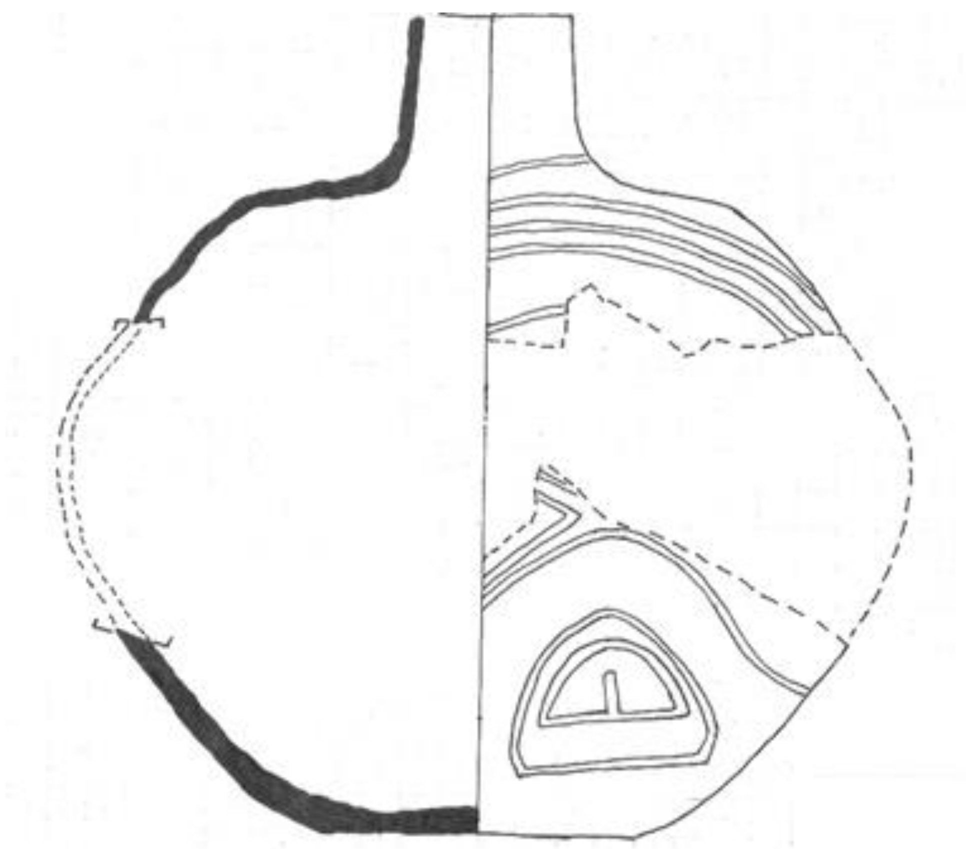
Connecting communities across Hispaniola:

A study of Late Ceramic Age white ware



Kwinten Van Dessel

Cover image:

Drawing of a reconstructed bottle of Late Ceramic Age white ware from the site of El Carril, northern Dominican Republic. Reconstruction and drawing by Kwinten Van Dessel.

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Kwinten Van Dessel

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Supervisors: Prof. dr. Hofman
Prof. dr. Degryse

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Leiden University, Faculty of Archaeology

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Contents

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1. Introduction

1.1 An introduction to Late Ceramic Age white ware

This Research Master's thesis has been written in the context of the NEXUS 1492 project: New World encounters in a Globalizing World (2013-2019), directed by Prof. dr. C.L. Hofman, which was made possible through funding from the European Research Council and is being continued through the CaribTrails Project (LU/KITLV). The current thesis focuses on the study of Late Ceramic Age 'white ware' in Hispaniola (present-day Haiti and Dominican Republic), aiming at clarifying how this ceramic ware was involved in social interactions on the island and adjacent areas of the Greater Antilles. "Late Ceramic Age white ware" is a self-termed group of pottery that appears in sites throughout the island of Hispaniola (Van Dessel 2019; Van Dessel *et al*. 2019). It is related to the Chicoid ceramic series as defined by Irving Rouse (1992), but stands out of the ceramic assemblage because of its white/whitish appearance. While the rest of the Chicoid ceramic assemblage is characterised by a greyish to brown paste, Late Ceramic Age white ware (LCAWW) is set apart by the use of a white or buff-firing clay or white slip. Little (profound) information on LCAWW is as yet available about this particular ware as it is grouped under the all-encompassing and nebulous term "Taino art" (e.g. Brecht *et al*. 1997; Kerchace 1994). Its occurrence is connected amongst others to Chicoid effigy bottles and jars or *potizas*. As a result they are often (tentatively) linked to the presence of social elites known by the term *caciques*, and/or to mythical figures (García Arévalo 1977; Kerchache 1994; Veloz Maggiolo 1972; Wilson 1997).

It is hypothesised here that LCAWW was part of a large network of inter-community exchange or transmission of ideas in the period c. AD 1000-1500 on Hispaniola and possibly some other islands of the Greater Antilles and northern Lesser Antilles (C. L. Hofman, pers. comm., 2019; Van Dessel 2019; Van Dessel *et al*. 2019). This hypothesis is built on two main pillars. The first pillar involves the specific characteristics of the occurrence of LCAWW on Hispaniola, being a homogenous style, with specific vessel shapes, and a low occurrence with a wide geographic distribution. The Chicoid ceramic series shows local and regional differences in style throughout the islands (Keegan and Hofman 2017). Although LCAWW is connected to this tradition, it appears to have more homogenous stylistic expressions throughout the ceramic assemblages of different sites of which it consistently takes up only a small percentage (C. L. Hofman, pers. comm., 2019; Van Dessel 2019; Van Dessel *et al*. 2019). The second pillar of the hypothesis involves the find on the island of Saba of four pot sherds decorated with incisions and punctations on a white slipped and polished surface (Hofman 1993, 129). These sherds are stylistically related to the Chicoid ceramic series in the Greater Antilles, more specifically in Hispaniola. Subsequent macroscopic fabric analysis and X-Ray Fluorescence spectrometry confirmed that they were not made with a local clay from Saba, but with a sedimentary clay from one of the larger islands of the Greater Antilles (Hofman *et al*. 2008).

Figure 1: LCAWW from Kelbey's Ridge 2, Saba. (Courtesy of C. L. Hofman)

1.2 Caribbean connectedness and diversity

Figure 2: Map of the Caribbean region. The island of Hispaniola and Saba are encircled in red. (Adapted from Keegan et al. 2013, 2)

The Caribbean region includes the coastal areas of the South, Central and North American mainland. The islands of the Caribbean extend over 4000 kilometres between these landmasses and show a great range of diversity in history, topography, temperature, flora, fauna, etc. (Keegan *et al.* 2013, 1; Keegan and Hofman 2017, 2). The Caribbean islands comprise five island groups: the Southern Caribbean, Trinidad and Tobago, the Lesser

Antilles, the Greater Antilles and the Bahama archipelago. All of these island groups are situated in the Caribbean Sea except for the Bahama archipelago. This archipelago is located in the Southern North Atlantic. It is regarded as being part of the Caribbean islands due to the similarities on a cultural, geological and biological level (Keegan *et al*. 2013, 1). The Lesser Antilles, comprising the Leeward and the Windward Islands, form a double arc of islands arranged from north to south on the transition between the Atlantic and Caribbean tectonic plate (Keegan and Hofman 2017, 5). The Greater Antilles are the spurs of mountain ranges coming from northern Central America. It includes the following (volcanic) islands: Cuba, Hispaniola, Jamaica, Puerto Rico, U.S. Virgin Islands and Cayman Islands (Keegan and Hofman 2017, 6).

For a long time the islands of the Caribbean were believed to be isolated entities prior to the start of the European colonisation. The extensive surrounding bodies of water, being the Caribbean Sea and the Atlantic Ocean, were considered to be a prohibiting factor for inter-island exchange in the region. During the last two decades this view has changed drastically. Archaeological evidence has shown that connectivity was not only present on a micro-scale, but that interactions were also taking place on a much larger scale (e.g. Curet and Hauser 2011; Hofman *et al*. 2007; 2011; 2014; Mol 2013; 2014; Wilson 2007). Recently the high degree of mobility and the interconnectedness of the people(s) of the Caribbean islands has also been attested for through analyses and comparison of genome-data of pre-colonial Caribbean individuals (Fernandes *et al.* 2021). This new view on processes of mobility and exchange was accompanied by a change in focus within Caribbean archaeology. The culture-historical approach had led to a homogenisation of the peoples and cultures of the islands, using all-encompassing terms to address peoples, often strongly based on simplistic and biased historical sources (Curet 2003; Pestle *et al.* 2013, Sued-Badillo 1992). Where grand culture-historical narratives on the pre-colonial peoples and cultures prevailed in the 20th century, archaeologists nowadays are more and more distancing themselves from these big culture-historical narratives, rather seeing the past as a flux which identified phenomena should not be adjusted in such a way that they fit our archaeologically constructed boxes (Keegan and Hofman 2017; Pestle *et al.* 2013).

1.3 The island of Hispaniola

Hispaniola is an island in the Greater Antilles which is shared today by the nations of Dominican Republic and Haiti. The island covers an area of 75,940 km^2 and has a coastline of 3,059 km. There are two main mountain ranges, the Cordillera Septentrional in the north and the Cordillera Central which includes the Pico Duarte (3,175m), the highest peak in the Greater Antilles (Keegan *et al*. 2013). Hispaniola was one of the first Caribbean islands to be settled by humans. The approximated dates for the first settling are 4400 cal. BC for Haiti and 3200 cal BC for Dominican Republic (Hofman and Antzcak 2019). It is unclear whether the settlers had a northern South American or Central American origin (Fernandes *et al.* 2021). The material assemblage of the first settlers was characterised by flaked stone tools. By 2000 BC ground-stone, bone and shell tools made up an important part of the material assemblage (Rouse 1992). The start of a new phase, called the Ceramic Age, in the island's prehistory has been situated around AD 500. People from Arawak origins had moved from the South American mainland into the Caribbean going as far north as Puerto Rico. Recent genetic evidence points to a south-to-north stepping stone trajectory (Fernandes *et al.* 2021). Arawak people and influence subsequently spread from Puerto Rico over the Mona Passage to Hispaniola, causing a focus on ceramic artefacts in the archaeological assemblage. The Ceramic Age on Hispaniola is further divided based upon the occurrence of different ceramic series identified by Rouse (1939; 1992). The ceramic series are named Ostionoid, Meillacoid and Chicoid and are all related to a specific culture on the island. The Ceramic Age ended from an archaeological and historical point of view with the arrival of Columbus on the island in 1492 and the extremely disruptive events of the European colonisation that followed.

This research focusses on the Late Ceramic Age on the island, specifically on the Chicoid ceramic series that appears from about AD 1000 in eastern Hispaniola. By AD 1200 Chicoid influence spread out to the rest of the island, resulting in a social and ideological transformation through warfare, exchange, marriage and religious conversion (Keegan and Hofman 2017, 146). The social and ideological transformation is traditionally associated with the rise of a new form of social organisation on the island: a chiefdom ruled by hereditary leaders named *caciques*. The transformation has also been connected to the spread of Chicoid pottery, ritual paraphernalia, the occurrence of ceremonial plazas and the growing importance of ritual events, such as *areytos* and ball games or *bateys* (Wilson 2007). The cause for the spread of Chicoid influence has been related to the economic expansionist mindset of the *caciques* (Moscoso 1981) and/or to the presence of a theocratic chiefdom (Oliver 2009). The Chicoid expansion did not confine to Hispaniola but spread to other islands from Jamaica to St. Croix and even further to the northern islands of the Lesser Antilles (Hofman 1993, Wilson 2007). Although it is tempting to identify this as a Chicoid horizon, a large diversity between the expressions on the islands can be observed (McGinnis 1997, Wilson 2007). Diversity is also present on Hispaniola itself, reflecting a myriad of interactions between communities (Ulloa Hung 2014; Veloz Maggiolo 1972). These various interactions include networks related to the exchange of material culture, such as beads and lithic artefacts and probably other non-perishables and perishables which we cannot see in the archaeological record (Breukel 2019; Guzzo Falci *et al.* 2020).

1.4 Problem statement

Although Caribbean archaeology is trying to move more towards a discipline that emphasizes differences and is aware of processes like hybridization and the plurality of things (see above), the ideas of the culture-historic paradigm are still present in our view and understanding of the past (Pestle *et al*. 2013). This is for example the case in studies on social complexity. Our view on social organisation has been shaped in such a way that social complexity in the form of chiefdoms has been used as an all-encompassing answer to explain social phenomena (Pauketat 2007). While I do not debate the presence of chiefdoms in Hispaniola, nor the importance of social organisation and its influence on the people it binds together or divides, the situation might have been more complex than is often being presented (Curet 2003; Torres 2012; 2013). Distribution patterns on the island during the period leading up to the European invasion show a diverse Indigenous landscape. The micro-scale differences that were observed are related to small-scale multi-ethnic groups characterised by political decentralization rather than homogenized chiefdoms ruled by a *cacique* (Herrera Malatesta 2018, 264). The presence of a stratified and "complex" social organisation as mentioned by chroniclers and the elaborate pottery of the Boca Chica style on Hispaniola has resulted in a Chicoid fetisj (*sensu* Keegan and Hofman 2017). The occurrence of LCAWW, part of the Chicoid ceramic assemblage, is an example of a social phenomenon that has been tentatively linked to elites and *caciques* on Hispaniola without a clear justification, because it is still poorly understood.

The meaning of (materialised) social phenomena is not readily available to us. Material assemblages do not simply represent past realities, they are the subject of our interpretation (Shanks and Tilley 1987). Therefore, answers to questions like "Why do these ceramic vessels have a different colour?", "What does the colour white signify for the communities that use these vessels?" or "What is the meaning of LCAWW?" can only be approached through assumptions of an archaeological nature. The first assumption here is that the significance of artefacts is affected by their material properties (Jones 2007, 19). The second assumption relates to the metaphorical use of (artefactual) colour on material artefacts as a mode for revealing unities between their properties (Jackson 1996, 9). Therefore, I believe that in order to gain a deeper understanding of the phenomenon of LCAWW we need to look into its properties through the study of the technology used to produce the vessels (e.g. Dobres 2010).

1.5 Research questions and objectives

The research questions that are addressed in this work are:

1) Was LCAWW part of networks of exchange or the transmission of ideas on the island of Hispaniola?

2) Is there a technological basis that underlies a possible symbolical meaning of LCAWW for communities on Hispaniola in the Late Ceramic Age?

> A) Was the colour white used (artificially) as a mode for revealing unities between the properties of different vessels of LCAWW?
>
> B) Can we use that technological basis to infer meaning on a symbolical level?

I aim to offer an answer to these questions to gain insight in the role LCAWW played in the pre-colonial Caribbean concerning the connection of communities through networks, specifically on Hispaniola. By approaching this from a technological point of view I want to avoid using (the rise of) social complexity as an all-encompassing answer or reason for the materialisation of social phenomena. Given the very dispersed and limited information available on this topic, a secondary goal is to create a reference work on the occurrence of white vessels connected to the Chicoid ceramic series that occur in the Late Ceramic Age in the Caribbean and for which I took the liberty of giving it a name: Late Ceramic Age White Ware. While the focus here lays on Hispaniola, I also want to provide an overview of LCAWW on other islands of the Caribbean, creating a larger reference frame. Finally I want to form a basis for possible further research including the technological study of LCAWW from other islands as well.

1.6 Methodology and approach

In order to provide an answer to the research questions I will delve into the realm of ceramic technology. The approach I will use is the *chaîne opératoire* as described by Roux (2019). This approach looks at the operational sequence that was used for the production of pottery, starting with the gathering of the raw materials to the final firing of the product. It is connected to the ideas of the French "Anthropology of techniques" school (Lemonnier 1992, see also Leroi Gourhan 1964). According to this school of thought the manufacturing process of material culture is culturally determined and material culture patterning on the level of technological choices can be seen as a reflection and indicator of social boundaries (Dietler and Herbich 1994; Dobres 2000; Lemonier 1992; Stark 1998). The *chaîne opératoire* approach therefore does not only allow for the properties of a material assemblage to be studied in detail, it also offers information on sharing of ideas. The ceramic *chaîne opératoire* approach (Roux 2019) was adapted in order to fit the aims and extent of this thesis. The resulting approach is three-tiered and based on a compositional analysis, an analysis of the manufacturing techniques and a morpho-stylistic analysis. The methods used are macroscopic fabric analysis and ceramic petrography (composition), macroscopic trace analysis (manufacturing techniques), and the guidelines of the Leiden Codebook for Ceramics (morpho-stylistic aspect; Hofman 2005, online pottery tool). Assemblages from three sites in Dominican Republic were studied: the site of El Cabo in the south-eastern part of the island and the sites of El Flaco and El Carril in the northwest. The complete three-tiered approach was applied to LCAWW sherds from El Cabo. The assemblages of LCAWW from El Flaco and El Carril were subjected only to compositional and morpho-stylistic analysis. The results of the analyses carried out on the assemblages from all three sites will be compared to each other and to existing reference materials from the sites themselves to answer the research questions.

1.7 Thesis outline

In the first part of the second chapter I will provide the background of LCAWW both on a social and cultural level. First, I look at the characteristics of the Chicoid ceramic tradition, secondly I discuss the related social organisation as based on historical documents and archaeological evidence, and thirdly I deal with the Chicoid expansion. Further on in the chapter I will look at the characteristics of this type of pottery and its spread on Hispaniola and surrounding islands. Since LCAWW is a self-termed group of pottery I will also explain the process of name-giving. The theoretical and methodological approach used in this study are explained in chapter three. I depart from the sensory perception of the colour white and see how technology can be a basis for the interpretation of the (possible) symbolical meaning of material culture. This last aspect will lead us to review the modal analysis of Rouse (1939) and the *chaîne opératoire* approach. The second part of this chapter will go into detail on the methodology used in this study. Chapter four zooms in on the assemblages of the sites that are treated in this work and their archaeological context. The selection procedures for the analyses are also discussed here. This chapter also deals with previous and ongoing ceramic analyses in the region that will serve as reference material to reach the objectives of this thesis. Special attention is being paid to the petrographic analyses of ceramics from El Flaco and El Carril, which was the topic of my previous thesis at KU Leuven (Van Dessel 2018). These results are important reference material for this study and by expanding on them here, they will also be available in English. The results of the analyses will be presented in chapter five. In chapter six I will interpret the results from the sites separately and connect them to the chosen approach. Chapter seven serves to discuss the results in light of the background and theory chapter in order to answer the research questions that were posited. It will also conclude this work, give an overview of the results and insights that it produced and propose avenues for future research.

2. Background

2.1 The Chicoid ceramic tradition

Chicoid pottery appears by the end of the first millennium in Hispaniola, more specifically in nowadays south-eastern Dominican Republic. Different styles of Chicoid were identified on the island: the Boca Chica style of south-eastern Dominican Republic and the Carrier style in Haiti (Rouse 1992). Local Chicoid styles also appear on the island, for example north-western region of the Dominican Republic (Ulloa Hung 2014). Chicoid pottery or (elements of) the Chicoid ceramic style spread westwards from its area of origin trough Hispaniola to the eastern part of Cuba and the Bahamian archipelago and eastwards to Puerto Rico and St. Croix, "becoming simpler as it went" (Rouse 1992, 135).

Figure 3: Chicoid pottery from Hispaniola. Photos by Menno Hoogland and Corinne Hofman, not to scale (Keegan and Hofman 2017, 121).

Chicoid pottery has vessel walls with a thickness between 7 and 9 mm and is built out of greyish brown coloured clays. The surfaces of the vessels are often highly polished. One of the most characteristic elements of Chicoid pottery is the presence of widely spaced, broad incisions of around 4 to 5 mm wide. Both curved and straight lines generally end in a punctation (Rouse 1939, 43; Keegan and Hofman 2017, 121). These decorative elements were usually applied on the shoulders of incurving bowls (Veloz Maggiolo 1972). Another important aspect of this kind of ceramics is the presence of elaborate lugs and modelled anthropo-, zoö- and anthropozoömorphic faces. These modelled faces are known as *adornos*. They often occur as handles or elaborate spouts of bottles (Wilson 2007, 100). The Chicoid ceramic assemblage does not only show modelled faces, but also whole effigy vessels which are deemed to be an important aspect of Chicoid art (Kerchache 1994; Veloz

Maggiolo 1972, Wilson 2007). A wide range of vessel shapes occur including incurved bowls, jars, effigies and (white-slipped) bottles (Rouse 1939, 43; Keegan and Hofman 2017, 121).

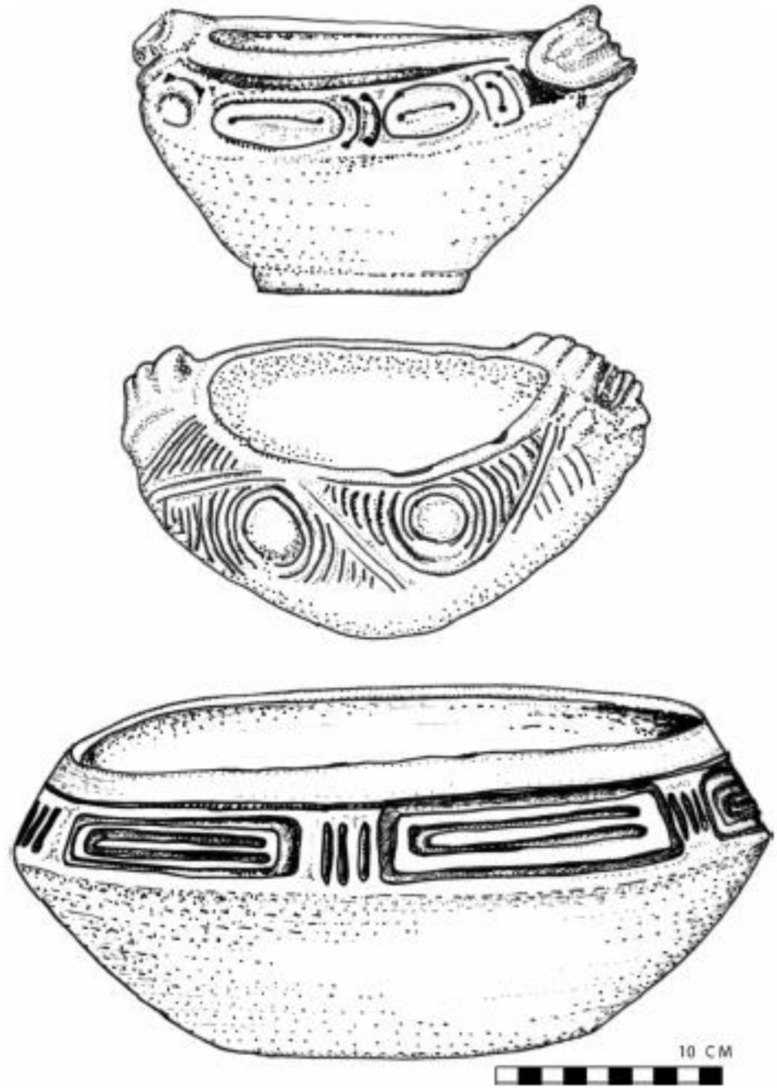


Figure 4: Examples of Chicoid incurved bowls. Typical decoration can be spotted in the form of broad straight and curvilinear incisions and punctations on the vessel shoulder and elaborate lugs (Veloz Maggiolo 1972).

Chicoid pottery supposedly wiped previously developed ceramic traditions from the surface of the island by ± AD 1200. Its emergence and subsequent spread through Hispaniola was consider a superior step in the cultural evolution of the inhabitants of the island. A cultural evolution that culminated in the Chicoid series and specifically in the highly polished Boca Chica style of the south-eastern Dominican Republic (Rouse 1992). However, research has pointed out that the transitions between ceramic series were not hard and did not happen all over the island. Jorge Ulloa Hung (2014) describes the mixing of elements from different ceramic series in north-western Dominican Republic. First there was a mixing of Archaic, Ostionoid and Meillacoid elements resulting eventually in what we know as the Meillacoid series. When Chicoid immigrants started to appear in the area, Ulloa Hung (2014) notices that interaction between representatives of both groups resulted again in a mixing of the ceramic traditions and in some cases a long contemporaneous existence of both Chicoid and Meillacoid pottery intra and across sites. In other words, there was no quick replacement of ceramic series. The situation was much more complex and diverse than Rouse suggested as there were intensive contacts between peoples producing and using Archaic, Ostionoid, Meillacoid and Chicoid pottery (Ulloa Hung 2014).

The notion of a single line of cultural development culminating on Hispaniola in the Chicoid series can be discarded. There are various underlying reasons for the unjustified idolization of Chicoid or Chicoid fetisj (*sensu* Keegan and Hofman 2017). Most of them relate to the unilineal view on cultural evolution and the emergence of phenomena often connected to (a growing) social complexity such as monumental architecture in the form of plazas or ball courts known as *bateyes* or *corrales* (e.g. Wilson 1990) or a population boom (e.g. Keegan 2007). Elements like these are often regarded as markers of the development of "primitive" tribal societies to "complex" chiefdoms (see Moscoso 1981). In order to understand the phenomenon of Chicoid idolization, we need to take a look at the social organisation that has been linked to communities characterised by Chicoid pottery.

2.2 Social organisation

2.2.1 *Cacicazgos* and the concept of chiefdoms

Information on the social organisation of the pre-colonial peoples of the Caribbean is often literally taken from the accounts of the early Spanish chroniclers. Their reports were -and often still are- regarded as ethnohistoric evidence, an unbiased depiction of the situation at the start of the European invasion of the Caribbean (Hofman *et al. 2020*). Subsequently the descriptions in the chronicles were projected on the period leading up to the colonisation and on the peoples that fall under the umbrella of the "Chicoid culture" (± AD 1200-1500) on Hispaniola (Torres 2013, 348). The social organisations of these peoples came to be known under the term "*cacicazgos"* and their leaders as "*caciques"*. These were among the first words the Spanish took over from the Indigenous population. The fact that they did not use an already existing word such as "*reye"* to name a leader, might be an indication for an encounter of a political structure that was previously unknown to the Spanish (Hulme 1988, 105). Drawing from the Spanish chronicles, Rouse (1948) described the political structure which the Spaniards identified on Hispaniola as a three-tier system. The first level of organisation is that of the provinces, each governed by a paramount *cacique* or *matunheri*. At the time of the Spanish arrival there were at least five provinces or *cacicazgos*. The second level consists of local districts controlled by subchiefs or *bahari* who were considered as regional *caciques*. The third level is that of the single village which was under supervision of a headman or *guaoxeri* (Rouse 1948, 528-529; Redmond and Spencer 1994, 194-195). The chiefs are considered to be part of one class, *nitainos*, which has been translated as "nobles" (Taylor 1960, 348). Besides the chiefs there was also a shaman or *behique*. The shaman was both a healer and the bridge with the supernatural as he performed rituals with hallucinogenic drugs through which he talked to the spirits (Keegan and Hofman 2017, 253).

It was Oberg (1955) who first identified the structure of *cacicazgos* as a chiefdom. Moreover, this was the first social structure in the Americas to be classified as a politically organized chiefdom. Chiefdoms are a form of socio-political organisation which transcend local autonomy (Marcus and Feinmann 1998, 4). They require social stratification as the interests of a dependent population are balanced against those of an emerging aristocracy (Carneiro 1981, 45; Earle 1987, 297). The permanent control over subordinate villages lies in the hands of a paramount chief, a centralized and institutionalized function (Carneiro 1981, 45; Flannery 1972, 403). Next to that this function is hereditary, creating a distinction between those who can claim succession to leadership roles by birth right and those who cannot (Redmond 1998, 12). The term chiefdom comes from ethnology, where neo-evolutionists used it to label a stage in the evolutionary trajectory towards the formation of states (Fried 1960; Sahlins and Service 1960) . As a result, a chiefdom is often still regarded as an evolutionary stage, an incipient political formation characterised by social inequality that eventually will become more "complex" and evolve into a state or be subjugated by one. Parameters used for the identification of chiefdoms include bureaucratization, demography growth, centralization of power, hereditary power, monumental architecture, social stratification, and specialization (Carneiro 1967; Feinman 1995; Haas 2001; Marcus and Flannery 1996; Moscoso 1981; Siegel 1996; Yoffee 2005). Societies fitting some of these characteristics were immediately labelled as chiefdoms and were considered to have all the characteristics mentioned above. However, over the years the resistance against the concept of chiefdoms and how it was being used grew (Chapman 2003; Crumley 1987; Plog and Upham 1983). This opposition against chiefdoms culminated in the work of Timothy Pauketat (2007), who thinks of them as an archaeological delusion. According to him the concept of chiefdoms was used as a catchall construct that served to reify our models. Through the identification of chiefdoms archaeologists ignored the underlying cultural pluralism and organizational variability that was encountered during archaeological investigations (see also Herrera Malatesta 2018). Moreover, by using the concept we totally disregarded the agency of the people we were studying and uniformised their identities through the establishment of the cultural dominance of chiefdoms (Keegan and Hofman 2017; Pauketat 2007; Wilson 1993).

2.4.2 The Chicoid expansion

In Hispaniola and the Greater Antilles the identification of chiefdoms also resulted in the uniformisation of identity (Rodríguez Ramos 2007; Torres 2012; 2013). The encompassing term used to indicate this shared identity for the people who inhabited these islands by the time Columbus arrived, was “Taino”. Rouse (1992) divided them according to geographic boundaries and material assemblages combined with some of the usual suspects for so-called social complexity that is discussed above. He labelled the inhabitants of Hispaniola and Puerto Rico “Classic Taino” because he considered these islands to be most populous and most culturally advanced. He considered them to be “evolving toward full civilization” (Rouse 1992, 19). Jamaica, most of Cuba and the Bahamian Archipelago were home to the “Western Taino”, while the Virgin Islands and most of the Leeward Islands were home to the “Eastern Taino” (Rouse 1992, 7). Rouse saw the people he labelled “Chicoid” as the direct ancestors of the Classic Taino, which caused Chicoid pottery and specifically the elaborate Boca Chica style from south-eastern Dominican Republic to become emblematic for Taino culture (Keegan and Hofman 2017, 146). “Taino” possibly has even more problematic underlying assumptions than the other terminology in Rouse’s classification system. This is due to the fact that its origins go back to a misuse of the term in the nineteenth century by historians (see Rafinesque 1836) and the fact that “Taino” has been used to indicate not only a term, but also a concept and a phenomenon (Curet 2014). “Taino” is not a term that suits one specific culture, it represents a plurality of social groups. Therefore it has been approached as a spectrum of diverse expressions of Taínoness (Rodríguez Ramos 2007, Oliver 2009). Although the use of the term indicates the realisation of the existence and importance of diversity, the term itself does not offer a more clear understanding of the situation at the time, as it itself is a nebulous concept (Keegan and Hofman 2017, 116).

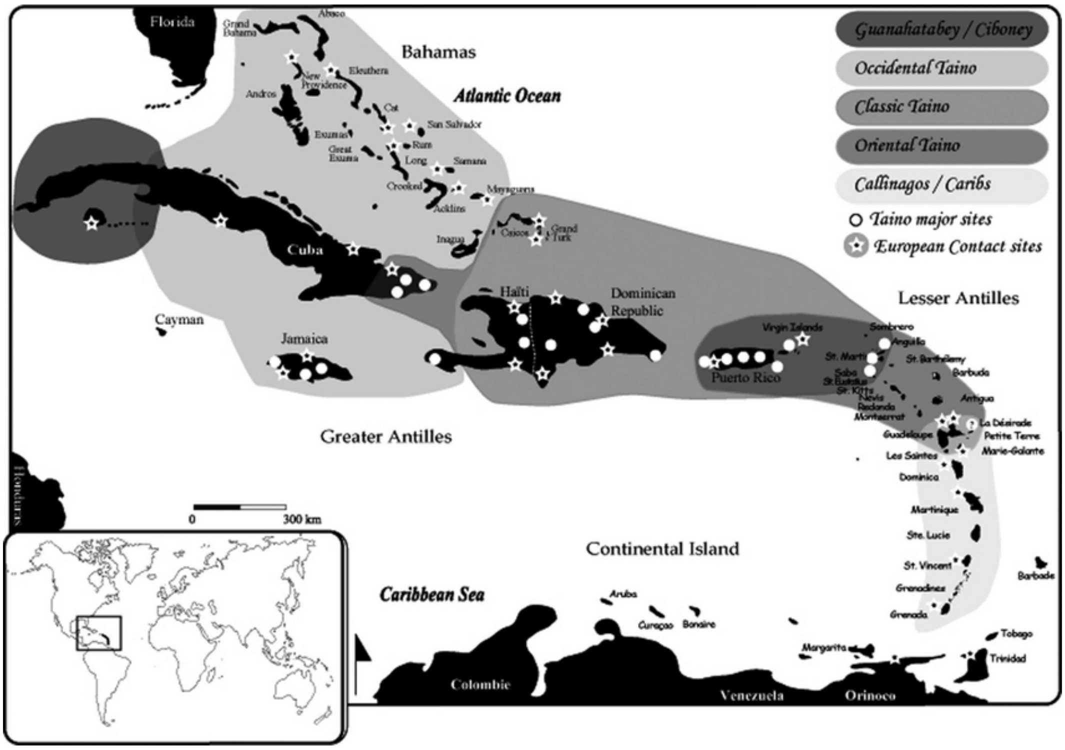


Figure 5: An indication of the spread of Caribbean peoples at the time of Columbus according to the vision of Irving Rouse (Grouard 2010, 136).

The spread of Chicoid pottery from Hispaniola to other, also not-neighbouring islands has been attested for (e.g. Rouse 1992; Hoogland and Hofman 1999). Multiple interpretations for processes of mobility and exchange in the pre-colonial Caribbean have been posited (e.g. Mol 2013). The spread of Chicoid pottery has been related to the establishment of outposts on other island. On the one hand these outpost remained affiliated to the homeland, on the other hand they were incorporated in the local network (Hofman, Mol, Hoogland and Valcárcel Rojas 2014). The spread has also been related to the emergence of *caciques* and *cacicazgos* and the expansionist mindset that was thought to be inherent to chiefdoms (e.g. Moscoso 1981; Rouse 1992). The descriptions in the Spanish chronicles should not be disregarded, neither do I deny the existence of chiefdoms on the island of Hispaniola by the end of the fifteenth century. However, the existence of chiefs and social stratification should not be usesd as an omnipotent explanation for every phenomenon we encounter in the archaeological record, nor as a label for a stage in the path towards social complexity or civilisation. We should be aware of the fact that multiple forms of social organisation can exist at the same time and intertwine (Curet 2003). We, archaeologists, should shift our view from the vertical level of social organisation to a frame where we also capture the horizontal relationships that were characteristic for these people (Crumley 1995, Pauketat 2007).

2.3 "Taino art"

With that in mind I now turn towards the term "Taino art". This nebulous concept includes a large variety of material artefact types, which existence and biographies are almost exclusively linked to the *caciques* (e.g. Brecht *et al*. 1997; García Arévalo 1977; Kerchache 1994). One of the phenomena that has been incorporated under the term "Taino art" is *cemi*. *Cemi* are religious artefacts believed to contain or rather to be a form of spiritual power. They are an immaterial, numinous, and vital force, manifested as an unusual sign in nature (Oliver 2009, 59-60). *Cemi* can take on many forms and style. Well-known examples are three-pointers, large stone heads, shell face masks, *guanin* and wooden seats or *duhos*. (Oliver 2009, 3; Keegan and Hofman 2017, 143). Although Oliver sees the importance of *cemi* as the primary expression of Tainoness, Keegan and Hofman (2017, 146) reject this. They propose that "… what we assume to be a singular expression expanding from a Chicoid homeland is actually the syncretism of competing ideologies" (Keegan and Hofman 2017, 147). Keegan and Hofman ((2017, 144) posit that since *cemi* are predominantly found on Puerto Rico and the eastern Dominican Republic, and copies and local replicas have been found far outside the area to which Tainoness is confined, it does not represent the beliefs of a specific culture. Instead, they believe that what we do see in the archaeological record is evidence of social networks through which objects like *guanin*, three-pointers, pottery, jadeite etc. moved (e.g. Hofman and Bright 2010; Hofman and van Duijvenbode 2011; Keegan and Hofman 2017; Mol 2013; 2014; Rodríguez Ramos 2010). These networks of exchange did not only take shape through the exchange of goods they also allowed for the distribution of a common set of ideas (Hofman and Hoogland 2011; Keegan and Hofman 2017, 135).

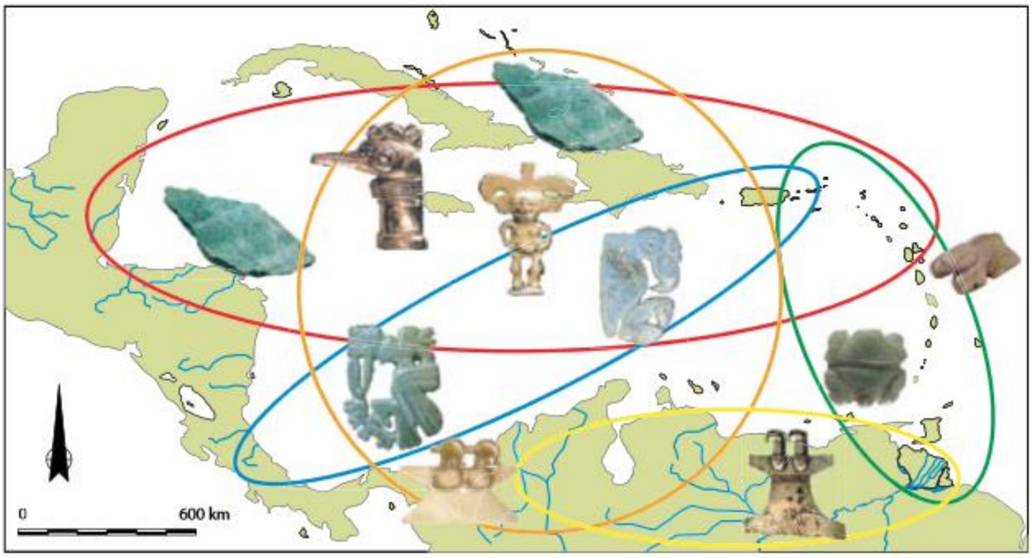


Figure 6: Pan-regional distributions of guanin and greenstone objects in the Caribbean (Hofman and Hoogland 2011, 20).

Another class of material artefacts that is included by the term "Taino art" and connected to *caciques* and mythical figures are white coloured or whitish ceramic vessels. Although they are associated with the Chicoid ceramic series, I treat them here as a separate type of pottery within this tradition. Given the fact that there was no term available for addressing this phenomenon, the term Late Ceramic Age white ware (LCAWW) was coined. I believe that this type of pottery might have been involved in social interactions in the Carribean through networks of exchange or the transmission of ideas between different communities, like *cemi* were.

2.4 Late Ceramic Age White Ware

2.4.1 Nomen est omen

The process of making archaeological classifications is subject to the background of the classifier and the context surrounding the classification (Borck *et al*. 2020). The same goes for singling out a type of pottery from a previously identified ceramic tradition based on certain deviating characteristics (colour, rather homogenous style, low occurrence, wide geographic distribution) and subsequently naming it. Therefore, it is extremely important to provide a detailed account of this process and explain why we came up with the name Late Ceramic Age white ware. "We" in this case includes the author, Prof. dr. Corinne Hofman and members of the Caribbean research group of Leiden University. People involved in the 2019 fieldwork campaign of Leiden University at the site of El Carril, also contributed to the discussion. The findings and ideas presented here are the result of a literature study and a first study of the ceramic assemblages from the sites of El Cabo, El Caril and El Flaco in Dominican Republic (see Van Dessel 2019). The information provided here also resulted from personal communication with experienced amateur archaeologist Manuel García Arévalo and visiting the *Sala de Arte Prehispanico de la Fundacion García Arévalo* in Santo Domingo. The results were presented at the 2019 congress of the International Association for Caribbean Archaeology in Barbados (Van Dessel *et al*. 2019).

2.3.1.1 "Late Ceramic Age"

The Late Ceramic Age period runs from around AD 800 to 1500. As we have seen the pottery studied in this thesis is related to the Chicoid ceramic series, which appeared around AD 1000 in Hispaniola. The term Late Ceramic Age therefore includes the Chidoid series, but also covers a slightly longer time span. I refrained from using "Chicoid" in the name, because there are a lot of contested assumptions underlying this term and by extension the terminology of the classification system of Irving Rouse in general (see chapter 3). Furthermore, the fact that the transitions between ceramic series in Hispaniola were not immediate and did not happen all over the island, makes the interpretation of ceramic series on Hispaniola more difficult. Not only mixing of elements from different ceramic series has been observed, also the long contemporaneous existence of both Chicoid and Meillacoid pottery intrasite and across sites (Hofman *et al*. 2020; Ulloa Hung 2014). Connecting LCAWW to one specific ceramic tradition without previous profound analytical ceramic research would be a sign of a kind of bias towards the nature of the material. Another important aspect that runs along the same line of reasoning is the (tentative) connection of LCAWW with *caciques*. Using "Chicoid" in the name would involuntarily contribute to this association.

2.3.1.2 "White"

The most distinguishing factor of this type of pottery is its colour, as opposed to the generally brown- or grey-coloured paste of the vessels in the ceramic assemblages. As a result there was little question that the colour had to be incorporated in the name. However, while it is true that the colour is the most distinguishing factor of this type of pottery, the colour cannot always be considered as pure white. The specific colour of the vessels is the result of the application of a slip or the use of a buff-firing clay. While the vessels with slip remains can clearly be identified as being white, the buff-firing clays show a greater variety. Reaching a pure white colour by using a buff-firing clay depends on many variables such as the ability to control the firing process and the purity of the clay (Rice 1987). In the Caribbean region open fires or pit fires are used for firing pottery. The combination of these elements causes LCAWW to sometimes have a colour that can be identified as whitish, beige or sometimes even light-orange or pinkish. We must also keep in mind that the identification of colour is a process that strongly depends on both the observer and external factors. Problems with identifying LCAWW can also arise when the slip that was originally applied to vessel surface has been removed. Not only post-depositional processes have an influence on the preservation of a (lime-rich) slip, also the treatment of ceramic artefacts by (amateur) archaeologists after excavation is crucial. From personal experience, I know that some white-coloured slips applied on LCAWW can be very easily removed during the washing of the sherds. Sherds should be washed with care and by hand. The use of a toothbrush might quicken the washing process, it is also disastrous for the preservation of certain slips and manufacturing traces present (V. Roux, pers. comm., 2020). On the other hand it can also be hard to identify the presence of slip or of a white/whitish colour on unwashed or poorly washed sherds. It is probable that these elements cause some sherds not to be recognised as LCAWW, which would reinforce the perception of their low frequency in the ceramic assemblage.

2.3.1.3 "Ware"

The term "ware" was incorporated so it would be clear that we are talking about a specific kind of pottery. The term was introduced by Lehmer (1951). He used it to indicate groups of pottery that share fundamental characteristics such as clay fabric and surface finish (Krause 2016, 73). While the exact technological characteristics that unite LCAWW still have to be analysed (see chapter three), the findings so far provide enough basis to use the term 'ware'. I did not choose the perhaps more anticipated indication of "bottles", because I found that other shapes with the same characteristics also occur. When looking at the assemblages it seems plausible that a lot of sherds belonged to large restricted vessels, but it is often difficult to identify a specific vessel shape. This is certainly the case for sherds belonging to the body of such vessels. The actual connection to bottles is mostly drawn from the occurrence of bottle mouths and bottlenecks, sometimes decorated with elaborate *adornos*. A revision of how bottles or *potizas* are perceived in Caribbean archaeology is needed in order to understand their connection to LCAWW.

2.4.2 *Potizas*

Large, elaborate bottles in all kind of shapes have been found on the island of Hispaniola (e.g. García Arévalo 1977; Krieger 1931; Veloz Maggiolo 1972). These bottles are amongst the biggest (complete) vessels that have been found on the island (VanderVeen 2011). Several *potizas*, as they are known locally, have been recovered in contexts related to freshwater springs in caves and *cenotes*. Traditionally, it is assumed that they were used for collecting and transporting water (Beeker *et al*. 2002; De Booy 1915; Krieger 1931).

The *potizas* are also regarded as symbols of fertility as the bottle mouths are considered to represent phallic shapes and the shoulders are interpreted as mammillae (Keegan 1997; Roe 1997; see figure 7). These assumptions have been countered by morphological and technical analyses of several *potizas* from Hispaniola by VanderVeen (2011). He concludes that *potizas* were not subjected to standardization. He observes substantial agency on the potter's behalf, as the characteristics of the *potizas* vary greatly. In some cases no fertility symbols can be observed, in others only male/female or even both. Furthermore, VanderVeen (2011, 7) states " there is so much variety in *potiza* forms that it is difficult to believe they all served as part of a single, region-wide religious practice. Moreover he rejects the notion of these vessels as fertility symbols because it is based on the interpretation of these shapes, but does not fit within "Taino" symbology.

Next to that VanderVeen (2011) found that the *potizas* occur in all kind of shapes, but that these shapes are certainly not ideal for collecting and transporting liquids. He concludes that their most likely use must have been the storage of liquids, also liquids other than water. He believes their shape is ideal for the cooling, preservation and pouring of liquids. Starch-grain analyses pointed out that *potizas* were used for storing and serving both fermented and energetic liquids (Pagan Jimenez *et al*. forthcoming). This confirms the findings of VanderVeen (2011) as it links *potizas* to feasting and/or rituals. Columbus mentions water being brought to him in "jars, made like those in Spain" (Markham 2011, 123). Krieger (1931, 5) refers to Giralomo Benzoni, who witnessed the use of *potizas* in the manufacture of "wine" by Indigenous peoples. These sources confirm the use of *potizas* for the storage of liquids in the form of fermented beverages, water and energetic liquids.

Figure 7: Examples of different shapes of potizas from Hispaniola (VanderVeen 2011).

The presence of jars and the application of a white slip were two of the modes on pottery identified by Rouse (1939) to discern between the Meillac style and the Carrier style[1]. According to him jars were rare in Meillac style and white slip was absent, while they were respectively seen as "common" and "present" for the Carrier style (Rouse 1939, 55). Moreover, the fact that historic sources mentioned painted water bottles or handsomely made and painted earthenware pitchers among the Indigenous material assemblage, led Rouse to the conclusion that the chroniclers observed people with ceramics of the Carrier style. He also commented on the nature of the slip, as he mentions that "It is assumed that slips of this colour were applied after firing, because they are rough, irregular, soft and tend to wash off. They only occur on jars." (Rouse 1939, 53). Krieger (1931, 93) mentions that grey ware was preferred for the production of *potizas* and a white kaolin slip was often applied. Some sources believe that the bottles were whitened by smearing crushed caliche on them (M. García Arévalo, pers. comm., 2019). As can be seen from figure 7, not all of the bottles or bottle fragments that were recovered are white or whitish. We already explained that slip can erode or be removed due to post-depositional processes. The contributions by Rouse and García Arévalo add to the believe that it is possible that more *potizas* were initially white. The information presented on *potizas* and the use of slip points to the fact that the image obtained from the archaeological record is the result of the use of different coating methods and their tendencies to preserve. While there is no real evidence that can help verify whether a *potiza* was initially white or not, we must remain open to this possibility.

2.4.3 Spread

The final part of this chapter revolves around the spread of LCAWW on Hispaniola and others Caribbean islands. The findings presented here result from a literature study and personal communication with experienced researchers. Next to that I looked at the ceramics that are part of the collection of the Smithsonian Museum of the American Indian and which have been related to the Late Ceramic Age. Access to and information on the collection was provided by Antonio Curet in November 2020. The collection consist for the most part of artefacts collected by Theodoor the Booy during his expeditions throughout the Caribbean region between 1911 and 1918 (see Curet and Galban 2019). This kind of research is very dependent on the specifity of the archeological information available and is affected by limitations of the identification process mentioned above.

[1] The Meillac style was the basis for the Meillacoid series. The Carrier style was seen as an expression of Chicoid pottery on Haiti (Rouse 1939; 1992).

These limitations certainly apply to the identification based on descriptions and/or photos of artefacts. Next to that, the presence of the *adornos* and the sheer size of the bottles cause them to be popular items in private and museum collections. This again complicates the study of these kind of vessels as their archaeological context is often unknown and they are spread out in collections all over the world. Moreover, there their status as symbol of "Taino art" has resulted in a lot of contemporary reproductions as is the case with threepointers and *duhos*. This may cast doubts on the authenticity of certain artefacts in private or museum collections (C. L. Hofman and A. Antczak, pers. comm., 2020). It must be clear that the following information is by no means exhaustive due to all these limitations.

2.3.3.1 Hispaniola

First, LCAWW on the Dominican Republic will be discussed. In a relative sense this part of the island has been rather well researched, in particular in the east coast. However, we should also take into account that a lot of archaeological information has been destroyed by construction works of large hotels. Nevertheless there are many sources that confirm the presence of LCAWW on the island. I found evidence for the presence of LCAWW in 13 contemporary provinces of the Dominican Republic: La Altagracia, Azua, María Trinidad Sánchez, Monte Cristi, Puerto Plata, San Juan, Santo Domingo, Santiago, Samaná, La Romana, El Seibo and Valverde. Almost all of the sherds that have been found can be related to bottles.

Figure 8: Map of the provinces of the Dominican Repblic nowadays. Provinces where LCAWW has been found according to the information gathered and presented in this thesis, are encircled in red (Adapted from https://www.wikiwand.com/en/Outline_of_the_Dominican_Republic).

I did not only find proof of the occurrence of LCAWW in different provinces, sometimes also interesting remarks were made. Krieger (1929, 82) mentions that some of the sherds (see figure 9) belong to "a thick-walled type of water container, shaped from a grey coloured granular paste, different from the black loamy clay paste from which most of the vessels and potsherds of Samaná had been fashioned". Next to that Krieger informs us on the use of two kinds of paint, one being creamy white and the other salmon coloured. He observed the use of both paints in one vessel (Krieger 1929, 82). I also observed the use of paint at the site of El Flaco and El Carril. In these cases black paint seems to highlight lower-lying parts of a vessel such as incisions and parts of modelled faces, creating a contrast with the white-coloured background (see figure 10). The black paint is believed to be extracted from the fruit and the bark of the *Genipa Americana L.*, also known as *jagua* (M. García Arévalo, pers. comm., 2019; Veloz Maggiolo 1972, 108). "Earthenware pitchers, handsomely made, and painted, full of fresh water" are mentioned by Antonio de Herrera y Tordesillas ([1740], 68). While Herrera never actually visited the Caribbean, there seems to be some truth to what he was writing. However, it makes me wonder why I do not encounter more *potizas* with traces of painting. Moreover, the few examples I did find all contain black paint, while red pigments were also known at the time (Alegría 1997, 29). Due to the scarcity of paint remains post-depositional processes and identification problems come to mind again (see above). However little actual examples there are available, they do point to the possibility that the white look of (a part of the) *potizas* that can be observed now, was actually not the final outcome of the production process. In that sense the phenomenon may show similarities to the perceived white appearance of Ancient Greek temples and sculptures, which in fact were characterized by their polychrome painting (Brinkmann 2008).

Figure 9: Examples of bottle mouths and bottle necks from Samaná (Krieger 1929, plate 15).

Figure 10: Examples of LCAWW from the site of El Carril (left) and El Flaco (middle and right) decorated with black paint in incisions or lower lying parts of modelled faces (Photos by author for NEXUS 1492).

Table 1: Overview of the spread of LCAWW in the Dominican Republic.

Spread of LCAWW in the Dominican Republic		
Province	**Sites**	**Source(s)**
La Altagracia	Cabo Egaño El Cabo de San Rafael El Salado Hoyos de Molina	NMAI Own observations NMAI Ortega 2005
Azua	Site unknown	NMAI
María Trinidad Sánchez	Playa Grande	López Belando 2019
Monte Cristi	La Reforma – Cerro Gordo	Own Observations
Puerto Plata	Coanoa El Coronel Edilio Cruz Paradero Unknown sites	 Ulloa Hung 2014 C. L. Hofman, pers. comm., 2019; Museo Arqueologica La Isabela
La Romana	Sites unknown	NMAI
Samaná	Anadel San Juan (?)	Krieger 1929 Krieger 1929
San Juan	La Caribe Florito	Ortega 2005 Ortega 2005
San Pedro de Macoris	Sites unknown	NMAI
Santiago	Santiago de los Caballeros	NMAI
Santo Domingo	Boca Chica	NMAI and Ortega 2005
El Seibo	Sites unknown	NMAI
Valverde	El Carril El Flaco La Luperona	Own observations Katarina Jacobson, pers. comm., 2020
La Vega	Concepcion De La Vega Rio Verde	M. Ernst, pers. comm., 2021. C. L. Hofman, pers. comm., 2021.

Sources that provide evidence for the presence of LCAWW in Haiti are less prominent. This probably is not so much related to the actual presence of LCAWW, but to the fact that there has been a lot less archaeological research in Haiti in general. Nonetheless, the available information is very valuable. I have already mentioned the identification of white slipped sherd by Rouse (1939) in the area around Forte Liberté. LCAWW was also found in this region during a survey of the area by Sony Jean (2019; own observation by author). Other evidence on the presence of LCAWW in Haiti can possibly be found at the *Musée de Guahaba* in Limbé. This museum hosts many artefacts that have been collected by William Hodges during the many years he lived in Haiti. Unfortunately this collection is not available online (K. Deagan, pers. comm., 2019). I identified a possible example of LCAWW in the NMAI collection coming from Île de la Gonâve.

The site of En Bas Saline is the only site that in Haiti that I know of that has been thoroughly excavated (and documented) and where LCAWW has been found. The site was excavated by Deagan in the 1980's (1987; 2004). En Bas Saline is located near Forte Liberté in the North of Haiti. It encompasses around 95 000 m^2, making it the largest town in the region. It was inhabited from around AD 1250 and continued to be so after the start of the European invasion in 1492. Due to its size and the observed organisational complexity the site has been considered as a central town of the *cacicazgo* (Deagan 2004, 605). A flat open area in the middle of the town has been identified as a plaza, dance court or ball court (Deagan 2004, 606). The excavations focused on five analytical units: a pre-contact ritual event (ca AD 1350), a post-ritual event (post AD 1492); a pre-contact elite residential area (ca AD 1250), a post-contact elite residential area (post AD 1492) and a post-contact non-elite residential area (post AD 1492) (Deagan 2004, 610). LCAWW was found at En Bas Saline in big quantities: 11 661 retrieved sherds were white slipped, representing roughly 10 percent of the total amount of sherds found. 1.8 percent of the white slipped sherds contained decorations linked to the Chicoid series.

Table 2: Vessel shapes of LCAWW at En Bas Saline (Info courtesy of K. Deagan).

En Bas Saline: White-slipped Pottery by Form , Site Area and Deposit Period									
	Carinated bowl	Shallow open bowl	Bowl	Jar	Bottle	Indeter-minate	TOTAL	Ratio	Approximate dates
N. Residential Plowzone									
N. Residential Contact Era									
N. Residential Pre-Contact					3	1031	***1034***	*0,09*	
					27	454	***481***	*0,04*	post 1492
Feast Area Plowzone					2	167	***169***	*0,01*	Cal AD 1310-1480
Feast Pits									
					1	58	***59***	*0,01*	
Central Mound Residence Plowzone	2	1			38	1084	***1125***	*0,10*	Cal AD 1280-1440
Central Mound Residence Contact Era									
Central Mound Residence Precontact					34	1453	***1487***	*0,13*	
					124	3216	***3340***	*0,29*	ca AD 1450-1520
Burial Pit (Contact era)	2		2	1	105	2256	***2366***	*0,20*	ca. AD 1200-1450
Plaza Plowzone	1	5			81	858	***945***	*0,08*	post 1492
Plaza Precontact									
TOTAL					2	266	***268***	*0,02*	
					12	375	***387***	*0,03*	
	5	***6***	***2***	***1***	***429***	***11218***	***11661***	*1,00*	

Of the 11661 sherds only 443 could be linked to a specific vessel shape. This confirms that it is hard to relate LCAWW to a specific vessel form. No less than 429 out of 443 identified vessel forms was a bottle, a stunning 97 percent. Other vessel shapes identified include carinated bowls, shallow open bowls, bowls and jars (K. Deagan, pers. comm., November

2020). Interestingly LCAWW was found in all five analytical units: both pre- and post- "contact" and both elite and non-elite contexts, as well as in a burial, residential and ritual context. The majority of LCAWW (62%) has been found in the elite residence area of the central mound. However, when comparing the amount of LCAWW to the total amount of sherds recovered from the contexts, we see that the relative differences are not that big (see table 3). This indicates that LCAWW was not only connected to *caciques* or social elites and was used in different contexts at the site of En Bas Saline both before and after 1492. There is a rather uniform relative presence of white-slipped sherds between 10% and 13% in both elite and non-elite residential contexts and in a ritual context. Only in the (elite) burial context we see that the relative presence of white slipped sherds is higher, more specifically around 19%.

Table 3: Overview of the presence of types of pottery in different contexts at En Bas Saline (Adapted from Deagan 2004, 612).

	Pre-contact ritual (Feast)		**Post-contact ritual (elite burial)**		**Pre-contact residence (Elite)**		**Post-contact residence (elite)**		**Post-contact residence (non-elite)**	
	#	%	#	%	#	%	#	%	#	%
Total Carrier	7765	0,96	3845	0,97	15934	0,96	37749	0,97	4257	0,97
Dec.	525	0,07	274	0,07	1068	0,06	2307	0,06	311	0,07
Undec.	6188	0,77	2827	0,71	12676	0,76	31006	0,80	3499	0,79
White Slipped	1052	0,13	744	0,19	2190	0,13	4436	0,11	447	0,10
Other pottery	23	0,00	25	0,01	29	0,00	54	0,00	/	/
Griddle	269	0,03	107	0,03	634	0,04	921	0,02	147	0,03
Total pottery	8057	1	3977	1	16597	1	38724	1	4404	1

Figure 11: Examples of LCAWW from En Bas Saline (Photo courtesy of Kathleen Deagan and the Florida Museum of Natural History).

2.3.3.2 East of Hispaniola

There is also evidence for the presence of LCAWW outside of the island of Hispaniola. The occurrence of this type of pottery on the island of Saba was already mentioned in the previous chapter. This might be related to the expansion of (influence from) societies from the Greater Antilles toward the Lesser Antilles, resulting from socio-ideological and economic reasons (Hofman 1993; Hofman and Hoogland 2004). One of hypotheses includes the establishment of a gateway community on the island of Saba. This would have allowed for the control of the major trade route and channel of communication which ran along the Lesser Antilles towards the South American mainland (Hofman and Hoogland 2004, 54). Other hypotheses are related on the one hand to alliance building and feasting, on the other hand to hostile interactions such as raiding and appropriation (Hofman and Hoogland 2011, 21). Some archaeological sites on the Virgin Islands can be seen in a similar way (Lundberg *et al.* 1992). There is evidence of a connection between settlements in the Virgin Islands and the Chicoid ceramic series, for example at the sites of Cinnamon Bay and Trunk bay on St. John between ca AD 1280/1300 - 1450 (Wild 2013). So far evidence for the occurrence of LCAWW has not been discovered yet on the Virgin Islands. However, Ken Wild of the Virgin Islands National Park mentioned that they "are recovering buff and white pottery that appears to be older than Chican, possibly Ostiones, and does make up a small percentage of the assemblage" (K. Wild, pers. comm., February 2021).

Directly to the east of Hispaniola, across the Mona Passage, lies Puerto Rico. Influence of the Chicoid ceramic series has been observed (Rouse 1992). LCAWW has also been discovered on this island. One sherd (see Figure 12) was brought to my attention by Antonio Curet (pers. comm., October 2020). The sherd comes from Tibes, a ceremonial centre dated to AD 600-1200. It is a (partially) white-slipped rim sherd belonging to a bowl, decorated with broad incisions in combination with punctations on the shoulder of the vessel. These decorations are clearly related to the Chicoid ceramic series. One more clear example has been found among the collection of the NMAI (See figure 12). It is a complete globular jar with two vertical spouts connecting the upper and lower part of the vessel. The upper part is characterised by a anthropomorphic *adorno*. The jar is made from a buff-firing clay and has been found on Isla de Mona, situated between Puerto Rico and Hispaniola. Two other possible examples of LCAWW have been found in Arecibo.


Figure 12: Example of a sherd of LCAWW from the site of Tibes, Puerto Rico (Left, photo courtesy of A. Curet) and a jar from Isla de Mona (Right, photo courtesy of Antiono Curet the National Museum of the American Indian).

2.3.3.3 North and west of Hispaniola

There are three more islands or island groups where LCAWW has been found: Cuba, Jamaica and the Bahama Archipelago. The Late Ceramic Age on these islands/island groups was characterized by the arrival of Meillacoid pottery in the beginning of the 9th century AD (Keegan and Hofman 2017, 151). All three cases exhibit their own characteristics of LCAWW, making the situation more interesting, but also more complex. First we will look at the island of Cuba, for which I reached out to Roberto Valcárcel Rojas (INTEC and Leiden University). According to his information the occurrence of LCAWW, in particular *potizas*, on Cuba is rare. The only area where it has been found is the Maisi area in the eastern part of the island. It is believed that certain ceramics, among which *potizas,* were imported to this region from Hispaniola (R. Valcárcel Rojas, pers. comm., November 2020). The north-eastern part of the island is also the region where Chicoid influences in general are most common in Cuba. These influences possibly reached Cuba already in the 11th or 12 century AD. Ceramics related to the Chicoid series on Cuba show also Meillacoid elements and are therefore considered to be a mix between both traditions (Hofman *et al*. 2014; Keegan and Hofman 2017). The occurrence of LCAWW in the Maisi area has been confirmed by my observations of the NMAI collection, more specifically at the Big Wall site and the site of El Lindero, both located near Cape Maisi. Both sites are believed to have been inhabited until after the start of the European colonisation (Harrington 1921). The artefacts from El Lindero include a white-slipped, restricted bowl (Figure 13). Among the most interesting examples of LCAWW at Bigg Wall are two *adornos* (Figure 13). One has the shape of a snakehead and probably served as a bottle mouth. The other one is part of an *adorno* that exhibited the same black painting on the lower lying parts as was observed in the north-western part of the Dominican Republic (see above). While we have to be careful with depending too much on the style of pottery (e.g. Stark 1998), this similarity clearly shows some kind of relation concerning LCAWW in the two areas. Interestingly, the earthworks that has been discovered by Harrington (1921) at Big Wall show similarities to earthworks at En Bas Saline (Deagan 1989).

Figure 13: Examples of LCAWW from Cuba. Left: adorno of which the lower lying parts and incisions are decorated with black paint (Big Wall, Cuba). Middle: adorno is the form of a snakehead that was used as bottle mouth (Big Wall, Cuba). White-slipped restricted bowl (El Lindero, Cuba) (Photos courtesy of Antonio Curet and the National Museum of the American Indian).

The next area of focus is the Bahama archipelago. This archipelago nowadays consist of the Turks & Caicos Islands and the Commonwealth of the Bahamas. Sites on the many islands and cays of this archipelago include temporary and seasonal procurement sites and long-term occupation sites. The culture-history of the archipelago is divided in three parts: Non-Lucayan (AD 700-1300), Early-Lucayan (AD 700/800 – 1100) and Late-Lucayan (AD 1100 – ca 1530) (Berman *et al*. 2013). The non-Lucayan period is related to Ostionoid and mostly to Meillacoid influences. Particularly the Turks & Caicos islands are seen as a colonial enclave within the sphere of influence of these traditions on Hispaniola (Berman *et al*. 2013, 265). The Early Lucayan period is characterised by the occurrence of locally made Palmetto-ware. During the Late-Lucayan period more (raw) materials were imported to the archipelago as political and economic relations with Hispaniola and Cuba intensified (Berman *et al*. 2013, 268). The ceramic assemblages of Late-Lucayan sites do not only include Palmetto ware, but also imported pottery such as LCAWW. The non-local pottery can be easily recognised as the temper used contain igneous and metamorphic rocks in contrast to the shell-tempered Palmetto ware (Bate 2011, 53).

Material assemblages connected to the Late-Lucayan period have been found all over the Bahama archipelago. Nevertheless, I have only found evidence of LCAWW on the Turks & Caicos islands. This does not mean that LCAWW was not present on other islands in the archipelago. It just means that I did not find a clear representative of this type of pottery among the sources I consulted. I believe a more in-depth and extensive search is likely to prove the presence of LCAWW in the Bahamas, as for example Bate (2011) mentions the presence of non-local, slipped ceramics at the site of Long Bay, San Salvador Island. She does so without mentioning the colour, nor providing a picture, making the identification of LCAWW at the site impossible.

The occurrence of LCAWW on the Turks & Caicos Islands is mentioned by Sinelli (2010). He found white slipped sherds at the site of Spud, Middleton and Pelican Cay. Chalky white pasted sherds were also found at Middleton and Pelican Cay. One of them also had a white slip. Sinelli (2010) relates these white sherds consistently with imported bottles of the Chicoid series, even though some of them have been found in the same contexts as Meillacoid sherds (SInelli 2010, 290). He also encountered two examples of white ceramic pastes that were not typical to the Meillacoid or Chicoid series at the sites of Spud and Habitation 2 (Figure 14). Two other examples of LCAWW have been identified at the site of Palmetto Junction. The sherds are considered to be imported and were found in a Chicoid context. Macroscopic trace analysis pointed out that the white-slipped vessel(s) were made by joining together assembled elements of clay, more specifically by pinching clay coils together. Afterwards they were scraped and smoothed (Graves 2020).

Figure 14: Sherd with an "unusual white paste" (Sinelli 2010, 347).

Another island where evidence for the presence of LCAWW was found, is Jamaica. This island only started to get inhabited in the 8th century AD (Allsworth-Jones 2008). The first settlers of Jamaica were labelled as the Little River culture. Their ceramic assemblage is known as red ware and is linked to the Ostionoid series. The Meillacoid series are also represented on Jamaica, where it is divided in three local styles: White Marl style, Montego Bay style and Port Morant style (Allsworth-Jones 2008). Interestingly, ceramics related to the Chicoid series do not occur on Jamaica (Wesler 2013, 260). Despite the absence of the Chicoid ceramic series on the island, LCAWW does occur there prominently. Information about LCAWW on Jamaica was obtained through personal communication with Lesley-Gail Atkinson Swabi. LCAWW has been found in the form of water jars on the island. They are never white slipped, but they stand out of the assemblage due to their lighter colour. Spouts and handles, specifically the laterally perforated knob handle, are used as indicators for their occurrence, as whole vessels are a rare find. The vessels occur in two ranges of thickness: medium (2.0 -4.9 mm) and large (> 10 mm). The jars are mostly decorated with incision on applique (see figure 15). When *adornos* are present, they are "less elaborate" than the examples we have seen from Hispaniola. The jars were found at 19 sites so far. The can be related to the Meillacoid or Ostionoid series (L.-G. Atkinson Swabi, pers. comm., February 2021; see table 4).

Table 4: Overview of the occurrence of water jars on Jamaica (Pers. comm, Lesley-Gail Atkinson Swabi, January 2021).

Water Jars or LCAWW on Jamaica		
Site	**Dates of sites**	**Parish**
Fort Charles	/	St. Elizabeth
Great Pedro Bay	/	St. Elizabeth
Black River	/	St. Elizabeth
Bull Savannah	Cal. AD 969-1023 to AD 1049-1204	St. Elizabeth
Ward's Bay	/	Manchester
Rowe's Corner	/	Manchester
Cuckold Point Cave	/	Manchester
Gut River #2	/	Manchester
Round Hill	/	Clarendon
Braziletto	/	Clarendon
Water Jar Cave	Cal. AD 1280-1608	Clarendon
Portland Ridge Cave	/	Clarendon
Taylor's Hut Cave	/	Clarendon
White Marl	Cal. AD 766-1166 to AD 1488-1645	St. Catherine
Hartfield	/	St. James
Fairfield	Cal. AD 1270-1420	St. James
Spot Valley	/	St. James
Clifton (Martha Brae)	/	Trelawny

Figure 15: Spout of jar or bottle with serrated ribbon from White Marl, Jamaica (Atkinson 2019, 339) and a laterally perforated knob handle from White Marl, Jamaica (Atkinson 2019, 344).

Figure 16: Avian shaped spout from White Marl, Jamaica (Atkinson 2019, 345).

2.4.4 Origins of LCAWW

After looking more closely at the phenomenon of LCAWW on Hispaniola and including information from other islands, the view on LCAWW has to be revised. Evidence of white or buff-firing pottery occurring in small quantities has been found on many islands next to Hispaniola. This type of pottery could be identified as LCAWW in Puerto Rico, the Bahama archipelago, Cuba and Saba and could be related to the Chicoid series. On other islands, such as Jamaica and the Virgin Islands, there was no link with the Chicoid series. On Jamaica the white pottery is linked to (the local equivalents of) the Ostionoid and Meillacoid series. Moreover, there is no evidence of the production of Chicoid pottery at Jamaica. In the Virgin Islands the white or buff pottery appears to be older than LCAWW from Hispaniola, which is striking, because it does not confirm the reigning view on LCAWW (see above). The information from Ken Wild on white pottery in the Virgin Islands and a conversation with A. Boomert (Leiden University) led me to explore other avenues that can provide insight in the (his)tory of LCAWW.

The first avenue took me to St Croix, where Meredith Hardy observed a pale yellow, chalky-white ware. First at the archaeological site of Judith's Fancy (Hardy 2007), later at Salt River, Sprat Hall and River while she was studying the Vescelius Collection from Yale University (Hardy 2008, 199). Chalky ware is quite thin (3.6-6 mm), and consists mostly of incurved, sometimes carinated vessels. This type of pottery occurs from the Coral Bay-Longford phase onwards, which is the Crucian variant of Cedrosan Saladoid and is dated to ca. AD 400 to 600 (Hardy 2008, 80). Compositional analysis shows that chalky ware from Judith's Fancy mostly contains calcite and calcium carbonate (Hardy 2008, 199). It is hypothesised that it is made with "locally mined calcium carbonate derived from Tertiary marls and limestones found in the central part of the island" (Faber Morse 2009, 164).

Figure 17: Chalky wares and smoothed-burnished wares from the Salt River site in St. Croix, Early Saladoid period (Hardy 2008, 200).

St. Croix is not the only island where a ware similar to LCAWW has been identified. Charles Hoffman encountered a comparable phenomenon at Antigua, which he (tentatively) termed "Yorkstead series (Hoffman 1970; 1979). Hoffman studied ceramics excavated at the Mill Reef Colony on the southern coast of Antigua. Next to the dominant (Mill Reef) pottery series, he observed the presence of white ceramics that represented a minority of the assemblage. Hoffman (1979, 43) described the Yorkstead series as having a chalky, but hard paste with a white colour throughout. The surface colour is also white, with a smooth texture and a sleek appearance. The vessel types are probably hemispherical bowls made with a coiling technique, no decoration was observed. Hoffman (1979, 43) states that the temperless nature of the paste is the most diagnostic trait of this type of pottery. He proposes a date between AD 800-1000 for this series. José Oliver also reported the rare occurrence of a kaoline white paste at the (Cuevas-style) site of Lower Camp, Culebra. This paste was always associated to necked bottles/jars that resembled early Cedrosan shapes (Oliver 1995, 492). Finally I want to mention the occurrence of rare white type of pottery on Puerto Rico. It is made of what has been called "ivory clay" and is linked to the Early Elanan Ostionoid (Gutiérrez *et al*. 2009; Maíz López 2002; Pers. comm., A. Boomert, April 2021).

2.5 Summary

Against this background we can conclude that the reigning view on the phenomenon of LCAWW in the Caribbean has to be adjusted. The spread of LCAWW in the Caribbean can be related to multiple and diverse processes. Firstly, the colonising practices of Chicoid communities from Hispaniola have to be taken into account. Secondly, there is the special situation on Jamaica, that is not directly incorporated in the Chicoid influential sphere through colonisation and where LCAWW seems to be locally produced. The occurrence of LCAWW related to Ostionoid and Meillacoid style on Jamaica, points towards the fact that this type of pottery was not just involved in processes of mobility and exchange across the islands, it was also part of a network of shared ideas. This may fit within a larger framework of the sharing of ideas and beliefs between Jamaica and nearby islands, as has been observed through the study of wooden artefacts, petroglyphs and pictographs (Keegan and Hofman 2017, 195). Thirdly, the occurrence of white pottery with similar characteristics on various other islands before the emergence of the Chicoid ceramic series on Hispaniola, points to the fact that the temporal axis also has to be taken into account. Chalky ware, Yorkstead series and ivory clay was already present in ceramic assemblages of pre-colonial communities before the emergence of the Chicoid series. The earliest date so far for the first occurrence is between AD 400 and 600 on St. Croix. Other islands such as Antigua, Puerto Rico and Culebra also have an early date for this type of pottery. It is unclear how these types of pottery are related, both among themselves and to LCAWW. Further research is needed to find out whether this phenomenon can be considered as a returning factor from the Late Saladoid period onwards, which had its culmination in the Chicoid series of Late Ceramic Age Hispaniola.

The understanding of LCAWW in Hispaniola itself also has to be revised. The connection with *caciques* and social elites does not hold. The excavations at En Bas Saline clearly show the presence of LCAWW in both elite and non-elite contexts, as well as burial, residential and ritual/feasting contexts. Next to that the bottles are traditionally seen as water containers, while starch-grain analyses pointed out that they were (also) used for storing and serving both fermented and energetic liquids. In this chapter I have proposed alternative avenues for approaching the phenomenon of LCAWW and its connection to *potizas*, slip and paint. On the one hand more *potizas* might have had a whitish look. On the other hand, the whitish look might not have been the final result the potter was going for. Nevertheless, the colour white is strongly affiliated with LCAWW and remains its most defining characteristic.

LCAWW seems to have been involved in processes of mobility and exchange over time, but the nature of these processes remain unclear. In the following chapters I will try to create a framework for LCAWW on Hispaniola as a first step in the process of comprehending this phenomenon and the related social interactions in more detail.

3. Theoretical and methodological approach

3.1 Theoretical approach

3.1.2 Technology as a basis for symbolical interpretation

The most distinctive characteristic of LCAWW is its colour. The white or whitish element that is so typical for this type of pottery causes it to stand out in comparison to the rest of the ceramic assemblage. The influence that the presence of the colour has on our sensory perception is so strong that it is taken up in the name proposed to address for this type of pottery (see chapter 2). Assessing the presence and importance of colour is one thing, relating it to (symbolical) meaning is something entirely different. Some generalities in the perception of colours have been observed worldwide. Victor Turner (1967, 89) saw a clear relatedness between the significance of colours and body fluids. According to him, there is a universal experience that connects the perception of the colour white with semen and milk and is therefore connected to the act of mating between men and women, and to the tie between a mother and her child. Wierzbicka (1990) believes the significance of colours is to be found in their association with phenomena of the lived world. She proposes a universal relatedness between white and elements related to the phenomena of the day as opposed to black which is related to the night. Similar thoughts can be find in our modern understanding on Amerindian religion. The Amerindian believe system has an animistic nature. The colour white is related to the 'Sky World', which is inhabited by positive spirits, has male associations and is linked to semen and the sun among others (e.g. Boomert 2000; Roe 1982; 1987; Stevens-Arroyo 1988). A general approach to the meaning of colours can be useful because some aspects of the significance of colours can be naturally constituted. On the other hand colours' meanings are culturally constructed and can only be understood within their specific context (Sahlins 1976, Jones and MacGregor 2002).

When applying (archaeological) methods we must be aware of the fact that material assemblages do not simply represent past realities which are just laying around waiting to be rightfully interpreted by us. Observations happen in the here and now and are influenced by our own perceptions of the world (Shanks and Tilley 1987). There is a difference in the way people see material culture. We can observe the same thing, but have a different understanding of what we perceive. I can see that these ceramics are white or whitish, but my mind does not automatically make the same connection as someone else's. Durkheim (1976 [1915]) saw a distinction between sensations and representations as an explanation for (cultural) differences in perception. Sensations are private and individual, while representations are public and social. Durkheim believed that the individuality of perception is overcome through communication between individuals by means of the sharing of a stable system of concepts. These concepts are usually thought to exist within the sphere of linguistics. In a similar way the material world has been conceptualised as a signification system that is to be read as text. Following Ferdinand de Saussure's structural linguistics, archaeologists started to think of artefacts as signs (Hodder 1982, Shanks and Tilley 1987, Tilley 1991). Signs are made up of a signifier, the signified and the unity between the two which is culturally determined (Jones 2007, 14). However, this approach to material culture can create a division between the body, existing in the outside world, and the mind that objectifies the world out there (Ingold 2000). Body and mind are essentially two sides of the same coin, therefore the body should not be regarded as a conduit for sensations, but as a subject of perception (Merleau-Ponty 1962).

According to Tilley (1999) speech does not merely mirror the world, it is an extension of the human body in the world, through which we gain understanding of it and alter it. He believes tropes and specifically metaphors, are key to this process as they lay the foundation for an interpretative understanding of the world. Material or image metaphors, related to the meaning of material culture, usually symbolize in a non-arbitrary way, e.g. using the colour red for blood and white for semen or milk (Tilley 1999, 265). When talking about material metaphors, the questions "What does this artefact mean?", "What does this artefact do?" and "Why was this artefact chosen rather than another" are closely related since artefacts are not just communicating, but actively participating in the world as an agent of various possible kinds (Tilley 1999, 265). Christopher Tilley states that if we want to start thinking about answers to these questions then we have to understand the artefacts within their actional and biographical contexts (Tilley 1999, 264). Furthermore, the significance of artefacts might be effected by their material properties (Jones 2007, 19). In relation to the (artefactual) colour of material culture it has been posited that it is used metaphorically as a mode for revealing unities between their properties (Jackson 1996, 9). These elements point to the fact that there is a technological and material basis that is underlying the symbolic aspect of a type of artefacts and their colour. By looking into the technology that is used during the manufacturing of the artefacts we can form a baseline to start our interpretations from. Besides providing insight on a symbolical level the study of technology can also be used to look at the sharing of these ideas. The (metaphorical) meaning of a thing or an artefact works at the level of connotation according to particular cultural conventions (Tilley 1999, 270). These conventions cannot be readily analysed through archaeological methods, but through the study of technology affiliation/differentiation processes or boundaries between social groups can be identified and used as a proxy for the sharing of ideas (Stark 1998).

The methodological framework that was chosen here is the *chaîne opératoire* approach which is related to anthropology of technology (Lemonnier 1992). First of all, the *chaîne opératoire* approach looks at the properties of the artefacts and how or why they differ by comparing every step of the manufacturing process in detail. Secondly, it has been proven through ethnoarchaeology that this approach is very useful to identify social boundaries based on artefact analysis (e.g. Dietler and Herbich 1994, Gosselain 1992, Stark 1998). The combination of these two elements within the approach means that it allows for the study of technological properties of LCAWW as a basis for its meaning on a symbolic level and that it can provide insight on the sharing of these ideas as they relate to social groups. Another important element besides its aptitude for this study is the fact that it is compatible with other research in the area. This theoretical framework is also being used by other researchers working in Hispaniola (see chapter 4). Using the same approach will make it possible for future research to achieve an overarching view of the situation on the island relating to the production of ceramics with the inclusion of LCAWW. Before I continue explaining what this approach exactly involves, I will first discuss the reigning view on ceramic analysis in Caribbean archaeology that was incorporated in the classification system of Irving Rouse. The approach of Rouse also relates artefact analysis to social boundaries, but does so in a different way and on a different level. I believe it is important to give an overview of his ideas, how they were applied and received and how the *chaîne opératoire* approach counters these critiques.

The main alternative for Rouse's system in Caribbean archaeology is based on the identification of so-called "*modos de vida*" or ways of life (Keegan and Rodríguez Ramos 2004). This paradigm was developed by Dominican archaeologists, such as Marcio Veloz Maggiolo (1984; Veloz Maggiolo and Pantel 1988). It was a reaction of Spanish-speaking archaeologists related to the Latin American School of Social Archaeology on the classificatory approach of North American archaeology, represented by the culture-historical system of Irving Rouse (Bérard 2019, 53). Their reaction meant a shift towards the internal social dynamics of societies. They did not believe that the classificatory approach towards culture provides a truthful image of the social dynamics present. Therefore they looked into the particular social relations specific to different ways of life which existed as expressions of variations on the general social formation (Ensor 2000, 16). They were based on Marxist theory, using a three levelled system consisting of cultures, lifestyles and socio-economic formations to form general descriptions of societies (Bérard 2019, 53). Although this also posits an interesting way to go forward, I chose to expand on Rouse's system instead, as the link with the *chaîne opératoire* approach is more clearly present.

3.1.2 The classification system of Rouse

Benjamin Irving Rouse (1913 – 2006) was an American anthropologist-archaeologist who worked in the Caribbean region during his whole academic career. He completed his doctoral dissertation on the prehistory of Haiti at Yale University and published his findings in 1939 and 1941. In these works Rouse developed a taxonomy for prehistoric Haiti based on the analysis of archaeological artefacts. Over the decades he expanded his chronology to the other Caribbean islands building further on the classifications that he developed through his modal analysis, with an emphasis on ceramics. By examining archaeological assemblages Rouse inferred the adjoining cultural customs, which according to him collectively make up culture (Rouse 1986, 4). Rouse was mostly occupied by arranging these cultures in time and space across the Caribbean area, trying to deduce the processes of migration and diffusion underlying them. This resulted in a time-space diagram representing the presence of cultures and their dispersal in the Caribbean, based on the traits he deemed emblematic for certain cultures (Rouse 1992).

Rouse used two concepts which he named "modes" and "types" as the basis for his analysis to describe cultural traits. By using these two concepts he believed that he separated the cultural factors from the non-cultural factors, which together influenced the Artisan's procedure and the resulting artefact (Rouse 1939, 19; see figure 18). The term "mode" refers to each individual attribute that has been observed in the artefact analysis. The term "type" refers to the attributes which artefacts of a given kind have in common; it is the resulting pattern of attributes which have been obtained by classifying the artefacts. Each type consists of a list of attributes which characterize the type group. An important remark is that types only indicate designs and specifications which appear on the artefact, while modes also involve techniques of manufacture (Rouse 1939, 11-12). Rouse used types and modes to determine cultural traits, but he did not see them as being equal to culture, as he himself states and further explains in his dissertation (Rouse 1939, 15-23):

"*1. Culture does not consist of artifacts. The latter are merely the result of culturally conditioned behaviour performed by the artisan.*

2. Types and modes express the culture which conditions the artisan's behavior. Types are stylistic patterns, to which the artisan tries to make his completed artifacts conform. Modes are community-wide standards which influence the behaviour of the artisan as he makes artifacts.

3. Artefacts are concrete objects. Types and modes, on the contrary, are conceptual patterns set up by the archaeologist to represent ideas possibly held by the artisan"

(Rouse 1939, 15)

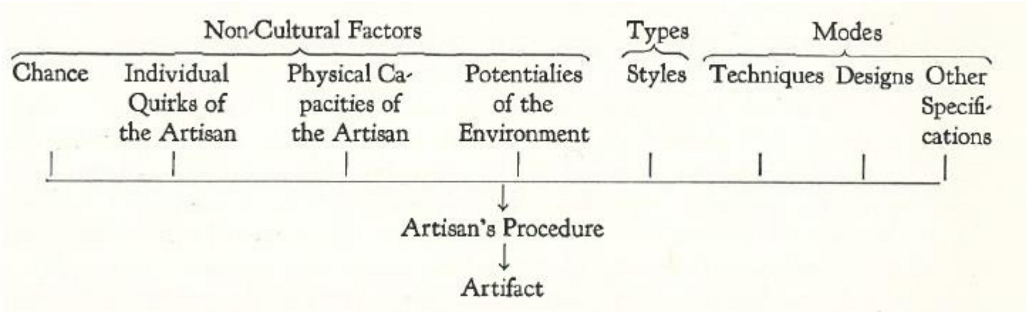


Figure 18: Overview of the non-cultural factors and the cultural factors represented by types and modes, that influence the artisan's procedure and the resulting artefact in the frame of the modal analysis developed by Irving Rouse (Rouse 1939, 19).

Rouse categorised the prehistoric peoples and cultures of the Caribbean in a three-level order. In order to do so he relied mostly on their ceramics, since it makes up the biggest part of the archaeological assemblage in the Caribbean. Based on his modal analysis he identified local ceramic styles which he grouped into subseries and on an overarching level in regional series, which he subsequently organized in a hierarchical way. The names of the series have the suffix *-oid*, the subseries have the suffix *–an*. They are named after the first site where the style was found (Rouse 1986, 1992: 33)

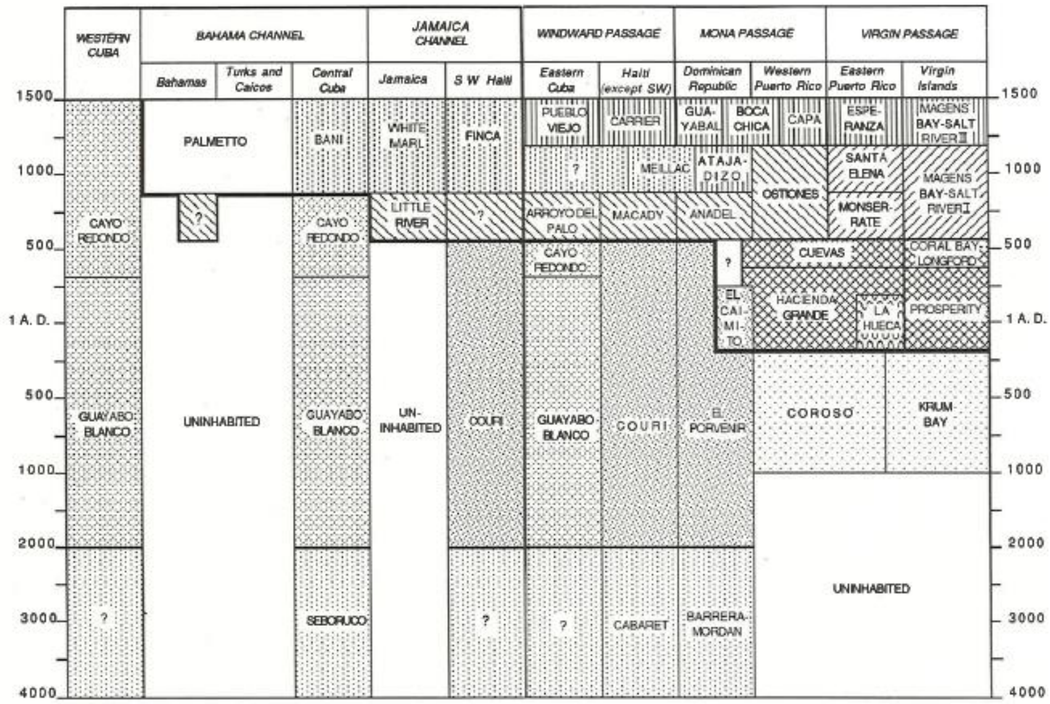


Figure 19: Rouse's chronology of the peoples and cultures in the Greater Antilles (Rouse 1992, 52).

The classification system of Rouse which culminated in his work on “the people who greeted Columbus”, who he named Taino (Rouse 1992), is still the reigning paradigm in Caribbean archaeology today. However, it received a lot of criticism. Firstly, there were new archaeological findings which made clear that the classification system does not capture the whole archaeological frame. Examples of these discoveries are the ceramic assemblage of El Caimito in the Dominican Republic (Veloz Maggiolo *et al.* 1974), the archaeological assemblage found at the site of Sorcé/La Hueca in Puerto Rico (Chanlatte-Baik 1981, 2013) and the discovery of a pre-Arawak pottery horizon in the Antilles (e.g. Rodríguez Ramos *et al.* 2008; Ulloa Hung and Valcárcel Rojas 2019). A second critique is based on the fact that the archaeological discipline itself also develops and changes over time. By the 1960s the interests in archaeology had shifted away from the focus on diffusion and migration that was typical for Culture History and Rouse's system. By the time post-processual archaeology became part of the archaeological perspective, the classification system did no longer provide the means to answer the type of questions that were treated in archaeological research. Pestle *et al.* (2013) give a clear overview of critiques that have emerged over the last thirty years which go beyond a mere revaluation and adjustment of the classification system. Pestle *et al.* (2013, 250) provide six points of critique, drawing from the problems researchers have encountered with the modal analysis over the years:

1) Its focus on only one class of material culture: pottery

2) Its normative perspective

(3) Its troublesome correlation of local pottery manifestations with distinct notions of group identity and super-structural processes

4) Its tendency to ignore the social aspects of phenomena and processes

5) The inaccuracy of the homogenous groups created

6) The unfounded assumption of the presence, at any one time and place, of only one culture

(Pestle *et al.* 2013, 250)

In order to overcome these problems they propose a rejection of the culture-historical assumption in which patterns of attributes identified in a material assemblage mirror archaeological cultures, which subsequently can be grouped into homogenous temporally and geographically restricted boxes (Pestle *et al.* 2013). We have to emphasize differences and be aware of processes like hybridization and the plurality of things. We have to see the past as a flux whose identified phenomena often fit multiple of our constructed archaeological boxes or maybe even none of them (Keegan and Hofman, 2017; Pestle *et al.* 2013). These critiques are not only applicable to the Greater Antilles, but are also relevant for the Lesser Antilles (Bérard 2019). What was presented here is just a summary of the many critiques that have been directed towards the classification of Rouse (see for example Curet 2003; Petersen *et al.* 2004). Important to note is that a large part of the critiques are related to a shift of focus towards the nature of social relations.

3.1.3 The chaîne opératoire approach

The term "*chaîne opératoire*" was introduced by the French archaeologist-anthropologist André Leroi- Gourhan in 1964. He posited that social structures and belief-systems can be understood through the study of technology as human behaviour is characterized by *chaînes opératoires* or operational sequences (Leroi-Gourhan, 1964). Originally the term referred to the operational sequence of the manufacturing process of lithic artefacts as it was put into practice by Tixier (1967) to study prehistoric technology. Over the years the term was also applied to other material categories and Leroi-Gourhan's thoughts heavily influenced the development of a methodology for the study of techniques (Stark 1998, 5). In the following decades the *chaîne opératoire* approach became instituted within archaeology because of promising results of studies in the domains of anthropology of techniques and ethnoarchaeology (e.g. Balfet, 1981; Creswell, 1983; Dietler and Herbich, 1994; Gosselain, 1992; Latour and Lemonnier, 1994; Lemonnier 1992). *Chaîne opératoire* studies look into the operational sequence of the manufacturing process of material culture. The technological transformation of nature into culture, of raw materials into a man-made product is mediated by culture. Material culture is the materialisation of beliefs and values through the use of technology. These beliefs and values in turn influence the choices an artisan makes along the manufacturing process (Dobres 2010, 106). The *chaîne opératoire* approach goes beyond aspects of function and style as technical behaviours are full social productions (Gosselain 1998, 78). "… at the group level, technical practices are considered as social facts, made in accordance with social strategies and meanings, their underlying and embedded representations fitting into a wider symbolic system (Roux *et al*. 2017).

An important aspect of the approach draws from the theoretical work of Bourdieu (1977, 1980) on *habitus* (Dietler and Herbich 1998, 246). According to Bourdieu people develop a system of practical correspondences as an answer to the material conditions of their environment. These dispositions are the translation of objective social structures into embodied social structures or *habitus* (Bourdieu 1984, 467; Lizardo 2004, 394). Patterns of social activities, such as those of a technical nature, can appear to be following rules due to the dispositions of choice that are inherent to the actor's *habitus*. Therefore *habitus* "involves the development through practice of 'tendencies' and cultural perceptions of the limits of the possible in patterns of choice at all stages of *chaînes opératoires* (Dietler and Herbich 1998, 246). The dispositions are also socially acquired and passed on through social learning (Dietler and Herbich 1994, 465; Lave and Wegner 1991). Through the relationship between tutor and student the dispositions are passed on. When the learning process is finished the skills the tutor taught the student have become embodied dispositions (Dobres 2000; Gosselain 2000; Ingold 2001). On a collective level the dispositions, the way of doing things, are shared by individuals within groups reflecting social ties (Roux 2016, 102). Material culture patterning on the level of technological choices can be seen as a reflection and indicator of social boundaries (Stark 1998).

While technical practices are considered to be social facts (see above), social boundaries are not, or rather should not. "Social boundaries are abstractions and ideological constructs, recognized differently and for different reasons by people on the basis of their perceived identity, interests, and social context" (Goodby 1998, 161), social boundaries are not social facts but social constructs (Hegmon 1998, 272). The nature and structure of groups with shared dispositions or ways of doing is not only highly variable, it can also change over time (Roux 2016, 102). Archaeology is better suited for recognizing social boundaries than for understanding the specific content of these bounded units (Hegmon 1998). Therefore, when looking at differentiations and affiliations in *chaînes opératoires* of social groups in this study, I do not relate my findings to heavily loaded – and often misused or misunderstood- terms such as ethnicity or culture. Instead, through the study of *chaînes opératoires*, I will look at the existence or non-existence of social boundaries relating to LCAWW and connect them to the existence or non-existence of a network of contact and exchange, either of knowledge or of goods.

The focus of the *chaîne opératoire* approach on variability and the detailed level of analysis (Dobres 1999) can provide an answer to many of the problems posited by Pestle *et al.* (2013) concerning ceramic analysis in the tradition of Irving Rouse (see above). While Rouse did use some technical attributes of ceramic manufacture in his approach, he did mostly rely on ceramic style (see Hegmon 1998) for his classification of cultures. Of course there is also the fact that this study does not aim at making cultural classifications based on pottery as Rouse's did or turned out to do. It does aim at revealing a communal ground for the symbolical meaning and the cultural perception of one type of pottery through the study of its technology. In this sense the *chaîne opératoire* approach allows us to form a basis for understanding the meaning of the phenomenon of LCAWW on the island of Hispaniola. Next to that it can provide insight on the social relations of the people based on the affiliation and differentiation of the manufacturing techniques used for the production of this specific type of ceramics, which is only one of the many elements that (possibly) made up their identity.

3.2 Methodological approach

3.2.1 The ceramic *chaîne opératoire*

The ceramic *chaîne opératoire* consists of two levels (Roux 2016). The first level, following the theoretical outline offered by Creswell (1976, 13), includes the seven different steps in the manufacturing process from raw material to fired vessel: collecting raw materials, preparing raw materials, fashioning, finishing, surface treatment, decoration, and firing (Roux 2016). The second level as proposed by Lemonnier (1983) describes in detail the various *chaînes opératoires* or operational sequences of each of the steps from the first level. The first level follows a universal order of production steps, the order of the steps is seen as natural for everyone who makes ceramic vessels. The second level on the other hand is variable. It is at this level that we see cultural differences and preferences through the use of different *chaînes opératoires* (Roux 2016, 103). The classification of assemblages using the *chaîne opératoire* concept is based on three different aspects relating to the production of ceramics: composition, used manufacturing techniques and the morphological and stylistic aspects of the vessels (Roux 2019, 217). This roughly relates to the three main aspects of the production process of a vessel: first the acquisition of raw materials and the preparation of the paste (composition, step 1 and 2), secondly transforming the clay (manufacturing techniques) and thirdly the final and finished result (morphological and stylistic aspect). I used macroscopic fabric analysis and ceramic petrography to analyse the composition, macroscopic trace analysis for the main part of the manufacturing techniques and macroscopic analysis following the Leiden Codebook for Ceramics to look at the morphological and stylistic aspect. The reconstruction of the *chaîne opératoire* took place after the gathering of the necessary data through these methods. The classification using this concept follows three successive stages of grouping: by technical groups, by petro-technical groups and by techno-morphological and stylistic groups (Roux 2019, 217). It must be noted that this is confined by the nature of the archaeological assemblage, since not every sherd contains the diagnostic traits for reconstructing the whole *chaîne opératoire* and secondly that the reconstruction of the whole *chaîne opératoire* depends on the examination of different parts of the vessel (Roux 2019, 218). In what remains of this chapter I will explain the used analytical methods in detail. They will be treated according to the specific aspect of the ceramic manufacturing process they provide insight to. I will start with the morphological and stylistic aspect, followed by the compositional aspect and lastly the manufacturing techniques. I will conclude by giving an overview of how these methods were exactly put into practice during this study.

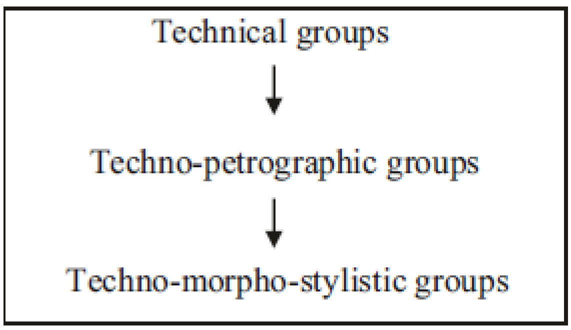


Figure 20: Classification procedure of ceramic assemblages following the concept of chaîne opératoire (Roux 2019, 218).

3.2.2 Morphological and stylistic elements

The first step involved the documentation of basic characteristics following the Leiden Codebook for Ceramics (Hofman, 2005). The codebook was developed by C. L. Hofman for analysing ceramics in the Caribbean region and is still used during the excavations in the Caribbean under her supervision. Usually the Leiden code book for ceramics focusses on thirteen different attributes which are related to morphological, stylistic and technological treatment applied during and after construction of the ceramic vessels (Hofman, 2005). Because the *chaîne opératoire* approach requires an in-depth method of analysis of the manufacturing techniques I left out the attributes of the code book that relate to the technological aspect of ceramic production and applied a different method to study these elements (see below). The remaining attributes I looked at are: general vessel shape, wall profile, lip shape, rim profile, wall thickness, diameter, colour of the inside and colour of the outside. Next to that I also added decoration to this list for more insight on style. The code book is usually only applied to sherds larger than five cm, given the relevance of size in morphological analysis. However, in this study I also looked at attributes of smaller sherds when relevant information could be retrieved. The sherds were weighed in order to get an idea of their proportional occurrence in comparison to the total excavated ceramic assemblage.

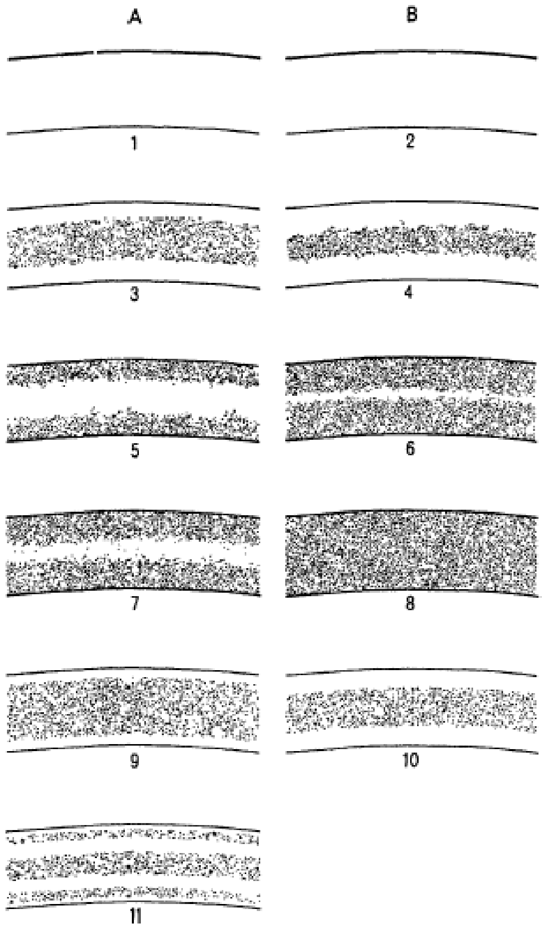
3.2.3 Composition

This composition of the assemblage was studied through the combination of two methods: macroscopic fabric analysis and ceramic petrography. Macroscopic fabric analysis provided a first understanding of the compositional variability of the ceramic assemblage. The insights of this method were used as a basis for the petrographic analysis which allowed us to study the composition of sherds in more detail. Both methods focus on the same characteristics of sherds, being the ceramic matrix, the microstructures and the inclusions present; therefore the build-up of the analyses are similar. A lot of attributes are used both in macroscopic fabric analysis and ceramic petrography and both analyses resulted in a grouping which is (mostly) determined by their composition. Although the attributes they study are similar, they approach them on a different scale. While the first analysis was carried out with the naked eye, a magnification loop (x20) and a Dino Lite microscope, the second one involves the use of a petrographic microscope (see below). Furthermore both methods have a destructive nature.

3.2.3.1 Macroscopic fabric analysis

The macroscopic fabric analysis was divided in two parts: one relating to firing temperature and conditions and one relating to inclusions present. The main characteristics for the first part are colour, hardness, fracture and feel (Orton and Hughes 2013, 72). The observations concerning the inclusions present in the fabric relates to their identification and their textural parameters (Orton and Hughes 2013, 75-76). According to the observed features the samples were grouped in fabrics. In order for the analysis to be reproducible and for non-participants to understand the reasoning behind the groupings, a fixed structure was used. This structure is represented by the macrofabric analysis form (see appendix 1) provided by Martina Revello Lami from Leiden University. The analysis had to be performed on a fresh break in order to obtain representative characteristics and descriptions, therefore a piece of the sherd was cut off with a pair of pliers. The relevance of the analysed characteristics are explained here.

The colour of the sherds were determined according to a Munsell Soil Colour Chart (MSCC) generally used for the determination of soil colours in geology. The MSCC allows for the use of standardized neutral terms for colours instead of personal and unclear terminology. The colour of a sherd depends on the presence of organic carbon and iron and how it is distributed within the clay; and the firing conditions (Orton and Hughes 2013, 73). There are two firing atmospheres: reduced and oxidized. A reducing atmosphere means there was no (or few) oxygen present during the firing process, an oxidizing atmosphere means there was much oxygen. The colour of the sherds will be determined at 4 zones: the inner surface, the outer surface, the core, and the margins. Differences between these zones give an indication of properties of the firing process (Orton and Hughes 2013, 73). Another aspect of colour is related to the possible addition of a slip or glaze on the surface, which colour may differ on the original surface of the vessel (Rice 1987, 336). Figure 21 was used to relate the determined colours with the firing atmosphere.



1. Oxidized, organics not originally present; no core
2. Oxidized, organics may or may not have been originally present; no core
3-4. Oxidized, organics originally present; diffuse core margins
5. Reduced, organics not originally present; diffuse core margins
6. Reduced, organics not originally present; black or grey may extend completely through the wall leaving no 'core'
7. Reduced, organics originally present; diffuse core margins
8. Reduced, organics may or may not have been originally present; no core
9-10. Reduced, cooled rapidly in air; sharp core margins
11. Reduced, cooled rapidly in air; reduced and cooled rapidly in air again; sharp core margins, 'double core'

Figure 21: Stylized cross sections comparing variations in the appearance of firing cores in fine-textured clays (Column A) and coarse-textured clays (Column B) (drawing by Winifred Munford, from Rye 1981, fig. 104).

The hardness of a sherd is related to the durability and serviceability of a ceramic. The hardness of a ceramic is its resistance to mechanical deformation. It is related to the firing conditions, the impurities present, microstructural features and surface treatment. The hardness of a ceramic increases with the firing temperature. The hardness of ceramics is generally determined according to Mohs' scale. This scale uses 10 minerals with an increasing hardness ranked from 1 (talc) to 10 (diamond). The hardness correlates the number of the mineral that leaves a barely visible scratch on the sherd (Rice 1987,354-357). Because these minerals are not readily available, alternative techniques and materials will be used alongside a modified Mohs' scale (See table 5).

Table 5: Modified Mohs' scale for hardness (Adapted from Peacock 1977, 30)

Modified Mohs' scale for hardness	
Very soft	Easily scratched with fingernail, deep indentation
Soft	Scratched with fingernail, indentation
Hard	Scratched with penknife, indentation
Very hard	Cannot be scratched with penknife, no indentation

The third aspect that relates to the firing temperature of a vessel is the fracture, the way in which a sherd breaks. Orton and Hughes (2013) distinguish between four types of fractures: conchoidal, smooth, hackly and laminated. A conchoidal fracture is characterized by ripple marks. Smooth fractures do not have these ripple marks. The term hackly means that there is a rough fracture surface visible. Laminated fractures are characterized by small layers (Orton and Hughes 2013, 74). The last characteristic of the fresh break relating to the firing process of the vessel is the feel of the surface, which is established through finger touch. There are 5 types of feel: harsh, rough, smooth, soapy and powdery (Orton and Hughes 2013, 74-75).

The second big topic of macroscopic fabric analysis relates to the inclusions present (and visible) in the fresh break. Inclusions are considered as everything present in a fabric that is not a clay mineral. Naturally occurring clay deposits are generally not found to be pure, mono-mineral deposits. They contain a mix of minerals consisting of their parent rock material, weathering products other than clay or minerals coming another source through the process of erosion and deposition. The interesting inclusions here are the non-plastic relatively large particles in the clay body (compared to clay minerals, colloids, and organics present). These can either be naturally present or added by the potter in order to modify the properties of a clay (Rice 1987, 72). The addition of inclusions generally reduces the plasticity of the clay. Potters use(d) temper of all different kinds, from crushed shells and recycled ceramic sherds (grog) to dung (Rice 1987, 406). I focussed on two aspects: the identification of the inclusions and their textural parameters (Orton and Hughes 2013, 75-76). Firstly, the non-plastics in general were considered, more specifically their overall frequency, sorting, shape and size. The overall frequency is measured according to frequency charts and given a frequency label ranging from very rare (<0.5%) to predominant (>70%) (see table 6 and figure 22). The possibilities for sorting are well sorted, moderately sorted, poorly/badly sorted and very poorly/badly sorted (see figure 23). Possible shapes are angular (a), sub-angular (sa), rounded (r), sub-rounded (sr) (see

Figure 24). The size of the non-plastic inclusions is determined according to table 7, ranging from fine (0.1 – 0.02 mm) to coarse (> 2.0 mm) (see table 7).

Table 6: Frequency labels (adapted from Whitbread 1995, 379).

Frequency labels	
Predominant	>70%
Dominant	50-70%
Frequent	30-50%
Common	15-30%
Few	5-15%
Very few	2-5%
Rare	0.5-2%
Very rare	<0.5%

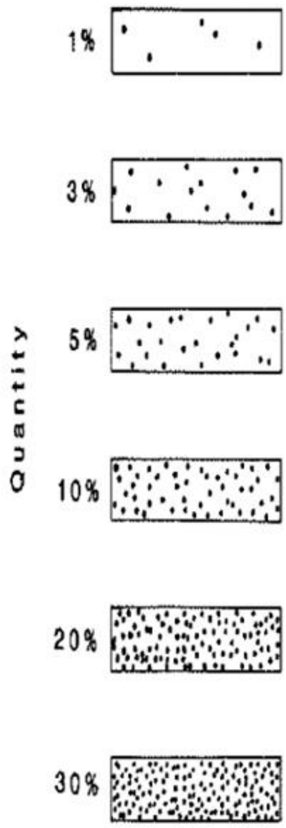


Figure 22: Example of a reference chart for determining the frequency of inclusions (Rice 1987, 348).

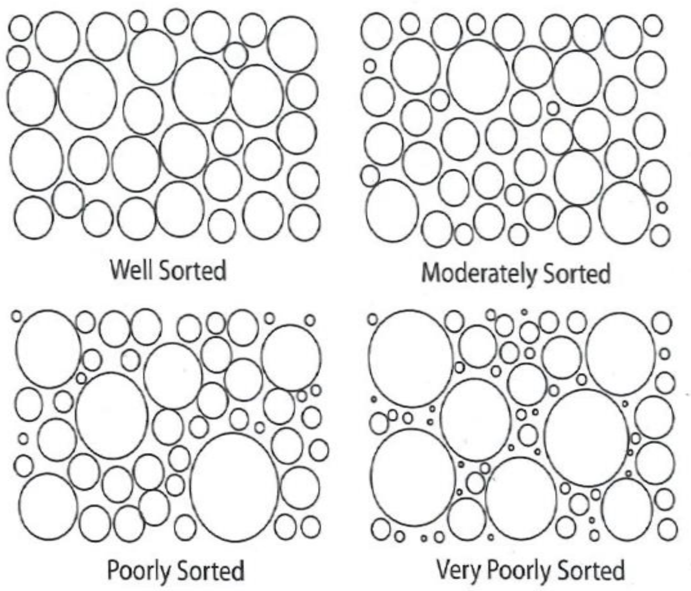


Figure 23: Indication of the different degrees of sorting of inclusions in ceramics (Quinn 2013, 87).

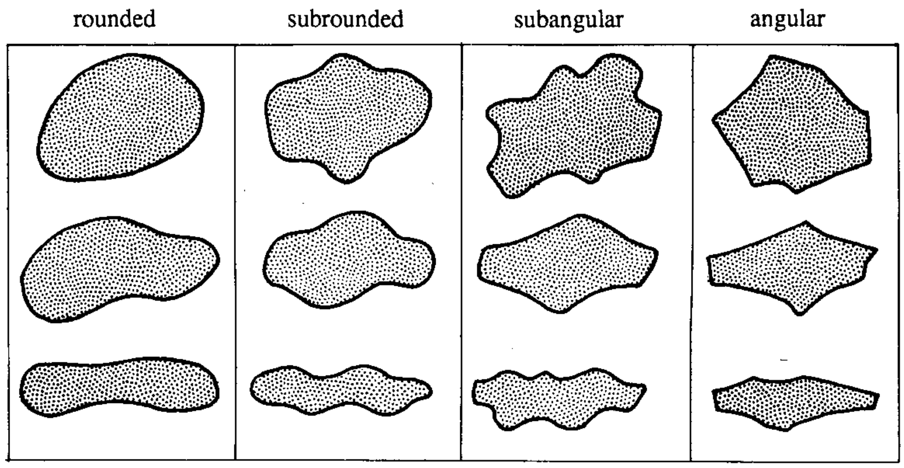


Figure 24: Chart used to estimate shape and rounding of grain (Courty et al. 1989, 69).

Inclusion size	
Fine	0.1 - 0.02 mm
Medium	0.5 - 0.1 mm
Coarse	2.0 - 0.5 mm
Very coarse	>2.0 mm

Table 7: Inclusion size and corresponding labels (adapted from Stoops & Eswaran 1986: 86)

Subsequently the features of the non-plastics were determined by looking at the individual types of inclusions. A distinction was made between coarse non-plastics and fine non-plastics. For each type the frequency, colour, shape and appearance was identified separately. The identification of these characteristics followed the same procedure as mentioned above. Next to that a preliminary identification of the inclusions was provided if possible. These identifications were only used as indications for the inclusions present in the fabric. The actual identification of inclusions was based on ceramic petrography (see below).

The final element of the macroscopic fabric analysis was porosity. According to Rice (1987, 231) “porosity refers to the presence of pores or spaces within the wall, which allows liquid to move through the wall once it has penetrated either surface”. It affects a wide range of properties such as weight, strength, permeability and insulation. Porosity of clay pastes is often caused by the formation of air bubbles during the preparation of the paste and the production of ceramics as a whole. Pores are formed during the drying and firing process through the loss of structural water. Next to that they also come to be through the burning out of organic and calcareous matter present in the matrix, post-depositional processes, during the use-time or during the preparation of the clay (Quinn 2013, Rice 1987). The characteristics of the voids that were determined are frequency, shape and orientation.

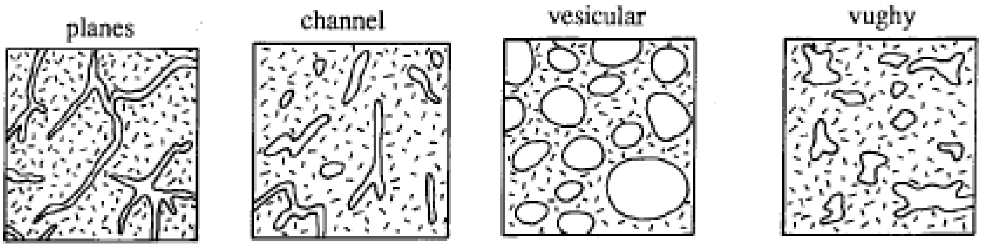


Figure 25: Main types of voids (Adapted from Courty *et al*. 1989, 72)

Description of voids	
Planar voids	Linear in thin section, but planar in three dimensions –width is variable-, frequent sub-angular changes in direction may be noted
Channels	May be linear in thin section but are cylindrical in three dimensions
Vughs	Relatively large, irregular voids
Vesicles	Regular in shape with smooth surfaces

Table 8: Description of voids in ceramics (Adapted from Whitbread 1995, 380)

3.2.3.2 Petrography

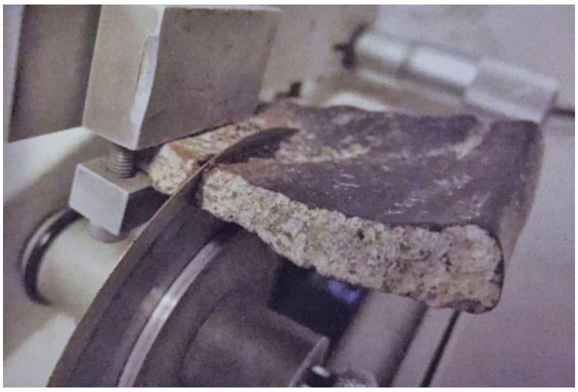


Figure 26: Cutting off a chip from a ceramic sherd in order to make a thin section (Quinn 2013, 24).

Analysing ceramics with a petrographic microscope requires the preparation of the samples in thin sections. A thin section is a 30 µm slice of a ceramic sherd that has been fixed onto a glass microscope slide (Quinn 2013, 4). First a small "chip" is sawed off the sherd in the direction that the researcher wants to analyse. Next the chip is drizzled with epoxy, which fills the voids present in the chip. After the absorption of the epoxy, the chip is polished to create a smooth and flat surface that is to be bonded onto a microscope slide. Often carborundum is used as abrasive for polishing. The bonded sample has to be reduced to the thickness of 30 µm. This happens by cutting pieces of the sample and grinding it until the correct thickness has been reached (Quinn 2013).

Thin sections are analysed through a petrographic microscope, which contains two polarizers. One polarizer is placed right in front of the light source coming from below the sample, polarizing the light in a certain way (see Figure 28 and 29). This means that only light having a specific directionality passes through this polarizer. This one-directional light passes through the thin section from beneath and is again scattered in all directions because of optically anisotropic structures in the thin section. Before reaching the eye of the observer the second polarizer polarises the light again. The second polarizer is installed perpendicularly to the first polarizer. This way the second polarizer blocks the light direction that was able to pass through the first. Due to the fact that this second polarizer is removable, we are able to switch between two different polarising modes. When only one polarizer is used this is called the plane polarized mode (PPL), because only plane polarized light reaches the eye of the observer. Using both polarizers is called the crossed polarized mode (XP) (Whitbread 2017, 205). Both light conditions provide different tools for the identification of characteristics of the sample. The main elements of the thin sections that were analysed are the microstructure, the clay matrix and the inclusions present. These elements were analysed following the methodological outlines provided by Braekmans and Degryse (2017) and Quinn (2013), who drew from the descriptive method of Whitbread (1995). The characteristics of each sherd were described on the basis of form designed for petrographic analysis of ceramics (see appendix 1). The form is based on the method of Quinn (2013) and a worksheet by Simone Casale, this for the sake of uniformity in petrographic analyses carried out by the Caribbean research group at Leiden University/KITLV.

Figure 27: A polarizing microscope with a thin section on the stage (Quinn 2013, 3).

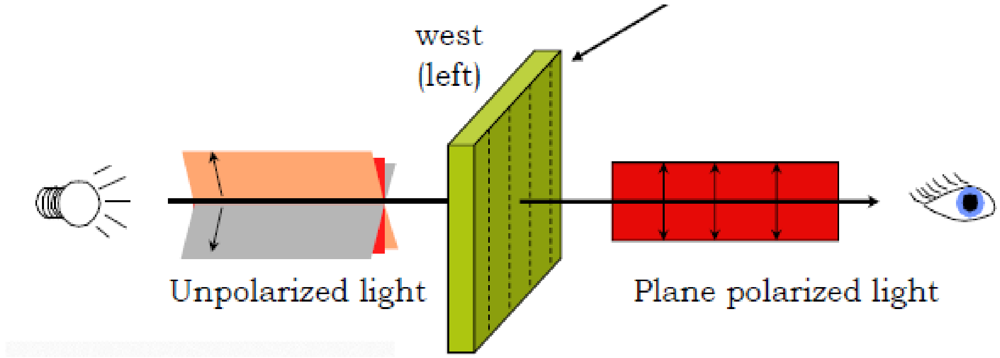


Figure 28: Visualisation of how a polarizer works. Only the light passing through the polarizer (indicated by the upper arrow) in an east-west direction will reach the eye of the observer (Image courtesy of Ioannis Illiopoulos).

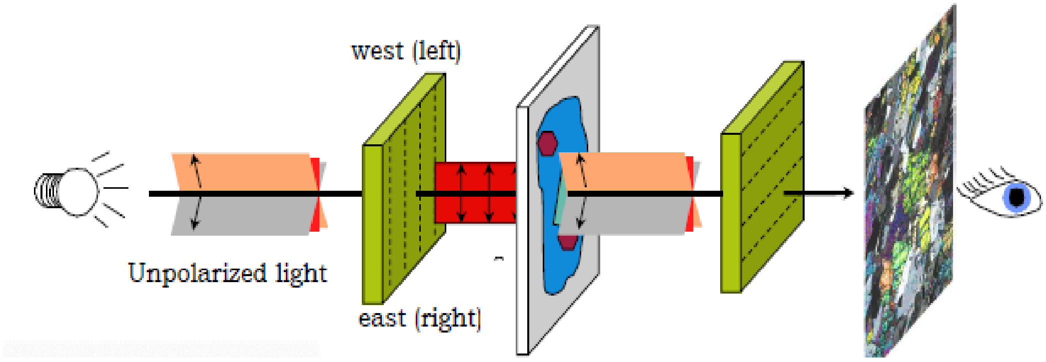


Figure 29: Working of PPL and XP in a polarizing microscope. The plane polarized light reaches the thin section and is scattered in many wavelengths and frequencies due to inclusions present. The scattered light beam passes through the second polarizer which is perpendicularly positioned to the first polariser. The image that reaches the observer is characterised by the properties of the thin section and its inclusions (Image courtesy of Ioannis Illiopoulos).

The first group of characteristics on the form for the description of a thin section fall under the heading "microstructure". The microstructure is divided in three elements: voids, c:f:v and the distribution of inclusions. The parameters for the description of the voids in ceramic petrography is identical to those used in macroscopic fabric analysis (see above). Although information on the porosity is valuable for understanding the vessel function and/or manufacturing technology, the interpretation of pores through ceramic petrography is not a straightforward process (Braekmans and Degryse 2017, 252-254). The c:f:v ratio, as it was modified by Quinn (2013, 81) from the original Whitbread (1995) descriptive system, indicates the percentage of inclusions, matrix and voids present. The term orientation that is used in the form refers to the preferred alignment of the elongated inclusions present in the sample relative to the vessel walls. The preferred alignment can be weak, moderate, strong or very strong. It is also possible that there is no preferred alignment at all, which can also be termed chaotic. Other features related to orientation of inclusions, such as relic coils, also fall under this heading (Quinn 2013, 83). Another element important here is the spacing of the inclusions, based on the distance between inclusions measured by their diameter. The spacing can be termed close-spaced (points of contact), single-spaced, double-spaced or open spaced (Quinn 2013, 83). A last element here is the sorting of the inclusions for which the same parameters as with macroscopic fabric analysis is used (see above).

The second heading relates to the description of the clay matrix, which consists of clay minerals such as illite, smectite and kaolinite. The clay minerals present in a ceramic paste have a great impact on the physical properties of a clay such as plasticity. Given the fact that clay minerals are smaller than 2 µm they cannot be analysed through ceramic petrography. In order to do so other archaeometric methods have to be used (e.g. Pollard *et al.* 2007). However small clay minerals are, they are certainly not unimportant. There are two main properties of clay minerals which are crucial for the forming and the final characteristics of a ceramic vessel. First of all the adsorption of water by clay minerals allows the formation of a usable object out of wet clay (Quinn 2013, 39-42). The second aspect is the fusing together of clay minerals during firing. Clay minerals start to sinter around 600°C and vitrify around 900 to 1100°C. These processes result in the hardening of the fired ceramic object, which is of course important for a ceramic vessel (Quinn 2013, 190). Characteristics of the matrix that can be analysed through ceramic petrography are the colour, homogeneity/heterogeneity and optical activity. The colour is described in both PPL and XP. The heterogeneity of a clay can be of a natural origin, the result of post-depositional processes or the result of bad/insufficient preparation of the used clay (Quinn 2013, 42. On the basis of these properties information on the firing temperature and atmosphere, the nature and origin of the raw materials and the manufacturing technology can be derived (Quinn 2013, 42-44).

The last part of the petrographic analysis deals with the inclusions present in the thin section. The basic parameters here are the same ones used for macroscopic fabric analysis: shape size, angularity and frequency/relative abundance. However, while macroscopic fabric analysis provided a first indication of the inclusions present in the fabric, here the specific type of inclusion was identified, as detailed as possible. Inclusions in a clay are often minerals. Minerals can be studied and identified based on their specific characteristics: colour and pleochroism (PPL), relief (PPL), cleavage (PPL), interference colours (XP), extinction angle (XP) and twinning (XP) (Braekmans and Degryse 2017, 237-240). Another important share of inclusions in ceramics consists of rock fragments. These polymineralic inclusions are a combination of two or more minerals or clasts (Quinn 2013, 47). Through the identification of rock fragments the geological background of the region where the original clay or the temper has been procured can possibly be identified. The identification of these rocks is heavily reliant on the identification and characteristics of minerals, glass phases and orientation within them. The rock fragments are divided into 4 categories: plutonic, volcanic, sedimentary and metamorphic rocks (Braekmans and Degryse 2017, 241). There is a wide range of other inclusions that are also present in ceramics: iron rich particles, shell, bone, microfossils, organic material, grog and slag (Quinn 2013, 83). Through the identification of naturally present inclusions and temper next to the study of their properties, we can infer information on raw materials, origin and technology used for producing the vessel (Quinn 2013, 47).

3.2.4 Manufacturing techniques

The manufacturing techniques that are discussed here are connected to three steps of the ceramic *chaîne opératoire*: fashioning, finishing and surface treatment. Based on ethnoarchaeological and experimental research the range of possible techniques used in each step has been determined (Roux 2019). For the fashioning step a division has been made between techniques using rotative kinetic energy (RKE) and techniques without RKE. Because of the fact that RKE was not used in pre-colonial times in the Caribbean I focus here on the techniques without RKE. The fashioning step of the ceramic *chaîne opératoire* consists of two stages: the roughout and the preform. The roughout is obtained by thinning operations that lead to " [a] hollow form which does not present the final geometrical characteristics of the container" (Roux 2016, 104). It is the base structure of the vessel the potter aims to make. There are eight techniques for roughing-out without RKE: coiling by pinching, coiling by crushing, coiling by drawing, the slab technique, modelling by pinching, modelling by drawing, hammering and moulding. The last four techniques mentioned are performed on a mass of clay, while the others involve the use of assembled elements. In the preforming stage the roughout is further shaped into desired form. The preform has been defined as " [a] container with its final geometrical characteristics but whose surface has not been (or will not be) subjected to finishing techniques" (Roux 2016, 104). Preforming involves the smoothing of the formed base structure. The techniques for making the preform without RKE are scraping, preforming with continuous pressures, beating, shaving, repoussage, paddling, hammering. Scraping, preforming with continuous pressures and beating are performed on wet clay, while the other techniques are performed on leather hard clay. A combination of techniques can be used to form the whole vessel. Different techniques are then used for making different parts of the vessel such as the base, body and neck (Roux 2016, 104).

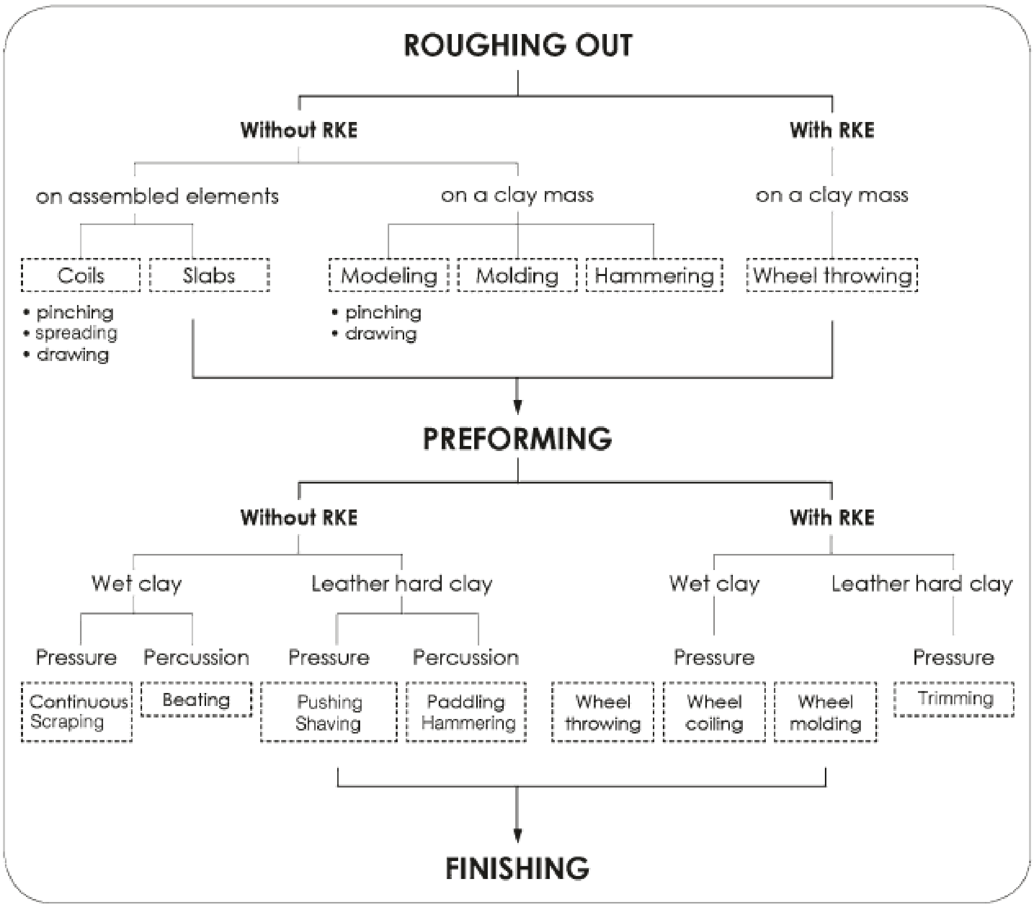


Figure 30: Classification chart of techniques used in the fashioning step of the ceramic chaîne opératoire. (Roux 2019, 65).

Finishing techniques are performed after the fashioning of the preform and before surface treatments. Most of them are used to regularise the superficial layer of the walls of the vessel. Surface treatments are classified by two parameters: the hygrometry of the clay and the type of pressure applied. Smoothing can be performed on both wet clay and leather hard clay. Brushing is only performed on leather hard clay (Roux 2019). The next step involves the modification of the internal and/or external surface of the vessel by rubbing or coating. At the moment when the surface is treated, the clay can be non-fired, leather hard or fired. Treating the surface results in a lower permeability and an increased resistance against erosion. The rubbing treatments are softening, burnishing or polishing and shining. The vessel can also be coated with slips, glazes, organic materials, graphite, silica and carbon (Roux 2016, 2019).

The identification of the manufacturing techniques involved in the fashioning, finishing and surface treatment steps of the ceramic *chaîne opératoire* were identified through macroscopic trace analysis. The traces on the sherds that are indicative of the techniques were looked at with the naked eye and if necessary through a magnifying loupe (x20) or a Dino Lite microscope. Artificial light provided by a flashlight was used in order to reveal traces of manufacturing techniques which were not visible or more difficult to see in natural light. The interpretation of the traces is based on the extensive overview of possible traces on ceramics provided by Roux (2019). Next to that I learned to identify and interpret manufacturing traces at the Université de Nanterre (Paris), both during a course on the *chaîne opératoire* approach taught by Manem and Roux and by working with the database of manufacturing traces on experimental pottery available at the lab for material culture studies. It must be noted that while many traces (can) remain visible on a sherd, the successive stage in the production process can also cause previous traces to disappear and thus remove information on the manufacturing techniques used in previous steps (Roux 2019).

3.2.5 Overview of methodological approach

The analyses that were carried out focussed on the sherds that were selected from the assemblage of El Cabo that was readily available at Leiden University. All the methods discussed above were carried out on the LCAWW-sherds from this site in order to reconstruct their *chaîne(s) opératoire(s)*. The macroscopic trace analysis and the macroscopic analysis following the Leiden codebook of ceramics were performed on the whole assemblage of LCAWW from the site of El Cabo. A selection consisting of thirty sherds from the studied assemblage was made for petrographic analysis. The results of these analyses were grouped following the principles of the ceramic *chaîne opératoire* approach and were compared to the findings of Simone Casale on the remaining "regular" assemblage of the site of El Cabo. A second part of the study focussed on the sites of El Flaco and El Carril. It comprised a morpho-stylistic analysis of the assemblage and a compositional analysis through ceramic petrography of nineteen sherds that were selected by the author during the 2019 field campaign of Leiden University (Hofman 2019). The results of the compositional analyses were compared with those from El Cabo and with the results of previous compositional analysis at the sites of El Flaco and El Carril provided by Van Dessel (2018).

In this chapter I have explained how the *chaîne opératoire* approach can contribute to the understanding of the social relations related to the phenomenon of LCAWW in Hispaniola.

Next to that we have seen how it can also tell us something about the meaning of this pottery by verifying whether technological similarities can provide a basis for a symbolical interpretation. In the following chapter I will zoom in on the sites of El Cabo, El Flaco and El Carril and provide an overview of the ceramic assemblages of these sites.

4. Research sites and their ceramic assemblages

In this chapters I present the archaeological sites that were used as a case study to answer the research questions. Three sites on the island of Hispaniola were selected, all of them in modern-day Dominican Republic. The site of El Cabo is situated near the south-east corner of the island in the modern province of La Altagracia. The two other sites, El Flaco and El Carril, are located in the north-western area of Dominican Republic in the Valverde province. The sites were chosen because of the availability/accessibility of the artefacts and information concerning the archaeological excavations at these sites, since well-documented and extensive site excavations are sparse. Next to that the possibility to compare two geographically close sites with a site located in a different geological environment and culture-historic background, was considered to be a valuable addition to this research.

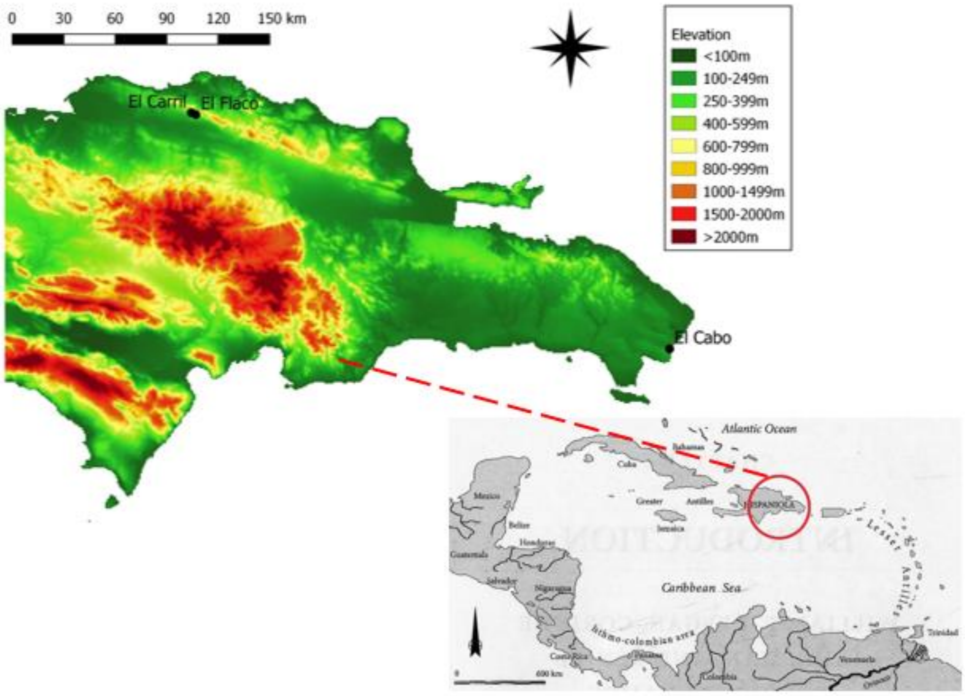


Figure 31: Situating the research sites of El Cabo, El Carril and El Flaco on the island of Hispaniola and the wider Caribbean (Part created by author in Q-GIS and part adapted from Keegan et al. 2013, 2).

4.1 The south-eastern area: El Cabo

4.1.1 Geological, historical and archaeological background

El Cabo is situated in the coastal plains of Seibo in La Altegracia province (Samson 2010, 73). The geology is characterised by a carbonate platform with karst formations and thin soils. These coastal plains are the result of accumulated marine sediments and typically have a low topography with small differences in elevation (see figure 31). The karstic geological nature of the environment resulted in the presence of many caves and sinkholes in the area, due to the dissolution of parts of the limestone bedrock. The water storage capacity of the karstic landscape and the soil infill of the dissolution pits and larger depressions with fertile soils allowed for crop cultivation in the otherwise dry coastal plain (Samson 2010, 74). From a mineralogical point of view the area appears to be rather monotonous and is characterised by little variation in lithic raw material sources. Next to the carbonate bedrock Samson (2010, 76) mentions the presence of serpentinized peridotite, bauxite and re-crystallised limestone. El Cabo is situated on a stretch of limestone coast adjacent to the Mona Passage, a strait connecting/dividing the islands of Puerto Rico and Hispaniola (Keegan and Hofman 2017, 123). Therefore it is part of the cultural area connected to this strait, identified by Rouse (1982, 1992). The Mona passage cultural area is thought to play an important role throughout Caribbean pre-colonial times, both as a boundary area between cultures and as a conduit for the rapid dispersal of agricultural practices in the Greater Antilles (Rouse 1992; Samson and Cooper 2015). It is also believed to be the heartland of the Chicoid series and thus of so-called Taino culture (Rouse 1992; see chapter 2).

The site was excavated between 2005 and 2008 by a team from Leiden University in collaboration with locals from El Cabo, under direction of Menno Hoogland and Corinne Hofman (Hofman *et al.* 2006; 2008). The excavation built on previous research by the *Museo del Hombre* in the form of test-pits (Ortega 1978) and as part of a survey project (Olsen Bogaert 2004). The field campaigns of 2005 through 2008 focused on the excavation of 31 small units and one large main unit (see figure 32)

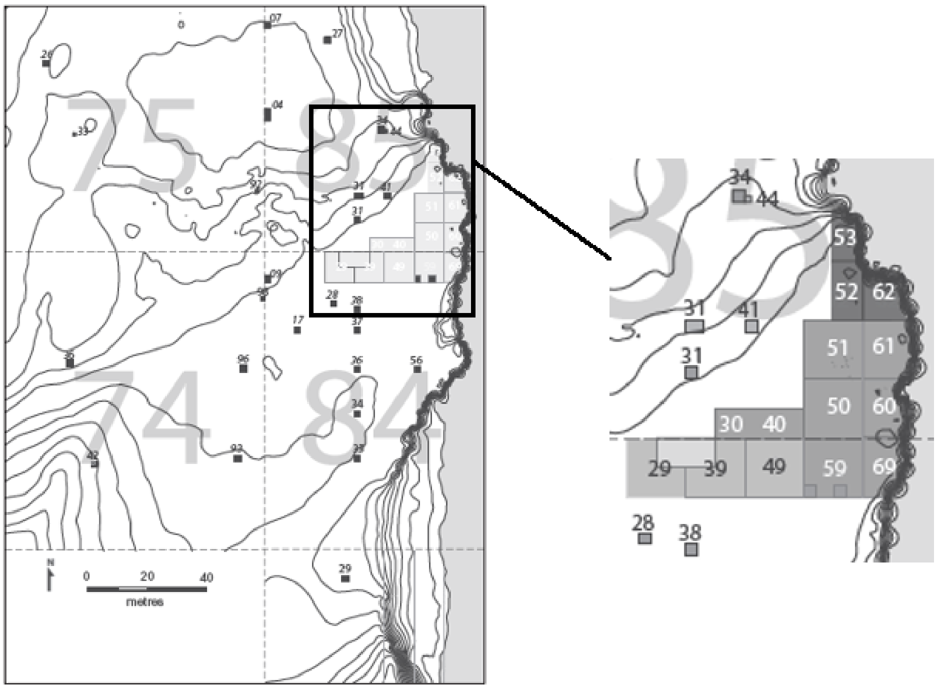


Figure 32: Map of the excavation units at El Cabo (Samson 2010).

The earliest evidence for occupation of the site was found at the northern side, in zones 75 and 85 (see figure 32). Radiocarbon dates situate the start of the occupation of the site in the early 7th century AD (Samson 2010, 149). It is not clear whether the site was continuously inhabited, but the presence of European artefacts in the final occupation context of the site indicates habitation until after the European invasion (Ernst and Hofman 2014; Hofman *et al*. 2014; Samson 2010). In general two habitation areas were identified (see figure 33). The northern part of the site is identified as a habitation are characterised by the presence of Ostionoid ceramics. The occurrence of Chicoid pottery at the site started in the 9th century AD, providing one of the earliest dates for the appearance of Chicoid ceramics (Samson 2010; see also Veloz Maggiolo *et al*. 1973). During the later period the occupation area of the site spatially shifted south. The southern habitation area is related to the Chicoid series (see figure 33).

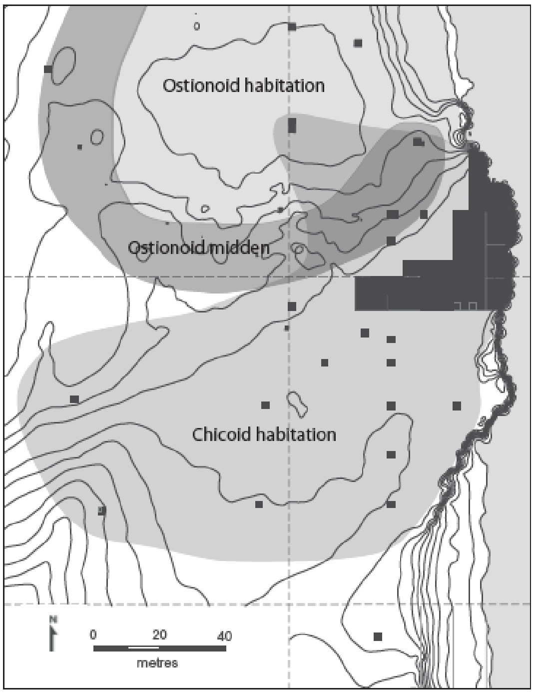


Figure 33: Map of the habitational areas at the site of El Cabo (Samson 2010, 149).

The housing structures in the main excavation unit (habitation area related to Chicoid series) were reconstructed by Alice Samson (2010) for her doctoral research. The excavation unit, which measured 1030 m^2, contained 2100 features, almost all of them postholes cut out of the limestone bedrock. In total Samson (2010) identified over 50 structures related to three different functions, i.e. dwelling, special activity and organisational practices. Next to that she concluded that the structures in the main unit represented the majority of a housing group or household. The structures of this housing group were dated between the 9th and 16th centuries AD and were divided into five phases related to cycles of renewal. Based on an archaeological survey Samson posited that the entire settlement contained five to seven more or less equal and contemporaneous house groups with ceramics related to the Chicoid series (Samson 2010, 305).

It is presumed that the site was abandoned shortly after the end of the second Higüey war in 1504 (Keegan and Hofman 2017, 124). This war resulted in the end of the *cacicazgo* of Higüey, which included the site of El Cabo (Churampi Ramirez 2007). The latter is true for -at least- the early colonial times when Higüey became a military confederation as an answer to the Spanish threat (Oliver 2009). In pre-colonial times, what has become known to us as "the *cacicazgo* of Higuëy" may have been a regional community based on various relationships, such as local networks of reciprocity (Samson 2010, 95).

4.1.2 The ceramic assemblage at El Cabo

4.1.2.1 Results from previous and ongoing ceramic studies at El Cabo

Alice Samson (2010) also looked at the ceramic distribution in the main excavation unit of El Cabo (see figure 34). She noticed a difference in distribution between the western and eastern half of the unit. The western half mostly contained less than 750 g of ceramics per square, the eastern and north-eastern parts generally more than 2 kg. The highest density is found in sectors 40 and 50, and 49 and 59, where the excavated ceramic sherds generally weigh between 750 and 5000 g. Samson (2010, 273) identified some (relatively) 'cleaner' areas, also within the areas showing higher density. Examples of such areas can be found in sector 49, 50 and in the northern part of sector 51. Samson (2010, 273) suggested that the observed distribution patterns are to be associated with maintenance/sweeping activities in the latest phase of habitation in the main excavation unit. The 'cleaner' areas are thought to represent the insides of structures and the areas with higher density would be the refuse zones from these structures. The combination of the maintenance activities and the fact that there is no discernible stratigraphy present in the shallow (10-20 cm thick) find layer, makes it impossible to correlate the ceramic distribution to archaeological interpretations of different habitation phases (Samson 2010).

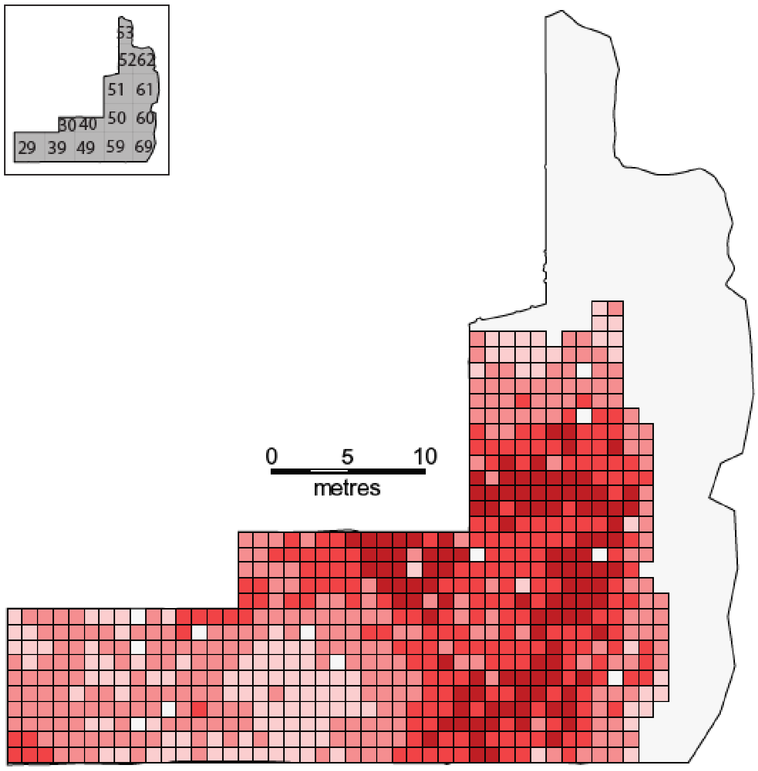


Figure 34: Ceramic distribution at the site of El Cabo (Samson 2010, 274).

Just like the occupational areas, the pottery assemblages can be divided into two main groups: one relating to the Ostionoid series and another to the Chicoid series. Next to that the presence of pottery showing mixed elements between these two styles has also been mentioned (St. Jean 2008b). The information on the ceramic production and use of primary raw materials at the site of El Cabo comes from two studies. The first part consists of an attribute analysis by Cortney St. Jean (2008a; 2008b) for his MA thesis at Leiden University. The second part comprises low-tech ceramic analyses, analyses of clay samples and a comparative pottery study provided by van As *et al.* (2008).

St. Jean studied a selection of Early Ostionoid ceramics coming from two test units (75-26-62 and 84-34-80) in the northern part of the site, which were excavated during the 2007 field campaign (St. Jean 2008b, 21). Ostionoid pottery was first seen as the result of a rapid population expansion from post-Saladoid groups in Puerto Rico to Hispaniola. There is also a possibility that this phenomenon started on Hispaniola from where it subsequently spread towards Puerto Rico in the east. A detailed study is required to test both hypotheses and gain a deeper understanding on the origins of Ostionoid (Keegan and Hofman 2017, 119-120). Wherever the origins of the Ostionoid series may lie, there is evidence for its spread to Cuba, Jamaica and the Bahamian archipelago from Hispaniola. Based on an attribute analysis St. Jean concluded that the ceramic Ostionoid factor present at El Cabo can be defined as "…mostly plain, simply shaped functional ceramic material with some noticeable variations in lip form and a range of uncommon but interesting decorative elements" (St. Jean 2008b, 49). Van As *et al*. (2008, 57) add that the main forming technique of Early Ostionoid pottery was coiling through pinching and spreading. The coils had a diameter of around 1 cm. The vessel walls were finished by smoothing, burnishing or polishing procedures. Relating to the colour of the pottery van As *et al*. (2008, 49) note that it is mostly reddish to light brown, but they also mention the use of white firing clays and a cream-coloured or red slip. Furthermore they observed a continuation of this pottery producing tradition in Late Ostionoid pottery. The firing colours of Late Ostionoid pottery is red-brown and partly greyish-spotted. There is no mention of the use of white firing clays or cream-coloured slip for Late Ostionoid pottery (van As *et al*. 2008).

Figure 35: Examples of Ostionoid pottery from EL Cabo (St Jean 2008b, 31).

According to van As *et al.* (2008, 60) the Chicoid pottery at El Cabo is related to the Boca Chica style. The vessels are mostly produced through coiling, after which the vessel walls were smoothed and burnished. The typical Chicoid decoration motives (see figure 36 and chapter 2) were applied right before the clay reached a leather-hard state. Afterwards, the surface of the pot, which can show cream to brown and greyish-black colours, was often completely burnished (van As *et al.* 2008, 60).

Figure 36: Examples of Chicoid pottery from El Cabo (van As et al. 2008, 62).

Due to the lack of suitable clay sources in the immediate surrounding, van As *et al.* (2008) compared the fabrics of the pottery found at El Cabo with clays from the wider area. Therefore they collected in total ten clay samples from six locations: Caliche, Playa Macao, Anamuya, Higuey, La Aleta and Boca de Yuma. The locations at Playa Macao, Boca de Yuma and La Aleta (see figure 37) were considered to be potential clay sources used for the production of the pottery from El Cabo. This resulted in two hypotheses. The first hypothesis involves the collection of raw materials at (one of) these locations during fishing or hunting trips that departed from El Cabo. The second hypothesis relates to the import of finished vessels from (one of) those locations to El Cabo (van As *et al.* 2008).

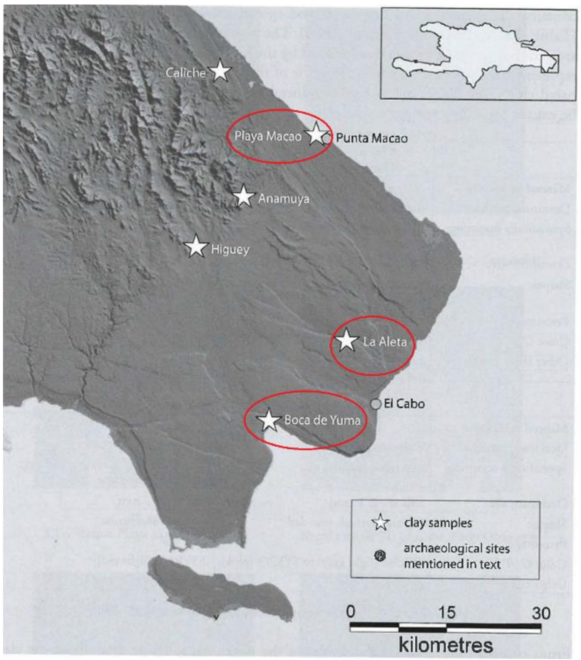


Figure 37: Map of the locations of the origin of the clay samples studied by van as et al. 2008 (Adapted from van As et al. 2008, 69).

4.1.2.2 LCAWW from El Cabo

Among the ceramic assemblage from El Cabo were also examples of LCAWW. The available assemblage at Leiden University was already a selection from the total ceramic assemblage excavated at the site. The material transported to the Leiden labs consisted of decorated sherds and rim sherds larger than 5 cm for further technological analysis. The fact that the assemblage used for the selection of the sherds was already a selection itself, has repercussions on its representability for the entire site of El Cabo. This does not cause big problems for answering the research questions, but the repercussions for the interpretation of the results should be taken into account. In total 132 sherds were selected with characteristics for LCAWW as described in chapter 2. After a first examination of the sherds, I found that some of them fitted together and came from the same vessel, resulting in the identification of 118 individual vessels. Together they weigh 3351,9g. The selection consists of 75 rims, 1 base, 9 body sherds, 9 appendages, 18 *adornos* and 6 sherds that are either a rim or a body sherd in combination with an *adorno*. One additional sherd (CB.1445/1) was selected based on its morphology. This is the only sherd that did not have a whitish colour but could be linked to a bottle shape. I selected this sherd to serve as reference material and to gain more insight in the relation between LCAWW and bottle-shaped vessels. Below I present some photos of examples of LCAWW from El Cabo.

Figure 38: Examples of LCAWW from EL Cabo. Left to right: CB.011, CB.1636-2, CB.267, CB.781, CB.1393-3 and CB.1517 (Photos by author).

Drawing interpretations regarding the spread of LCAWW at the site of El Cabo is complicated by the unavailability of the geographic data from the excavations in GIS, in combination with the absence of a clear stratigraphy at the site. To provide an overview I use the terms that were used for the excavation grid at the site (see figure 32 above and Samson 2010). I will look at the number of sherds per zone and whether they have been found in the main excavation unit or in the additional, small units.

Table 9: Spread of LCAWW sherds selected in this study from the site of El Cabo.

Zone	# of sherds	# in Main Unit	ID Small Units
74	7	0	74-34 74-42
75	2	0	75-26
84	23	21	/ (surface finds)
85	86	78	85-04 85-34 85-44 85-60

As can be seen from table 9 most of the LCAWW sherds have been found in zone 85 and zone 84. This should not come as a surprise, since these two units comprise the main excavation unit. When looking at the spread in the main unit, it is clear that LCAWW is best represented in zone 85, more specifically in sectors 40, 50 and 51. This fact again is logical, as these areas show the highest values of total ceramic weight retrieved (see figure 34). The pattern that can be distinguished here for the spread of LCAWW, is thus coherent with the spread of the rest of the ceramic assemblage and can probably be related to the same sweeping activities performed to clean the habitation area that were mentioned above. Two sherds could be related to a feature in the main excavation unit. Both were identified as postholes, but there is no date available for these features. Interpreting the relation between radiocarbon dates and the selection of LCAWW is difficult due to the maintenance activities and the renewal of structures during the period of habitation at El Cabo. Based on the dates provided by Samson (2010) I carefully assume a dating for LCAWW at the site of El Cabo ranging from the 12th century to 1504.

Outside of the main excavation unit, LCAWW has been found in seven small units, of which most measure 2 x 2m. All of those seven units are located in the southern habitation zone (related the Chicoid ceramic series), except for U75-26, which is situated in a midden with Ostionoid pottery. Two samples, CB.1318/1 and CB.1372/1, were excavated in that Ostionoid midden. There is no information available in the database on the layers in which the samples from these units occur, so LCAWW cannot be linked to the dates provided by Samson (2010). The fact that there is no layer indicated, suggests that the sherds were retrieved from the surface before excavating U75-26. This is a pity, since U75-26 is the only unit with a clear stratigraphy, consisting of seven stratigraphic (i.e. non-arbitrary) layers. Samson (2010, 127) interprets the filling of the units as "deposition beginning halfway through the 7th century AD, continuing (interrupted or smooth) throughout the 8th, 9th and 10th centuries".

4.2 The north-western area: El Flaco and El Carril

4.2.1 Geological, historical and archaeological background

The sites of Flaco and El Carril lie on the southern flanks of the Cordillera Septentrional in the Valverde province, north-western nowadays Dominican Republic. They are located at a distance of 2.5 km of each other. The geology of the area is characterised by the presence of two underlying terranes (Ting *et al*. 2016, 377). The first terrane is disruptive and has outcrops in three main inliers: near Rio San Juan, in Puerto Plata and in Pedro Garcia. The Rio San Juan-Puerto Plata-Pedro Garcia disruptive terrane has been extensively described by Mann *et* al. (1991). The terrane consists of a heterogeneous mix of igneous and metamorphic rocks. Near the town of Rio San Juan it is an amalgam of blueschist-eclogite mélange with serpentinite matrix, fine-grained coherent greenschist-blueschist facies rocks, coarse-grained amphibolite facies rocks, and a gabbroic intrusive complex. In the area of Puerto Plata it comprises serpentinite, gabbro, and volcanic rocks. The third outcrop, located in Pedro Garcia, is characterised by the presence of tuff and lava that is intruded by basaltic dikes and a small tonalite stock (Mann *et al*. 1991, 9). The Rio San Juan-Puerto Plata-Pedro Garcia disruptive terrane is faulted against the Altamira terrane. The Altamira terrane consists of biomicric limestones interbedded with small quantities of volcaniclastic rocks, tuffaceous siltstones, and mudstones. Both terranes are overlain by marine conglomerates and sandstones of the Mamey Group (Ting *et al.* 2016, 378).

In the literature the history of the region is heavily connected to the so-called '*ruta de Colon'*. This is the inland route that Columbus and his troops allegedly followed across the Cordillera Septentrional, moving southward from the settlement of La Isabela in search for the Cibao Valley in 1494 (Hofman *et al.* 2018; 2020; Ortega 1988). The sites of El Flaco and El Carril are situated near the '*ruta de Colon'* in the territory that is ethno-historically known as the '*cacicazgo of Magua'* (Hofman and Hoogland 2015).

El Flaco was excavated between 2013 and 2016 under supervision of Corinne Hofman and Menno Hoogland from Leiden University in the context of the ERC-funded NEXUS 1492 project (see Hofman and Hoogland 2015; 2016). The site was interpreted as a hamlet with a surface of ca. 2680m^2 (Hofman et al. 2020). Radiocarbon dating indicates that the site was occupied between cal. AD 990 and 1490 (Hofman et al. 2018). The site is characterised by multiple occupation phases. The first occupation phase is related to pottery showing a mix of Ostionoid and Meillacoid characteristics. In a later stage pottery of the Chicoid series made its appearance at El Flaco. Although Chicoid pottery was dominant, Meillacoid pottery was still present at the site and both Meillacoid and Chicoid ceramic features were mixed (Hofman and Hoogland 2015).

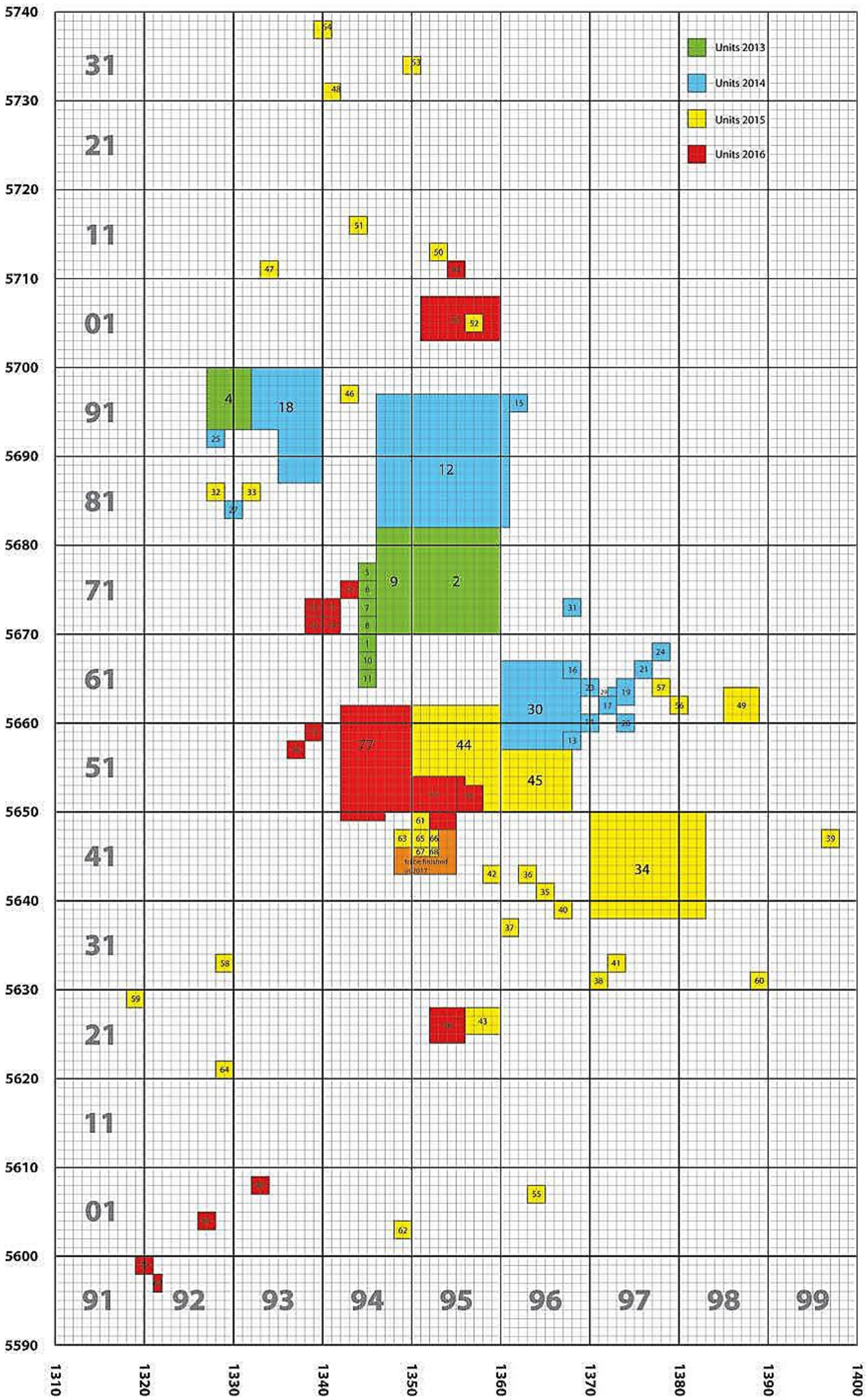


Figure 39: Overview of the excavation units at the site of El Flaco (Hofman and Hoogland 2016).

Between 2016 and 2019 the NEXUS 1492 project, again under supervision of Hofman and Hoogland, excavated the site of El Carril located 2.5 km westward of El Flaco. The occupation area of El Carril (around 43,000 m2) covered a larger surface than the site of El Flaco and was identified as a large village (Hofman *et al*. 2018). El Carril was periodically inhabited from around cal. AD 1097 until the 15th century. Culture-historically speaking, the people(s) inhabiting El Carril are connected to a mixture of Ostionoid/Meillacoid and Meillacoid/Chicoid features, based on the ceramic types that occurred at the site (Hofman 2019). A similar settlement pattern consisting of an alternation of artificially levelled areas and *monticulos* was observed at both sites. The platforms were used for the construction of houses as indicated by the presence of postholes (Hofman and Hoogland 2015). The mounds are evidence of intensive local landscape transformation at the sites (Pagán-Jiménez *et al*. 2020). They consist of multiple layers of accumulated waste, indicating a multi-functional use, as they were identified as places for burning/cooking, agricultural practices, burials and waste refusal (Hofman *et al.* 2020; Pagán-Jiménez *et al.* 2020). At El Carril over a hundred of these mounds were identified (Hofman and Hoogland 2015; Pagán-Jiménez *et al.* 2020; van Dijk 2019). The diverse functions of the mounds resulted in a complex stratigraphy with various lenses, mostly of very fine ash (Keegan and Hofman 2017, 129).

4.2.2 El Flaco and El Carril: The ceramic assemblages

4.2.2.1 Previous and ongoing ceramic studies at El Flaco and El Carril

Elements of the three main ceramic traditions of the Late Ceramic Age on Hispaniola that were identified by Irving Rouse (e.g. 1992), are represented in the ceramic assemblages of both El Flaco and El Carril. We have already seen the characteristics for the Chicoid series in chapter two and the features of the Ostionoid series were discussed above for El Cabo. The third ceramic tradition in the Late Ceramic Age on Hispaniola is known as the Meillacoid series, named after the site of Meillac near the Forte Liberté area (Rouse 1939). It originated in the early 9th century in the Cibao Valley and expanded into Cuba, Jamaica and the Southern Bahamas (Sinelli 2013). Meillacoid pottery as observed by Rouse (1939, 42-43) in the Ft. Liberté area has thin walls, varying between 3 and 7 mm. The surfaces are hard and smooth but not highly polished. The vessels are often decorated with narrow straight incised lines which have rough and jagged edges. The incisions are usually crosshatched or form alternating patches of oblique parallel lines. Decorations are often applied to the vessel by adding a decorated piece of clay to the vessel wall (appliqué). These decorations are similar to the patterns and characteristic textures of basketry, which might be the result of the (partial) replacement of these woven containers by ceramic vessels (Wilson 2007, 97).

As is common in the region (see Ulloa Hung 2014 and Herrera Malatesta 2018), the mixing of elements from different ceramic series was identified at both sites (Hofman and Hoogland 2015; Hofman 2018). Next to that 'pure' Meillacoid and Chicoid pottery has also been found at the sites.

Figure 40: Selection of sherds from El Flaco and El Carril : Ostionoid/Meillacoid: C, D; Meillacoid: B; Meillacoid/Chicoid: A, F; Chicoid: E. (Courtesy of the NEXUS 1492 project; taken from Van Dessel et al. 2019).

The composition of ceramics from El Flaco and El Carril is studied on a petrographic and chemical level by Van Dessel (2018). His work built on a previous petrographic study of the site of El Flaco and the nearby site of La Luperona by Ting *et al*. (2016). Van Dessel (2018) identified five main petrofabric groups: the quartz group, the quartzite group, the amphibolite group, the calcareous matrix group and the volcanic rock group. All but the volcanic group were subsequently further divided in subgroups (for more information see Van Dessel 2018). The identification of many groups and subgroups in this study indicated the use and possible sharing of multiple and diverse clay sources and raw materials at El Carril and Flaco.

The studied samples showed a low level of standardization as evidenced by the internal heterogeneity of (sub)groups and the variety in firing atmosphere. Van Dessel (2018) observed some variety in the degree of optical activity of the samples within (sub)groups. However, generally a high optical activity of the samples was observed, suggesting a low firing temperature for the vessels. Due to these elements he suggested that the vessels were fired in an open fire. Furthermore Van Dessel (2018) concluded that the studied pottery was produced on the individual or household level, following Ting *et al.* (2016). Trustworthy indications for the forming process of the ceramics were mostly lacking, but the few observations that were made all indicated the use of a coiling technique (Van Dessel 2018, 68). There was evidence for the addition of raw materials to the clays. Temper was identified in all groups except for the quartz group. It occurred in the form of amphibolite, quartzite, grog and rock fragments.

Griddles were also part of the study by Van Dessel (2018). They did not only form a macroscopic and functional group, but also a petrographic subgroup. The presence of a calcareous matrix, grog and added large rock fragments, an oxidizing firing atmosphere and somewhat higher firing temperatures were identified as characteristic for griddles. However, the absence of large rock fragments in one sample indicated that the addition of rock fragments was not a necessary step in the production process of griddles, making them a superfluous element of the petrofabric. Van Dessel (2018) hypothesised that the addition of rock fragments might be related to a kind of tradition of adding fragments to clays as also observed in other (sub)groups. Moreover the use of grog as temper was only observed in the calcareous matrix group (Van Dessel 2018, 69).

The quartz, quartzite and amphibolite group identified by Van Dessel (2018) contained samples coming from all three sites. This observation by Van Dessel confirmed the hypothesis of Ting *et al.* (2016) on the existence of a network between households of the nearby site of La Luperona and El Flaco and expanded it to the site of El Carril. Due to the low standardisation observed, the possibility involving the centralization of the production process of (one of) these groups on a certain location was disregarded by Van Dessel (2018). Given the fact that the same petrofabrics were observed at the three sites, he hypothesised that the households producing the pottery had similar ideas about what clays to use for pottery production and the addition of other raw materials such as amphibolite and quartzite. Next to that they must also have had access to the same or similar sources of raw materials, or it is also possible that there was an exchange of raw materials or finished goods. Van Dessel (2018) noted that the actual situation relating to the sharing of ideas and materials may have been less straightforward than is often envisioned. Different social processes relating to ceramic production can be in play at once and result in a complex whole of different interactions of exchange at the same time.

The two other groups, which were identified by Van Dessel (2018) as the calcareous matrix and the volcanic rock group, only contained samples from the site of El Flaco. It was not clear whether these groups were actually only confined to El Flaco or whether this was due to the overrepresentation of samples from this site in the study (Van Dessel 2018, 69).

A second part of the study by Van Dessel (2018) related to geo-chemical analyses of 38 samples through Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES, see Pollard *et al.* 2007). He compared the results of these analyses to those of 25 regional clays selected and gathered for comparison by Lou Jacobs from Leiden University (see figure 41). The comparison of the chemical compositions of the groups verified to a high degree the petrographic observations, except for the calcareous matrix group. The samples in this group showed a strong variety in chemical composition. Van Dessel (2018) posits that this can be explained by different factors. Firstly these samples were grouped based on the presence of a calcareous matrix, which is not really a strong chemical connection. Next to that a lot of samples in the group were characterised by the addition of grog and large rock fragments, which can cause the chemical composition of a fabric to change.

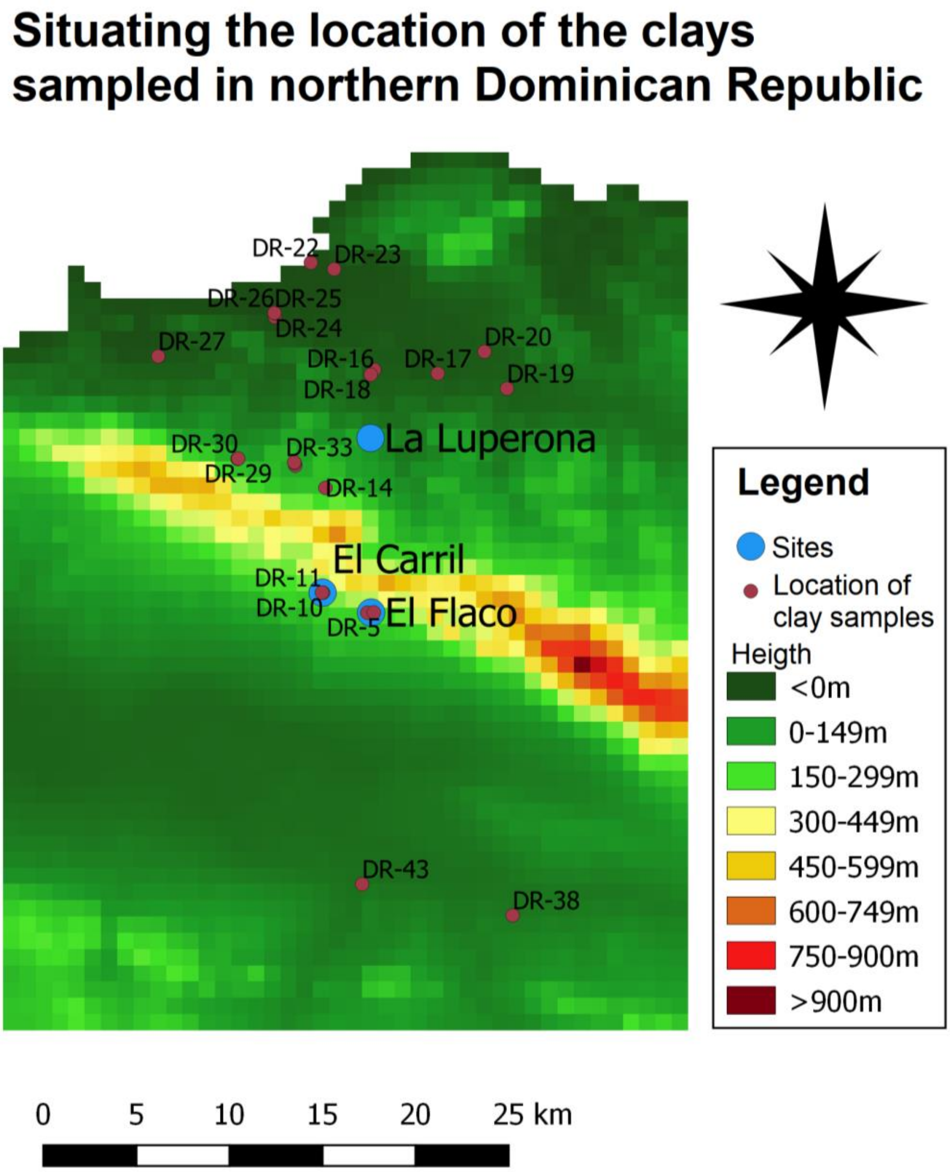


Figure 41: Location of the origins of the clay samples gathered by Lou Jacobs in the northern Dominican Republic (Translated into English by author from Van Dessel 2018).

The comparison to the composition of the local clays by Van Dessel (2018) only gave positive results for four samples: two sherds from the amphibolite group and two griddle sherds. This analysis indicate that the clay used for the production of the amphibolite group could have been DR-38, DR-43 or maybe a similar clay. Since the production site of these vessels remains unknown, no conclusions were drawn involving the distance between the studied sites and the two possible clay sources, which was at least around 15 kilometres (Van Dessel 2018). Furthermore, it is possible that closer sources exhibit a similar chemical composition due to the weathering of soils in the valley system to the south of the Cordillera Septentrional. Van Dessel (2018) found a possible match for the two griddle sherds with DR-10, DR-16, DR-17 and DR-18. He identified DR-10 as the most likely candidate, given its location at the site of El Flaco itself, while the other clay sources are located at the other side of the Cordillera Septentrional. Van Dessel (2018, 89) concluded that this might point to the fact that griddles at the site of El Flaco were made with a local clay, found close to/at the actual site. However, since the production site of griddles is unknown, we should be cautious with these interpretations.

Next to the study by Van Dessel (2018) there is also ongoing research at the sites of El Flaco and El Carril relating to ceramic analyses and available clays in the area. Katarina Jacobson (NEXUS 1492) is writing a dissertation on the *chaîne opératoire* of pottery production from the site of El Flaco. Her preliminary findings indicate that white ware from El Flaco has a different style than the rest of the ceramic assemblage (Katarina Jacobson, pers. comm., December 2020). Dr. Sebastien Manem is looking into the ceramic *chaîne opératoire* at the site of El Carril. Next to that an additional clay survey in the area has been carried out during the field campaign of 2019 by Casale and Van Dessel. The survey focussed on the valley systems on the southern slopes of the Cordillera Septentrional. In total 21 clay samples, some of them of white clays, were taken for further analysis. The clays were tested for their natural plasticity and fired experimentally. The samples have not yet been prepared for compositional analysis. Finally, I also include some 'ethnographic' evidence of the use of white clays in the area. During the 2019 field campaign I was visiting the location of the site of La Luperona (see figure 41 above) with the excavation team. There, I learned that local white clays are (still) used by the people living there nowadays. The family living in a house next to the site of La Luperona showed us their home-made stove, which they use for everyday cooking (see figure 42). The stove was made of a very fine, locally-delved white clay. The clay was put on a high tableau were it was worked until it formed a kind of E-shape. Small fires are made on the tableau in the two openings enclosed by the outer legs and the inner leg of the clay stove. The cooking pots are balanced on the clay stove above the openings, so that the fire on the tableau will heat the cooking pot. The materfamilias explained that these stoves are typical for the area and that they are traditionally made from a white clay.

Figure 42: Traditional stove made out of a local white clay, seen in La Luperona. Remnants of a fire on the tableau and of soot on the clay stove can be observed (Photo by author).

4.2.2.2 Late Ceramic Age white ware from El Carril and El Flaco

During the 2019 field campaign I examined the entire excavated ceramic assemblage of El Carril. In total 203 sherds of LCAWW were identified at the site. The combined weight of these sherds is 2032.22 g. This is approximately 0.43 % of the total weight of 472 531 g of excavated ceramics.

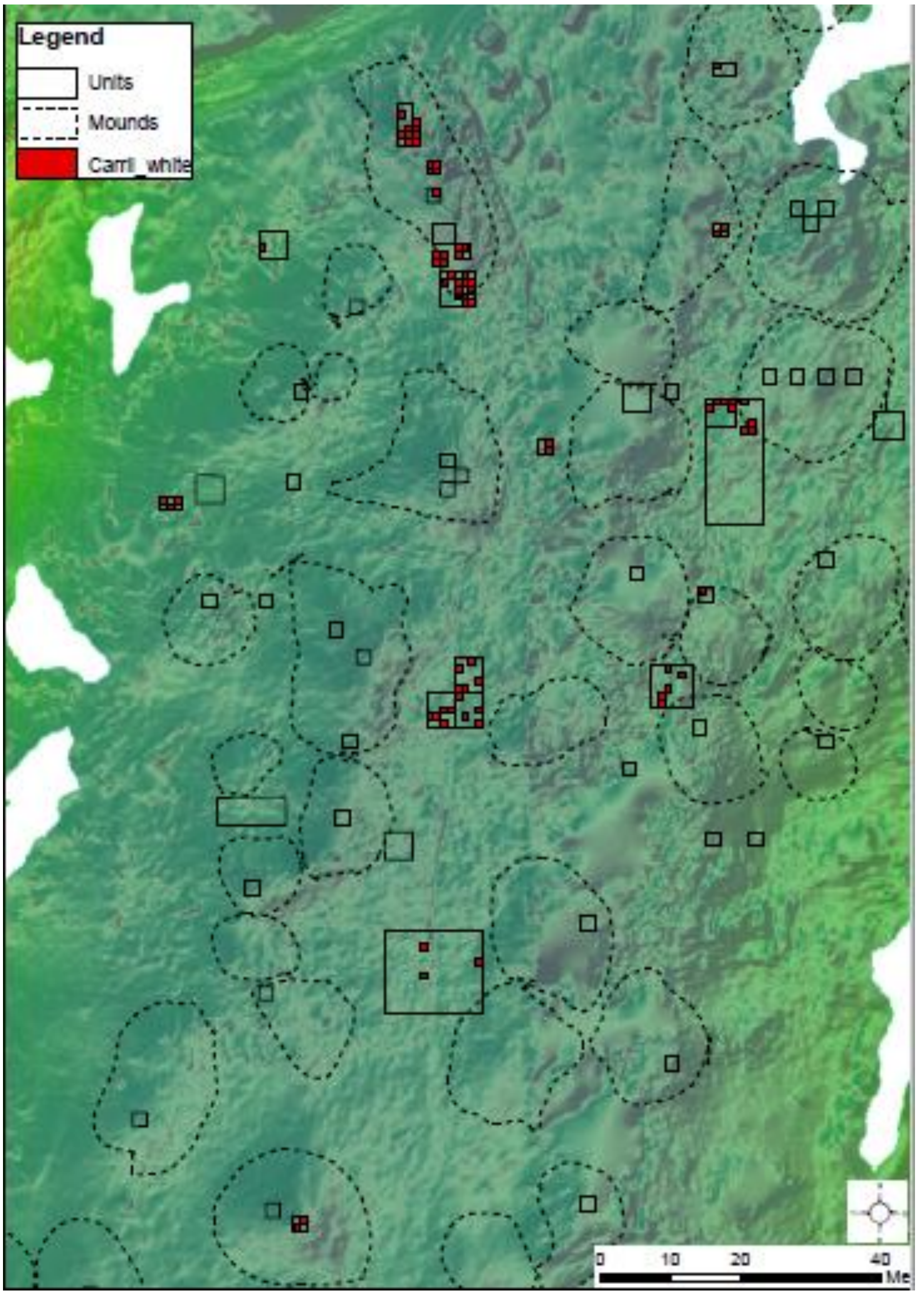


Figure 43: Spread of LCAWW (in red) at El Carril with an indication of the mounds (dashed lines) and excavation units (full lines) (Map by Simone Casale for NEXUS 1492).

Figure 43 represent the spread of LCAWW at the site of El Carril. It is clear that the main concentration of LCAWW has been found in the northern part of the site, which is related to the Chicoid series (Hofman 2019). Specifically one northern mound, including units 52 and 54, shows the highest concentration of LCAWW. In these two units 96 of the 203 identified sherds have been found. Moreover, this mound is not only characterised by the abundant presence of LCAWW, also four inhumations were found there (Hofman 2019). One of the individuals buried there was a boy of 8 to 12 years old, who was placed facing downward in the burial pit. At some point during or after decomposition, the head of the individual had been removed. In the process, the upper vertebrae and some ribs had been altered and scattered in the vicinity (Hofman 2019, 23). Next to that many isolated human remains have been found in that specific mound and also in another unit with a high concentration of LCAWW. This clearly indicates a connection between the occurrence of LCAWW and the presence of human remains or affiliated rituals at the site of El Carril. However, this does not count for all the units were LCAWW has been excavated. LCAWW was found in both flat areas and mounds.

The majority of the identified sherds (144 out of 203) has been found in layer one and two that have been excavated at the site. The lowest level was layer 11 in unit 38. The excavated layers represent vertical strokes of ten centimetres of soil and were chosen arbitrarily. Next to that the stratigraphy of the site and the configuration of the layers is influenced by the construction of mounds and levelling and sweeping activities. The majority of LCAWW has been retrieved very close to the surface, but in order to say something about the context we can only confide in archaeologically identified features. The features at El Carril that can be related to the occurrence of LCAWW are: F15-60, F15-62, F15-64, F25-36, F25-37, F25-38, F34-01, F34-47, F34-57 and F35-01. The latter feature is related to a burial. All the other features are described as a discolouration of the soil or a layer of ash. The ceramics found in these features are characterised by both Chicoid and Meillacoid features (see figure 44). Four available radiocarbon samples at El Carril can be linked to the occurrence of LCAWW at the site. The calibrated dates indicate that LCAWW appears at El Carril at the end of the 11th century and is present until the second half of the 14th century (M. Hoogland, pers. comm., June 2021).

Figure 44: CA18.3414 (left, F35-01, Chicoid), CA18.3638 (right, F35-01, Chicoid), CA19.4482 (Below, F34-57, Meillacoid/Chicoid) (Photos by author for NEXUS 1492).

The ceramic assemblage of El Flaco was only partly examined, so the information provided here is not a complete representation of the actual occurrence of LCAWW at the site of El

Flaco. 543 sherds of LCAWW were identified. The combined weight of these sherds is 5225,58 g. This is approximately 1.1 % of the total weight of 473 633 g of excavated ceramics.

Figure 45: Photos taken during the 2019 field campaign of the NEXUS 1492 project in Cruce de Guayacanes, Dominican Republic. The trays are filled with LCAWW from the site of El Flaco. The left tray contains plain (mostly slipped) body sherds, the right tray contains adornos and decorated sherds (Photos by author for NEXUS 1492).

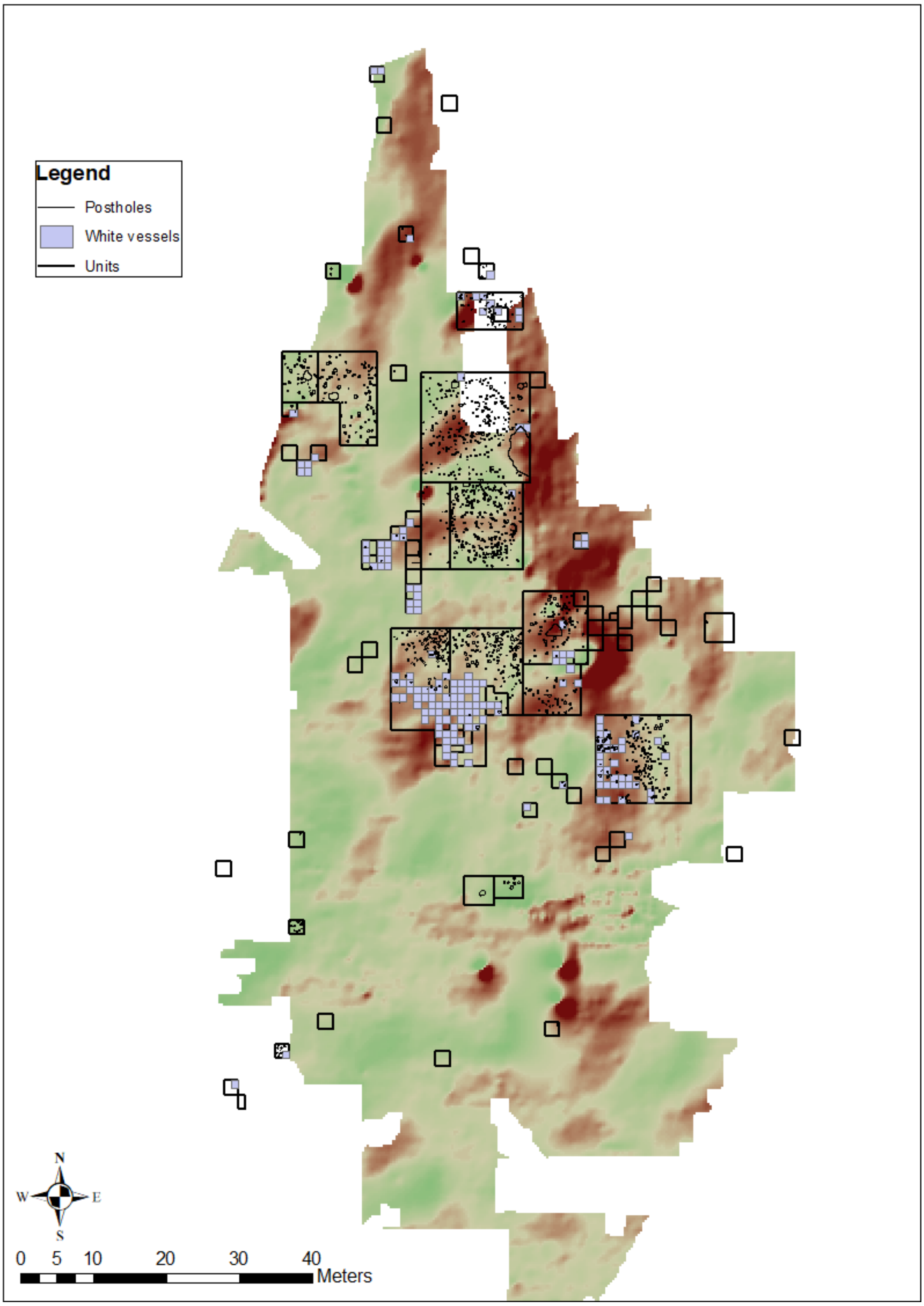


Figure 46: Spread of LCAWW (in light-blue) at the site of El Flaco with an indication of the excavation units and postholes (Map by Simone Casale for NEXUS 1492).

Figure 46 represents the spread of the selected sherds at El Flaco. I did not manage to through the whole ceramic assemblage for this study, so this does not represent the full picture. Nevertheless, there are some interesting remarks to be made concerning the spread and occurrence of LCAWW at El Flaco. When looking at the map, three main clusters of LCAWW can be observed. Moreover, when looking at the identified sherds per unit, there are two units that have a remarkable amount of LCAWW: unit 34 (95 sherds) and unit 69 (80 sherds). It is remarkable that 310 of the 543 identified sherds of LCAWW were found in only five units (U34, U69, U77, U71 and U74). Of course, the (arbitrary) unit measurements and the fact that multiple sherds can belong to the same vessel should be taken into account. Furthermore U69 and U77 combined contained no less than 142.723g of ceramics in total. They also have very high weight numbers for other materials such as coral, shell and stone (Hofman and Hoogland 2016). However, again there seems to be a (non-consistent) connection with human remains as U69 contained 12 inhumations. LCAWW has been found in flat areas related to postholes and houses, and on mounds.

297 of the 543 sherds have been retrieved from the two uppermost layers. LCAWW has been found up until layer ten. Again, the layers represent arbitrarily chosen levels and the stratigraphy at the site has been heavily influenced by human activities. The features at El Flaco that can be related to the occurrence of LCAWW are: F45-07, F45-11, F45-14, F46-01, F47-01, F55-109, F73-07, F73-15, F83-01 and F95-42. F55-109, F73-07 and F83-01 were identified as a hearth. F46-01 and F95-42 are related to a posthole. The other features are described as a discolouration of the soil or an ash layer. F45-07, F45-11 and F45-14 are probably related to a burial that was found nearby. When looking at the ceramics found in F45-07 and F47-01, we see that they are characterised by typical Chicoid decorations (see figure 47). There are dates available from eight radiocarbon samples that can be linked to the occurrence of LCAWW at the site of El Flaco. The calibrated dates indicate that the emergence of LCAWW at El Flaco is situated at the end of the first half of the 12th century. The latest date for the presence of LCAWW at El Flaco is situated in the second half of the 15th century and coincides with the final habitation phase of the site (M. Hoogland, pers. comm., June 2021).

Figure 47: FL15.2256 (left and middle, F45-07, Chicoid) FL15.1357 (right, F47-01, Chicoid) (Photos by author for NEXUS 1492).

4.3 Summary

In this chapter the three sites used as a case study in this research have been presented. Previous research provided the background of the ceramic production at these sites, which I will use as a comparison for the analyses of LCAWW at these sites. The influences of sweeping processes and past local landscape transformations resulted in limited interpretations of the archaeological context. LCAWW was identified as minority in the ceramic assemblages of all three sites. It is clear that El Carril contains less LCAWW than El Flaco and probably also El Cabo (keep in mind that this assemblage was already preselected). This is possibly related to the fact that El Carril had a shorter occupation phase characterised by the presence of CHicoid pottery than the two other sites. The higher relative quantity at El Flaco is even more remarkable if you consider that El Carril is a much larger settlement. LCAWW was found areas with housing structures and areas related to other contexts such as hearths. At El Carril some of the higher concentrations in LCAWW could be linked to human burials. At Flaco the connection between human remains and LCAWW could also be made, although it was less clear than at El Carril. We must keep in mind that the contexts at the sites could not be as clearly defined as those from the site of En Bas Saline (Deagan 2004; see chapter 2). Nevertheless, also at El Flaco and El Carril LCAWW can be found in diverse contexts. The archaeological contexts for LCAWW at El Cabo could not clearly be identified due to past sweeping activities. Calibrated radiocarbon dates give an indication of the timeframe in which LCAWW at the three sites can be situated. LCAWW occurred at El Cabo between the 12th century and 1504. At El Flaco it was present between the first half of the 12th century and the 15th century. The calibrated dates at the site of El Carril situate the presence of LCAWW at the site between the end of the 11th century and the second half of the 14th century. The latest dates related to the occurrence of LCAWW at El Cabo and El Flaco are linked to the final occupation phase of the sites. This is not the case at El Carril, but there were only four dates of contexts related to LCAWW available at this site. In the following chapter I will present the results of the analyses that were carried out on LCAWW belonging to the ceramic assemblages of the sites presented in this chapter.

5. Results

5.1 El Cabo

5.1.1 Compositional analysis

5.1.1.1 Macro fabric analysis

Based on the parameters provided in chapter 3 and in collaboration with Martina Revello Lami (Leiden University) the samples from El Cabo were divided in six macroscopic fabric types/groups. In what follows I will give a short description and focus on the main discriminants between the groups. Macroscopic fabric analysis was used only as a first step to 'get to know' the assemblage. It serves as a basis for the petrographic analyses, which will be described extensively. The forms that were created for the macroscopic fabric description of each group can be found in the appendix 2.

Table 10: Distribution of macroscopic fabric groups of LCAWW at El Cabo.

Distribution of macroscopic fabric groups for LCAWW at El Cabo	
Group 1	27
Group 2	31
Group 3	40
'Group' 4	1
Group 5	12
Group 6	21

The first macroscopic fabric group (n=27) is characterised by buff-firing clays and the presence of fine to coarse plastic inclusions (0.02 – 1.5 mm). There are four types of coarse inclusions. The main discriminant between them is their colour: whitish/cement-like (common), orange (common), red (common) and translucent (rare). The fine fraction consists of whitish dull beats and black sand-like circular inclusions. Seven sherds within this group are set apart. They contain similar inclusions, but are made of a more iron-rich clay, giving them a more reddish to pink colour than the predominant grey to pale brown colour of the other sherds. The second group (n=31) is distinguished by the common to frequent occurrence of mat, blackish to dark brown, medium to coarse inclusions (up to 2 mm). Two sherds are again set apart due to their more iron-rich content and reddish colour. The differences with the third group (n=40) are bigger. While the sherds in group one and two are soapy with a hackly break, group three has a soapy to smooth feel, and conchoidal fracture. The main feature of group three is the presumed presence of burned out organic material in combination with medium-coarse inclusions, all occurring in mixed frequencies throughout the sherds. These characteristics point to a different mix of raw materials, which resulted in a denser clay. 'Group' 4 consists of only one sample. It is set apart due to its rough feel on the outside and the common presence of coarse, sub-angular inclusions with a whitish colour. The whitish inclusions were either translucent or cement-like. They were respectively, preliminary identified as quartz and calcite. Group five comprises twelve samples. They are characterised by a common to frequent presence of medium-coarse whitish, translucent inclusions, again identified as quartz. Next to that some of them show some black spots, possibly related to the presence of organic material. Finally, group six is compositionally similar to group two, but the fabric is extremely badly mixed. The inclusions present are also very coarse, some larger than 2 mm.

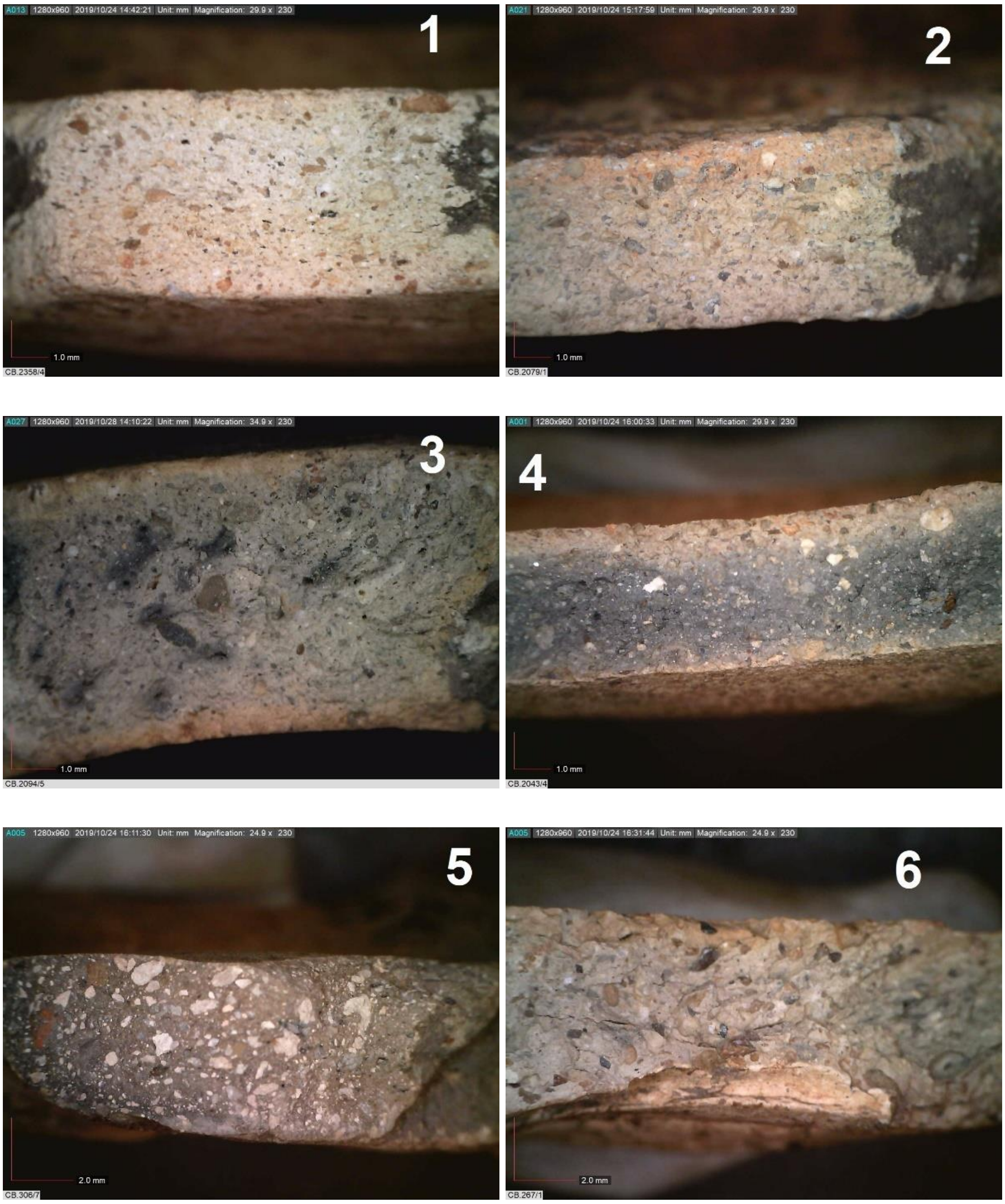


Figure 48: Macro fabric group 1 to 6: CB.2358/4, CB.2079/1, CB.2094/5, CB.2043/4, CB.306/7, CB.267/7 (Photos by author for NEXUS 1492).

Table 11: Samples from the site of El Cabo selected for petrography.

Selection petrography El Cabo		
Macro fabric group	*# of samples (total = 30)*	*Sherd numbers*
Group 1	6	CB.2153/3 CB.969/1 CB.1996/1 CB.3095 CB.011 CB.849
Group 2	7	CB.2079/1 CB.1761/8 CB.1737/1 CB.2035/1 CB.1995/5 CB.1761/6 CB.2283/2
Group 3	8	CB.2046/2 CB.3237/3 CB.3666 CB.2036/2 CB.1826/5 CB.2046/1 CB.3774/10 CB.2363/6
'Group' 4	1	CB.2043/4
Group 5	4	CB.1445/1 CB.1990/3 CB.2424/6 CB.1761/9
Group 6	4	CB.1254/1 CB.2071 CB.3091 CB.306/9A

Based on the macroscopic fabric analysis, 30 samples were chosen for further petrographic analysis. They were selected in such a way that they represent the compositional variability that was observed. Unfortunately, because of time management I had to select the samples for petrography before I could do the macroscopic trace analysis. Given the destructive nature of the production of thin sections for petrographic analysis, I also took into account the amount of indicative traces for macroscopic trace analysis that might have been destroyed if I selected very indicative sherds. The thin sections were prepared by Herman Nijs at Katholieke Universiteit Leuven (KUL).

5.1.1.2 Petrography

After individual analysis of each sample, the results were compared to each other and the sherds were divided in petrographic fabrics. We have to keep in mind here that we are looking at a collection of sherds that already has been selected based on certain similarities (see chapter 2), not for representing the maximum variability that has been macroscopically observed in the ceramic assemblage of the whole site. Based on the description of the 30 selected samples I identified one main group, three additional smaller groups and nine outliers.

5.1.1.2.1 Group 1: Fabric with clay streaks and volcanic component

<u>*Samples*</u>

Subgroup 1A*: CB.849A, CB.1761/6, CB.1826/5, CB.2035/1, CB.2046/1, CB.2071, CB.2363/6, CB.3237/2, CB.3666 and CB.3774/10. (n= 10)*

Subgroup 1B*:* CB.2153/3 and *CB.3095. (n=2)*

Group 1 consist of 12 samples characterised by the presence of similar, though highly irregular inclusions and volcanic rock fragments. These highly irregular inclusions have no systematic appearance. They occur in many shapes such as triangles, rounded shapes, … but they also occur without clear delineation. Next to that there is no consistent presence of air gaps within them. Crystals or other inclusions can be observed within these highly irregular inclusions. Their content is similar to that of the groundmass. Therefore, these inclusions are identified as clay streaks (P. Degryse, pers. comm., June 2020). Group 1 is the largest group I identified at the site of El Cabo, but there is also a high level of variability between the sherds in this group. I made a distinction between subgroup 1A and 1B based on the amount of volcanic rock fragments present. Subgroup 1A comprises 10 sherds with a frequent to dominant presence of clay streaks and a small volcanic component consisting mostly of fine-grained rock fragments with occasionally few larger feldspar crystals. Even within this subgroup a lot of variability was observed. Therefore, an attempt was made to further divide this subgroup based on the nature of the inclusions present, their size and the characteristics of the groundmass, but I did not succeed in making a clear subdivision. The use of a similar recipe for the samples in this subgroup can be identified, but there is a clear variety noticeable in size and quantity of the inclusions present. Other inclusions that can be present in the samples of this subgroup are quartz, feldspar, chert and limestone. The clay used for producing these vessels was badly prepared as pointed out by the heterogeneity of the groundmasses. Next to that the inclusions are very badly sorted. The (very) high optical activity of the groundmasses indicates a low firing temperature. The differences in firing conditions are clearly visible (also macroscopically). The vessels were all fired in an oxidizing atmosphere, but different degrees of oxidation can be observed, ranging from almost no oxidation to almost complete oxidation. There was clearly no standardization in firing conditions. The configuration of the drying cracks indicate that the groundmass of the samples shrunk too quickly because of the exposure to a rapidly rising firing temperature.

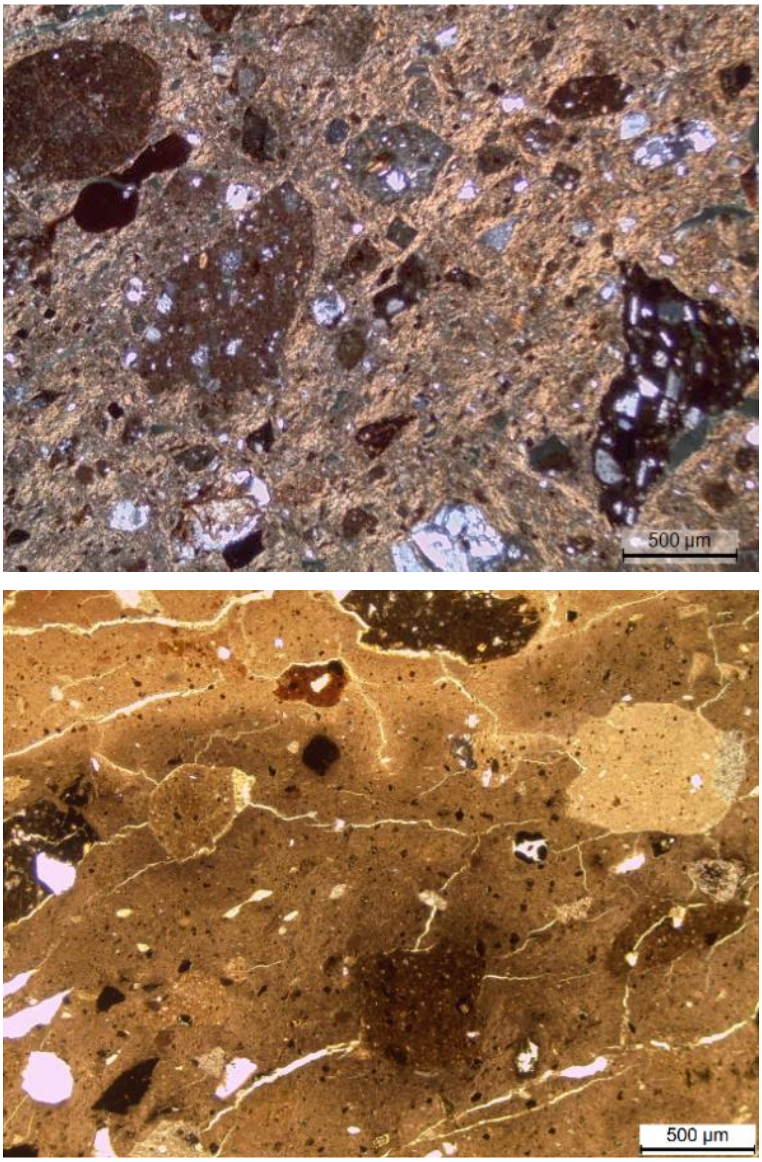
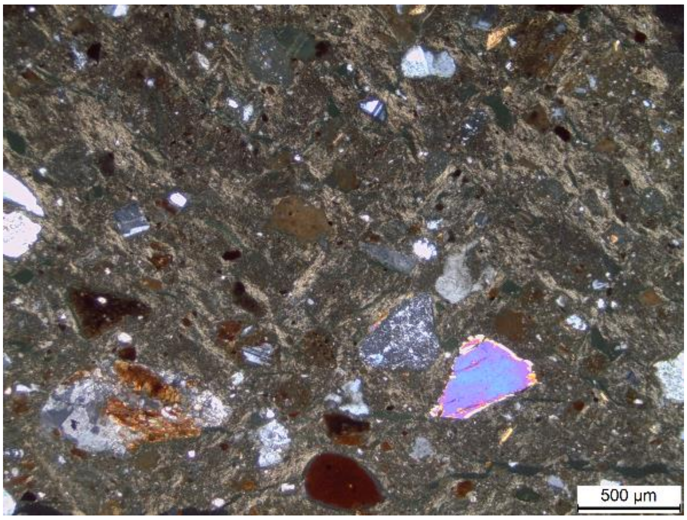


Figure 49: Examples of Subgroup 1A identified at the site of El Cabo. Heterogeneous matrix of CB.849 (top, XP, scale 500 µm)) with clay streaks and volcanic rock inclusions. Drying cracks of CB.2071 (down, PPL, scale 500 µm), caused by a rapidly rising temperature during firing (Photos by author for NEXUS 1492).

Subgroup 1B consists of two samples with a clearly larger volcanic component than the samples in subgroup 1A. The volcanic component in this case does not only comprise volcanic rock fragments such as is the case for subgroup 1A. It also consists of plutonic rock fragments that are often a combination of feldspar and amphibole crystals with a mode of 400 µm. CB.3095 has the largest volcanic component of both sherds. Quartz (common), amphiboles (few to common), pyroxenes (few) and biotite (rare to very few) were identified, next to the common presence of feldspar inclusions with a mode of 200 µm. CB.2153/3 does not only contain less overall inclusions, but also less mafic inclusions in comparison to CB.3095. Next to that few chert fragments were identified. The presence of clay streaks (common to frequent) is again significant for this subgroup. Both sherds have been incompletely oxidized and have a high optical activity. Their groundmass is heterogeneous.



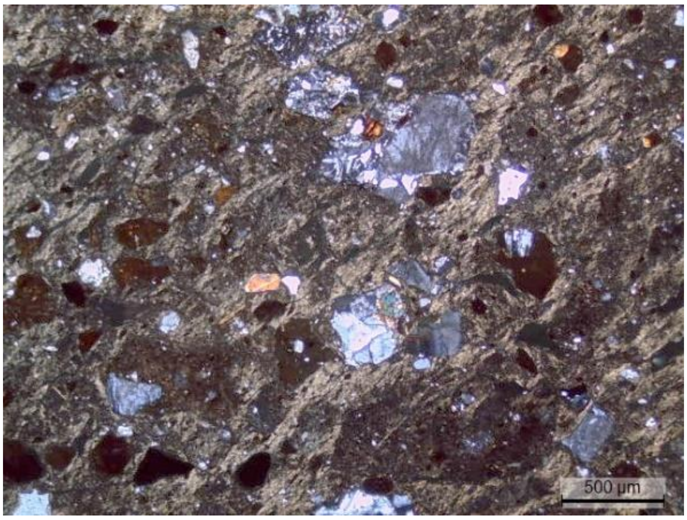


Figure 50: Examples of Subgroup 1B identified at the site of El Cabo. Presence of mafic minerals and igneous rock fragments in CB.2153/3 (Top, XP, scale 500 µm) and CB.3095 (Down, XP, scale 500 µm), next to the characteristic presence of clay nodules and a heterogeneous matrix (Photos by author for NEXUS 1492).

5.1.1.2.2 Group 2: Fabric with volcanic rock fragments and a small metamorphic component

<u>Samples</u>: CB.969/1, CB.1761/9, CB.1990/3, CB.2043/4 and CB.2046/2. (n=5)

The second group I identified comprises five sherds. The samples in this group are characterised by the (frequent to dominant) presence of volcanic rock fragments in addition to a small metamorphic component. The volcanic rock fragments often include quartz, feldspar and sometimes biotite crystals. They have a mode of 300-400 µm and are sub-rounded to angular. The (very few) metamorphic rock fragments present are characterised by foliation that is schist-like, with a mode of 300 µm. Other inclusions present are quartz (common), feldspar (few-common), amphiboles (few), pyroxenes (very few), biotite (very few) and clay nodules (very few). The groundmasses show a high optical activity, indicating a low firing temperature. They are also slightly heterogeneous, although less than was the case in the previous group. The dark core observed in the samples is a remnant of an incomplete oxidation process during firing. The inclusion size and sorting differs across the different samples. They range from fine sized to medium sized and single spaced to double spaced. Next to that CB.969/1 contains few calcareous inclusions. CB.1990/3 has pores that are somewhat parallel to the vessel walls, while the configuration of the pores of other samples is more chaotic. This can be related to the fact that CB.1990/3 is thinner and seems to be part of the body, while the other samples in this group are rims.

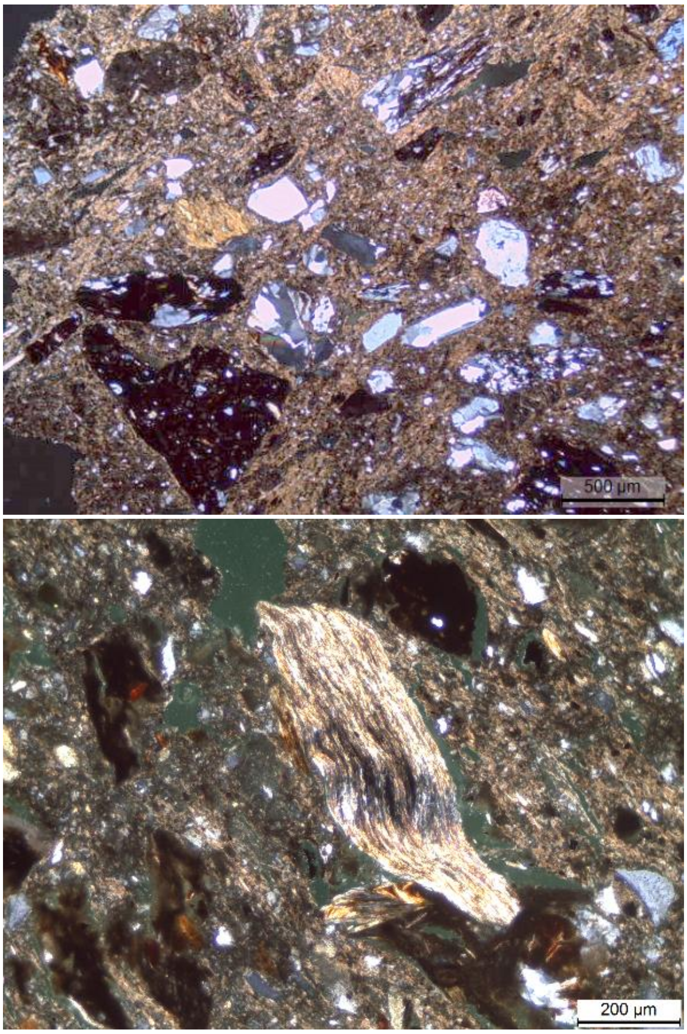
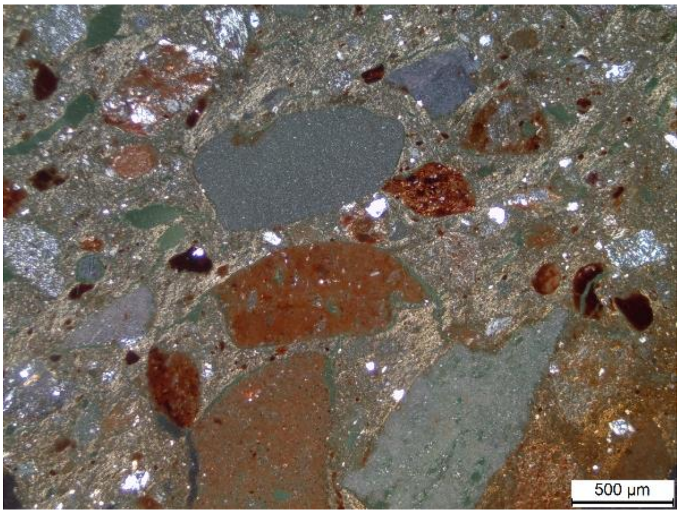


Figure 51: Examples of Group 2 identified at the site of El Cabo. Left: dominant presence of volcanic rock fragments in CB.2046/2 (XP, scale 500 µm). Right: Metamorphic rock fragment characterised by foliation in CB.2043/4 (XP, scale 200 µm) (Photos by author for NEXUS 1492).

5.1.1.2.3 Group 3: Fabric dominated by sedimentary rock fragments

<u>Samples</u>: CB.1761/8 and CB.1254/1 (n=2)

This group contains two samples that are characterised by sedimentary rock fragments (dominant) and an additional small volcanic component (few). Both samples have a rather iron-rich groundmass with some fine quartz and opaque inclusions. The other inclusions present are mostly medium- to coarse-sized, very badly sorted and packed to single-spaced. They comprise sub-rounded to rounded sedimentary rock fragments that can be identified as mudstone or siltstone. They are large and can measure up to 1-1.5 mm. Next to that few sub-rounded to sub-angular volcanic rock fragments were observed. Other inclusions present are quartz, feldspar, chert, clay pellets and sandstone. The groundmasses of both samples have a high optical activity, indicating a low firing temperature. Next to that they are (slightly) heterogeneous. Both sherds have been incompletely oxidized.



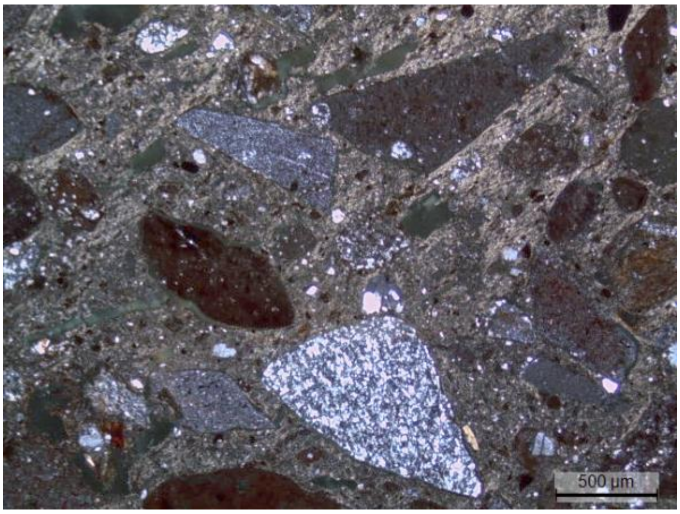
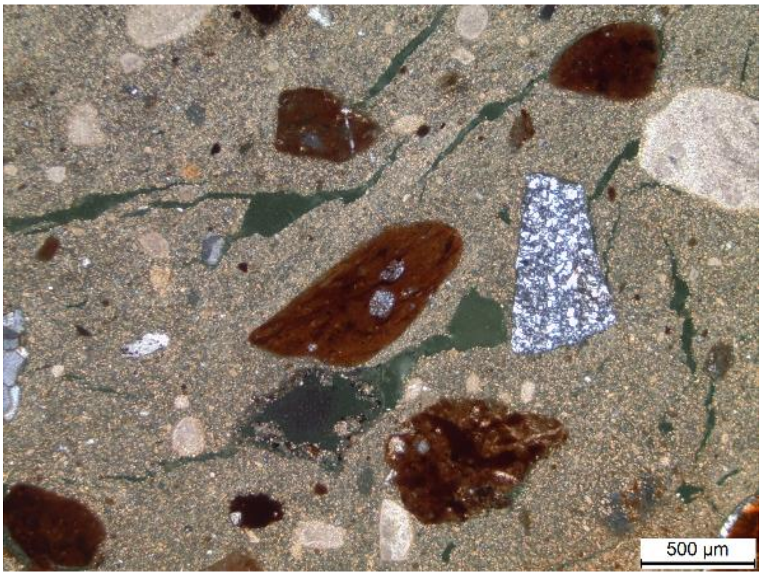


Figure 52: Examples of Group 3 identified at the site of El Cabo. The characteristic presence of large sedimentary and volcanic rock fragments in CB.1253/1 (Top, XP, scale 500 µm) and CB.1761/8 (Down, XP, scale 500 µm) (Photos by author for NEXUS 1492).

5.1.1.2.4 Group 4: Limestone-based fabric with quartzite

__Samples__: CB.306/9 and CB.1995/5 (n=2)

Group four also consist of two samples. They are characterised by the common to frequent presence of limestone. The limestone inclusions are rounded to sub-rounded and range between 50 and 600 µm. Another characteristic inclusion for this group is quartzite, which occurs common to frequent. The quartzite fragments are mostly sub-angular, with a mode of 300 µm. Rounded red clay pellets are present as well. Next to that this group has a small sedimentary component that is represented by the occurrence of chert, sandstone and mudstone/siltstone inclusions. The inclusions are very badly sorted and single to double spaced. The groundmasses of both samples are homogenous and microcrystalline. They also have a high optical activity and are incompletely oxidized.



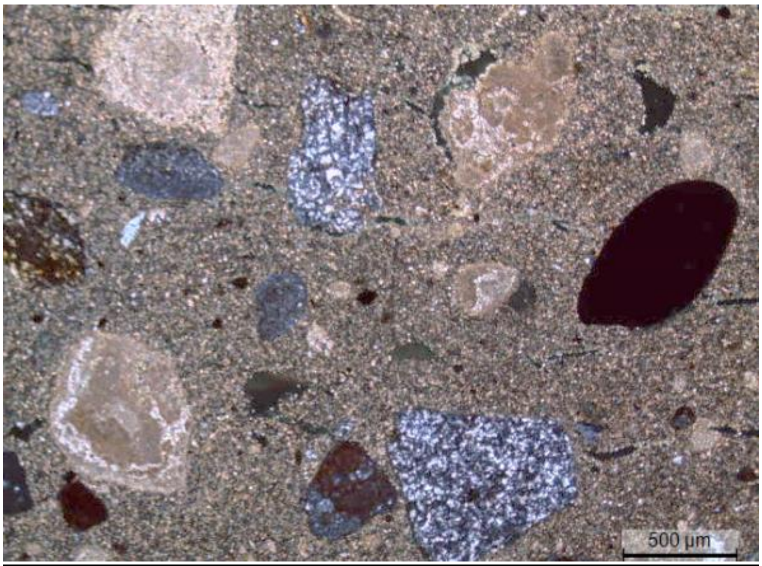


Figure 53: Examples of group 4 identified at the site of El Cabo. Presence of limestone, rounded clay pellets and quartzite in CB.1995/5 (Top, XP, scale 500 µm) and CB. 306/9 (Down, XP, scale 500 µm) (Photos by author for NEXUS 1492).

5.1.1.2.5 Outliers

In total no less than nine outliers were identified: CB.011, CB.1445/1, CB.1737, CB.1996/1, CB.2036/2, CB.2079/1, CB.2283/2, CB.2424/6 and CB.3091. The latter is the only one among the outliers that has a clear linkage to one of the groups identified. Based on its content and heterogeneity this sample is related to group 1, as it is characterised by the presence of clay nodules and volcanic rock fragments. I chose to mark **CB.3091** as an outlier, because of the way it was prepared. While the samples in group 1 have inclusions of all sizes, this is not the case for CB.3091. The inclusions in this sample are either smaller than ±150 µm or bigger than ±650 µm. The whole middle fraction of inclusion sizes is not present. Therefore, I believe that the practices applied to CB.3091 are different from the practices linked to group 1. The absence of the middle fraction can point to two things: the levigation/sieving of a clay to remove the middle fraction that was naturally present; or the absence of a naturally present middle fraction and the addition of larger inclusions. As there are large(r) inclusions present, the levigation/sieving possibility seems unlikely, as this process would have also removed the larger inclusions that are still present in the sample.

CB.011 is made from a non-calcareous clay that has been fired at a high temperature, as indicated by the very low optical activity of the groundmass. The sherds was fully oxidized during the firing process. The inclusions present are mostly from a volcanic origin. There is a dominant presence of unidentified, sub-rounded to sub-angular volcanic rock fragments consisting of quartz and feldspar crystals in combination with a reddish altered mineral, probably mica. These volcanic rock fragments have a mode of 400 µm. Next to that chert fragments, quartz, feldspars and amphiboles were observed. **CB.2079/1** consists of a homogenous calcareous clay of a marine origin, pointed out by the predominant presence of shells and bioclasts with a mode of 300 µm. Other inclusions are quartz and iron-rich particles. The sherd has been completely oxidized and has a high optical activity. **CB.1737** shows a frequent presence of volcanic rock fragments with a mode of 300 µm. The fragments are silica-rich and characterised by small grains and feldspar laths. Next to that the sample contains common clay pellets and fine quartz and feldspar crystals. The sherd has a moderate optical activity and is incompletely oxidized. **CB.1996/1** is very fine-grained with well-sorted inclusions, predominantly quartz and some clay nodules. The inclusions are double to open spaced. The sherd is completely oxidized and has a very high optical activity, pointing to a low firing temperature. **CB.1445/1** is characterised by the presence of feldspars (common) with a mode of 150 µm and plutonic rock fragments with a mode of 400 µm, mostly consisting of a combination of feldspar and amphibole. Amphibole crystals are also an important component of this petrographic fabric. Next to that quartz, clay nodules and olivine were observed. The inclusions are very badly sorted and are close to single spaced. The sherd is fully oxidized and has a high optical activity. **CB.2283/2** is composed of limestone, feldspar, clay nodules, quartzite and some minerals with third order interference colours. The inclusions are medium-coarse and the groundmass has a high optical activity. Remarkable about this sherd is that the inside is more sintered than the outside. Next to that the inside is dark red, while the edges are more beige. This is possibly explained by the post-burial deposition of micrite which has not reached the inside of the sherd. **CB.2036/2** has a very fine-grained groundmass with very few and small inclusions (open spaced). The inclusions present are quartz crystals (dominant), limestone (common), clay pellets (common) and sandstone (few). The sherd is incompletely oxidized and has a rather homogenous groundmass. **CB.2424/6** contains frequent feldspars and common quartz crystals. The other inclusions present are clay pellets, volcanic rock fragments and chert. The inclusions are very badly sorted and are close to single spaced. The groundmass is fine-grained, homogenous and has a high optical activity.

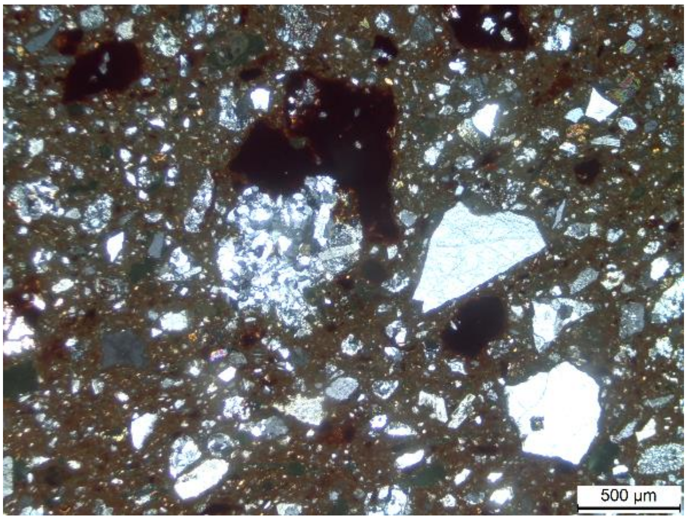


Figure 54: The presence of volcanic rock fragments containing feldspar and mica in CB.011 (XP, scale 500 µm) (Photos by author for NEXUS 1492).

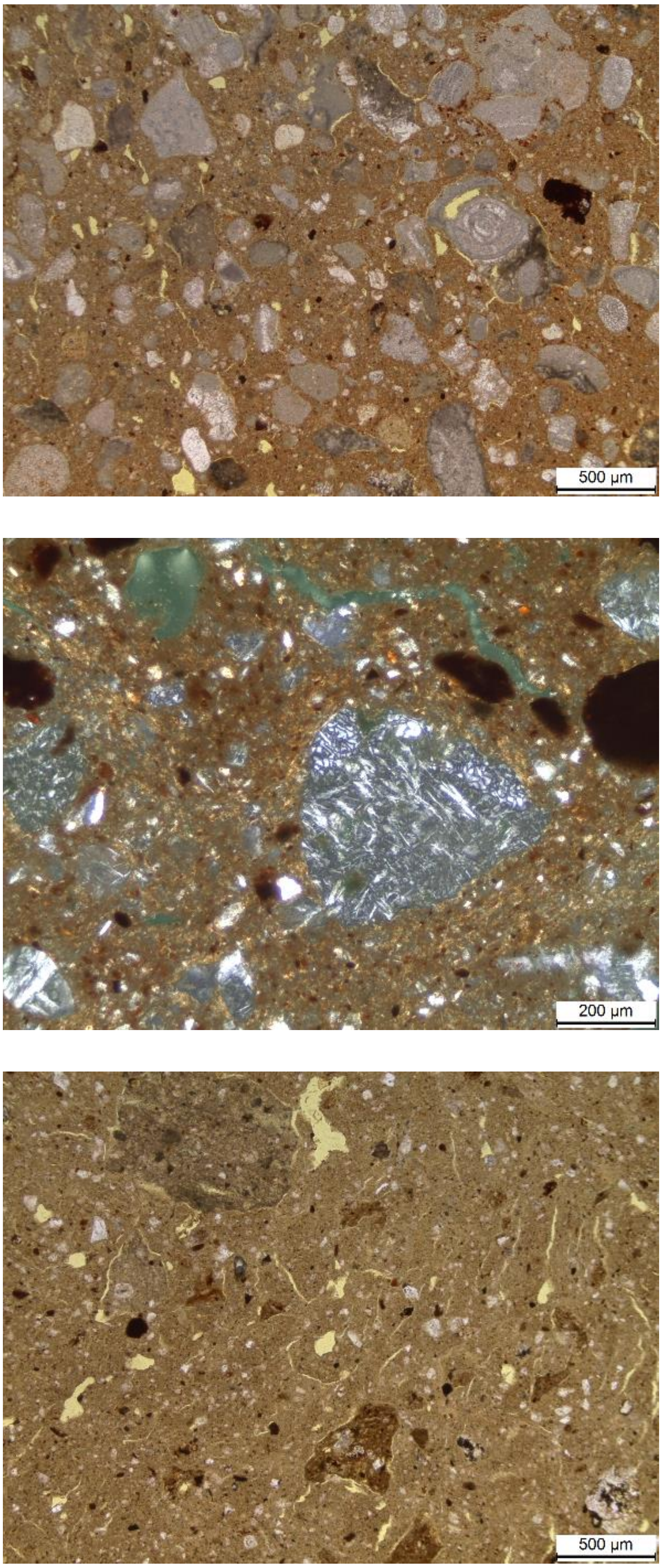


Figure 55: Inclusions from a marine origin in CB.2079/1 (Top, PPL, scale 500 µm),. Silica-rich volcanic rock fragments with feldspar laths in CB.1737/1 (Middle, XP, scale 200 µm). Presence of fine quartz crystals and clay nodules in CB.1996/1 (Down, PPL, scale 500 µm) (Photos by author for NEXUS 1492).

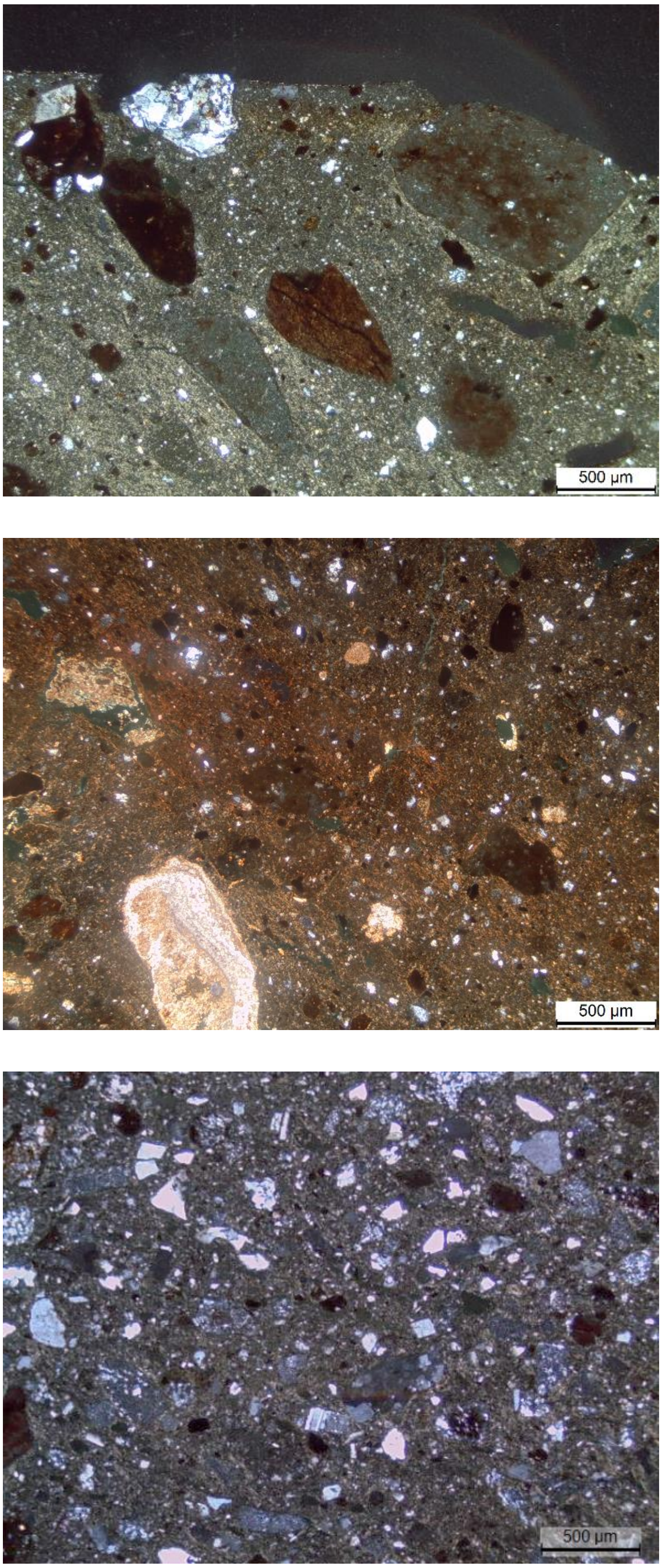
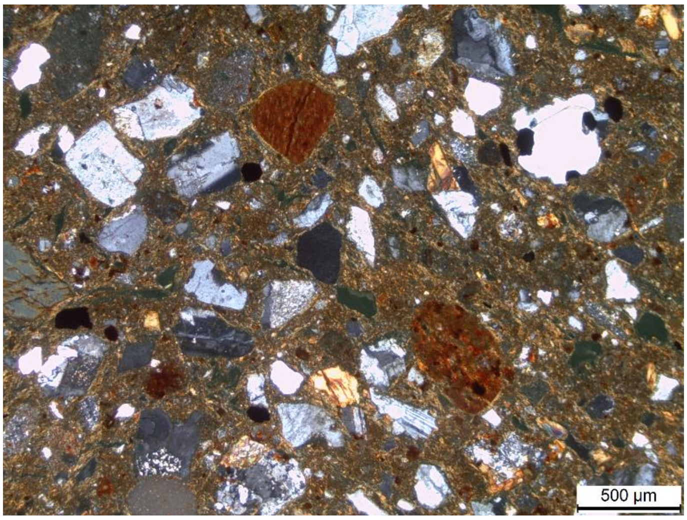


Figure 56: The bimodal inclusion distribution of CB.3091 (Top, XP, scale 500 µm). The very fine-grained groundmass with quartz crystals, limestone, clay pellets and sandstone of CB.2036/2. (Middle, XP, scale 500 µm). The presence of feldspars, quartz crystals, clay pellets, volcanic rock fragments and chert in CB.2424/6 (Down, XP, scale 500 µm) (Photos by author for NEXUS 1492).



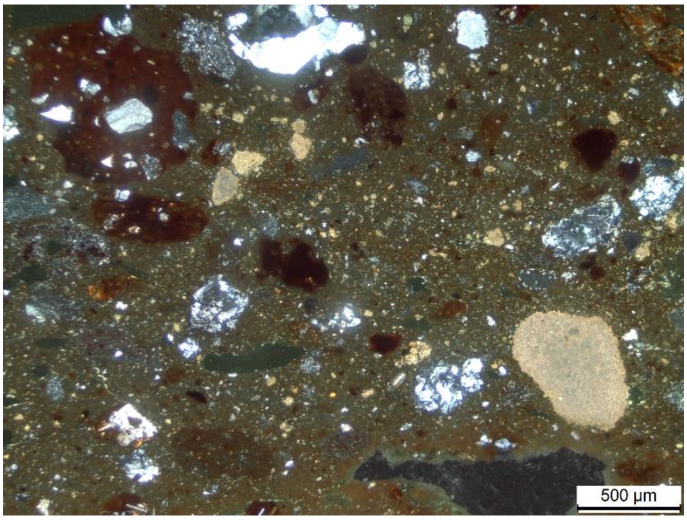


Figure 57: Presence of feldspar, plutonic rock fragments and amphiboles in CB.1445/1 (Top, XP, scale 500 µm). Presence of limestone, feldspar, clay nodules, quartzite and small minerals with third order interference colours in CB.2283/2 (Below, XP, scale 500 µm) (Photos by author for NEXUS 1492).

5.1.2 Macroscopic trace analysis

I found that 90 of the 118 sherds from El Cabo had identifiable traces that could help us to understand the manufacturing techniques used. The twenty eight sherds that were considered as non-informative were for the most part *adornos* or other appendages. I could infer that they were generally made from assembled elements of clay, but further interpretation was not possible. Elements of decoration of these sherds were noted and taken into consideration for that step of the *chaîne opératoire*, in combination with the results of the diagnostic sherds. The assemblage of LCAWW that was available to us consisted mostly of rims and appendages/*adornos*. The reconstruction of *chaîne opératoire* should be based on observations of all parts of the vessel: base, body and rim (Roux 2019). What follows is the interpretation of the manufacturing techniques derived from the parts of the vessels that were available to us. I divided the presentation of the results of the macroscopic trace analysis following the description of Roux (2019) in 4 parts: fashioning, finishing, surface treatments and decoration.

5.1.2.1 Fashioning

The fashioning techniques identified were similar for all the sherds, both for the roughout and the preform. The roughout is obtained from assembled elements without the use of rotative kinetic energy (RKE), more specifically by coiling. This means that coils, i.e. rolls of clay, are built up to establish the vessel circumference and gradually increase the height of the vessel (Rice 1987, 127). This can be seen from (semi-)equidistant discontinuities in the radial section. It is also indicated by the presence of preferential brakes. A range of coil sizes can be observed, varying in different parts of the vessel as the coil size generally increased going downwards from the rim to the base. The coils around the rim usually have a diameter of around 0.6 to 0.7 cm that extended slightly to 0.8-1.0 cm. The main coiling technique observed is coiling by pinching, pointed out by an irregular profile with rhythmic undulations along the surfaces of the vessels that can be associated to the succession of coils (Roux 2019, 160). Horizontal fissures and over-thicknesses indicate movement of the coils by discontinuous pressure. They are joined in a superimposed way by applying discontinuous pressure with the thumb and fingers on either side of the coil, resulting in a slight thinning of the coil (Roux 2019, 55). This interpretation is reinforced by the observation of semi-circular, U-shaped joining of coils and oblique fissures in the radial section (Roux 2019, 160). Few traces also indicate a coiling technique by spreading. In this case coils are joined by a horizontal movement of the fingers. The coils are no longer superimposed, but are built up through internal/external apposition. Coiling by spreading causes a larger thinning of the coils than coiling by pinching (Roux 2019, 160). The spreading technique was observed at the top (near the rim) of some closed vessels, where coiling by superposition could not be used to create the same shape. In this cases I see a stronger deformation/thinning of the coils, resulting in an initial coil size of around 0.4 cm. For one sherd this could be linked to a spiral forming technique that gradually transitioned into a segment forming procedure which is the regular forming procedure generally observed. In this case coils were very irregular and applied on the inner face. The (only) base that I examined was made of a clay disk. The coils were added on top of the disk, not on the side. The juncture between the body and the base (i.e. the clay disk) was reinforced with an additional coil, indicated by a curvilinear fissure in the radial section.

Traces that allow us to interpret the used preforming technique are more difficult to spot. This is because the successive finishing operation (see below) removed a lot of those traces as it refined the shape of the preform. Nevertheless, imprints point to the application of discontinuous pressure with fingers on wet clay as the main preforming technique (V. Roux, pers. comm., February 2020).

Figure 58: CB.707/6 (Top): Arrows indicate the semi-circular, U-shaped deformation that is the result of coiling by pinching. CB.849 (down): arrows indicate a horizontal fissure that is indicative of a coiling technique. The circles/ovals indicate depressions caused by the application of discontinuous pressure during the roughing out and the preforming of the vessel (Photos by author for NEXUS 1492).

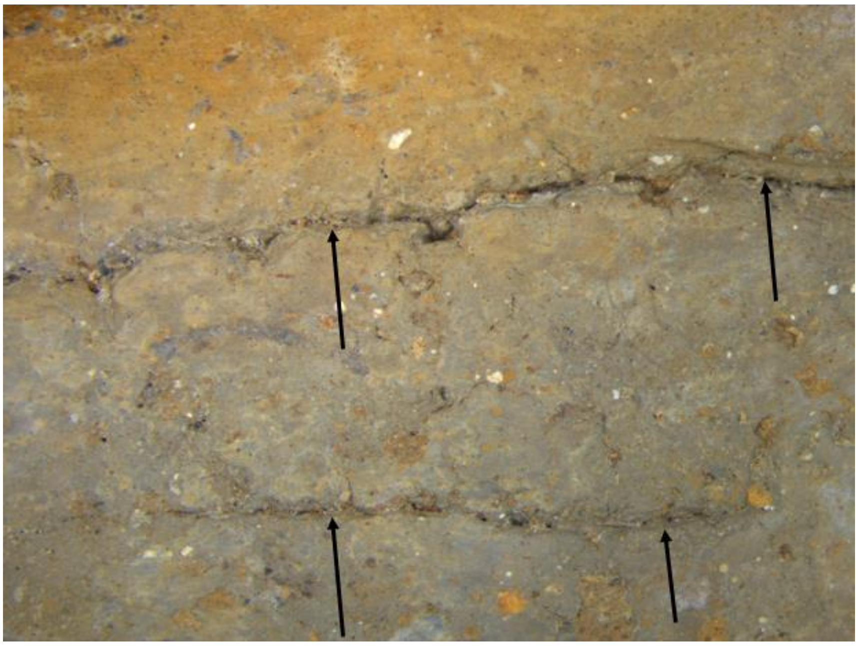


Figure 59: Arrows indicating concentric fissures on sherd CB.1593/1 (Photo by author for NEXUS 1492).

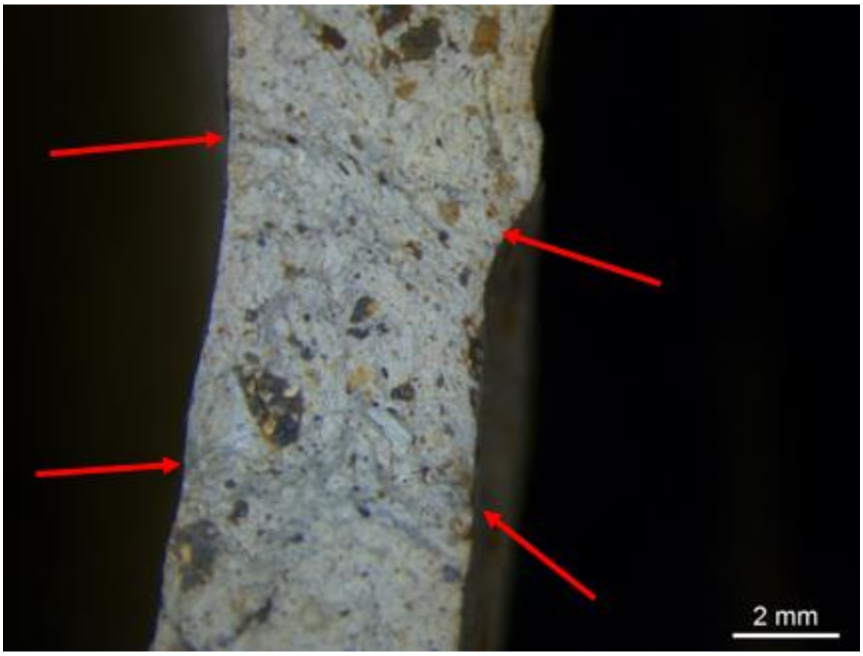


Figure 60: The irregular profile of CB.1517/2 and oblique fissures noticeable in its radial section (Photo by author for NEXUS 1492)

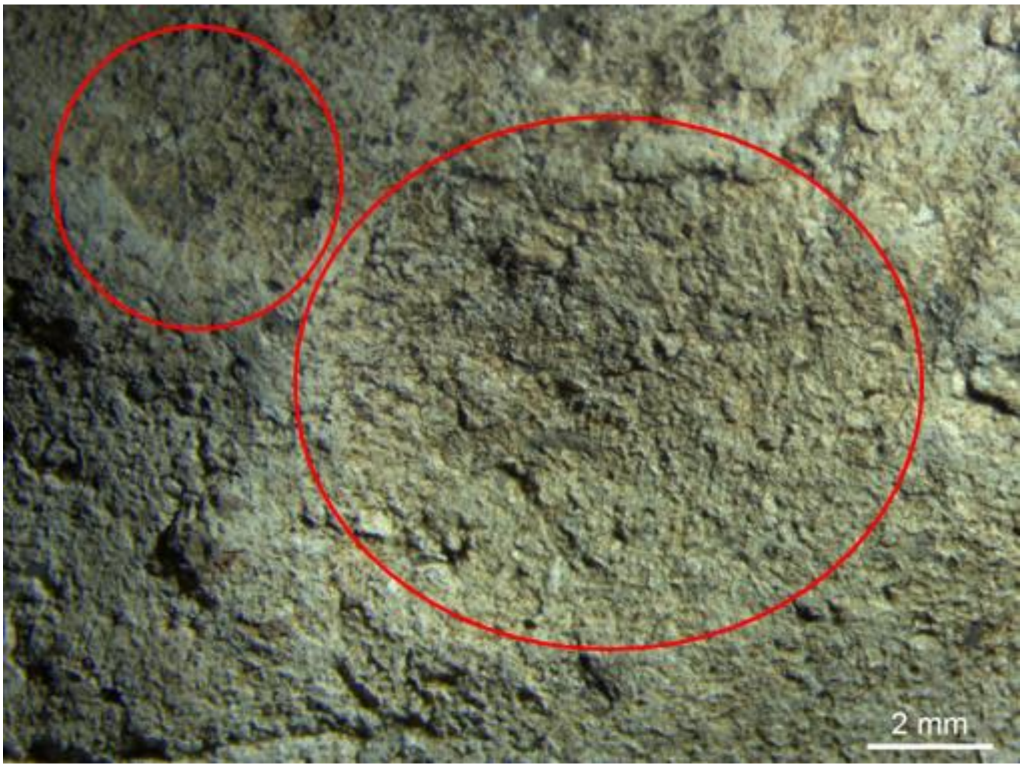


Figure 61: Depressions caused by pinching and preforming with discontinuous pressure on the inner surface of CB.1517/1 (Photo by author for NEXUS 1492).

5.1.2.2 Finishing

The finishing operation could not be identified for each sherd. This is due to the fact that the successive surface treatment often removed all the diagnostic traits of the finishing operation. Consequently traces for determining the finishing operation are to be found at spots where the surface treatment was not well performed, where surface treatments were not carried out, but also were they could not be carried out due to the shape of the vessel. So although the surface treatment for most of the vessels is unknown, examination of the previously mentioned spots led to the identification of smoothing on humid clay (without RKE) as finishing technique for some sherds on the inside. The smoothing process was carried out with fingers or with a smooth tool on humid clay. Generally the smoothing was 'dry', without the addition of water, as indicated by an irregular microtopography with protruding grains. In some cases the same smoothing operation has been observed with the use of additional water, leading to an irregular microcrotopography with reticulated threated striations and over-thicknesses (Roux 2019, 196).

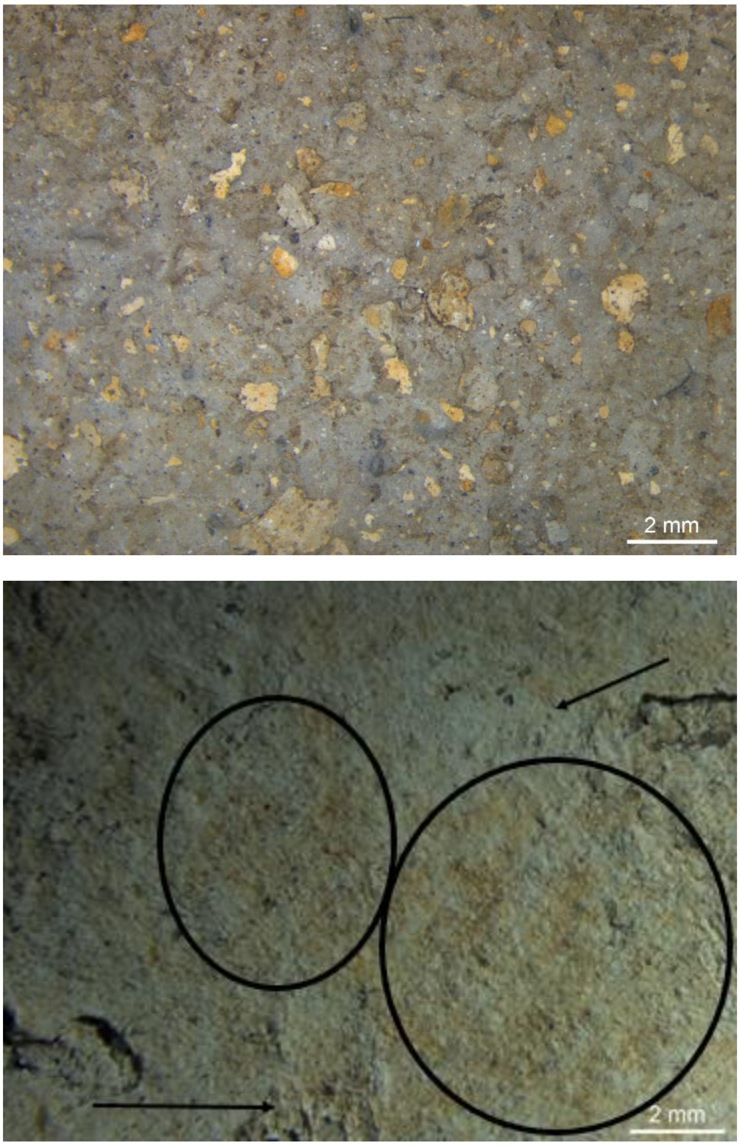


Figure 62: CB.1345 (top): inner surface showing protruding grains and an irregular microtopography as evidence of the dry smoothing of humid clay. CB.1517/2 (down): inner surface showing reticulated threaded striations (circles), an irregular microtoporapghy (lower arrow) and over-thickness (upper right arrow), indicating the smoothing of humid clay with additional water (Photos by author for NEXUS 1492).

5.1.2.3 Surface treatments

Two surface treatments were identified: burnishing and clay coating. All the sherds were burnished on the outside. In few cases the outer surface was extremely eroded due to post-depositional processes, making determination of the surface treatments on the outside impossible. The traces indicating a burnishing procedure are: a compact microtopography with inserted grains, a shiny surface and striations. These traces are caused by rubbing a tool, possibly a pebble, on the leather hard surface of the vessels without the addition of water (Roux 2019, 201). Sometimes the shiny effect has disappeared from (parts of) the surface. Burnishing has also been determined as the main surface treatment of the inner surfaces. Only when smoothing was observed as the finishing technique on the inside, burnishing traces could not be observed.

A second surface treatment is the application of a clay coating. The addition of an extra layer of clay can easily be seen by variations in the thickness of the clay coating or over-thicknesses and the whitish colour that contrasts with that of the clay paste. Usually, other traces can also be observed, such as "a surface combining protruding grains covered with a fine film of clay and floating grains, a fluidified microtopography, ribbed striations" (Roux 2019, 202). The reason there are no such traces in the assemblage, is twofold. Firstly, the slip used is very pure, containing almost no inclusions. Secondly, those traces were eliminated by a successive surface treatment, more specifically burnishing (see above). The grains are inserted, since the burnishing of the slip also affects the surface of the ceramic. The areas where the slip has disappeared show a matt and not a shiny surface, indicating that the surface was not burnished before the addition of the clay coating (S. Manem, pers. comm, April 2021). Next to that is remarkable how only one sherd (CB.011) shows a clear and thick slip layer. The slip layer of the other sherds has partially disappeared and is thinner and/or flaky. Decorations were both applied after and before the addition of the clay coating.

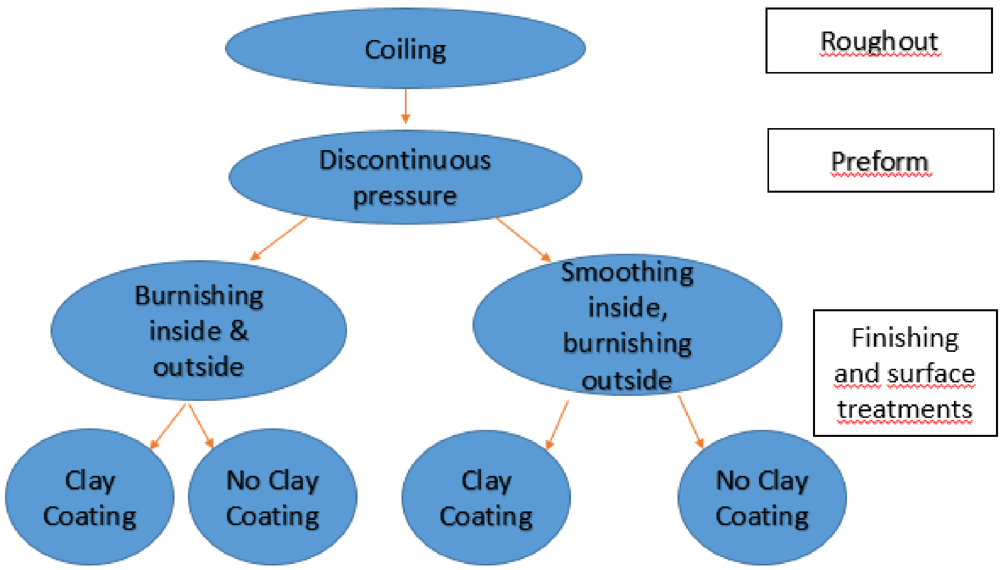


Figure 63: Overview of manufacturing techniques observed for the roughout stage, the preform, the finishing techniques and the surface treatments for LCAWW at the site of El Cabo (Image by author).

Figure 64: CB.011 (left): thick and clear white slip layer applied on a reddish clay. CB.2216/1 (right): white, thinner clay coating on a brownish clay. The arrows indicate the absence of a coating in the decorations, which means the sherd was decorated after the application of the clay coating (Photos by author for NEXUS 1492).

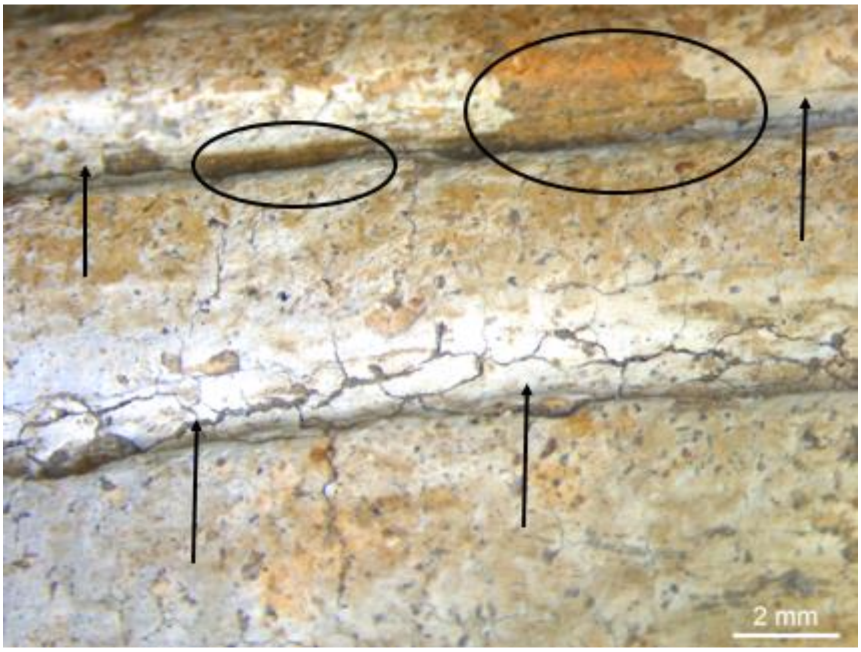


Figure 65: CB.3774/10, The arrows indicate the presence of a coating in the decorations, which means that the application of the clay coating took place after decorating the vessel. The circles indicate spots were the coating layer has disappeared (Photos by author for NEXUS 1492).

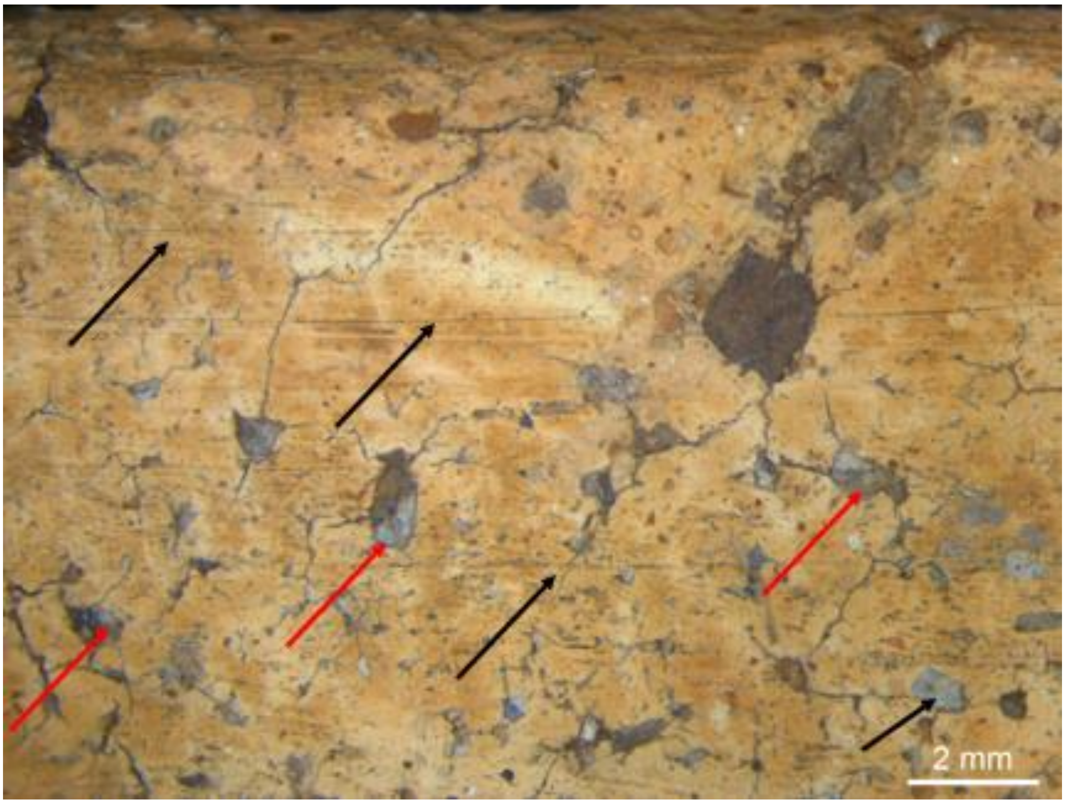


Figure 66: CB.1873/1 showing traces of burnishing. Black arrows indicate striations/micro pullouts caused by rubbing the surface. Red arrows point to inserted grains (Photo by author for NEXUS 1492).

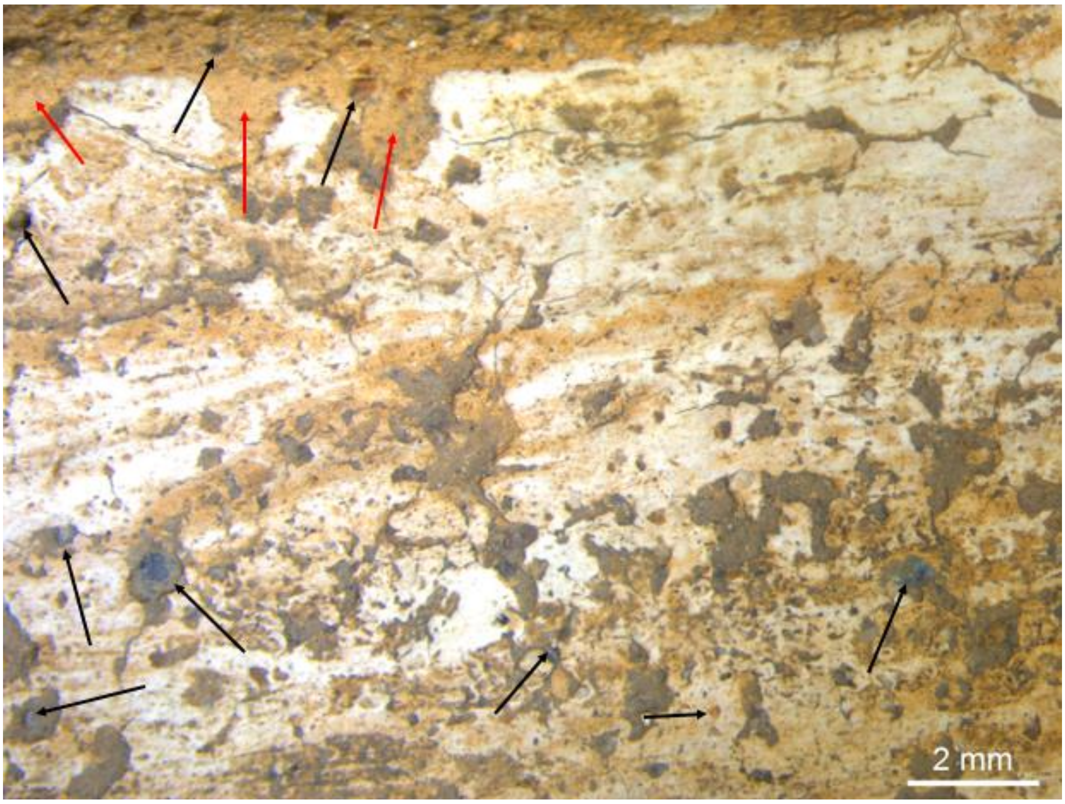


Figure 67: CB.2016/2. Red arrows point to matt surfaces where the clay coating has disappeared. Black arrows point to inserted grains. These traces indicate that the clay coating was applied before burnishing (Photo by author for NEXUS 1492).

5.1.2.4 Decoration

The decorations that have been identified are incisions, punctations and the use of applied elements[2]. Often two or even three different types of decorations were combined in one sherd. The incisions generally have a width between 0.2 and 0.4 mm. Very few incisions are narrow and have a width of only 0.1 mm. The punctations have a diameter of 0.2 or 0.3 mm. When they represent eyes of an *adorno* they can measure up to 0.5 mm. The methodology of Roux (2019) distinguishes between a technique of incision and one of excision. Incision is the action of drawing patterns with linear movements using a tool to incise the vessel. Excisions on the other hand is described as "shaping hollowed or relief decorations by removing material from leather-hard paste" (Roux 2019, 108). In Caribbean archaeology the difference between these two decorative techniques is usually not made, as they are both grouped under the term "incision" where a further distinction is made based on their width. I observed here that the smaller 'incisions' are indeed incised, while broader 'incisions' are actually excised. Sometimes the width of an excision can show differences in width on the same sherd due to the fact that the decorative technique is not well-applied. The incisions and excisions have a compact microtopography with scalloped or slightly scaled edges, indicating that they were performed on leather-hard paste (Roux 2019, 205). Striations were identified on the bottom of the excisions, pointing to the use of a wet tool. The decorations on the vessels with a clay coating were applied after the addition of the coating. This is indicated by the absence of a coating layer in the grooves of the decorations.

[2] The use of this terminology is derived from the modal analysis developed by Irving Rouse (1939)

Figure 68: CB.267. Arrows point to striations that are the result of excision with a wet tool on leather-hard clay (Photo by author for NEXUS 1492).

5.1.3 Morphological and stylistic analysis

The selection consists of 76 rims, one base, nine body sherds, nine appendages, 18 *adornos* and 6 sherds that are either a rim or a body sherd in combination with an *adorno*. I was able to determine the vessel shape of 75 sherds. Ten rims are linked to bottle mouths (13%). The diameter of the opening of the bottle mouths lies between 1.3 and 3.0 cm. The thickness of the vessel walls of the bottle mouths ranged between 0.7 and 1.1 cm. The rim shape of the bottles was outward thickened with an external bolster and a taper (Nr. 54, see codebook Hofman 2005). Two bottle mouths were decorated, one with incisions and the other one with zoomorphic modelling combined with incisions; both point to a Chicoid style. Additional information on the shape of the bottles (e.g. globular, mammiform etc.) could not be retrieved. Two body sherds are also linked to a bottle/jar shape and are decorated with anthropo-zoomorphic modelling. Four additional body sherd can be identified as (part of) a bottle neck with the mouth broken off. One, heavily-eroded bottle neck is decorated with applique and incisions. It is not possible to relate this sherd to a specific pottery style, but I must note that it shows remarkable similarities with one of the sherds found at White Marl, Jamaica (see chapter two). In total 13 sherds are related to a bottle/jar shape (17%).

Figure 69: CB.2000, a bottle neck from El Cabo decorated with applique and incisions (left, photo by author for NEXUS 1492), and a very similar bottle neck found at the site of White Marl, Jamaica (right, photo courtesy of Lesley-Gail Atkinson).

The remaining 62 sherds give an indication about the vessel shapes that occur next to bottles. The majority of the sherds are related to restricted vessel shapes. The most frequently occurring vessel shape is a restricted bowl with a composite contour (61,3%). Most of them have a convex wall. Another restricted vessel shape that was identified, is a jar with a corner point (2,7%). Unrestricted vessel shape observed are dishes (8%) and bowls with a corner point (10,7%). The diameter of the opening of the vessels ranges between ±5 and 35 cm, with an average of 20.7 cm.

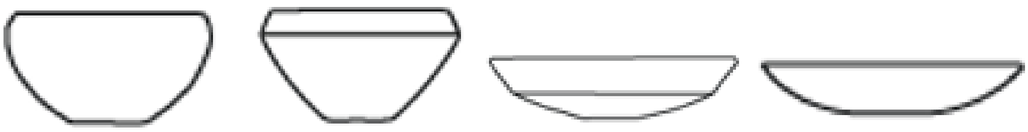


Figure 70: The most common vessel shapes of LCAWW in El Cabo, next to bottles. From left to right: restricted bowls with a composite contour (61,3%), jar with a corner point (8%), bowls with a straight wall and a corner point (10.7%) and dishes (8%) (Adapted from Hofman 2005).

30 sherds are decorated, including 24 rim sherds and six body sherds. Next to that most of the appendages are decorated as well. The decoration is typically related to the decorative style of the Chicoid series, including broad incisions, incisions in combination with punctations and modelled faces. There are 24 *adornos*: 14 with zoomorphic modelling, three with anthropomorphic modelling and seven with anthropo-zoomorphic modelling. 'Identifiable' depictions are frogs, owls, people with headdresses and probably a monkey. The latter is very elaborate and big. Moreover it is the top part of a bottle, a

small opening in its head was used to pour out the liquid. There are few *adornos* that have large dimension of five centimetre or larger.

Figure 71: Clockwise: CB.1636 (monkey), CB.1761/4 (frog), CB.1252/1 (anthropomorphic adorno with headdress) and CB.2210 (unidentified) (Photos by author for NEXUS 1492).

5.2 El Carril and El Flaco

5.2.1 Petrography

Ten sherds from El Carril and nine sherds from El Flaco were selected during the field campaign of the NEXUS 1492 project in 2019. The thin sections were prepared by Herman Nijs at Katholieke Universiteit Leuven (KUL). The sherds were selected in such a way that they represented the compositional and morphological variability present in the whole assemblage of LCAWW from the sites. Due to unforeseen circumstances and time pressure the selection did not happen according to the rigid structure of the macroscopic fabric analysis I presented in chapter 3. Instead, it was based on a very rudimentary version of the same procedure that was shaped by the (compositional) interpretation of the author at that time. The procedure for petrographic analysis was the same as the one for the analysis of the sherds from El Cabo (see also chapter 3). In total four groups and seven outliers were identified.

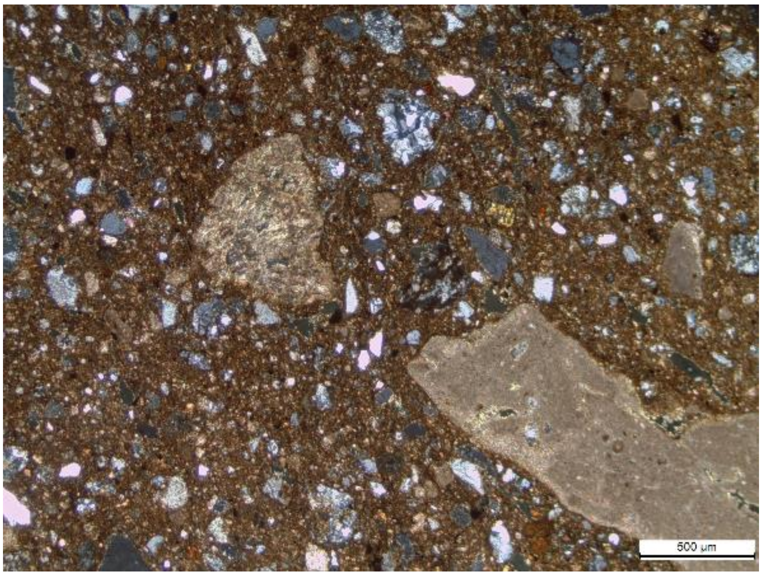
Table 12: Overview of the LCAWW sherds from El Flaco and El Carril selected for petrography.

Selection petrography LCAWW northern Dominican Republic	
El Carril	**El Flaco**
CA17.479/01	FL14.772/4
CA17.1173/01	FL15.1678/02
CA17.1195/3	FL15.2301/11
CA18.1688/3	FL16.2583/3
CA18.1820/01A	FL16.2726/03
CA18.3367/01	FL16.2744/6
CA18.3633/02	FL16.2757/01
CA19.4146/A	FL16.2764/01
CA19.4157/2	FL16.2841/8
CA19.4482/1	

5.2.1.1 Group 1: Fabric with Limestone and igneous rock fragments

Samples: CA17.1173/01, CA17.1820/01A, FL16.2726/03, FL16.2841/8. (n=4)

This group is characterised by the common to frequent occurrence of (sub-)rounded limestone fragments that measure up to 1.5 mm, with a mode of 200 µm. Other rock fragments also occur, more specifically few volcanic and few to common plutonic rock fragments. The igneous rock fragments are sub-rounded to sub-angular and measure up to 1 mm, with a mode of 300 µm. Other common occurring inclusions are sub-rounded to sub-angular quartz and feldspar crystals. Next to that clay pellets and very fine mafic minerals, such as amphiboles and clinopyroxenes (e.g. augite) are present. The inclusions are badly sorted and are single spaced. The groundmasses of the samples in this group are fine, calcareous and microcrystalline. They have a high optical activity. The firing conditions observed for this group range from full to incomplete oxidation.



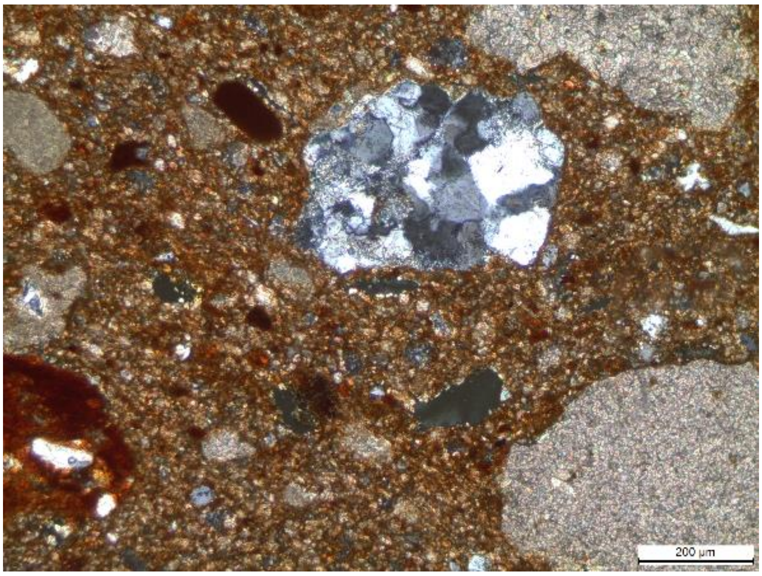


Figure 72: Examples of Group 1 identified at El Flaco and El Cabo. Large limestone fragments, quartz, feldspar and igneous rock fragments in CA17.1820/01A (Top, XP, scale 500 µm). Limestone inclusions, clay pellets and an igneous rock fragment against the microcrystalline matrix of FL16.2841/8 (Down, XP, scale 200 µm) (Photos by author for NEXUS 1492).

5.1.2.2 Group 2: Limestone-dominated fabric

<u>Samples</u>: *CA17.1995/3, CA18.3367/01. (n=2)*

Group 2 comprises two samples, both from the site of El Carril. They are characterised by the dominant presence of sub-rounded limestone inclusions, measuring up to 1.5 µm and with a mode of 300-400 µm . Other inclusions present are few to common sub-rounded to sub-angular quartz and feldspar crystals, and andesitic volcanic rock fragments. CA17.1195/3 also contains very fine mafic mineral inclusions, mostly sub-angular amphiboles, pyroxenes and amphiboles. The inclusions are very badly sorted and are close to single spaced. The groundmasses of both samples are very fine and have a high optical activity. While CA17.1995/3 is fully oxidized, CA18.3367/01 is incompletely oxidized. A very calcareous layer can be observed on the outer surface of CA18.3367/01.

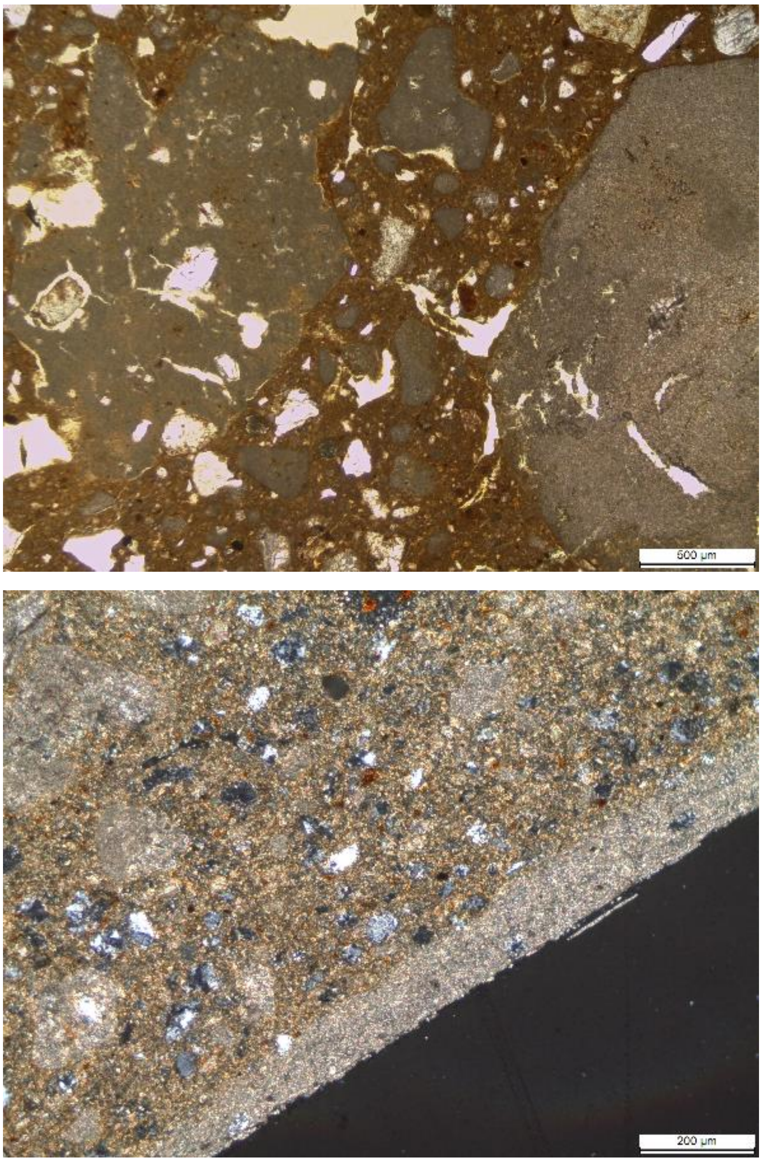


Figure 73: Examples of Group 2. Dominant presence of limestone inclusions in CA17.1195/3 (Top, PPL, scale 500 µm). Limestone and volcanic rock fragments in CA18.3367/01 (Down, XP, scale 200 µm). Also note the additional, very calcareous layer on the outer surface (Photos by author for NEXUS 1492).

5.2.1.3 Group 3: Fabric with clay streaks and a volcanic component

<u>Samples</u>: CA17.479/01 and FL16.2583/3. (n=2)

Group 3 comprises two samples, one from El Flaco and one from El Carril. The main characteristic of this group is the dominant presence of highly irregular inclusions without any systematic appearance. They are again identified as clay streaks (see above, 5.1.1.2.1). Next to that sub-rounded (andesitic) volcanic rock fragments are commonly present. They measure up to 1 mm and have a mode of 300-400 µm. The volcanic rock fragments often contain feldspar crystals in combination with amphiboles. Other occurring minerals are fine sub-rounded quartz grains, sub-angular amphibole crystals, sub-angular feldspars and biotite. The inclusions are very badly sorted and are close to single spaced. Both sherds have a fine, slightly heterogeneous groundmass with a high optical activity. Next to that they have a dark core, which points to an incomplete oxidation process.

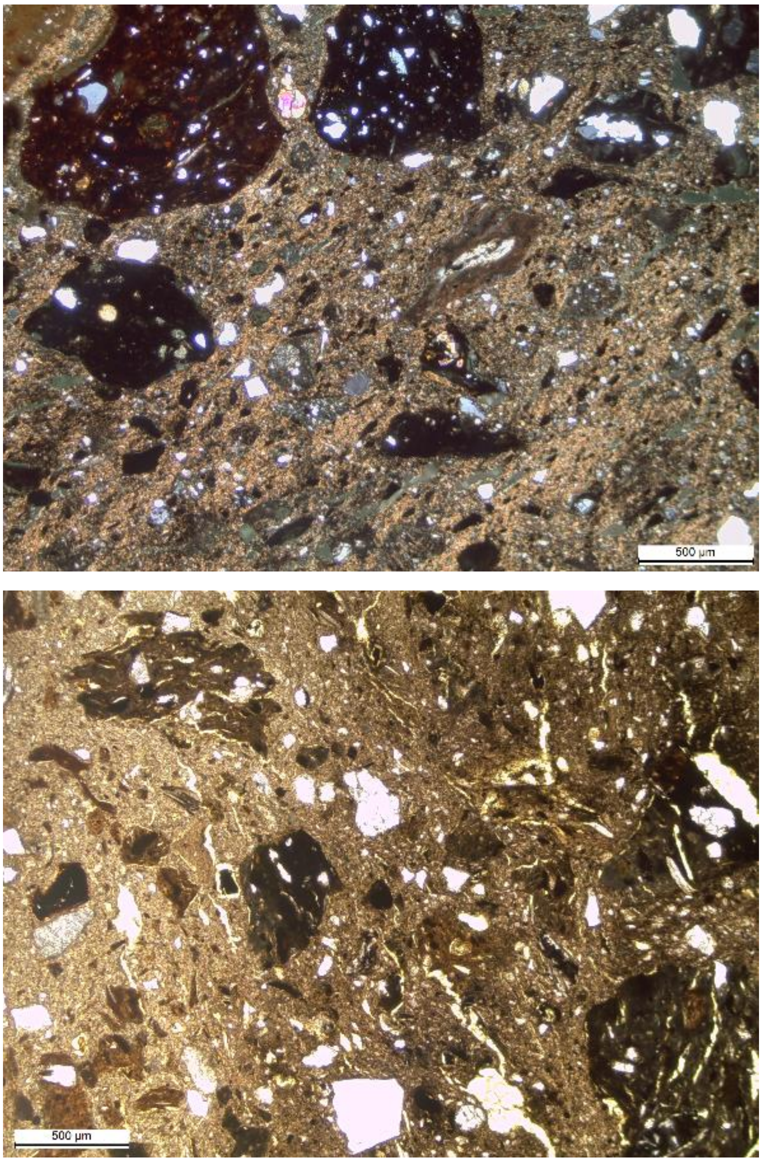


Figure 74: Examples of Group 3 identified at El Flaco and El Carril and characterised by the presence of clay nodules and volcanic rock fragments; FL16.2583/3 (Top, XP, scale 500 µm) and CA17.479/01 (Down, PPL, scale 500 µm) (Photos by author for NEXUS 1492).

5.1.2.4 Group 4: High porosity volcanic fabric

<u>Samples</u>: CA19.4146/A, FL16.2744/6, FL16.2764/01 and FL15.2301/11. (n=4)

There are three samples in this group: two are from the site of El Flaco, one from El Carril. Group 4 is characterised by a high level of porosity in addition to the presence of volcanic inclusions. Furthermore the samples in this group have a homogenous, iron-rich groundmass that is low optically active. They were all incompletely oxidized. These elements are the communal factor that forms the basis of the reasoning to put these samples in the same group. The samples do differ in size and quantity of inclusions, neither do they all have exactly the same kind of inclusions. They do all have a significant volcanic component though. CA19.4146/A is very fine grained. The inclusions are very well sorted, close spaced and most are smaller than 60 µm. The inclusions are quartz, feldspar, clay pellets and mafic minerals, mostly amphiboles. Next to that the sample contains one altered, calcareous-rich inclusion with a size of around 5 mm. A thick calcareous layer was observed on one side of the vessel surface. The fine fraction of FL16.2744/6 is more coarse. In general it has coarser inclusions of up to 800 µm, which are badly sorted. The inclusions are sub-rounded to sub-angular and include: quartz, feldspar, mafic minerals (mostly amphiboles), limestone fragments, volcanic rock fragments with feldspar and amphibole crystals, and clay pellets. Again a very calcareous layer can be identified on one side of the vessel surface. The inclusions of FL15.2301/11 are coarser than both previous samples. They are badly sorted and close to single spaced. The inclusions are mostly sub-rounded to sub-angular and include: quartz, feldspar, mafic minerals (mostly amphiboles), calcareous inclusions that are altered and chert. A calcareous layer was observed on one side of the vessel surface. FL16.2764/01 is very coarse grained and contains frequent sub-angular amphiboles with a mode of 300 µm. Other inclusions are sub-rounded to sub-angular and include pyroxenes, quartz, feldspar and volcanic rock fragments with feldspar and amphibole crystals. The inclusions are very badly sorted and close spaced.

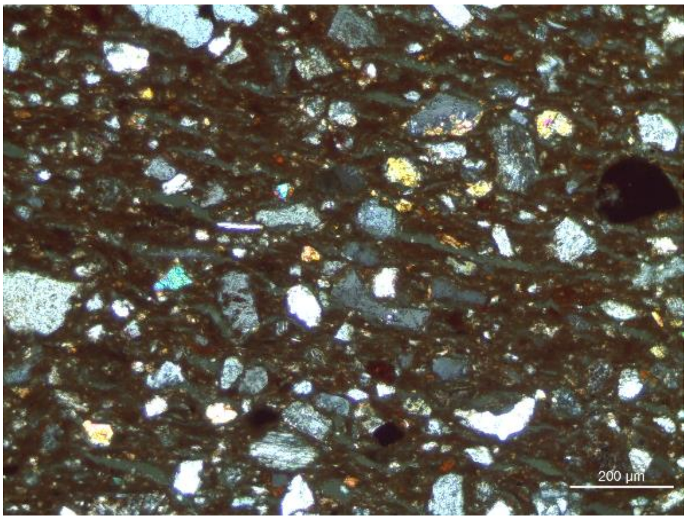


Figure 75: Fine grained inclusions including quartz, feldspar and mafic minerals in CA19.4141/A (XP, scale 200 µm) (Photo by author for NEXUS 1492).

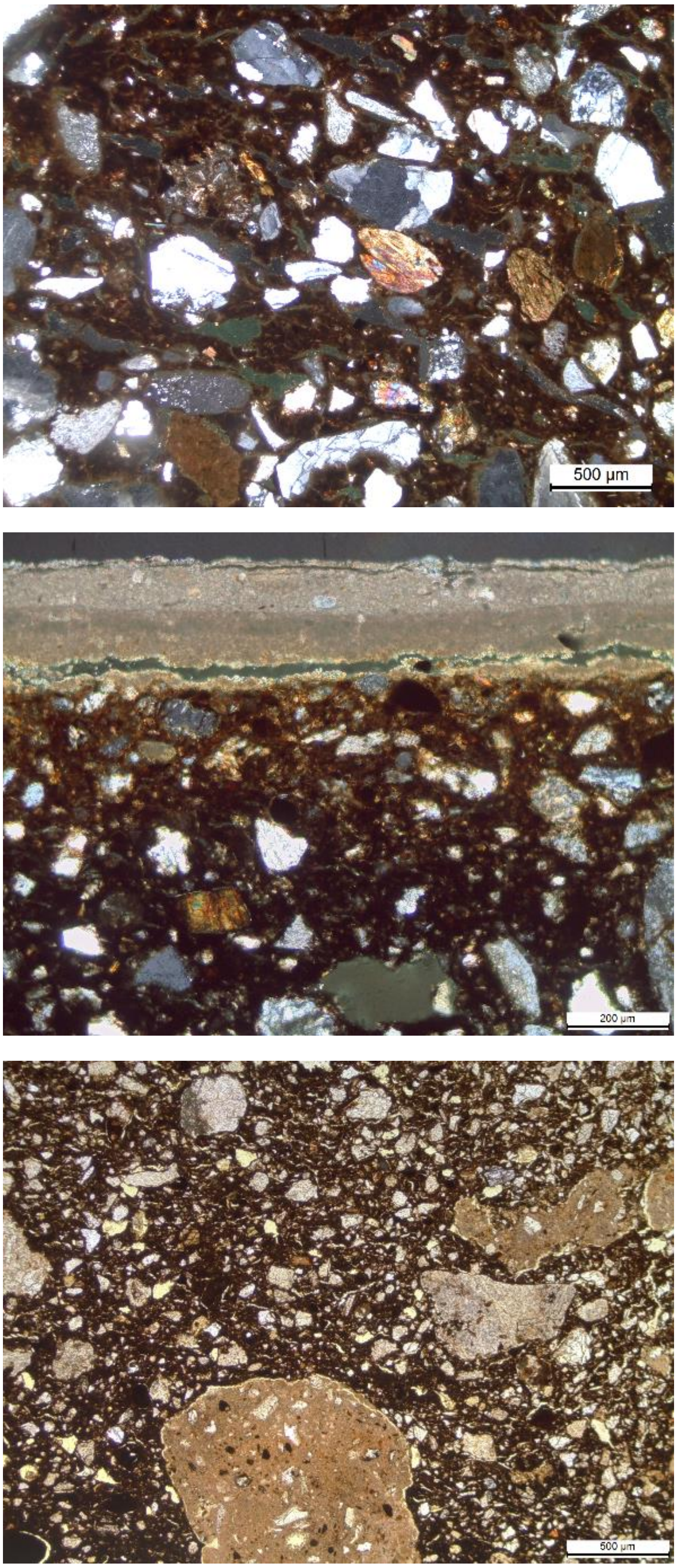


Figure 76: Examples of the high porosity volcanic fabric group that was identified at the sites of El Flaco and El Carril. Top: coarse grained inclusions of FL15.2301/11 (PPL, scale 500 µm) including amphiboles, pyroxenes, quartz, feldspar and volcanic rock fragments. Middle: calcareous layer on the surface of FL16.2744/6 (XP, scale 200 µm). Down: Large altered calcareous-rich inclusions in FL15.2301/11 (PPL, scale 500 µm) (Photos by author for NEXUS 1492).

5.2.1.4 Outliers

<u>*Samples*</u>*: FL16.2757/01, FL.15.1678/02, CA19.4482/1, FL14.772/4, CA18.3633/02, CA18.1688 and CA19.4157/2*. (n=7)

FL16.2757/01 is very coarse-grained. The sample is characterised by a predominant presence of large altered inclusions. I hypothesize that these are volcanic rock fragments of which the feldspar inclusions have altered. Quartz crystals are generally more resistant to alteration, which explains why some can still be observed as part of the inclusions. The fragments are generally sub-rounded to sub-angular and can be up to 3 mm wide. Next to that sub-angular quartz fragments with a mode of 150 µm occur. The inclusions are very badly sorted and are close to single spaced. The groundmass is heterogeneous with a high optical activity. The sherd is incompletely oxidized. It is more difficult to say something about **FL.15.1678/02**, since the rock fragments present are affected by sericite alteration. Quartz occurs next to these rock fragments. The inclusions are very badly sorted and are close to single-spaced. A very calcareous layer can be observed on one of the sides of the vessel surface. **CA19.4482/1** is medium to coarse grained. The inclusions are very badly sorted and are single spaced. The sample contains frequent to dominant sub-rounded to sub-angular igneous (both volcanic and plutonic) rock fragments with a mode of around 500 µm. Other identified inclusions are pyroxenes, quartz, clay pellets, olivine and amphiboles. The groundmass is microcrystalline and very calcareous with a high optical activity. The sherd was incompletely oxidized. **FL14.772/4** has a very heterogeneous groundmass that is calcareous. It has a high optical activity and was incompletely oxidized. The inclusions have a fine to medium grain size. They include clay pellets, quartz and altered sedimentary rock fragments. Next to that very few feldspars occur, as well as very few and fine amphiboles and pyroxenes. One inclusion has been identified as grog. **CA18.3633/02** is characterised by the pre-dominated presence of calcareous inclusions, primarily altered calcite with a width of up to 250 µm. Other inclusions that occur are few quartz crystals, few igneous rock fragments and few chert fragments. The inclusions are moderately sorted, fine to medium sized and close to single spaced. The groundmass is microcrystalline and has a high optical activity. The sherd has been completely oxidized. **CA18.1688** contains few inclusions which are very badly sorted and single to double spaced. They consist of few sub-rounded chert, common quartz and frequent to dominant limestone. Next to that fossils were observed. The groundmass is microcrystalline with a high optical activity. The sherd was incompletely oxidized. Lastly, **CA18.4157/2** contains a lot of inclusions. They are mostly rounded, close to single spaced

and badly sorted. The inclusions comprise altered calcite (frequent), quartz (few to common), feldspar (few), volcanic rock fragments (common), clay pellets (very few)and an organic inclusion. The groundmass is iron-rich and was fully oxidized. It is homogeneous and has a moderate to high optical activity. A thick calcareous layer was observed on one of the vessel surfaces.

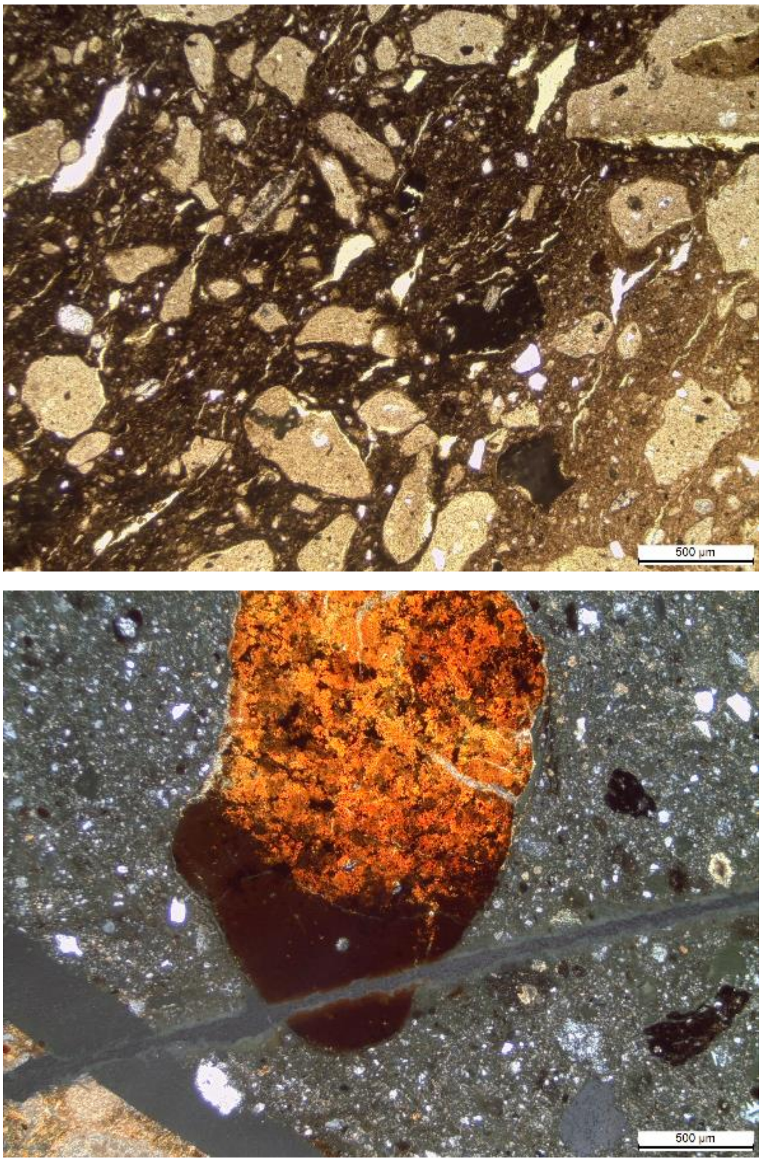


Figure 77: Examples of outliers identified at El Flaco and El Carril. Top:: The dominant presence of altered volcanic rock fragments in FL16.2757/01 (PPL, scale 500 µm). Down: Fine-grained inclusions and a fragment of grog in FL14.772/4 (XP, scale 500 µm) (Photos by author for NEXUS 1492).

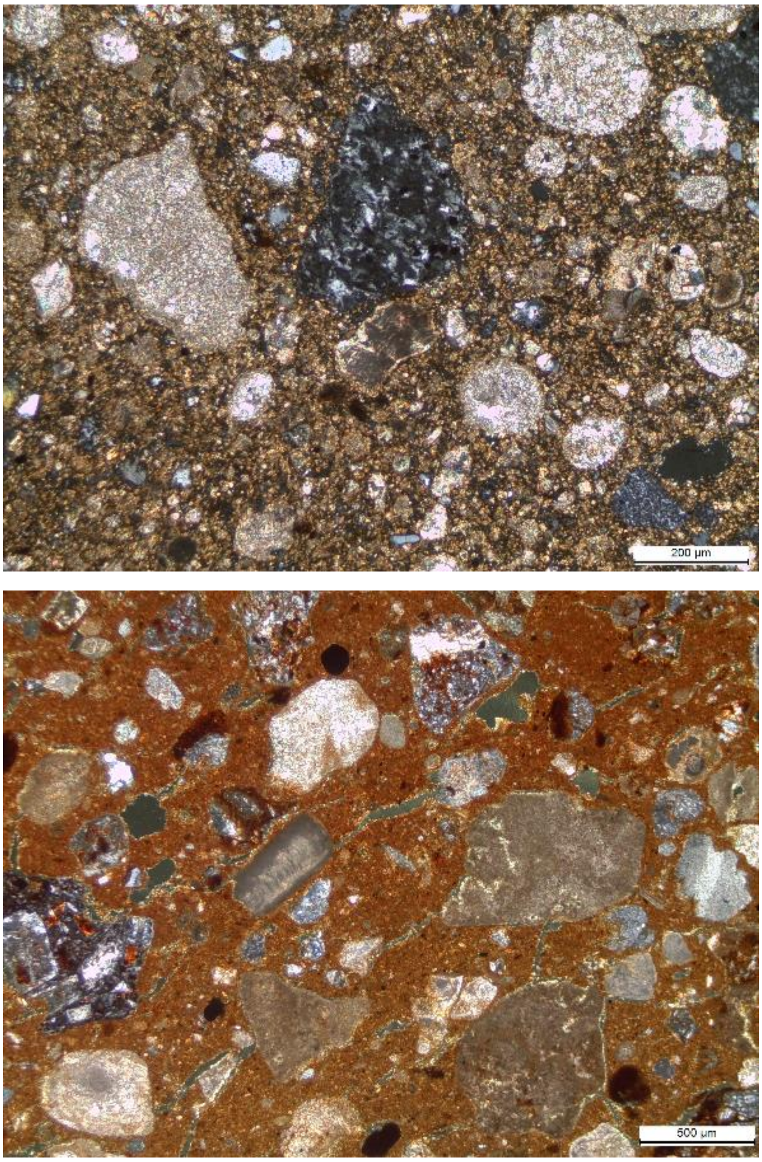


Figure 78: Top: Calcite and chert inclusions in CA18.3633/02 (XP, scale 200 μm). Down: calcareous inclusions and volcanic rock fragments in CA18.4157/2 (XP, scale 500 μm) (Photos by author for NEXUS 1492).

5.2.2 Morphological and stylistic analysis

5.2.2.1 El Carril

Thirteen of the LCAWW sherds found at El Carril were identified as rims. Nine additional sherds were part of a bottleneck/lip. Other types of sherds included *adornos* (3), base sherds (5), body sherds (171) and appendages (2). The majority of the sherds was white-slipped. Twenty-six sherds did not contain any slip remains, but were made of buff-firing clays. Five individual bottles could be identified, due to the presence of bottle mouths. The diameter of the opening of the bottle mouths ranges between 2.1 and 3.0 cm. One bottle could be partly reconstructed (CA19.4146, see figure 80). The reconstructed bottle is globular. It has a flat base with a wall thickness of around 1.0 cm, similar to the other bases I have found. The walls gradually thin towards the bottleneck, where they measure

0.6 cm. The reconstructed globular bottle is decorated with broad incisions with returning patterns (see figure 79). It is around 23 cm high and the maximum width is almost 25 cm. The bottle does not include an *adorno*. Many of the body sherds can possibly be related to bottles, but it is difficult to identify actual vessel shapes based on the body sherds. The few rims that could be related to a specific vessel shape, belonged to restricted bowls with a composite contour.

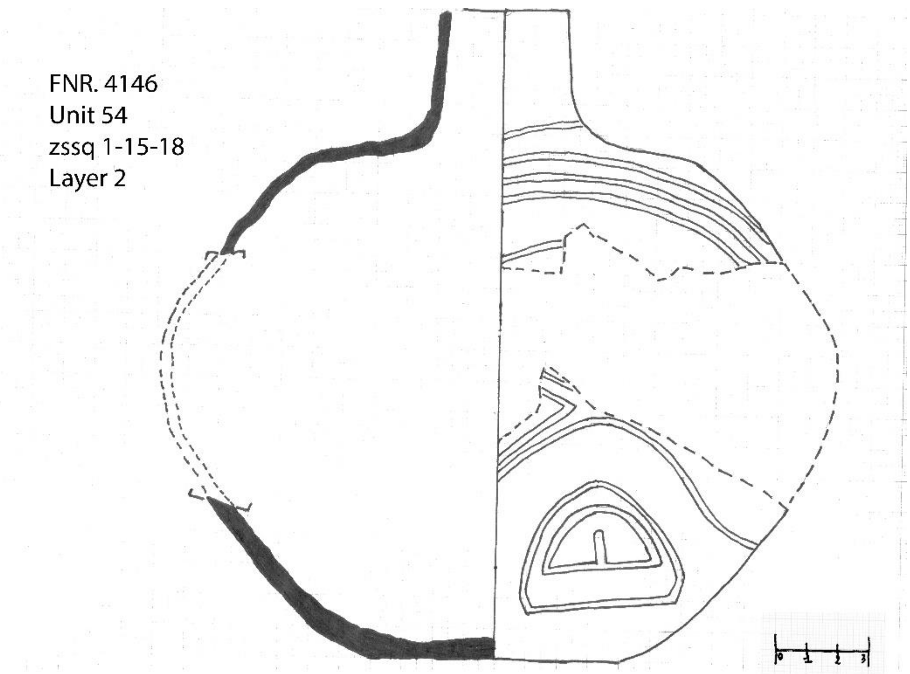


Figure 79: Reconstruction of CA19.4146, a globular bottle (Reconstruction and drawing by author for NEXUS 1492).

58 sherds in total were decorated. However, among them are 21 sherds belonging to the same vessel (the reconstructed bottle, CA19.4146). The dominant decoration type is the broad incision characteristic of the Chicoid series (see chapter 2). Only one (zoo-anthropomorphic) *adorno* has been found. One sherd was decorated with black paint, which was applied in an incision. Punctations also occur, for example on the shoulder of a bottle/jar, similar to decorations observed on Saba and El Flaco (see figure 80). The decorations are also similar to those of LCAWW from En Bas Saline (see chapter 2).

Figure 80: Sherds belonging to jars/bottles decorated with punctations on the shoulders coming from El Carril (CA17.1178, top left, photo by author for NEXUS 1492), El Flaco (FL14.772, top right, photo by author for NEXUS 1492) and Kelbey's Ridge, Saba (bottom, photo courtesy of C. L.. Hofman).

5.2.2.2 El Flaco

19 of the LCAWW sherds from El Flaco were identified as rims. Other types of sherds are *adornos* (18), base sherds (14) and body sherds (490). Eight additional sherds could be related to a bottleneck/lip. The diameter of the opening of the bottle mouth ranges between 1.3 and 5 cm. Both bottlenecks with a gradual, smooth transition as bottle necks with a sharp, more angular transition occur. Many body sherds were thin and somewhat curved, indicating that they might have been part of a (globular) bottle. Furthermore few sherds were clearly a curved corner point that was part of the wall of a bottle with a composite contour. Next to that few body sherds could be linked to a small jar or bottle-like shape. Most of the rims can be linked to restricted bowls with a composite contour. Bowls with a straight wall and a corner point, and jars with a corner point above the shoulder are also identified.

Figure 81: Examples of sherds from El Flaco belonging to small jars (Photos by author for NEXUS 1492).

The majority of the sherds was white-slipped. Eighteen sherds did not have any traces of slip, but were made from buff-firing clays. Eight of those sherds were decorated, while forty-nine slipped sherds were decorated. The dominant decoration is again the broad incision characteristic of the Chicoid series (see chapter 2). Furthermore three body sherds are decorated with black paint applied in an incision, similar to decorations observed at El Carril and on Cuba. Also one *adorno* (possibly even two) contained traces of black paint, highlighting the lower-lying parts of the modelled face. Five *adornos* are anthropomorphic, some of them showing headdresses. Six were zoomorphic, including depictions of owls and a fish. Seven *adornos* are anthropo-zoomorphic. Furthermore some of the *adornos* are of a high depictional and technological quality and have relatively large dimensions, exceeding 5 cm in length.

Figure 82: Examples of adornos from El Flaco (Photos by author for NEXUS 1492).

5.3 Summary

This chapter is an overview of the results of the compositional analysis, macroscopic trace analysis and morpho-stylistic analysis of LCAWW from the sites of El Cabo, El Carril and El Flaco. The sherds selected for El Cabo (see chapter four) were analysed using the methods I explained them in chapter three. I identified six macroscopic fabric groups for LCAWW at El Cabo. 30 samples were subsequently selected for petrography. The image obtained from the petrographic results is one of great variability, as I identified four petrographic fabrics/groups and nine outliers. The macroscopic trace analysis pointed to the use of a coiling technique for the roughing out and discontinuous pressure for the preforming of all of the selected vessels from El Cabo. The finishing techniques could not be identified on all surfaces due to later processes in the *chaîne opératoire*, which erased the traces of the previous steps. When a finishing technique could be identified it was smoothing on either dry or wet clay. Next to that two techniques relating to surface treatment were observed: burnishing and clay coating. In total 13 sherds (17%) are related to a bottle/jar shape at El Cabo. The most frequently occurring vessel shape is a restricted bowl with a composite contour (61,3%). Other shapes identified are a jar with a corner point (2,7%), dishes (8%) and bowls with a corner point (10,7%). The selection contained 24 *adornos* and 30 additional decorated sherds. Nine sherds received a clay coating.

A rudimentary version of the macroscopic fabric analysis served as the basis for the selection of nine sherds from El Flaco and ten sherds from El Carril for petrography. The image obtained from the petrographic results is also one of great variability, as four petrographic fabrics/groups and seven outliers were identified. It was hard to relate sherds to a specific body shape, but it was clear that both at El Carril and El Flaco the majority sherds were linked to bottle or jar shapes, only few rim sherds belonging to restricted bowls were observed. The majority of the sherds at both sites was white-slipped. Only one *adorno* was found at El Carril, while 18 were part of the ceramic assemblage of El Flaco.

In the following chapter I will interpret these results and discuss what role LCAWW has within the ceramic assemblages of these sites. Next, I will compare the characteristics of LCAWW at these three sites to address the research questions and gain insight in the social relations that are linked to this phenomenon.

6. Interpretation of the results

In this chapter the results of the compositional analysis, macroscopic trace analysis and the morpho-stylistic analysis are combined to form an overall image of LCAWW at the research sites. All methods have been applied to the selection of sherds from the site of El Cabo. The results are combined to reconstruct the *chaîne(s) opératoire(s)* of LCAWW at the site, as explained in chapter three. In the next step, the outcome of the reconstruction is compared to the rest of the ceramic assemblage at the site of El Cabo. The *chaîne(s) opératoire(s)* at the site of El Flaco and El Carril cannot be reconstructed, because the manufacturing techniques could not be analysed as explained previously. The interpretation of the position of LCAWW and the relation with the rest of the ceramic assemblage is therefore mostly based on the petrographic results.

6.1 Interpretation of the results from *El Cabo*

6.1.1 Reconstruction of the *chaînes opératoires* of LCAWW at El Cabo

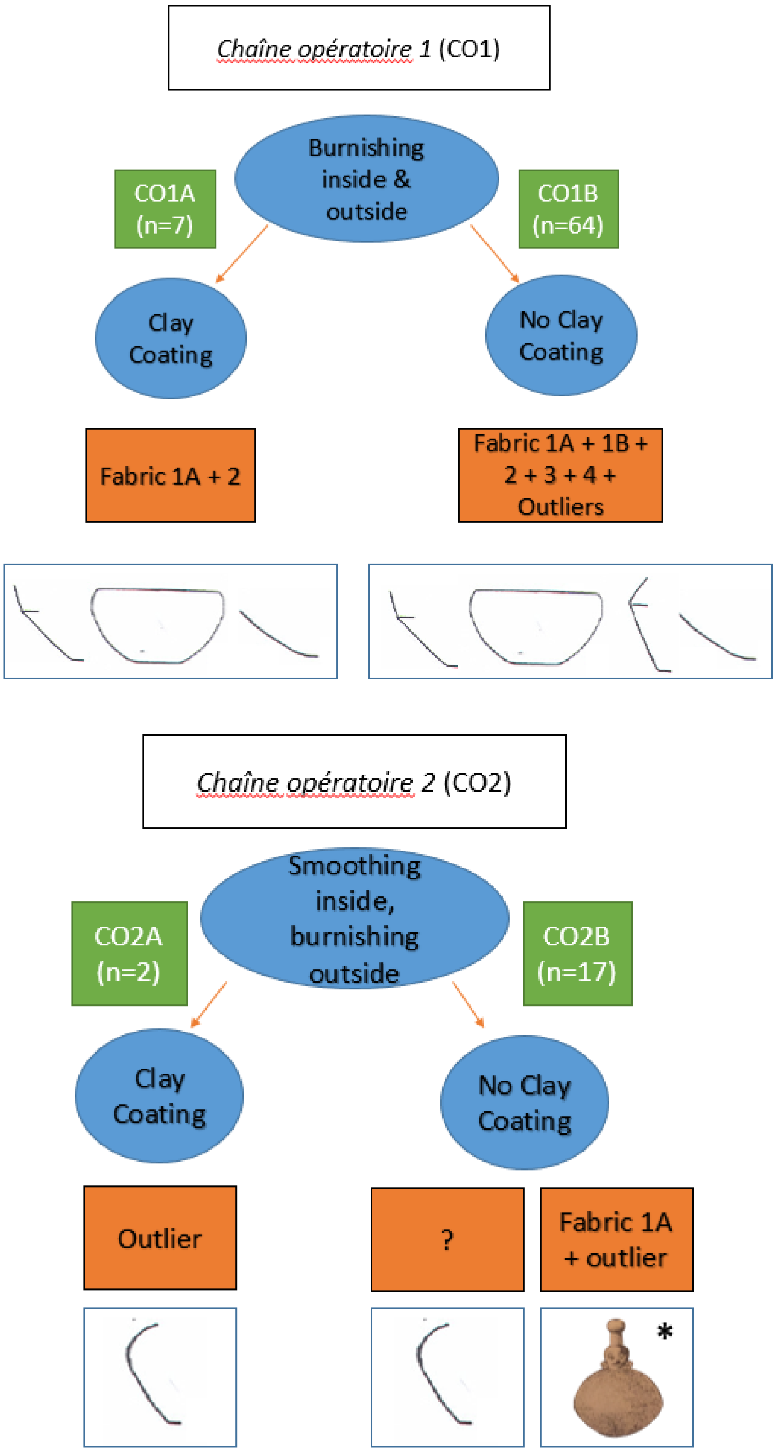


*Figure 83: Overview of the chaînes opératoires of LCAWW at the site of El Cabo. For both CO1 and CO2 the fashioning techniques are coiling and discontinuous pressure. The finishing techniques and surface treatment are indicated in blue. The orange colour relates to the fabrics identified for each chaîne opératoire. The final step connects each chaîne opératoire with the vessel shapes. They are depicted as represented in the codebook for ceramics (Hofman 2005). *The codebook does not have an image for bottles, therefore I used a depiction provided by Irving Rouse (1939) (Image by author for NEXUS 1492).*

Figure 83 represents the different *chaînes opératoires* I have identified for LCAWW at the site of El Cabo, based upon the results of the compositional analyses, macroscopic trace analyses and morpho-stylistic analyses presented in chapter 5. Based on the manufacturing techniques, four ways of producing a vessel are presented. The fashioning techniques observed are the same for each individual sherd. First a coiling technique was used for the roughout. Next the shape of the vessels is further refined through the application of discontinuous pressure, which led to the preform. The first difference between the manufacturing techniques was observed in the finishing step and the subsequent step of surface treatment: some vessels are only smoothed on the inside, while others are (also) burnished. Burnishing was not the only surface treatment recorded. In both cases, whether it involves vessels with a smoothed inside or a burnished one, a clay coating was identified on few vessels (nine in total). The outer surface of vessels with a clay coating were burnished after the application of the clay coating. The two main differences observed in the manufacturing process of the sherds/vessels studied, are the basis for the identification of two *chaînes opératoires*. Each *chaîne* is further divided in A and B. Sherds following an A-*chaîne* received a clay coating.

74 sherds were made according to *chaîne opératoire* one (CO1). Seven received a clay coating (CO1A), 64 did not (CO1B). CO1A comprises three vessel shapes: a bowl with a corner point (n=1), restricted bowls with a composite contour (n=5) and a dish (n=1). Fabric 1A and 2 are linked to CO1A, however only two examples of restricted bowls that belong to this specific production process were analysed. CO1B is clearly the most used *chaîne opératoire* for producing LCAWW at the site of El Cabo. It comprises the widest range of vessel shapes: bowls with a corner point (n=7), restricted bowls with a composite contour (n=35), dishes (n=5) and jars with a corner point (n=2). Next to that 15 sherds that cannot be related to a specific vessel shape were also made following the steps of CO1B. All of the five petrofabric (sub-)groups identified are represented in CO1B, as well as five more outliers. *Chaîne opératoire* 2 contains sherds that were not burnished on the inside, only smoothed on wet clay. 17 sherds were manufactured according to CO2B. The majority of them (13) are related to closed shape of bottles or jars. The remaining four sherds were part of (restricted) bowls. Two sherds of CO2B, both linked to a bottle shape, were studied through a petrographic microscope. One of them belongs to subgroup 1A, the other one (CB.1445/1) was identified as an outlier. CB.1445/1 was originally included in the selection because of its shape. It was the only bottle mouth that did not show a white colour and therefore was selected as a reference sample (see chapter 4). In that

sense it does not come as a surprise that it is also identified as an outsider on a petrographic level and shows that bottles were not just made of buff firing clay. There were no remnants observed (microscopic and macroscopic) on CB.1445/1 that would indicate the presence of a clay coating. However, that does not mean it was never there, since the outside of the sherd is rather eroded. It is unclear which fabric(s) can be linked to the restricted bowls of CO2B, since none of them were selected for petrography due to the restrictions of the selection procedure (see chapter 4). The two sherds in CO2A are both restricted bowls. One of them was selected for petrography and was identified as an outlier.

6.1.2 Interpretation of the *chaînes opératoires*

6.1.2.1 Functional versus sociological variability

Now that the *chaînes opératoires* for LCAWW at the site of El Cabo have been reconstructed, it is important to understand what the differences between the identified production processes mean. More specifically it is crucial to verify whether these differences are due to functional or sociological reasons (Roux 2019).

Let us first look at the difference between CO1 and CO2. The vessels produced according to the steps of CO1 are burnished on the inside, while those made according to CO2 are only smoothed on the outside. When taking the vessel shape and function into account, it becomes clear that the difference in surface treatment of the inner surface is related to the vessel function. There are two vessel shapes connected to CO2: closed bottles/jars and (restricted) bowls. The closed bottles/jars are specifically made through the steps of CO2, as they do not occur in the other *chaîne opératoire* identified. The fact that the inside is not burnished is very logical in this case, since this type of bottles/jars are closed vessels. This means that the inside of the vessels cannot be seen by the users. Next to that the bottle opening is too small to be able to reach the inside of the vessel after the completion of the rudimentary shape. The smoothing procedure on the other hand probably happened soon after the addition and the joining of the coils. When focussing on the (restricted) bowls in this study, it becomes clear they are not restricted to CO2. However, the reason for the difference in surface treatment is the same as for the bottles/jars. If the diameter of the opening of the vessels is taken into account, we see that the restricted bowls in CO2 have the smallest diameter of the bowls in the assemblage, ranging from 5 to 10 cm. These bowls all have a convex wall and a small opening, which also causes the inside to be mostly invisible to the users of these vessels. So this is again a functional difference. This is true for CB.011, CB.2036/10 (both related to CO2A), CB.1517 and

CB1884-5 (both related to CO2B). The inner surface of CB.781 is burnished on the inner side of the rim, which is easily reachable and also visible. The rest of the inner surface was only smoothed. CB.1873/1 is an exception, as the estimated diameter of the opening is ± 35 cm. This is also the largest diameter observed during this study. Therefore it is possible that this sherd belonged to a vessel with a totally different function compared to the other sherds in this study. The large diameter can indicate a storage vessel for food. However, the vessel is also decorated on its shoulder, which is rather unusual for a storage vessel. Another, or perhaps additional explanation involves the misinterpretation of this sherd as being part of the LCAWW assemblage at El Cabo (see also chapter 2).

The second element that creates a distinction in the production process of the studied sherds is the addition of a clay coating. This additional surface treatment has been observed in both *chaîne opératoire* 1 and 2. In total nine sherds have received a clay coating: seven sherds of CO1A and two sherds of CO2A. It is clear by looking at the vessel shapes related to the *chaînes opératoires* that the shape is not the underlying reason for the difference between coated and non-coated vessels. CO1A comprises three of the four vessel shapes identified for CO1B, and CO2A is linked to a similar vessel shape as part of CO2B. In other words, the coating is not specific to a vessel shape or shapes. The petrographic analysis shows us that the coating procedure is also not specific to a certain fabric. Three of the nine sherds that have a coating were analysed with a petrographic microscope, resulting in the identification of three different petrofrabrics. CB.2046/2 is part of subgroup 1A, CB.2035/1 of group 2 and CB.011 was identified as an outlier. What they and the other sherds with a coating do have in common is the fact that their paste has a reddish or pinkish colour. CB.2046/2 and CB.2035/1 are not considered to be outliers, but are connected to petrofabrics of sherds with a white/whitish paste without coating. This points to the fact that the raw materials selected by the potter for the production of these vessels were similar to those selected for the vessels that do not have a white coating. It is possible that the iron content for some vessels was higher and/or that the firing conditions were different, resulting in an unwanted/unexpected reddish paste. Applying a white clay coating can be seen as an easy way to make those vessels with a reddish paste look white. The clay coating observed is white, often very thin, flaky and looks more like a clay slurry than a clay slip. It seems like it served to cover up things that were beyond the control or that possibly surpassed the skill-level or the level of investment of the potters that produced this type of pottery. The high optical activity of the sherds that was observed through petrographic analysis points to a low firing temperature (Quinn 2013). The identification of drying cracks indicate that the temperature rose too quickly during the firing process. Next to there was a large oxidation range of the sherds and I could macroscopically distinguish spots that were more oxidized compared to other parts of the sherds. All these elements point to the use of an open fire during the firing of the pottery, which can make it hard to control the firing conditions (Orton and Hughes 2013; Rice 1987; Rye 1981).

CB.011 was identified as an outlier. The sherd has no connection on a petrographic level to the other sherds studied. Furthermore CB.011 could already be distinguished macroscopically. Firstly, because of its pinkish paste, which stands out compared to the colours of the rest of the assemblage. Secondly, because of the thickness and colour of the colour applied to the outer surface. While the other sherds were coated with a clay slurry, CB.011 was clearly coated with a thick white slip (see also chapter 5). This difference is even noticeable within CO2A, as the other sherd belonging to this group (CB.2036-10) is coated with a clay slurry and not a slip as is the case for CB.011. The combination of both differences makes us believe that CB.011 was part of an imported vessel that probably has a different origin from the rest of the assemblage studied here. It is more difficult to interpret CB.2036-10 because it was not selected for petrography. Based on the comparison of the results of all the analyses performed, CB.2036-10 is different from CB.011, but can also be regarded as non-coherent with the rest of the assemblage.

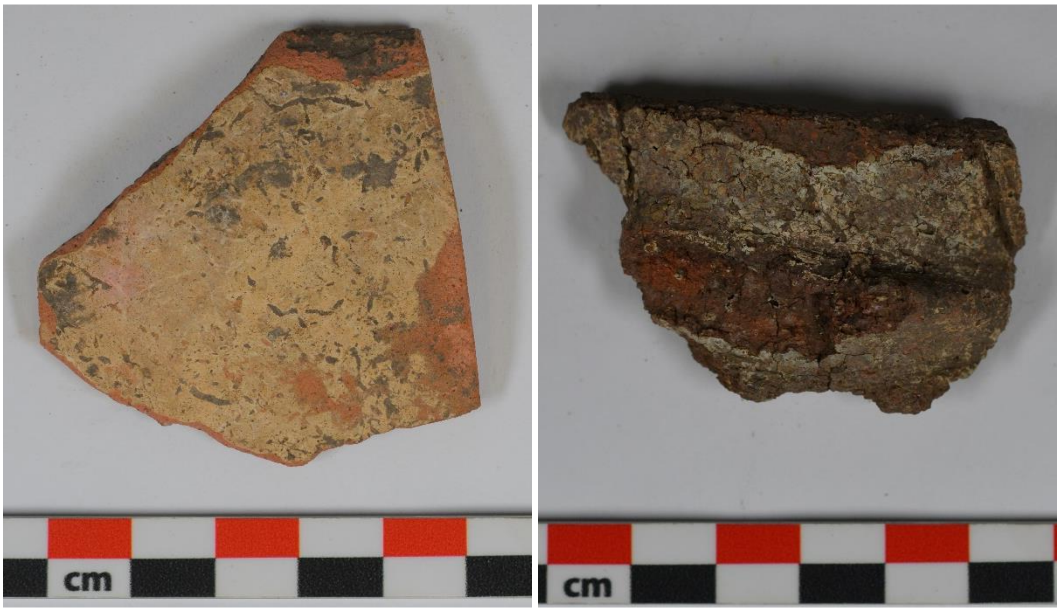


Figure 84: CB.011 (left) and CB.2036-10 (right) of chaîne opératoire 2A (Photos by author for NEXUS 1492).

The difference between CO1 and CO2 observed through macroscopic trace analysis has a functional nature. The addition of a clay coating in CO1 is probably connected to an unexpected outcome of the firing process, which can be due to a combination of a difference in iron content and varying firing conditions. These findings point to the fact that the assemblage studied here is part of a coherent pottery tradition. Only CO2A, comprising 2 sherds (2.3 % of the sherds fit for macroscopic trace analysis), did show distinctive features that are not linked to functional reasons, but possibly to sociological ones. The main characteristics of the pottery assemblage studied here are:

1. Fashioned through coiling and discontinuous pressure
2. Burnished on the outside, if possible/visible also on the inside
3. Surfaces are whitish coloured, either through the colour of the paste after firing or the addition of a clay coating
4. The use of small coils (up to 1 cm) and a wall thickness of 0.6-0.9 cm on average
5. The decorations are linked to the Chicoid series

6.1.2.2 Variety in petrofabrics

When looking at the variety in *chaînes opératoires*, we must also keep the variety in petrographic fabrics in mind. The 30 samples analysed for the site of El Cabo were divided in one main group, three additional smaller groups and eight outliers. So, while the manufacturing techniques observed indicate a coherent pottery tradition for CO1 and CO2B, the petrographic results show a large variety in used raw materials. This variability can also be observed when zooming in on the most common petrographic fabric of group 1. Group 1 consist of 12 sherds (40% of the selection for petrography), divided in subgroup 1A (n=10; 33.3%) and 1B (n=2; 6.6%). Group 1 is characterised by a high degree of variability, not only on a compositional level (see chapter 5), but also on morpho-stylistic level and the level of manufacturing techniques (see **t**able 13). Multiple kinds of shapes occur, two *chaînes opératoires* were identified, both with slipped and non-slipped sherds, decorated and non-decorated. All three of the analyses confirm that there is absolutely no standardisation, not even in the subgroups. The sherds in subgroup 1A for example all have the same basis for their ceramic recipe, but in different combinations of frequencies and sizes of inclusions. What is the same for each sherd is that they all are badly prepared, have a low firing temperature and that the temperature rose too quickly during firing, causing drying cracks. The dominant inclusions present in samples belonging to group 1 are defined as “clay streaks”. These are highly irregular inclusions, not only in shape but also in colour. Nothing points to the addition of this type of inclusion. Therefore, they are being identified as clay streaks, which are naturally present in the clay deposit (see also Casale *et al*. in prep.). The clay used for the production of these vessels probably came from a top layer and was highly heterogeneous, with a high level of zonation of iron-rich particles and high differentiation of lime-content. This, in combination with highly variable firing conditions, can explain the variability in shape and colour that was observed through petrography (P. Degryse, pers. comm., June 2021). The naturally-present clay streaks took on the role of temper, as they held the fabric together during (too rapid) firing (D. Braekmans, pers. comm., May 2021). The fact that these clay streaks are still present is because the gathered clays were not homogenised by the potters. There was a very limited treatment of something that is very heterogeneous. The clays are not prepared first, because it is simply not necessary to do so: due to the clay streaks present, the potters could –so to speak- just pick up some clay and start to make a pot. They did not treat the pottery at the beginning of the process, but they do it at the end. In case the potter intended to create a whitish vessel, they added a clay coating and fixed it at the end of the production process instead of preparing the whole thing in the beginning. The presence of the clay streaks actually led to an unnecessity of standardization (P. Degryse, pers. comm, June 2021).

Table 13: Overview of basic information per sherd obtained through macroscopic fabric analysis, petrographic analysis, macroscopic trace analysis and morpho-stylistic analysis. The sherds presented here are part of fabric 1 (subgroup 1A and 1B), 2, 3 and 4 identified at the site of El Cabo.

Subgroup 1A	**Shape**	**Slip**	**Decorated**	**CO**
CB.849A	Bottle mouth	No	No	CO2B
CB.1761/6	Bowl with corner point	No	Yes	CO1B
CB.1826/5	Unknown (body)	No	Yes	CO1B
CB.2035/1	Restricted bowl	Yes	Yes	CO1A
CB.2046/1	Restricted bowl	No	No	CO1B
CB.2071	Restricted Bowl	No	No	CO1B
CB.2363/6	Restricted bowl	No	No	CO1B
CB.3237/2	Restricted bowl	No	No	CO1B
CB.3666	Bowl	Yes	No	CO1A
CB.3774/10	Unknown (body)	No	Yes	CO1B
Subgroup 1B				
CB.2153/3	Restricted Bowl	No	Yes	CO1B
CB.3095	Dish	No	Yes	CO1B
Group 2				
CB.969/1	Restricted Bowl	No	Yes	CO1B
CB.1761/9	Jar with corner point	No	No	CO1B
CB.1990/3	Restricted Bowl	No	No	CO1B

CB.2043/4	Dish	No	No	CO1B (outside heavily eroded)
CB.2046/2	Restricted Bowl	Yes	No	CO1A
Group 3				
CB.1761/8	Restricted Bowl	No	No	CO1B
CB.1254/1	Dish	No	No	CO1B
Group 4				
CB.306/9	Undefined	No	Yes	CO1B
CB.1995/5	Restricted Bowl	No	No	CO1B (eroded)

A similar variability can be observed for group 2, 3 and 4, though perhaps less prominent. Next to that no less than nine outliers were identified, providing an even stronger sense of variability concerning the raw materials used to produce LCAWW that has been excavated at the site of El Cabo. CB.3091 is a sort of special case. Although this sherd has been identified as an outlier on a petrographic level, it shows similarities to group 1 due to the presence of clay nodules and volcanic rock fragments. I decided to mark this sherd as an outlier because it is the only one showing clear indications of manipulation by the potter of the raw materials present, more specifically the removal of the medium-sized fraction of inclusions out of the 'clay recipe'. There were no indications for the addition of temper observed in any sherd. Next to that the high level of heterogeneity of the groundmasses points to a bad preparation/treatment of the raw materials (Quinn 2013). Nevertheless, the potters seem to have known what they were doing when selecting the clays. The natural presence of large inclusions (partly) counters the effects of a quickly rising temperature during firing, which could cause the vessels to explode (Rice 1987). Besides that, the identification of four different petrographic groups and nine additional indicates the use of many different clay sources. In that sense it is remarkable that only very few sherds were coated with a clay coating, presumably to obtain a whitish look.

6.2 Situating LCAWW within the ceramic assemblage at the site of El Cabo

To situate the results of this study within the larger framework of the entire ceramic assemblage from the site of El Cabo, I compared my results with those of PhD student Simone Casale of the CARIB Trails project (Leiden University/KITLV). He is currently reconstructing the ceramic *chaînes opératoires* of the pottery recovered from excavation pits 75-26 and 85-34, next to 85-50 which is part of the main excavation unit (Casale *et al.* in prep.). These contexts were selected so the results would include early Ostioniod (ca.

AD 600-800) and Late Ostionoid pottery (ca. AD 800-1200) as well as ceramics related to the Chicoid series (ca. AD 900-beginning of the 16th century).[3]

6.2.1 Based on macroscopic trace analysis

When comparing the results of the macroscopic trace analyses presented in chapter five to the manufacturing techniques of the entire pottery assemblage at El Cabo, we can see that LCAWW belongs to the same pottery tradition as the rest of the ceramic assemblage excavated at the site. This means that it was produced by people belonging to the same social group (Casale *et al.* in prep). This is also confirmed by Prof. Valentine Roux when I was visiting the ceramic lab at Université Paris-Nanterre (Pers. comm., Valentine Roux, February 2019). However, some sherds studied by Casale showed traces of a percussion technique, which was not observed for LCAWW. This was mostly the case for Early Ostinoid pottery and was less clearly observed for Late Ostionoid or Chicoid ceramics. When comparing the results it is important to keep in mind the nature of the selection (see also chapter 3). The sherds of LCAWW that were available for this study only comprised one base and few body sherds. Most of the interpretations concerning the manufacturing traces of LCAWW are based on the examination of rims, which do not provide information on the construction process for the entire vessel (see also Roux 2019). Moreover, the sherds studied in this thesis are often rather small, certainly in comparison to the sherds studied by Casale, who had large body sherds available. Next to that we must also keep in mind that the selection was aimed at a specific type of pottery that is related to the Chicoid ceramic tradition on Hispaniola (see chapter 2). Taking these elements into account we can state that evidence of a percussion technique observed in large body sherds of a part of the ceramic assemblage, connected to Early Ostionoid utilitarian ware, does not indicate that we are dealing with different pottery traditions. Certainly not since the other manufacturing techniques are all similar. Next to that the preforming technique of percussion is part of the same “family” as the preforming technique relating to discontinuous pressure (Roux 2019, 92).

Casale *et al*. (in prep.) identified four petrographic groups and two outliers. They have a very variable origin as the different groups are characterised by the presence of either intermediate volcanic inclusions, marine limestone fragments, ceramics tempers and clay pellets or heavily weathered and metamorphisized tuff. The marine limestone-based

[3] We are currently working on an article in which we combine our results and findings about ceramic production relating to the site of El Cabo (see Casale *et al*. in prep.).

fabric is further divided in three subgroups: one with microfossil inclusions and two with evaporite fragments. This is the only fabric that can be related to clay outcrops present in the eastern region of Hispaniola where El Cabo is situated. All the other fabrics identified do not represent the geology of the area around El Cabo according to Casale *et al.* (in prep.). The intermediate volcanic fabric is also subdivided in three smaller groups. Casale *et al.* (in prep.) present two possibilities for its origin. The first possibility is the area of Sabana del Mar and Miches on the north coast of the contemporaneous Hato Mayor and the El Seibo province respectively. The second proposed possible origin is the central northwest coast of Puerto Rico. The absence of workable clays in the immediate environment of El Cabo (van As *et al*. 2008, see chapter 4) was one of the underlying reasons for the development of a social network with other communities. This is similar to networks that existed relating to body ornaments (Guzzo Falci *et al*. 2020).

6.2.2 Based on Petrographic analysis

The petrographic results from Casale *et al.* (in prep.) are along the same line as what was observed in this study for LCAWW concerning the level of standardization in clay procurement practices. In both cases several groups were identified and even within groups variability was observed. No clear relation between morphology and raw materials used was observed. The sherds studied all showed a varying degree of oxidation and a low firing process. When looking at the specific characteristics of the petrographic fabrics and how they relate to each other, several elements stand out.

First, let us take a look at the outliers. CB.1445/1 is a bottle mouth, but is macroscopically and microscopically identified as an outlier. The description of its fabric is (somewhat) similar to that of subgroup 1.A identified by Casale *et al.* (in prep.). CB.1445/1 is characterised by the presence of feldspars, igneous rocks, amphibole, clay pellets and olivine. Chert, sandstone, biotite and a serecite alteration of the inclusions was not observed for CB.1445/1, but was observed for intermediate volcanic subgroup 1.A. There is no exact correspondence, but we also have to keep in mind the level of variability within one group. CB.2424/6 contains frequent feldspars and common quartz crystals. The other inclusions present are clay pellets, volcanic rock fragments and chert. There is again no exact match with one of the subgroups, but the composition of this sherd can also be related to a similar origin/parental rock as is the case for the intermediate volcanic group. Outlier CB.011 is characterised by the presence of unidentified, sub-rounded to sub-angular volcanic rock fragments consisting of quartz and feldspar crystals in combination with a reddish altered mineral, probably mica. Outlier CB.1737 shows a frequent presence of volcanic rock fragments with a mode of 300 µm. The fragments are silica-rich and characterised by small grains and feldspar laths. Both CB.011 and CB.1737 show inclusions with a volcanic origin. However, they cannot be directly connected to the composition of the intermediate volcanic group, nor another group identified by Casale *et al.* (in prep.). CB.2079/1, identified as an outlier in this study, shows a predominant presence of microfossils, and can therefore be related to the marine limestone-based subgroup 2.A described by Casale *et al.* (in prep.). After deliberation with Simone Casale and macroscopic re-examination I concluded that CB.2079/1 is also a macroscopic outlier and in fact should not have been part of the selection of LCAWW from El Cabo. The other outliers, CB.1996/1 and CB.2283/2, do not show a connection to the petrographic fabrics described.

Second, the petrographic fabrics/groups identified in this study will be compared to those described by Casale *et al*. (in prep.) for the rest of the ceramic assemblage. Again, we have to keep in mind that a range in variability was observed within (sub-)groups, which results in less rigid boundaries for comparison and similarities. On the one hand this makes the comparison easier, as it is normal for samples to differ somewhat from each other. On the other hand, we have to be very cautious of the boundaries between fabrics and not let the aspect of variability dominate the interpretations of the petrographic results. The first petrographic group identified at the site of El Cabo in this study is characterised by the presence of clay streaks and a volcanic component, which is small for subgroup 1A and clearly better represented in subgroup 1B. Therefore, the latter might be linked to the intermediate volcanic group identified by Casale *et al*. (in prep.). Subgroup 1A on the other hand shows more similarities to Casale's group 3, characterised by the presence of different types of ceramics tempers (500-2000 µm) and clay pellets (500-1500 µm). In this study I have chosen for the more neutral description of clay streaks to describe this kind of inclusions instead of ceramic tempers. Nevertheless, I believe that we are talking about the same phenomenon and that these fabrics are related.[4]

Forr group 2, there is again a link with the intermediate volcanic group described by Casale *et al*. (in prep.). However, the presence of a small metamorphic component in the shape of metamorphic rock fragments characterised by a schist-like foliation, does indicate the use of a different clay outcrop. There is no evidence that points to the addition of these metamorphic rock fragments. The fabric dominated by sedimentary rock fragments

[4] The comparison presented here between the results of this study and the results by Casale *et al.* are based on a preliminary version of the final article.

(group 3 in this study) cannot be connected to one of the other fabrics described. The limestone-based fabric with quartzite (group 4 in this study) is partially linked to subgroup 2.C with evaporite inclusions, identified by Casale *et al*. (in prep.). The limestone-based fabric with quartzite has some additional inclusions such as mudstone/siltstone and clay pellets. Next to that there is a clear distinction in the frequency of the non-limestone-based inclusions and there is the fact that one group shows the presence of limestone, while the other contains evaporite inclusions that form in water-rich environments (both marine and non-marine). Both fabrics can thus be related to a similar geological background, but to different clay outcrops.

The petrographic results are in line with the results of the macroscopic trace analysis. Similarities are found on both levels of analysis, although they are more clearly observable based on the manufacturing techniques. The majority of the LCAWW-sherds can be linked to a similar geological background as the non-LCAWW sherds, indicating that the raw materials might have been delved in the same area. This means that Late Ceramic Age white ware at the site of El Cabo was probably (partly) integrated in the same networks as 'regular' ceramics (see above). On top of that, some of the fabrics identified did not show any correspondence to the other fabrics, indicating that the network for LCAWW extended beyond the networks for other types of pottery.

6.3 Interpreting and situating LCAWW within the ceramic assemblage of El Flaco and El Carril

The petrographic results for LCAWW at El Flaco and El Carril show a similar image to that of El Cabo: no standardisation, low firing temperature and various degrees of oxidation relating to a low level of control over the firing conditions. These observations are in line with what has been observed for the general ceramic assemblages of both sites (Van Dessel 2018; for El Flaco see also Ting *et al.* 2016; see chapter 4). Four petrographic groups and seven outliers were identified at El Flaco and El Carril in this study. This also confirms the findings of Van Dessel (2018) and Ting *et al*. (2016) on the use of a wide range of raw materials for the production of ceramics.

Table 14: Overview of basic information per sherd obtained through macroscopic fabric analysis, petrographic analysis, macroscopic trace analysis and morpho-stylistic analysis. The sherds presented here are part of fabric 1, 2, 3 and 4 identified at the sites of El Carril and El Flaco.

Fabric 1	**Shape**	**Slip**	**Decorated**
CA17.1173/01	Body with (strange) rounded edge	Yes	No
CA17.1820/01A	Small jar	Yes	No
FL16.2726/03	Body, possibly bottle	Yes	No

FL16.2841/8	Body, possibly bottle	Yes	No
Fabric 2			
CA17.1195/3	Body, undetermined	No	Yes
CA18.3367/01	Body, undetermined	Yes	No
Fabric 3			
CA17.479/01	Restricted bowl	No	No
FL16.2583/3	Restricted Bowl	No	No
Fabric 4			
CA19.4146/A	Bottle	Yes	Yes
FL16.2744/6	Body with (strange) rounded edge	Yes	Yes
FL16.2764/01	Body, undetermined	Yes	No
FL15.2301/11	Restricted Bowl	No	Yes

Each petrographic group, except for fabric 2, contains sherds from both sites. This is along the line of the findings concerning ceramic production at El Flaco and El Carril by Van Dessel (2018), who posited that people living at El Carril and El Flaco used similar clay outcrops and shared raw materials and/or finished products. The degree of standardisation is also the same as observed for the general ceramic assemblage. Only for fabric 3 the vessel shape is the same for all samples belonging to this petrographic group, but then again we are only dealing here with a 'group' existing of two samples. Next to that all the sherds belonging to fabric 1 are slipped and none are decorated. This indicates that fabric 1 was consistently chosen for the production of this type of ceramics, but had to be slipped. The characteristics of fabric 4 that were observed through petrography, could be considered as an indication for the identification of this fabric as cooking ware: apart from some coarse grains it contains more or less uniform inclusions and it has a high micro-porosity. Next to that the groundmasses of the samples connected to fabric 4 has a lower optical activity than the other fabrics, indicating that they might have been re-fired. However, the morphology of the vessels makes this hypothesis unlikely. At least two of the four sherds belong to vessels that are unsuited for cooking. CA19.4146/A is part of a bottle and FL16.2744/6 is a body sherd belonging to a vessel with an unknown shape, which includes a kind of rounded corner point, with the lower half broken off (see figure 85). Next to that 75% of the sherds in this group is decorated.

Figure 85: FL16.2744/6. Unknown shape with a rounded edge or possibly corner point. The lower side, beyond the corner point, was broken off (Photo by author for NEXUS 1492).

Fabric 1 and fabric 2 identified at El Flaco and El Carril are both limestone-based fabrics. Fabric 1 also contains igneous rock fragments, while fabric 2 almost only contains limestone inclusions. They cannot be linked to the petrographic groups identified by Van Dessel (2018) or Ting *et al*. (2016). There are however two samples (FL136 and FL146) classified by Van Dessel (2018) as "other fabrics". The composition of these samples is very much limestone-based. Due to the dominant presence of limestone the fabrics of those sherds are considered to be very similar to fabric 2. As mentioned in chapter four, the Altamira terrane, consisting of limestone and volcaniclastic rocks, is part of the geological background of El Flaco and Carril. Therefore I hypothesize that both fabric 1 and 2 have a local origin.

Fabric 4 is somewhat more difficult to interpret, mostly because the main connecting factor of this fabric is the high porosity. By focusing more on the composition, it becomes clear that three of these samples resemble elements of fabrics that were previously identified by Ting *et al.* (2016) and Van Dessel (2018). CA19.4146/A is very fine grained and contains mostly quartz crystals and mafic minerals. Therefore it can be related to the fine-quartz group, but with the addition of a white, calcareous slip layer. FL16.2744/6 and FL16.2764/01 contain coarser inclusions and consist mostly of amphibole, plagioclase, quartz and volcanic rocks. These two sherds show a rather large resemblance to the amphibole-amphibolite subgroup that has been identified by Ting *et al*. (2016) and Van Dessel (2018). Amphibolite has not been identified in FL16.2744/6 and FL16.2764/01 as such, but the volcanic rock fragments are often composed of feldspar and amphibole crystals as well. I believe that what has been identified as amphibolite is actually the more metamorphisized form of the volcanic rock fragments observed in FL16.2744/6 and FL16.2764/01. Both sherds were also slipped on the outside with a white, calcareous rich layer. As mentioned in chapter two, Manuel García Arévalo (pers. comm, July 2019) believes that this layer probably consists of crushed *caliche*. It is unclear from the petrographic analysis whether this is the case or not. Chemical analyses like SEM-EDS can provide clarity in this matter. The final sherd that belongs to fabric 4 is FL15.2301/11. It comprises quartz, feldspar, mafic minerals (mostly amphiboles), calcareous inclusions that are altered and chert. It cannot be linked to a previously identified petrographic group.

Fabric 3 is characterised by the presence of clay streaks and a volcanic component existing of amphiboles and (andesitic) volcanic rock fragments. No 'clear match' can be found with the previously identified fabrics by Ting *et al*. (2016) or Van Dessel (2018) at first sight. However, both of them identified the dominant presence of grog inclusions in respectively one and two sherds. As explained above, the difference between clay streaks and grog inclusions is not always clear cut. As was the case for El Cabo, here again some inclusions showed a diffuse edge which is a characteristic of clay streaks, while other inclusions have more sharp edges, pointing to a determination as grog inclusions. I hypothesize here that these two are related. Furthermore, there is a clear link with subgroup 1A that was identified at El Cabo: both fabrics are characterised by the presence of clay streaks and a volcanic component with a heterogeneous matrix. Whether these two fabrics have the same origin is impossible to tell from the data that I gathered, certainly taking into consideration the high degree of variability that characterizes the clay deposits. It is however very clear that the basic recipe for both fabrics, found in regions with a very different geological background and separated by several hundreds of kilometres of land, is very much alike. An additional element that (independently) reinforces the interpretations related to fabric 3 is provided by the identification of those 'grog' sherds as white ceramics by Katarina Jacobson (pers. comm., May 2021). She is currently finishing her thesis with the NEXUS 1492 project on the ceramic *chaînes opératoires* from El Flaco. She identified coiling as the preforming technique and discontinuous pressure for the roughing out of those 'grog' sherds. This differs from the other manufacturing techniques she identified for the ceramic assemblage of El Flaco. Next to that she connects these sherds to a pure Boca Chica style, which is related to the south-western part of the island and can be distinguished from the local, so-called El Flaco style (K. Jacobson, pers. comm., May 2021).

6.4 Summary

This study focused mostly on the site of El Cabo. LCAWW occurred here in a very low frequency. The style of the decorations identified was all Chicoid, except for one bottleneck that possibly showed Meillacoid influences with narrow incisions on applique. The connection between LCAWW and *potiza* shapes has been confirmed. However, only 17% of the sherds could actually be linked to *potiza* shapes, the most occurring shape was in fact a restricted bowl. I also found that non-white bottles were made as well, with a petrographic fabric not directly related to LCAWW. LCAWW forms a coherent pottery tradition. The manufacturing techniques used for the production of LCAWW were the same as those used for the rest of the ceramic assemblage, with the rare addition of a white clay slurry when presumed necessary. There were no clear social boundaries observed between producers of LCAWW and the rest of ceramic assemblage based on the manufacturing techniques. The petrographic analysis did indicate that interactions took place between different communities. The identification of four petrographic groups and nine outliers indicate the use of a wide range of raw materials, coming from different origins, to produce LCAWW. The immediate region around El Cabo is poor in good workable clay. Interactions with other communities involved the exchange of raw and/or possibly finished materials (Casale *et al.* in prep.; van As et al. 2008). The petrographic fabrics identified indicate that these networks were also used for the exchange of raw and/or finished materials relating to LCAWW. Next to that they point to the fact that the exchange mechanisms of LCAWW also extended beyond the boundaries of those networks.

The second focus area was the northern Dominican Republic, more specifically the sites of El Carril and El Flaco, which are two kilometres apart. LCAWW occurs at both sites, but with somewhat different characteristics. It has been identified as a minority in the ceramic assemblage at both sites, but was more present at El Flaco. The nature of the available sherds often made it hard to determine exact body shapes. Nevertheless, it is clear that many of the sherds found at El Flaco and El Carril were connected to bottle shapes. Similar shapes as observed at El Cabo were identified, but the ratio differs remarkably. While the majority of LCAWW at El Cabo are restricted bowls and just below one out of five sherds could be linked to a bottle shape, I noticed the exact opposite for El Flaco and El Carril. The same can be said of the addition of a white slip, which seems to have been the standard in northern Dominican Republic, but seldom occurred in El Cabo. The vessels at El Flaco and El Carril were sometimes decorated, but definitely not consistently. The observed decorations could all be linked to the Chicoid ceramic tradition. *Adornos*, often very elaborate and with large dimensions, were found in high frequency at El Flaco, but were rarely present at El Carril. Similar petrographic fabrics were identified for the production of LCAWW at both sites. The petrographic fabrics show a mixed image that has local elements as well as a fabric that can be linked to what I have observed at El Cabo. The identification of four petrographic groups and seven outliers indicate the use of a wide range of raw materials, coming from different origins, to produce LCAWW. No specific type of raw materials was selected. I observed the use of similar recipes as for other types of pottery, but with the addition of a white slip and I observed fabrics that were only used to produce LCAWW. One of these petrographic fabrics might show a possible connection between LCAWW from the northern Dominican Republic and from the south-eastern part of the island.

7. Discussion and conclusion

This chapter merges the information presented throughout this thesis. It discusses how the results reshape the view on Late Ceramic Age white ware in the Caribbean and specifically on the island of Hispaniola. The interpretation and combination of the compositional analysis, macroscopic trace analysis and morpho-stylistic analysis allows us to address the research questions which initiated the need for this study. To recapitulate, the research questions were:

1) Was LCAWW part of networks of exchange or the transmission of ideas on the island of Hispaniola?

2) Is there a technological basis that underlies a possible symbolical meaning of LCAWW for communities on Hispaniola in the Late Ceramic Age?

> A) Was the colour white used (artificially) as a mode for revealing unities between the properties of different vessels of LCAWW?
>
> B) Can we use that technological basis to infer meaning on a symbolical level?

First, the view on white ceramics on the island of Hispaniola needs to be adjusted. This study originated from the identification of a few non-local sherds on the island of Saba (Hofman 1993; Hofman *et al.* 2008) and led us to single out a specific type of pottery, which we termed Late Ceramic Age white ware (see chapter 2). Before going further, the reigning notion on white ceramics needs to be evaluated based on the information provided in the background chapter and the results. In the next step this will be coupled with the theoretical framework presented in chapter three to provide answers to the research questions.

7.1 Reshaping the view on Late Ceramic Age white ware on the island of Hispaniola

In chapter one and two I have revised the dominant view on LCAWW that occurs on the island of Hispaniola. White ceramics in Hispaniola are rare and in the first place connected to *potizas*, which are often large and/or elaborate vessels with bottle-shapes and with an *adorno* incorporated in the bottle neck (e.g. Brecht *et al*. 1997; Kerchace 1994). They are also heavily connected to social elites and mythical figures (e.g. García Arévalo 1977; Veloz Maggiolo 1972; Wilson 1997). They are in a way considered to be (one of) the expression(s) of elite status in an environment that is getting more and more stratified due to the emergence of *cacicazgos* as complex chiefdoms, typically linked to the Chicoid series on Hispaniola (Moscoso 1981; Wilson 1990, Rouse 1992). This study has made clear that there is a need to reshape the view on white ceramics occurring in Hispaniola.

The link between LCAWW and the Chicoid series on Hispaniola seems to be valid, because the decorations observed were of a Chicoid nature, characterised by broad incisions with punctations and the presence of *adornos*. This was the case at the three sites that were examined. Nevertheless, van As *et al.* (2008, 49) mention the use of white firing clays and a cream-coloured slip on Early Ostionoid pottery at the site of El Cabo (± AD 600 – 800). The presence of this type of ceramics has also been mentioned on Antigua, Culebra, Puerto Rico and St. Croix (Gutiérrez *et al*. 2009; Hardy 2007; 2008; Hoffmann 1970; 1979; Maíz López 2002; Oliver 1995). This occurrence was not identified by the technological analyses of this study, but keep in mind that the available assemblage at Leiden University was already a pre-selection of the entire ceramic assemblage excavated at the site of El Cabo. One vessel from El Cabo decorated with applique and thin incisions on the bottle neck (see chapter 5.1.3, figure 69) is possibly related to the Meillacoid series and is similar to a bottle neck from White Marl, Jamaica (Atkinson 2019; see below). The features with LCAWW identified at El Flaco were all connected to Chicoid pottery. At El Carril they were not only connected to Chicoid pottery, but also to pottery showing a mix of Meillacoid and Chicoid elements.

However, the fact that LCAWW seems to be connected to the Chicoid series, does not mean it is also connected to the emergence of *cacicazgos* and *caciques* on Hispaniola. Firstly, there are many problems with (complex) chiefdoms and the way archaeological data is interpreted to fit this concept (Pauketat 2007; Torres 2013). While identifying chiefdoms archaeologists ignored the underlying cultural pluralism and organizational variability that was encountered during archaeological investigations in Hispaniola (Herrera Malatesta 2018). One of the main characteristics of LCAWW is the high degree of variability, which was clear from the results of all of the analyses. Although the presence of LCAWW indicates interactions between different communities and possibly a shared belief or tradition concerning this type of pottery, I observed different kinds of local interpretations and a high degree of agency on the potters' behalf. Secondly, reports of Spanish chroniclers often serve(d) as ethnohistoric evidence. This resulted in the creation and reproduction of a Eurocentric-based image on the organisation of Indigenous communities at the start of the European invasion of the Caribbean, which was reflected on the period leading up to the colonization (Hofman *et al.* 2020). Thirdly, and most importantly, the contextual evidence presented by Deagan (2004) on the site of En Bas

Saline does not point to the exclusive use of LCAWW by elites. It was found in different contexts (residential, burial, feasting), elite and non-elite, at the site of En Bas Saline, both before and after 1492.

The connection between white ceramics and *potizas* should be revised. Indeed, LCAWW seems to occur throughout Hispaniola and make up a minority of the ceramic assemblage, but the vessel shapes are not just confined to *potizas*. At the sites of El Flaco and El Carril in northern Dominican Republic (and by extension also En Bas Saline in northern Haiti), the majority of LCAWW does seem to belong to (different kind of) bottle shapes. Furthermore, other shapes occur to a limited extend, of which a restricted bowl is the most common. At El Cabo the bottle shapes only make up 17% of the assemblage (again, based on a pre-selection) and restricted bowls represent the majority of LCAWW at the site. It does not seem farfetched to posit that the overrepresentation of *potizas* is due to the fact that these vessels are considered to be more elaborate. The results confirm the findings of VanderVeen (2011) who states that *potizas* were not subjected to standardization as they occur in all kind of shapes. Moreover, not all *potizas* are white. The fragility of the white-coloured coating applied on some sherds is addressed by some sources (e.g. Krieger 1929; Rouse 1939) and confirmed by my own observations. This allows for the possibility that certain *potizas* (and other vessels), which are now not recognised as LCAWW, actually had a whitish colour. In addition to that, the identification of black paint on a very small number of sherds (all in northern Dominican Republic or Cuba) indicates that the whitish look that is considered to be the main characteristic of LCAWW, might not be the final outcome for all the vessels identified as LCAWW.

7.2 Interactions related to LCAWW

The first research question deals with the interactions between people(s) that produced LCAWW. In chapter three we have seen how technological elements of the *chaîne opératoire* relate to social ties and boundaries (e.g. Lemonnier 1992; Stark 1998; Roux 2017). The results from El Flaco, El Carril and El Cabo show that Late Ceramic Age white ware was part of a kind of network that existed between communities across the island of Hispaniola. At El Cabo the interactions related to LCAWW were twofold. The reconstruction of the *chaînes opératoires* pointed to social ties between producers of LCAWW and the producers of other types of ceramics found at El Cabo. On the one hand these interactions were coherent with interactions for other types of pottery as indicated by a possible similar origin of the clays used (Casale *et al.* in prep.). On the other hand, the identification of many compositional outliers and outliers based on manufacturing techniques observed, indicates that the interactions related to LCAWW also extended beyond them. The morpho-stylistic analysis showed that there are both similarities and differences concerning LCAWW of the nearby sites of El Flaco and El Carril. The compositional analysis showed that similar raw materials were used for the production of LCAWW at both sites, which is in line with the findings for their general ceramic assemblages (Van Dessel 2018). Again, many probably non-local compositional outliers were identified, which points to interactions with other communities.

The interactions linked to LCAWW comprised both the transmission of ideas and actual exchange of vessels. Both differences and similarities between the two research areas and within the northern area itself were observed. There were local adaptations and variations of a similar idea revolving around white ceramics, but non-local LCAWW was also clearly identified. These findings point to the existence of both local, regional and possibly extra-regional interactions related to LCAWW on the island of Hispaniola. This reinforces the image of Hispaniola as a well-connected island, characterised by diversity which is the result of a myriad of interactions on various scales between communities related to material culture (Breukel 2019; Guzzo Falci et al. 2020; Keegan and Hofman 2017; Ulloa Hung 2014).

The study of the occurrence of LCAWW on other islands shows that these interactions are not limited to the island of Hispaniola, but extend to other Caribbean islands as well. The image of variability and diverse expressions that has been observed on Hispaniola is reflected on other Caribbean islands. Late Ceramic Age white ware was identified on Cuba, Puerto Rico, the Bahamas, Jamaica and Saba (see chapter two). Again we see that these interactions are diverse, probably involving both the transmission of ideas and exchange of goods, but more research is needed. The spread of LCAWW from Hispaniola to other islands can be connected to exchange within the Chicoid influence sphere and to colonisation practices, for example on Saba and the Bahamas (Hofman 1993; Sinelli 2010). However, local adaptations of similar ideas relating to LCAWW were also observed, for example on Jamaica where LCAWW is connected to the Ostionoid and Meillacoid series. Similarities in morphology and decoration observed between the different islands can point both to an exchange of goods and/or an exchange of ideas. Further research is required to understand the nature of these interactions.

White pottery that represents only a very small percentage of the ceramic assemblage has been identified on Antigua, St. Croix, Culebra and Puerto Rico; which are all islands east of Hispaniola, where it is known under different names such as Yorkstead series or chalky ware (Gutiérrez *et al*. 2009; Hardy 2007; 2008; Hoffman 1970; 1979; Maíz López 2002; Oliver 1995). These interrelations already occurred before the emergence of LCAWW on Hispaniola and were not linked to the Chicoid ceramic tradition. The earliest date found is between AD 400 and 600 on St. Croix, where it is connected to the Late Saladoid period (hardy 2008). It is unclear whether LCAWW and the presence of white pottery in very small quantities on these islands is related. Further research is needed to explore whether LCAWW is actually a (more or less) constant factor on different islands of the Caribbean that culminated in the Chicoid series on Hispaniola in the Late Ceramic Age, from where it possibly (again) dispersed to other islands both as an exchange of goods and of ideas.

7.3 The connection between technology and symbolical meaning

The second research question revolved around the symbolical meaning of the colour white and whether a technological basis for its meaning could be identified. As explained in chapter three, the meaning of colours is culturally constructed and can only be understood within their/its specific context (Sahlins 1976, Jones and MacGregor 2002). We have also seen that the significance of artefacts might be affected by their material properties (Jones 2007, 19) and that colour can be used metaphorically as a mode for revealing unities between the properties of artefacts (Jackson 1996, 9). The intention was to study whether aspects of technology could inform us on questions like "What does this artefact mean?" and "Why was this artefact chosen rather than another?" (Tilley 1999). Consequently I hoped to understand why some vessels within the ceramic assemblage had a white colour, why these artefacts were white and others not. If one approaches this purely on a technological level, the answer is simple: some vessels are white because of the interplay between the firing conditions and the iron- and lime-content of the raw materials used; others turn white because of the application of a white clay coating. This clay coating was probably applied in case the outcome of the firing process, being a paste with a reddish colour, was not what was intended at El Cabo. In El Flaco and El Carril this seems to have been the standard procedure. However, if you approach it from a symbolical level, the questions remain: what does the colour white mean or indicate? As the colour white was sometimes intentionally applied one might assume it had an extra layer of meaning. Why were these vessels used/selected?

The comparison of production processes does not provide answers on a symbolical level. On the grounds of the compositional analysis, macroscopic trace analysis and morpho-stylistic analysis I am not able to identify a technological basis that underlies a possible symbolical interpretation of Late Ceramic Age white ware. There is no standardisation in the production process of LCAWW. The analyses performed in this work do not reveal unities in the properties of the vessels which could point to an underlying connection that is the basis for the meaning of the colour white. However, throughout this work I realised that the way this issue is approached here is one-sided and most importantly Western/European. Standardization in the production process is totally normal to us (Western researchers) and thus we believe that the way we produce vessels can be linked to their meaning. I encountered a similar way of approaching issues like this in VanderVeen's study on *potizas*, where he states: "there is so much variety in *potiza* forms that it is difficult to believe they all served as part of a single, region-wide religious practice" (VanderVeen 2011, 7). However, is standardization in morphology and/or technology really necessary to from a connection? Is diversity and variability not just a characteristic of pottery and possibly by extension other material culture in a nonetheless connected Hispaniola/the Caribbean (see chapter two)?

One of the main characteristics observed for LCAWW is the complete lack of standardisation, which seems to be coherent with ceramic manufacturing processes on Hispaniola in general (Casale *et al.* in prep. ; Ting *et al*. 2016; Ting *et al*. 2018; Van Dessel 2018). The production of LCAWW happened on a small -probably household- scale, for which standardization was completely unnecessary. The main group with clay streaks identified at El Cabo indicates that people were just picking up top layer deposits and made vessels without preparation, exactly due to the characteristics of the clay streaks present (see chapter six). To the producers it was clearly not important for all these vessels to have a similar composition or to look exactly alike, there was a high level of agency on behalf of the potter. The fact that standardization of the technology or morphology as we see it nowadays was not a connecting factor between the vessels, does not mean that there is no symbolical meaning behind the white colour of these vessels at all. The image obtained from the results is one of variability, not only from the ceramic analyses but also from the (limited) contextual analyses. It is possible that other similarities are underlaying the meaning of the colour white in this case. The approach used in this study focused heavily on the production process of LCAWW, while the symbolical basis of LCAWW can also be situated in processes related to other aspects, like the way these vessels were used. Starch-grain analyses pointed out that *potizas* in El Flaco were used for storing and serving both fermented and energetic liquids related to feasting and rituals (Pagan Jimenez *et al.* forthcoming). It is possible that the link between vessels of LCAWW has to be situated within this sphere. It is also plausible that communities in the past saw another level of connection between these vessels and why they needed/were chosen to be white, that we are not able to understand.

7.4 Limitations

I want to list the main limitations that I encountered during the course of this research in the hope that future research(ers) will benefit from my experiences. One of the major limitations is the nature of the selection of the ceramic assemblage from El Cabo. The selection available for study at Leiden Univeristy, was originally made for petrographic analysis and not for a reconstruction of the *chaîne opératoire*. Therefore, bases and body sherds were almost absent from this study. In order to reconstruct the *chaîne opératoire* you need to be able to look at (more or less) complete vessels and preferably large sherds. Another limitation is the fact that the relation with the temporal axis in this study was difficult. This was either due to maintenance/sweeping activities and the intentional modification of the landscape. The addition of the temporal axis could have brought more clarity to this study and definitely would have provided more insight in the variability observed. A final limitation I want to mention is the fact that the *chaîne opératoire* approach comes from a Western perspective towards technology and standardisation. One the one hand this approach proved to be very useful and provided valuable insights in the production process of LCAWW and the relations between its producers. On the other hand the *chaîne opératoire* approach could not be used to relate the technological aspect of LCAWW to the symbolical, due to the variability and diversity that characterises pottery production on Hispaniola.

7.5 Conclusion and avenues for future research

This thesis provides a baseline for the understanding of the phenomenon of Late Ceramic Age white ware (LCAWW). This study focused on LCAWW from three sites in Hispaniola: El Cabo, El Flaco and El Carril. Calibrated radiocarbon dates situate the occurrence of LCAWW at El Cabo and El Flaco between the first half of the 12th century until the final occupation of the sites, respectively 1504 and the second half of the 15th century. At El Carril the presence of LCAWW is situated between the end of the 11th century and the second half of the 14th century. However, only four available radiocarbon samples could be linked to the presence of LCAWW at the site of El Carril (M. Hoogland, pers. comm., June 2021). The results of the ceramic analyses have shown that it was both part of an exchange of ideas and an exchange of goods on the island of Hispaniola. Two *chaînes* *opératoires* were identified for LCAWW at El Cabo. The difference between them is of a functional nature. LCAWW forms a coherent pottery tradition that is consistent with the rest of the ceramic assemblage. Since there was no workable clay in the immediate environment of the site, interactions with other communities involved the exchange of raw and/or finished materials for pottery production, as is evidenced by identification of various non-local petrographic fabrics by Casale *et al.* (in prep.). Four petrographic fabrics and nine outliers were identified for LCAWW at El Cabo. Some of them show similar possible origins to the rest of the ceramic assemblage, others do not. This indicates that LCAWW was both part of the interactions relating to other types of pottery, and of interactions that extended beyond those networks. At El Flaco and El Carril I identified four petrographic fabrics and seven outliers. Similar petrographic fabrics were identified for the production of LCAWW at both sites. The petrographic fabrics show a mixed image that has local elements, but also fabrics that are not local, including one fabric that can be linked to a petrographic group identified at El Cabo. LCAWW at El Flaco and El Carril seems to be related to a local adaptation on the one hand and exchange of goods on the other. The results of the compositional analysis, macroscopic trace analysis and morpho-stylistic analysis point to a great level of variability in the characteristics of LCAWW as no standardisation was observed. Furthermore they indicate the existence of both local, regional and possibly extra-regional interactions related to LCAWW on the island of Hispaniola. This reinforces the image of Hispaniola as a well-connected island, characterised by diversity which is the result of a myriad of interactions on various scales between communities related to material culture (Breukel 2019; Guzzo Falci et al. 2020; Keegan and Hofman 2017; Ulloa Hung 2014).

These interactions extended beyond the borders of Hispaniola to other islands of the Caribbean such as Jamaica, Cuba, the Bahama's, Puerto Rico and the Lesser Antilles (Saba), where the presence of LCAWW was identified (Atkinson 2019; Hofman 1993; Hofman *et al.*2008; Sinelli 2010; own observations). It is hypothesised here that these interactions are also exchanges of ideas and of goods, but further research needs to be conducted to see in what way LCAWW connected Caribbean communities in the Late Ceramic Age across different islands. White-coloured ceramics already occurred in small quantities on islands east of Hispaniola before the emergence of the Chicoid series, such as the Yorkstead series on Antigua and chalky-ware on St. Croix (Hoffman 1970; 1979; Hardy 2007; 2008). Further research on the relation of LCAWW and these possible "predecessors" is required to understand its position in Caribbean communities over time. The temporal axis should also be studied on Hispaniola, as the occurrence of white ceramics in the Ostionoid series have been reported by van As *et al*. (2008), but were not identified in this study. The connection, or possibly whether there is a connection between the Ostionoid and Meillacoid ceramic series at Hispaniola is not yet clear. I believe that a study into this topic should also include Jamaica, where LCAWW related to the Ostionoid and Meillacoid series has been discovered. The study of LCAWW should not be confined to the period before the colonisation. The characteristics of its occurrence after 1492 can also be a good indication of the influence of colonial processes on interactions in Hispaniola.

The information provided in this thesis needs to be supplemented with other lines of research in order to understand how this type of pottery connected Caribbean communities. LCAWW is not (solely) linked to social elites on Hispaniola, but the instalment of a more stratified/centralised social organisation can have helped to increase its spread. One of the avenues to go forward is to study if and how the interactions of exchange of LCAWW intertwine with networks related to other objects such as *guanin*, three pointers, jadeite, etc. The connection between LCAWW on Hispaniola and on other islands should be studied more profoundly to understand the nature of the interactions and the relations between people living on different islands. An important element that will make further research easier is raising awareness about the existence of LCAWW. At this moment LCAWW is often not recognised and not reported, because people do not know what it is. This way a lot of crucial information is lost. Another important aspect that is pivotal to future research is of course the availability of reports from archaeological excavations and results of ceramic analyses in combination with dated contexts.

I believe that it is crucial to not just look at interactions and networks, but to go beyond this and to try to understand what was behind them and what actually connected these people. There was no technological basis observed for the symbolical meaning of LCAWW through the *chaîne opératoire* method. Future research into LCAWW should not be restricted to the production process, but also has to explore different avenues. A next step can be to focus on how LCAWW was used. I believe that the analysis of starch grains present in *potizas* from different sites could provide more insight, next to a comparison between the use of *potizas* and other vessel shapes related to LCAWW.

Abstract

This thesis was initiated by the identification of non-local white pottery on the island of Saba and of similar white pottery occurring in very small quantities on the island of Hispaniola. This work studies the hypothesis that this type of pottery was a connecting factor between communities on the island of Hispaniola and possibly other Caribbean islands as well. Little information was available about the white ceramics on Hispaniola which were (tentitavely) linked to the Chicoid series, *potizas*, the emergence of *cacicazgos* and social elites.Throughout this work it became clear that this is a specific type of ceramics and the need arose to single them out and give them a name: Late Ceramic Age white ware (LCAWW). This type of pottery occurred in small quantities all over Hispaniola in the Late Ceramic Age and was identified in Cuba, the Bahama's, Jamaica, Puerto Rico and the Lesser Antilles (Saba). The presence of white ceramics was also observed on other islands such as Antigua and St. Croix, dating back to the Late Saladoid period. Further research is required to examine a possible relation between these earlier dated types of pottery and LCAWW.

This thesis applied the *chaîne opératoire* approach to verify whether LCAWW was part of an exchange of goods or ideas on Hispaniola and to see whether there is a technological basis underlying the symbolical meaning of LCAWW. The production process of LCAWW was studied at El Cabo, El Carril and El Flaco, three sites in modernday Dominican Republic. The applied methods are macroscopic fabric analysis, petrographic analysis, macroscopic trace analysis and a morpho-stylistic analysis. The image obtained from LCAWW is one of high variability, which appears to be consistent with the general ceramic production on Hispaniola. Local adaptations and variations of a similar idea revolving around white ceramics were observed, but non-local LCAWW was also clearly identified at the three sites. These findings point to the existence of both local, regional and possibly extra-regional interactions related to LCAWW on the island of Hispaniola. The results indicate that the interactions linked to LCAWW comprised both the transmission of ideas and actual exchange of raw materials and/or finished goods across Hispaniola, which probably extended to other islands in the Caribbean. The results of the technological analyses indicated that the potters were not occupied with standardisation at all and that there was a high level of agency on the potters' behalf. They did not provide a basis for the interpretation of the symbolical meaning of LCAWW. Further research is needed to understand if and how LCAWW connected communities on different Caribbean islands, with a focus on the temporal axis and the use of LCAWW.

Appendices

Appendix 1: Template of forms for technological analyses

Macroscopic Fabric Description		
Ware group:	**Fabric group:**	**Samples:**
Site:	**Unit:**	**Context:**
Colour: Homogeneous: Heterogeneous (two/three layered): • Margins: • Core:		
Hardness:		
Feel:		
Fracture:		
Voids: • Frequency: • Shape: • Preferred orientation:		
Non-plastic inclusions: • Overall frequency: • Sorting: • Shape: • Size:		
Individual type of inclusions: frequency/ colour/ shape/ appearance **Coarse Fraction**: • Frequent to common • Common to few ….. • Common to few …. • Few ….. • Few to rare …… • Rare …. • Rare …. **Fine Fraction** • Common to few … • Few to rare ….		
Surface vessel:		
Wall thickness:		
Shape and function:		
Note:		

Form for macroscopic fabric analysis used in this study (courtesy of Martina Revello Lami).

Petrographic Fabric Description		
Ware group:	**Fabric group:**	**Sample:**
Site:	**Unit:**	**Context:**
1.Microstructure: • Voids:. • C:F:V: • Orientation:		
2. Matrix • Heterogeneity: • Colour: • Optical activity:		
Individual type of inclusions: frequency/ shape/size **3. Inclusions**		
4.Comments		

Form used in this study for petrographic analysis (by author).

Appendix 2: Macroscopic fabric results

Macroscopic Fabric Description		
Ware group: LCAWW	**Fabric group: LCAWW_CB_1** *Buff firing clays with plastic inclusions*	**Samples:** 27
Site: El Cabo	**Unit: /**	**Context: /**
Colour: Homogeneous: Pink (7.5 YR 8/3), Grey (10 YR 6/1 and 5/1) to Dark Gray (10 YR 4/1), : Very Pale Brown (10 YR 7/3) Heterogeneous (two/three layered): • Margins: Very Pale Brown (10 YR 7/3) , Brown (7.5 YR 5/3 and 5/4) • Core: Reddish Brown (5 YR 5/4) to Brown (7.5 YR 5/3 and 5/4) Grey (10 YR 6/1 and 5/1) and Very Pale Brown (10 YR 7/3)		
Hardness: Hard		
Feel: Soapy		
Fracture: Hackly		
Voids: • Frequency: Common • Shape: Few Planes and Channels, Common Vughs • Preferred orientation: /		
Non-plastic inclusions: • Overall frequency: Common to Frequent • Sorting: Poorly Sorted • Shape: Rounded to Sub-Angular • Size: Fine to Coarse (0.02 – 1.5 mm)		
Individual type of inclusions: frequency/ colour/ shape/ appearance **Coarse Fraction**: • Common Whitish, Cement-like, Coarse, Sub-Angular to Sub-Rounded Grains (Limestone?) • Common to Few Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains • Common to Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules • Rare White, Translucent, Medium, Angular Grains (Quartz?) **Fine Fraction** • Common whitish, fine, dull beats (calcareous inclusions?) • Few black, fine, sand-like circular inclusions		
Surface vessel: /		
Wall thickness: /		
Shape and function: Bowls, Bottles (and related adorno's), Storage/processing of Liquid and/or food		
Note: /		

Macroscopic fabric analysis Group 1 (By author for NEXUS 1492).

<table>
<tr><th colspan="3">Macroscopic Fabric Description</th></tr>
<tr><td>Ware group: LCAWW</td><td>Fabric group: LCAWW_CB_2</td><td>Samples: 31</td></tr>
<tr><td>Site: El Cabo</td><td>Unit: /</td><td>Context: /</td></tr>
<tr><td colspan="3">Colour:
Homogeneous: Reddish Brown (5 YR 5/4), : Very Pale Brown (10 YR 7/3), Grey (10 YR 6/1 and 5/1), Dark Gray (10 YR 4/1)
Heterogeneous (two/three layered):
• Margins: Reddish Brown (5 YR 5/4)
• Core: Dark Gray (10 YR 4/1), : Very Pale Brown (10 YR 7/3)</td></tr>
<tr><td colspan="3">Hardness: Hard</td></tr>
<tr><td colspan="3">Feel: Soapy</td></tr>
<tr><td colspan="3">Fracture: Hackly</td></tr>
<tr><td colspan="3">Voids:
• Frequency: Common
• Shape: Few Planes and Channels, Common Vughs
• Preferred orientation:</td></tr>
<tr><td colspan="3">Non-plastic inclusions:
• Overall frequency: Common to Frequent
• Sorting: Poorly Sorted
• Shape: Rounded to Sub-Angular
• Size: Fine to Coarse (0.02 –2mm)</td></tr>
<tr><td colspan="3">Individual type of inclusions: frequency/ colour/ shape/ appearance
Coarse Fraction:
• Common to Frequent Blackish to Dark Brown, Medium-Coarse, Sub-Rounded to Sub-Angular Grains
• Common Whitish, Cement-like, Coarse, Sub-Angular to Sub-Rounded Grains (Limestone?)
• Common to Few Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains
• Common to Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules
• Rare White, Translucent, Medium, Angular Grains (Quartz?)

Fine Fraction
• Common whitish, fine, dull beats (calcareous inclusions?)
• Few black, fine, sand-like circular inclusions</td></tr>
<tr><td colspan="3">Surface vessel: /</td></tr>
<tr><td colspan="3">Wall thickness: /</td></tr>
<tr><td colspan="3">Shape and function: Bowls, Bottles (and related adorno's), Storage/processing of Liquid and/or food</td></tr>
<tr><td colspan="3">Note: /</td></tr>
</table>

Macroscopic fabric analysis Group 2 (By author for NEXUS 1492).

<table>
<tr><th colspan="3">Macroscopic Fabric Description</th></tr>
<tr><td>Ware group: LCAWW</td><td>Fabric group: LCAWW_CB_3
Conchoidal fracture and organic material</td><td>Samples: 40</td></tr>
<tr><td>Site: El Cabo</td><td>Unit: /</td><td>Context: /</td></tr>
<tr><td colspan="3">Colour:
Homogeneous: Dark Grey (10 YR 4/1) to Very Dark Grey (10 YR 3/1) to Black (10 YR 2/1);
Reddish Brown (5 YR 5/4) to Brown (7.5 YR 5/3 and 5/4)
Heterogeneous (two/three layered):
• Margins: Very Pale Brown (10 YR 8/2 to 8/3)
• Core: Grey (10 YR 6/1 and 5/1) to Dark Gray (10 YR 4/1) and Black (10 YR 2/1)</td></tr>
<tr><td colspan="3">Hardness: Hard</td></tr>
<tr><td colspan="3">Feel: Soapy to Smooth</td></tr>
<tr><td colspan="3">Fracture: Conchoidal</td></tr>
<tr><td colspan="3">Voids:
• Frequency: Frequent
• Shape: Mostly Planes and Vughs, few Channels
• Preferred orientation: /</td></tr>
<tr><td colspan="3">Non-plastic inclusions:
• Overall frequency: Common to frequent (20-35%)
• Sorting: Moderately to Poorly Sorted
• Shape: Angular to Sub-Rounded
• Size: Fine to Coarse (0.02 mm – 2 mm)</td></tr>
<tr><td colspan="3">Individual type of inclusions: frequency/ colour/ shape/ appearance
Coarse Fraction:
• Common to Frequent Vague Blackish, Medium, Organic-like (Burned-out) inclusions
• Common to Few Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains (Grog?)
• Common to Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules (Clay Pellets?)
• Common to Few Whitish, Cement-like, Coarse, Sub-Angular Grains (Limestone?)
• Common to Few Blackish to Dark Brown, Medium-Coarse, Sub-Rounded to Sub-Angular Grains
• Rare White, Translucent, Medium, Sub-Angular Grains (Quartz?)

Fine Fraction
• Common to few whitish, fine, dull beats (calcareous inclusions?)
• Common to few black, fine, sand-like</td></tr>
<tr><td colspan="3">Surface vessel: Slipped, Smoothed</td></tr>
<tr><td colspan="3">Wall thickness: Variable</td></tr>
<tr><td colspan="3">Shape and function: Bowls, Bottles (and related adorno's), Storage/processing of Liquid and/or food</td></tr>
<tr><td colspan="3">Note: The main feature of this group is the presence of burned out organic material in combination with medium-coarse inclusion, presumably grog, clay pellets, limestone and blackish to dark-brown grains, all occurring in mixed frequencies throughout the sherds. Next to that quartz is rarely present.</td></tr>
</table>

Macroscopic fabric analysis Group 3 (By author for NEXUS 1492).

Macroscopic Fabric Description		
Ware group: LCAWW	**Fabric group:** LCAWW_CB_4	**Samples:** 1
Site: El Cabo	**Unit: /**	**Context: /**
Colour: Heterogeneous (two/three layered): • Margins: Grey (10 YR 6/1) • Core: Very Pale Brown (10 YR 7/3) to Pink (7.5 YR 8/3)		
Hardness: Hard		
Feel: Rough (Outside) and Smooth (Inside)		
Fracture: Hackly		
Voids: • Frequency: Common • Shape: Planes and Vughs • Preferred orientation: /		
Non-plastic inclusions: • Overall frequency: Few-Common (10-15%) • Sorting: Moderately Sorted • Shape: Sub-Rounded to Angular • Size: Fine-Coarse (0.02 – 1mm)		
Individual type of inclusions: frequency/ colour/ shape/ appearance **Coarse Fraction**: • Common Vague Blackish, Medium, Organic-like (Burned-out) inclusions • Common Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains (Grog?) • Common Whitish, Cement-like, Coarse, Sub-Angular Grains (Limestone?) • Common White, Translucent, Medium, Sub-Angular Grains (Quartz?) • Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules (Clay Pellets?) **Fine Fraction** • Common White, Translucent, Medium, (Sub-) Angular to Sub-Rounded Grains (Quartz?) • Common to few whitish, fine, dull beats (calcareous inclusions?)		
Surface vessel: Smoothed (inside), eroded (outside)		
Wall thickness: 0.5 mm		
Shape and function: Bowl for storage/processing of food/liquids		
Note: /		

Macroscopic fabric analysis Group 4 (By author for NEXUS 1492).

Macroscopic Fabric Description		
Ware group: LCAWW	**Fabric group:** LCAWW_CB_5 *Quartz Group*	**Samples:** 12
Site: El Cabo	**Unit: /**	**Context: /**

Colour:
Homogeneous: Dark Grey (10 YR 4/1) to Dark Greyish Brown (10 YR 4/2), Very Pale Brown (10 YR 7/3)
Heterogeneous (two/three layered):

- Margins: Very Pale Brown (10 YR 7/3)
- Core: Dark Grey (10 YR 4/1)

Hardness: Hard

Feel: Smoothed

Fracture: Hackly

Voids:

- Frequency: Few to Common (10-15%)
- Shape: Planes and Vughs
- Preferred orientation: /

Non-plastic inclusions:

- Overall frequency: Common (15-25%)
- Sorting: Moderately to Poorly Sorted
- Shape: Angular to Sub-Rounded
- Size: Fine to Coarse (0.02 mm – 2 mm)

Individual type of inclusions: frequency/ colour/ shape/ appearance

Coarse Fraction:

- Frequent White, Translucent, Medium, (Sub-) Angular to Sub-Rounded Grains (Quartz?)
- Common to Few Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains (Grog?)
- Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules (Clay Pellets?)
- Few Whitish, Cement-like, Medium, Sub-Angular Grains (Limestone?)
- Few to Rare Blackish to Dark Brown, Medium-Coarse, Sub-Rounded to Sub-Angular Grains

Fine Fraction

- Frequent White, Translucent, Medium, (Sub-) Angular to Sub-Rounded Grains (Quartz?)
- Common to few whitish, fine, dull beats (calcareous inclusions?)
- Common to few black, fine, sand-like

Surface vessel: Smoothed

Wall thickness: around 5 mm

Shape and function: Bowls for storage/processing of food/liquids

Note:

Macroscopic fabric analysis Group 5 (By author for NEXUS 1492).

Macroscopic Fabric Description		
Ware group: LCAWW	**Fabric group:** LCAWW_CB_6	**Samples:** 17
Site: El Cabo	**Unit: /**	**Context: /**
Colour: Homogeneous: Very Pale Brown (10 YR 7/3) Heterogeneous (two/three layered): • Margins: Very Pale Brown (10 YR 7/3) , Brown (7.5 YR 5/3 and 5/4) • Core: Grey (10 YR 6/1 and 5/1), Brown (7.5 YR 5/3 and 5/4), Reddish Brown (5 YR 5/4)		
Hardness: Hard		
Feel: Smooth to Rough		
Fracture: Extremely Hackly		
Voids: • Frequency: Common - Frequent • Shape: Vughs and Planes • Preferred orientation: /		
Non-plastic inclusions: • Overall frequency: Frequent to Dominant • Sorting: Extremely badly sorted • Shape: Sub-Rounded to Angular • Size: Fine to extremely coarse (> 2 mm)		
Individual type of inclusions: frequency/ colour/ shape/ appearance **Coarse Fraction**: • Common Blackish to Dark Brown, Medium-Coarse, Sub-Rounded to Sub-Angular Grains • Common Whitish, Cement-like, Coarse, Sub-Angular to Sub-Rounded Grains (Limestone?) • Common to Frequent Few Orange, Medium-Coarse, Sub-Angular to Angular Claylike Grains • Common to Few Red, Medium-Coarse, Sub-Rounded to Rounded Nodules • Rare White, Translucent, Medium, Angular Grains (Quartz?) **Fine Fraction** • Common whitish, fine, dull beats (calcareous inclusions?) • Few black, fine, sand-like circular inclusions		
Surface vessel: /		
Wall thickness: /		
Shape and function: /		
Note: /		

Macroscopic fabric analysis Group 6 (By author for NEXUS 1492).

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