conus	1	1	6		5.35
Malea ringens	1	1	1.1		0.85
Melongena patula	12	12	581		533
Natica	37	37	36.4	24.2	55.47
N. unifasciata	51	51	137	137	251
Nerita				2.9	2.5
Oliva	2	2	28.2		25.72
Polinices	4	4	12.6		11.4
P. uber	1	1	8.2		7.36
Thais kiosquiformis	2	2	2.9		2.5

Appendix 2 (continued)

Table V
Shell from Operation 19-1ls, Site LS-31

Genus and species Operation 19-1ls	NISP	MNI	W (g)- counted	W (g) - uncounted	BM (g)
Stratum 1					
Anadara	11		18	22.8	27.80
A. tuberculosa	2	2	16		10.91
A. perlabiata	1	1	3		2.06
A. grandis	10	9	87		59.27
Chione	1	1	9		6.15
Donax	130	22	88	3.5	62.33
D. asper	4	3	3		2.06
D. dentifer	28	19	45		30.66
D. ecuadorianus	1	1	1		0.70
D. panamensis	40	27	42.4		28.89
Dosinia	32	22	50		34.07
D. dunkeri	2	2	11		7.51
Iliochione subrugosa	6		30		20.45
Iphigenia altior	6	6	6		4.10
Ostrea				1	0.70
Pinctada mazatlanica				11.8	8.05
Pitar	3	2	4.4		3.01
Polymesoda	428	140	402	65.7	318.52
P. boliviana	229	133	529		360.27
Protothaca	26	2	31.5		21.47
P. asperrima	2	2	13		8.87
Tagelus	0			2.7	1.86
cf. Tagelus	2		2.5		1.72
Tellina	1		1		0.70
TELLINIDAE	1		0.2	1.5	1.18
Tivela	7,458	7,458	5,221	176.2	3,675.51
T. argentina	1,987	1060	3774		2570.11
cf. Tivela	188	188	26		17.72
Pelecypoda	0			13006.2	8857.24
VENERIDAE	0			8.3	5.67
Anachis	1	1	1		0.76
Cerithidea	356	105	133	1	122.85
C. pulchra	1		1		0.76
C. valida	491	253	558.4		512.45
Land snail shells	7	7	1		0.76
Littorina	3	3	3		2.59
Malea ringens	5	5	8.7		7.82
Melongena patula	1	1	438		401.92
Natica	171		108	10.3	108.44
N. unifasciata	278	278	533		489.13

Appendix 2, Table V (continued)

Genus and species Operation 19-1ls	NISP	MNI	W (g)- counted	W (g) - uncounted	BM (g)
NERITA	3	3	1.8		1.49
Northia	6	6	20.5		18.66
N. northiae	9	9	84		76.95
Olivella	4	3	1.6		1.31
O. volutella	5	5	8.7		7.82
Polinices	3	1	3		2.59
P. panamaensis	2	2	36		32.89
P. uber	2	2	8		7.18
Stramonita biserialis	18	15	42.2	3	41.33
Thais kiosquiformis	64	11	61	11.1	66.03
Gastropoda	5		1.3	1.9	2.78
Mollusca	0			2,426.7	
Stratum 2					
Anadara	0			8	5.47
A. tuberculosa	1	1	10		6.83
A. grandis	2	2	24		16.36
Donax	36	10	17.6	0.5	12.34
D. dentifer	10	6	14		9.55
D. ecuadorianus	1	1	0.5		0.36
D. panamensis	14	10	12.6		8.60
Dosinia	8	6	7.2		4.92
Mactrellona	1		1		0.70
Polymesoda	98	51	102		69.48
P. anomala	1	1	9		6.15
P. boliviana	30	22	71.4		48.64
Protothaca	5		8.8	1.9	7.30
Mollusca	0			422.7	287.88
Tellina	1		0.1		0.09
Tivela	1,473	1,473	1289	15.4	888.31
T. argentina	340	194	784		533.92
cf. Tivela	2	2	0.2		0.15
Pelecypoda	0			2,340.6	1593.97
CERITHIDEA	15		14	1	13.61
C. pulchra	1	1	1.5		1.22
C. valida	133	84	134		122.85
Littorina	2		2.1		1.77
Malea ringens	0			0.6	0.39
Natica	23	23	10	7	15.44
N. unifasciata	80	80	129		118.26
Northia	1		1		0.76
N. northiae	3	3	23.4		21.32
Olivella volutella	1	1	0.9		0.66
Thais or Stramonita	0			0.9	0.66

Appendix 2, Table V (continued)

Genus and species Operation 19-1ls	NISP	MNI	W (g)- counted	W (g) - uncounted	BM (g)
Stramonita biserialis	7	4	11.8		10.67
Thais kiosquiformis	18	3	19.6	1.2	18.93
Gastropoda	4		7	1	7.18
Cirripedia or Balanos	1		1		
Stratum 3					
Anadara grandis	2	2	5.8		3.97
CORBICULIDAE	1		0.1		0.09
Donax	1		0.1	0.2	0.22
D. dentifer	1	1	0.6		0.43
Polymesoda boliviana	1	1	0.9		0.63
Tivela	34	34	9.2	5.4	9.96
T. argentina	5	3	11.2		7.65
cf Tivela .	1	1	0.1		0.09
Pelecypoda	0			33.7	22.97
Cerithidea	1		0.5		0.30
C. valida	2	2	2.1		1.77
Natica unifasciata	3	3	6.6		5.90
Strombus	0			14.7	13.33
Thais or Stramonita	0			0.1	-0.07
Stratum 4					
Donax	1		0.1	0.2	0.22
Tivela	2	2	1.1	1	1.45
cf. Tivela	6	6	0.3		0.22
Pelecypoda	0			12.2	8.33
Cerithidea	0			0.1	-0.07
Natica unifasciata	1	1	0.1		-0.07
Thais kiosquiformis	0			0.1	-0.07
Stratum 5					
Anadara	5		11	15	17.72
A. tuberculosa	1	1	8		5.47
A. grandis	1	1	2		1.38
Donax	31	8	15		10.23
D. dentifer	11	8	17		11.60
D. panamensis	6	6	5		3.42
Dosinia	5	2	4		2.74
Iliochione subrugosa	3	2	11		7.51
Iphigenia altior	4		3		2.06
Mactrellona	1		1		0.70
Polymesoda	95	51	72		49.05
P. boliviana	35	20	70		47.69
Protothaca	3		2		1.38
Semele	1		1		0.70
Shell residue	0			450	306.47

Appendix 2, Table V (continued)

Genus and species Operation 19-1ls	NISP	MNI	W (g)- counted	W (g) - uncounted	BM (g)
Tellina	2		1		0.70
Tivela	619	619	530		360.95
T. argentina	144	83	325		221.34
Pelecypoda	0			1,898.5	1,292.90
Cerithidea pulchra	3	3	5		4.43
C. valida	109	50	82		75.11
Littorina	0		1	1	1.67
Melongena patula	0			6	5.35
Natica	25		12	1	11.77
N. unifasciata	34	34	83		76.03
Nerita scabricosta	1	1	3		2.59
Northia	1		2		1.67
N. northiae	5	5	35		31.97
Prunum sapotilla	1	1	1		0.76
Stramonita biserialis	5	3	13		11.77
Thais kiosquiformis	6	1	13	0.2	11.96
Gastropoda	1		2		1.67
Stratum 6					
Anadara	0			3.5	2.40
Donax	13	7	9.1	5.6	10.03
D. dentifer	2	2	5.2		3.56
Dosinia	1		1.3		0.90
Iphigenia altior	2	1	2.7		1.86
Polymesoda	13	8	10.5	3.6	9.62
P. boliviana	4	3	21.6		14.73
Protothaca	0			2.6	1.79
Spondylus calcifer	1		7.7		5.26
Tivela	192	192	166	41.1	141.05
T. argentina	155	101	330		224.75
cf. Tivela	61	61	6.1		4.17
Pelecypoda	0			824	561.16
Cerithidea	14		3.7	0.3	3.51
C. valida	14	14	18.6		16.91
Natica	13		3.9	5.4	8.38
N. unifasciata	14		21.4		19.48
Thais kiosquiformis	7		5.1	1.8	6.17

Appendix 2 (continued)

Table VI
Shell from Operation 19-2ls, Site LS-31

Genus and Species Operation 19-2ls	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 2					
Pelecypoda				18	12.28
Anadara grandis	1	1	6.3		4.31
Donax	3	1	2	1.3	2.26
D. dentifer	2	2	2.3		1.58
cf. Polymesoda	2		0.7		0.49
cf. Tagelus				0.3	0.22
Tivela	11	5	16.1	3.4	13.30
T. argentina	4	3	9.1		6.22
cf. Tivela	3		0.3		0.22
Gastropoda	1		0.5		0.30
Cerithidea valida	1	1	0.4		0.21
NATICA				0.3	0.11
N. unifasciata	4	4	9		8.10
Stratum 4					
Anadara				10.5	7.17
Gastropoda				1	0.76
Stratum 5					
Pelecypoda				1.6	1.11
Polymesoda	1		0.7		0.49
cf. Tivela	1		0.1		0.09

Appendix 2 (continued)

Table VII-A
Shell from Operation 19-3ls, LS-31

Genus and species Operation 19-3ls SQ A	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 1					
Mollusca				1084	
Pelecypoda			9657	859	7,161
Anadara	7	7	14	10.2	16.5
A. tuberculosa	2	2	19.1		13.
A. grandis	6	4	52.7		35.9
Cardites laticostata	1	1	3		2.06
Donax	127	106	82.9		56.47
D. asper	8	5	8		5.47
D. carinatus	1	1	1		0.70
D. dentifer	57	36	97		66.07
D. ecuadorianus	2	1	2		1.38
D. panamensis	18	13	17.6		12
Dosinia	22	13	52.7		35.9
D. dunkeri	1	1	3		2.06
Iliochione subrugosa	6	4	24.8		16.9
Iphigenia altior	10	6	56.2		38.3
Pitar	2	1	4.1		2.8
P. paytensis	1	1	3		2.06
Polymesoda	427	348	377		256.7
P. boliviana	312	173	712		485
Protothaca	13	5	23.3		15.9
P. asperrima	3	2	14		9.55
Semele	1	1	1		0.7
SOLECURTIDAE		1		1.2	0.83
cf *Tagelus*		1	3.2		2.2
Tellina	2	1	1		0.70
Tivela	4,689	4,550	4,129	3,657.5	5303
T. argentina	3,757	890	3757		2,558
Gastropoda	2		1	1.4	2.04
Calliostoma	1	1	1		0.76
Cassis centiquadrata	1	1	1		0.76
Cerithidea	8	1	1		0.76
C. pulchra	6		8.7		7.82
Cerithidea valida	481	294	462		424
Pulmonata	3	1	0.1		
Littorina	4	1	3		2.59
Malea ringens	1	1	1		0.76
Nassarius	1	1	1		0.76
Natica	60	60	37.2	2	35.82
N. unifasciata	150	123	349		320

Appendix 2, Table VII-A (continued)

Genus and species Operation 19-3ls SQ A	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Nerita scabricosta	1	1	1		0.76
Northia	5	1	22.1		20.13
N. northiae	4	4	46.2		42.25
Olivella	1	1	1		0.76
O. volutella	4	4	7		6.26
Polinices panamaensis	4	4	35.3		32.24
Polinices uber	4	4	22.6		20.58
Thais or *Stramonita*	1		2		1.67
Stramonita biserialis	8	5	10.3	2	11.13
Thais kiosquiformis	27	8	37.3	9.1	42.43

Table VII-B
Shell from Operation 19-3ls Square B, Site LS-31

Genus and Species Operation 19-3ls SQ B	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 1					
Mollusca				1,647	
Pelecypoda				10,922	7,485.57
Anadara	5	5	5.4		3.70
A. tuberculosa	2	2	16		10.91
A. grandis	4	4	25.6		17.45
Donax	141	104	106		72.20
D. asper	6	4	5		3.42
D. cf *carinatus*	2	2	0.8		0.56
D. dentifer	78	47	116		79.01
D. ecuadorianus	1	1	1		0.70
D. panamensis	65	43	68.2		46.46
Dosinia	31	20	66.2		45.10
Dosinia dunkeri	7	6	41.4		28.21
Iliochione	1	1	1		0.70
I. subrugosa	5	5	21.1		14.39
Iphigenia altior	26	5	49		33.39
Mactrellona	1	1	1		0.70
Pitar	2	2	5.9		4.04
P. paytensis	2	2	6		4.10
Polymesoda	331	129	289.3		197.03
P. boliviana	242	127	552.6		376.34
Protothaca	18	13	49.5		33.73
P. asperrima	2	2	7		4.79
Semele	3	1	2		2.06
Spondylus cf *calcifer*		1		0.6	0.43

Appendix 2, Table VII-B (continued)

Genus and Species Operation 19-3ls SQ B	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
cf *Tagelus*	2		6		4.10
Tagelus	2	1	1.6		1.11
Tellina	8	1	5.9		4.04
Tivela	6,431	5,402	7,246		4,934.54
T. argentina	3,059	1,661	7,127		4,853.51
Cassis centiquadrata	5	3	1		0.76
Cerithidea	38	38	16.4		14.89
C. pulchra	4	1	4.4		3.88
C. valida	562	242	487		446.90
Daphnella	1	1	2		1.67
Jenneria pustulata	1	1	1.4		1.12
Littorina	6	4	2	1	0.76
Melongena patula	1	1	300		275.24
Natica	72	72	46.4	10	51.61
N. unifasciata	199	166	427.4		392.19
Northia	6	1	13.5		12.23
N. northiae	5	5	17.5		15.90
Olivella volutella	4	4	6.7		5.99
Polinices	1	1	2		1.67
P. uber	4	4	25		22.79
Thais or *Stramonita*	2	2	3.8		3.33
S. biserialis	18	10	47.4	5	45.19
T. kiosquiformis	35	9	49.7	11.2	55.74
Cirripedia	2	1	1		
Stratum 3					
Pelecypoda				6.7	4.58
Dosinia	1	1	1.5		1.04
Tivela	4	1	4.3	1.8	4.17
Gastropoda				0.1	
Cerithidea valida	1	1	0.9		0.66
Melongena patula	1	1	56.5		51.71
Natica	1	1	0.6		0.39

Appendix 2 (continued)

Table VIII
Shell from R170, Site CHI-33

Genus and Species Station R170	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Surface					
Pelecypoda				368	251.0
Anadara perlabiata	1	1	6		1.4
Donax	45	31	46.8		31.9
D. panamensis	21	14	30.7		20.9
Dosinia	39	23	2.7		124.0
D. dunkeri	11	7	68.6		46.7
Iphigenia altior	8	6	28.9		19.7
Tivela	194	194	197		134.2
T. argentina	468	239	933		635.0
Natica	3	3	4.3		3.8
N. unifasciata	9	9	25.1		22.9
Olivella volutella	1	1	1.7		1.4
Stratum 1					
Pelecypoda				466	317.4
Anadara tuberculosa	1	1	9.9		6.8
A. grandis	2	2	115		78.3
Donax	70	59	104		70.8
D. dentifer	1	1	2		1.4
D. panamensis	42	23	45.9		31.3
Dosinia	30	18	73.9		50.3
D. dunkeri	17	10	95.5		65.1
Iphigenia altior	18	9	46.6	8.3	37.4
Polymesoda	2	2	3		2.1
Protothaca	2	2	2		1.4
P. asperrima	2	2	7		4.8
Tivela	205	205	200		136.0
T. argentina	403	215	805		548.0
Natica	6	6	3.7		3.2
N. unifasciata	20	19	72.7		66.6
Northia	1	1	0.5		0.3
N. northiae	1	1	5.2		4.6
Polinices panamaensis	2	2	6.6		5.9
Thais kiosquiformis	3	3	0.8		0.6
Stratum 2					
Pelecypoda				714	486.0
Anadara perlabiata	2	2	12		8.2
A. grandis	2	2	311		212.0
Donax	122	97	103		70.2
D. dentifer	1	1	2.1		1.4
D. panamensis	184	105	236		161.0

Appendix 2, Table VIII (continued)

Genus and Species Station R170	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Dosinia	102	57	261		178.0
D. dunkeri	34	21	186		127.0
Iphigenia altior	17	11	106		72.2
Polymesoda	1	1	2		1.4
Protothaca	2	2	3		2.1
Tagelus	1	1	0.5		0.4
Tellina	1	1	2		1.4
Tivela	357	357	384		261.5
T. argentina	1574	880	3164		2155
cf. Tivela	1	1	2.4		1.7
Naticidae	2	2	3	3	5.3
Natica	1	1	1		0.8
N. unifasciata	30	28	117		107.0
Polinices panamaensis	1	1	7		6.3
P. uber	1	1	4		3.5
Prunum sapotilla	1	1	1		0.8
Thais kiosquiformis	3	3	3		2.6
Stratum 3					
Pelecypoda				804	548.0
Anadara				7	4.8
A. tuberculosa	7	5	56.5		38.5
A. perlabiata	3	3	11.8		8.1
Iliochione	1	1	1.5		1.0
Donax	300	196	298		203.0
D. asper	1	1	2		1.4
D. dentifer	11	9	27.1		18.5
D. panamensis	264	145	333		227.0
Dosinia	149	87	401		273.0
D. dunkeri	95	56	577		393.0
Iphigenia altior	24	19	94.6		64.4
Pitar paytensis	3	3	19		13.0
Polymesoda boliviana	1	1	6		4.1
Protothaca	3	3	4.4		3.0
Tagelus	1	1		1	0.7
Tivela	340	340	401		273.0
T. argentina	4686	2495	8958		6100.0
Gastropoda	1	1	7		6.3
Cerithidea	1	1	0.4		0.2
C. valida	1	1	1		0.8
Fasciolaria granosa	1	1	17		15.4
Natica	2	2	1	1	1.7
N. unifasciata	35	32	123		113.0
Naticidae	1	1	1	3	3.5

Appendix 2, Table VIII (continued)

Genus and Species Station R170	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Olivella volutella	3	3	13.8		12.5
Polinices	3	3	1.8		1.5
P. panamaensis	3	3	33.1		30.2
P. uber	1	1	2		1.7
Thais kiosquiformis	3	3	3	2	4.4
Stratum 4					
Pelecypoda				724	493.0
Anadara perlabiata	2	2	8.5		5.8
Iliochione subrugosa	1	1	2.8		1.9
Donax	328	200	303		206.0
D. dentifer	1	1	3		2.1
D. panamensis	504	268	706		481.0
Dosinia	86	51	212		144.0
D. dunkeri	65	38	368		251.0
Iphigenia altior	16	11	122		83.1
Tivela	606	606	710		484.0
T. argentina	3543	1951	6991		4761.0
Natica	3	3	6.8		6.1
N. unifasciata	37	34	154		141.0
Naticidae				2	1.7
Polinices panamaensis	2	2	14.9		13.5
Thais kiosquiformis	1	1		1	0.8
Stratum 5					
Pelecypoda				156.5	106.0
Anadara perlabiata	1	1	4.8		3.3
Donax	96	57	488.2		333.0
D. panamensis	26	26	44.3		30.2
Dosinia	16	8	40.9		27.9
D. dunkeri	4	2	28.9		19.7
Iphigenia altior	4	4	18.1		12.3
Tivela	75	75	80.2		54.6
T. argentina	289	149	600		409.0
Natica unifasciata	5	4	10.1		9.1
Stratum 6					
Pelecypoda				41.3	28.1
Donax	8	7	4.8		3.3
D. panamensis	5	5	10.5		7.2
Dosinia	6	4	7.4		5.1
D. dunkeri	7	4	37.2		25.4
Iphigenia altior	1	1	0.9		0.6
Tivela	63	63	66.7		45.6
T. argentina	447	234	828		564.0

Appendix 2, Table VIII (continued)

Genus and Species Station R170	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 7					
Pelecypoda				1016	692.0
Anadara tuberculosa	2	2	24.6		16.8
Donax	224	162	199		136.0
D. dentifer	1	1	2.5		1.7
D. panamensis	262	151	339		231.0
Dosinia	94	54	183		125.0
D. dunkeri	100	67	359		245.0
Iphigenia altior	28	17	111		75.6
Polymesoda	1	1	1		0.7
P. boliviana	2	2	6.3		4.3
Protothaca	2	2	4.8		3.3
Tivela	775	775	786		535.0
T. argentina	3314	1719	6467		4404.0
Fasciolaria granosa	1	1	17.6		16.0
Melongena patula				8.6	7.7
Natica	6	6	6.6		5.9
N. unifasciata	35	32	113		104.0
Olivella volutella	1	1	3		2.6
Polinices	4	4	7.8		7.0
P. panamaensis	1	1	9		8.1
P. uber	5	5	70.5	70.5	129.0

Appendix 2 (continued)

Table IX
Shell from R171, Site CHI-33

Genus and Species Station R171	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Stratum 1					
Pelecypoda				806.5	549
Anadara	1	1	1.2	7.9	6.2
A. tuberculosa	2	2	18		12.3
A. grandis	1	1	63.2		43
Cardita	1	1	1.2		0.8
Iliochione subrugosa	1	1	2.5		1.7
Donax	103	44	102.3		69.7
D. panamensis	18	12	34.9		23.7
Dosinia	158	98	435.6		297
D. dunkeri	21	17	134.6		91.6
Iphigenia altior	45	42	224.4		152
Pitar	1	1	0.9		0.6
Polymesoda	7	6	20.4		13.9
P. boliviana	9	9	42.4		28.8
Protothaca	3	1	7.7		5.3
Semele			3		2
Tagelus	1	1	1		0.7
cf. Tagelus	1	1	0.6		0.4
Tellina	1	1	0.3		0.2
Tivela	186	186	233		159
cf. Tivela	1	1	1.3		0.9
T. argentina	509	267	1038.3		707
Cerithidea valida	1	1	1.4		1.1
Fasciolaria granosa	1	1	11.6		10.4
Melongena patula				16	14.5
Naticidae				1.8	1.5
Natica	3	3	3.3	1.8	4.5
N. unifasciata	41	35	136.7		125
Polinices	1	1	0.7		0.5
P. panamaensis	2	2	18.2		16.5
Thais kiosquiformis	6	6	9.2	5.8	13.6
Stratum 2					
Pelecypoda				42.9	29.3
Donax	2	2	2.2		1.5
Dosinia	6	5	17.8		12.1
Iphigenia altior	13	12	54.6		37.2
Polymesoda	2	2	3.6		2.4
Tellina	1	1	2.3		1.6
Tivela	1	1	2		1.4
VENERIDAE	1	1	1.9		1.3

Appendix 2, Table IX (continued)

Genus and Species Station R171	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Natica unifasciata	2	2	8.1		7.2
Thais kiosquiformis				1	0.7
Stratum 3					
Pelecypoda				102.8	70
ARCIDAE				0.1	0.08
Donax	89	41	85		57.9
D. dentifer	1	1	3.4		2.3
D. panamensis	39	20	68.4		46.6
Dosinia	11	6	24.9		16.9
D. dunkeri	9	5	57.4		39.1
Iphigenia altior	1	1	1		0.7
Tivela	94	94	132.9		90.5
T. argentina	634	319	1288		877
Natica unifasciata	7	7	22.5		20.4
Olivella volutella	2	2	3.4		2.9

Appendix 2 (continued)

Table X
Shell from Field 32he, Station R205, Site CHI-30

Genus and Species Site CHI-30	NISP	MNI	W (g) - counted	W (g) - uncounted	Biomass
PELECYPODA				693	472
Anadara	2	2	3.3	8.2	7.8
A.. Tuberculosa	9	5	710	710	967
Iliochione subrugosa	1	1	1.3		0.9
Donax	4	2	3.4		2.3
Dosinia	23	11	36		24.5
D. Dunkeri	1	1	4.6		3.2
Iphigenia altior	13	12	77.6		52.8
Pitar paytensis			5.1		3.5
Polymesoda	75	73	111		75.6
P. Boliviana	214	119	570		388
Protothaca	13	3	19.3		13.1
P. Asperrima	1	1	3		2.1
Tellina	1	1	0.7		0.5
Tivela	335	335	319		217
T. Argentina	347	185	731		498
GASTROPODA	1	1	1.5		1.2
Fasciolaria granosa	1	1	49.9		45.6
Malea ringens	1	1	1.8		1.5
Melongena patula	3	3	504		462
Natica	11	11	10.4		9.4
N. Unifasciata	9	9	11.3		10.2
Naticidae	2	2	1.1	1.4	2.1
Polinices	6	6	20.3		18.4
P. Panamaensis	5	5	33.7		30.8
Thais	1	1	0.3		0.11
T. Kiosquiformis	2	2	0.6		0.4

Table XI
Shell from Field 33he, Station T4R2, Site LS-10

Genus and Species Site LS-10	NISP	MNI	W (g) - counted	W (g) - uncounted	Biomass
Pelecypoda				2361	1607.9
Anadara perlabiata	4	3	14		9.6
Anadara grandis	7	5	270.9		184.5
Donax	1640	736	585.6	3.7	401.3
D. Asper	1	1	1		0.7

Appendix 2, Table XI (continued)

Genus and Species Site LS-10	NISP	MNI	W (g) - counted	W (g) - uncounted	Biomass
D. Dentifer	17	13	27		18.4
D. Panamensis	3982	2076	2802		1908.2
Dosinia	72	54	138		94.0
D. Dunkeri	78	53	470		320.1
Iphigenia altior	86	60	438		298.3
Mactrellona	13	13	40.6	5.5	31.4
M. Exoleta	19	15	118		80.4
Mytella	293	293	10	19	19.8
Ostrea				3	2.1
Pinctada mazatlanica	1	1	20	1	14.3
Pitar	2	2	2		1.4
P. Paytensis	11	8	47.2		32.2
Protothaca	3	3	8		5.5
Tagelus	12		12		8.2
T. Dombeii	8	6	38.9		26.5
Tellina	379	379	286		194.8
T. Laceridens	127	83	428		291.5
Tivela	22	22	17		11.6
T. Argentina	26	22	55.5		37.8
Gastropoda	1	1	1	0.8	1.5
Cassis centiquadrata	55	55	58	11	63.2
Cerithidea	16	16	8		7.2
C. Valida	194	194	175.4		160.9
Crepidula	17	17	3		2.6
Littorina	4	4	5		4.4
Malea ringens	10	10	28.8		26.3
Nassarius	1	1	1		0.8
Natica	67	67	32.1	21	48.6
N. Unifasciata	385	304	899		825.1
Olivella volutella	3	3	6		5.3
Polinices	2	2	2		1.7
P. Panamaensis	6	6	48		43.9
P. Uber	2	2	7		6.3
Terebra	1	1	4		3.5
Thais	1	1		6.2	5.5
Thais kiosquiformis	53	53	49.3	23.5	66.7
Stramonita biserialis	12	12	29	4	30.1
Cirripedia	17	17			

Appendix 2 (continued)

Type-1 Sites
Table XII
Shell from surface collection stations, Site LS-3
Total number of surface collection stations= 144

Genus and species LS-3	**Ubiquity**	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Pelecypoda	73	2	2	1	2854	1944
Anadara	62	24	24	441	1399	1253
Anadara similis	3	11	9	62		42.2
Anadara tuberculosa	21	70	47	627		427
Anadara perlabiata	1	1	1	12		8.2
Anadara grandis	44	94	76	7164	88.6	4939
Anadara multicostata	7	12	10	175		119
CARDITIDAE	1				1.5	1
Iliochione subrugosa	10	16	14	76.8		53.2
Donax	11	29	26	27.7	2	20.2
Donax dentifer	2	5	4	13.2		9
Donax panamensis	8	19	16	21.6		14.7
Dosinia	16	76	58	266		181
Dosinia dunkeri	11	40	27	254		173
Iphigenia altior	29	338	204	2122		1445
Mactrellona	1	1	1	2.2		1.5
M. exoleta	1	1	1	10.3		7
Mytella	1				4.8	3.3
Ostrea	1				3	2.1
cf. Ostrea	6	2	2	81	206.2	195.6
Pinctada mazatlanica	4	3	3	94	8.4	69.8
Pitar	1	1	1	0.9		0.6
Pitar paytensis	3	8	6	30.7		20.9
Polymesoda	39	181	128	508		346
Polymesoda anomala	1	16	9	121		82.4
cf. Polymesoda anomala	1	1	1	12.5		8.5
Polymesoda inflata	2	4	2	38		25.9
Polymesoda boliviana	55	763	470	3498		2382
Protothaca	16	244	188	470		320
Protothaca asperrima	5	91	56	388		264
Tagelus	3	6	6	4		2.7
cf. Tagelus	3	4	4	2.7		1.9
Tagelus dombeii	1	1	1	3		2.1
Tellina	4	10	8	16.7		11.4
Tellina laceridens	1	1	1	5		3.4
Tivela	16	224	222	215		146
Tivela argentina	22	171	104	332		226
VENERIDAE	1	1	1	0.7		0.5
Gastropoda	2	2	2	0.5		0.3

Appendix 2, Table XII (continued)

Genus and Species LS-3 (continued)	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Cassis centiquadrata	1	1	1	20.8		18.9
Cerithidea	1	1	1	1.2		0.9
Cerithidea valida	12	30	30	55.9		51.2
CONIDAE	1	1	1	11.7		10.6
Conus patricius	1	1	1	50.3		46
Fasciolaria granosa	2	2	2	124		114
Hexaplex Brassica	1	1	1	92		84.3
Pulmonata	1	4	4			
Malea ringens	3	4	4	82.6		75.7
Melongena	1				8	7.2
Melongena patula	20	30	30	8,381	145	7,827
Murex	1	1	1	116		106.0
NATICIDAE	1				1.5	1.2
Natica	11	20	20	26.1	7.5	30.7
Natica unifasciata	36	173	161	913.4		838.0
Northia	3	1	1	3.7		3.2
Northia northiae	2	2	2	19		17.2
Olivella volutella	1	1	1	6		5.3
Polinices panamaensis	5	7	7	79.3		72.6
Strombus galeatus	1	1	1	1.57		1.3
cf. Strombus galeatus	1	1	1	115.1		106.0
Terebra robusta	1	1	1	32.1		29.3
Stramonita biserialis	6	7	7	65.9		60.3
Thais kiosquiformis	9	15	15	46.3	3.2	4.3
Coral	1				10.9	9.8
cf. Coral	1				14	12.7

Appendix 2 (continued)

Table XIII
Shell from surface collection stations, Site LS-10
Total number of surface collection stations= 44

Genus and Species LS-10	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	14				423	288
Anadara	21	15	15	571	20001	14009
Anadara grandis	22	69	50	6371	6371	8677
ARCIDAE	1	1	1	2		1.4
Iliochione subrugosa	1	1	1	3.5		2.4
Donax	3	90	40	40		27.3
Donax carinatus	1	1	1	1		0.7
Donax dentifer	1	1	1	1		0.7
Donax panamensis	6	121	78	99		67.4
Dosinia	7	32	23	84.7		57.7
Dosinia dunkeri	2	5	5	27		18.4
Iphigenia altior	2	12	8	62		42.2
Mactrellona	1	9	5	23		15.7
Mytella	1				1	0.7
Ostrea palmula	1	1	1	37		25.2
cf. Ostrea	1				2.2	1.5
Polymesoda	1	1	1	4		2.7
Polymesoda boliviana	1	2	1	9		6.1
Protothaca	1	1	1	3		2.1
Protothaca asperrima	1	1	1	4		2.7
Tagelus	1	1	1	1		0.7
Tellina	2	61	45	60		40.9
Tellina laceridens	2	68	42	212		144
Tivela	5	45	45	42		28.6
Tivela argentina	7	57	39	101		68.8
Cassis	1				1	0.8
Cassis centiquadrata	1	8	8	8	1	8.1
Cerithidea valida	3	12	12	13		11.8
Conus patricius	1	1	1	47		43
Littorina	1	1	1			0.3
Melongena patula	14	71	71	7550		6931
Natica	4	18	18	13	12	22.8
Natica unifasciata	11	62	59	177		162
Oliva	2	2	2	186		171
Polinices	2	3	3	5		4.4
Polinices panamaensis	2	5	5	45		41.4
Polinices uber	3	4	4	40		36.6
Terebra robusta	2	2	2	57		52.2
Thais kiosquiformis	4	10	10	13	6	17.3

Appendix 2 (continued)

Table XIV
Shell from surface collection stations, Site LS-15
Total number of surface collection stations= 62

Genus and Species LS-15	**Ubiquity**	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Pelecypoda	17				186	127
Anadara	36	16	16	1022	1096	1442
Anadara tuberculosa	2	31	20	215		146
Anadara grandis	25	58	41	6955		4736
Cardita	2	1	1	2	3	3.4
Carditamera radiata	1	1	1	6		4.1
Cardites laticostata	2	10	7	73		49.7
Donax	1	1	1	1		0.7
Dosinia	3	16	10	43		29.2
Dosinia dunkeri	1	4	4	25		17
Iphigenia altior	2	2	2	3		2
Ostrea	4	5	5	78	2	54.5
Pinctada mazatlanica	3	5	5	87		59.2
Pitar	1	3	3	5		3.4
Pitar paytensis	1	2	1	10		6.8
Polymesoda	1	1	1	7		4.8
Protothaca	4	7	7	15		10.2
Protothaca asperrima	1	33	22	142		96.7
Tivela	1	6	6	7		4.8
Gastropoda	1	3	3	74		67.8
CONIDAE	2	2	2	44		40.2
Conus	1	2	2	33		30.1
Melongena patula	8	12	12	1888		1733
NATICA	1	4	4	2		1.7
Natica unifasciata	2	2	2	9		7.9
Polinices panamaensis	1	1	1	9		8.1
Terebra	1	1	1	6		5.3

Appendix 2 (continued)

Type 2 Sites
Table XV
Shell from surface collection stations, Site CHI-6
Total number of surface collection stations= 18

Genus and Species CHI-6	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	6				2212	1506
Anadara	10	6	6	40.9	191	158
Anadara grandis	3	3	3	79.2	1	54.6
Anadara multicostata	1	3	3	29.2		20
cf. Cardita	1				2.6	1.7
Dosinia	1	3	3	9.4		6.4
Iphigenia altior	1	85	49	125		85.1
Megapitaria	1	1	1	15		10.2
Pitar	1	1	1	1		0.7
Polymesoda	4	79	64	21.3		14.5
Polymesoda boliviana	1	18	15	34.9		23.8
Protothaca	1	1	1	0.8		0.6
Tivela	2	97	95	72.2		49.1
Tivela argentina	2	14	11	20.9		14.2
Natica	1	47	47	37.5	22.8	55.2
Natica unifasciata	2	46	45	181		166
Northia	1	1	1	2		1.7
Northia northiae	1	1	1	6.8		6.1
Polinices	1	1	1	1		0.7
Polinices panamaensis	1	2	2	15		13.6
Terebra	1	1	1	1.8		1.5

Table XVI
Shell from surface collection stations, Site LS-8
Total number of surface collection stations= 2

Genus and Species LS-8	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	2				2.7	2
Anadara	1				1.4	1
Anadara tuberculosa	1	1	1	5.1		3.5
Anadara grandis	2	2	1	53.2		36
Polymesoda	1	1	1	3.7		2.5
Polymesoda boliviana	1	1	1	3.5		2.4
Natica unifasciata	1	1	1	3.7		0.5

Appendix 2 (continued)

Table XVII
Shell from surface collection stations, Site LA-28
Total number of surface collection stations= 19

Genus and Species LA-28	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	9				27	18.4
Anadara	10				148	101
Anadara tuberculosa	1	1	1	14		9.6
Anadara grandis	7	12	9	1314		895
Donax	1	3	3	3		2
Donax asper	1	3	2	7		4.8
Donax dentifer	2	4	4	19		13
Donax panamensis	2	2	1	2		1.4
Dosinia	4	5	5	10		6.8
Dosinia dunkeri	2	2	2	9		6.1
Iphigenia altior	1	1	1	3		2
Pitar	2	2	2	4		2.7
Pitar paytensis	1	1	1	8		5.4
Polymesoda	4	5	5	20		13.6
Polymesoda boliviana	1	1	1	7		4.7
Protothaca	3	7	6	16		10.9
Gastropoda	2	1	1	2		1.7
Melongena patula	1				15	13.6
Natica	3	3	3	4	5	8.1
Natica unifasciata	5	6	6	36		32.9
Prunum	1	1	1	2		1.7

Appendix 2 (continued)

Type 3 Sites
Table XVIII
Shell from surface collection stations, Site CHI-33
Total number of surface collection stations= 18

Genus and Species CHI-33	**Ubiquity**	**NISP**	**MNI**	**W (g) - counted**	**W (g) - uncounted**	**BM (g)**
Pelecypoda	15				334.6	228
Anadara	7	6	6	151	132	193
Anadara tuberculosa	3	4	3	34.9		23.8
Anadara perlabiata	1	2	2	22.1		15.1
Anadara grandis	6	11	10	648		441
Cardites laticostata	1	1	1	1.7		1.2
Iliochione subrugosa	3	16	11	58		39.5
Donax	5	14	14	15.1		10.3
Donax asper	1	3	2	5		3.4
Donax panamensis	4	30	21	34.2		23.3
Dosinia	5	46	29	140		95.4
Dosinia dunkeri	5	21	15	123		83.8
Iphigenia altior	8	56	41	340		232
Mactrellona exoleta	1	2	2	21		14.3
cf. Ostrea	1				9.2	6.3
Pitar paytensis	2	3	3	14		9.6
Polymesoda	6	9	9	10.1		6.9
Polymesoda boliviana	5	37	24	180		123
Protothaca	3	3	3	8.3		5.7
Protothaca asperrima	3	13	9	63		42.9
cf. Tagelus	1	4	4	1.9		1.3
Tagelus dombeii	2	4	3	18		12.3
Tellina laceridens	2	3	3	10		6.8
Tivela	9	79	77	95		64.7
Tivela argentina	5	218	138	479		326
Cassis centiquadrata	1				3	2.6
Cerithidea valida	1	1	1	2		1.7
Conus	1	1	1	31.26		28.5
Melongena patula	4	7	7	1186		1089
Murex	1	1	1	11		9.9
Natica	2	4	4	2		1.7
Natica unifasciata	4	35	35	164		150
Olivella volutella	3	3	3	12.5		11.3
Polinices	1	1	1	1		0.8
Polinices panamaensis	4	10	10	88		80.6
Polinices uber	2	2	2	16		14.5

Appendix 2 (continued)

Table XIX
Shell from surface collection stations, Site LA-29
Total number of surface collection stations= 8

Genus and Species LA-29	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	5	2	2	2	50	35
Anadara	5				143	97.4
Anadara tuberculosa	1	1	1	5		3.4
Anadara grandis	3	3	3	352		240
Dosinia	1	3	2	10		6.8
Dosinia dunkeri	2	10	9	21		14.3
Iphigenia altior	2	2	2	10		6.8
Ostrea	2	2	2	19		13
Pitar	2	6	4	16		10.9
Pitar paytensis	2	4	3	24		16.3
Polymesoda boliviana	1	2	2	10		6.8
Protothaca	2	2	2	4		2.7
Tellina laceridens	1	1	1	3		2
Tivela	1	3	3	2		1.4
Tivela argentina	3	11	10	25		17
Melongena patula	4	6	6	1017		693
Natica	1	3	3	1		0.7
Natica unifasciata	2	9	9	25		22.7

Type 4 Sites
Table XX
Shell from surface collection stations, Site CHI-30
Total number of surface collection stations= 4

Genus and Species CHI-30	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Pelecypoda	3				153	104
Anadara	2	1	1	0.3	14	9.7
Anadara grandis	1	1	1	9.7		6.6
CARDITIDAE	1				0.8	0.6
Cardita laticostata	2	3	3	7		4.8
Donax	1	40	25	38.3		26
Donax dentifer	2	8	5	17.3		11.7
Donax panamensis	2	45	25	53.5		36.4
Dosinia	1	1	1	0.5		0.4
Dosinia dunkeri	1	25	13	113.7		77.6
Iphigenia altior	1	5	3	33.6		22.9
Ostrea	1				5	3.4

Appendix 2, Table XX (continued)

Genus and Species CHI-30	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Polymesoda	1	2	2	2		1.4
Protothaca	3	4	4	3.6		2.4
Tivela	3	45	45	36.7		25
Tivela argentina	4	984	506	1863		1269
VENERIDAE	1	1	1	0.3		0.1
Melongena patula	1	1	1			183
Natica	1	2	2	0.8		0.6
Natica unifasciata	2	9	9	24.8		22.6
Polinices panamaensis	1	2	2	10.7		9.7
Polinices uber	1	1	1	5		3.4

Table XXI
Shell from surface collection stations, Site CHI-34
Total number of surface collection stations= 1

Genus and Species CHI-34	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Anadara grandis	1	2	1	283		193

Table XXII
Shell from surface collection stations, Site LS-21
Total number of surface collection stations= 1

Genus and Species LS-21	Ubiquity	NISP	MNI	W (g) - counted	W (g) - uncounted	BM (g)
Tivela argentina	1	1	1	2		0.7

Appendix 3
Quantitative summary of PARLV vertebrate fauna

Table I
Vertebrate fauna from Operation 19-2he, Site LS-3

Taxa Operation 19-2he	**NISP**	**MNI**	**W (g)**	**BM (g)**
Stratum 1				
Mammalia	5	5	5.23	
Stratum 2				
Cartilaginous fish				
Urotrygon	3	1	0.1	125
Sphyrna lewini (cf.)	2	1	0.05	350
Bony fish				
Osteichthyes	353		41.99	
Ariidae	199			
Ariopsis seemanni	4	2		575
Bagre pinnimaculatus	1	1		450
Cathorops	23	1		110
Cathorops furthii (cf.)	1			
Cathorops furthii	13	4		550
Cathorops multiradiatus (cf.)	1	1		175
Cathorops tuyra	1	1		250
Notarius	1	1		300
Sciades dowii	1	1		
Albula neoguinaica	4	1	1	300
Batrachoides boulengeri	1	1	0.2	500
Belonidae	1		0.25	
Strongylura	8	1		120
Tylosurus	13	3		475
Caranx caballus	7	3	5.62	625
Chloroscombrus orqueta	9	2		75
Oligoplites refulgens	1	1		100
Selene	35	?		
Selene peruviana	79	11		875
Centropomus	3	3	0.3	460
Centropomus nigrescens (cf.)	2	1		25
Opisthonema libertate (cf.)	54	3	1	350
Dormitator latifrons	1	1	0.05	150
Elops	1	1	0.05	25
Anchoa	1	1		15
Lycengraulis poeyi	1	1	0.06	100
Haemulidae	7	0	1.2	
Orthopristis chalceus	2	1		150
Pomadasys bayanus (cf.)	1	1		125
Pomadasys panamensis	10	4		650

Appendix 3, Table I (continued)

Taxa Operation 19-2he	**NISP**	**MNI**	**W (g)**	**BM (g)**
Mugil	2	1	0.1	50
Citharichthys gilberti (cf.)	2	1		25
Cyclopsetta panamensis	3	3	0.14	275
Polydactylus approximans	3	3	0.44	450
Polydactylus opercularis	5	1		50
Ilisha furthii	6	2	0.3	375
Cynoscion albus (cf.)	1	1	0.15	550
Menticirrhus panamensis	1	1		100
Scomberomorus sierra	3	2	0.15	450
Peprilus medius	1	1	0.1	150
Guentheridia formosa	2	2	0.4	425
Sphoeroides	1	1		150
Frogs and toads				
Bufo marinus	2	1	0.1	50
Leptodactylus insularum	1	1	0.01	10
Reptiles				
Colubridae	4	1	0.05	50
Iguanidae (cf.)	2	?	0.16	150
Ameiva ameiva	4	2	0.2	200
Birds				
Aves	1	1	0.06	100
Buteo (cf.)	1	1	0.03	225
Crotophaga sulcirostris (cf.)	1	1	0.01	50
Mammals				
Mammalia	112	0	17.7	
Cricetidae	1	1		40
Muridae	1	1	0.03	40
Liomys	3	2	0.03	70
Odocoileus virginianus (cf.)	4	1	1.79	40,000
Stratum 3				
Bony fish				
Osteichthyes	2,067		84.87	
Ariidae	1	1	0.2	
Oligoplites	1	1	0.04	
Guentheridia formosa	1	1	1.1	550
Reptiles				
Boidae (cf.)	2	1	0.13	
Colubridae	4	1	0.09	50
Kinosternon	1	1	0.22	
Iguanidae	2	1	0.05	150
Teidae	2	2	0.1	60
Mammalia	139	0		
Odocoileus virginianus	7	1	5.4	40,000

Appendix 3, Table I (continued)

Taxa Operation 19-2he	**NISP**	**MNI**	**W (g)**	**BM (g)**
Odocoileus virginianus (cf.)	2	0	1.36	
Urocyon (cf.)	1	1	0.04	
Dasypus novemcinctus	1	1	0.08	
Sylvilagus brasiliensis	2	1	0.3	700
Muridae	1	1		50
Liomys adspersus	2	2	0.05	80
Feature 1				
Bony fish				
Osteichthyes	900		43	
Mammals				
Mammalia	68		15.8	
Reptiles				
Boa (cf.)	3	1	0.3	
Colubridae	1	1	0.4	
Iguanidae (cf.)	1	1	0.01	
Birds				
Jacana jacana	1	1	0.07	110
Stratum 4				
Bony fish				
Osteichthyes	83	1	16.1	
Reptiles				
Trachemys (cf.)	1	1	0.24	
Ctenosaura similis	1	1	0.1	300
Mammals				
Mammalia	19	1	5.4	
Odocoileus virginianus	1	1	0.1	30,000
Stratum 5				
Cartilaginous fish				
Carcharhinus leucas	1	1	0.05	3,200
Dasyatidae	1	1	0.02	2,000
Sphyrna lewini	1	1	0.02	400
Bony fish				
Osteichthyes	154		13.26	
Ariidae	89		10.5	
Ariopsis seemanni	7	4		395
Bagre panamensis	1	1		250
Bagre pinnimaculatus	1	1		500
Cathorops	12	0		
Cathorops furthii	13	4		525
Sciades dowii	2	1		5,000
Notarius kessleri	2	1	0.6	600
Albula neoguinaica	5	5		500
Belonidae	7		0.4	

Appendix 3, Table I (continued)

Taxa Operation 19-2he	NISP	MNI	W (g)	BM (g)
Strongylura	7	3		450
Tylosurus	28	5		1,725
Caranx	2		4.02	500
Caranx caballus	6	3		700
Caranx caninus	3	3		1,050
Caranx otrynter	1	1		450
Chloroscombrus orqueta	12	4		150
Oligoplites	4	3		675
Selene	17	1		
Selene peruviana	44	9		910
Centropomus	1	1	0.77	
Centropomus armatus	4	2		525
Centropomus nigrescens	1	1		850
Opisthonema libertate (cf.)	30	5	0.41	650
Haemulopsis leuciscus	1	1		225
Orthopristis chalceus	4	2		150
Pomadasys panamensis	6	3		700
Pomadasys macracanthus	1	1		180
Lobotes surinamensis	1	1		2,200
Mugil	2	2		75
Polydactylus	1		1	
Polydactylus approximans	3	3		750
Polydactylus opercularis	9	6		1,250
Ilisha furthii	7	3	2.2	500
Bairdiella ensifera	1	1	0.1	350
Isopisthus remifer	1	1		25
Menticirrhus panamensis	2	2		150
Ophioscion typicus	1	1		150
Scomberomorus sierra	5	4	0.8	1,900
Sphyraena ensis	1	1	0.35	25
Guentheridia formosa	7	5	1.41	2,025
Frogs and toads				
Bufo marinus	1	1	0.05	225
Reptiles				
Colubridae	3	1	0.1	50
Mammals				
Mammalia	29		4.8	
Muridae	1	1	0.1	50
Odocoileus virginianus	6	1	34.6	40,000

Appendix 3 (continued)

Table II
Vertebrate fauna from Station R213, Site LS-10

Taxa Station R213	**NISP**	**MNI**	**W (g)**	**BM (g)**
Stratum 1				
Guentheridia formosa	1	1	0.3	200
Mammalia	4	0	2.7	
Dasypus	1	1	0.7	
Odocoileus virginianus	4	2	30	70,000
Stratum 2				
Osteichthyes	1	1	0.05	
Ariidae	1	1	0.2	1,500
Pomadasys panamensis	1	1	0.1	300
Iguana iguana	1	1	0.3	1,000
Mammalia	11	0	9.6	
Dasypus novemcinctus	3	2	1.8	
Odocoileus virginianus	6	2	46.9	70,000
Stratum 3				
Bairdiella armata	1	1	1.3	250
Mammalia	4	0	5.3	
Odocoileus virginianus (cf.)	1	0	2	
Odocoileus virginianus	3	1	5.8	
Looter pit				
Ariopsis	1	1	0.1	400
Cathorops multiradiatus (cf.)	1	1	0.4	350
Selene peruviana	1	1	0.05	70
Centropomus medius	1	1	1.5	2,500
Bairdiella ensifera (cf.)	1	1	0.3	70
Aves	2	1	2.5	700
Mammalia	21	1	17.4	
Odocoileus virginianus	16	2	67.1	70,000
Odocoileus virginianus (cf.)	2	0	2	

Appendix 3 (continued)

Table III
Vertebrate fauna from Station R297, Site LS-10

Taxa Station R297	NISP	MNI	W (g)	BM (g)
Stratum 1				
Osteichthyes	1	0	0.1	
Ariidae	2	2		6,000
Ariopsis	1	1	0.3	200
Bagre pinnimaculatus	2	2	0.7	1,000
Notarius kessleri	2	2	0.6	850
Sciades dowii	3	2	1.7	1,550
Echiophis brunneus	1	1	0.3	1,000
Centropomus nigrescens	1	1	0.2	350
Pomadasys bayanus (cf.)	1	1	0.3	1,000
Bairdiella	1	1	0.7	225
Mammalia	62	0	25.5	
Odocoileus virginianus (cf.)	1	1	1.5	10,000
Odocoileus virginianus (cf.)	2	0	7.8	
Odocoileus virginianus	11	2	45	70,000
Stratum 2				
Osteichthyes	2	0	0.27	
Ariidae	1	0		
Ariopsis	1	1	0.5	600
Cathorops	1	0	0.2	
Cathorops furthii	2	2	0.5	600
Notarius kessleri	1	1	0.5	400
Sciades dowii	4	4	2.6	7000
Echiophis brunneus	1	1	0.6	3000
Batrachoides boulengeri	1	1	0.2	450
Selene peruviana	1	1	0.2	300
Centropomus medius	1	1	0.4	1500
Guentheridia formosa	3	2	0.6	1100
Sphoeroides annulatus	2	2	4	1350
Ctenosaura similis	1	1	0.1	550
Mammalia	30	2	19.2	
Odocoileus virginianus	7	2	27.5	80,000
Odocoileus virginianus (cf.)	2	1	0.7	
Stratum 3				
Sciades dowii	1	1	0.6	650
Echiophis brunneus	2	2	1	3,500
Centropomus nigrescens	1	1	1	1,300
Guentheridia formosa	1	1	0.4	425
Mammalia	6	0	4.2	
Odocoileus virginianus	4	2	30.9	50,000

Appendix 3, Table III (continued)

Taxa Station R297	NISP	MNI	W (g)	BM (g)
Stratum 4				
Ariidae	1	1	0.8	4,000
Notarius	1	0	0.1	
Notarius kessleri	1	1	0.4	200
Stratum 5				
Odocoileus virginianus	1	1	0.6	20,000
North wall				
Osteichthyes	1	1	0.2	
Looter pit				
Osteichthyes	1	0	0.3	
Ariidae	1	0	0.2	
Ariopsis	4	4	2	1,375
Cathorops furthii	1	1	0.3	250
Sciades dowii	5	3	4.8	10,500
Echiophis brunneus	1	1	0.6	1,000
Centropomus	1	1	0.3	1,000
Caranx otrynter	1	1	0.6	1,000
Reptilia	2	0	1.8	
Chelonia	1	1	3.4	
Mammalia	20	0	14.4	
Odocoileus virginianus (cf.)	3	0	1.5	
Odocoileus virginianus	9	2	54.2	70,000

Appendix 3 (continued)

Table IV
Vertebrate Fauna from Operation 19-1ls, Site LS-31

Taxa Operation 19-1ls	NISP	MNI	W (g)	BM (g)
Stratum 1				
Osteichthyes	10,934	2	288	
Ariidae	1	0	0.04	
Bagre panamensis	1	1	0.05	40
Cathorops	2	1	1.1	200
Cathorops furthii	2	2	0.6	300
Larimus acclivis	3	3	0.6	325
Elasmobranches	48		1.3	
Scolopacidae (cf.)	1	1	0.1	100
Tringa solitaria (cf.)	1	1	0.1	50
Mammalia	16	0	5.72	
Liomys	1	1	0.1	40
Odocoileus virginianus	2	1	0.4	40,000
Stratum 2				
Osteichthyes	1,955		58.55	
Cathorops	1	1	0.24	200
Bufo marinus	2	1	0.08	300
Iguanidae	1	1	0.1	200
Columbina	1	1	0.1	30
Mammalia	11	1	1.1	
Odocoileus virginianus	2	1	0.9	
Stratum 3				
Osteichthyes	6		0.13	
Stratum 4				
Osteichthyes	53		1.5	
Stratum 5				
Osteichthyes	1538		60.85	
Bagre panamensis	2	2	0.25	100
Cathorops	1	1	0.08	40
Larimus acclivis	1	1	0.08	80
Mammalia	13	0	0.68	
Odocoileus virginianus	1	1	0.1	30,000
Stratum 6				
Osteichthyes	391		9.99	
Iguanidae (cf.)	1	1	0.01	

Appendix 3 (continued)

Table V
Vertebrate fauna from Operation 19-3ls SQ-A Stratum 1

Taxa Operation 19-3ls SQ-A	NISP	MNI	W (g)	BM (g)
Elasmobranchs	41		1.43	
Osteichthyes	10,202		300.08	
Bagre panamensis	1	1		80
Cathorops	1	1		110
Nebris occidentalis	1			
Ophioscion typicus	1	1	6.98	70
Mammalia	25		2.55	
Odocoileus virginianus	4			?
Muridae	1	1		40
Oryzomys	1	1		60
Liomys	1	1		50
Colubridae	1		0.02	40
Oxybelis	1			40

Table VI
Vertebrate fauna from Operation 19-3ls SQ-B Stratum 1

Taxa Operation 19-3ls SQ-B	NISP	MNI	W (g)	BM (g)
Elasmobranchs	10		4.53	
Rhizoprionodon longurio	2	1		1,200
Dasyatis longus (cf.)	5	1		3,000
Aeteobatus narinari	2	1		3,000
Sphyrna	2	0		450
Sphyrna lewini (cf.)	1	0		400
Sphyrna lewini	3	2		1,500
Osteichthyes	2,712		73.16	
Albula neoguinaica	16	2		575
Ariidae	220			
Ariopsis seemanni	9	4		1,300
Bagre panamensis (cf.)	1	1		440
Bagre panamensis	13	5		675
Bagre pinnimaculatus (cf.)	1	1		75
Bagre pinnimaculatus	12	3		900
Cathorops	19			1,030
Cathorops furthii (cf.)	2	0		120
Cathorops furthii	63	11		1,750
Notarius	4			1,200
Notarius kessleri (cf.)	2	2		950
Notarius kessleri	12	5		2,400
Notarius troschelii	3	1		600
Sciades dowii	1	1		4,500
Carangidae	6	0		
Caranx	1	1		320
Caranx caninus (cf.)	1	1		250
Caranx caninus	5	3		1,000
Chloroscombrus	17	3		150

Appendix 3, Table VI (continued)

Taxa Operation 19-3ls SQ-B	NISP	MNI	W (g)	BM (g)
Oligoplites	5	1		40
Oligoplites altus (cf.)	1	1		125
Oligoplites refulgens	2	2		200
Selar	1	1		125
Selene	77			
Selene brevoorti (cf.)	1	1		400
Selene peruviana	231	15		1,550
Centropomus medius	1	1		1,000
Centropomus medius (cf.)	1	1		350
Opisthonema libertate (cf.)	16	3		375
Dormitator	1	1		50
Chaetodipterus zonatus	1	1		100
Parapsettus panamensis	2	2		375
Diapterus peruvianus	3	3		825
Haemulopsis leuciscus	2	2		550
Orthopristis chalceus	18	8		930
Haemulidae	28			
Pomadasys	1			150
Pomadasys panamensis (cf.)	1			220
Pomadasys panamensis	43	7		1,225
Lutjanus guttatus	3	2		1,100
Lutjanus novemcinctus (cf.)	1	1		1,000
Cyclopsetta querma	4	4		1,025
Polydactylus approximans	10	4		700
Polydactylus opercularis (cf.)	1	0		140
Polydactylus opercularis	5	3		650
Ilisha furthii	16	5		1,400
Sciaenidae	2	0		
Cynoscion albus	3	2		2,700
Cynoscion phoxocephalus	1	1		125
Larimus	1	1		50
Larimus acclivis	1	1		150
Menticirrhus panamensis	2	2		750
Micropogonias	1	1		200
Nebris occidentalis	2	1		200
Ophioscion typicus	2	2		125
Paralonchurus dumerilii (cf.)	1	1		150
Scomberomorus	10	3		1,350
Sphyraena	1	1		1,000
Stromateidae	1	0		
Peprilus medius	2	1		100
Guentheridia formosa	5	3		675
Sphoeroides annulatus	1	1		4,000
Mammalia	32		9.53	
Procyon lotor	2			
Colubridae (cf.)	2	0		40
Colubridae	1	1		40
Viperidae	1	1		
Iguanidae (cf.)	1	1	0.3	

Appendix 3 (continued)

Table VII
Vertebrate fauna from Station R170, Site CHI-33

Taxa Station R170	**NISP**	**MNI**	**W (g)**	**BM (g)**
Stratum 1				
Mammalia	1	0	0.2	
Odocoileus virginianus	3	1	8.1	40,000
Stratum 2				
Sciades dowii	1	1	0.4	3,000
Tetraodontidae	1	1	0.05	600
Mammalia	2	0	1.6	
Odocoileus virginianus	3	1	5.1	40,000
Stratum 3				
Mammalia	11	0	9.8	
Dasyprocta	1	1	1	2,500
Odocoileus virginianus	5	2	7.9	70,000
Stratum 4				
Ctenosaura similis	1	1	0.04	800
Mammalia	13	0	3.5	
Odocoileus virginianus	1	1	3.5	30,000
Stratum 5				
Mammalia	1	1	4.6	
Stratum 7				
Lobotes surinamensis	1	1	1.8	3,200
Odocoileus virginianus	1	1	3.6	30,000

Table VIII
Vertebrate fauna from Station R171, Site CHI-33

Taxa Station R171	**NISP**	**MNI**	**W (g)**	**BM (g)**
Stratum 1				
Sphyrna lewini (cf.)	1	1	0.4	3,600
Iguana iguana	1	1	0.2	2,000
Kinosternon scorpioides	2	2	1.8	600
Trachemys (cf.)	1	1	0.8	
Mammalia	30	0	19.6	
Dasypus	17	1	4	
Agouti paca	1	1	0.3	
Sylvilagus	1	1	0.8	650
Odocoileus virginianus (cf.)	12	2	95	70,000
Stratum 2				
Odocoileus virginianus	1	1	1.7	30,000
Mammalia	2	1	1.1	
Stratum 3				
Dasypus	1	1	0.4	

Appendix 3 (continued)

Type 1 sites
Table IX
Vertebrate fauna from surface collections, Site LS-3

Provenience	Taxa	NISP	BM (g)
F13he, R071	Ariidae	1	6,000
	Cynoscion	2	
	Cynoscion albus	1	800
F9he, T6R10	*Echiophis brunneus*	1	200
F18ls, R1; F22ls, T1R9; F44ls, T4R9; F57ls, R1; 7he, T7R3; F9he, T8R3; 18he, T2R5;	Mammalia	10	
F9he, T2R5, T3R2, T8R3; 13he, R071; F16he, R1; F19he, R118	Mammalia	13	
F1ls, T1R1; F5he, T2R2; F13he, T7R9	*Bos* (cf.)	3	
F44ls, R238; F2he, T1R11; F48ls, T2R1; F16he, R094;	*Bos*	4	
F57ls, R321	*Canis* (cf.)	1	
F9he, T2R5	*Odocoileus virginianus* (cf.)	1	
F9he, T3R2	*Odocoileus virginianus*	2	20,000
F13he, R071	*Odocoileus virginianus*	1	40,000
F15ls, R1	*Caiman*	1	10,000
F19ls, R118	Cheloniidae (cf.)	1	

Table X
Vertebrate fauna from surface collections, Site LS-10

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F33he, T2R2	*Odocoileus virginianus*	1	1	0.3	
F33he, T4R2	Vertebrata	2	0	0.2	
	Rhizoprionodon longurio	4	3	1.1	4,050
	Carcharhinus leucas	1	1	0.5	1,200
	Carcharhinus	2	2	0.15	3,200
	Osteichthyes	45	?	3.3	
	Perciformes	1	0	0.2	
	Ariidae	79	1	7.45	2,200
	Ariopsis seemanni	12	3	2.15	800
	Bagre	1	0	0.3	
	Bagre panamensis	2	1	0.2	1,000
	Bagre pinnimaculatus	38	7	24.5	9,150
	Cathorops	10	0	0.85	250
	Cathorops furthii	39	6	7.15	1600
	Cathorops furthii (cf.)	1	1		250

Appendix 3, Table X (continued)

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F33he, T4R2 (continued)	*Cathorops tuyra*	2	2	1.1	400
	Notarius	1		0.1	650
	Notarius troschelii	3	2	0.55	900
	Sciades dowii	17	3		9,300
	Tylosurus	1	1	0.1	225
	Caranx caninus	10	3	1.7	1,500
	Chloroscombrus orqueta	1	1	0.05	50
	Oligoplites altus	31	2	0.4	1,200
	Oligoplites altus (cf.)	2	2		1,500
	Selene peruviana	15	4	0.9	375
	Trachinotus kennedyi	1	1	0.6	800
	Centropomus	1	0	0.2	300
	Centropomus medius	2	1	0.7	700
	Centropomus robalito	2	1	0.6	400
	Centropomus unionensis	1	1	0.2	350
	Opisthonema libertate (cf.)	1	1	0.05	125
	Diapterus peruvianus	1	1	0.15	150
	Pomadasys	1	1	0.1	150
	Pomadasys panamensis	2	2	0.3	600
	Lobotes surinamensis	1	1	0.4	2,000
	Echiophis brunneus	1	1	0.1	400
	Citharichthys gilberti (cf.)	1	1	0.1	100
	Polydactylus	1	0	0.05	
	Polydactylus opercularis	8	4	1.4	1,550
	Ilisha furthii	9	4	0.95	1,200
	Cynoscion	1	0	0.1	
	Cynoscion albus (cf.)	1	1		1,500
	Cynoscion albus	6	4	7.1	22,600
	Cynoscion phoxocephalus (cf.)	1	1	0.1	350
	Cynoscion praedatorius (cf.)	1	1	0.5	2,000
	Cynoscion squamipinnis	1	1	0.1	200
	Cynoscion squamipinnis (cf.)	1	1	0.2	800
	Micropogonias	1	1	0.2	350
	Ophioscion	1	1	0.1	75
	Ophioscion scierus	1	1	0.1	250
	Scomberomorus	2	2	0.2	700
	Sphyraena	3	2	0.25	550
	Guentheridia formosa	19	4	3.6	1,325
	Sphoeroides	1	1	0.1	150
	Sphoeroides annulatus	2	1	0.2	250
	Chelonia (cf.)	1	1	0.9	
	Iguanidae (cf.)	1	1	0.05	
	Iguana iguana	3	3	4.5	2,200
	Mammalia	141	0	4.1	
	Dasypus	1	1	0.05	

Appendix 3, Table X (continued)

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F33he, T4R2 (continued)	*Liomys*	1	1	0.05	50
	Agouti paca	1	1	1.1	
	Odocoileus virginianus	56	4	73.7	100,000
F33he, T10R5	*Osteichthyes*	1	?	0.1	
	Ariidae	1	0	0.02	
	Bagre pinnimaculatus	2	1	0.32	700
	Mammalia	1	0	0.4	
	Odocoileus virginianus	3	1	1	30,000
F41he, R251	*Bagre pinnimaculatus*	1	1	0.6	850
	Notarius kessleri	2	1	2.1	800
	Cathorops furthii	1	1	0.9	250
	Tylosurus cocodrilus	1	1	0.4	1,800
	Ilisha furthii	1	1	0.04	250
	Polydactylus opercularis	1	1	0.13	400
	Pomadasys panamensis	3	2	0.26	850
	Caranx caninus	2	1	0.09	300
	Odocoileus virginianus	1	1	0.8	40,000
F39he, T19R2	*Dasypus*	1	1	0.3	
F44he, R263	Mammalia*	1	1	1.1	
	Odocoileus virginianus (cf.)	1	1	2.9	30,000
	Bos	1	1	2.2	
F82ls, R527	Mammalia	1	1	1.5	
	Odocoileus virginianus (cf.)	1	1	2.4	
F82ls cat3197	*Bos*	1	1	15.1	
F82ls cat3197	*Odocoileus virginianus*	2	1	20.9	40,000
F85ls, T7R12	*Osteichthyes*	1	1	0.3	
	Trachemys	1	1	0.6	3,500
	Sus	1	1	0.7	
F87ls, T9R9	Mammalia	4	4	0.6	
	Odocoileus virginianus	1	1	1	30,000
F87ls, R532	*Odocoileus virginianus*	1	1	7.1	40,000
F87ls, R568	*Odocoileus virginianus*	1	1	0.9	30,000
F99ls, T1R10	Mammalia*	10	1	4.5	
F99ls, T3R2	Mammalia	1	1	0.2	700
F99ls, T3R18	Mammalia*	1	1	0.9	

Appendix 3 (continued)

Table XI
Vertebrate fauna from surface collections, Site LS-15

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F102ls, R676	*Bos*	1	1		
F103ls, R679-C	*Bos*	1	1		
surface	*Odocoileus virginianus* (cf.)	1	1	3.8	40,000
F103ls, R679-C	*Osteichthyes*	2	2		
Inside Pica-pica bowl	*Cathorops*	1	1		250
	Opisthonema libertate	4	1		125
	Orthopristis chalceus	1	1		75
	Odocoileus virginianus	2	2	12	40,000
F58he, R341	Mammalia	2	0	2.2	
F58he, R363-C	*Bos*	2	2		
F58he, T1R0	Mammalia	1	1		
F58he, T2R10	*Bos*	1	1		
F58he, T2R3	*Bos*	1	1		
F58he, T8R20	*Bos*	1	1		
F58he, T10R2	*Bos*	3	3		
	Mammalia*	4	4		
F58he, T11R1	*Bos*	1	1		
F58he, T11R2	Mammalia	4	1	0.9	
F58he, T11R9	Mammalia	1	1	0.58	
F58he, T12R2	Mammalia*	1	1	1.24	
F58he, T18R7	Mammalia*	1	1	1.11	
F58he, T37R2	Mammalia*	1	1		

Type 2 sites
Table XII
Vertebrate fauna from surface collections, Site LS-8

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F25he, T11R10	Mammalia*	3	1		
F66ls, T2R15	*Bos*	1	1	0.9	
F69ls, T1R8	*Bos*	1	1	26	
F70ls, T1R9	*Carcharhinus*	1	1		
	Sphyrna	1	1		
	Albula neoguinaica	1	1		250
	Strongylura	1	1		125
	Chloroscombrus	1	1		50
	Selene peruviana	3	2		200
	Pomadasys panamensis	1	1		75

Appendix 3, Table XII (continued)

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
	Kinosternon scorpioides	1	1		350
	Testudinata	1	0		
	Mammalia*	13	0		
	Bos	4	2		
F71ls, P16	*Carcharhinus*	1	1	0.08	2,500
	Testudinata (cf.)	1	1	0.05	
	Mammalia*	8	1	0.55	
F71ls, T3/T4 (PH1)	*Sphyrna*	1	1	1.8	100,000
	Selene peruviana	3	3	0.1	200
	Polydactylus approximans	1	1	0.2	250
F71ls, T4R6	Mammalia	6		2.7	
	Albula neoguinaica	1	1	0.1	250
	Strongylura	1	1	0.1	125
	Chloroscombrus	1	1	0.1	50
	Selene peruviana	1	1	0.1	75
	Pomadasys panamensis	1	1	0.1	60
	Polydactylus approximans	1	1	0.2	400
	Odocoileus virginianus	1	1		30,000
F72ls, T1R3	*Kinosternon scorpioides*	1	1	2.5	350

Table XIII
Vertebrate fauna from surface collections, Site LS-9

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F81ls, T8R6	Mammalia*	1	1	1.4	
F81ls, R506	*Bos*	1	1	1.6	

Table XIV
Vertebrate fauna from surface collections, Site LS-11

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F88ls, R535-B	Mammalia*	2	0	0.58	
	Odocoileus virginianus	18	1	11.7	40,000
F88ls, T6R7	Mammalia*	1	1		

Appendix 3 (continued)

Table XV
Vertebrate fauna from surface collections, Site LA-28

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F70he, R413	Mammalia*	4	4	0.6	
F70he, R413-B	*Bos*	1	1	32.6	
F70he, R413-D	*Bos* (cf.)	1	1		
F70he, R415-B	Mammalia*	1	1	0.6	
F70he, R415-C	*Artiodactyla*	1	1	2.7	
	Bos (cf.)	30	1	102.4	
F70he, R415-D/R416	Mammalia	1	1	0.8	
F70he, R416-A	*Odocoileus virginianus*	1	1	2.2	40,000
F70he, R416X	Mammalia	12	0	3.4	
	Odocoileus virginianus	8	1	21.6	30,000

Type 3 sites
Table XVI
Vertebrate fauna from surface collections, Site CHI-33

Provenience	Taxa	NISP	MNI	W (g)	MB (g)
F30he, T2R4	*Dasypus*	1	1	1.3	
F30he, R226	Mammalia	1	0	1.5	
	Bos (cf.)	1	1	8.3	
	Odocoileus virginianus (cf.)	1	1	10.9	
	Odocoileus virginianus	1	1	4	30,000

Table XVII
Vertebrate fauna from surface collections, Site LA-29

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
71he, T1R2/ 72he, T1R2	*Odocoileus virginianus*	2	2	21.4	70,000
71he, T2R2	*Cynoscion albus*	1	1	0.6	1,300
	Mammalia	1	1	1.8	
	Odocoileus virginianus	4	1	28	30,000

Appendix 3 (continued)

Type 4 sites

Table XVIII

Vertebrate fauna from surface collections, Site LS-7

Provenience	Taxa	NISP	MNI
F63ls, T1R4	Mammalia*	4	1
F64ls, T1R9	*Bos* *	1	1
F64ls, T2R3	Mammalia*	1	1

Table XIX

Vertebrate fauna from surface collections, Site CHI-30

Provenience	Taxa	NISP	MNI	W (g)	BM (g)
F32he, R205	*Kinosternon* (cf.)	30	1	0.2	?
	Kinosternon	7	1	2.3	?
	Mammalia	23	0		?
	Odocoileus virginianus	3	0		?
	Odocoileus virginianus (cf.)	1	0	0.1	?

Table XX

Vertebrate fauna from surface collections, Site LS-13

Provenience	Taxa	NISP	MNI
F97ls, T3R1	*Bos*	1	1

Appendix 4
Pre-Columbian Human Remains from Stations R213 and R297, Las Huertas (LS-10)

Prepared By Claudia Díaz
Cerro Juan Díaz Project

Table I Human remains from Station R 213, Site LS-10

Age	Bone	Description
Looter pit		
Adult-1	Calcaneum	Severely deteriorated fragment
Adult-1	Canine tooth	Right side mandible canine. Dental calculus covers almost all of the corona, there is small evidence of attrition
Adult-1	Carpus	Missing the head and base
Adult-1	Clavicle	Mid section of the medial left clavicle that adjoins with the acromion
Adult-1	Cranium	Includes several fragments that join and make the occipital complete A fragment from the temporal and two fragments of the parietal from the petrous section Another fragment shows the of the coronal suture obliterated The rest of the fragments are very small and although they do not fit one another they can be from the same individual
Adult-1	Epiphysis	Proximal epiphysis possible from the femur or humerus
Adult-1	Epiphysis	Possible distal epiphysis of the fibula
Adult-1	Epiphysis	Small fragment
Adult-1	Epiphysis	Small fragment with concretions
Adult-1	Femur	Several deteriorated fragments with concretions
Adult-1	Femur	Several fragments of the diaphysis that do not join
Adult-1	Femur	Big fragments (2) of an individual who is smaller than the previous
Adult-1	Femur	Several fragments that do not joint
Adult-1	Femur	Proximal section of the right femur, missing the main trochanter, presents concretions
Adult-1	Fibula	Small fragments (3) of the diaphysis, present concretions
Adult-1	Fibula	Fragments (2) of the diaphysis measuring 4.96 cm and 5.53 cm
Adult-1	Humerus	Diaphysis fragment measures 8.7cm
Adult-1	Humerus	Fragments (2) One fragment is from the diaphysis measures 14cm and the other is a small fragment of the proximal epiphysis head
Adult-1	Humerus	Fragments (2) measuring 8.43cm and 6.74cm, half section of the distal diaphysis
Adult-1	Humerus	Big fragments (2) each measuring 8cm, they do not join but could be from the same individual.
Adult-1	Jaw bone	Small fragment from the mid section of the mandible only the internal section is present
Adult-1	Long bone	Unidentifiable fragment
Adult-1	Long bone	Deteriorated fragments (2)
Adult-1	Long bone	Possible femur fragment

Appendix 4, Table I (continued)

Age	Bone	Description
Adult-1	Long bone	Small deteriorated fragment
Adult-1	Maxillary bone	Small fragment of the maxillary bone, presents the right side middle incisor, half of the corona is worn-out, occlusion overbite, left canine presents tartar
Adult-1	premolar tooth	From the jaw bone, presents concretions
Adult-1	metacarpus	Fragments (2) missing the head
Adult-1	metacarpus	Fragments (3) two of the fragments are missing the head and the base the third fragment is missing the head
Adult-1	metatarsus	Fragment, only the base
Adult-1	metatarsus	Fifth left side metatarsus, missing the head
Adult-1	metatarsus	The first from the left side, missing the base
Adult-1	metatarsus	Missing the base
Adult-1	metatarsus	Left side metatarsus missing the head
Adult-1	metatarsus	Fragments (2) of the right side metatarsus missing the head
Adult-1	metatarsus	Complete with concretions
Adult-1	navicular	Fragment with concretions
Adult-1	navicular	Incomplete left side navicular with concretions
Adult-1	patella	Incomplete patella, external lateral edge of the spur
Adult-1	pelvis	Few fragments of the ilium's crest and the acetabulum
Adult-1	pelvis	Fragment of the articulation section of the acetabulum with the sacrum
Adult-1	pelvis	Several fragments of the ilium crest another fragment from the ischium and other fragments that do not joint but could be from the same individual
Adult-1	phalangette	Complete hand phalangette
Adult-1	phalanx	Very deteriorated hand phalanx (2)
Adult-1	phalanx	Hand phalanx complete (3)
Adult-1	phalanx	Hand phalanx, four present concretions (5)
Adult-1	phalanx	Head fragment of a foot phalanx
Adult-1	radio	Small fragment of the diaphysis, measures 5.1cm
Adult-1	radio	The texture is very compact there is the possibility it might be fauna
Adult-1	radio	Diaphysis fragments (3) measuring 7.6cm, 4.3cm, 2.84cm
Adult-1	rib bone	One big fragment and five small ones
Adult-1	rib bone	Big fragments (5)
Adult-1	rib bone	Deteriorated fragment
Adult-1	rib bone	Several small fragments
Adult-1	rib bone	Several big fragments
Adult-1	scapula	Fragment from the neck section
Adult-1	talus	Fragment with concretions
Adult-1	talus	Complete talus, present a lot of concretions
Adult-1	tarsus	Deteriorated fragment
Adult-1	tibia	Very small fragment from one of the sides

Appendix 4, Table I (continued)

Age	Bone	Description
Adult-1	tibia	(2) Fragments: one side of the proximal fragment presents concretions and one face section of the proximal fragments with concretions. They both join
Adult-1	tibia	Deteriorated proximal fragment of the tibial tuberosity
Adult-1	tibia	Several fragments that do not joint
Adult-1	ulna	Diaphysis fragment with concretions
Adult-1	ulna	Proximal half section of the left side ulna, is missing the epiphysis, measures 12.5cm, presents concretions
Adult-1	vertebra	One of the fragments is from the spiny apophysis and the other from the body
Adult-1	vertebra	Thoracic vertebra fragments, from the body, apophysis and spiny apophysis
Adult-1	vertebra	One fragment of the vertebra's body and 9 small fragments of the apophysis
Adult-1	vertebra	Small fragments: 2 apophysis and one body
Infant	ulna	Epiphysis proximal
Adult-2 (Senile)	jaw bone	Left side jaw bone fragment perhaps of a senile individual, there were no teeth and the alveolus were completely closed
Adult-2 (Senile?)	maxillary bone	Fragment of the left side of the maxilla possibly from an elder person. The maxilla lacked of teeth and the alveoli were all closed. The canine was the last to fall. There was evidence of abscess in the M1, perhaps the reason for loosing the molar

Appendix 4 (continued)

Table II Human remains from Station R 297, Site LS-10
Context: Armadillo borrow, Stratum 1 and 2

Age	Bone	Description
Armadillo burrow		
Adult	Fibula	Distal epiphysis
Adult	Jaw bone	Fragment of the left ascending ramus of the mandible
Adult	Femur	Fragment of the proximal side of the diaphysis. It joints with the fragments found in Stratum 1
Adult	Phalanx	1st phalanx from the left hand, missing part of the head and shows evidence of being burnt
Adult	Rib bone	Large fragment, almost half of the second right side rib
Adult	Vertebra	Apophysis fragment of a thoracic vertebra
Adult	Vertebra	5th lumbar vertebra with complete apophysis
Stratum 1		
Adult	Femur	Fragment of the proximal side of the diaphysis and extreme proximal of the diaphysis.
Adult	Long bone	Several burnt fragments, possible form the humerus or femur
Adult	Metatarsus	4th right side deteriorated metatarsus missing the head
Adult		3rd right side metatarsus missing the head
Adult		Head fragment
Adult	Molar	First right side molar from the mandible, presents fragmented corona with few evidence of attrition
Adult	Phalanx	Phalanx fragment missing the head and base, presents stain marks
Adult	Vertebra	Apophysis fragment
Infant	Rib bone	Small deteriorated fragment, present stain marks
Stratum 2 (upper level)		
(?)	Long bone	Small fragment perhaps of a long bone
Adult	Long bone	Small fragment of the diaphysis
Adult	Rib bone	Small fragment
Stratum 2 (lower level)		
Adult	Long bone	Fragment
Adult	Molar	3rd right side molar from the maxilla. The corona is covered with dental calculus and the root is deteriorated scraped by a mouse
Adult	Rib bone	Fragment of one of the sides
Infant	Rib bone	Small fragment

Appendix 5

Testing for Magnetite with a Mössbauer Spectrum

Report prepared by Dr. Juan Jaén

Centro de Investigaciones con Técnicas Nucleares, Universidad de Panamá

Sample preparation

Provided material were carefully ground in an agate mortar and separated magnetically with a soft magnet before assembling the "Mössbauer thin absorbers" with approximately 70 mg of powdered samples. ^{57}Fe Mössbauer spectra were taken at room temperature using a constant acceleration transmission spectrometer and a 2 mCi $^{57}Co/Rh$ source. Spectra were least square fitted by using Lorentzian-shape lines with the program Recoil. Isomer shifts are referred to α-Fe. The quality of each computer fit was checked by a χ^2 test.

Results and discussion

All spectra, shown in the figures, were fitted with two sextets (S) for the magnetic part and two doublets (D) for the paramagnetic contributions. The parameters are given in the Table. Paramagnetic Fe^{3+}, presumably originating from clays minerals (paramagnetic Fe^{3+} in silicates) [1] and/or superparamagnetic Fe^{3+} in hydrated iron oxides [2] could be assigned to species (A). The doublets with a large quadrupole splitting may be attributable to paramagnetic high-spin Fe^{2+} (species B), as Fe^{2+} in octahedral co-ordination site of silicate minerals [3-7]. The sextets in the Mössbauer spectra reveal characteristic features of a magnetic phase, which may be well assigned to non-stoichiometric, substituted and partially oxidized magnetite. Magnetite is an inverse spinel structure, with tetrahedral positions (A-site) completely occupied by Fe^{3+}, and octahedral ones (B-site) by equal amounts of Fe^{3+} and Fe^{2+}. Due to a rapid electron exchange, at room temperature the average chemical and magnetic environment is the same in the octahedral positions. Thus, for stoichiometric magnetite the sextet area ratio A_A/A_B amounts to 1:2. However, oxidation of Fe^{2+} results in a decrease of the octahedral component and introduces a B-site Fe^{3+} sextet for which the parameters are not very different from those of the A-site sextet. The partly oxidized spinel is better described as non-stoichiometric magnetite $Fe_{3-x}O_4$ ($0 \leq x \leq 1/3$), and the area ratio deviate from 1:2. The fact that the values of ε for both sites are different of 0 mm/s and the area ratio greater than 0.33 suggest the presence of other structural defects. The presence of a substitutional element (Ti, Al, Ca, etc.) also results in deviations of the area ratio.

This is a characterization done in order to answer your questions regarding the presence of magnetite in these soils. The presence of substituted and partially oxidized magnetite is clearly established. More detailed information concerning the minerals in the sample soils can be obtained combining selective dissolution techniques, X-ray diffraction and low temperature and field Mössbauer spectroscopy studies.

Sample	Component	δ (mm/s)	ε (mm/s)	Δ (mm/s)	H (T)	Γ (mm/s)	A (%)
OP-19-2 Cuadro C	Doublet A	0.37	-	0.65	-	0.28	64.30
	Doublet B	1.13	-	2.67	-	0.27	10.60
	Sextet A	0.29	-0.12	-	49.5	0.30	19.80
	Sextet B	0.69	-0.05	-	44.7	0.21	5.40
Cat 3161	Doublet A	0.36	-	0.65	-	0.27	67.70
	Doublet B	1.09	-	2.64	-	0.24	10.50
	Sextet A	0.24	-0.14	-	49.7	0.30	15.20
	Sextet B	0.60	-0.05	-	45.6	0.40	6.60
OP-19-2 Cuadro C magnetically separated	Doublet A	0.37	-	0.65	-	0.30	48.50
	Doublet B	1.10	-	2.61	-	0.26	8.50
	Sextet A	0.30	-0.07	-	49	0.32	32.90
	Sextet B	0.69	-0.10	-	45.2	0.27	10.00
Cat 3161magnetically separated	Doublet A	0.36	-	0.65	-	0.28	63.30
	Doublet B	1.16	-	2.73	-	0.27	7.00
	Sextet A	0.27	-0.09	-	48.8	0.36	23.70
	Sextet B	0.79	-0.08	-	45.3	0.30	6.00

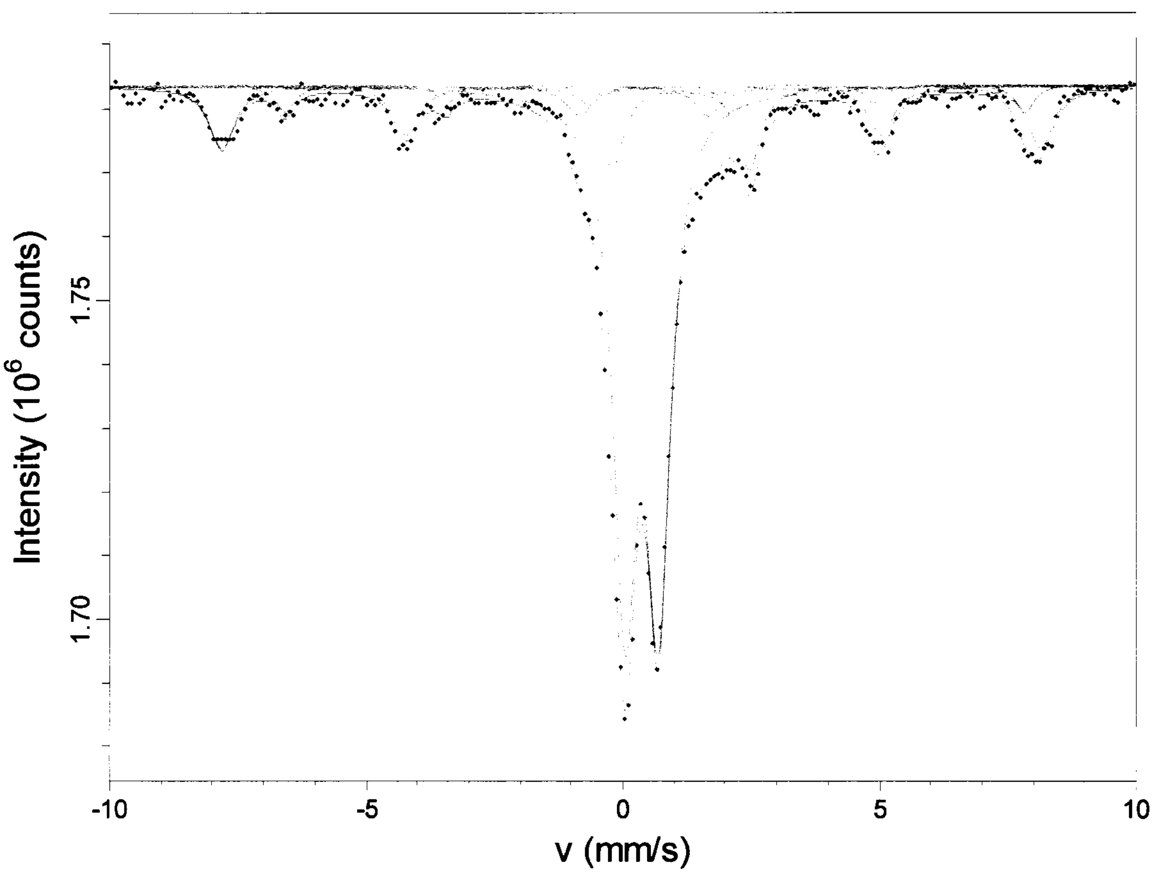

Figure 1 Room temperature Mössbauer spectrum of sample Operation 19-2ls SQ C

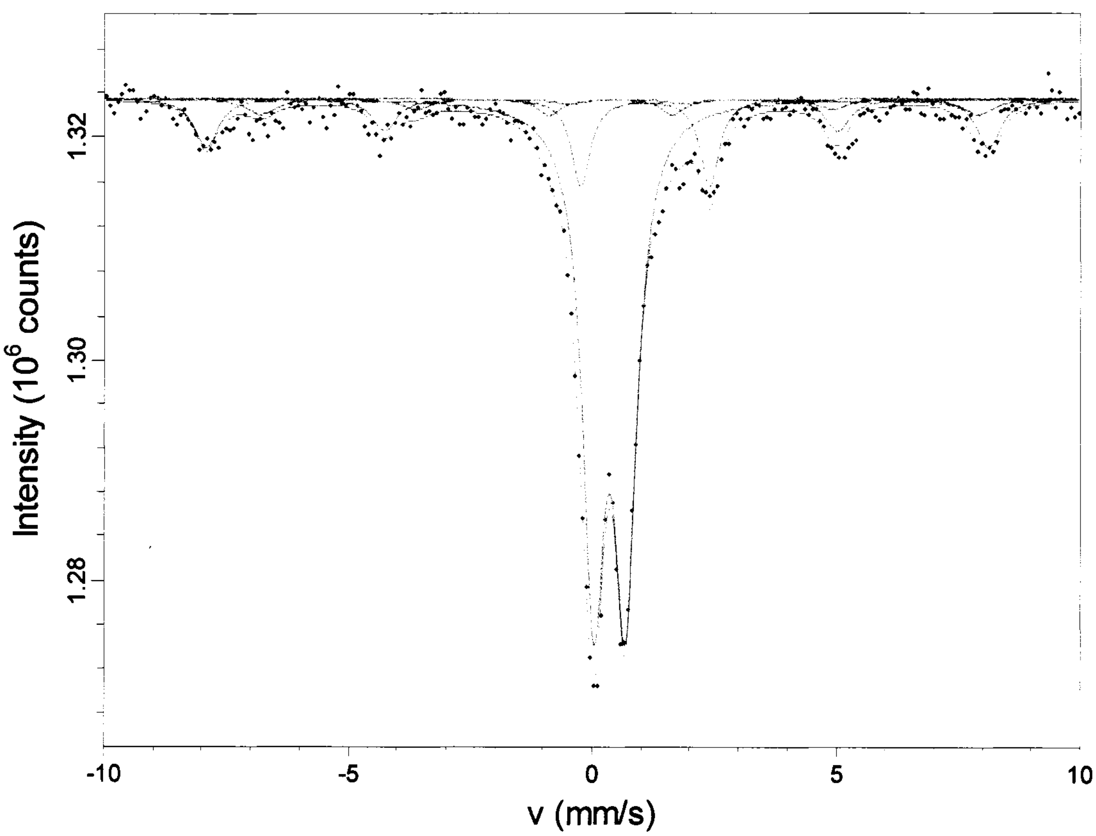

Figure 2 Room temperature Mössbauer spectrum of sample cat 3161

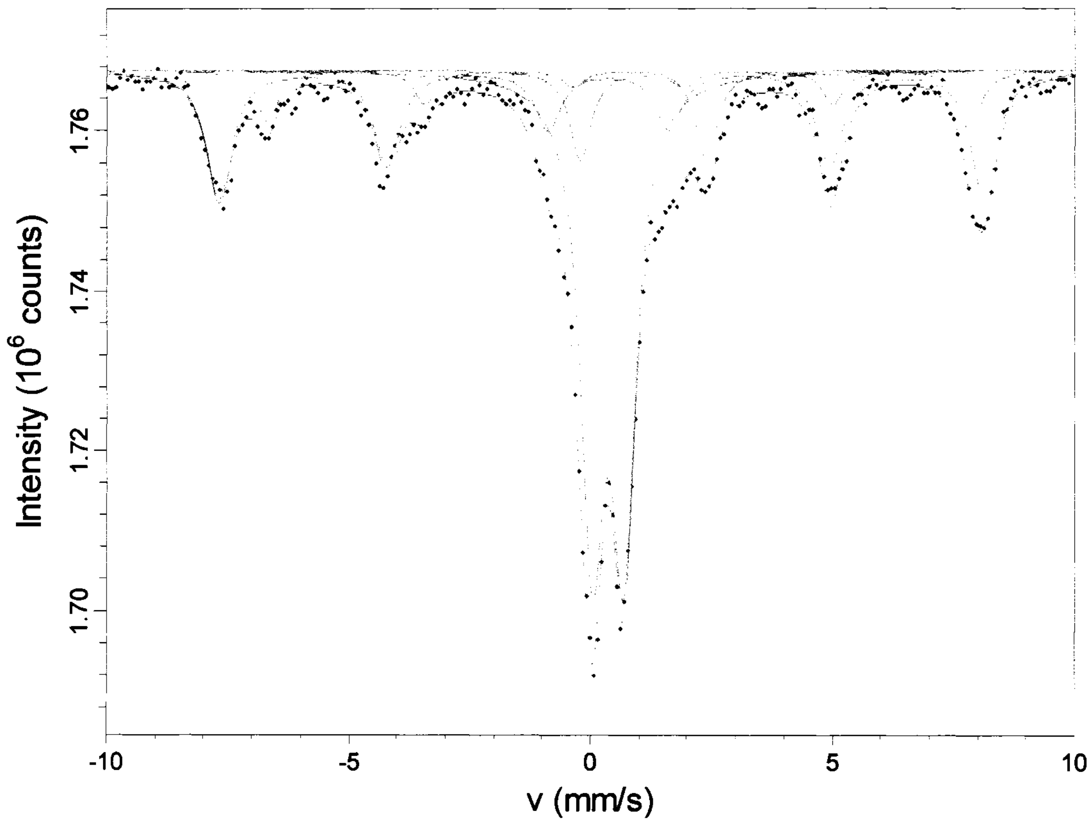

Figure 3 Room temperature Mössbauer spectrum of sample Operation 19-2ls SQ C magnetically separeted

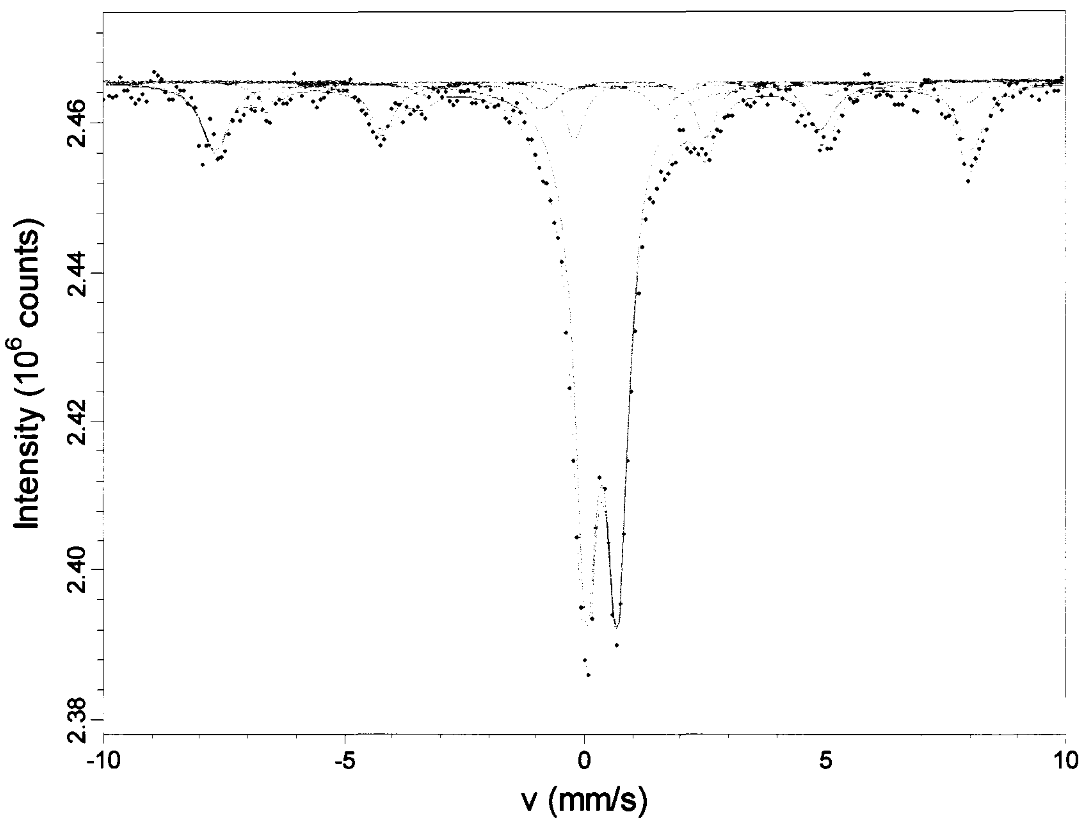

Figure 4 Room temperature Mössbauer spectrum of sample cat 3161 magnetically separated

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Appendix 6

Resistivity data from the northeastern foothills of Cerro Juan Díaz

Report prepared by Alexis Mojica
Departamento de Física, Universidad de Panamá/
University of Paris 6

Global Positional System–GPS (Trimble)

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point A – Coordinates (0, 0)
T_0:	2:02 p.m.
T_f:	2:27 p.m.
GPS height:	152,50 cm
Series number:	9872

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point B – Coordinates (10, 0)
T_0:	2:03 p.m.
T_f:	2:25 p.m.
GPS height:	153,50 cm
Series number:	9875

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point C – Coordinates (24, 0)
T_0:	3:35 p.m.
T_f:	3:57 p.m.
GPS height:	140,00 cm
Series number:	9875

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point D – Coordinates (0, 5)
T_0:	2:44 p.m.
T_f:	3:06 p.m.
GPS height:	147,30 cm
Series number:	9875

Appendix 6 (continued)

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point E – Coordinates (13. 11)
T_0:	2:47 p.m.
T_f:	3:15 p.m.
GPS height:	147,60 cm
Series number:	9872

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point F – Coordinates (24. 11)
T_0:	3:37 p.m.
T_f:	4:24 p.m.
GPS height:	133,50 cm
Series number:	9872

Operator:	O. Caballero & A. Mojica
Date:	Friday January 10, 2003
Site:	Point G – Coordinates (24. 5)
T_0:	5:25 p.m.
T_f:	5:51 p.m.
GPS height:	141,50 cm
Series number:	9872

Electric resistivity of the sub-soil - apparent resistivity map field data

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	0	62	21.64
1	0	63	21.99
2	0	68	23.74
3	0	61	21.29
4	0	99	34.56
5	0	86	30.02
6	0	91	31.76
7	0	96	33.51
8	0	99	34.56

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	1	56	19.55
1	1	72	25.13
2	1	73	25.48
3	1	80	27.92
4	1	112	39.10
5	1	101	35.26
6	1	123	42.94
7	1	113	39.44
8	1	133	46.42

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	2	83	28.97
1	2	79	27.58
2	2	78	27.23
3	2	88	30.72
4	2	104	36.32
5	2	119	41.54
6	2	154	53.76
7	2	163	56.90
8	2	153	53.41

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	3	82	28.62
1	3	93	32.46
2	3	122	42.59
3	3	109	38.05
4	3	124	43.28
5	3	174	60.74
6	3	174	60.74
7	3	185	63.88
8	3	213	74.35

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	4	96	33.51
1	4	123	42.94
2	4	152	53.06
3	4	145	50.62
4	4	174	60.74
5	4	332	115.89
6	4	275	95.99
7	4	307	107.16
8	4	236	82.38

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	5	112	39.095
1	5	136	47.47
2	5	145	50.61
3	5	159	55.50
4	5	239	83.43
5	5	495	172.79
6	5	393	137.18
7	5	283	98.78
8	5	129	45.03

Appendix 6 (continued)

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	6	96	33.51
1	6	128	44.68
2	6	150	52.36
3	6	181	63.18
4	6	305	106.46
5	6	287	100.18
6	6	177	61.78
7	6	187	65.28
8	6	214	74.70

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	7	113	39.44
1	7	122	42.59
2	7	190	66.32
3	7	161	56.20
4	7	174	60.74
5	7	159	55.50
6	7	173	60.39
7	7	158	55.15
8	7	205	71.56

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	8	125	43.63
1	8	149	52.01
2	8	133	46.42
3	8	173	60.39
4	8	194	67.72
5	8	186	64.93
6	8	173	60.39
7	8	181	63.18
8	8	216	75.40

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	9	154	53.76
1	9	168	58.64
2	9	176	61.44
3	9	194	67.72
4	9	189	65.97
5	9	189	65.97
6	9	213	74.35
7	9	218	76.10
8	9	210	73.30

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	10	172	60.04
1	10	165	57.60
2	10	206	71.91
3	10	178	62.13
4	10	217	75.75
5	10	217	75.75
6	10	225	78.54
7	10	233	81.33
8	10	227	79.24

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0	11	161	56.20
1	11	152	53.06
2	11	195	68.07
3	11	183	63.88
4	11	188	65.62
5	11	203	70.86
6	11	205	71.56
7	11	215	75.05
8	11	201	70.16

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	0	96	33.51
10	0	123	42.94
11	0	116	40.49
12	0	112	39.10
13	0	102	35.60
14	0	88	30.72
15	0	71	24.78
16	0	75	26.18
17	0	69	24.08
18	0	75	26.18
19	0	74	25.83
20	0	145	50.61
21	0	120	41.89
22	0	72	25.13
23	0	75	26.18
24	0	90	31.42

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	1	154	53.76
10	1	147	51.31
11	1	155	54.11
12	1	139	48.52
13	1	116	40.49
14	1	103	35.95
15	1	99	34.56
16	1	86	30.02
17	1	77	26.88
18	1	81	28.27
19	1	93	32.46
20	1	77	26.88
21	1	90	31.42
22	1	73	25.48
23	1	70	24.43
24	1	64	22.34

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	2	156	54.45
10	2	188	65.62
11	2	181	63.18
12	2	157	54.80
13	2	165	57.60
14	2	127	44.33
15	2	100	34.91
16	2	104	36.30
17	2	86	30.02
18	2	79	27.58
19	2	94	32.81
20	2	79	27.58
21	2	95	33.16
22	2	89	31.07
23	2	80	27.92
24	2	77	26.88

Appendix 6 (continued)

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	3	324	113.10
10	3	202	70.51
11	3	213	74.35
12	3	223	77.84
13	3	214	74.70
14	3	159	55.50
15	3	113	39.44
16	3	72	25.13
17	3	84	29.32
18	3	80	27.92
19	3	88	30.72
20	3	94	32.81
21	3	84	29.32
22	3	80	27.92
23	3	73	25.48
24	3	71	24.78

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	4	237	82.73
10	4	239	83.43
11	4	271	94.60
12	4	193	67.37
13	4	186	64.93
14	4	190	66.32
15	4	102	35.60
16	4	79	27.58
17	4	101	35.26
18	4	106	37.00
19	4	89	31.07
20	4	119	41.54
21	4	103	35.95
22	4	77	26.88
23	4	72	25.13
24	4	57	19.90

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	5	227	79.24
10	5	366	127.76
11	5	255	89.01
12	5	205	71.56
13	5	176	61.44
14	5	155	54.11
15	5	124	43.28
16	5	91	31.76
17	5	100	34.91
18	5	116	40.49
19	5	104	36.30
20	5	106	37.00
21	5	130	45.38
22	5	82	28.62
23	5	68	23.74
24	5	61	21.29

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	6	255	89.01
10	6	281	98.09
11	6	260	90.76
12	6	250	87.27
13	6	212	74.00
14	6	163	56.90
15	6	143	49.92
16	6	138	48.17
17	6	108	37.70
18	6	111	38.75
19	6	131	45.73
20	6	125	43.63
21	6	106	37.00
22	6	95	33.16
23	6	106	37.00
24	6	85	29.67

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	7	241	84.13
10	7	258	90.06
11	7	238	83.08
12	7	203	70.86
13	7	191	66.67
14	7	208	72.61
15	7	153	53.41
16	7	194	67.72
17	7	119	41.52
18	7	108	37.70
19	7	144	50.26
20	7	110	38.40
21	7	117	40.84
22	7	97	33.86
23	7	76	26.53
24	7	77	26.88

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	8	203	70.86
10	8	269	93.90
11	8	202	70.51
12	8	227	79.24
13	8	225	78.54
14	8	142	49.57
15	8	139	48.52
16	8	113	39.44
17	8	128	44.68
18	8	133	46.42
19	8	117	40.84
20	8	140	48.87
21	8	120	41.89
22	8	91	31.76
23	8	124	43.28
24	8	94	32.82

Appendix 6 (continued)

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	9	225	78.54
10	9	249	86.92
11	9	236	82.38
12	9	244	85.17
13	9	184	64.23
14	9	172	60.04
15	9	119	41.54
16	9	91	31.77
17	9	122	42.59
18	9	152	53.06
19	9	132	46.08
20	9	106	37.00
21	9	118	41.19
22	9	112	39.10
23	9	124	43.28
24	9	123	42.94

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	10	226	78.89
10	10	265	92.50
11	10	211	73.65
12	10	237	82.73
13	10	197	68.77
14	10	140	48.87
15	10	104	36.30
16	10	117	40.84
17	10	100	34.91
18	10	125	43.63
19	10	135	47.12
20	10	118	41.19
21	10	199	34.56
22	10	106	37.00
23	10	109	38.05
24	10	111	38.75

x (m)	y (m)	ΔV (V)	ρ (Ωm)
9	11	216	75.40
10	11	207	72.26
11	11	190	66.32
12	11	209	72.95
13	11	190	66.32
14	11	137	47.82
15	11	86	30.02
16	11	71	24.78
17	11	69	24.08
18	11	99	34.56
19	11	118	41.19
20	11	106	37.00
21	11	94	32.81
22	11	83	28.97
23	11	116	40.49
24	11	103	35.95

Notes:
Injected current = 18 mA

Appendix 6 (continued)

Electric resistivity of the subsoil – Pseudosection field data

x (m)	y (m)	ΔV (V)	ρ (Ωm)
0,5	1	116	18
1,0	2	31	18
1,5	3	13	18
2,0	4	15	35
2,5	5	9	35
1,5	1	147	18
2,0	2	34	18
2,5	3	15	18
3,0	4	9	18
3,5	5	8	35
2,5	1	287	35
3,0	2	36	18
3,5	3	14	18
4,0	4	7	18
4,5	5	8	35
3,5	1	188	18
4,0	2	34	18
4,5	3	12	18
5,0	4	8	18
5,5	5	9	35
4,5	1	323	18
5,0	2	33	18
5,5	3	12	18
6,0	4	14	35
6,5	5	8	35

x (m)	y (m)	ΔV (V)	ρ (Ωm)
5,5	1	472	18
6,0	2	39	18
6,5	3	15	18
7,0	4	15	35
7,5	5	9	35
6,5	1	333	18
7,0	2	46	18
7,5	3	17	18
8,0	4	17	35
8,5	5	9	35
7,5	1	326	18
8,0	2	50	18
8,5	3	19	18
9,0	4	17	35
9,5	5	9	35
8,5	1	256	18
9,0	2	55	18
9,5	3	19	18
10,0	4	16	35
10,5	5	12	35
9,5	1	268	18
10,0	2	56	18
10,5	3	17	18
11,0	4	16	35
11,5	5	10	354

x (m)	y (m)	ΔV (V)	ρ (Ωm)
10,5	1	282	18
11,0	2	45	18
11,5	3	16	18
12,0	4	16	35
12,5	5	9	35
11,5	1	211	18
12,0	2	44	18
12,5	3	16	18
13,0	4	15	35
13,5	5	6	35
12,5	1	202	18
13,0	2	38	18
13,5	3	14	18
14,0	4	12	35
14,5	5	5	35
13,5	1	167	18
14,0	2	32	18
14,5	3	10	18
15,0	4	10	35
15,5	5	7	35
14,5	1	140	18
15,0	2	23	18
15,5	3	10	18
16,0	4	9	35
16,5	5	5	35

x (m)	y (m)	ΔV (V)	ρ (Ωm)
15,5	1	96	18
16,0	2	21	18
16,5	3	9	18
17,0	4	10	35
17,5	5	6	35
16,5	1	192	35
17,0	2	21	18
17,5	3	8	18
18,0	4	8	35
18,5	5	5	35
17,5	1	96	18
18,0	2	20	18
18,5	3	7	18
19,0	4	7	35
19,5	5	5	35

x (m)	y (m)	ΔV (V)	ρ (Ωm)
18,5	1	110	18
19,0	2	19	18
19,5	3	7	18
20,0	4	7	35
20,5	5	5	35
19,5	1	95	18
20,0	2	16	18
20,5	3	5	18
21,0	4	6	35
21,5	5	4	35
20,5	1	108	18
21,0	2	14	18
21,5	3	5	18
22,0	4	6	35

x (m)	y (m)	ΔV (V)	ρ (Ωm)
21,5	1	98	18
22,0	2	12	18
22,5	3	4	18

22,5	1	76	18
23,0	2	9	18

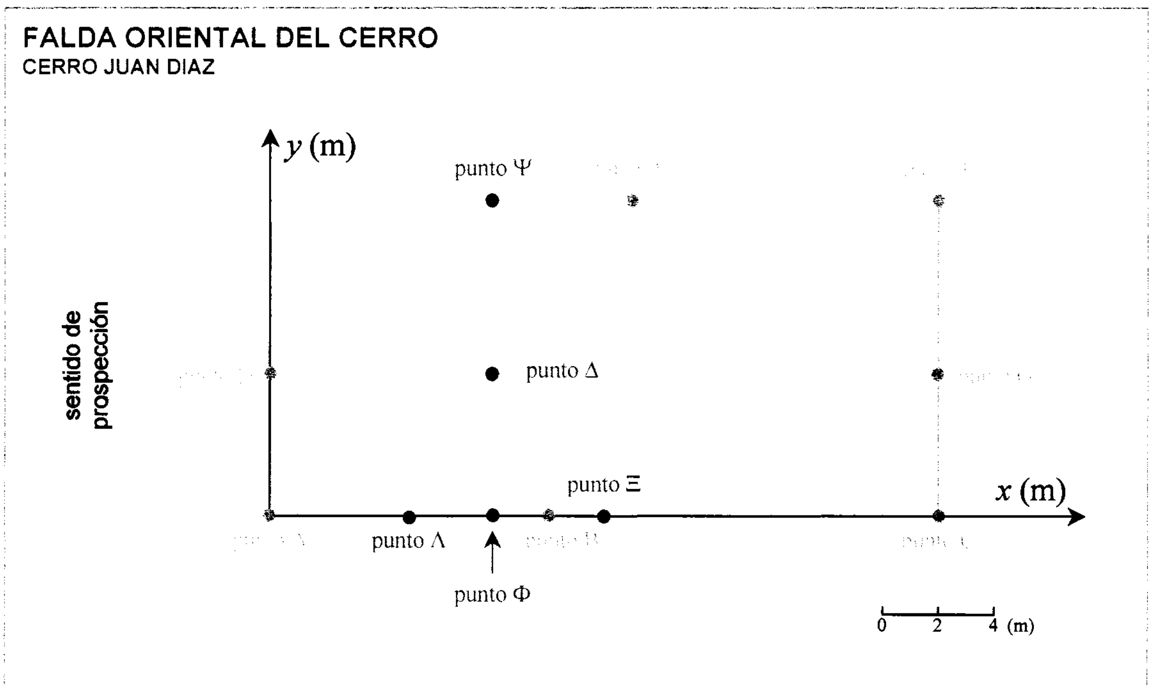
23,5	1	59	18

Appendix 6 (continued)

Global Positioning System – GPS [Garmin 48]
Date: Thursday January 9, 2003

Point	x (m)	y (m)	17 N	UTM
A	0	0	566133	879449
Λ	5	0	566131	879453
Φ	8	0	566130	879456
Δ	8	5	566127	879456
Ψ	8	11	566120	879452
Ξ	12	0	566128	879460

Diagram:



Appendix 7
PARLV Invertebrate Fauna Habitat

Based on A. Myra Keen's 1971 edition of "Sea Shells of Tropical West America" catalog and Carol Skoglund 2001 and 2002 supplements "Panamic Province Molluscan Literature Additions and Changes From 1971 through 2000"

TAXON[1]	COMMON NAME	HABITAT
GASTROPODA	"Stomach-footed"	
Archaeogastropoda		
NERITIDAE		
Nerita (Retina) scabricosta	Nerite	Sun baked rocks in the splash zone, wetted only at high tide
TROCHIDAE		
Calliostoma		Intertidally in rocky areas
Mesogastropoda	"Middle stomach-footed"	
CALYPTRAEIDAE		
Crepidula	Slipper shell	Attached to rocks or bivalves
POTAMIDIDAE		
Cerithidea pulchra	"Concha prieta"	Muddy sand or mangrove swamps at high tide level
Cerithidea valida	Horn shell	Brackish mud or entirely out of the water on reeds and twigs
OVULIDAE		
Jenneria pustulata		In and near masses of stony coral
Littorinidae		
Littorina	periwinkles	Mangrove swamps attached to rocks near the tide line
NATICIDAE		
Natica (Natica) unifasciata	Moon snail	Intertidal, mud or sand
Polinices (Polinices) panamaensis	Moon shell	Offshore in depths to about 45 meters
Polinices (Polinices) uber	Moon shell	Intertidal and offshore in depths of 4 to 90 meters
STROMBIDAE		
Strombus (Tricornis) galeatus	Winged conch	Intertidal zone just below low-tide line
CASSIDIDAE		
Cassis (Semicassis) centiquadrata		Sand at very low water
TONNIDAE		
Malea ringens	Turn shell	Under ledges of rocks at extreme tides and on sandbars
Neogastropoda	"New stomach-footed"	
BUCCINIDAE		
Northia northiae		Near the coast in shallow waters
COLLUMBELLIDAE		
Anachis		Naturally found under rocks

[1] In Molluskan taxonomy orders end in "oda" and the families in "ae" (Claasen 1998: 20).

Appendix 7 (continued)

TAXON	COMMON NAME	HABITAT
Nassarina		Intertidal zone and offshore
FASCIOLARIIDAE		
Fasciolaria (Pleuroploca) granosa	Tulip shell	Mud flats below low-water mark
MELONGENIDAE		
Melongena patula	"Cambombia"	Found in sand and mud flats
NASSARIIDAE		
Nassarius	Dog whelk	Intertidal zone and offshore
CONIDAE		
Conus (Pyroconus) patricius	Cone shell	Intertidal, muddy sand, not uncommon at low tide
TEREBRIDAE		
Terebra robusta		Mud in the Intertidal zone and offshore to depth of 90 meters
Turridae		
Daphnella		Panama Bay
MURICIDAE		
Hexaplex brassica		Commonly found offshore in depths to 55 meters, can be found also in tide flats but rarely
Murex		Offshore
THAIDIDAE		
Stramonita biserialis[2]	Dye shell	Mangrove swamps attached to rocks
Thais (Thaisella) kiosquiformis	Dye shell	Mangrove swamps attached to oysters or in muddy areas attached to rocks
MARGINELLIDAE		
Prunum (Prunum) sapotilla		Intertidal zone and up to 60 meters on mud, but is not common
OLIVIDAE		
Oliva	Olive shell	Outer side of sandpits
Olivella (Lamprodoma) volutella	Olive shell	Found in mud flats
PELECYPODA	"Hatched-footed"	
Arcoida "serrate teeth"		
ARCIDAE	Ark shells	
Anadara (Anadara) similis	"Concha prieta"	Mostly offshore in depths to 24 meters
Anadara (Anadara) tuberculosa	"Concha prieta"	Abundant in mangrove swamps attached to the mangrove roots
Anadara (Cunearca) perlabiata	Ark shell	Sandbars at extreme low tide or dredged in shallow waters to depth of 82 meters

[2] Genus changed from *Thais (Stramonita) biserialis* (Vermeij 2001: 701).

Appendix 7 (continued)

TAXON	COMMON NAME	HABITAT
Anadara (Larkinia) multicostata	Ark shell	Commonly found by dredging in shallow waters where mollusk lives free upon the bottom, but can also be found in sandbars at very low tide
Anadara (Larkinia) grandis[3]	"Cocálica"	Sandbars or mudflats at the outer edge of the tidal range
Veneroida "perfected teeth"		
CARDITIDAE		
Cardita	Cardita	Shallow waters attached under the rocks by a byssus
Carditamera radiata[4]	Cardita	Common on mud flats to 24 meters depth
Cardites laticostata[5]	Cardita	In sand under rocks or offshore to depths of 27 meters
CORBICULIDAE		
Polymesoda (Egeta) anomala	Marsh clam	Brackish to fresh waters. The shells may be floated by stream down to the coast and intermixed with marine material
Polymesoda (Egeta) inflata	Marsh clam	Brackish to fresh waters. The shells may be floated by stream down to the coast and intermixed with marine material
Polymesoda (Neocyrena) boliviana	Marsh clam	Brackish to fresh waters. The shells may be floated by stream down to the coast and intermixed with marine material
DONACIDAE		
Donax asper	Sandy beach clam	Sandy beaches or bays
Donax carinatus	Sandy beach clam	Sandy beaches or bays in depth to 24 meters
Donax dentifer	Sandy beach clam	Sandy beaches or bays
Donax ecuadorianus	Sandy beach clam	Sandy beaches or bays
Donax panamensis	Sandy beach clam	Sandy beaches or bays
Iphigenia altior		Sandy beaches and intertidal mud to 11 meters in depth
MACTRIDAE		
Mactrellona exoleta		Mostly offshore (mud) in depth to 24 meters
SEMELIDAE		
Semele	Semeles	Intertidal zone and offshore
Solen		Intertidal zone
SOLECURTIDAE		
Tagelus (Tagelus) dombeii	Jackknife clam	Mud flat dweller
TELLINIDAE		

[3] Subgenus changed from *Grandiarca* (Skoglund 2001:12).
[4] Genus changed from *Cardita (Carditamera) radiata* (Skoglund 2001:42).
[5] Genus changed from *Cardita (Cardites) laticostata* (Skoglund 2001:42).

Appendix 7 (continued)

TAXON	COMMON NAME	HABITAT
Tellina sp.	Tellen	Mud flats at low tide
Tellina (Eurytellina) laceridens	Tellen	Mud flats at low tide at the lowest tide
VENERIDAE		
Dosinia dunkeri	Disk dosinia	Sandy beaches, mud flats and offshore to depth of 55 meters
Iliochione subrugosa[6]	Pointed Venus	Found in lagoons or on mud flats
Megapitaria		Found in extreme low waters and offshore
Pitar sp.	Venus clam	Firm intertidal substrates
Pitar (Lamelliconcha) paytensis	Venus clam	Firm intertidal substrates
Protothaca (Leukoma) asperrima	Venus shell	Firm intertidal substrates
Tivela (Tivela) argentina		Sandy beaches and sandbars
Pteriomorphia "wing shaped"		
MYTILIDAE		
Mytella	Mussel	Mud flats or shallow lagoons attached to the rocks
OSTREIDAE		
Ostrea palmula	Mangrove oyster	Attached to mangrove roots or rocks, especially on reefs exposed to surf, in depths to 7 meters
SPONDYLIDAE		
Spondylus calcifer	Thorny oyster	Attached to rocky substrata or in coral reefs in deep waters. The name calcifer means "lime-bearer"
PTERIIDAE		
Pinctada mazatlanica	Pearl oyster	Shallow waters attached to rocks or reefs offshore

[6] Genus changed from *Chione (Iliochione) subrugosa* (Skoglund 2001:56).

Appendix 8
PARLV Vertebrate Fauna Habitat

Prepared By Richard Cooke
Smithsonian Tropical Research Institute

Taxon	**English Name**	**Habitat**	**Present day status around Parita Bay**
Amphibia			
Anura			
LEPTODACTYLIDAE			
Leptodactylus insularum	Frog	Grassy areas, ponds & marshes, river edges	Formerly abundant and widespread, but numbers affected by disease in recent years
BUFONIDAE			
Bufo marinus	Marine toad	Clearings, ponds & marshes, human habitation	Formerly abundant and widespread, but numbers affected by disease in recent years
Aves			
Charadriiformes			
JACANIDAE			
Jacana jacana	Wattled jacana	Freshwater swamps and ponds with floating vegetation	Common, in small groups
SCOLOPACIDAE			
Tringa solitaria	Solitary sandpiper	Usually freshwater swamps & ponds, more infrequently coastal habitats	Occasional; migratory (July-May); solitary and wary
Columbiformes			
COLUMBIDAE			
Columbina	Ground-dove	Depends on species, but generally open land, gardens, forest edges	Three species in area: *C. Tlapacoti* is abundant, *C. Minuta* is common; *C. passerina* is restricted to arid coastal margins
Cuculiformes			
CUCULIDAE			
Crotophaga sulcirostris	Groove-billed ani	Forest edges, second growth, gardens	Common

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Falconiformes			
ACCIPITRIDAE			
Buteo	Hawk	Depends on species	Depends on species
Mammalia			
Artiodactyla			
BOVIDAE			
Bos	Cow	European domesticate	
CERVIDAE			
Odocoileus virginianus	White tail deer	Dry forest, second growth and cultivated fields	Extirpated locally, still present in foothills of Azuero and Coclé
SUIDAE			
Sus	Domestic pig	European domesticate	Kept everywhere
Carnivora			
CANIDAE			
Canis	Dog / coyote	Dogs kept in pre-Columbian times in large numbers	Coyote (*Canis latrans*) is a recent immigrant (post-1981)
Urocyon cinereoargenteus	Grey fox	low second growth and clearings	Widespread, usually solitary, it is the most frequently seen road-killed mammal
PROCYONIDAE			
Procyon lotor	Raccoon	*P. lotor* mostly in coastal habitats, especially mangroves; *P. cancrivorus* inland in forests	*P. lotor* abundant locally; *P. cancrivorus*' status unknown
Lagomorpha			
LEPORIDAE			
Sylvilagus brasiliensis	Cotton-tailed rabbit	Forest edges, grassy areas with trees	Widespread
Rodentia			
AGOUTIDAE			
Agouti paca	Paca	Woods and gallery woods	Local (over-hunted)
DASYPROCTIDAE			
Dasyprocta punctata	Agouti	Woods, gardens	Very local (over-hunted)
HETEROMYIDAE			
Liomys	Spiny pocket mouse	Forest margins and wooded savannas, human habitations (lives in roofs)	Common

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
MURIDAE			
Oryzomys	Rice rat	Ditch and grassland	Common
Zygodontomys brevicauda	Cane rat	Ditch and grassland	Common
Xenarthra			
DASYPODIDAE			
Dasypus novemcinctus	Nine-banded armadillo	Protean; frequent in second growth and forest patches	Common
Elasmobranchii	Cartilaginous fishes		
Carcharhiniformes			
CARCHARHINIDAE			
Carcharhinus leucas	Bull shark	Coastal marine and estuarine, frequently enters freshwater and runs well up rivers	Common, but numbers dwindling due to over-fishing
Rhizoprionodon longurio	Pacific sharpnose shark	Shallow coastal waters, especially estuaries	Common, but numbers dwindling due to over-fishing
SPHYRNIDAE			
Sphyrna lewini	Scalloped hammerhead	Marine waters, young animals inshore in marine waters and estuaries	Common, but numbers dwindling due to over fishing
Myliobatiformes			
DASYATIDAE			
Dasyatis longus	Long tailed stingray	Shallow coastal marine waters, especially estuaries	Common, enters shallow estuaries in large shoals
MYLIOBATIDAE			
Aeteobatus narinari	Spotted eagle ray	Inshore marine waters to approximately 200 feet (60 m); frequently enters shallow estuaries and river mouths	Common, enters estuaries in large shoals and moves well up tidal rivers
Rajiformes			
UROLOPHIDAE			
Urotrygon	Round ray	Coastal waters , including estuaries and sandy beaches	Common, on mud flats and sandy beaches

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Osteichthyes	"Bony fish"		
Albuliformes			
ALBULIDAE			
Albula neoguinaica	Pacific bonefish	Shallow coastal waters, prefers clear water columns, around reefs and rocks	Present at estuarine margins, but uncommon
Anguilliformes			
OPHICHTHIDAE			
Echiophis brunneus	Fang jaw eel	Demersal; marine; inhabits sandy and muddy bottoms, from shallow waters to 10 m	Common over mud flats
Batrachoidiformes			
BATRACHOIDIDAE			
Batrachoides boulengeri	Boulenger's or estuary toadfish	Shallow coastal waters and tidal rivers	Common
Beloniformes			
BELONIDAE			
Strongylura	Needlefish	*S. scapularis* in shallow coastal waters, enters tidal rivers and mangrove channels	*S. scapularis* common inshore; *S. exilis* uncommon
Tylosurus	Crocodile needlefish	*T. cocodrilus* and *T. acus* present; both avoid turbid waters, *cocodrilus* frequents around reefs and rocks, *T. acus* more oceanodromous	*T. cocodrilus* common, *T. acus* occasional in deeper water
Clupeiformes			
CLUPEIDAE			
Opisthonema libertate	Pacific thread herring	Near the surface of coastal and offshore waters, down to over bottom of continental shelf; avoids turbid water plumes	Abundant in large shoals, especially at estuary edges
ENGRAULIDAE			
Anchoa	Anchovy	Shallow coastal waters	Several species in estuary, some abundant

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Clupeiformes			
ENGRAULIDAE			
Lycengraulis poeyi	Pacific sabretooth anchovy	Shallow coastal waters; enters estuaries in very large shoals	Abundant in large shoals
PRISTIGASTERIDAE			
Ilisha furthii	Pacific ilisha	Shallow coastal waters, especially estuaries	Abundant
Elopiformes			
ELOPIDAE			
Elops affinis	Pacific ladyfish	In schools in shallow inshore areas.; penetrates lagoons and estuaries	Common, enters freshwater
Perciformes			
CARANGIDAE			
Caranx caballus	Green jack	Epipelagic; coastal waters; depth range 3–100 m	Abundant in clear water, avoids turbid estuaries; in large shoals
Caranx caninus	Pacific crevalle jack	Epipelagic; oceanodromous; shallow coastal waters; depth range - 350 m	Abundant, frequent in estuaries and tidal rivers
Caranx otrynter	Threadfin jack	Widespread in coastal waters	Occasional, enters estuaries
Chloroscombrus orqueta	Pacific bumper	Benthopelagic; shallow coastal waters	Abundant, enters estuaries in large shoals
Oligoplites altus	Longjaw leatherjack	Benthopelagic; brackish; marine, penetrates estuaries and tidal rivers	Common
Oligoplites refulgens	Shortjaw leatherjack	Shallow coastal waters, prefers sandy beaches	Common, unusual in estuaries
Selar crumenophthalmus	Purse-eye scad	Depth range 0 – 170 m, often over reefs, but will enter estuaries	Occasional
Selene brevoorti	Pacific lookdown	Inshore coastal waters	Common, often with *Selene peruviana*, enters estuaries
Selene peruviana	Pacific moonfish	Coastal waters up to at least 50 m depth; generally forms schools near the bottom; juveniles are encountered near the surface	Abundant, but stays away from turbid water plumes

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Trachinotus kennedyi	Blackblotch pompano	Inshore coastal waters, adults are common in shallow water	Common, frequently enters estuaries and river mouths
CENTROPOMIDAE			
Centropomus armatus	Armed snook	Shallow coastal waters, seems to avoid fresh water	Common
Centropomus medius	Bigeye snook	Shallow coastal waters, runs up rivers but apparently not often in fresh water	Common
Centropomus nigrescens	Black snook	Shallow coastal waters, enters freshwater at considerable distances from sea	Common, runs a long way up rivers
Centropomus robalito	Little snook	Shallow coastal waters, mangrove channels	Common, recorded in completely fresh water
Centropomus unionensis	Humpback snook	Shallow inshore waters	Common
ELEOTRIDAE			
Dormitator latifrons	Pacific fat sleeper	Estuaries, stagnant ditches creeks, in brackish and fresh water	Common, abundant as juvenile in tide pools and salt pans
EPHIPPIDAE			
Chaetodipterus zonatus	Pacific spadefish	Shallow inshore waters, frequently over reefs, but enters bays and estuary edges, 3 – 50 m	Common, large schools seem to move inshore in dry season
Parapsettus panamensis	Panama spadefish	Demersal, over coral reefs and rocky bottom, but also enters estuaries	Abundant, large schools seem to move inshore in dry season
GERREIDAE			
Diapterus peruvianus	Peruvian mojarra	Shallow coastal waters	Common, found in salt pans and tidal rivers, frequent over sandy beaches
HAEMULIDAE			
Haemulopsis leuciscus	White Grunt	Generally found in shallow coastal waters over sandy or mud bottoms	Common, frequent in estuaries and river mouths
Orthopristis chalceus	Brassy grunt	Sand and gravel bottoms of coastal waters	Common, avoids mud flats and river mouths
Pomadasys bayanus	Purplemouth grunt	Adults ascend rivers with moderate currents; swims in brackish water where gravid females often concentrate	Common, recorded at least 60 km from the sea

Appendix 8 (continued)

Taxon	**English Name**	**Habitat**	**Present day status around Parita Bay**
Pomadasys macracanthus	Longspine grunt	Shallow inshore waters, frequent in river mouths, mangrove channels and tidal rivers	Common, more littoral than *P. panamensis*
Pomadasys panamensis	Panamanian grunt	Shallow coastal waters, prefers sandy and gravel bottoms, seems to avoid mud flats	Common in fairly deep water seaward of estuary edge
LOBOTIDAE			
Lobotes surinamensis	Tripletail	Shallow inshore waters, regularly enters tidal rivers	Common, usually solitary though sometimes in small schools
LUTJANIDAE			
Lutjanus guttatus	Spotted rose snapper	Shallow inshore waters, prefers sandy or rubble bottoms	Common but stays away from mud bottoms
Lutjanus novemcinctus	Dog snapper	Shallow inshore waters, in several habitats	Common, recorded in completely fresh water 20 km from sea
MUGILIDAE			
Mugil	Mullet	Shallow coastal waters, some species abundant in shallow estuaries and river mouths	*M. curema* easily outnumbers *M. cephalus* and is very common in estuaries and along sandy beaches
POLYNEMIDAE			
Polydactylus opercularis	Yellow threadfin	Shallow coastal waters, on sand and mud bottoms	Common, over mud flats and along sandy beaches, in large shoals often with next species
Polydactylus approximans	Blue threadfin	Shallow coastal waters, on sand and mud bottoms	Common, over mud flats and along sandy beaches, in large shoals often with former species
SCIAENIDAE			
Bairdiella armata	Armed croaker	Shallow coastal waters, enters estuaries and river mouths	Common, in shoals with other small scaenids
Bairdiella ensifera	Swordspine croaker	Shallow coastal waters, especially estuaries; enters oligohaline sections of rivers	Common, in shoals with other small sciaenids
Cynoscion albus	White corvina	Shallow coastal waters, frequent in oligohaline stretches of rivers	Common, the most inshore of the *Cynoscion* species in Parita Bay

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Cynoscion phoxocephalus	Cachema weakfish	Coastal waters and estuaries with high salinities	Common
Cynoscion praedatorius	Boccone corvina	Coastal waters, not often in estuaries	Uncertain, seems to prefer deeper water outside turbid water plume
Cynoscion squamipinnis	Weakfish drums/ corvina	Coastal waters, along shores and in estuaries	Uncertain, seems to prefer deeper water outside turbid water plume
Isopisthus remifer	Silver weakfish	Shallow coastal waters and lower estuarine regions	Infrequent
Larimus acclivis	Steeplined drum	Coastal waters and lagoons	Common, in shoals with other small sciaenids
Menticirrhus panamensis	Panama kingcroaker	Coastal waters and bays	Common
Micropogonias altipinnis	Highfin croaker	Along sandy shores and bays, also in estuaries and lagoons	Not common over mud flats, appears to prefer sand or gravel bottoms
Nebris occidentalis	Pacific smalleye croaker	Surf zone of coastal waters, in estuaries and coastal lagoons especially as juvenile	Uncommon, appears to avoid estuaries when adult but juveniles can be caught with throw-nets close to shore
Ophioscion scierus	Tuza croaker	Shallow coastal waters	Common, in shoals with other small sciaenids
Ophioscion typicus	Point-nosed croaker	Shallow coastal waters, common in estuaries	Common, locally seems to be the most abundant *Ophioscion* species
Paralonchurus dumerilii	Suco croaker	Along sandy shores and bays, also in estuaries	Common
SCOMBRIDAE			
Scomberomorus sierra	Sierra mackerel, spotted mackerel	Coastal waters	Common, epipelagic and in large shoals; adults prefer clear water columns, but juveniles enter turbid estuaries occasionally
SPHYRAENIDAE			
Sphyraena	Barracuda	Coastal waters, pelagic, generally around reefs and rocks	*S. ensis* only species recorded; avoids estuaries but juveniles sometimes come close to shore and will enter turbid plumes

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
STROMATEIDAE			
Peprilus medius	Long-finned butterfish	Occurs near the surface of coastal waters to over bottom of continental shelf	Abundant, often in huge shoals; seemingly less frequent close to shore
Pleuronectiformes			
BOTHIDAE			
Cyclopsetta panamensis	Panamanian flounder	Soft bottoms, from shallow estuaries up to a depth of 44 m	Uncommon, not well known
Cyclopsetta querna	Chocolate flounder	Soft bottoms, from within the vicinity of mangrove areas up to a depth of 29 m	Common, enters estuaries
PARALICHTHYIDAE			
Citharichthys gilberti	Gilbert's flounder	On soft bottoms of trawling grounds and bays; commonly found in estuaries; sometimes enters freshwater, to 36 m	Common, recorded in oligohaline stretches of river and fresh water
Siluriformes			
ARIIDAE			
Ariopsis seemanni	Seemann's sea catfish	Shallow coastal waters, especially estuaries and sandy beaches, enters rivers to freshwater	Abundant in all littoral habitats, not recorded in fresh water but probably found there
Bagre panamensis	Chihuil sea catfish	Shallow coastal waters, usually on muddy bottoms; enters estuaries	Common, appears not to run up rivers
Bagre pinnimaculatus	Long-barbelled sea catfish	Coastal waters, frequent in estuaries and tidal rivers	Abundant in all marine habitats, enters tidal rivers
Cathorops furthii	Congo sea catfish	Coastal waters, frequent in estuaries	Abundant, mostly coastal
Cathorops multiradiatus	Many-rayed sea catfish	Shallow coastal waters, frequent in estuaries	Common, mostly coastal
Cathorops tuyra	Tuyra sea catfish	Shallow coastal waters, enters freshwater, where common as adult	Common, recorded well inland in completely fresh water
Notarius kessleri	Kessler's sea catfish	Shallow coastal waters, frequent in estuaries	Abundant, especially over mud flats and in mangroves

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
Notarius troschelii	Chili sea catfish	Coastal waters, frequent in deeper water seaward of turbid water	Common, but hangs further off shore than other species recorded archaeologically
Sciades dowii	Brown sea catfish	Shallow coastal waters, frequent in estuaries and oligohaline sections of rivers	Abundant, especially over mud flats and in mangroves; enters river channels
Tetraodontiformes			
TETRAODONTIDAE			
Guentheridia formosa	Spotted puffer	Coastal waters, generally on soft bottoms	Abundant, especially over mud flats
Sphoeroides annulatus	Puffers/ tamboril anillado	Coastal waters, including coral reefs and estuaries, where common	Common, especially over mud flats
Reptilia			
Crocodylia			
ALLIGATORIDAE			
Caiman	Cayman	Extremely adaptable species found in virtually all lowland wetland and riverine habitat types throughout its range	Common especially along lower reaches soft rivers; juveniles in creeks and ponds
Testudinata			
CHELONIIDAE			
Chelonia	Green turtle	Coastal waters worldwide	Commoner than believed, enters mangroves
EMYDIDAE			
Trachemys scripta	Pond slider	Freshwater habitats, with good basking areas	Common wherever there is freshwater
Squamata			
IGUANIDAE			
Ctenosaura similis	Black iguana	In Panama, preeminently littoral preferring mangroves and rocky eras	Common in coastal habitats
Iguana iguana	Green Iguana	Arboreal, especially in riverine and secondary forest	Common where not over-hunted, juveniles abundant in mangroves
KINOSTERNIDAE			
Kinosternon scorpioides	Mud turtle	Freshwater habitats, even where there are few trees	Common wherever there is fresh water

Appendix 8 (continued)

Taxon	English Name	Habitat	Present day status around Parita Bay
TEIDAE			
Ameiva ameiva	Borriguero	Heliophile species abundant around human dwellings and cultivated fields	Common and widespread
Serpentes			
BOIDAE			
Boa	Boa	Habitats from deserts to rain forests	Occasional in habitats with trees
COLUBRIDAE	Colubrid snakes	Depends on species	Depends on species
VIPERIDAE	Viper snakes	Protean: tropical rain forests to deserts and even high mountains	Depends on species, none of which is common
COLUBRIDAE			
Oxybelis	Vine snake	Arboreal, mostly riverine/ secondary forest	Occasional

Appendix 9

Distribution of shells in the lower La Villa Valley [1]

Genus and species	LS-3	CHI-6	LS-7	LS-8	LS-9	LS-10	LS-11	LS-12	LS-13	LS-14	LS-15	LS-18	LS-21	LA-28	LA-29	CHI-30	LS-31	CHI-33	CHI-34
BIVALVES																			
ARCIDAE						X												X	
Anadara sp	X	X		X		X	X		X	X	X	X	X	X	X	X	X	X	
Anadara (Anadara) obesa						X													
Anadara (Anadara) similis	X					X											X		
Anadara (Anadara) tuberculosa	X			X							X			X	X	X	X	X	
Anadara (Cunearca) perlabiata	X					X											X	X	
Anadara (Larkinia) grandis	X	X		X	X	X	X				X			X	X	X	X	X	X
Anadara (Larkinia) multicostata	X	X																	
CARDITIDAE	X															X			
Cardita sp		O									X							X	
Carditamera radiata											X								
Cardites laticostata								X	X		X					X	X	X	
Donax sp	X	X				X	X			X	X			X		X	X	X	
Donax asper						X								X			X	X	
Donax carinatus						X											X		
Donax dentifer	X					X								X		X	X	X	
Donax ecuadorianus																	X		
Donax panamensis	X					X								X		X	X	X	
VENERIDAE	X					X							X			X	X	X	
Dosinia sp	X	X				X	X				X			X	X	X	X	X	
Dosinia dunkeri	X					X					X			X	X	X	X	X	
Iliochione sp	X	X				X											X	X	

[1] X = present; O = most probable taxa

Appendix 9 (continued)

Genus and species	LS-3	CHI-6	LS-7	LS-8	LS-9	LS-10	LS-11	LS-12	LS-13	LS-14	LS-15	LS-18	LS-21	LA-28	LA-29	CHI-30	LS-31	CHI-33	CHI-34
Iliochione subrugosa	X					X										X	X	X	
Megapitaria sp		X																	
Pitar sp	X	X				X					X			X	X		X	X	
Pitar (Lamelliconcha) paytensis	X					X					X			X	X	X	X	X	
Protothaca sp	X	X				X	X				X			X	X	X	X	X	
Protothaca (Leukoma) asperrima	X					X					X					X	X	X	
Tivela sp	X	X				X					X		X		X	X	X	X	
Tivela (Tivela) argentina	X	X				X	X						X		X	X	X	X	
Iphigenia altior	X	X		X		X	X				X			X	X	X	X	X	
Mactrellona sp	X					X											X		
Mactrellona exoleta	X					X												X	
Mytella sp	X					X													
Ostrea palmula						X													
Ostrea sp	X					X					X				X	X	X	O	
Pinctada mazatlanica	X		X			X					X						X		
CORBICULIDAE																	X		
Polymesoda sp	X	X		X		X					X			X		X	X	X	
Polymesoda (Egeta) anomala	X																X		
Polymesoda (Egeta) inflata	X																		
Polymesoda (Neocyrena) boliviana	X	X		X		X							X	X	X	X	X	X	
Semele sp																	X	X	
Solen sp						X													
Spondylus calcifer																	X		

Appendix 9 (continued)

Genus and species	LS-3	CHI-6	LS-7	LS-8	LS-9	LS-10	LS-11	LS-12	LS-13	LS-14	LS-15	LS-18	LS-21	LA-28	LA-29	CHI-30	LS-31	CHI-33	CHI-34
SOLECURTIDAE																	X		
Tagelus sp	X					X											X	X	
Tagelus (Tagelus) dombeii	X					X												X	
TELLINIDAE																	X		
Tellina sp	X					X					X					X	X	X	
Tellina (Eurytellina) laceridens	X					X									X			X	
GASTROPODS																			
Anachis sp	O																X		
Calliostoma sp																	X		
Cassis sp	X					X													
Cassis (Semicassis) centiquadrata	X					X											X	X	
Cerithidea sp	X				X	X											X	X	
Cerithidea pulchra	X																X		
Cerithidea valida	X					X											X	X	
CONIDAE	X										X								
Conus sp						X					X							X	
Conus (Pyroconus) patricius	X		X	X		X													
Crepidula sp						X													
Daphnella sp																	X		
Fasciolaria sp						X											X		
Fasciolaria (Pleuroploca) granosa	X															X		X	
Hexaplex brassica	X																		
Hexaplex sp																	X		

Appendix 9 (continued)

Genus and species	**LS-3**	**CHI-6**	**LS-7**	**LS-8**	**LS-9**	**LS-10**	**LS-11**	**LS-12**	**LS-13**	**LS-14**	**LS-15**	**LS-18**	**LS-21**	**LA-28**	**LA-29**	**CHI-30**	**LS-31**	**CHI-33**	**CHI-34**
Jenneria pustulata																	X		
Littorina sp	X					X											X		
Malea ringens	X					X										X	X		
Melongena sp	X			X	X	X					X						X		
Melongena patula	X			X	X	X	X				X			X	X	X	X	X	
Murex sp	X																	X	
Nassarina sp	X																		
Nassarius sp						X											X		
NATICIDAE	X					X										X		X	
Natica sp	X	X				X					X			X	X	X	X	X	
Natica (Natica) unifasciata	X	X		X		X					X		X	X	X	X	X	X	
Nerita sp						X											X		
Nerita (Retina) scabricosta																	X		
Northia sp	X	X															X	X	
Northia northiae	X	X															X	X	
OLIVIDAE	X																		
Oliva sp	X					X													
Olivella sp																	X		
Olivella (Lamprodoma) volutella	X					X											X	X	
Polinices sp	X	X				X										X	X	X	
Polinices (Polinices) panamaensis	X	X				X	X				X					X	X	X	
Polinices (Polinices) uber	X					X										X	X	X	
Prunum (Prunum) sapotilla																	X	X	
Prunum sp														X					

Appendix 9 (continued)

Genus and species	**LS-3**	**CHI-6**	**LS-7**	**LS-8**	**LS-9**	**LS-10**	**LS-11**	**LS-12**	**LS-13**	**LS-14**	**LS-15**	**LS-18**	**LS-21**	**LA-28**	**LA-29**	**CHI-30**	**LS-31**	**CHI-33**	**CHI-34**
Strombus sp	X												X				X		
Strombus (Tricornis) galeatus	O																		
Terebra sp	O	X				X					X								
Terebra robusta	X					X													
Thais sp	X	X				X										X	X		
Stramonita biserialis	X					X											X		
Thais (Thaisella) kiosquiformis	X					X										X	X	X	
Cirripedia	X					X											X		
Coral	X																		
Land snail shell	X																		

Appendix 10
Distribution of vertebrate in the lower La Villa Valley

Genus and species	Common name (English)	LS-31	LS-23	LS-3	LS-7	LS-8	LS-9	LS-10	CHI-30	CHI-33	LS-11	LS-15	LA-29	LA-28
Teleosts	BONY FISH													
Albula neoguinaica	Pacific bonefish	X		X		X								
Ariopsis seemanni	Seemann's sea catfish	X		X				X						
Bagre panamensis	chihuil sea catfish	X		X				X						
B. pinnimaculatus	long-barbelled sea catfish	X		X				X						
Cathorops	sea catfish	X		X				X				X		
C. furthii	congo sea catfish	X		X				X						
C. multiradiatus	many-rayed sea catfish			O				O						
C. tuyra	Tuyra sea catfish			X				X						
Notarius	catfish	X		X										
N. kessleri	Kessler's sea catfish	X		X				X						
N. troschelii	chili sea catfish	X						X						
Sciades dowii	brown sea catfish	X		X				X		X				
Batrachoides boulengeri	estuary toadfish			X				X						
Echiophis brunneus	fang jaw eel			X				X						
Strongylura	needlefish			X		X								
Tylosurus	needlefish			X				X						
T. cocodrilus	crocodile needlefish							X						
Caranx	jack	X		X				X						
C. caballus	green jack			X										
C. caninus	pacific crevalle jack	X		X				X						
C. otrynter	threadfin jack			X				X						
Chloroscombrus	pacific bumper	X		X		X		X						
Oligoplites altus	longjaw leatherjack	O						X						
O. refulgens	shortjaw leatherjack	X		X										

Appendix 10 (continued)

Genus and species	Common name (English)	LS-31	LS-23	LS-3	LS-7	LS-8	LS-9	LS-10	CHI-30	CHI-33	LS-11	LS-15	LA-29	LA-28
Selar	purse-eye scad	X												
Selene brevoorti	pacific lookdown	O												
Selene peruviana	pacific moonfish	X		X		X		X						
Trachinotus kennedyi	blackblotch pompano							X						
Centropomus armatus	armed snook			X										
C. medius	bigeye snook	X						X						
C. nigrescens	black snook			X				X						
C. robalito	little snook							X						
C. unionensis	humpback snook							X						
Opisthonema												X		
Opisthonema libertate	pacific thread herring	X		X				X						
Dormitator	pacific fat sleeper	X		X										
Elops	pacific ladyfish			X										
Anchoa	anchovy			X										
Lycengraulis	pacific sabretooth anchovy			X										
Chaetodipterus zonatus	pacific spadefish	X												
Parapsettus	panama spadefish	X												
Diapterus peruvianus	Peruvian mojarra	X						X						
Haemulopsis leuciscus	white grunt	X		X										
Orthopristis chalceus	brassy grunt	X		X								X		
Pomadasys bayanus	purplemouth grunt			O				O						
P. macracanthus	longspine grunt			X										
P. panamensis	Panamanian grunt	X		X		X		X						
Lobotes surinamensis	tripletail			X						X				
Lutjanus guttatus	spotted rose snapper	X												
L. novemcinctus	dog snapper	O												

Appendix 10 (continued)

Genus and species	Common name (English)	LS-31	LS-23	LS-3	LS-7	LS-8	LS-9	LS-10	CHI-30	CHI-33	LS-11	LS-15	LA-29	LA-28
Mugil	mullet			X										
Citharichthys gilberti	Gilbert's flounder			O				O						
Cyclopsetta panamensis	Panamanian flounder			X										
C. querma	chocolate flounder	X												
Polydactylus approximans	blue bobo	X		X		X								
P. opercularis	yellow bobo	X		X				X						
Ilisha furthii	pacific ilisha	X		X				X						
Bairdiella armata	armed croaker							X						
Bairdiella ensifera	swordspine croaker			X				X						
Cynoscion albus	white corvina	X		X				X					X	
C. phoxocephalus	cachema weakfish	X						O						
C. praedatorius	boccone corvina							X						
C. squamipinnis	weakfish drums/corvina							X						
Isopisthus	silver weakfish			X										
Larimus acclivis	steeplined drum	X												
Menticirrhus panamensis	panama kingcroaker	X		X										
Micropogonias	highfin croaker	X						X						
Nebris	pacific smalleye croaker	X												
Ophioscion scierus	tuza croaker							X						
O. typicus	point-nosed croaker	X		X										
Paralonchurus dumerilii	suco croaker	X												
Peprilus medius	long-finned butterfish	X		X										
Scomberomorus	sierra	X		X				X						
Sphyraena	barracuda	X		X				X						
TETRAODONTIDAE	puffer			X						X				

Appendix 10 (continued)

Genus and species	Common name (English)	LS-31	LS-23	LS-3	LS-7	LS-8	LS-9	LS-10	CHI-30	CHI-33	LS-11	LS-15	LA-29	LA-28
Guentheridia formosa	spotted puffer	X		X				X						
Sphoeroides	puffer			X										
S. annulatus	puffers/ tamboril anillado	X												
Elasmobranchs	**CARTILAGINOUS FISH**													
Carcharhinus	shark					X		X						
Carcharhinus leucas	bull shark			X				X						
Rhizoprionodon	pacific sharpnose shark	X						X						
Sphyrna	hammerhead shark	X				X								
Sphyrna lewini	scalloped hammerhead	X		O					O					
Aeteobatus	spotted eagle ray	X												
Dasyatis cf *longus*	long tailed stingray	O												
Urotrygon	round ray													
Anurans	FROGS													
Bufo marinus	marine toad	X		X										
Leptodactylus insularum	frog			X										
Reptilia	**REPTILES**													
Kinosternon	turtle			X					X					
K. scorpioides	mud turtle					X				X				
Trachemys	freshwater/ marsh turtle			O						O				
T. kennedyi	freshwater/ marsh turtle							X						
Chelonia	green turtle							X						
Caiman	cayman			X										
Boa	boa			O										
COLUBRIDAE	colubrid snakes	X		X										
Oxybelis	vine snake	X												

Appendix 10 (continued)

Genus and species	Common name (English)	LS-31	LS-23	LS-3	LS-7	LS-8	LS-9	LS-10	CHI-30	CHI-33	LS-11	LS-15	LA-29	LA-28
VIPERIDAE	viper snakes	X												
IGUANIDAE	iguana	O		X				O						
Ctenosaura similis	black iguana			X				X		X				
Iguana iguana	green iguana							X		X				
Ameiva ameiva	borriguero			X										
Aves	**BIRDS**							X						
Buteo	hawk			O										
Jacana	wattled jaçana			X										
Tringa solitaria	solitary sandpiper	X												
Columbina	ground-dove	O												
Crotophaga	groove-billed ani			X										
Mammalia	**MAMMALS**													
Dasypus	nine-banded Armadillo			X				X		X				
Sylvilagus	cottontail rabbit			X						X				
Dasyprocta	agouti									X				
Agouti	paca							X		X				
Liomys	spiny pocket mouse	X		X										
Oryzomys	rice rat	X												
Zygodontomys	cane rat	X												
Procyon lotor	raccoon	X												
Canis	dog / coyote			O										
Urocyon	grey fox			O										
Odocoileus	white tail deer	X		X		X		X	X	X	X	X	X	X
*Bos**	cow		X	X	X	X	X	X		X				X
*Sus**	domestic pig							X						

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CURRICULUM VITAE

ILEAN ISEL ISAZA AIZPURÚA

Date of Birth:	August 10, 1970
Place of Birth:	Republic of Panama
Languages:	Spanish, English

Education

1988-1993	Universidad Autónoma de Guadalajara, México Escuela de Antropología *Licenciatura* in Archaeology
Thesis Title:	"Desarrollo Estilístico de la Cerámica Pintada del Panamá Central con Énfasis en el Periodo 500 a.C.-500 d.C."
1995-1997	Boston University Department of Archaeology Master of Arts in Archaeological Studies
Research paper title:	"Shell Working and Social Differentiation at the Formative Maya village of K'axob."
1998-2007	Boston University Department of Archaeology Doctor of Philosophy in Archaeological Studies
Dissertation title:	The Ancestors of Parita: Pre-Columbian Settlement Patterns in the Lower La Villa River Valley, Azuero Peninsula, Panama

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Positions

2004	Boston University, Department of Archaeology Summer Term Instructor
1997-98	National Institute of Culture (INAC), Republic of Panama Assistant Director of Cultural Patrimony
1993-95	Smithsonian Tropical Research Institute (STRI), Republic of Panama Archaeologist for the Cerro Juan Díaz Project (CJDP), Los Santos Project directed by Dr. Richard G. Cooke, Staff Scientist.

Museum Experience

1997 Curator of the "*Vida y Costumbres de un Pueblo Precolombino*" Temporary museum exhibition sponsored by INAC, STRI and CJDP, Museo de La Nacionalidad, Los Santos, Republic of Panama October-December.

Teaching Experience

2004 Boston University, Department of Archaeology
Summer Term Instructor
AR100 Great Discoveries in Archaeology

2003 Boston University, Department of Archaeology
Teaching Assistant for AR100 Great Discoveries in Archaeology, Taught by Professor Curtis Runnels

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Field Experience

2006 Testing of Early Occupation Area of the Wakefield Estate, Milton, Massachusetts. Project Directed by Professor Mary Beaudry, and fellow graduate Jessica Striebel McLean (field supervisor) Department of Archaeology, Boston University.

2001-2003 Principal Investigator: *Proyecto Arqueológico del Río La Villa* (PARLV)

1999 Volunteer at the Royal House Historical Archaeological Project, Medford Massachusetts. Project directed by Professor Ricardo Elia, Department of Archaeology, Boston University.

1998 Operation Director of the K'axob Archaeological Project, Belize. Last phase. Project directed by Professor Patricia A. McAnany, Department of Archaeology, Boston University.

Archaeologist and education outreach coordinator for the Cerro Juan Díaz Archaeological Project, Los Santos, Republic of Panama. Project directed by Richard G. Cooke, Staff Scientist, STRI.

1997 K'axob Archaeological Project, Belize (Boston University Field School). Project directed by Professor Patricia A. McAnany, Department of Archaeology, Boston University.

Xibún Archaeological Project, Belize (Boston University Field School). Project directed by Professor Patricia A. McAnany, Department of Archaeology, Boston University.

1993-1995 Archaeologist for the Cerro Juan Diaz Archaeological Project, Los Santos, Republic of Panama. Project directed by Richard G. Cooke, Staff Scientist, STRI.

Fellowships and Awards

2006 *Mary M. B. Wakefield Trust Fellowship*, for participating in the Archaeological Testing of Early Occupation Area of the Wakefield Estate, located in Milton, Massachusetts.

Scholarship award from the Graduate School of Arts and Sciences, Boston University.

2004-2005 Scholarship award from the Department of Archaeology, Boston University.

2004 Boston University Women's Guild Clara Ellis Graham Award.

2003 Boston University Department of Archaeology Teaching Fellowship.

2002-2004 Dissertation Improvement Grant from the National Science Foundation (Number 0206939) to perform dissertation field research
La Villa River Valley, Azuero Peninsula, Panama

2001-2003 Pre-doctoral Fellowship from the Smithsonian Tropical Research Institute to perform dissertation field research
La Villa River Valley, Azuero Peninsula, Panama.

2000 Scholarship award from the Department of Archaeology, Boston University.

1998-2003 Secretaría Nacional de Ciencia Tecnología e Innovación (SENACYT), and Instituto para la Formación y Aprovechamiento de Recursos Humanos (IFARHU), Republic of Panama, *2003 Pre-Doctoral Fellowship* to continue graduate studies at Boston University, Massachusetts.

1998 Matching Grant from the Graduate Studies Department at Boston University.

1995-1997 Organization of American States (OAS) Fellowship TSF44550, to continue graduate studies at Boston University.

1995 International Atomic Energy Agency Fellowship to attend the advisory group meeting on "*Applications research and use of radiation for control of biodeterioration in cultural materials*" at the Smithsonian Institution in Washington, D.C.

1994 Organization of American States Fellowship to participate in the seminar "*Tejiendo la Tela Interpretativa, Vinculando el Patrimonio Cultural con su Contexto Natural*", El Salvador, Nicaragua, and Costa Rica

Smithsonian Tropical Research Institute Fellowship to continue field research at the *Cerro Juan Díaz Project*, Los Santos, Republic of Panama.

1992 El Diario de México "*El mejor estudiante de México*" Award for academic excellence.

Publications

In press **Ilean Isel Isaza Aizpurúa**
Arqueología de la cuenca baja del río La Villa, Península de Azuero. *Vínculos*, Costa Rica.

2004 **Ilean Isel Isaza Aizpurúa**
The art of shell working and the social uses of shell ornaments. In *Ritual, Work and Family in an Ancient Maya Village*, edited by Patricia A. McAnany. Monumenta Archaeologica 22, The Cotsen Institute of Archaeology, University of California, Los Angeles.

2003 Cooke, Richard, **Ilean Isaza**, John Griggs, Benoit Desjardins and Luis Alberto Sánchez Herrera
Who crafted, exchanged, and displayed gold in Pre-Columbian Panama? In *Gold Power in the Intermediate Area,* edited by Jeffrey Quilter and John W. Hoopes. Dumbarton Oaks, Washington D.C.

Cooke, Richard, Luis Alberto Sánchez Herrera, Diana Rocío Carvajal, John Griggs and **Ilean Isaza Aizpurúa**
Los pueblos indígenas de Panamá durante el siglo XVI: Transformaciones sociales y culturales desde una perspectiva arqueológica y paleoecological. *Mesoamerica* 45: 1-34. Plumsock Mesoamerican Studies, CIRMA.

2002 **Isaza Aizpurúa, Ilean Isel**
The ancestors of Parita: pre-Columbian settlement patterns in the lower La Villa River Valley, Azuero Peninsula, Panama. *The Shell Mound Research* 7: 27-28, Soiety of Sonnou Shell Mound Studies, Chiba, Japan.

1999 **Isaza Aizpurúa, Ilean Isel** and Patricia A. McAnany
Adornment and identity: Shell ornaments from Formative K'axob. *Ancient Mesoamerica* Vol 10, 1: 117-127.

1998 **Ilean Isel Isaza Aizpurúa**
Transect 8: Paseo de las hormigas. In *Where the Water Meets the Land: 1998 Excavations in Wetlandfields and along transects at K'axob, Belize,* edited by Patricia A. McAnany and Kimberly Berry. Boston University, Department of Archaeology and International Programs.

Ilean Isel Isaza Aizpurúa, Jennifer Smit and David Carballo
Of Canals and Metates: Human Activity in the Wetland Fields. In *Where the Water Meets the Land: 1998 Excavations in Wetlandfields and along transects at K'axob, Belize*, edited by Patricia A. McAnany and Kimberly Berry. Boston University, Department of Archaeology and International Programs.

Cooke, Richard, Luís Alberto Sánchez Herrera, **Ilean Isel Isaza Aizpurúa** and Aguilardo Pérez Yancky
Rasgos mortuorios y artefactos inusitados de Cerro Juan Díaz, una aldea Precolombina del 'Gran Coclé' (Panamá Central). In *La antigua* (Panamá), *Investigaciones científicas USMA* Vol. 53

Steve Morandi, Ben Thomas, **Ilean Isaza**, and David Carballo
Wetland Fields: The deep South and shallow North. In *Where the Water Meets the Land: 1998 Excavations in Wetlandfields and along transects at K'axob, Belize,* edited by Patricia A. McAnany and Kimberly Berry. Boston University, Department of Archaeology and International Programs.

1997 **Ilean Isel Isaza Aizpurúa**
Excavations along Brecha 4- link between uplands and wetlands. In *Where the Water Meets the Land: 1997 Excavations in Maya Residences and Wetland Fields, K'axob, Belize, edited by* Patricia A. McAnany. David Manuel Carballo, Production Editor. Boston University, Department of Archaeology and International Programs.

Ilean Isel Isaza Aizpurúa, Amalia Kenward and Kimberly Berry
Ritual use of the Sibun-Manatee karst System. In *Caves and Settlements of the Sibun River Valley, Belize: 1997 Archaeological Survey and Excavation*, edited by Patricia A. McAnany. David Manuel Carballo, Production Editor. Boston University, Department of Archaeology and International Programs.

1994 Cooke, Richard G., **Ilean Isaza A,** and Luís A. Sánchez H.
Cerámica Pintada en Panamá Central, 3000 a.C.-1500 d.C. *Talingo, La Prensa,* July 3.

Conferences and Lectures

2005 "The Ancestors of Parita." Invited to lecture at the Cotsen Institute of Archaeology, University of California, Los Angeles.

2004 "The Ancestors of Parita: Settlement Survey of the Lower La Villa Valley, Azuero Peninsula, Panama." Paper presented at the 69th annual meeting of the Society for American Archaeology, March 3-April 4, Montreal Canada.

2002 "Los Ancestros de Parita." Paper presented at the VIII Congreso Nacional de Ciencia y Tecnología organized by the Asociación Panameña para las Ciencias (APANAC), November 21-23, Republic of Panama.

2001 "Utilización de los sistemas de información geográfica y sistemas de posicionamiento global, en estudios de patrones de asentamientos precolombinos en el curso bajo del Río la Villa – Península de Azuero." Paper presented at the *Segundo seminario taller: Infraestructura Nacional de Datos Espaciales: Tecnologías Clearinghouse y Metadatos* Organized by SENACYT, IGNTG March 14-16, Republic of Panama.

1999 Co-Organizer with Christa Beranek and Manri Blake
Boston University's Department of Archaeology Fifth Annual Graduate Student Conference titled "The Two Cultures: Humanities and Science in Archaeology" celebrated on November 6.