The re-creation of decoration

Wilmer Claessens

Reference cover:

(Title, The re-creation of decoration (designed by Laura Arnold), viewed on the 27th of April, 2018)

The Re-creation of Decoration

A research on decoration techniques on Meillacoid and Chicoid pottery from El Flaco, Dominican Republic

Name:	Wilmer Claessens
Studentnumber:	s1493582
Course:	BA Thesis
Supervisors:	Prof. dr. C.L. Hofman; Dr. J.E. Laffoon
University:	Leiden University, Faculty of Archaeology
Place:	Leiden
Date:	09-06-2018
Version:	2

Index:

Acknowledgments:

First and foremost I would like to thank both my thesis supervisors: prof. dr. Corinne L. Hofman and dr. Jason E. Laffoon, who took on the role of my second supervisor later in the progress of writing my thesis for practical reasons. Both professor Hofman and dr. Laffoon provided me with indispensable help and feedback that helped me develop this research. Next I would like to thank all other (ex-)staff members of Leiden University who have helped me with this research, most notably Katarina Jacobsen, who guided me at various stages through my research and the writing process of this thesis, and Loe Jacobs, who helped me execute the experimental part of this research and managed the firing of my experimental clay-slabs which I made for this research. Finally I would like to give special thanks to my dear friend Ronny Kost, who proofread this thesis multiple times during the writing process, as well as helped me with both the macroscopic analysis and comparison of the 35 Meillacoid and Chicoid pottery samples and 44 experimental clay-slabs.

1. Introduction:

The ERC-Synergy project Nexus1492: New World Encounters In A Globalising World is, amongst others, investigating past activities in the indigenous Caribbean. One of these activities was the production of pottery. This thesis aims to investigate the 'act' of decorating ceramic vessels through incising and punctating during the Late Ceramic Age.

More specifically, the goal is to investigate whether or not it is possible to establish relationships between decorations on archaeological pottery and the tools that were possibly used to make these decorations using a combination of experimental archaeology and macroscopic analysis. In particular, this study will be looking at the relations between the implements used for decoration and incisions and punctations made on the Meillacoid and Chicoid pottery from the site of El Flaco in the northern Dominican Republic. The goal is to re-create the pre-Colonial potter's toolkit through a combination of experimental archaeology and macroscopic analysis.

Roux (2016, 101) argues that a clear relation exists between social groups and their technological behavior. Because people tend to work like the group they are a part of, it is possible to reveal social borders between groups based on assemblages of technological traits through researching the *chaîne opératoire*. *Chaîne opératoire* can best be described as the manufacturing processes wherein raw materials are transformed, through a number of (different) actions, into finished products (Sellet 1993, 106). This thesis contributes to research of the *chaîne opératoire* of Late Ceramic Age peoples of Hispaniola by complementing Katarina Jacobsen's upcoming Ph.D. dissertation: *Jeu d'argile: Etude technologique de la céramique dans la Caraibe du 13e au 16e siecle.* Jacobsen researches the complete *chaîne opératoire* of the pre-Columbian potter, of which decoration techniques form a part. This thesis will supplement Jacobsen's dissertation with an experimental approach to the *chaîne opératoire* research on decorating ceramics.

1.1 A brief History of Archaeological Research in the Caribbean:

The earliest phases of archaeological research in the Caribbean, which occurred between the 1930s and the 1980s, consisted mainly of typological researches of lithic and pottery assemblages and the resulting establishment of chronological charts of the Caribbean (Hofman *et al.* 2008, 1-5). One of the most important researches of this time is Irving

Rouse's (1972) *Introduction to Prehistory: A Systematic Approach*, in which he classified numerous pottery styles to demarcate the peoples and material culture associated with the different peoples of the Caribbean, inspired by the biological classification system of Carolus Linnaeus (Hofman *et al.* 2008, 2-3). It was not until the 1980s that more technological research methods were implemented in the Caribbean field. Inspired by the concept of *chaîne opératoire* of André Leroi-Gourhan (1964; 1965), the focus of Caribbean researches shifted more towards that of functional studies, production sequences, and manufacturing techniques (Hofman 1993, 159-196; Hofman *et al.* 2008, 5-14). It was from this time onward until present-day that experimental archaeology found its place within Caribbean archaeological research. Numerous Caribbean experimental studies have been executed in the last couple of decades, including those of potsherds as tools (van Gijn and Hofman 2008), bead-making (Falci 2015), various coral experiments (Kelly and van Gijn 2008), lithic experiments (Walker 1980), various shell tool experiments like *Strombus* axe and adze production (Lammers-Keijsers 2007), and pottery experiments (Guzmán 2011; Hofman and Jacobs 2001). One of the closest of these to this research is Amanda Guzmán's *Experimental Archaeology and Prehistoric Technology: A Study of Chicoid Ceramic Style Production in El Cabo, Dominican Republic* (2011). In this study Guzmán replicated two Chicoid-style ceramic vessels each bearing two *adornos* as well as multiple instances of the classic Chicoid incision + punctation motif. Actually the term 'incision + punctation' does not completely fit the decorations on the two Chicoid vessels, for the lines are actually generated by impressing the stem of a plant into the ceramic vessel. The word 'incision' does not really fit because, as will be described in chapter 3, impressing is a displacement technique, not a removal technique (which incising is). Anyway, Guzmán (2011) chose to implement the research methods of replication studies to test whether or not these 'incisions' were actually made by impressing the ceramic vessel with a plant stem. Guzmán observed that these stem fragments were most useful when stripped, soaked in water, applied to a still rather plastic vessel, and held in place or impressed multiple times during the surface finishing stages of the vessel (Guzmán 2011, 16).

<u>1.2 Research Aim:</u>

As mentioned above, Caribbean pottery analysis started as a mostly typological process, with creating typologies and chronologies as the main goal (Hofman *et al.* 2008, 1-5). Later researchers implemented various other techniques and approaches to pottery analysis as a study. Looking at any given subject the study of it through different methodological frameworks can offer new insights on the problems at hand. The reasoning for this research lies in the prospect of offering answers to newer questions concerning pottery production. Decoration techniques and, more importantly, potters' toolkit recreation studies have not had the same focus as other elements of technological analysis of Caribbean pottery. Although there has already been a large amount of research on Meillacoid and Chicoid pottery, most of this research does not emphasize the technological aspects of the act of decorating pottery (Hofman and Hoogland 2015a; 2015b; Hofman *et al.* 2018; Keegan and Hofman 2017; Ting *et al.* 2016; Wilson 2007). This still leaves us with the question 'how was it made?' This research aims to answer this question through answering a couple of formal questions. The main research question that serves to that end is the following:

- *What techniques and tools were used to make incisions and punctations on the pre-Columbian pottery from El Flaco (Dominican Republic) during the Late Ceramic Age?*

This research aims to answer this question through answering the following sub-questions:

- *Which are the types of incision and punctation present on the pottery of El Flaco?*
- *How do the decorations on the experimental slabs compare to the archaeological samples?*
- *Which tools were used for the creation of different incisions and punctations?*
- *Were incisions and punctations generally applied to wet or leather-hard clay?*

<u>1.3 Methods:</u>

The main methods that were implemented in this research are those of experimental archaeology, replication studies to be more exact, and macroscopic analysis. Based on the concepts of *chaîne opératoire* of André Leroi-Gourhan (1964; 1965). Numerous clay-slab experiments were decorated with a plethora of different tools and, in turn, compared to multiple Meillacoid and Chicoid-style pottery samples which were taken from the site of El Flaco (Dominican Republic) in 2016. The methodology will be further explained in chapters two and three.

1.4 Chapter Outline:

The first chapter serves as an introduction to the research, it presents both the research questions, and the relevance of the subject, as well as past (experimental) researches in the Caribbean. The second chapter describes the methodological framework on which the research is based. It will discuss both the field of experimental archaeology and the importance of the concept of *chaîne opératoire*, as well as some basic knowledge on pottery decoration techniques. Chapter three will illustrate the process of this research and the decisions which were taken during the experiments and macroscopic analysis of both the Meillacoid and Chicoid pottery samples and the experimental clay-slabs.

The geographical and social context of this research will be provided in chapter four: Geographical Framework and Materials'. This chapter will also present a description of Meillacoid and Chicoid pottery traditions. Finally the sampling strategy which was implemented in this research will be discussed shortly.

The data derived from the experiments and macroscopic analysis of these experiments will be presented and discussed in chapter five: 'Results and Discussion'. The final chapter will present my conclusions, as well as suggestions for future research.

2. Methodological Framework:

This chapter will provide the methodological framework in which this research is rooted. First the two most important methodological elements of this research (namely the field of experimental archaeology and Leroi-Gourhan's (1964; 1965) concept op *chaîne opératoire*) will be presented, defined, and discussed. Secondly, and finally, the two decoration-categories under which incising and punctation falls will be defined and discussed.

2.1 Experimental Archaeology and Chaîne Opératoire:

Robert Ascher (1961, 793) describes experimental archaeology as the testing of past cultural behavior. Experimental archaeology, or, as Ascher calls them, imitative experiments, form an useful tools for testing an archaeological hypothesis by simulating methods or tools which are believed to have been used in the past. The function of this process is to access the plausibility of any given hypothesis that derives itself to experimental archaeology or replication studies (Ascher 1961, 795-796). Experimental archaeology operates under the premise of falsification, a formulated theory or hypothesis gets tested to see whether or not it can be falsified. If it does, the theory or hypothesis should either be adjusted accordingly or completely discarded and reformulated. Afterwards, the new hypothesis can be tested (Outram 2008). However, a hypothesis that is not falsified is not necessarily true, it can be regarded as useful, but the fact that a theory has not been disproved does not prove its validity. Yvonne Lammers-Keijsers (2005) visualized and discussed this 'circle' of hypothesis formulation, testing, and rejection or acceptance (see figure 1).

Experimental archaeology often deals with the concept of *chaîne opératoire*, most notably when dealing with replication studies, of which this research is a prime example. As mentioned before, the concept which was invented by the Frenchman André Leroi-Gourhan (1964; 1965) plays an important role for researches involving replication studies. When studying a specific stage within the production sequence of an object, you are inherently studying (a part of) the *chaîne opératoire* of that object. Therefore both experimental archaeology, or replication studies, and *chaîne opératoire* form the most important premises of this thesis.

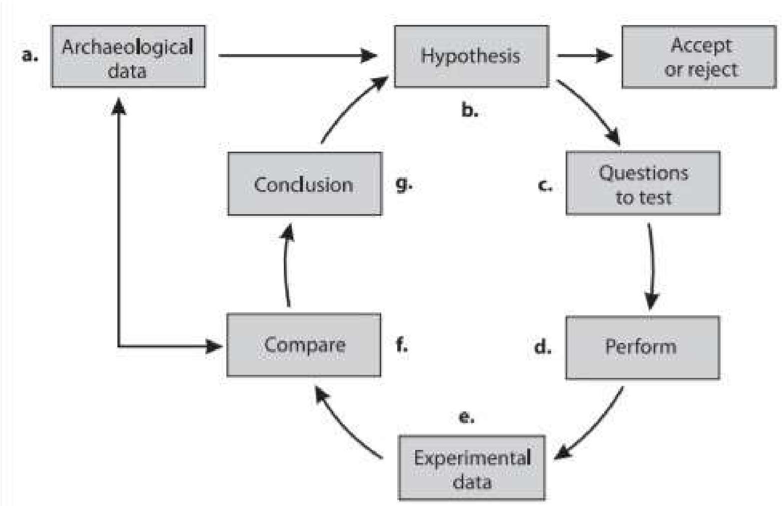

Figure 1: 'Circle' of experimental research (Lammers-Keijsers 2005, 18)

Leroi-Gourhan (1964; 1965) used his teacher's (Marcel Mauss) ideas, which Mauss released in his article: *Les techniques du corps* (1936) as the basis of the concept of *chaîne opératoire*. Mauss (1936, 12) claims that he himself was 'inferior' to the Australians when he was living on the front with them. This was because he (a Frenchman) was not able to squat while his Australian comrades could and blamed his own 'race' for 'forgetting how to squat'. Mauss (1936) argues that 'stances' (like squatting) and 'movements' are something that can be learned and forgotten and that they should be approached and studied as being *techniques*. These so-called *techniques* are effectively human actions which are shaped by traditions. Because the number of different so-called *techniques*, like the ability to squat or not, or the way a person throws a ball, is virtually infinite, all *techniques* of a single society combined should form a collection of properties unique to that specific society (Maus 1936). This forms the base of the concept of *chaîne opératoire*, since *chaîne opératoire* is in essence a sequence of technological and social choices and processes that describes the production, use, and disposal of artifacts (Leroi-Gourhan 1964; 1965; Sellet 1993, 106). This means that the collection of technological and social choices (*chaîne opératoire*) of any society should be unique too. Although it is theoretically possible for two societies to share all components of their *chaîne opératoire*, it is highly unlikely due to the virtually limitless amount of variables. Assuming that the *chaîne opératoire* of any society or culture is indeed unique, it is possible to identify a culture based on certain combinations of (archaeological) findings. Researchers engaged in the study of *chaîne opératoire* try to understand these technological and social choices through various methods, of which experimental archaeology is one.

As mentioned before, this research will not study all aspects of *chaîne opératoire* of El Flaco pottery traditions, but only the decorating aspect of producing ceramic vessels (incising and punctating). However, the goal of this research is to complement Katarina Jacobsen's upcoming Ph.D. dissertation: *Jeu d'argile: Etude technologique de la céramique dans la Caraibe du 13e au 16e siecle.* Which deals with the complete *chaîne opératoire* of, amongst others, mixes of Ostionoid, Meillacoid, and Chicoid pottery traditions using a multidisciplinary approach.

2.2 Decoration Techniques:

As seen in chapter 1, there are a plethora of different decoration techniques present on both Meillacoid and Chicoid pottery. However, this research is only concerned with the act of incising and punctating. These are both forms of either removal or displacement of clay. There are multiple ways to create dots and lines into pottery and these will be shortly introduced here.

2.2.1 Displacement Techniques:

There are multiple forms of impressing pottery: simple impression, stamping, rocker stamping, punctation, and rouletting. These can be done with multiple tools and *ad hoc* tools, like pieces of shell, wood, stone, pottery, fingernails, or bone. However, it is also possible to use manufactured tools, like an altered piece of the aforementioned materials, nets, textiles, etc. The applying of these impressions create certain patterns on (certain parts of) the vessel resembling the negative of the tool used. Impression techniques can be applied on both plastic and leather-hard clay and are considered displacement techniques, for they do not remove, but displace the clay. The variations of impressing depend on how the impressions are applied to the clay. With stamping, the tool is impressed at regular intervals to create a repetition of identical motives, where simple impression is somewhat more random. Rocker stamping is a method wherein a tool, like a bivalve shell, is pressed and moved from side to side (like a rocking chair) on the surface of the vessel, creating a 'zig-zag' pattern. The punctation method creates depressions in the vessel. They differ from simple impressions in the sense that punctations are generally much smaller in size. A variation of punctation is 'linear punctation', which are straight lines of punctations. Finally rouletting is a technique wherein a carved cylinder or wheel is rolled over clay to leave a recurring pattern (Rice 2015, 155-156; Rye 1981, 92-93).

2.2.2 Removal Techniques:

Although removal techniques will generally also displace clay in the process, removal techniques distinguish themselves from displacement techniques in the fact that the removal of clay is the main result. Removal techniques include: incision, carving, combing, perforating, piercing, drilling, and sgraffito. Most of these techniques make use of the same tools as those used in displacement techniques, although some need specific tools. Removal techniques can be applied to both plastic and leather-hard clay, as well as bone-dry clay or even after firing for some variations of removal techniques. Incision is the act of cutting into a vessel and is dependent on the tool used, the state of the clay, the paste of the clay, the direction of the incision, the angle at which the tool is used, and the amount of pressure used. The two most relevant variations of incision are fine-line incision and broad-line incision. Fine-line incision is usually applied with a pointed tool and results mostly in deep, narrow, V-shaped lines. Broad-line incisions, or groove incisions, are generally broader and more shallow than fine-line incisions, and are applied with tools with a more rounded, broader point. The dryness of the clay on which incisions were added influences the appearance of said incisions, incising a vessel in a more plastic state tends to leave deeper and sharper incisions than incisions which are executed on a drier, less plastic vessel. In addition incisions which were added on a more plastic vessel are more likely to have serrated edges (Hofman 1993, 166-167). Carving produces lines by creating them with at least two separate cuts, in contrast to incision, which produces lines with just a single cut. Combing is a special form of incision where multiple, parallel, lines are created simultaneously through the use of a tool with multiple points, like a comb. Perforating, piercing, and drilling, are comparable in the sense that all three techniques completely penetrate the wall of a vessel. However, there are some differences between the three. Perforation can manifest itself as a hole, but also as a line, where the other two techniques can only be holes. With piercing, a tool is pushed through the wall of a vessel, and drilling uses a drilling motion while pushing through the vessel. In the case of drilling, the state of the clay is always bone-dry or it is done post-firing, where the clay is mostly plastic or leather-hard when applying the perforation and piercing techniques. Finally, sgraffito is a special form of incision where a pattern is incised after the application of a slip layer, but before a glaze is applied to the vessel, creating contrast between the grooves and the rest of the vessel after firing (Rice 2015, 156-159; Rye 1981, 90).

3. Methods:

The following pages will describe the different elements of the experimental/ macroscopic research that were applied to the research in chronological order. Starting with a description of the experiments that were conducted, followed by the macroscopic analysis and categorization of the experiments, as well as the samples, and finally the comparison of the two.

3.1 Experiments:

The experiments that were conducted for this research can be subdivided into two categories: tool creation experiments and decoration recreation experiments. The former of those experiments are not that relevant per se. However, if it took an extensive amount of time to create a certain tool using non-modern tools, it could say something about the plausibility of whether or not these possible tools were actually fashioned for the purpose of incising or punctating pottery.

In total, 36 tools were either fashioned or collected. Some of the possible tools were unaltered and served as possible *ad hoc* tools. The materials used for these tools range from different species of seashells, to wood, stone, pottery, and calabash. A list of all the tools, including the possible modifications that have been applied to them can be found in table III.1, appendix III. Pictures of all the experimental tools that were actually used during the decorative experiments are presented in appendix IV.

The decorative experiments were all done on so called 'clay-slabs', which are little tableau's of clay, which were in turn provided with several incisions and punctations from one single tool. The paste of these slabs consists of a commercial clay (K127) with an extra added 7% of dutch river sand ($1{,}4mm>\alpha\geq 1mm$), this decision has been made after it has been recommended by the ceramic expert of the faculty of archaeology of Leiden University, Loe Jacobs, who looked at the paste of the samples of El Flaco and deemed this a good substitute. The slabs were fashioned with the following dimensions: 8x6x1cm, these dimensions were chosen randomly and are not relevant. Finally, after all the experiments were done, the experiments were fired at 850°C by Loe Jacobs. This firing temperature has also been chosen by Loe Jacobs based on his experience and thoughts on the pottery samples. A list of all 44 experiments which were executed with information on which incision or punctation was made by which gesture can be found in appendix V (tables V.1 and V.2). Pictures of all 44 experiments can be found in appendix VI.

Since multiple tools were made of some of the materials, not all of them were actually used during the decorative experiments. 16 of the 36 tools were used for the 44 decorative experiments which were conducted. If there were multiple tools of a specific material, only one (or two if they showed major variations in size or other properties) was used for an experiment, in this case the tool which was deemed most durable was chosen. The experiments were done on the slabs during three different stages of drying: on wet clay, half-dry clay (1 day old), and on leather-hard clay (2 days old). If a possible tool suffered major damage during the process of decorating wet clay or half-dry clay, it would not have been used for further experiments on clay which was further in the drying process to prevent unnecessary waste of resources. This is the reason why there are only 44 experiments instead of the expected 48 (3x16=48). Each slab was provided with multiple incisions and punctations, each set with a different *gesture* or *motion*, the movement and position of the hand and tool relative to the clay slab. Although there are virtually endless gestures possible, only a few were applied to the slabs, these are the most standard motions which could have been used by the pre-Columbian potters. The gestures used were chosen after experimenting with different possibilities on the first experiment and after recommendations of Loe Jacobs of Leiden University after the first experiment (001.CO02.WC). In tables V.1 and V.2 (appendix V) all these gestures are written as a small code for practical reasons. The following paragraphs function as a description for most of the different gestures which were used during the experiments. The gestures that were not used after the first experiments are not described here, for they formed no contribution to this research. However, for the sake of completeness these incisions and punctations are described in tables V.1 and V.2 (appendix V), but they can be disregarded for the sake of this research, for they are the only instances of those specific gestures in all the experiments.

The most used gestures used for the incising are variations of the 90° gesture. The 90° gesture is a simple straight movement from top to bottom with the tool perpendicularly incising the clay. Variations include "lateral" (in which case the same movement was made with the wider side of the tip of any given tool), 90°x3 (in which three incisions were made to cut deeper into the clay, this was mostly applied to drier clay in which a single incision had little impact), 90°(x3) with wet tool (where the tip of the tool was kept wet with water), and lastly 90° backside (in which the other end of the tool was used), this was done with the duck bones which have a specific, round shape. Another category of incisions is the 45°, of which there are a few variations. The first one uses the same motion as the 90° gesture, but the tool is held in a 45° angle (in the same direction as the working direction. The second method holds it at the same angle, but in the opposite direction, which results in a scooping motion where the removed clay slides onto the tool. These two variations were quickly cut as a gesture because the first one seemed to have no differences in result (with the naked eye), and the second method was not only hard to control, it also put a lot of strain on the tools. The last variation, which was used in nearly all experiments, is the one that is described as 45°, it uses the same straight motion which is used in the 90° gesture, but the tool is inserted at a 45° angle in the clay sideways, which creates an incision which is not perpendicular to the surface of the slab. The last variation is not an incision at all, for it is a displacement technique, not a removal technique. In the case of "impression" the tool was pushed lengthwise in the clay, leaving an imprint of the tool in the slab.

The following gestures have been used while providing the experiments with different punctations: 90°, 90°+90° turn, 45°, 45°+90° up, and 90° drilling motion. The 90° motion is simply a downward movement of the tool into the clay perpendicular to the clay. The 90°+90° turn motion starts the same, but after the tool is in the clay, it is first turned 90° clockwise before removing the tool from the clay. Punctations set with the 45° motion are applied by punctating the clay at a 45° angle instead of a perpendicular punctation. A variation on this involves the removal of the tool at a 90° angle, in which some clay gets scooped out of the experiment (45°+90° up). The last motion is the drilling motion, in which the tool was repeatedly turned clockwise and counterclockwise while penetrating the clay, this was applied to experiments which were drier where a simple 90° punctation would leave almost no mark.

Finally, all experiments are systematically coded. These codes consist of three elements. Firstly the experiment number, which is an increasing three-digit number up to 044. After that the tool number, which consists of a two-letter code which stands for a specific material, followed by a two-digit increasing number up to 36. Finally the clay condition, which can either be WC (wet clay), 1D (one day old clay, half-dry clay), or 2D (two day old clay, leather-hard clay).

<u>3.2 Macroscopic Analysis/ Categorization:</u>

The first step of the macroscopic analysis was the analysis of the experimental slabs. It was chosen to start with the analysis of the experiments instead of the archaeological samples since the information of which tools were used for these experiments were known beforehand. It seemed best for the sake of categorizing the different incisions and punctations to do this with the information of the different tools, gestures, clay condition, etc., in mind. Every single incision and punctation has been evaluated and documented on the basis of the following macroscopic properties, in case of incisions: insertion (is the cross-section of a given incision V-shaped, U-shaped, or rectangular?), width (in mm), depth (are the incisions deep or shallow relative to their width), and the presence or absence of ridges (note: some of the incision-like grooves are actually impressions of a tool, which leaves no ridges for it is a displacement technique, not a removal technique). The properties which were taken into account while analyzing the punctations are: form (circular, triangular, rectangular, oval-shaped, crescent-shaped, line-shaped, or ring-shaped), diameter (in mm), and depth (again relative to their width). These values, as well as more information, such as the condition of the clay in which these incisions and punctations were applied as well as the tools and gestures which were used to apply them, can be found in tables V.1 and V.2 (appendix V). The next step was to analyze the samples using the same methods and terminology as with the analysis of the experimental slabs. This way the two different data-sets could be compared not only analogously, but also digitally. Using the same properties, tables I.1 and I.2 (appendix I) were created for comparing the Meillacoid and Chicoid pottery samples with the experimental slabs described earlier.

3.3 Comparison Samples and Experiments:

Using a combination of digital data-manipulation and manual comparison of both the Meillacoid and Chicoid pottery samples with the experimental data the research of this thesis was concluded. By filtering the extensive experimental tables (V.1 and V.2, appendix V) with the values from multiple properties of the archaeological samples, smaller amounts of experimental slabs presented themselves as possibly comparable manifestations of the same incisions or punctations as those on the samples. Each sample was subsequently compared with the possible experiments, as well as to experiments that where not brought up by the digital activities but appeared to be plausible comparisons too. All the experiments that looked similar enough to the samples were recorded into tables 1 and 2, which can be found in chapter 4 (Results). The tools and gestures used, as well as the state of the clay on which these were applied on these experiments, could form a basis of the potter's toolkit as well as the *chaîne opératoire* of Dominican potter during the Late Ceramic Age. Likewise, tools and gestures that are not comparable to any of the archaeological samples might not have been a part of the potter's arsenal.

4. Geographical framework and Materials:

4.1 The so-called Taíno and the Caribbean:

As Fitzpatrick and Keegan (2007, 30) explain, islands are very fragile and vulnerable environments. This means that insular environments tend to react heavily on the arrival of humans. The arrival of Saladoid peoples and cultures, who introduced some new animal species like the dog (*Canis familiaris*), multiple plant species, as well as an increase in land-clearing practices for crop cultivation, put a strain on the islands' environments of the Caribbean (Fitzpatrick and Keegan 2007, 35-38). In historic times, with the arrival of the Spanish, Caribbean environments were altered even more. The large-scale introduction and cultivation of tobacco, cotton, and other economically important crops, the 16th century plantations, and huge forest-clearings through the use of fire altered the ecology tremendously (Fitzpatrick and Keegan 2007, 35). This illustrates just how much the Caribbean environments changed between the moment the first native peoples entered the Caribbean and now.

The pre-Columbian societies which lived on Hispaniola during the Late Ceramic Age are generally labeled as Taíno, a term adopted in the 1980s to distinguish them from the South American Arawaks (Keegan and Hofman 2017, 13). The people who lived in the Dominican Republic during the time of Spanish colonization lived in a land full of beaches, swamps, mangroves, mountains, and savannas (Hofman *et al.* 2018, 202). The so-called Taíno are generally characterized as living in settlements consisting of multiple round buildings of varying sizes on leveled limestone bedrock (Hofman *et al.* 2018, 210). The larger structures are composed of two rows of post-holes and are, in the case of El Flaco, approximately 9 meters in diameter, the smaller round huts generally house a hearth and are about 3-4 meters in diameter (Hofman *et al.* 2018, 210). These sites also contain multiple anthropogenic mounds on which most probably both domestic as well as ritual activities took place (Hofman *et al.* 2018, 209-210). The Taíno were mostly farmers who cultivated a plethora of crops, herbs, and medicinal plants, on small kitchen gardens and mounds called 'montones' (Keegan 2013, 71-72). One of the most important food staples for the Taíno was the root crop *Manihot esculenta*. The poisonous bitter manioc was processed with different techniques and tools into edible cassava bread, which was then cooked on griddles. These griddles, which were also used for the processing of other foodstuffs, form an important find category in the archaeological record, in the form of griddle fragments. The manioc, amongst other cultigens, were supplemented by animals procured through fishing, collecting (shellfish), and hunting (Fitzpatrick and Keegan 2007, 33; 34). Shellfish occupied an important place in 'Taíno' life. Be it as a food source, raw material for tools (such as projectile points or axes from a *Lobatas gigas* shell), as temper in clay, or as a decorative inlay in another object (Keegan and Hofman 2017; Rye 1981, 32-33; Wilson 2007, 31; 53). Owen Rye (1981, 86) even shows the utility of shell in pottery production (see figure 2), using a bivalve shell tool to scrape a clay slab.

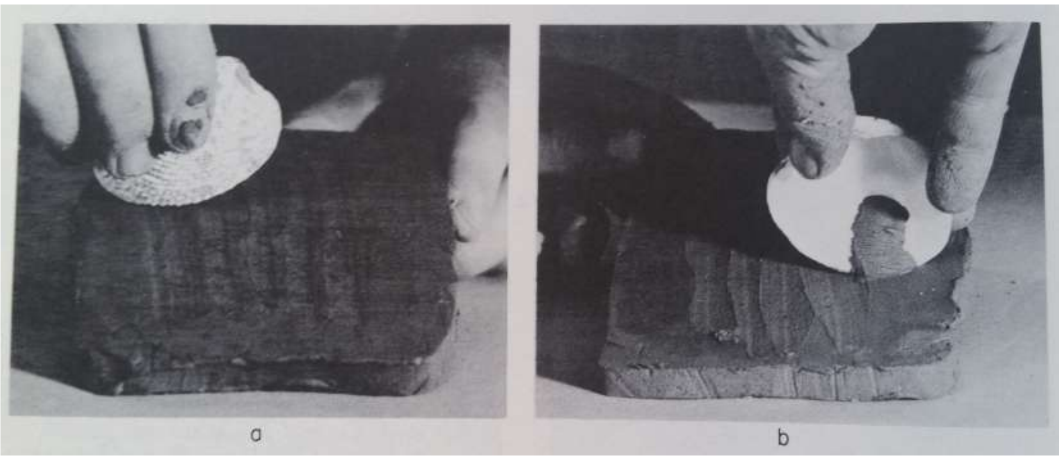

Figure 2: Scraping leather-hard clay using a shell tool at two different angles (Rye 1981, 86)

In terms of social and political organization Hispaniola was divided in five 'cacicazgos' (provinces), which were ruled by a five 'caciques' (chiefs). Another important individual in the Taíno world was the 'behique' (shaman), who represented the supernatural through communication with spirits through the use of 'Cohoba', a hallucinogenic which was powdered and inhaled through the nose (Keegan 2013, 72-73; Wilson 2007, 80; 139-140). It is important to note that 'Taíno' is not a singular group, but rather a collection of different, interacting groups around the Greater Antilles (Keegan and Hofman 2015, 11-15). This means that although the general characteristics of Taíno societies are applicable to, in this case, the people from El Flaco, it only paints a broad picture of those people, leaving out certain nuances or details specific to the people of El Flaco.

4.2 The Site of El Flaco, Dominican Republic:

El Flaco (see figure 3) is an inland site, approximately 20km away from the coast, located in the Valverde region of the Dominican Republic at the southern foothills of the Cordillera Septentrional, a 200 km long mountain range that runs parallel to the northern coastline of the Dominican Republic (Hofman and Hoogland 2015a, 8; Hofman *et al*. 2018, 202-203). Situated along the 'Ruta de Colon', the route between La Isabela and Santo Tomás, Christopher Columbus took when he first went land inward, El Flaco provides indispensable insights on the transition from pre-Columbian to post-Columbian times in the New World, as well as the period leading up to the arrival of the Spaniards (Hofman *et al*. 2018, 203-211; Keegan and Hofman 2017, 128; Ting *et al.* 2016, 377).

El Flaco consists of multiple leveled bedrock platforms bearing round house structures and huts, mounds (either anthropogenic or natural), and earthen walls (Hofman and Hoogland 2015b). The anthropogenic mounds consist of alternating layers of rocks and white marl, brown or black soil, ash (from burned garbage), and ash related to hearth features with land snails (*Pleurodonte* sp.), seashells and small animal bones. These mounds provide evidence for many different household activities that took place on the site (Hofman and Hoogland 2015a, 8-11). The soils of these mounds are very fertile from the ashes in them, making them ideal for small kitchen gardens (Hofman and Hoogland

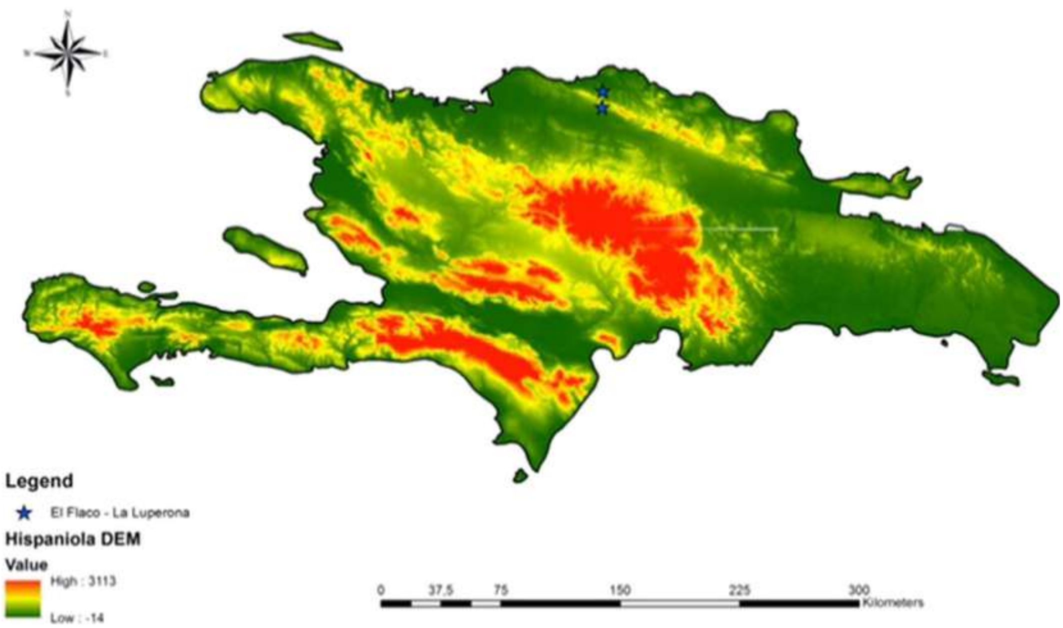

Figure 3: Map of the Dominican Republic depicting the locations of the archaeological sites of La Luperona (top star) and El Flaco (bottom star) by E. Herrera Malatesta (Ting et al. 2016, 379)

2015a, 9). The mounds are formed through the regular sweeping of waste to the mound, accumulating more and more material, this changes the distribution of archaeological finds towards concentrated clusters within these mounds combined with smaller amounts of artifacts in the rest of the site (Hofman and Hoogland 2015a, 9).

Excavations at El Flaco yielded 18 human burials, consisting of children, as well as sub-adults, and adults, in three of the excavated mounds. The mortuary practices of El Flaco were complex and varied, consisting of multiple single and composite burials. Investigations of the taphonomy of these burials suggest that most of these graves were left open until the bodies were desiccated. Multiple bodies were missing their cranium, these crania were probably removed after the decomposition of the soft tissues. In addition to the 18 human burials of El Flaco there was also one instance of a dog burial in the same context as some of the human burials. Gene Shev discusses this dog burial, amongst others, in his upcoming master's thesis: *Feeding Opiyelguobirán: a multidisciplinary analysis of human-canid relations in pre-colonial Hispaniola.*

The archaeological record of El Flaco consists largely of high amounts of land snails (*Pleurodonte* sp.) and griddle fragments, accompanied by seashells, small animal bones and ceramics. The griddle fragments are often found in close context to hearth features, of which there are plenty on the site, indicating that El Flaco was most probably a consumption site where a lot of root-crop processing took place (Hofman and Hoogland 2015a, 8-11).

4.3 The Pottery of El Flaco:

The ceramic assemblage of El Flaco consists mainly of mixes of local Chicoid pottery with smaller amounts of Meillacoid style pottery and an even smaller Ostionoid/Meillacoid complex in the lower layers of the site. The lower layers have been dated to 9th and 10th centuries AD, the Meillacoid/Chicoid assemblage which is associated with the main occupation of the site has been dated between the 13th and 15th centuries AD (Hofman and Hoogland 2015a, 8-11).

Meillacoid pottery can be described as smoothed, but not highly polished, thin-walled pottery. The most common vessel shapes are boat-shaped and incurving bowls. However, other closed vessel shapes and simple open contours also appear. Decorations include pairs of opposing adornos, either anthropomorphic or zoomorphic, various expressions of appliqué (hands/paws, cross-hatched ribbons, etc.), punctations, and thin (1-2 mm in width, 0,5-1 mm in depth), cross-hatched, incisions which leave small ridges of clay on the edge of each incision which gives the pottery the appearance of woven baskets. This typically Meillacoid cross-hatched design was typically applied to wet, unpolished vessels (Keegan and Hofman 2017, 120-121; Ulloa Hung 2013, 169-172; Wilson 2007, 97). Examples of Meillacoid pottery and decorations can be seen in figure 4.

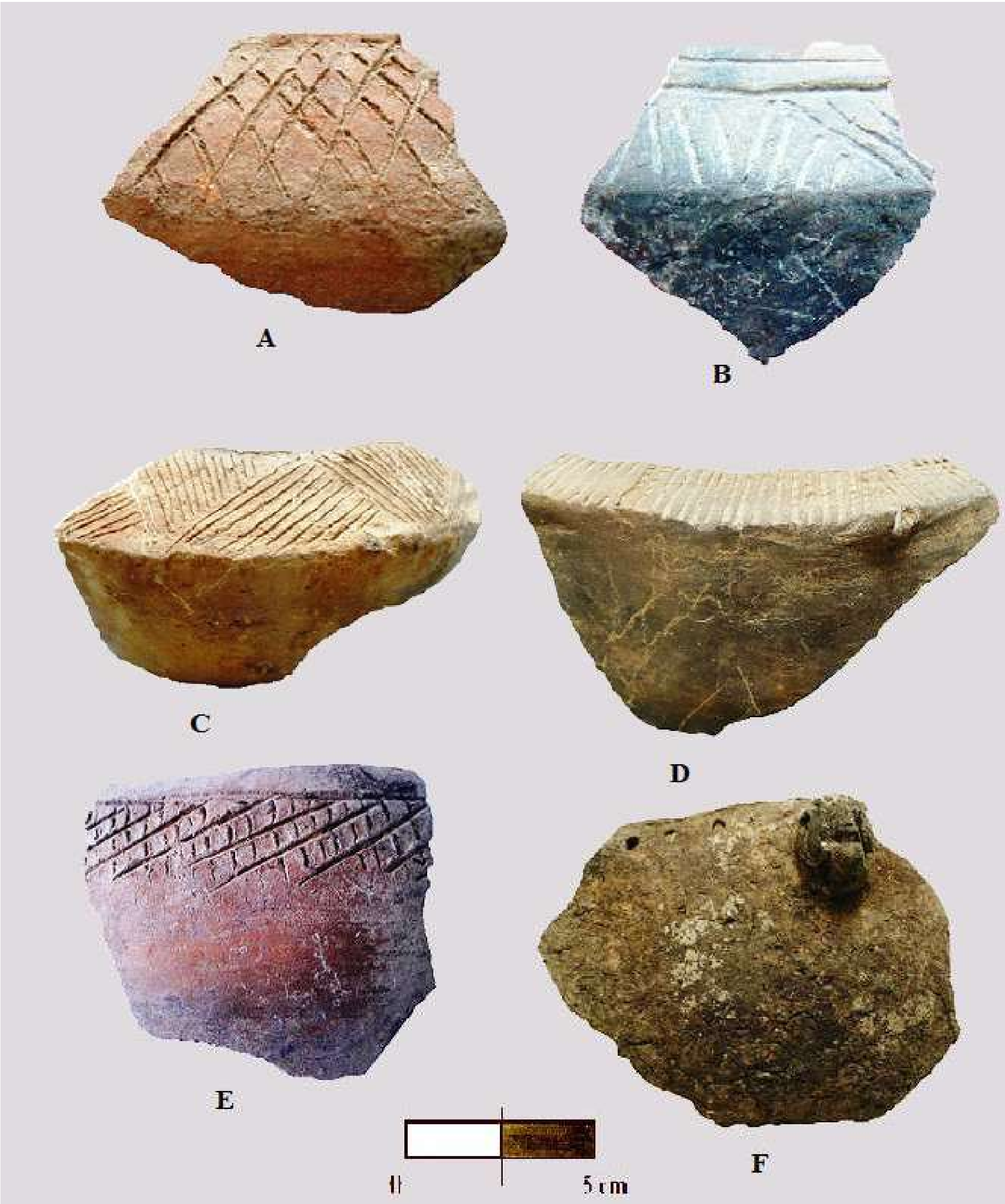

Figure 4: Examples of Meillacoid-style pottery, note the typical Meillacoid cross-hatched design patterns visible on sherds A, B, C, and E (Ulloa Hung 2013, 170)

Chicoid pottery, on the other hand, has a thicker wall than Meillacoid pottery, is polished more intensively, and comes in more different vessel shapes, including, but not limited to: effigy bottles and other closed vessels like jars. Jorge Ulloa Hung (2013, 190-196) argues that the morphology of Chicoid pottery as more diverse, complex, and varied than the earlier Meillacoid and Ostionoid pottery traditions. Ulloa Hung also describes nine different standard vessel shapes that are common to Chicoid pottery traditions. Chicoid pottery also bears a lot of adornos, however, in general it has less other forms of appliqué. Chicoid incisions are generally broader than Meillacoid incisions (4-5 mm), smoother than Meillacoid incisions (lacking those small ridges of excess clay along the edges of each incision, and regularly end and/or starts with a punctation. Curved or (semi-)circular incisions are decorative elements typical to Chicoid pottery traditions (see all examples of

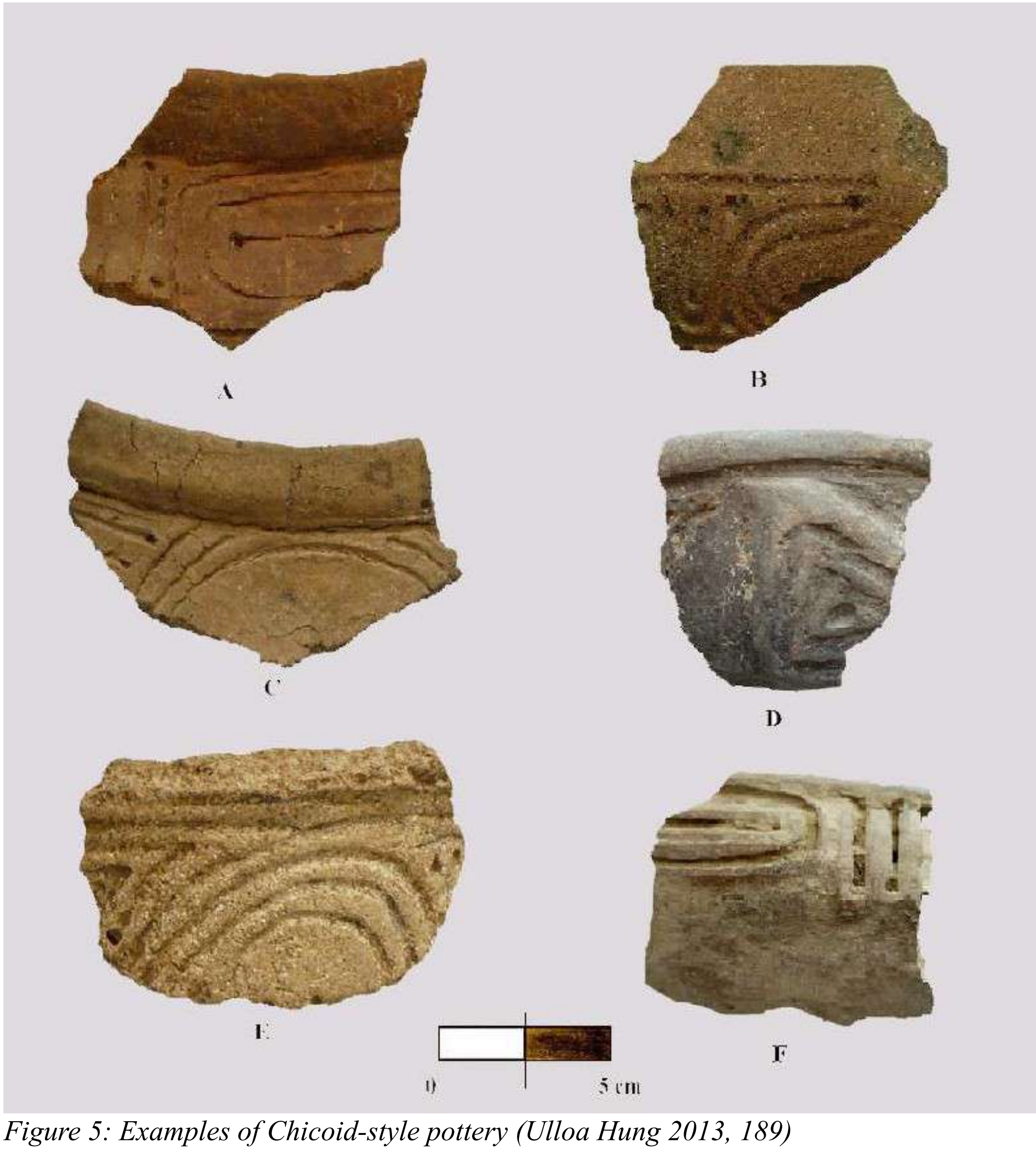

Figure 5: Examples of Chicoid-style pottery (Ulloa Hung 2013, 189)

Chicoid pottery and decorations, figure 5). The act of painting ceramics red is almost completely absent on Chicoid pottery (Keegan and Hofman 2017, 121; Ulloa Hung 2013, 190-196; Wilson 2007, 99).

4.4 Sampling Strategy:

As Rice (2015, 264-265) argues, a sample of sherds must be taken when studying a large sherd collection for pragmatic reasons. It is namely impossible to thoroughly analyze thousands of sherds of just a single site. Unfortunately it is impossible to know with a 100 percent certainty which sherds can be ignored when sampling a collection, this is called the "sampling paradox" (Rice 2015, 264-265). The goal of sampling a collection is to find a researchable amount of sherds which represents the whole collection of sherds as close as possible. To know which and how many samples one must take for their research, one must first define their research question. After that one should determine what aspects of the sherds are important to reach this end, be they typological, technological, decorative, or something else (Rice 2015, 265). Because this thesis focuses on the production of incisions and punctations on pre-Columbian pottery, it is apparent that only sherds bearing either incisions, punctations, or both, should be taken as samples. The next decision that should be made is whether the sample should reflect the common elements of a certain collection or the abnormalities (Rice 2015, 265). Since this thesis aims to distinguish all different possible variations of incisions and punctations, it is necessary to take a sample of all variations found within the collection, even if a certain incision is only present on just a few sherds. For the same reason it is also sufficient to take just one sample of a certain variation of incision, because the research does not try to represent the ratios of different incisions and variations within the whole collection.

Sometimes, primarily when analyzing a large collection, it is required to incorporate the concept of stratified sampling. This means that the collection should be divided into different subgroups based on a specific factor that is important to the problem at hand, this could be technological, which could bring a subdivision based on temper or vessel shape, or contextual, in which the researcher subdivides the collection based on their context, for instance burial contexts versus house contexts (Rice 2015, 266). Because this thesis aims to incorporate all variations of incisions and punctations it would have been the best to subdivide the whole collection on the base of macroscopically visible variations within the incisions and punctations. However, because of pragmatic reasons since there was only a limited amount of time and space available for sampling, this has not been done for the samples for this thesis. Instead, when a specific variation of an incision or punctation showed itself during the sampling, it was immediately taken as a sample, and only removed as a sample when a better (read clearer, bigger, less worn) example of the specific incisions or punctation was encountered.

The sampling process, which took place on site in July of 2016, yielded 43 Meillacoid and Chicoid pottery samples which can be subdivided in three main decorative groups: incision samples, punctation samples, and incision + punctation samples. The latter is a special combination of incision and punctation in which the punctations are set within, usually at either end of the incision (see figure 6), which is a typically Chicoid decorative technique (Keegan and Hofman 2017, 121). Because these incision + punctation samples solely differ macroscopically from the other samples because of the combination of incisions and punctations, and not for those incisions and/or punctations themselves, these samples were later removed from the sample collection, bringing to final number of samples down to 35 (see appendix I, tables I.1 and I.2). Appendix II provides pictures of all 35 samples.

Figure 6: Incision + punctation decoration (picture by author)

5. Results and Discussion:

This chapter will provide and discuss all findings, be they direct or indirect, from both the experiments and the macroscopic analysis and comparison of both the experimental slabs and the Meillacoid and Chicoid pottery samples. The direct results of the comparison of the experimental slabs and the Meillacoid and Chicoid samples have been put into two pie charts depicting how many times a tool of a certain material category has been matched to one of the archaeological samples (see figures 7 and 8).

5.1 General Results:

The comparison of the experimental slabs with the archaeological pottery samples from El Flaco provided multiple cases wherein an incision or punctation was at least partly similar to one or multiple incisions or punctations that were present on the experimental clay-slabs. All instances of this phenomena are recorded in tables 1 (results regarding incision) and 2 (results regarding punctation). The first column of these tables provide the names of different Meillacoid and Chicoid pottery samples, the three next columns provide the names of different experimental slabs which have been linked to the archaeological samples. If a value in the first column reads *continued* it means that the previous sample was linked to more than three experimental slabs and serves as a way to make the size of the table such that it stays easily readable.

Table 1: Results regarding incision.

Sample no.	**Experiment/no.**	**Experiment/no.**	**Experiment/no.**	**Remarks**
FL14.877/6	016.LR27.WC/1	033.WO35.1D/1		Ridges within incisions probably due to wooden tool?
FL15.1672	010.EE25.1D/2			
FL15.1758	002.EE24.WC/5	004.LG05.WC/1	019.LR27.1D/1	Ridges within incisions probably due to wooden tool?
continued	020.TH28.1D/1	033.WO35.WC/2	038.WO35.1D/2	
FL15.2199/2	004.LG05.WC/1	033.WO35.WC/2		
FL15.2200/9	034.ST36.WC/1	039.ST36.1D/1	035.CA30.1D/1	
FL15.2283/3	033.WO35.WC/1	029.CA30.WC/2		
FL16.2474/3	017.TH28.WC/1	030.FI31.WC/1	032.CE33.WC/1	

FL16.2488/2	002.EE24.WC/3	031.FI32.WC/2	007.AM16.WC/1	
FL16.2580/1+5+6	035.CA30.1D/1	040.CA30.LH/2		
FL16.2646/11	004.LG05.WC/1			
FL16.2650/3	002.EE24.WC/3	031.FI32.WC/2		
FL16.2886/6	/			No matches
FL16.3013/3	002.EE24.WC/2	004.LG05.WC/1	025.AM16.LH/6	
FL16.3033/2	033.WO35.WC/1	016.LR27.WC/1	018.AG26.1D/3	
FL16.3320/3	/			No matches

Table 2: Results regarding punctation.

Sample no.	Experiment/no.	Experiment/no.	Experiment/no.	Remarks
FL15.1676/1+2	004.LG05.WC/5	032.CE33.WC/3		Dimensions are not comparable (experiments are smaller). However, the insertion and form are comparable
FL15.1676/5	010.EE25.1D/3			Hollow tool
FL15.2022/1	003.EE25.WC/4	018.AG26.1D/6	033.WO35.WC/4	Dimensions are not comparable with the wooden tool experiments. However, the insertion and form are comparable
continued	038.WO35.1D/4			
FL15.2082/2+5	001.CO02.WC/12	007.AM16.WC/8	017.TH28.WC/7	
continued	019.LR27.1D/5	029.CA30.WC/6		
FL15.2200/2	010.EE25.1D/4			Hollow tool
FL15.2241/2	033.WO35.WC/5	037.CE33.1D/6		
FL15.2356	003.EE25.WC/5			
FL16.2428/6	003.EE25.WC/4	006.CR22.WC/5		
FL16.2431	004.LG05.WC/5	017.TH28.WC/5	037.CE33.1D/3	
FL16.2527/5	005.CP12.WC/4	032.CE33.WC/3		
FL16.2619/9	003.EE25.WC/4	015.AG26.WC/5-6	033.WO35.WC/4	
continued	038.WO35.1D/4			

FL16.2632/4	034.ST36.WC/3	039.ST36.1D/3		
FL16.2880/1	002.EE24.WC/10	033.WO35.WC/5		
FL16.2931/2	002.EE24.WC/10	015.AG26.WC/5-6	018.AG26.1D/5-6	
continued	033.WO35.WC/4	038.WO35.1D/4	037.CE33.1D/4	
FL16.3006/1+3017/2	005.CP12.WC/6	010.EE25.1D/5	021.EE25.LH/10	
FL16.3026/1	034.ST36.WC/3	039.ST36.1D/3		
FL16.3088/	003.EE25.WC/5			
FL16.3168/2	002.EE24.WC/6	007.AM16.WC/5	014.AM16.1D/5	
continued	030.FI31.WC/5	036.FI31.1D/5		
FL16.3330/6	017.TH28.WC/7			Very unsure, the punctation has a step mark, as if it was applied with the 45^{O} method. However, none of the experiments are exactly the same
FL16.3478/5a+b	004.LG05.WC/5			

As can be seen, only two sherds of the Meillacoid and Chicoid samples were incomparable to the incisions present on the experimental slabs, sherds FL16.2886/6 and FL16.3320/3 (see appendix II, figures II.12 and II.15). This can be explained by the fact that, judging by how they look to the naked eye, these two incisions are also the two most deviant sherds in the sample collection. The lines on sample FL16.3320/3 might even not be incisions at all. Furthermore it is important to note that these results are not binding. Although a sample might only be comparable to only one experiment, it does not mean that the tool used for that experiment is the only possible tool that was used for that particular sample. The last important thing to note is that the width or diameter from an incision or punctation can deviate. A punctation with a diameter of 5mm can be made with an implement of the same material as a punctation with a diameter of 1mm. For this reason the some samples have been linked to experiments with a different diameter. However, this 'allowance of variation' does have its boundaries. For instance, fish bones are very unlikely to produce punctations with a diameter bigger than 5mm.

The direct results of the comparison of the experimental slabs and the Meillacoid and Chicoid samples have been put into two pie charts depicting how many times a tool of a certain material category has been matched to one of the archaeological samples (see figures 7 and 8). Because the numbers of different tools within a single category are different from each other (there are for instance five tools within the 'plant matter' category and only two within the 'avian' category), archaeological samples that were linked to multiple tools within a single category (or to the same tool but on multiple slabs with dissimilar dryness) were not counted multiple times. For instance, sample sherd FL14.877/6 (see appendix II, figure II.1) was linked to both experiments 016.LR27.WC and 033.WO35.1D (see appendix VI, figures VI.16 and VI.33), despite that this sample was linked to the category 'plant matter' twice, it was only counted one time to combat biased data-interpretation.

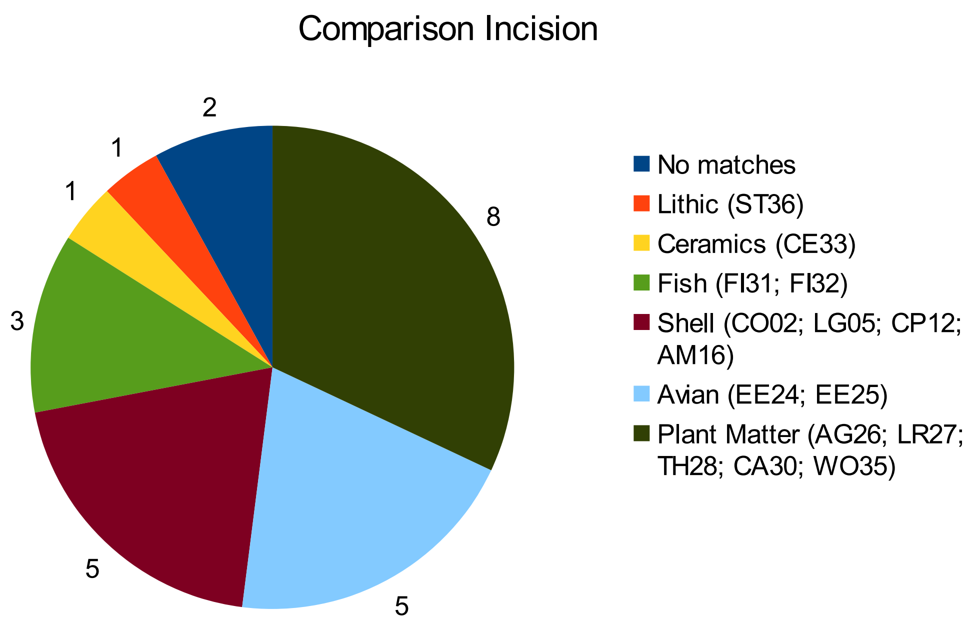

Figure 7: Pie chart depicting the number of matches between the incision-bearing experimental slabs and the archaeological samples (pie chart by author)

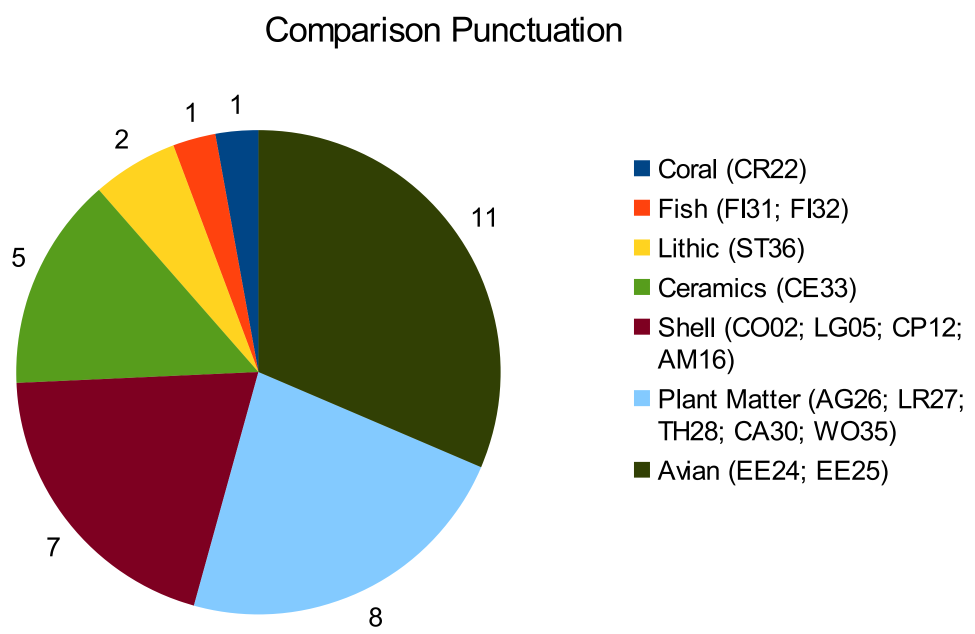

Figure 8: Pie chart depicting the number of matches between the punctation-bearing experimental slabs and the archaeological samples (pie chart by author)

5,2 Discussion Regarding Incising:

5,2,1 Plant Matter:

The category which has been linked to the most different archaeological samples is the wood-like plant matter category making up for up to 53% of the 15 Meillacoid and Chicoid samples bearing incisions. A possible explanation for this is the fact that small sticks and the like are easy and widely accessible. Apart from the calabash tool (CA30, see appendix IV, figure IV.11), all experimental tools in this category are *ad hoc* tools costing virtually no time and energy gathering and fashioning into a desirable implement.

Several of the archaeological pottery samples with incisions bear, to various degrees, some amount of ridges within the incision. These ridges are most clearly visible on samples FL14.877/6 and FL15.1758, and to a lesser extent, samples FL15.2200/9 and FL16.3033/2 (see appendix II, figures II.1, II.3, II.5, and II.14). This phenomenon also appears on various experimental slabs, all clear examples of these experiments were exclusively executed with wooden tools. A clear example of this is the first incision (from the left) on experiment 016.LR27.WC (see appendix VI, figure VI.16). Although there is no concluding evidence that supports a correlation between the with wooden tools executed experiments and the four mentioned samples, the absence of these ridges in other experiments indicate that it is plausible that these specific incisions were indeed applied with a wooden implement.

5.2.2 Avian Bones:

The two tools in this category (EE24 and EE25, see appendix IV, figures IV.6 and IV.7) serve as a proxy for avian bones. Both are from the same duck from the Netherlands due to the lack of Dominican avian bones available. Therefore the data might not be entirely reliable. However, using the duck bones as a proxy is a better option than disregarding avian bones as a whole. Especially while analyzing the punctations in this particular sample collection, which will be explained later. Five samples have been deemed as pottery sherds bearing incisions that were possibly added using an avian bone. Four out of these five are linked to the duck rib (EE24), while only one was related to the hollow bone. The reason probably being that the hollow bone is less convenient to use while incising clay, for the tool was less precise than the average tool that has been used during these experiments. The tool was fashioned, and thus used, mainly for its hollow structure which could have unique implications for punctating clay (which will be discussed more thoroughly later). The duck rib was especially useful for making deep and thin incisions, which might make it a good implement for the Meillacoid potter wishing to apply the typical Meillacoid cross-hatched pattern (see sample FL16.2650/3, appendix II, figure II.11). However, thin bones from any other animal might have been just as good for this purpose, or any thin tool for that matter. Finally, an avian rib takes no reforming to make it an useful tool. Only if the bone still has meat or traces of meat attached to it, it takes at least some effort to make these tools work-ready. The hollow bone was first sawn in half and then ground for a few seconds to get a ring-shaped, hollow tool. Although this material category also does not take a lot of effort to prepare, they were probably less accessible than small wooden sticks and branches.

5.2.3 Shell Tools:

Five out of the 15 Meillacoid and Chicoid pottery samples have been linked to experiments which were executed using a shell tool. However, only two of the four different shell species used in the experiments resulted into a link (LG05 and AM16, see appendix IV, figures IV.2 and IV.4). Because of the fragile nature of the *Codakia orbicularis* shell (CO02), working with this tool is quite awkward. While using a tool fashioned from a *Codakia orbicularis* shell, one should avoid putting too much strain on the tool while working clay, which results in incisions of uneven depth and form. The *Cittarium pica* shells are curved in nature, making it hard to fashion a straight tool from it (see appendix IV, figure IV.3), which makes it harder to apply nice straight incisions into the vessel (as can be seen in figure VI.5, appendix VI).

Looking at the two tools that were actually linked to the archaeological samples, both tools differ from each other in two major ways: the type of shell which is used as the raw material and the effort it costs to produce it. Both tools are not only fashioned out of different shell species, but actually they are completely different shell types with different properties. Tool LG05 is fashioned out of a *Lobatas gigas* shell, a large conch which is typically very hard and strong (which makes sense given that these shells can actually be made into axes). Tool AM16 (*Angulus* merus, see appendix IV, figure IV.4), in contrast, is a smaller, bivalve shell. Although the *Lobatas gigas*, similarly to the *Cittarium pica*, has a curved nature, the sheer size of the shell still makes it possible to create multiple straight tools from it. A tool made from this shell species also is guaranteed to have a long life-span. However, as mentioned before, the *Lobatas gigas* shell demands more time and energy to get work-ready than the average tool (c. 60 min. of grinding after the preform has been obtained), as can be seen in table III.1 (appendix III). In contrast, tools made from *Angulus merus* only take a fraction of that time (see appendix III, table III.1). In addition, tool AM16 could also make the cross-hatched pattern present on Meillacoid pottery due to its narrow nature.

5.2.4 Fish Bones:

Two out of three experiments that were linked to experimental slabs with incisions originating from fish bones, bear the typical Meillacoid cross-hatched pattern. Fish bones are perfect for producing these fine, deep incisions that make up for this cross-hatched pattern. This makes fish bones very comparable to the avian rib which was discussed earlier this chapter. Although these tools are similar to the avian rib which was used, and produce comparable incisions, the fish bones that were used for the experimental slabs were more fragile than the avian rib. Therefore it seems logical that a rib from another animal might have been preferred over fish bones. However, because the fish bones used for these experiments (as well as the duck bones mentioned before) are not from a Caribbean origin, but European, these experiments only function as a proxy. This could mean that the bones of fish species which were caught in the Dominican Republic at the time might have been less fragile than those of birds, making fish bones possibly the better option of the two. In addition availability might have influenced any possible choice between the two. In spite of these obstacles to concluding which of the two (avian ribs or fish bones) formed the best tool for these incisions, we can say that at least the smaller, more fragile, bones were probably not used for incising clay. These small bones are so fragile that the chance of breakage is too high on any kind of clay-state to form a viable option.

5.2.5 Ceramic Tools and Lithic Tools:

The last two categories (experiments with ceramic and lithic tools) both only have one archaeological sample to which they are linked. In addition both of these samples (FL15.2200/9 and FL16.2474/3, see appendix II, figures II.5 and II.7) were not linked exclusively to the experiments executed with these two tools. This makes any claim on whether these tools were actually used for the production of these two samples indecisive. However, it is undesirable to not at least discuss them.

The surface and fractures of hand-made pottery are by nature not homogeneous, meaning that a pottery sherd seldom bears a nice point with which to incise clay. The point of a sherd is most of the time angular in shape, where it is desirable for a tool to incise clay has a smoother tip, because more angular tools tend to create more ridges than their smoother counterparts. Although these properties of pottery sherds might be useful for punctating clay, because they can produce non-round punctations which will be discussed later, pottery sherds seem to be a less than ideal choice for producing incisions because of these same properties.

Although the lithic tool which was used for three of the 44 experiments is rather small (less than 3cm in length), it produced quite big incisions compared to the other tools. However, the incisions that were applied using tool ST36 (see appendix IV, figure IV.16) were applied with relative ease and precision. The tool also left relatively small ridges on wet and half-dry clay as can be seen in figures VI.34 and VI.39 (appendix VI). In addition lithic tools are one of the better options for incising harder clay because they bear virtually no chance of breakage because of their hardness. Furthermore, there should be no availability issues when coming to random small stones, and they can be used without preparation (assuming that you select a stone while keeping in mind the desired properties related to form and dimensions), which make them the perfect *ad hoc* tools. Finally, as will be discussed later, small stones might have the perfect natural form for creating specific punctations.

5.3 Discussion Regarding Punctating:

5.3.1 Avian Bones and Fish Bones:

Avian bones are more represented in the punctation-category. One of the explanations for that is the unique punctations resulting from using a hollow bone when punctating clay. Archaeological samples FL15.1676/5 and FL15.2200/2 (see appendix II, figures II.16 and II.20) bear ring-shaped punctations, which can only be accomplished by using a round, hollow tool or by incising a small, round circle. However, because the rings on both samples show only little variation it seems highly unlikely that the latter method was the case. Especially sample FL15.1676/5 seems to imply this. The rings on this sample are not perfectly round, but round with a small nick inwards at the top. The most plausible method of applying these rings on ceramics thus is by punctating it with a ring-shaped tool like EE25 (see appendix IV, figure IV.7). However, this was not necessarily done with an avian hollow bone. There are other possible materials that could fill in this phenomenon, for instance a piece of reed. Looking at the second punctation from the top at experiment 003.EE25.WC (see appendix VI, figure VI.3), a circular punctation appears. This was accomplished by turning the tool 90° while still being in the clay (following the principle of coring earth). This brings the potter the option to make round punctations while removing clay instead of displacing it. Although the amount of clay saved by this method is virtually zero, it does give the potter the option to make two different kinds of punctation with only a single tool.

Tool EE25 clearly bears the most interest for punctating clay, because of its unique properties which allow the potter to provide vessels with ring-shaped punctations. Tool EE24 (see appendix IV, figure IV.6) also can be an interesting tool for punctating clay. Tool EE24 has a very narrow tip, making it possible to apply small line-shaped punctations to pottery. However, this type of punctation does not seem to be very prevalent in the sample collection from the site of El Flaco, Dominican Republic. Much like tool EE24, fish bones possess a rather narrow tip, making them useful for the production of the same kind of punctations. However, keeping in mind the fact that all bone tools used in these experiments are not of a Dominican origin as mentioned before, the fish bones used for these experiments (FI31 and FI32, see appendix IV, figures IV.12 and IV.13) seemed to be more fragile than their avian counterpart EE24. Therefore it seems even more unlikely that these fish bones provided any addition to the potter's toolkit for punctating clay. The fact that only one archaeological sample was linked to the experiments executed with a fish bone only reinforces that claim.

5.3.2 Plant Matter:

Wood-like tools also seem to be linked to many of the punctation-bearing Meillacoid and Chicoid pottery samples. The eight samples linked to experiments executed with wooden tools form 40% of the 20 punctation-bearing samples. These samples generally bear a circular punctation (six out of eight) which seems to coincide with the usually round nature of small sticks and twigs. Therefore it is no surprise that the category plant matter is being linked to an above average number of archaeological samples. These high rates of comparability between samples and experimental slabs done with wooden tools, combined with the high availability and the fact that small sticks form an excellent *ad hoc* tool imply that wood-like tools probably fill a major role in at least the decoration aspect of the *chaîne opératoire* of pre-Columbian pottery.

5.3.3 Shell Tools:

As mentioned before, only two out of the four shell tools which were used in the production of the experimental slabs were linked to archaeological samples with incision. However, all four tools have been linked at least once to a sample with punctation. The main explanation for this is that there are more different punctation-bearing samples than incision-bearing samples, and the variation between the former categories also are more numerous. Although all four tools have been mentioned at least once, tool CO02 (see appendix IV, figure IV.1), which was linked to sample FL15.2082/2+5 (see appendix II, figure II.19), is not the most plausible tool that was linked to this sample. The sample shows a crescent-shaped punctation which was most probably fashioned by punctating the clay under a 45° angle and then either removing the tool in the opposite direction or straight up perpendicular to the clay slab. A method that leaves punctations which are relatively similar to each other when changing between different tools, combined with the high chance of breakage which coincides with the use of a tool fashioned from the

Codakia orbicularis shell and the fact that these are not *ad hoc* tools for punctating clay, it seems unlikely that *Codakia orbicularis* tools actually were used as a tool to punctate clay. In contrast, the *Lobatas gigas* tool (LG05, see appendix IV, figure IV.2) might actually be a very potent tool for punctating clay. The hardness makes it possible to punctate drier clay without chance of breakage and it is relatively easy to fashion a rectangular-shaped tip which can be used to create specific punctations, very similar to the punctations visible on sample FL16.3478/5a+b (see appendix II, figure II.35). Tool CP12 (see appendix IV, figure IV.3), much like tool CO02, was linked to two archaeological samples (FL16.2527/5 and FL16.3006/1+3017/2, see appendix II, figures II.25 and II.29). However, these two links fail to be convincing. Both samples show some kind of triangular punctations, which are also present on experiment 005.CP12.WC (see appendix VI, figure VI.5). Just because a certain tool leaves triangular punctations, it does not mean that any punctation-bearing sample has to have been made with that tool. Although triangular, the punctations on experiment 005.CP12.WC are dissimilar to those on the two archaeological samples mentioned before. Finally, the tool fashioned from an *Angulus merus* shell, which showed interesting implications for the Meillacoid potter wanting to apply the classic Meillacoid cross-hatched pattern to their ceramic vessels, shows less potential in the act of punctating clay. The reason for this is the natural curve present in bivalve shells. The narrow tip leaves line-shaped punctations like avian rib bones or fish bones. However, the curved nature of the *Angulus merus* makes it so that these line-shaped punctations are just not straight, but slightly curved. And the quantities of these line-shaped punctations already are very low in the archaeological record of El Flaco. Therefore the role of shell tools for the act of incising and punctating clay is probably of a minor nature than for other parts of the *chaîne opératoire* of ceramic vessels.

<u>5.3.4 Ceramic Tools:</u>

As mentioned before, the angular character of the average tip of a broken pottery sherd might have been useful for creating various non-round shapes on ceramic vessels. The fact that five different archaeological sample sherds have been linked to experiments executed with a ceramic sherd sure seems to reinforce that theory. Samples FL15.1676/1+2, FL15.2241/2, FL16.2431, FL16.2527/5, and FL16.2931/2 (see appendix II, figures II.17, II.21, II.24, II.25, and II.34) have been linked to the experiments 032.CE33.WC and 037.CE33.1D (see appendix VI, figures VI.32 and VI.37). The experimental slabs show both examples of triangular punctation on the experiment on wet clay and rectangular punctation on the experiment on half-dry clay. And this is the result of a single unmodified pottery sherd. Other forms are also possible to gather or even fashion from another pottery sherd. Although the triangular punctations on the experimental slabs are not very striking, it is possible to fashion a tool with a more accentuated triangular form. The fact that curved body sherds are an useful implement for scraping unfinished vessels combined with the many forms a point on a ceramic sherd can adopt makes it a tool with a plethora of applications in the process of producing pottery which, in turn, makes it a great addition to any potter's toolkit.

5.3.5 Lithic Tools:

Like the ceramic tools, small stones can produce punctations with a specific form. However, unlike the small line-shaped punctations of rib-bones or fish bones, the punctations a small stone or pebble can produce actually are present in the archaeological record from the site of El Flaco. These punctations are oval-shaped. Although the differences between a circle and an oval are not grand, they are in terms of which tools can actually produce them. As mentioned, small wooden sticks and the like are generally round, and not oval-shaped, which makes them inefficient at producing oval punctations. Small rounded stones, however, can make those oval punctations because of their natural form. The punctations produced by tool ST36 (see appendix IV, figure IV.16) on its respective experiments (034.ST36.WC, 039.ST36.1D, and 044.ST36.LH, see appendix VI, figures VI.34, VI.39, and VI.44) are, however, rather large. Although the size of the punctations play a minor role in assessing whether or not a tool might have been part of the potter's toolkit, the smallest oval-shaped punctations were probably not applied with a lithic tool. This is because the smooth, rounded character a small pebble needs to possess to produce oval-shaped punctations, is generally a result of abrasion resulting from an extensive period of time being in a water-stream. A secondary result of this process is that most dimensions of any rounded pebble are very close to each other, meaning that a small stone capable of producing very small oval-shaped punctations is probably too small to hold properly while punctating. However, the oval-shaped punctations on samples FL16.2632/4 and FL16.3026/1 (see appendix II, figures II.27 and II.30) are of a comparable size to those present on the experimental slabs. Combined with the high accessibility and the fact that these tools fall under the category of *ad hoc* tools, makes small stones or pebbles a plausible addition to the pre-Columbian potter's toolkit.

5.3.6 Coral Tools:

Only one archaeological sample has been linked to a punctation experiment which was executed with a coral tool, and none of the incisions present on the samples are comparable to the incisions from tool CR22 (see appendix IV, figure IV.5). This is unsurprising, looking at the coral experiments (006.CR22.WC, 013.CR22.1D, and 024.CR22.LH, see appendix VI, figures VI.6, VI.13, and VI.24), both the coral incisions as well as the coral punctations are quite crude. The one archaeological sample that was linked to these experiments (FL16.2428/6, see appendix II, figure II.23) does, however, seem to look at least quite similar to the second punctation from top visible on experiment 006.CR22.WC. On the other hand, it is not the only experiment the sample was linked to. Experiment 003.EE25.WC (see appendix VI, figure VI.3), which was executed with a hollow avian bone seems to be a worthy contender. The fact that the avian bone did not leave clay residue whereas tool CR22 did, makes it more likely that a hollow avian bone was used, or even a somewhat bigger wooden stick. The process of fashioning a pointy tip on the coral tool also was less than ideal, the porous nature of coral made it hard to produce a solid tip on the tool. Combining these factors with the fact that coral tool was only linked to a single archaeological sample makes it unlikely that coral played any major role in the act of incising and punctating pre-Columbian pottery.

5.4 Indirect Findings:

The results following the comparison of the experimental slabs with the pottery samples of El Flaco are not the only results that follow from this research. The process of creating experimental ceramic slabs also yields certain findings regarding the *chaîne opératoire* of pre-Columbian pottery. The subjects that will be discussed are those of 'workability', tool breakage, and clay condition. The following paragraphs will provide and discuss these indirect findings which were obtained during this research.

5.4.1 Clay Condition and 'Workability':

All experiments were applied to slabs which were made from clay of the same composition. The only variable that had a major impact on how these experiments unfolded was the condition of the clay whereon the experiments were executed. This was done on either wet clay, half-dry clay (slabs which dried for one day before providing them with incisions and punctations), or leather-hard clay (slabs which dried for two days before adding incisions and punctations). Factors which were influenced by the differing conditions of the clay include the workability of the slab, the survival rate of any given tool, and finally the visible result of a certain incision. The workability stands for how easy it is to add a decoration with any tool to a ceramic vessel (or clay-slab) in any state of dryness. Workability thus relates to both the tools as the clay on which decorations are added.

5.4.2 Tool Breakage:

The survival rate of a tool is dependent, amongst other factors, on the workability of the clay and thus the clay condition. Incising or, to a lesser extent, punctating a drier clay puts more strain on the tool than on a wetter clay. This is because the evaporation of water in the vessel strengthens the bonds between the clay-minerals in the vessel. Paired with the amount of strain put on a tool, it gives a certain chance for breakage. Therefore, the quality of any given tool also fills a role when assessing its usefulness as an implement for incising and punctating clay. Tools with a long lifespan might have been favored above more fragile tools, at least when the preparation of a more 'fragile' tool takes a significant amount of time and/or energy. Tools that broke while incising and punctating wet or half-dry clay may therefore be regarded as sub-optimal tools and thus tools that were less likely to be part of the potter's toolkit, leastwise for the sake of decorating pottery through incision and punctation. If a tool broke during an experiment it can be seen in tables V.1 and V.2 (appendix V). Tools that are more susceptible to break include, but are not necessarily limited to: small fish bones, weaker species of shell like *Codakia orbicularis*, small bones, and certain wooden tools (small sticks and thin tools made from calabash). However, tools that take virtually no time and energy to prepare can be the exception. These so-called *ad hoc* tools provide easy-access implements for incising and punctating pottery. Therefore the aforementioned smaller wooden tools, at least the small wooden sticks, might have been part of the potter's toolkit after all. Moreover, these *ad hoc* tools might have actually been favored even over tools with a virtually infinite lifespan, like a well ground fragment of a *Lobatas gigas* shell, for these small sticks and such are less susceptible to loss and come in many shapes and sizes.

5.4.3 Clay Condition (continued):

The dryness of the clay does not only influence the strain put on tools and thus tool breakage, but also the appearance of incisions and punctations which are added to the clay. Incisions and punctations that are made on drier clay tend to be shallower than their counterparts which were made on a more plastic clay-state. Coherent with that is the fact that adding an incision or punctation on dry clay costs more strength than on wetter clay for obvious reasons. The experiments show that the incisions and punctations on leather-hard clay are very shallow and, in some cases, even hardly visible. From the perspective of the process of providing these leather-hard slabs with incisions, it also costs a lot more energy to even put these incisions and punctations on the slab, even those which are hardly showing at all.

One of the most notable findings during the experiments was that the leather-hard clay slabs were that much more difficult to incise and punctate than their more plastic counterparts, resulting in higher rates of tool breakage, a more time-intensive process of applying incisions and punctations, and less striking decorations. Assuming that these incisions and punctations were not really applied to pottery for functional reasons (they do not enhance the capacity of a vessel for instance), but for aesthetic reasons, it seems likely that it is more desirable to add more striking incisions and punctations for less effort than hardly noticeable incisions and punctations while requiring more time and energy. Therefore it seems plausible that incisions and punctations were generally more likely to have been executed on a rather plastic clay-state than on leather-hard clay-state.

However, when incising wet clay, one will create more ridges than when incising a drier clay. The experiments show relatively large amounts of ridges compared to the pottery samples from El Flaco, for the ridges of the experiments were not removed. It is possible to remove those ridges immediately after setting an incision, but this will distort the incision itself when the clay is still relatively plastic. Another possibility is to remove these ridges after the clay has dried more, or even after firing. Finally it is also possible to leave those ridges and let them wear over time through the use of a vessel. Because there are many possibilities of removing those ridges they were not removed on the experimental slabs at all. If ridges were undesirable, an option would be to apply incisions and punctations on a drier clay, where the chance of those ridges appearing in the first place is noticeably smaller. However, when the use of a drier clay is paired with for instance less striking decorations and, as noted in the previous chapter, a higher chance of breaking the tool which is used, it might be more desirable to remove them instead of preventing them. Although not all archaeological samples bear these ridges, more than half of the incision-bearing samples do, and it is possible that the rest of the incision-bearing samples also had those ridges, but that they were removed, worn down through use, or disappeared through time because of possible post-depositional processes. Therefore the claim that incisions and punctations were more likely to have been applied on a more plastic state of the vessels is still plausible. It is important to note that the punctation-bearing experiments and archaeological samples can be left out of the picture for the sake of discussing ridges. This is because these ridges will only appear while performing a removal technique, not while executing a displacement technique like punctating or impressing clay.

5.5 Decoration or not?:

Sample FL16.3320/3 (see appendix II, figure II.15) was not linked to any of the incisions present on any of the experimental slabs. As mentioned before, this sample also forms an exception to the other samples, for the fine incision-like lines are located on the inside of a closed vessel where they would not have been seen, as well as being quite thin and shallow. These depressions on the sherd seem to have been applied with a comb-like tool. This could imply that these “incisions” are not decorations at all, but drag-marks as a result of the scraping of the vessel. Rye (1981, 86) argues that the use of comb-like tools for scraping the surface of ceramic vessels results in a series of “incisions”. This would leave sample FL16.3320/3 as an undecorated sample with decoration-like depressions.

6. Conclusion:

This thesis produced (through the use of experimental archaeology), analyzed, and compared numerous experimental clay-slabs to 35 different archaeological Meillacoid and Chicoid pottery sherds from the site of El Flaco, Dominican Republic. The goal was to create and discuss links between different possible tools for incising and punctating clay and certain types of incision and punctation present on these archaeological samples. The question this thesis tries to answer is as follows: *What techniques and tools were used to make incisions and punctations on the pre-Columbian pottery from El Flaco (Dominican Republic) during the Late Ceramic Age?* Although we are unable to answer this question in full, there are multiple interesting claims to be made regarding this question. The process of producing, analyzing, and comparing archaeological samples to experimental clay-slabs through the use of experimental archaeology and macroscopic analysis did not result in the direct one on one comparison between different experimental tools and these incisions and punctations, for although there are some differences visible between incisions and punctations fashioned with different tools, there are still a lot of similarities between different experiments while judging them by the naked eye. It did, however, provide the opportunity to eliminate certain tool-types with some amount of certainty, as well as providing knowledge on multiple other factors that matter for the sake of incising and punctating ceramic vessels. Although this research looked at both the role of different possible tools as well as different gestures used for the production of certain incisions and punctations, there was a clear emphasis on the role of the different possible tools, and only a minor focus on the role of different gestures or 'motions' which could have been used while incising and punctating ceramic vessels.

The main groups of experimental tools used for this research include plant matter (wood-like tools), avian bone tools, fish bone tools, different shell tools, coral tools, ceramic tools, and lithic tools. Of those categories the wood-like tools seem to have been the major part of the Caribbean potter's arsenal for applying both incisions and punctations to their ceramic vessels. Wooden tools also tend to leave certain ridges within the incisions they produce while working on a more plastic clay, those ridges also show up in the archaeological record through multiple archaeological samples from the site of El Flaco. Thin bone tools, like an avian rib-bone or fish bones, seem to have been perfect for incising the typical Meillacoid cross-hatched pattern on pottery. However, these same tools seem to have provided only little utility for producing somewhat wider Chicoid incisions and punctations as a whole. Although avian hollow bones show interesting implications for adding ring-shaped punctations, it remains possible that these punctations were actually fashioned by another hollow tool like a reed. Even though shellfish played a major part in the El Flaco way of life, most probably even as tools for producing pottery (through the use of bivalve shells as scrapers), it seems less likely that they were prominent as incising or punctation tools. This is because different shell tools either cost quite some time and energy to fashion into eligible tools (like tools fashioned from a *Lobatas gigas* shells), are too fragile (*Codakia orbicularis*), or because their natural curves impede the process of producing straight and neat incisions or punctations. Coral tools were most probably not used for incising or punctating clay, for the production of a coral tool is a tedious process because of its porous nature and the crude incisions and punctations it produces. Although ceramic sherds may not have been ideal for incising clay because of the angular nature of their tips, those same factors gives them interesting implications for producing non-round punctations like triangular and rectangular punctations. Finally small lithic tools or pebbles might have been used for creating oval-shaped or even round punctations. However, smaller punctations are probably not set by a small stone, for the tool would become too small to handle properly.

This thesis has made a plethora of different incision and punctation experiments on clay slabs with three different plasticities. Wet clay, half-dry clay (after one day of drying), and leather-hard clay (after two days of drying). Experiments executed on the latter clay-state resulted in unclear, shallow incisions and punctations, more energy consumption when applying these poorly visible decorations, and higher chances of breakage because of the increased amount of strain exercised on the experimental tools, where experiments on more plastic clays showed easier progress and less cases of tool-breakage. However, wet clay experiments produced a lot of ridges while incising clay, in contrast to punctations and impressions in this same clay, as well as the same experiments on drier clay-slabs. Fortunately, these ridges are also present on the majority of the archaeological samples. Additionally the absence of these ridges on archaeological samples does not necessarily mean that they were not present at any point in time, for the use of the vessels as well as certain post-depositional process are able to wear these ridges down until they are no longer visible. Combining all these factors it seems plausible that the pre-Columbian potter probably added incisions and decorations to a relatively plastic ceramic vessel instead of a rather dry ceramic vessel.

6.1 Future Research:

Although this research turned out not to be able to present the complete toolkit of the pre-Columbian potter, it did provide many plausible theorems on which tools were probably part of it and which were less probable to have played a part in the act of decorating ceramic vessels. Additionally it seems quite evident that these decorations were generally applied to a more plastic clay, instead of a drier clay, because of the poorly visible decorations on dry clay and the higher chances of tool-breakage which coincides with a drier clay-state. Because many incisions and punctations look quite alike to the naked eye, future research should definitively implement microscopic analyzing-techniques for creating more sound claims on the subject of this thesis. The production-wear traces of different tools of different parent-materials should deviate from each other. Therefore a more microscopically-focused research has some strong implications for developing knowledge on the pre-Columbian potter's toolkit and the *chaîne opératoire* of pre-Columbian pottery. Other possibilities of supplementing this research encompass the continuation of these experiments by experimenting with even more different tools, techniques, clay-states, clay-compositions, etc. A continuation of this research might also be desirable if one wants to explore the role of gesture more thoroughly, in which case a comparable methodology can be used but with a greater emphasis on gesture. Finally, an ethnographic research on pottery production in the contemporary Caribbean might also complement this research greatly.

Summary:

The ERC-Synergy project Nexus1492: New World Encounters In A Globalising World is, amongst others, investigating past activities in the indigenous Caribbean. One of these activities was the production of pottery. This thesis aims to investigate the *chaîne opératoire* of pre-colonial pottery through studying the 'act' of incising and punctating ceramic vessels during the Late Ceramic Age. This research was executed through the macroscopic analysis and comparison of 35 Meillacoid and Chicoid pottery sherd samples with 44 experimentally manufactured clay-slabs which were incised and punctated with 16 different experimental tools of various material types. The archaeological samples which were studied in this research are all originating from the pre-Columbian archaeological site of El Flaco, Dominican Republic. An inland site situated along the 'Ruta de Colon' and at the southern foothills of the Cordillera Septentrional at a distance of approximately 20km from the ocean.

The main focus of this research is the potter's toolkit re-creation, comparing archaeological sample sherds with experimental clay-slabs with the goal of figuring out which tools were probably part of the potter's toolkit for the sake of incising and punctating ceramic vessels and which were not. Other variables like the dryness of clay vessels at the time of incising and punctating and the different possible *gestures* or motions are also discussed in this study. Preliminary conclusions include, but are not limited to a probably extensive toolkit with many tool-types as possible utensils for producing specific incisions and punctations, with tools from the category plant matter (read small wooden sticks and twigs) as the most important part of this toolkit. Additionally, it seems plausible that incisions and punctations were more likely to be applied to pre-colonial pottery on a relatively plastic clay, as opposed to a drier vessel.

Samenvatting:

Het ERC-gefundeerde onderzoeksproject Nexus1492: new World Encounters In A Globalizing World is een groot, meerjarig onderzoeksproject met als doel het onderzoeken van de geschiedenis van de Caribische eilanden en in mindere mate het vaste land zoals het noorden van Venezuela. Deze scriptie onderzocht een deel van de *chaîne opératoire* van pre-koloniale, inheemse aardewerk van de site van El Flaco, Dominicaanse Republiek. Dit werd gedaan door middel van de analyse en vergelijking van 35 Meillacoid en Chicoid aardewerk samples en 44 klei experimenten met verschillende incisies en punctaties die aangebracht zijn met 16 verschillende experimentele werktuigen van verschillende materiaalsoorten. De case-studie van dit onderzoek ligt in de pre-Columbiaanse site van El Flaco, een in het binnenland gelegen site gesitueerd langs de 'Ruta de Colon' en het zuidelijke voorgebergte van de Cordillera Septentrional.

De focus van dit onderzoek ligt op het recreëren van de gereedschapskist van de pre-koloniale pottenbakker. Dit werd gedaan door het vergelijken van verschillende archeologische samples met experimentele kleiplaatjes met als doel na te gaan welke werktuigen waarschijnlijk wel en waarschijnlijk niet deel uitmaakte van deze gereedschapskist. Andere variabelen naast de invloed van verschillende werktuigen, zoals de invloed van de droogheid van de kleiplaatjes en de verschillende mogelijke bewegingen die de pottenbakker kon uitvoeren met zijn of haar tools worden ook besproken. Voorlopige conclusies omvatten, maar zijn niet uitgesloten tot, dat de pre-koloniale pottenbakker waarschijnlijk vele verschillende werktuigen gebruikte bij het insnijden en puncteren van aardewerk, en dat plantaardige werktuigen (lees kleine houten stokjes en twijgjes) waarschijnlijk een belangrijk deel van deze gereedschapskist vormde. Ook lijkt het meer plausibel dat deze incisies en punctaties werden aangebracht op een relatief plastische klei, en minder op een drogere klei.

<u>Literature:</u>

Ascher, R., 1961. Experimental Archaeology. *American Anthropologist* 63(4), 793-816.

Falci, C.G., 2015. *Stringing Beads Together: a microwear study of bodily ornaments in late pre-Colonial north-central Venezuela and north-western Dominican Republic*. Leiden (unpublished research master thesis University of Leiden).

Fitzpatrick, S. and W.F. Keegan, 2007. Human impacts and adaptations in the Caribbean Islands: An historical ecology approach. *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* 98(1), 29-45.

Guzmán, A.J., 2011. *Experimental Archaeology and Prehistoric Technology: A Study of Chicoid Ceramic Style Production in El Cabo, Dominican Republic*. Leiden (unpublished essay University of Leiden).

Gijn, A.L. van, and C.L. Hofman, 2008. Were they used as tools? An explanatory functional analysis of abraded potsherds from pre-Colonial sites on the island of Guadeloupe, northern Lesser Antilles. *Caribbean Journal of Science* 44(1), 21-35.

Hofman, C.L., 1993. *In Search of the Native Population of pre-Columbian Saba (400 – 1450 AD) Part One: Pottery Styles and their Interpretations*. Leiden (unpublished doctoral thesis University of Leiden).

Hofman, C.L. and M.L.P. Hoogland, 2015a. *Archaeological investigations along the Ruta de Colón: The sites of El Flaco (Loma de Gayacanes). La Luperona (Unijica) and El Carril (Laguna Salada), Dominican Republic.* Leiden: Leiden University.

Hofman, C.L. and M.L.P. Hoogland, 2015b. Investigaciones arqueológicas en los sitios El Flaco (Loma de Guayacanes) y La Luperona (UNIJICA). Informe preliminary. *Boletín Museo del Hombre Dominicano* 46(42), 61-74.

Hofman, C.L., M.L.P. Hoogland, and A.L. Van Gijn, 2008. Crossing Disciplinary Boundaries and National Borders: New Methods and Techniques in the Study of Archaeological Materials from the Caribbean, in C.L. Hofman (eds), M.L.P. Hoogland (eds), and A.L. Van Gijn (eds), *Crossing the Borders: New Methods and Techniques in the Study of Archaeological Materials from the Caribbean*. Alabama (AL): The University of Alabama Press, 1-16.

Hofman, C.L., and L. Jacobs, 2001. The Dynamics of Technology, Function, and Style: A Study of Early Ceramic Age Pottery from the Caribbean. *Newsletter of the Department of Pottery Technology* 18/19, 7-44.

Hofman, C.L., J. Ulloa Hung, E. Herrera Malatesta, J.S. Jean, T. Sonnemann and M. Hoogland, 2018. Indigenous Caribbean perspectives: archaeologies and legacies of the first colonised region in the New World. *Antiquity* 92(361), 200-216.

Jacobsen, K.F., *in prep*. *Jeu d'argile: Etude technologique de la céramique dans la Caraibe du 13e au 16e siecle.* Leiden: Leiden University.

Keegan, W.F., 2013. The "Classic" Taíno, in W.F. Keegan (eds), C.L. Hofman (eds), and R.R. Ramos (eds), *The Oxford Handbook of Caribbean Archaeology.* Oxford: Oxford University Press, 70-83.

Keegan, W.F. and C.L. Hofman, 2017. *The Caribbean before Columbus.* Oxford: Oxford University Press.

Kelly, H.J., and A.L. Van Gijn, 2008. Understanding the Function of Coral Tools from Anse à la Gourde: An Experimental Approach, in C.L. Hofman (eds), M.L.P. Hoogland (eds), and A.L. Van Gijn (eds), *Crossing the Borders: New Methods and Techniques in the Study of Archaeological Materials from the Caribbean*. Alabama (AL): The University of Alabama Press, 115-124.

Lammers-Keijsers, Y.M.J., 2005. Scientific experiments, a possibility? Presenting a general cyclical script for experiments in archaeology. *EuroREA, (Re)construction and Experiment in Archaeology* 2, 18-26.

Lammers-Keijsers, Y.M.J., 2007. *Tracing Traces from Present to Past: a functional analysis of pre-Columbian shell and stone artefacts from Anse à la Gourde and Morel, Guadeloupe.* Leiden: Leiden University Press.

Leroi-Gourhan, A., 1964. *Le geste et la parole I: Techniqeu et langage*. Paris: Albin Michel.

Leroi-Gourhan, A., 1965. *Le geste et la parole II: La mémoire et les rythmes*. Paris: Albin Michel.

Mauss, M., 1936. Les techniques du corps. *Journal de psychologie* 32(3-4), 271-293.

Outram, A.K., 2008. Introduction to Experimental Archaeology. *World Archaeology* 40(1), 1-6.

Rice, P.M., 2015. *Pottery Analysis: a Sourcebook.* Chicago: University of Chicago Press.

Rouse, I.B., 1972. *Introduction to Prehistory: A Systematic Approach*. New York (NY): McGraw-Hill.

Roux, V., 2016. Ceramic Manufacture: The chaîne opératoire Approach, in A.M.W. Hunt (eds), *The Oxford Handbook of Archaeological Ceramic Analysis.* Oxford: Oxford University Press, 101-113.

Rye, O.S., 1981. *Pottery Technology: Principles and Reconstruction.* Washington: Taraxacum.

Sellet, F., 1993. Chaîne opératoire: the concept and its applications. *Lithic Technology* 18(1-2), 106-112.

Shev, G., *in prep*. *Feeding Opiyelguobirán: a multidisciplinary analysis of human-canid relations in pre-colonial Hispaniola.* Leiden: Leiden University.

Ting, C., B. Neyt, J. Ulloa Hung, C. Hofman and P. Degryse, 2016. The Production of pre-Colonial Ceramics in Northwestern Hispaniola: A Technological of Meillacoid and Chicoid Ceramics from La Luperona and El Flaco, Dominican Republic. *Journal of Archaeological Science: Reports* 6, 376-385.

Ulloa Hung, J., 2013. *Arqueología en la Línea noroeste de La Española: Paisajes, Cerámicas e Interacciones*. Leiden (unpublished Ph.D. thesis University of Leiden).

Walker, J.B., 1980. Analysis and Replication of Lithic Artifacts from the Sugar Factory Pier Site, St. Kitts, in S. Lewenstein (eds), *Proceedings of the Eighth International Congress for the Study of the Pre- Columbian Cultures of the Lesser Antilles*. Arizona (AZ): Arizona State University (Anthropological Research Papers 22), 69-79.

Wilson, S.M., 2007. *The Archaeology Of The Caribbean.* Cambridge: Cambridge University Press (Cambridge World Archaeology 05387059X).

List of Figures, Tables, and Appendices:

Figures:

Tables:

Appendices:

Appendix I

Table I.1: Incision samples.

Sample no.	Insertion	With [mm] (note: 0<0,5)	Deep/ Shallow	Ridges?	Remarks
FL14.877/6	Rectangular	3	D	x	Ridges within the incisions
FL15.1672	U-shaped	1	S	x	
FL15.1758	U-shaped	2	D	v	Ridges within the incisions
FL15.2199/2	U-shaped	2	D	v	
FL15.2200/9	U-shaped	4	S	x	
FL15.2283/3	Rectangular	2	D	x	
FL16.2474/3	V-shaped	2	D	v	
FL16.2488/2	V-shaped	1	D	v	Crescent-shaped termination of incisions.
FL16.2580/1+5+6	U-shaped	3	S	x	
FL16.2646/11	U-shaped	2	D	v	Ridges are smoothed; Short, tapering incisions.
FL16.2650/3	V-shaped	1	D	v	
FL16.2886/6	U-shaped	6	S	x	
FL16.3013/3	U-shaped	2	D	v	
FL16.3033/2	Rectangular	2	S	v	Ridges within the incisions
FL16.3320/3	U-shaped	1	S	x	Incision is located on the inside of a closed vessel, invisible

Table I.2: Punctation samples.

Sample no.	Form	Deep/ Shallow	Ømin [mm] (note; 0<0,5)	Ømax [mm] (note: 0<0,5)	Remarks
FL15.1676/1+2	Rectangular	D	3	5	
FL15.1676/5	Ring	S	3	3	
FL15.2022/1	Circular	S	5	5	
FL15.2082/2+5	Crescent	S	2	2	
FL15.2200/2	Ring	S	3	3	Possibly circular form
FL15.2241/2	Oval	S	2	4	
FL15.2356	Crescent	S	2	5	
FL16.2428/6	Circular	D	5	5	
FL16.2431	Rectangular	D	1	2	
FL16.2527/5	Triangular	S	1	4	
FL16.2619/9	Circular	D	3	3	Punctation is located on the lip
FL16.2632/4	Oval	S	2	6	
FL16.2880/1	Circular	S	2	2	
FL16.2931/2	Circular	S	2	2	Punctation is located on the lip
FL16.3006/1+3017/2	Triangular	S	4	5	
FL16.3026/1	Oval	S	3	7	
FL16.3088/6	Crescent	S	1	1	
FL16.3168/2	Line	D	1	2	
FL16.3330/6	Circular	S	3	4	
FL16.3478/5a+b	Rectangular	D	2	6	Punctation located on an appliqué

Appendix II

Samples with incision:

Figure II.1: Sample FL14.877/6 (picture by author)

Figure II.2: Sample FL15.1672 (picture by author)

Figure II.3: Sample FL15.1758 (picture by author)

Figure II.4: Sample FL15.2199/2 (picture by author)

Figure II.5: Sample FL15.2200/9 (picture by author)

Figure II.6: Sample FL15.2283/3 (picture by author)

Figure II.7: Sample FL15.2474/3 (picture by author)

Figure II.8: Sample FL16.2488/2 (picture by author)


Figure II.9: Sample FL16.2580/1+5+6 (picture by author)

Figure II.10: Sample FL16.2646/11 (picture by author)

Figure II.11: Sample FL16.2650/3 (picture by author)

Figure II.12: Sample FL16.2886/6 (picture by author)

Figure II.13: Sample FL16.3013/3 (picture by author)

Figure II.14: Sample FL16.3033/2 (picture by author)

Figure II.15: Sample FL16.3320/3 (picture by author)

<u>Samples with punctation:</u>

Figure II.16: Sample FL15.1676/5 (picture by author)

Figure II.17: Sample FL15.1676/1+2 (picture by author)

Figure II.18: Sample FL15.2022/1 (picture by author)

Figure II.19: Sample FL15.2082/2+5 (picture by author)

Figure II.20: Sample FL15.2200/2 (picture by author)

Figure II.21: Sample FL15.2241/2 (picture by author)

Figure II.22: Sample FL15.2356 (picture by author)

Figure II.23: Sample FL16.2428/6 (picture by author)

Figure II.24: Sample FL16.2431 (picture by author)

Figure II.25: Sample FL16.2527/5 (picture by author)

Figure II.26: Sample FL16.2619/9 (picture by author)

Figure II.27: Sample FL16.2632/4 (picture by author)

Figure II.28: Sample FL16.2880/1 (picture by author)

Figure II.29: Sample FL16.3006/1 and FL16.3017/2 (picture by author)

Figure II.30: Sample FL16.3026/1 (picture by author)

Figure II.31: Sample FL16.3088/6 (picture by author)

Figure II.32: Sample FL16.3168/2 (picture by author)

Figure II.33: Sample FL16.3330/6 (picture by author)

Figure II.34: Sample FL16.2931/2 (picture by author)

Figure II.35: Sample FL16.3478/5a+b (picture by author)

Appendix III

Table III.1: List of experimental tools.

Tool no.	Tool Name	Used in Experiment	Raw material	Modified	Remarks
1	CO01		Codakia orbicularis	yes	Preform made with modern tools; Ground for 45 min. on sandstone with water, the tool broke after 30 min. of grinding.
2	CO02	yes	Codakia orbicularis	yes	Preform made with modern tools; Ground for 45 min. on sandstone with water and sand.
3	CO03		Codakia orbicularis	yes	Preform made with modern tools; Ground for 45 min. on sandstone with water and sand, the tool broke 2 times total during this process.
4	CO04		Codakia orbicularis	yes	Preform made with modern tools; Ground for 30 min. on sandstone with water and sand, experiment done by another student.
5	LG05	yes	Lobatas gigas	yes	Preform made by breaking the conch with a large rock; Ground for 60 min. on sandstone with water and sand.
6	CO06		Codakia orbicularis		Fragment of shell, gathered after breaking a few shells with a small rock.
7	CO07		Codakia orbicularis		Fragment of shell, gathered after breaking a few shells with a small rock.
8	CO08		Codakia orbicularis		Fragment of shell, gathered after breaking a few shells with a small rock.
9	CO09		Codakia orbicularis		Fragment of shell, gathered after breaking a few shells with a small rock.

Tool no.	Tool Name	Used in Experiment	Raw material	Modified	Remarks
10	CO10		Codakia orbicularis		Fragment of shell, gathered after breaking a few shells with a small rock.
11	CP11		Cittarium pica		Fragment of shell, gathered after breaking the shell with a small rock.
12	CP12	yes	Cittarium pica		Fragment of shell, gathered after breaking the shell with a small rock.
13	CP13		Cittarium pica		Fragment of shell, gathered after breaking the shell with a small rock.
14	AM14		Angulus merus	yes	Preform made by breaking the shell with a small rock; Ground for 10 min. on sandstone with water, experiment done by another student.
15	AM15		Angulus merus	yes	Preform made by breaking the shell with a small rock; Ground for 10 min. on sandstone with water, experiment done by another student.
16	AM16	yes	Angulus merus	yes	Preform made by breaking the shell with a small rock; Ground for 20 min. on sandstone with water, experiment done by another student.
17	AM17		Angulus merus	yes	Preform made by breaking the shell with a small rock; Ground for 5 min. on sandstone with water, experiment done by another student.
18	CO18		Codakia orbicularis	yes	Preform made by breaking the shell with a small rock; tip of the fragment rounded with the same small rock.
19	CO19		Codakia orbicularis	yes	Preform made by breaking the shell with a small rock; tip of the fragment rounded with the same small rock.

Tool no.	Tool Name	Used in Experiment	Raw material	Modified	Remarks
20	CO20		Codakia orbicularis	yes	Preform made by breaking the shell with a small rock; tip of the fragment rounded with the same small rock.
21	CO21		Codakia orbicularis	yes	Preform made by breaking the shell with a small rock; tip of the fragment rounded with the same small rock.
22	CR22	yes	Acropora sp.	yes	Coral ground for 45 min. on sandstone with water.
23	LG23		Lobatas gigas	yes	Preform made by smashing the conch with a large rock; Ground for 35 min. on sandstone with water, experiment done by another student.
24	EE24	yes	Anas sp.		Rib of a dutch duck, as a proxy for avian bones.
25	EE25	yes	Anas sp.	yes	Hollow bone of the same duck, sawn in half with modern tools and briefly ground on sandstone to remove possible metal traces.
26	AG26	yes	Avicennia germanicus		Fragment of Dominican wood. Provided by Erica van Hees.
27	LR27	yes	Laguncularia racemosa		Fragment of Dominican wood. Provided by Erica van Hees.
28	TH28	yes	Tabebuia heterophylla		Fragment of Dominican wood. Provided by Erica van Hees.
29	CA29		Calabash, sp. unknown		Fragment of Calabash, gathered after breaking the calabash with a large rock.
30	CA30	yes	Calabash, sp. unknown	yes	Preform made by breaking the calabash with a large rock and sawing with modern tools; Ground for 10 min. with a small sandstone.

Tool no.	Tool Name	Used in Experiment	Raw material	Modified	Remarks
31	FI31	yes	Fish, sp. unknown		Fish vertebrae, big, as a proxy for Dominican fish species. Provided by Sjaak Waterlander.
32	FI32	yes	Fish, sp. unknown		Fish vertebrae, small, as a proxy for Dominican fish species. Provided by Sjaak Waterlander.
33	CE33	yes	Pottery		Fragment of a handmade small pot, made by Loe Jacobs, broken by dropping it on the ground.
34	LE34		Leaf, sp. unknown	yes	Core of a Dutch leaf, stripped.
35	WO35	yes	Wood, sp. unknown	yes	Fragment of Dutch wood, stripped and broken, fresh.
36	ST36	yes	Stone		Small round stone, unmodified, from El Flaco

Appendix IV

Figure IV.1: Tool CO02 (Codakia orbicularis), modified (picture by author)

Figure IV.2: Tool LG05 (Lobatas gigas), modified (picture by author)

Figure IV.3: Tool CP12 (Cittarium pica), modified (picture by author)

Figure IV.4: Tool AM16 (Angulus merus), modified (picture by author)

Figure IV.5: Tool CR22 (Acropora sp.), modified (picture by author)

Figure IV.6: Tool EE24 (Anas sp.), unmodified (picture by author)

Figure IV.7: Tool EE25 (Anas sp.), modified (picture by author)

Figure IV.8: Tool AG26 (Avicennia germanicus), unmodified (picture by author)

Figure IV.9: Tool LR27 (Laguncularia racemosa), unmodified (picture by author)

Figure IV.10: Tool TH28 (Tabebuia heterophylla), unmodified (picture by author)

Figure IV.11: Tool CA30 (Calabash), modified (picture by author)

Figure IV.12: Tool FI31 (Fish), unmodified (picture by author)

Figure IV.13: Tool FI32 (Fish), unmodified (picture by author)

Figure IV.14: Tool CE33 (Pottery), unmodified (picture by author)

Figure IV.15: Tool WO35 (Wood), modified (picture by author)

Figure IV.16: Tool ST36 (Stone), unmodified (picture by author)

Appendix V

Table V.1: Incision experiments.

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
001.CO02.WC	CO02	WC	1	U-Shaped	2	D	v	Lateral	
001.CO02.WC	CO02	WC	2	U-Shaped	2	D	v	Lateral	
001.CO02.WC	CO02	WC	3	U-Shaped	2	D	v	45 degrees aligned with working direction	
001.CO02.WC	CO02	WC	4	U-Shaped	3	D	v	45 degrees aligned against working direction	
001.CO02.WC	CO02	WC	5	V-shaped	1	D	v	90 degrees	
001.CO02.WC	CO02	WC	6	U-Shaped	1	D	v	45 degrees	
001.CO02.WC	CO02	WC	7	U-Shaped	3	D	v	Lateral 45 degrees	
001.CO02.WC	CO02	WC	8	U-Shaped	2	D	v	/	Removed as incision
001.CO02.WC	CO02	WC	9	U-Shaped	2	D	v	/	Removed as incision

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
001.CO02.WC	CO02	WC	10	U-Shaped	2	D	v	90 degrees, curvilinear	
002.EE24.WC	EE24	WC	1	Unidentified	0	D	v	90 degrees	
002.EE24.WC	EE24	WC	2	U-Shaped	2	D	v	Lateral	
002.EE24.WC	EE24	WC	3	V-shaped	1	D	x	Impression	
002.EE24.WC	EE24	WC	4	V-shaped	1	D	v	45 degrees	
002.EE24.WC	EE24	WC	5	U-Shaped	2	D	v	90 degrees (backside)	
003.EE25.WC	EE25	WC	1	U-Shaped	3	D	v	90 degrees	
003.EE25.WC	EE25	WC	2	U-Shaped	3	D	v	45 degrees aligned with working direction	
004.LG05.WC	LG05	WC	1	U-Shaped	2	D	v	90 degrees	
004.LG05.WC	LG05	WC	2	U-Shaped	3	S	v	Lateral	
004.LG05.WC	LG05	WC	3	U-Shaped	2	D	v	45 degrees	
004.LG05.WC	LG05	WC	4	U-Shaped	2	D	x	Impression	
005.CP12.WC	CP12	WC	1	U-Shaped	1	D	v	90 degrees	
005.CP12.WC	CP12	WC	2	V-shaped	1	D	v	45 degrees	
005.CP12.WC	CP12	WC	3	U-Shaped	2	D	x	Impression	

Experiment	**Tool**	**Clay Condition**	**No. (L>R)**	**Insertion**	**With [mm] (note: 0=<0,5)**	**Deep/ Shallow**	**Ridges?**	**Gesture**	**Remarks**
006.CR22.WC	CR22	WC	1	U-Shaped	3	D	v	90 degrees	
006.CR22.WC	CR22	WC	2	U-Shaped	3	D	v	45 degrees	
006.CR22.WC	CR22	WC	3	U-Shaped	5	S	x	Impression	
007.AM16.WC	AM16	WC	1	V-shaped	1	D	v	90 degrees	
007.AM16.WC	AM16	WC	2	U-Shaped	2	D	v	Lateral	
007.AM16.WC	AM16	WC	3	V-shaped	1	D	v	45 degrees	
007.AM16.WC	AM16	WC	4	V-shaped	1	D	x	Impression	
008.CO02.1D	CO02	1D	1	U-Shaped	1	D	x	90 degrees	
008.CO02.1D	CO02	1D	2	U-Shaped	2	D	x	90 degrees x3	
008.CO02.1D	CO02	1D	3	Unidentified	2	S	x	Lateral	Tool broke
008.CO02.1D	CO02	1D	4	U-Shaped	1	S	x	Impression	
009.EE24.1D	EE24	1D	1	Unidentified	0	S	x	90 degrees	
009.EE24.1D	EE24	1D	2	V-shaped	1	S	x	90 degrees x3	
009.EE24.1D	EE24	1D	3	U-Shaped	0	S	x	Impression	
009.EE24.1D	EE24	1D	4	U-Shaped	1	S	x	90 degrees (backside)	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
009.EE24.1D	EE24	1D	5	U-Shaped	2	S	x	90 degrees x3 (backside)	
010.EE25.1D	EE25	1D	1	U-Shaped	2	S	x	90 degrees	
010.EE25.1D	EE25	1D	2	U-Shaped	1	S	x	45 degrees aligned with working direction	
011.LG05.1D	LG05	1D	1	U-Shaped	1	D	x	90 degrees	
011.LG05.1D	LG05	1D	2	U-Shaped	1	D	x	90 degrees x3	
011.LG05.1D	LG05	1D	3	U-Shaped	2	S	x	Lateral	Polished surface
011.LG05.1D	LG05	1D	4	U-Shaped	2	S	x	Lateral x3	Polished surface
011.LG05.1D	LG05	1D	5	U-Shaped	1	S	x	45 degrees	Polished surface
011.LG05.1D	LG05	1D	6	U-Shaped	1	S	x	Impression	Impression is barely visible; Polished surface
012.CP12.1D	CP12	1D	1	V-shaped	1	D	x	90 degrees	
012.CP12.1D	CP12	1D	2	V-shaped	1	D	x	90 degrees x3	
012.CP12.1D	CP12	1D	3	V-shaped	1	D	x	45 degrees	
012.CP12.1D	CP12	1D	4	V/U-shaped	0-2	D-S	x	Impression	Impression is in 2 parts

Experiment	**Tool**	**Clay Condition**	**No. (L>R)**	**Insertion**	**With [mm] (note: 0=<0,5)**	**Deep/ Shallow**	**Ridges?**	**Gesture**	**Remarks**
013.CR22.1D	CR22	1D	1	U-Shaped	1	D	x	90 degrees	
013.CR22.1D	CR22	1D	2	U-Shaped	2	D	x	90 degrees x3	
013.CR22.1D	CR22	1D	3	U-Shaped	2	S	x	Impression	
014.AM16.1D	AM16	1D	1	V-shaped	1	D	x	90 degrees	
014.AM16.1D	AM16	1D	2	V-shaped	2	D	x	90 degrees x3	
014.AM16.1D	AM16	1D	3	U-Shaped	2	D	x	Lateral	
014.AM16.1D	AM16	1D	4	V-shaped	1	D	x	Impression	
015.AG26.WC	AG26	WC	1	V-shaped	2	D	v	90 degrees	
015.AG26.WC	AG26	WC	2	U-Shaped	2	D	v	45 degrees	
015.AG26.WC	AG26	WC	3	U-Shaped	3	D	v	90 degrees (backside)	Big groove within the incision
015.AG26.WC	AG26	WC	4	U-Shaped	2	D	x	Impression	
016.LR27.WC	LR27	WC	1	U-Shaped	3	D	v	90 degrees	Ridge within the incision
016.LR27.WC	LR27	WC	2	V-shaped	2	D	v	45 degrees	
017.TH28.WC	TH28	WC	1	V-shaped	2	D	v	90 degrees	
017.TH28.WC	TH28	WC	2	Rectangular	4	D	v	Lateral	
017.TH28.WC	TH28	WC	3	V-shaped	2	D	v	45 degrees	
017.TH28.WC	TH28	WC	4	U-Shaped	5	D	x	Impression	
018.AG26.1D	AG26	1D	1	U-Shaped	1	D	x	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
018.AG26.1D	AG26	1D	2	U-Shaped	1	D	x	45 degrees	
018.AG26.1D	AG26	1D	3	U-Shaped	2	D	x	90 degrees (backside)	
018.AG26.1D	AG26	1D	4	U-Shaped	1	S	x	Impression	Impression is barely visible
019.LR27.1D	LR27	1D	1	U-Shaped	2	D	v	90 degrees	
019.LR27.1D	LR27	1D	2	U-Shaped	1	D	v	45 degrees	
020.TH28.1D	TH28	1D	1	U-Shaped	2	D	v	90 degrees	
020.TH28.1D	TH28	1D	2	/	2	S	x	Lateral	
020.TH28.1D	TH28	1D	3	U-Shaped	1	D	v	45 degrees	
020.TH28.1D	TH28	1D	4	/	4	S	x	Impression	Incision is barely visible; Tool broke internally
021.EE25.LH	EE25	LH	1	/	2	S	x	90 degrees	Incision is barely visible
021.EE25.LH	EE25	LH	2	/	2	S	x	90 degrees x3	
021.EE25.LH	EE25	LH	3	/	1	S	x	45 degrees aligned with working direction	Incision is barely visible

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
021.EE25.LH	EE25	LH	4	/	2	S	x	45 degrees x3 aligned with working direction	
021.EE25.LH	EE25	LH	5	/	1	S	x	90 degrees (backside)	Incision is barely visible
021.EE25.LH	EE25	LH	6	/	2	S	x	90 degrees x3 (backside)	Incision is barely visible
022.LG05.LH	LG05	LH	1	U-Shaped	1	S	x	90 degrees	Polished surface
022.LG05.LH	LG05	LH	2	U-Shaped	1	S	x	90 degrees x3	Polished surface
022.LG05.LH	LG05	LH	3	/	2	S	x	Lateral	Polished surface
022.LG05.LH	LG05	LH	4	U-Shaped	3	S	x	Lateral x3	Polished surface
022.LG05.LH	LG05	LH	5	U-Shaped	1	D	x	90 degrees with wet tool	
022.LG05.LH	LG05	LH	6	U-Shaped	1	D	v	90 degrees x3 with wet tool	
023.CP12.LH	CP12	LH	1	U-Shaped	1	D	x	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
023.CP12.LH	CP12	LH	2	U-Shaped	1	D	x	90 degrees x3	
023.CP12.LH	CP12	LH	3	U-Shaped	1	D	x	90 degrees with wet tool	
023.CP12.LH	CP12	LH	4	U-Shaped	1	D	v	90 degrees x3 with wet tool	
024.CR22.LH	CR22	LH	1	U-Shaped	1	D	x	90 degrees	
024.CR22.LH	CR22	LH	2	U-Shaped	2	D	x	90 degrees x3	
024.CR22.LH	CR22	LH	3	U-Shaped	1	S	v	90 degrees with wet tool	
024.CR22.LH	CR22	LH	4	U-Shaped	2	D	x	90 degrees x3 with wet tool	
025.AM16.LH	AM16	LH	1	U-Shaped	1	D	x	90 degrees	
025.AM16.LH	AM16	LH	2	V-shaped	2	D	x	90 degrees x3	
025.AM16.LH	AM16	LH	3	U-Shaped	0	S	x	45 degrees	
025.AM16.LH	AM16	LH	4	U-Shaped	1	D	x	45 degrees x3	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
025.AM16.LH	AM16	LH	5	U-Shaped	1	S	x	90 degrees with wet tool	
025.AM16.LH	AM16	LH	6	U-Shaped	2	D	v	90 degrees x3 with wet tool	
026.AG26.LH	AG26	LH	1	/	1	S	x	90 degrees	Incision is barely visible; Tool crushes a bit
026.AG26.LH	AG26	LH	2	/	2	S	x	90 degrees x3	Incision is barely visible
026.AG26.LH	AG26	LH	3	/	1	S	x	90 degrees (backside)	Incision is barely visible
026.AG26.LH	AG26	LH	4	/	1	S	x	90 degrees x3 (backside)	Incision is barely visible
027.LR27.LH	LR27	LH	1	/	0	S	x	90 degrees	
027.LR27.LH	LR27	LH	2	/	1	S	x	90 degrees x3	
028.TH28.LH	TH28	LH	1	/	1	S	x	90 degrees	Incision is barely visible; Tool broke
029.CA30.WC	CA30	WC	1	U-Shaped	4	D	v	90 degrees	
029.CA30.WC	CA30	WC	2	Rectangular	2	D	v	Lateral	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
029.CA30.WC	CA30	WC	3	U-Shaped	3	D	v	45 degrees	
030.FI31.WC	FI31	WC	1	V-shaped	1	D	v	90 degrees	
030.FI31.WC	FI31	WC	2	V-shaped	1	D	v	90 degrees with wet tool	
030.FI31.WC	FI31	WC	3	U-Shaped	2	D	v	Lateral	
030.FI31.WC	FI31	WC	4	U-Shaped	2	D	x	Impression	
031.FI32.WC	FI32	WC	1	V-shaped	0	D	v	90 degrees	Tool broke
031.FI32.WC	FI32	WC	2	V-shaped	0	D	v	90 degrees	
031.FI32.WC	FI32	WC	3	V-shaped	0	S	x	Impression	
031.FI32.WC	FI32	WC	4	U-Shaped	0	D	v	90 degrees (backside)	
032.CE33.WC	CE33	WC	1	V-shaped	1	D	v	90 degrees	
032.CE33.WC	CE33	WC	2	Rectangular	3	S	v	Lateral	
033.WO35.WC	WO35	WC	1	U-Shaped	3	D	v	90 degrees	
033.WO35.WC	WO35	WC	2	U-Shaped	2	D	v	45 degrees	
033.WO35.WC	WO35	WC	3	U-Shaped	2	D	x	Impression	
034.ST36.WC	ST36	WC	1	U-Shaped	3	D	v	90 degrees	
034.ST36.WC	ST36	WC	2	U-Shaped	5	S	x	Lateral	Incision is barely visible
035.CA30.1D	CA30	1D	1	U-Shaped	4	D	v	90 degrees	
035.CA30.1D	CA30	1D	2	Rectangular	2	D	v	Lateral	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
035.CA30.1D	CA30	1D	3	U-Shaped	3	D	v	45 degrees	Tool broke
036.FI31.1D	FI31	1D	1	V-shaped	1	D	v	90 degrees	
036.FI31.1D	FI31	1D	2	V-shaped	1	D	v	90 degrees with wet tool	
036.FI31.1D	FI31	1D	3	U-Shaped	2	D	v	45 degrees	Tip of the tool broke
036.FI31.1D	FI31	1D	4	U-Shaped	1	S	x	Impression	Tool broke
037.CE33.1D	CE33	1D	1	V-shaped	1	D	v	90 degrees	Tool crushes a bit
037.CE33.1D	CE33	1D	2	Rectangular	2	S	x	Lateral	
038.WO35.1D	WO35	1D	1	Rectangular	2	D	v	90 degrees	
038.WO35.1D	WO35	1D	2	U-Shaped	2	D	v	45 degrees	
038.WO35.1D	WO35	1D	3	U-Shaped	1	S	x	Impression	
039.ST36.1D	ST36	1D	1	U-Shaped	3	D	v	90 degrees	
039.ST36.1D	ST36	1D	2	/	5	S	x	Lateral	Incision is barely visible
040.CA30.LH	CA30	LH	1	U-Shaped	2	S	x	90 degrees	
040.CA30.LH	CA30	LH	2	U-Shaped	3	S	x	90 degrees x3	
040.CA30.LH	CA30	LH	3	/	1	S	x	90 degrees with wet tool	Incision is barely visible

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
040.CA30.LH	CA30	LH	4	U-Shaped	2	S	x	90 degrees x3 with wet tool	
041.FI31.LH	FI31	LH	1	V-shaped	1	S	x	90 degrees	
041.FI31.LH	FI31	LH	2	V-shaped	1	D	x	90 degrees x3	
041.FI31.LH	FI31	LH	3	V-shaped	1	S	v	90 degrees with wet tool	
041.FI31.LH	FI31	LH	4	V-shaped	1	D	x	90 degrees x3 with wet tool	
042.CE33.LH	CE33	LH	1	/	3	S	x	90 degrees	
042.CE33.LH	CE33	LH	2	U-Shaped	4	S	x	90 degrees x3	
042.CE33.LH	CE33	LH	3	U-Shaped	2	S	x	Lateral	
042.CE33.LH	CE33	LH	4	U-Shaped	2	S	x	Lateral x3	
043.WO35.LH	WO35	LH	1	/	2	S	x	90 degrees	Incision is barely visible
043.WO35.LH	WO35	LH	2	/	2	S	x	90 degrees x3	Incision is barely visible
044.ST36.LH	ST36	LH	1	U-Shaped	1	S	x	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
044.ST36.LH	ST36	LH	2	U-Shaped	2	S	x	90 degrees x3	
044.ST36.LH	ST36	LH	3	/	3	S	x	Lateral	Incision is barely visible
044.ST36.LH	ST36	LH	4	/	5	S	x	Lateral x3	Incision is barely visible

Table V.2: Punctation experiments.

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
001.CO02.WC	CO02	WC	1	U-Shaped	2	D	v	Lateral	
001.CO02.WC	CO02	WC	2	U-Shaped	2	D	v	Lateral	
001.CO02.WC	CO02	WC	3	U-Shaped	2	D	v	45 degrees aligned with working direction	
001.CO02.WC	CO02	WC	4	U-Shaped	3	D	v	45 degrees aligned against working direction	
001.CO02.WC	CO02	WC	5	V-shaped	1	D	v	90 degrees	
001.CO02.WC	CO02	WC	6	U-Shaped	1	D	v	45 degrees	
001.CO02.WC	CO02	WC	7	U-Shaped	3	D	v	Lateral 45 degrees	
001.CO02.WC	CO02	WC	8	U-Shaped	2	D	v	/	Removed as incision
001.CO02.WC	CO02	WC	9	U-Shaped	2	D	v	/	Removed as incision

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
001.CO02.WC	CO02	WC	10	U-Shaped	2	D	v	90 degrees, curvilinear	
002.EE24.WC	EE24	WC	1	Unidentified	0	D	v	90 degrees	
002.EE24.WC	EE24	WC	2	U-Shaped	2	D	v	Lateral	
002.EE24.WC	EE24	WC	3	V-shaped	1	D	x	Impression	
002.EE24.WC	EE24	WC	4	V-shaped	1	D	v	45 degrees	
002.EE24.WC	EE24	WC	5	U-Shaped	2	D	v	90 degrees (backside)	
003.EE25.WC	EE25	WC	1	U-Shaped	3	D	v	90 degrees	
003.EE25.WC	EE25	WC	2	U-Shaped	3	D	v	45 degrees aligned with working direction	
004.LG05.WC	LG05	WC	1	U-Shaped	2	D	v	90 degrees	
004.LG05.WC	LG05	WC	2	U-Shaped	3	S	v	Lateral	
004.LG05.WC	LG05	WC	3	U-Shaped	2	D	v	45 degrees	
004.LG05.WC	LG05	WC	4	U-Shaped	2	D	x	Impression	
005.CP12.WC	CP12	WC	1	U-Shaped	1	D	v	90 degrees	
005.CP12.WC	CP12	WC	2	V-shaped	1	D	v	45 degrees	
005.CP12.WC	CP12	WC	3	U-Shaped	2	D	x	Impression	
006.CR22.WC	CR22	WC	1	U-Shaped	3	D	v	90 degrees	
006.CR22.WC	CR22	WC	2	U-Shaped	3	D	v	45 degrees	

Experiment	**Tool**	**Clay Condition**	**No. (L>R)**	**Insertion**	**With [mm] (note: 0=<0,5)**	**Deep/ Shallow**	**Ridges?**	**Gesture**	**Remarks**
006.CR22.WC	CR22	WC	3	U-Shaped	5	S	x	Impression	
007.AM16.WC	AM16	WC	1	V-shaped	1	D	v	90 degrees	
007.AM16.WC	AM16	WC	2	U-Shaped	2	D	v	Lateral	
007.AM16.WC	AM16	WC	3	V-shaped	1	D	v	45 degrees	
007.AM16.WC	AM16	WC	4	V-shaped	1	D	x	Impression	
008.CO02.1D	CO02	1D	1	U-Shaped	1	D	x	90 degrees	
008.CO02.1D	CO02	1D	2	U-Shaped	2	D	x	90 degrees x3	
008.CO02.1D	CO02	1D	3	Unidentified	2	S	x	Lateral	Tool broke
008.CO02.1D	CO02	1D	4	U-Shaped	1	S	x	Impression	
009.EE24.1D	EE24	1D	1	Unidentified	0	S	x	90 degrees	
009.EE24.1D	EE24	1D	2	V-shaped	1	S	x	90 degrees x3	
009.EE24.1D	EE24	1D	3	U-Shaped	0	S	x	Impression	
009.EE24.1D	EE24	1D	4	U-Shaped	1	S	x	90 degrees (backside)	
009.EE24.1D	EE24	1D	5	U-Shaped	2	S	x	90 degrees x3 (backside)	
010.EE25.1D	EE25	1D	1	U-Shaped	2	S	x	90 degrees	
010.EE25.1D	EE25	1D	2	U-Shaped	1	S	x	45 degrees aligned with working direction	
011.LG05.1D	LG05	1D	1	U-Shaped	1	D	x	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
011.LG05.1D	LG05	1D	2	U-Shaped	1	D	x	90 degrees x3	
011.LG05.1D	LG05	1D	3	U-Shaped	2	S	x	Lateral	Polished surface
011.LG05.1D	LG05	1D	4	U-Shaped	2	S	x	Lateral x3	Polished surface
011.LG05.1D	LG05	1D	5	U-Shaped	1	S	x	45 degrees	Polished surface
011.LG05.1D	LG05	1D	6	U-Shaped	1	S	x	Impression	Impression is barely visible; Polished surface
012.CP12.1D	CP12	1D	1	V-shaped	1	D	x	90 degrees	
012.CP12.1D	CP12	1D	2	V-shaped	1	D	x	90 degrees x3	
012.CP12.1D	CP12	1D	3	V-shaped	1	D	x	45 degrees	
012.CP12.1D	CP12	1D	4	V/U-shaped	0-2	D-S	x	Impression	Impression is in 2 parts
013.CR22.1D	CR22	1D	1	U-Shaped	1	D	x	90 degrees	
013.CR22.1D	CR22	1D	2	U-Shaped	2	D	x	90 degrees x3	
013.CR22.1D	CR22	1D	3	U-Shaped	2	S	x	Impression	
014.AM16.1D	AM16	1D	1	V-shaped	1	D	x	90 degrees	
014.AM16.1D	AM16	1D	2	V-shaped	2	D	x	90 degrees x3	
014.AM16.1D	AM16	1D	3	U-Shaped	2	D	x	Lateral	
014.AM16.1D	AM16	1D	4	V-shaped	1	D	x	Impression	
015.AG26.WC	AG26	WC	1	V-shaped	2	D	v	90 degrees	
015.AG26.WC	AG26	WC	2	U-Shaped	2	D	v	45 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
015.AG26.WC	AG26	WC	3	U-Shaped	3	D	v	90 degrees (backside)	Big groove within the incision
015.AG26.WC	AG26	WC	4	U-Shaped	2	D	x	Impression	
016.LR27.WC	LR27	WC	1	U-Shaped	3	D	v	90 degrees	Ridge within the incision
016.LR27.WC	LR27	WC	2	V-shaped	2	D	v	45 degrees	
017.TH28.WC	TH28	WC	1	V-shaped	2	D	v	90 degrees	
017.TH28.WC	TH28	WC	2	Rectangular	4	D	v	Lateral	
017.TH28.WC	TH28	WC	3	V-shaped	2	D	v	45 degrees	
017.TH28.WC	TH28	WC	4	U-Shaped	5	D	x	Impression	
018.AG26.1D	AG26	1D	1	U-Shaped	1	D	x	90 degrees	
018.AG26.1D	AG26	1D	2	U-Shaped	1	D	x	45 degrees	
018.AG26.1D	AG26	1D	3	U-Shaped	2	D	x	90 degrees (backside)	
018.AG26.1D	AG26	1D	4	U-Shaped	1	S	x	Impression	Impression is barely visible
019.LR27.1D	LR27	1D	1	U-Shaped	2	D	v	90 degrees	
019.LR27.1D	LR27	1D	2	U-Shaped	1	D	v	45 degrees	
020.TH28.1D	TH28	1D	1	U-Shaped	2	D	v	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
020.TH28.1D	TH28	1D	2	/	2	S	x	Lateral	
020.TH28.1D	TH28	1D	3	U-Shaped	1	D	v	45 degrees	
020.TH28.1D	TH28	1D	4	/	4	S	x	Impression	Incision is barely visible; Tool broke internally
021.EE25.LH	EE25	LH	1	/	2	S	x	90 degrees	Incision is barely visible
021.EE25.LH	EE25	LH	2	/	2	S	x	90 degrees x3	
021.EE25.LH	EE25	LH	3	/	1	S	x	45 degrees aligned with working direction	Incision is barely visible
021.EE25.LH	EE25	LH	4	/	2	S	x	45 degrees x3 aligned with working direction	
021.EE25.LH	EE25	LH	5	/	1	S	x	90 degrees (backside)	Incision is barely visible
021.EE25.LH	EE25	LH	6	/	2	S	x	90 degrees x3 (backside)	Incision is barely visible
022.LG05.LH	LG05	LH	1	U-Shaped	1	S	x	90 degrees	Polished surface
022.LG05.LH	LG05	LH	2	U-Shaped	1	S	x	90 degrees x3	Polished surface
022.LG05.LH	LG05	LH	3	/	2	S	x	Lateral	Polished surface
022.LG05.LH	LG05	LH	4	U-Shaped	3	S	x	Lateral x3	Polished surface

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
022.LG05.LH	LG05	LH	5	U-Shaped	1	D	x	90 degrees with wet tool	
022.LG05.LH	LG05	LH	6	U-Shaped	1	D	v	90 degrees x3 with wet tool	
023.CP12.LH	CP12	LH	1	U-Shaped	1	D	x	90 degrees	
023.CP12.LH	CP12	LH	2	U-Shaped	1	D	x	90 degrees x3	
023.CP12.LH	CP12	LH	3	U-Shaped	1	D	x	90 degrees with wet tool	
023.CP12.LH	CP12	LH	4	U-Shaped	1	D	v	90 degrees x3 with wet tool	
024.CR22.LH	CR22	LH	1	U-Shaped	1	D	x	90 degrees	
024.CR22.LH	CR22	LH	2	U-Shaped	2	D	x	90 degrees x3	
024.CR22.LH	CR22	LH	3	U-Shaped	1	S	v	90 degrees with wet tool	
024.CR22.LH	CR22	LH	4	U-Shaped	2	D	x	90 degrees x3 with wet tool	
025.AM16.LH	AM16	LH	1	U-Shaped	1	D	x	90 degrees	
025.AM16.LH	AM16	LH	2	V-shaped	2	D	x	90 degrees x3	
025.AM16.LH	AM16	LH	3	U-Shaped	0	S	x	45 degrees	
025.AM16.LH	AM16	LH	4	U-Shaped	1	D	x	45 degrees x3	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
025.AM16.LH	AM16	LH	5	U-Shaped	1	S	x	90 degrees with wet tool	
025.AM16.LH	AM16	LH	6	U-Shaped	2	D	v	90 degrees x3 with wet tool	
026.AG26.LH	AG26	LH	1	/	1	S	x	90 degrees	Incision is barely visible; Tool crushes a bit
026.AG26.LH	AG26	LH	2	/	2	S	x	90 degrees x3	Incision is barely visible
026.AG26.LH	AG26	LH	3	/	1	S	x	90 degrees (backside)	Incision is barely visible
026.AG26.LH	AG26	LH	4	/	1	S	x	90 degrees x3 (backside)	Incision is barely visible
027.LR27.LH	LR27	LH	1	/	0	S	x	90 degrees	
027.LR27.LH	LR27	LH	2	/	1	S	x	90 degrees x3	
028.TH28.LH	TH28	LH	1	/	1	S	x	90 degrees	Incision is barely visible; Tool broke
029.CA30.WC	CA30	WC	1	U-Shaped	4	D	v	90 degrees	
029.CA30.WC	CA30	WC	2	Rectangular	2	D	v	Lateral	
029.CA30.WC	CA30	WC	3	U-Shaped	3	D	v	45 degrees	
030.FI31.WC	FI31	WC	1	V-shaped	1	D	v	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
030.FI31.WC	FI31	WC	2	V-shaped	1	D	v	90 degrees with wet tool	
030.FI31.WC	FI31	WC	3	U-Shaped	2	D	v	Lateral	
030.FI31.WC	FI31	WC	4	U-Shaped	2	D	x	Impression	
031.FI32.WC	FI32	WC	1	V-shaped	0	D	v	90 degrees	Tool broke
031.FI32.WC	FI32	WC	2	V-shaped	0	D	v	90 degrees	
031.FI32.WC	FI32	WC	3	V-shaped	0	S	x	Impression	
031.FI32.WC	FI32	WC	4	U-Shaped	0	D	v	90 degrees (backside)	
032.CE33.WC	CE33	WC	1	V-shaped	1	D	v	90 degrees	
032.CE33.WC	CE33	WC	2	Rectangular	3	S	v	Lateral	
033.WO35.WC	WO35	WC	1	U-Shaped	3	D	v	90 degrees	
033.WO35.WC	WO35	WC	2	U-Shaped	2	D	v	45 degrees	
033.WO35.WC	WO35	WC	3	U-Shaped	2	D	x	Impression	
034.ST36.WC	ST36	WC	1	U-Shaped	3	D	v	90 degrees	
034.ST36.WC	ST36	WC	2	U-Shaped	5	S	x	Lateral	Incision is barely visible
035.CA30.1D	CA30	1D	1	U-Shaped	4	D	v	90 degrees	
035.CA30.1D	CA30	1D	2	Rectangular	2	D	v	Lateral	
035.CA30.1D	CA30	1D	3	U-Shaped	3	D	v	45 degrees	Tool broke
036.FI31.1D	FI31	1D	1	V-shaped	1	D	v	90 degrees	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
036.FI31.1D	FI31	1D	2	V-shaped	1	D	v	90 degrees with wet tool	
036.FI31.1D	FI31	1D	3	U-Shaped	2	D	v	45 degrees	Tip of the tool broke
036.FI31.1D	FI31	1D	4	U-Shaped	1	S	x	Impression	Tool broke
037.CE33.1D	CE33	1D	1	V-shaped	1	D	v	90 degrees	Tool crushes a bit
037.CE33.1D	CE33	1D	2	Rectangular	2	S	x	Lateral	
038.WO35.1D	WO35	1D	1	Rectangular	2	D	v	90 degrees	
038.WO35.1D	WO35	1D	2	U-Shaped	2	D	v	45 degrees	
038.WO35.1D	WO35	1D	3	U-Shaped	1	S	x	Impression	
039.ST36.1D	ST36	1D	1	U-Shaped	3	D	v	90 degrees	
039.ST36.1D	ST36	1D	2	/	5	S	x	Lateral	Incision is barely visible
040.CA30.LH	CA30	LH	1	U-Shaped	2	S	x	90 degrees	
040.CA30.LH	CA30	LH	2	U-Shaped	3	S	x	90 degrees x3	
040.CA30.LH	CA30	LH	3	/	1	S	x	90 degrees with wet tool	Incision is barely visible
040.CA30.LH	CA30	LH	4	U-Shaped	2	S	x	90 degrees x3 with wet tool	
041.FI31.LH	FI31	LH	1	V-shaped	1	S	x	90 degrees	
041.FI31.LH	FI31	LH	2	V-shaped	1	D	x	90 degrees x3	

Experiment	Tool	Clay Condition	No. (L>R)	Insertion	With [mm] (note: 0=<0,5)	Deep/ Shallow	Ridges?	Gesture	Remarks
041.FI31.LH	FI31	LH	3	V-shaped	1	S	v	90 degrees with wet tool	
041.FI31.LH	FI31	LH	4	V-shaped	1	D	x	90 degrees x3 with wet tool	
042.CE33.LH	CE33	LH	1	/	3	S	x	90 degrees	
042.CE33.LH	CE33	LH	2	U-Shaped	4	S	x	90 degrees x3	

Appendix VI

Figure VI.1: Experiment 001.CO02.WC (picture by author)

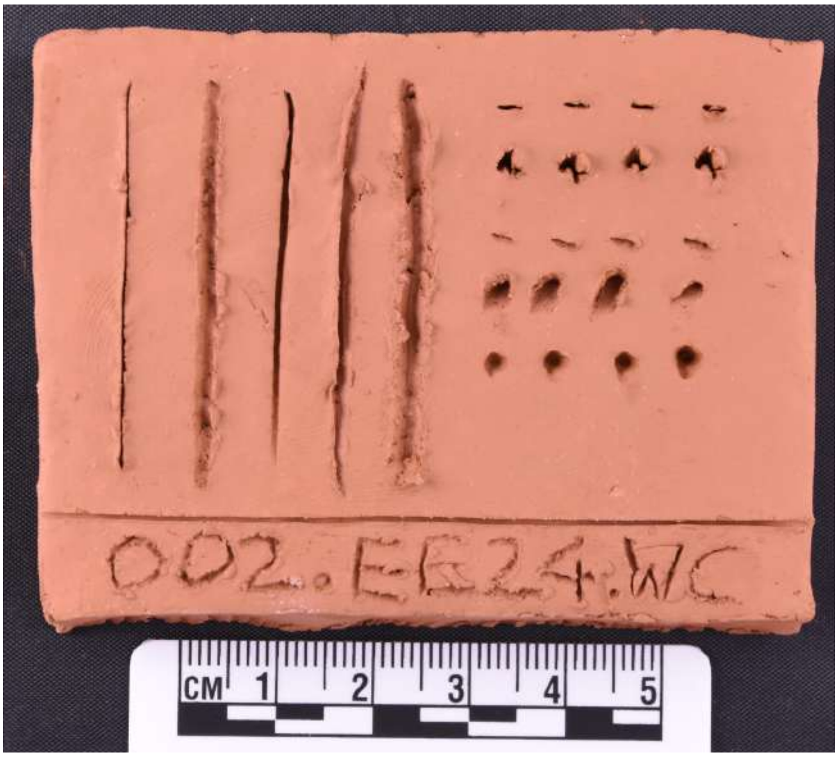

Figure VI.2: Experiment 002.EE24.WC (picture by author)

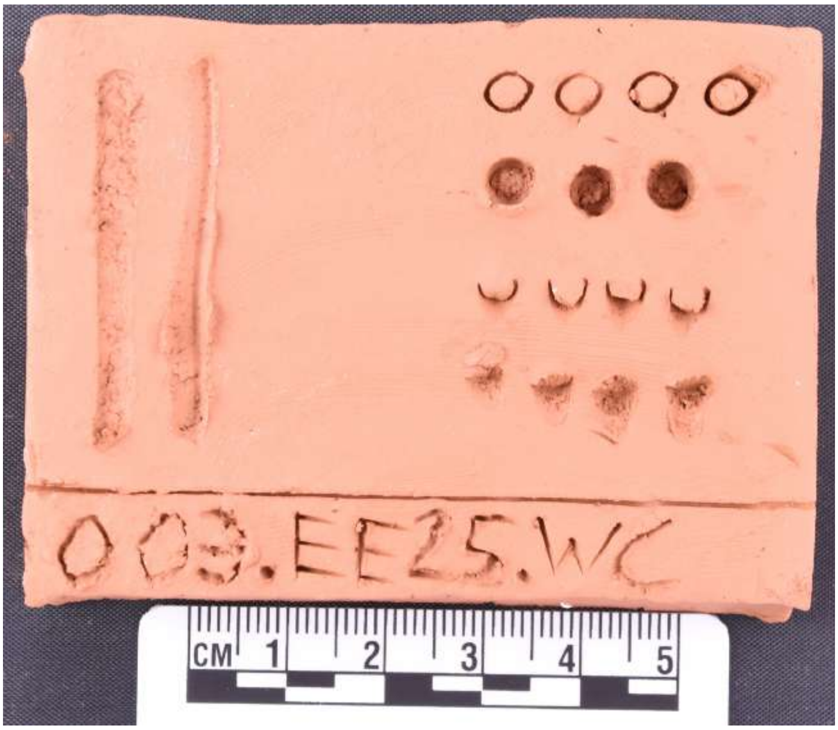

Figure VI.3: Experiment 003.EE25.WC (picture by author)

Figure VI.4: Experiment 004.LG05.WC (picture by author)

Figure VI.5: Experiment 005.CP12.WC (picture by author)

Figure VI.6: Experiment 006.CR22.WC (picture by author)

Figure VI.7: Experiment 007.AM16.WC (picture by author)

Figure VI.8: Experiment 008.CO02.1D (picture by author)

Figure VI.9: Experiment 009.EE24.1D (picture by author)

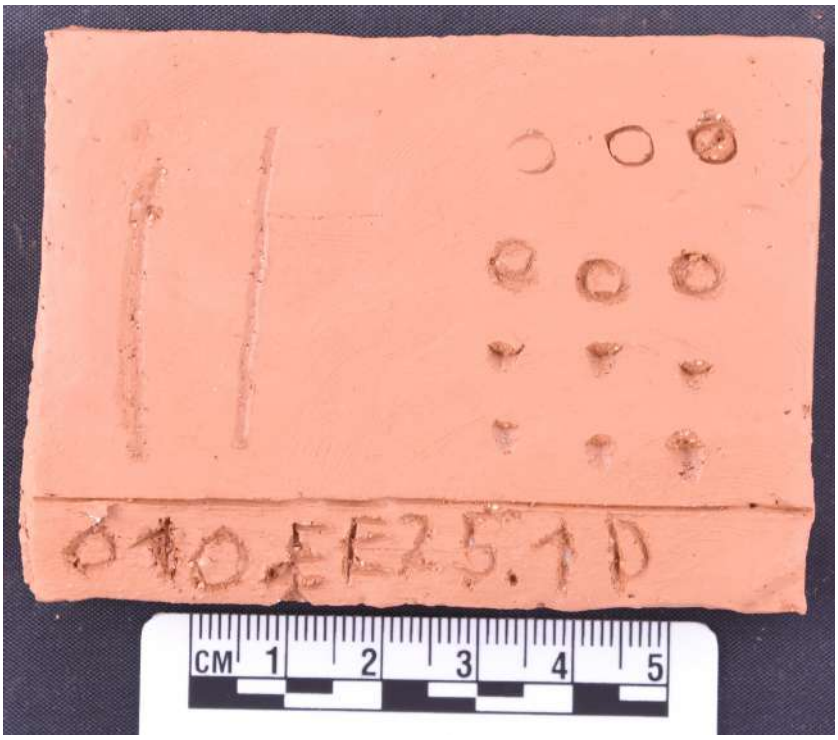

Figure VI.10: Experiment 010.EE25.1D (picture by author)

Figure VI.11: Experiment 011.LG05.1D (picture by author)

Figure VI.12: Experiment 012.CP12.1D (picture by author)

Figure VI.13: Experiment 013.CR22.1D (picture by author)

Figure VI.14: Experiment 014.AM16.1D (picture by author)

Figure VI.15: Experiment 015.AG26.WC (picture by author)

Figure VI.16: Experiment 016.LR27.WC (picture by author)

Figure VI.17: Experiment 017.TH28.WC (picture by author)

Figure VI.18: Experiment 018.AG26.1D (picture by author)

Figure VI.19: Experiment 019.LR27.1D (picture by author)

Figure VI.20: Experiment 020.TH28.1D (picture by author)

Figure VI.21: Experiment 021.EE25.LH (picture by author)

Figure VI.22: Experiment 022.LG05.LH (picture by author)

Figure VI.23: Experiment 023.CP12.LH (picture by author)

Figure VI.24: Experiment 024.CR22.LH (picture by author)

Figure VI.25: Experiment 025.AM16.LH (picture by author)

Figure VI.26: Experiment 026.AG26.LH (picture by author)

Figure VI.27: Experiment 027.LR27.LH (picture by author)

Figure VI.28: Experiment 028.TH28.LH (picture by author)

Figure VI.29: Experiment 029.CA30.WC (picture by author)

Figure VI.30: Experiment 030.FI31.WC (picture by author)

Figure VI.31: Experiment 031.FI32.WC (picture by author)

Figure VI.32: Experiment 032.CE33.WC (picture by author)

Figure VI.33: Experiment 033.WO35.WC (picture by author)

Figure VI.34: Experiment 034.ST36.WC (picture by author)

Figure VI.35: Experiment 035.CA30.1D (picture by author)

Figure VI.36: Experiment 036.FI31.1D (picture by author)

Figure VI.37: Experiment 037.CE33.1D (picture by author)

Figure VI.38: Experiment 038.WO35.1D (picture by author)

Figure VI.39: Experiment 039.ST36.1D (picture by author)

Figure VI.40: Experiment 040.CA30.LH (picture by author)

Figure VI.41: Experiment 041.FI31.LH (picture by author)

Figure VI.42: Experiment 042.CE33.LH (picture by author)

Figure VI.43: Experiment 043.WO35.LH (picture by author)

Figure VI.44: Experiment 044.ST36.LH (picture by author)