CERAMICS AS PRODUCT OF TECHNOLOGY AND ART: A CASE STUDY OF ARCHAEOLOGICAL REMAINS AT YIKPABONGO.

BY

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DECLARATION

I declare that apart from documentary and other sources of material cited and duly acknowledged in this work, I am solely responsible for the authorship, errors and omissions that might occur in this work irrespective of the guidance and suggestions from my supervisor and advisor.

I also declare that this work has never been submitted by me or any other person to the University or any of their affiliate institutions both within and outside Ghana for the award of any degree.

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DEDICATION

This thesis is dedicated to my husband, Paul; my parents, Stephen & Janet and my children, Akosua, Abena & Yaa.

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ABSTRACT

The focus of this archaeological research is in the area of ceramic technology and art. The aims of this study is to analyze the data on ceramic technology and art, establish ceramic typology base on technological and stylistic attributes and to determine the source of clay raw material of the excavated ceramics. To achieve these goals, the research approach adopted includes archaeological and chemical compositional analysis so as to provide answers to the unsolved concerns. The recovered materials from mound D included: human and animal remains, potsherds, stone objects, postholes, floor and a pot. The findings for this work indicated that mound D was a habitational/settlement mound. The radiocarbon date indicated that the excavated mound was between 5th and 7th centuries AD. The analysis of the potsherds revealed that large quantities of the potsherds were undecorated. The surface treatment techniques discovered were red-slipping, burnishing, dyeing and hand-smoothing of the vessels. Decorations on the potsherds consist of grooves, incisions, punctates, roulettes and channeling. Two types of vessel forms (jars/bowls) were discovered. X-ray fluorescence analysis was conducted on the excavated ceramics from Yikpabongo. These were compared to clay from Fumbisi. The result indicated that Fumbisi was the most likely source of the clay used to manufacture the excavated ceramics. The study indicated that ceramic technology and artistic decorations are the manifestation of the interaction or interrelation between societal goals, ideology and human capabilities on one hand and their environment on the other hand at every given time. This data adds to the existing body of knowledge about ceramics from Yikpabongo in the areas of technology of pottery production and decorative art.

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CHAPTER ONE

BACKGROUND TO THE STUDY

This chapter focuses on understanding the background to the study, the purpose of the study, general ceramic studies and their importance in archaeology and heritage studies of Ghana. It also explores the geographical distribution of clays in Ghana and the definition of the problem embedded in the subject matter of this thesis.

1.1 Introduction

Past societies relied on resources available in their environment for survival. Clay was among the resources that were exploited by these ancient people for the production of ceramics and other wares and Archaeologists have found that it was an abundant natural resource of Ghana's history. Archaeologists have been at the forefront of the study of these unique objects in the Koma-Bulsa sites of Northern Ghana. They have considered topics such as contents of the stone circle mounds and the purpose of the mounds. Art historians have also studied the aesthetics and the iconography of the ceramic objects and other forms of expressions. Also, cultural anthropologists have considered the documentation of contemporary culture of the people in that remote area to understand the symbolism and significance of the ceramic objects in the past.

Past ceramic objects are still being studied because they are central to the understanding of African cultural history and that of the people of ancient Yikpabongo as well. Therefore, the need to look at ceramic technology and decorative art for clues to the riddles that previous works have not been able to answer is expedient. The topic "Ceramic as product of technology and art: a case study of the archaeological remains at Yikpabongo is meant to be a step in this direction. For a better understanding of past lifeways at Yikpabongo, there is the need to discuss the importance of ceramic studies in general and that of Yikpabongo in particular. Ceramic studies in this context comprise all the

various means that archaeologists use to extract relevant information in order to understand, explain and interpret the ceramic objects that are recovered from the archaeological record.

1.2 Geographical Background

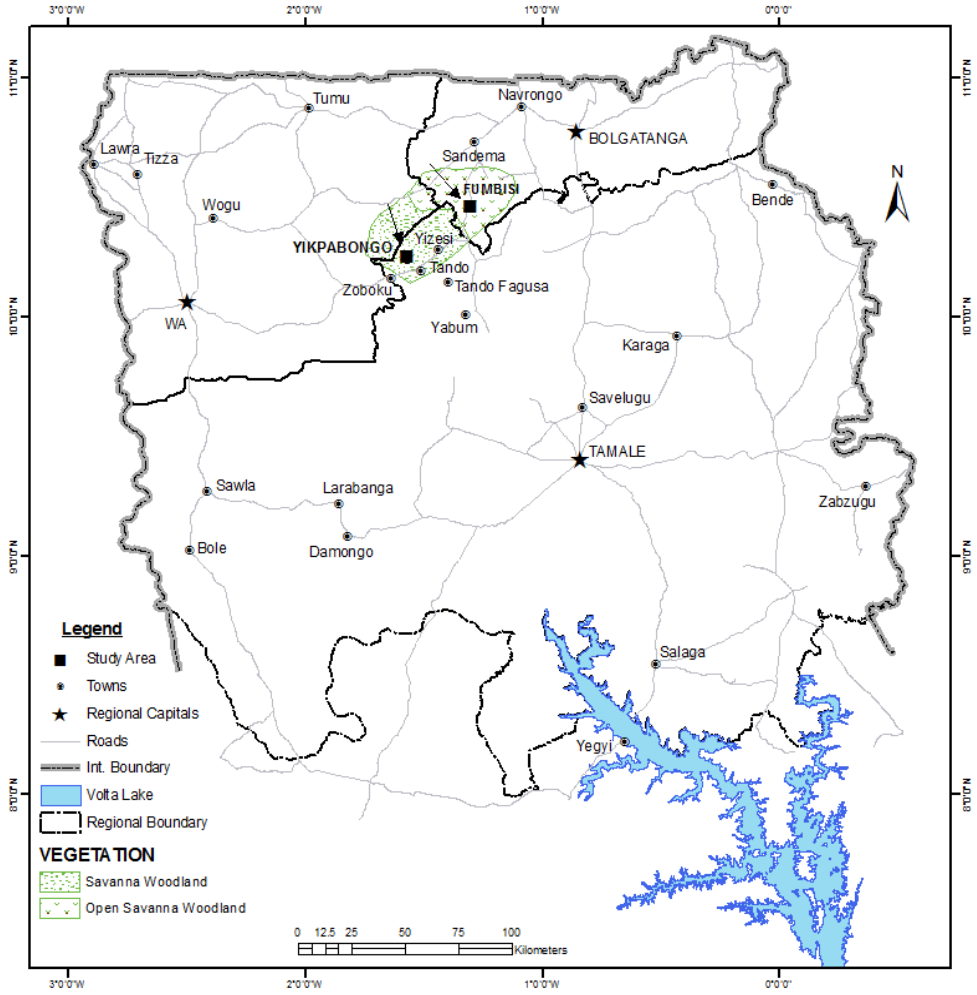


Figure 1: Map of the study area (Source: Geography Department –University of Ghana.)

Figure 1 shows the location of the study area, Yikpabongo, in the West Mamprusi District (Now designated as Mamprugu – Moagduri District with the capital at Yagaba) in Northern Ghana. The name Yikpabongo replaced the real name of the community which was "Nagbeeri" in the early 1970s. The people of Yikpabongo are Mamprusi and are part of the Mamprugu Kingdom. They speak the

Komin language and belong to the Koma tribe. Yikpabongo, which literally means “forest” is still called “Nagbeeri” to date by some Mamprusi people. The people of Yikpabongo also trade with neighboring settlers of Tantali, Yizezi and Fumbisi. Yikpabongo is a small community with a projected population size of one thousand three hundred and twenty six (1,326) people. In terms of gender distribution, males constitute 53% whilst females are 47% (male 698 and female 628). There are 56 houses, 127 households and an average household population of 8.5 persons (Ghana Statistical Service population projection unit 2012).

Yikpabongo has single maximum rainfall pattern which peaks in August and has an average range of temperature between 28- 40 degrees Celsius. The vegetation of the area is savanna grassland with few patches of trees. The land is relatively flat in nature and supports human habitation. The main occupation of the people comprises farming and keeping of livestock for both domestic and commercial purposes. The general geographical area associated with the Koma pottery tradition is encompassed within 1˚ 15W to 1˚45W and 10˚ N to 11˚N. The topography of the region is generally uniform, with undulating plateau and isolated residual hills. A greater part of the land ranges between 30 meters and 330 meters in height above sea level. The isolated ranges of Birimian and Tarkwian hills have attained heights of up to 500 meters above sea level which tend to break the monotony of the topography (Anquandah 1998).

The land is drained by a number of major rivers such as the Sisili and Kulpawn which are tributaries of the White Volta River. But there are scores of smaller rivers and streams forming a complicated network which renders the region impassable and inhospitable during rainy seasons hence the nickname "overseas". The soil type (sandstone) can hold large quantities of groundwater which has made the creation or construction of boreholes very effective. The area has fertile soil and favorable

climate which is good for crops. The soil is rich in macronutrients which determine the chemical and physical characteristics. Underlying the Sisili-Kulpawn basin are three rock series:

- The Voltaian sedimentary rock complex containing shales, mudstone and sandstones
- The Birimian metamorphic rock complex characterized by schist, phyllites and greywacks.
- The igneous rock complex featuring granite and granodiorite (Brian Wills 1962).

The rock structure on which most of the settlement of terracotta makers was sited was very ancient probably dating back to the palaeozoic era (Anquandah1998). According to Hilton (1959) as cited by Anquandah (1998) 'the rock systems and river drainage have all played a role in determining population distribution in the region. The local vegetation is that of tree - grassland. There are a few short branching trees which do not form a closed canopy and are often widely scattered'.

Fumbisi is now the largest and well patronized market in the Koma area where imported and locally made goods are traded including livestock. The people operated a barter trade system where goods were exchanged for goods until recently. Even today, a form of barter exists at Yikpabongo except that the magnitude is minimal. There are shops which provide the community with toiletries and other essential commodities. Currently, a local market has developed in the community because of the annual field schools and occasional visits by staff and students of the Department of Archaeology and Heritage Studies, University of Ghana.

The January field schools create a sizeable market where women of the village take advantage to sell and generate income to support their families. They sell boiled local rice with stew, fried yam and beans cake (masa) with porridge. They also process sheabutter for sale. In same vein, the men supply the students with game meat and honey. Another economic impact was local job creation where wages

are paid to locals who lend helping hands during the ten (10) days period. The involvement of community members, especially children, had instilled great deal of interest, enthusiasm and curiosity about their local heritage. As a result some of them hope to pursue a career in archaeology and its related fields.

Furthermore, local members acquired first- hand knowledge and experience about archaeological field methods and have fostered an appreciation for their past relics. This has reshaped their perception about the past community. The interaction between researchers and the members of the community has led to the exchange of culture and ideas through discussions of socio-economic issues such as best agricultural practices to increase crop yield, family planning methods and the need to educate the girl child to reduce early marriages which is one of the pertinent issues in the Northern sector of the country.

1.3 Purpose of research

The general objective of this research project is to reconstruct the cultural history of ancient Yikpabongo. This was achieved through the following specific objectives:

- To analyze the data on ceramic technology and decorative designs or arts in the archaeological records of Yikpabongo.
- To establish ceramic typology of Yikpabongo based on the evidence of technological and stylistic attributes.
- To determine the source of clay raw material of the excavated ceramics from the site.

1.4 Defining Technology and Art in the Context of Yikpabongo Ceramic Studies

For the purpose of this study, the ceramics of Yikpabongo are focused on as products of technology and art. The techniques and tools used in the selection of clay, tempering agents, formation of the shape and form of vessels and the execution of the artistic decorations on the vessels require an in-depth knowledge of the indigenous technology associated with potting in the area. That is, the process of potting starts from the quest of the Yikpabongo potters to solve a particular need with ceramics. The selections of raw material and the structural design in terms of the shape or form that the products will assume are very much dependent on the intended function of the products. Similarly, the choice of artistic decorations and techniques involved in their depiction on vessels also depends on the intended aesthetic or ideological functions that the indigenous potters have in mind.

The process of potting commences with clay acquisition either by purchase or mining from a source and transported to the working site. The clay is wedged to make it ready for moulding or the construction of ceramic products. The shapes or forms are done according to the desire and taste of both potters and consumers (users) of the products. The moulded vessels are dried and decorated with designs before firing. After this stage, the vessels undergo post firing surface treatments before they are ready for use.

The artistic aspects of the potting process are referred to as ceramic art. Some ceramic products are regarded as fine art while others are regarded as decorative art objects (www.wikipedia.com, 2013). In the context of this study, the focus on the ceramic art of Yikpabongo involves the assessment of the aesthetic shapes of the vessels, their decorative motifs and surface treatment. The execution of artistic designs by artistically inclined potters on ceramic products renders such end products as artistic objects as well. This is because pottery made by hand requires a conscious decision-making about the design, form, surface decoration, material and techniques at every step in the potting process (Hansen and

Hopper 2010). All of these perspectives are focused on in assessing the ceramics of Yikpabongo as a product of technology and art.

1.5 Importance of Ceramic Studies to Archaeology and Heritage Studies

The aim of archaeology and heritage studies is to explain, interpret and to learn more about past societies to understand past life ways, culture histories and culture processes. Ceramic objects do survive with their forms and decoration which make them appropriate for the reconstruction of past life ways. Ceramic objects are not just materials but they result from a process of social production and reproductions rooted in social actions and agency (Dobres & Hoffman 1994). Therefore ceramic studies can highlight the psychological (mindset or worldview), social, economic, technological and political dimensions of ancient societies.

Ceramics are bound up with the production, consumption and storage of plant and animal products and foodstuffs (Jones 1999:56). As a result, ceramic studies aid in the identification of subsistence practices of the past society. Also ceramics and their associated functions or tools can reflect new strategies used for food production, consumption and storage. In addition, the study of decorations on ceramics can articulate social identities, religious belief, philosophy and perceptions which will help explain the intangible aspects of the culture being reconstructed. Similarly, ceramic studies can provide data on social networking (exchange or trade) of the society through mineralogical studies, sources of raw material, tempering material and others.

According to Shinnie and Kense (1989) the stylistic differences in forms of vessels and decorations can be used to reconstruct the artistic inclination of the producers and the cultural history of an area. It can also be used to address the complex socio-cultural issues regarding kingship, social structure and intra-regional trade networks. In addition to the above, it can reflect the impact, effect or influence of one

culture on the other. Furthermore, ceramic studies provide chronology for the culture being studied which is crucial to the recording of history. According to Prudêncio (2012:30), ceramic studies has the potential to provide information about dates of sites, trade patterns and socioeconomic relationship in the past, All these perspectives aid in the understanding of time, culture or how humans in the past have interacted with their environment.

It could be stated from the above exposition that ceramic studies can aid in the understanding of the complex interrelated theoretical and methodological questions related to social, environmental, economic, organization and the aesthetic components of culture. The aesthetic component for the purpose of this study comprises the vessel shapes and decorative designs on the surfaces of the vessels and potsherds excavated. Hence scholars from the Archaeology and Heritage Studies Department of the University Ghana deemed it crucial to employ ceramic studies in an attempt to understand, explain and interpret the past life ways of the people of Yikpabongo in the Northern Region of Ghana.

Ceramic" is a Greek word which means the art of making pottery. Generally, ceramic is the science or art of manufacturing articles prepared from pliable earthly materials that are made rigid by exposure to heat (Jameson 1958). Ceramic materials are non-metallic, inorganic compounds which comprise compounds namely, oxygen, carbon, nitrogen and silicon. Chemically, ceramics are resistant to corrosive substances unlike plastics and metals. Ceramic objects do not react with most gases, liquids, alkalines and acids. In this regard ceramic objects remain stable over long periods of time hence their survival in the archaeological records and their recognition as being among the most important man-made materials.

Physically, ceramic objects are relatively strong, brittle and may break when dropped or when quickly heated or cooled (Jameson 1958). Clay is the main raw material for ceramic production. Clay is a

general term for any fine-grained earth that develops plasticity (the capacity to be moulded and shaped) when mixed with water. Plasticity of a clay sample depends on the amount of clay minerals present. Clays are often water laid soils. They vary in consistency according to grain size. Good clays have particles of 0.05 microns (0.00005mm) in diameter. Ceramic objects are mostly made with clays with particle size of one (1) micrometer or 0.000001meter or 0.00004 inches.

The main clays in Ghana are kaolin (brown or white), which are potentially useful in the ceramic industry. These are mostly widespread in terms of occurrence and utilization. Brown clays are exploited by the local populace throughout Ghana to make pottery and other household items (Minerals Commission 1997:46). A research conducted by the Ghana Geological Survey Department revealed that, there are forty-six (46) known clay deposits in Ghana, which can be located in all the ten (10) regions in Ghana. It has been estimated that there are about 1,384,895,000 tons of untapped brown and kaolin clay resources in Ghana. The area marked with the numbers 8- 46 on figure 2 are the 39 known brown clay deposits in Ghana. Similarly, the areas marked with numbers (1, 2, 3, 4, 5. 6 & 7) on figure 3 are the white clay deposits in Ghana (Minerals commissions (1997).

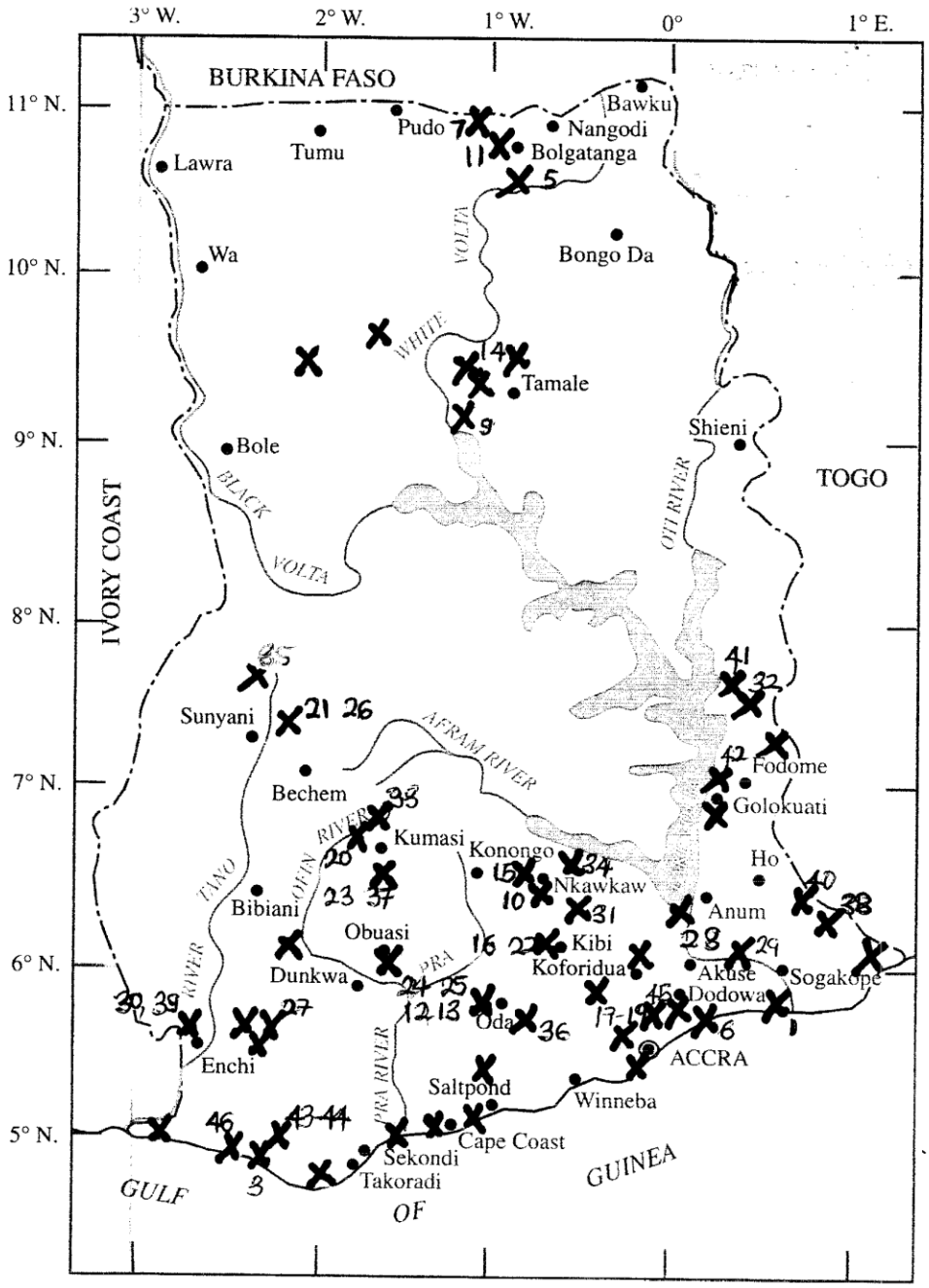


Figure 2: Map showing brown clay deposits in Ghana.

Source: Adopted from Minerals commission (1997)

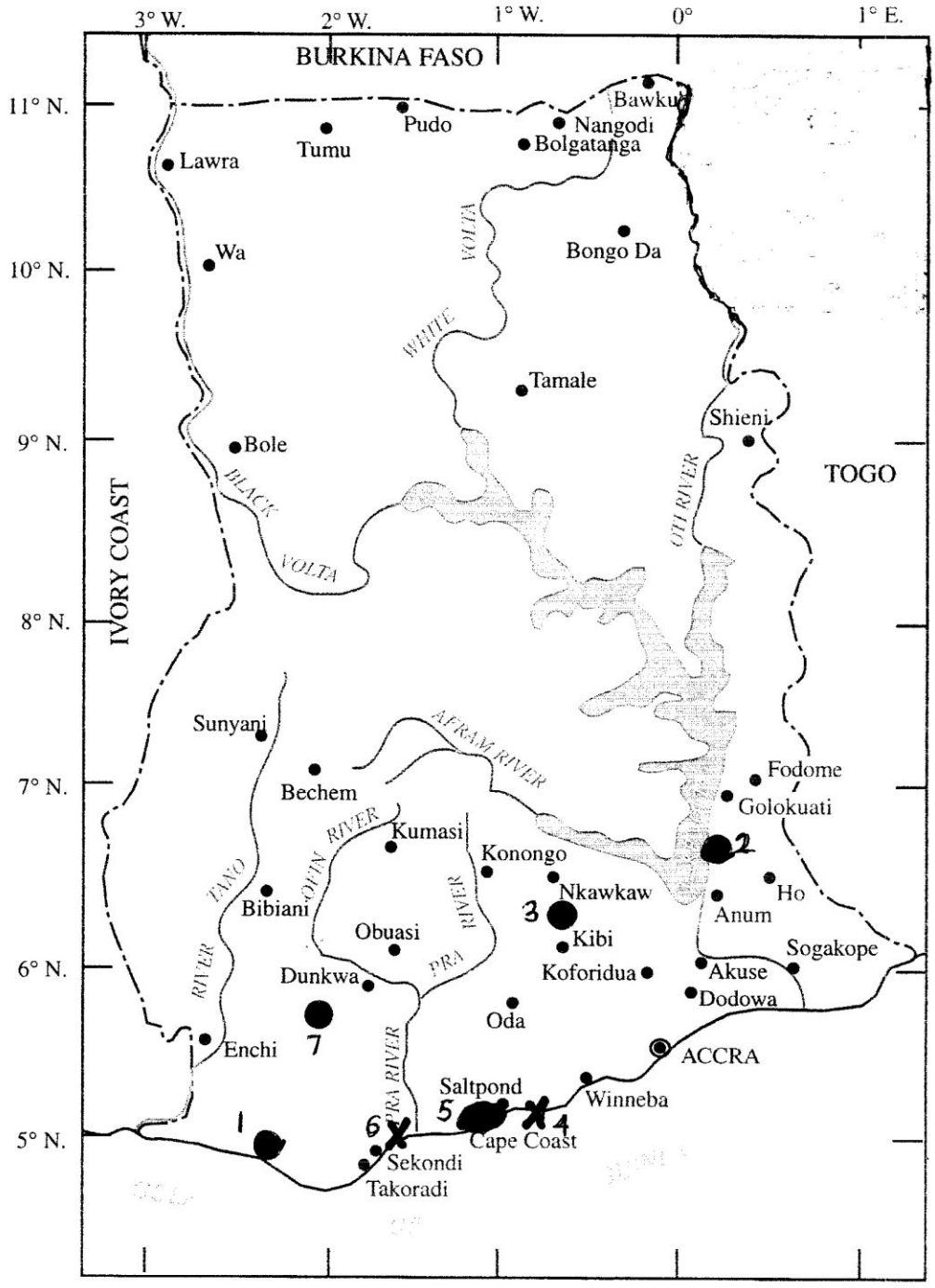


Figure 3: Map showing white clay deposits in Ghana.

Source: Adopted from Minerals commission (1997).

1.6 Problem Definition

For the past twenty seven (27) years, scholars have been researching into the myths, uniqueness, makers and the purpose of the ceramic objects from Yikpabongo in Northern Ghana. These are mostly resources excavated from stone circle mounds. The bone of contention as far as research into the archaeological records is concerned revolved around the function of the stone circle mounds. These have been controversial because Anquandah (1998) described the stone circle mounds as burial mounds while Kankpeyeng & Nkumbaan (2008/9) speculated that they served as shrines. The pivotal question of this research is to identify how ceramic technological and artistic analysis can be used to reconstruct past lifeways of the people of ancient Yikpabongo and to unearth valuable information that can be added to the knowledge building process in Northern Ghana.

For the purpose of this research ceramics comprise pottery vessels and potsherds that were recovered from the Archaeological record at the mound D site. The technological and artistic analysis focused on the vessel form, decorative motifs on the vessels, attachment of handles or appliqué, pedestals and source of clay raw material. The ceramic technology of Ghana in general and Yikpabongo in particular is dominated by the human factor that is vessels are hand-built and are based on levels of skills, indigenous technology, experiences of the potter and intended use of the vessels. Ceramic studies are very vital when studying pre-historic societies as discussed earlier. The focal point for this research was to ascertain the ceramic technology and artistic attributes of the excavated data. Ceramic artifacts from the mound D excavation formed the bulk of the archaeological data recovered.

Most of the researches on ceramics in Northern Ghana dwelt on the traditional approach. By this method the analysis of the ceramics was solely based on physical examination of the ceramic objects retrieved. In other words, the morphological and stylistic features of objects were the primary consideration for analysis. The only exception to the above related to Tong Hills and Banda where

there was a combination of both the traditional and technical (scientific) approach in analyzing the archaeological finds. The technical (scientific) methods employed by the researchers were the petrographic and neutron activation analysis respectively. In the case of Yikpabongo as an archaeological area, there has not been any in-depth analysis of the excavated ceramics and no particular attention has been devoted to the study of ceramic technology and artistic decorations. There is the need to bridge these research gaps in the areas indicated in the summary in chapter two to resolve the inconclusiveness in data assessment and controversies produced by these works.

It is against this background that this study seeks to provide in-depth scientific analysis of the ancient ceramics at Yikpabongo in an attempt to bridge some of the gaps identified. It is also hoped that the technical /scientific approach could provide further and better information of the past society. This does not imply that information provided by previous researches were not credible but rather an attempt is being made to simply build on the past studies from a technological perspective to enhance understanding of the ceramic past of Yikpabongo.

Technology is one of the three basic components of culture. It is the means used by human societies to interact directly with and adapt to the environment (Sharer & Ashmore 1992: 506). Technology, economy, organization and ideology as it is now were closely interrelated in the pre-historic era and this formed the major components of human society. Artistic depictions on ceramic vessels are seen in the form, surface treatment and decoration of ceramic objects. Decorations often appear to have been individualistic markings of ownership or identity. Distinctive distribution of style can be observed and this could mark the range of particular groups and their ideology.

It is in this context that this research is being carried out because technological and artistic studies can provide useful information about the economy, social organization and ideology. Technology and

artistic studies in this context comprises the examination of shapes of vessels, forms of decorations and sources of clay. For the purpose of this research, emphasis will be laid on pottery from Yikpabongo. This research seeks among others, to ascertain the ceramic tradition of Northern Ghana in general and Yikpabongo in particular. It also seeks to document the technological and artistic aspects of ceramic production in the Northern part of Ghana and to establish the relationship between the local culture and the artifacts that are produced.

Furthermore, the analytical study of ceramic technology in the archaeological records of Yikpabongo is to provide comprehensive and relevant data for the documentation of research in the area and to establish ancient socio-economic links. This study seeks to serve as a baseline for understanding the complexity of the ancient societies of Yikpabongo and the people of Northern Ghana as a whole. There is the need to assess the technological and artistic perspective of the ceramic culture of the people of Yikpabongo since this has the potential to unearth vital and useful information about the culture of the people in the area. One very short fall in previous research done in the Yikpabongo area is the lack of information on the geochemical attributes of the ceramics or clay sources. In view of this, my research uses geochemical analysis to identify the sources of the clay used in manufacturing the Yikpabongo pottery. Lastly, the study provides technological and artistic attributes of ceramics from Yikpabongo since this perspective are equally lacking in the previous research from the area.

1.7 Research Questions

In order to achieve the aforementioned objectives, a number of research questions were examined in the course of the research. The questions underlying this research are as follows:

1. What are the attributes of the mound D excavated ceramics from Yikpabongo?
2. What were the source(s) of raw material for constructing the ceramics?
3. Where were the ceramics manufactured?

4. What tempering materials were used?
5. What method was used in constructing the vessels?
6. What mode was employed for baking the vessels?
7. Is there evidence of ceramic production at Yikpabongo or were the ceramic objects used imported from another area?
8. How important were ceramics in the life of the people?
9. What meaning or significance may be attached to the artistic decorations and symbols on ceramic vessels from Yikpabongo?

1.8 Source of Data for the Research and Research Methods

This study depended on both primary and secondary data. The primary data for this work was based on the archaeological and ethnographic survey conducted. The secondary data was obtained or derived from reviewing the various relevant literatures about the subject matter in Northern Ghana and Yikpabongo in particular. This was done in order to summarize what was already known about the site and the topic so as to put the work into the right perspective. Also, relevant literature on ceramics and art were consulted to facilitate explanation and understanding of issues concerning ceramic technology and art.

An archaeological survey was also carried out through the excavation of two trenches at the northern (2m x2m) and the southern (2m x 1m) part of the mound D site in Yikpabongo. Data was collected from each level of the excavated pit. Both field and post field analysis was carried out. In addition, an ethnographic study was carried out at Fumbisi to provide data on ceramic technology and art to help in the interpretation of the archaeological data obtained from the excavation. A chemical analysis of sixteen (16) samples obtained from the excavated pit was carried out at the Geological Survey Department. These samples were made up of five (5) soil samples of the excavated strata, ten (10)

excavated potsherd samples from mound D and a sample of modern clay from Fumbisi. Details of the above analysis can be found at the *appendix I* of this thesis however the interpretation has been discussed under the chapters on data analysis and discussion in chapter four..

1.9 Significance of the Study

'It is our mission to preserve, protect, interpret and salvage the past for the future' M. J. Stottman (2012:1)'.

In reference to the above quote, this study has provided an opportunity to preserve, protect, interpret, explain, and understand the past for the future of the people of Yikpabongo. Ceramic technological and artistic studies can make valuable contributions in this regard. This research is very important in the sense that detailed analysis of the comparative attributes of the excavated ceramics has provided information to refine our current understanding of the archaeology of Yikpabongo. The research offers an opportunity to document, record and analyze the ceramic history of Yikpabongo which is currently shrouded in mystery or obscurity. The information gathered add to the existing data which tend to provide useful clues into the past lifeways of the people. The study also provides important insight on chemical analysis of ceramic technology and decorative art of Yikpabongo pottery in particular.

Furthermore, this research provides a new interpretation of the archaeology of Yikpabongo through careful assessment of the technology and uses of pottery. It also brings to the fore, the symbolic and social context of ceramics as a product of human action and the trading patterns and cultural exchanges between the people through the assessment of the technological, stylistic attributes and the source of the excavated ceramics. Finally, it informs the people of Yikpabongo, researchers and the general public about the past cultural development of Komaland. The study will thus serve as a guide for future comparative studies of ceramic technology at Yikpabongo and Ghana as a whole.

1.10 Organization of Work

This thesis is divided into five chapters.

i. Chapter one establishes the background to the study and explains the problem being investigated, the purpose of work, research questions, significance of the study and the organization of the study.

ii. Chapter two provides a review of the relevant literature on ceramics from Northern Ghana and the conceptual framework for the study.

iii. Chapter three provides overview of the various research methods including the archaeological excavation and chemical analysis carried out for this research.

iv. Chapter four provides data presentation, analysis and discussion of the excavated materials.

v. Chapter five provides conclusion drawn from the findings of the study, recommendations and opportunity for further study.

CHAPTER TWO

LITERATURE REVIEW ON SELECTED CERAMIC TRADITIONS IN GHANA

"A man who reviews the old so as to find out the new is qualified to teach others"-(Conficius as cited in E.Hofstee 2006:91).

Review of previous work to put an ongoing study in the context of others is very crucial to every academic research. For this reason, this chapter provides a critical survey of literature on ceramics technology and art from selected investigated archaeological sites and from a number of ethnographic contexts in Northern Ghana as a way of exemplifying the quote above. Although the various literatures cover a wide variety of contexts, this review will focus on the technological and artistic perspective of ceramic studies. In this review, attention is paid to data from ceramic traditions from Northern half of Ghana. That is Daboya, Komaland, Tonghill, Bandah and others.

2.1 Ceramic Traditions from the Northern Part (half) of Ghana

2.1.1 Daboya Archaeological Research

In 1978 - 83, P. L Shinnie and F.J. Kense (1989) carried out four seasons of detailed archaeological and ethnographic research at Daboya located on the White Volta River, Northern Ghana. A major preoccupation of the researchers was to use pottery data as source material for the reconstruction of ceramic sequence and cultural history of the area and also to determine possible linkages of Daboya's ancient ceramic with other ceramic assemblages in the Northern half of Ghana. The use of pottery to chart the cultural history of the area was facilitated, thanks to some 31 radiocarbon age determinations covering nearly 4000 years of site occupation at the site.

About 330,000 pottery sherds and 58 complete vessels were retrieved from the excavations. This made it possible to carry out ceramic analysis and periodization and to use data on fabric/paste, surface

treatment, rim and vessel shapes and decoration technique, style and patterning to delineate categories such as "tradition" "families" "ware" and "types". The ceramics studied, dating from 2200 B. C. to 1925 A. D., were all hand- made using local raw materials, tools, skills and techniques handed down from generation to generation. A summary of the features and developments of the major ceramic traditions/ families as set out by Shinnie and Kense is provided below:

"Kintampo tradition" (Circa 2200BC – 1200BC): The Pioneers of potting during this period produced ceramics with principal decorative styles of comb stamp, rocker impression and incipient red slipping (see fig 4 for details).

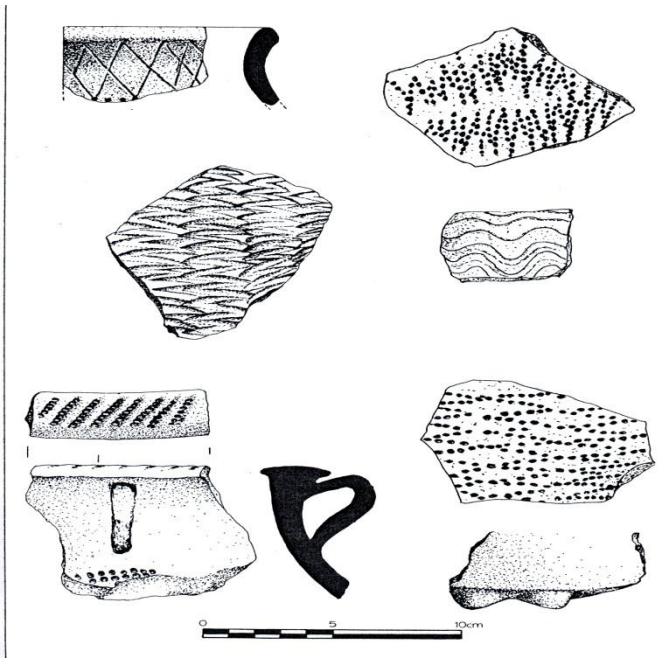


Figure 4: Kintampo tradition pottery from Daboya (Source: Kense & Shinnie1989:78).

Daboya tradition (Circa 800BC.–1200BC): The settlers of this period initiated iron technology and produced ceramics characterized by partial application of red slip on the body of vessel and introduction of decoration by string roulette technique (see fig 5 for details).

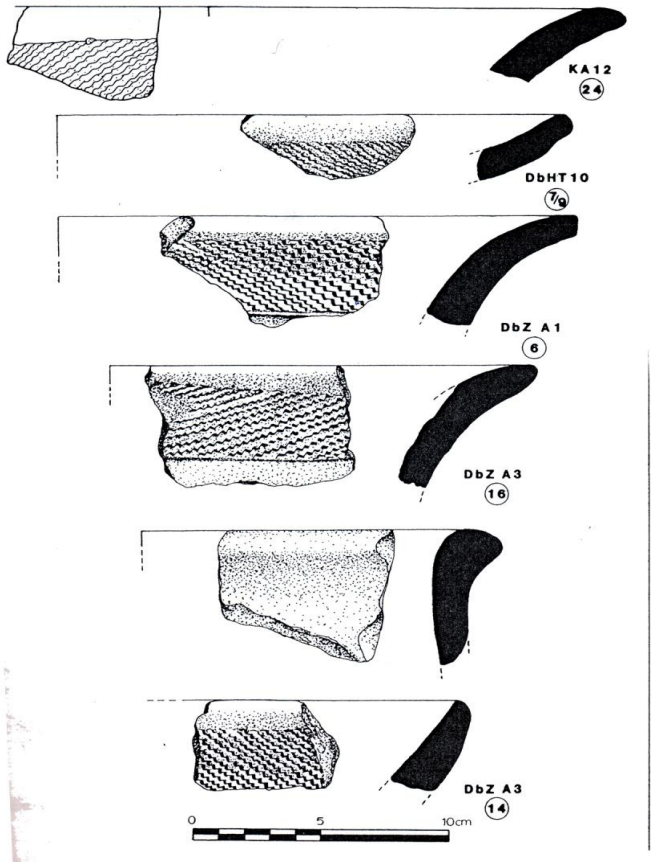


Figure 5: Pottery from the Daboya tradition**.**

Source: (Kense & Shinnie1989:86)

Applique roulette tradition (circa 200BC- 200 AD): The potters of this period made distinctive wares having thick mica and chalky fabric/paste and unique application of the carved wooden roulette to create elaborate appliqué patterns of ridges, chevrons, and embossments. But red slipping was totally absent (see fig 6 for details).

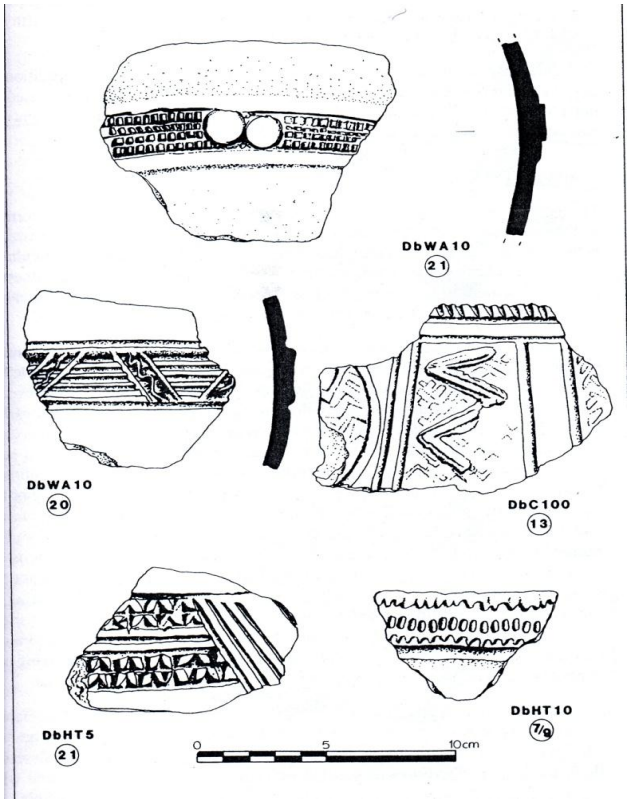


Figure 6: Pottery of the appliqué roulette tradition from Daboya.

Source: (Shinnie & Kense 1989:90)

Middle Niger – type tradition (circa AD700 – 1800): The ceramics of this period show indications of local potters operating in a vibrant environment of long distance trade and cultural contacts with the Middle Niger Region. Daboya's most diverse ceramic form and ornate ware belong to this era. Vessels were prepared with mica and grog inclusions. Red slip was applied to the entire body and decoration of the vessels took the form of combination of red painted lines, grooving, incision, channeling and string roulette impression (see fig 7 for details). The angular polymorphic forms of carafe, caliciform jars, trunco-conical jars, footed cups and carinated bowls also occur in ceramics of Gao, Timbuktu, Jenne, Kumbi Saleh, Tegdaoust, Killi and Oualedji and are clear pointers to either cultural influences or migration originating from the Middle Niger area.

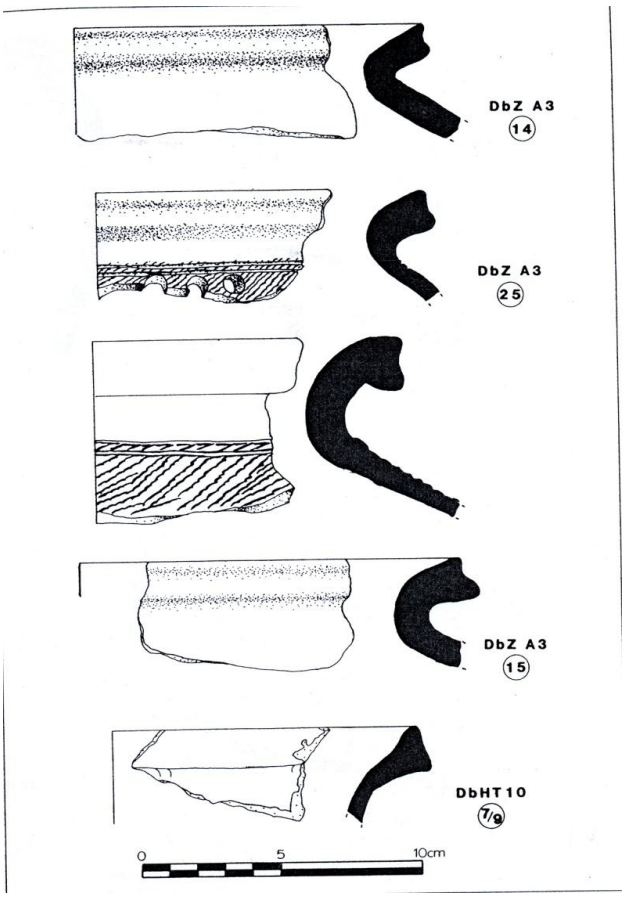


Figure 7: Pottery from the middle Niger type tradition from Daboya**.**

Source: (Shinnie & Kense 1989)

Silima ware tradition (circa AD. 1300-1850): This tradition is believed to have originated from New Buipe area in Ghana and its products were widely marketed northwards to Daboya and southwards to the confluence of the White and Black Volta Rivers and to the Begho-Hani area. Its intricate geometrical designs produced with red, purple, brown and yellow paints are characteristic of Gonja and Begho ceramics of the period (AD1100-1700) (see fig 8 for details).

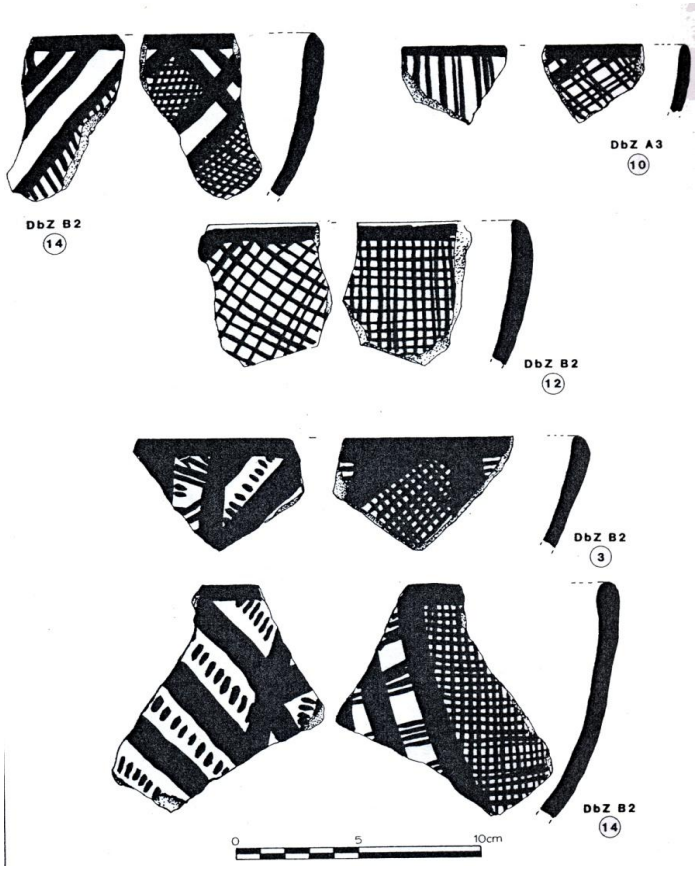


Figure 8: Pottery from the silima ware tradition from Daboya**.**

Source: (Shinnie & Kense1989:134).

Yaghaba tradition ***(circa ad 1600-1925):*** This tradition features ceramics with lugs and handles imported to Northern Ghana

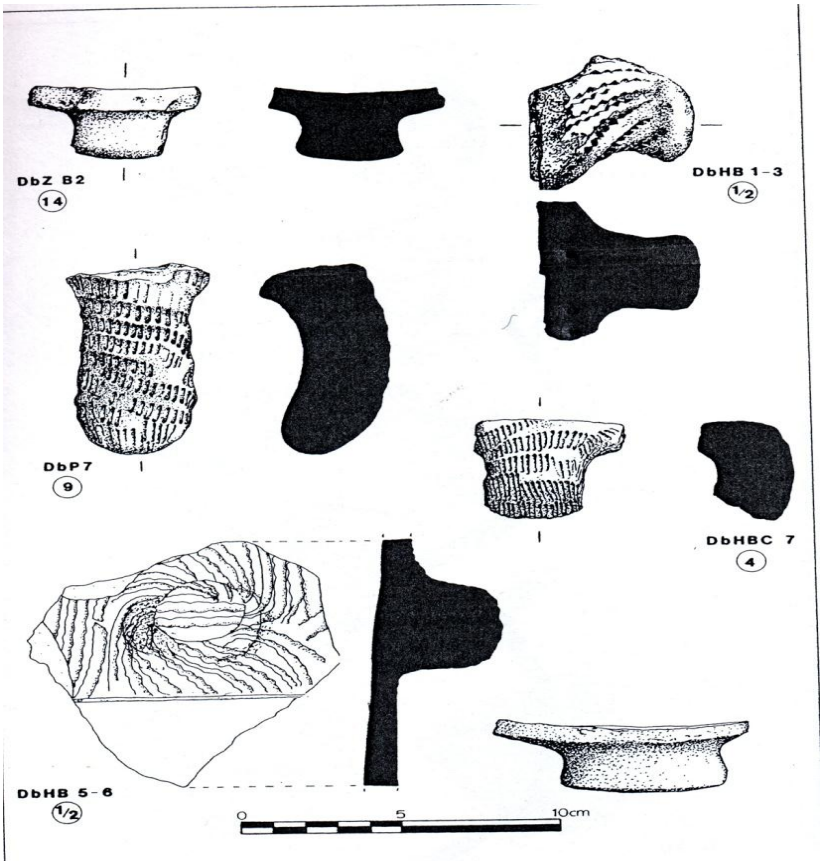


Figure 9: Pottery from the Yaghaba tradition from Daboya

Source: (Shinnie & Kense1989:134).

Red slipped *pito* ceramics made at Yagaba by Mamprusi potters were exported southwards to Daboya. An interesting outcome of the survey of the Daboya ceramics is the realization that while pottery practices of the Northern Volta Basin were entirely by indigenes and for indigenes, apparently they continually derived influences from the Middle Niger Region and that the broad Savanna environment was not a cul-de-sec but received influences from the Sahel/Sahara through trade and cultural contact and transmitted same to the ecological zone and forest lands further south. The archaeological ceramic data from Daboya provide an interesting insight into the varied technologically produced shapes and forms of pottery but have been classified into traditions. The assessment of the artistic decorations also facilitated the classification rubrics used in the analysis.

2.1.2 Komaland Archaeological Research

Anquandah James in 1985 carried out research in the Yikpabongo area based on an eclectic approach. It also included archaeological excavations to provide dates for the site and to assess the status and significance of the art works from an art historic perspective (Anquandah1998: 66-67). The study applied archaeological methods such as survey and excavation to study the history of the people of Yikpabongo. Also oral traditions were documented out to complement the archaeological survey "as archaeology without ethnography is like being blind in one eye and short sighted in the other eye" (Anquandah 1967). The archaeological excavations on the stone circle mounds at Yikpabongo provided the following findings: milling equipment, metal ornament and equipment, important trade goods like cowries, bones of domestic and wild animals and diverse terracotta sculptures and metal figures.

Anquandah (1998) carried out classification of the pottery and observed that potting was hand built by pressing and moulding of the base and the body using the coiling method. However no gender identity was unearthed. Five different major vessel forms were identified, namely: cup like vessels, medium burnished and red slipped surface bowls/dishes coarse large pot/medium size pots, medium jars/with handles, large heavy and thick walled storage vessels. Surface treatments such as burnishing, plain/undecorated and slipped examples were identified on both the interior and exterior surfaces of the vessels. Five decorative techniques were identified on the vessels assemblage: string/plaited grass or carved roulette vessels, painting and roulette impressed vessels, incised/channeling vessels, comb stamp decorated vessels and carved stamp decorated vessels. There was evidence of a pottery disc form with an uncertain function.

Anquandah concluded that, around AD 1300 – 1800, the Sisili Kulpawn basin (specifically the geographical area bounded by Sandema, Yagaba, Yala and Funsi) was occupied by an ethnic complex hose cultural traits were directly ancestral to those of the present day people, severally dubbed the Koma Bulsa. According to him, the human population and material culture buried in the stone circle mounds of Koma-Bulsa land most probably represent the Iron Age Bulsa type people and related groups and their lifestyle of the period spanning the period AD 1300 - 1800. In addition to the above, the ethnographic data provided insight into the various rituals associated with burial practices and the status of the dead. This work provided early evidence of the technology of ceramic production and artistic and decorative art on pottery among the Yikpabongo people. .

Kankpeyeng & Nkumbaan (2008a) also undertook archaeological investigation at Yikpabongo in Northern Ghana, with the aim of providing insight into the distribution of the material culture within the stone circle mounds and to facilitate the establishment of a chronology for the site at Yikpabongo. The research conducted used very good field methods such as survey, excavations and photography. The preliminary report revealed various artifact and ecofacts. They included glass fragment, local ceramic sherds, terracotta figurines of diverse shapes and sizes, ceramic bowls, fired clay ritual objects related to ancestral veneration, metals (Iron objects), human bone (skull), quarts, querns, and muscovite - biotite schist grinders (Kankpeyeng et.al 2008b:196-197).

From the distribution of material culture (figurines, ritual object and ceramic bowls) and the orientation of the skull in situ with its ceramic disc, it was concluded that the mounds functioned as shrines in the past. That proximity of the mounds to the houses also suggested the shrines were associated with ancestral worship and beliefs probably at family levels. Similarly, Kankpeyeng & Nkumbaan (2008b) set out to assess and record the condition of the mounds. Since 2008 Kankpeyeng and his colleagues have located and mapped a number of sites of archaeological interest to upgrade the delineation of the

Komaland archaeological region containing stone circle mounds and to understand the distribution of material culture within the mounds.

They also collected organic and ceramic samples to establish the chronology of two of the sites - Yikpabongo and Tando. Oral accounts from ethno-linguistic groups in northern Ghana were collected to facilitate the interpretation of the archaeological data and to establish a ceramic chronology that can be compared with those recovered from excavations at other sites in Northern Ghana. The thermoluminescence and radio carbon dating methods were used to date the relics to 6th - 10th Century AD. From the above data it has been concluded that dates, as well as, some types of objects and their arrangements portray an indigenous world view related to development and societies predating complexity in Northern Ghana (Kankpeyeng et.al 2008b:201).

The above discoveries reflect generic forms and cosmological subject matter. It also, provided clues to the role that the builders of these mounds played in Northern Ghana (Kankpeyeng et.al 2008b:201). The nature and arrangement of the material cultural assemblage from the site suggest the use of the stone circle mounds for various forms of rituals related to ancestral veneration and various forms of healing practices. The assemblage recovered contained elements reflecting religious and medical practices in which shrines would have played a crucial role in the past which have the potential for understanding ancient social and cultural practices. The question then is, are the above evidences enough in keeping within the suggested conclusions? What are the attributes of the excavated ceramics? How similar or different are they from the ceramic obtained from previous work? How will that data improve the understanding of ceramics in Yikpabongo and Northern Ghana as a whole?

In addition, Jobila Zakari Mohammed (2010) carried out archaeological research in 2009 at Tando-Yikora in the Mamprusi-Moagduri District in the Northern Region of Ghana. The people of Tando

form part of the Koma-Bulsa ethnic group. This was accompanied by ethnographic research to elicit analogical data for interpreting the archaeological records and to document oral information. Pottery featured prominently in both the archaeological and the ethnographic field investigation. The excavation unearthed evidences of pot fragments, terracotta figurines, smoking pipes, stone implements and a feature reminiscence of a shrine attached to a wall of a building.

The analysis of both the excavated and the ethnographic pottery revealed the following trends from the Koma-Bulsa tradition: Base types: Four different types of base were identified: these were flat, concave/round, ring and footed base vessels. Also rim forms were everted and inverted for both bowls and jars with heights ranging from 10cm - 90cm depending on the size of the vessels. In terms of decorative styles, the Koma-Bulsa tradition featured seven (7) main decorative techniques. These are roulette, wavy impression, incision, perforation, punctation, multiple motifs of punctation with wavy impressions and incision with cord roulette.

From the assessment of a variety of vessel forms, the author concluded that the vessels were used for: transporting liquids, serving foods, storing foods and water, cooking, sieving and smoking, brewing and for religious practices. The mound was relatively dated between 18th and 19th centuries. The evidence of the excavated pottery from Tando - Yikora was characteristically similar to that of Yikpabongo and other sites in Northern Ghana. My research provides a different insight as a new knowledge from the chemical analysis of the pottery and clay as well as from the assessment of Yikpabongo ceramic as a product of technology and art.

2.1.3 Tong Hill Archaeological Research

In another development, an archaeological research was conducted by Insoll el.al (2011) for the purpose of tracing trends in the development of ceramics in Northern Ghana. This project was carried

out at the Tong Hill in the Upper East Region which is inhabited by the Talensi ethno-liguistic group. The site excavated included abandoned compounds and settlement areas, shrines, rock shelters and rock features and iron working areas where 20 units were opened. The team noted that there were two occupation periods dated by nine (9) OSL dates ranging from ca AD 1300- 1500. A quantitative pottery analysis was carried out based on the traditional and technical approach to ceramic studies. The ceramic attributes of rim type, body thickness, vessel form, surface finish and preparation, decoration, clay type and pastes were identified.

From this study the team identified eight (8) distinctive vessel forms, as seen in fig.12 below. It was indicated that the coiling method was employed in the construction of the various vessels. The potsherds exhibited red slipped and burnished treatments on both rims and the body with rim diameters ranging from 3cm to 56cm. Three categories of rim types were represented at the sites, these are rounded, over-hanging and square rims. The Tong Hill tradition featured six (6) main decorative techniques, these are twisted string roulette, knotted strip roulette, cord wrapped stick, incised, cord impressed and embossed (fig 13). It is clear that the Tong Hill ceramic studies in collaboration with current work at Yikpabongo will add to the archaeological knowledge building process in the Northern part of the country. A B

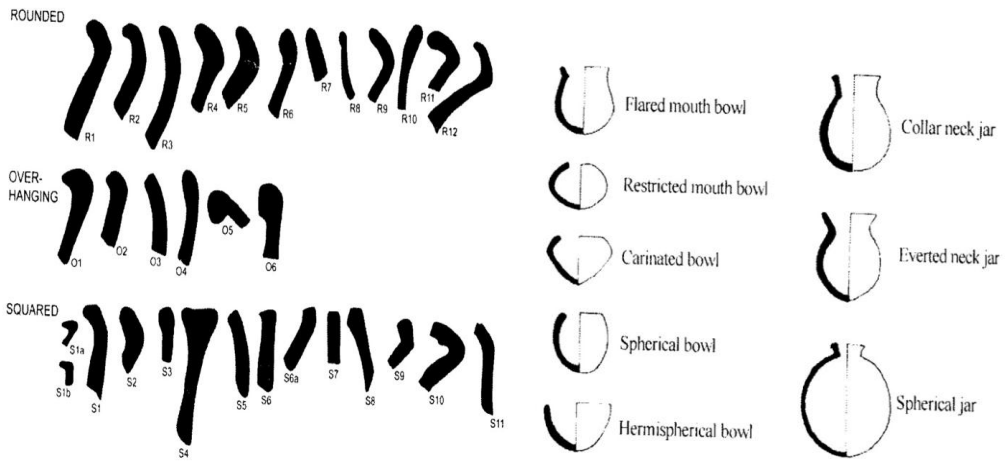


Figure10: A and B rim and vessel forms from Tong Hills. (Source: Insoll et. al (2011)).

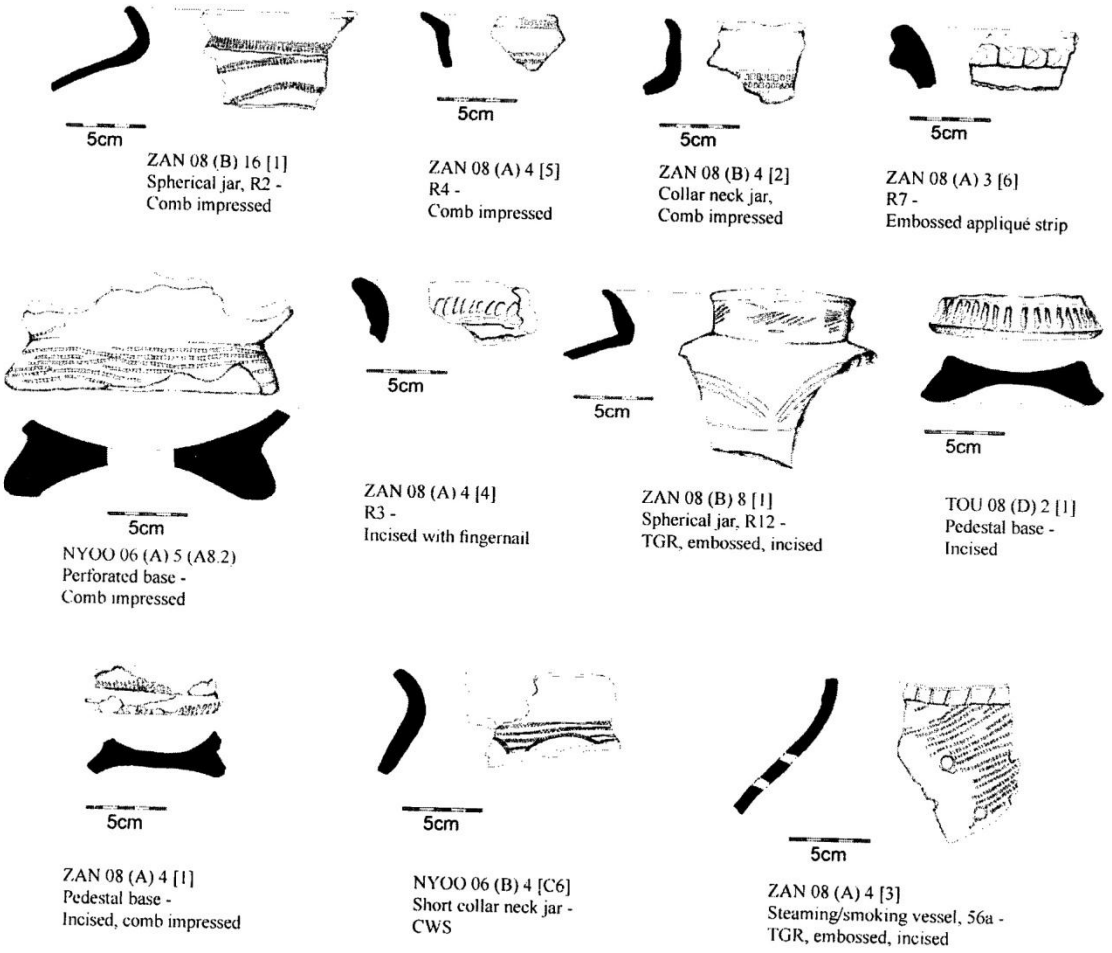


Figure11: Vessel form and decorative techniques from Tong Hills

Source: Insoll et .al (2011).

2.1.4 Banda Archaeological Research

In 1985 - 1995, A. B. Stahl carried out archaeological, historical and ethno-archaeological researches in the Banda area of the Brong Ahafo Region of Ghana. The investigations threw light on trends in ceramic developments in Banda covering the period circa A.D. 1300-1920s. Excavations were conducted on house mounds and middens at Kuulo Kataa (Dumpo site) dated by radiocarbon and thermoluminescence dating to circa A.D. 1285-1675, The Makala Kataa (Nafana site) phase I site was also dated by radiocarbon and thermoluminescence dating to circa A.D.1710-1835. The Makala Kataa

(phase II) site was dated by oral and written sources to circa A.D. 1896-1920 (Stahl 2001). However all these sites produced a lot of ceramics whose classification and analysis were aided by the varied shape, forms and decorative artistic surface treatment of the finds.

Kuulo Kataa site: Excavations at the Dumpo site unearthed evidence of coursed earth tauf building remains of iron smelting furnace, slag and iron artifacts, 16,232 pieces of mammal fauna remains as well as phytoliths of maize in levels dated to circa AD 1550 – 1650. The pottery from Kuulo Kataa is described as "stylistically similar to Begho ware". The vessel forms consist mainly of bowls, small and globular jars which were mostly carinated. Vessels were tempered with crushed laterite or crushed slag. Decoration was mainly by cord-wrapped roulette, mat impression, grooving, stamping by comb and wavy line motif (Stahl 2001see fig 10 for details).

According to Stahl (2001), a portion of potsherds numbering 44,415 were decorated with carved wooden roulette. Some sherds showed evidence of red slipped or red painted decoration (but not designed painting). Others were decorated by mica slip in bands. Seventy-six (76) potsherds from Kuulo Kataa were analyzed by neutron activation. The analysis showed that majority of the Kuulo Kataa ceramics were made from clays dug from a single source in the area east of the Banda hills where potting has not been practiced in recent times (Stahl 2001).

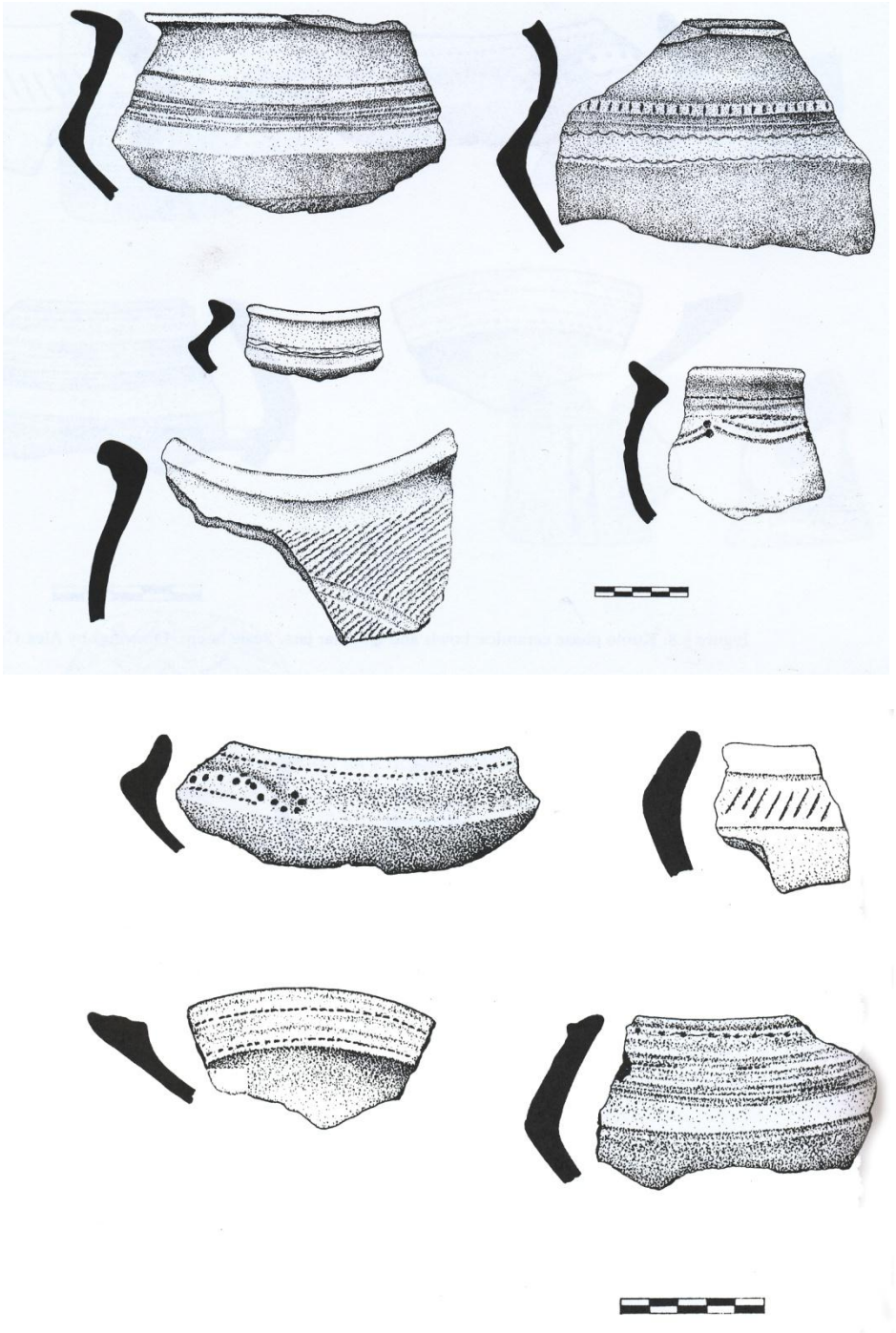


Figure 12: Vessels from Kuulo Kataa- Banda

Source: (Stahl 2010)

Makala Kataa site: Excavation of mounds belonging to phase I at Makala Kataa revealed evidences of buildings of tauf, numerous pieces of artifacts and faunal remains similar to that from Kuulo Kataa. Pottery forms comprise bowls, jars and globular vessels and decorative styles include cord and maize

rouletting, grooving and punctuates but no evidence of mat impression, stamped wavy lines or dentate motifs (see fig 11 for details). Neutron activation analysis conducted on 54 samples showed that the clays used for Makala Kataa phase I wares were taken from diverse sources. Clays for jars originated from Darbour and Adadiem in west of Banda hills and clays for bowls originated from east of Banda hills Stahl (2001).

Research on mounds and middens belonging to phase II of Makala Kataa showed evidence of houses built of pole and daga and some evidence of iron smithing but not iron smelting. The local pottery is mainly plain with far less decorations than in Makala Kataa phase I and with greater affinity to present-day ceramics. The neutron activation analysis indicated that clays employed for manufacture of late Makala Kataa ceramics were extracted from abandoned clay pits located near Bui, Bungasi and Sabiye villages, all east of the Banda hills (Cruz 1996). This research combined both the traditional and the technical approach to the documentation of the past culture of the people of the Banda area.

The knowledge gained from assessing the archaeological research from the Banda area has provided insight into how the local potters used various artistic decorative styles or indigenous technology to produced their ceramic ware. In a sense it has provided evidence of the technology of ceramic production and artistic and decorative art on pottery among the Banda people. Also, it has provided insight into the economic reasons behind the technological rendering of the pottery forms as well as the ideological and aesthetic meaning of the artistic decorations on the vessels.

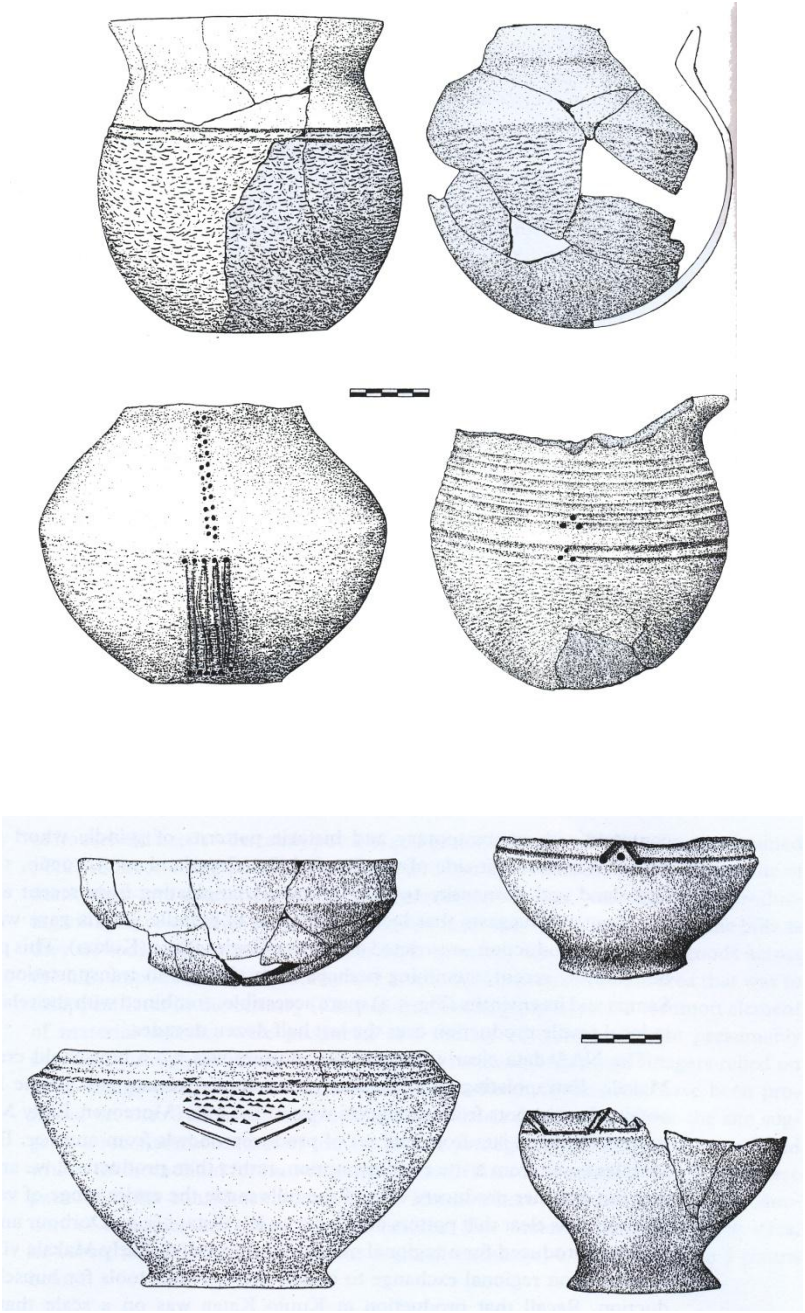


Figure 13: Vessels from Makala Kataa-Banda

Source: (Stahl 2010)

2.1.5 Other Ceramic studies in the Northern Region

In 1964 and 2007 Anna Craven (http:/www.uwic.ac.uk/icrc/issues010/article/03.htm 2011) carried out ethnographic field studies and documented indigenous potting processes among the people of Northern, Upper East and Upper West Regions of Ghana. The major pre-occupation of this independent researcher was to use the pottery data as a source of material to assess whether there has been continuity and change in potting in the Northern half of Ghana. Another objective was to make accessible photographs of potters, pots, techniques and marketing of ceramic. The survey showed that potters in the three regions used local raw materials, indigenous tool-kit and pot-building methods, ornamentation, surface treatment and baking techniques.

Potting traditions are handed down the generations in the area of techniques, shapes, forms and designs. It was observed that the potting tradition as a specialist skill is a preserve of women. However, it is a second profession for men when farming activities cease during the dry seasons among the Yanga, Bulsa, Busanga, and Bimoba ethnic groups. This ethnographic research has unearthed information and thought about ceramic production and decorative/artistic styles in Northern Ghana. It has provided a comprehensive framework for discussing technology transfer in some traditional societies of Northern Ghana. There is the need to have equally comprehensive archaeological excavations for better understanding and to aid the reconstruction of the past culture and history so as to establish links to the present day potting practices of the people in the respective areas in the Region.

Furthermore, in 2008 Mahmoud Malik Saako carried out archaeological and ethnological research in the Birifoh-Sila Yiri in the Lawra District of the Upper –West Region of Ghana. The investigation threw light on the material culture of the people. Excavations were conducted on an old settlement site dated by relative dates to 6^{th} - 11^{th} / 6^{th} - 10^{th} centuries AD. The excavation unearthed evidence of potsherd paved floors, stone foundations, burials covered with potsherds, potsherds, cowry shell, iron

slag, stone artifacts, metal object, and complete small and medium size pots. The vessel forms per this research consisted mainly of small and medium size pots with everted rims. From these vessels, the researcher inferred the following functions: water storing vessels, bowls for serving local beer (pito), cooking vessels and vessels serving religious functions such as pre and post mortuary rites.

Decoration on the pots was mainly by roulette, incision and grooving on the exterior of the vessels made by the people of Babilo. The pottery from this research is described as stylistically similar to that of the 'knotted strip roulette' from the Tong Hill. It also has resemblance with the pottery from Tando and Yikpabongo in terms of decoration, function and form. Due to limited analytical work done there is the need for detailed ceramic analysis of the ceramics to be carried out on the Birifoh-SilaYiri ceramic to help in building a robust ceramic database for the archaeology of Northern Ghana..

From the above analysis, the ceramic data from Northern Ghana can be summarized in the table below:

SUMMARY OF RESEARCH ON CERAMICS IN THE NOTHERN REGION

VARIABLES	ATTRIBUTES	DABOYA	BANDA	TONG HILLS	TANDO-YIKORA	BIRIFOL -SILA	YIKPA-BONGO I	YIKPA-BONGO II
LOCATION		Daboya on the white volta river N-Ghana	Northwest of B-Ahafo south of black volta	Tong Hill UE Region	Mamprugu - Moagduri-N.G	Lawra District-UW Region	Mamprugu - Moagduri-N.G	Mamprugu-Moagduri-N.G
ETHNIC STATUS			5 ethnic group (Nafaan, Kuulo, Ligby, Mo and Ewe)	Talensi Ethno-linguistic group	Koma-Bulsa	Lobi ethnolinguistic group	Koma-Bulsa	Koma-Bulsa
SOURCE OF CLAY		X	Banda Hills		X	Babile	X	X
METHOD OF CONSTRUCTION		Hand-built	Hand-built	Hand-built coiling	X	X	Hand – built: coiling	X
SURFACE TREATMENT	Burnished		√	√	X	X	√	
	Smoothed				X	X		√
	Red-slipped	√		√	X	X	√	
	Mica-slip		√		X	X		
DECORATIVE TECHNIQUES	Roulette	√		√	√		√	√
	Incision	√	√	√	√		√	X
	Groove	√	√				√	X
	Stamp	√	√				√	X
	Punctation		√		√		√	
	Perforation			√	√			
	Channeling	√					√	
	Undecorated	√		√			√	
	Embossed	√		√			√	
	Painted	√	X	X				
	Impression	√	√	√				
VESSEL FORMS	Bowls	√	√	√	√		√	
	Jars	√	√	√	√	X	√	
	Cup	√					√	
RIM FORMS	Everted	√	√	√	√	X		
	Inverted	√	√		√		√	
	Round			√				
	Squared			√				
	Straight	√			√	X		
BASE TYPES	Flat	√	√				√	
	Round	√	√		√	X	√	√
	Ring	√	X		√	X		
	Footed	√	X	√	√	X	√	√

TEMPER/ INCLUSION	Grit			√				
	White quartz			√				
	Slag/literite		√					
RESEARCH METHODS	Arch	√	√	√	√	√	√	√
	Ethno	√	√	X	√	√	√	X
	NAA	X	√	X	X	X	X	X
	XRF	X	X	X	X	X	X	X
	Thin section analysis	X	X	√	X	X	X	X
DATES		2200 B.C. -1925 A.D.	AD 1300 - 1920s	Ca AD 1300-1500	*18th -19th century AD*	*6th-10th century AD*	AD 1300-1800	6th- 10 century AD
REFERENCE		Shinnie & Kense 1989	Stahl 2010	Insoll et.al (2011)	Mohammed (2010)	Saako (2009)	Aquandah 1989	Kenkpeyeng & Nkumbaan (2008)

Table1: Summary of selected ceramic traditions in Northern half of Ghana.

Interpretation of symbols used in the above table:

X - Lack of study, data or there is a gap.

√ - There is information, data (research is available).

Italicized words represent relative dates.

The review of the literature on ceramics has set the tone for the conceptual framework for this study which was discussed in the next section of this chapter.

2.2 Conceptual Framework for Understanding Indigenous Ceramic Technology and Artistic Decoration.

This section sets out the conceptual framework of the thesis. The lens through which the topic is examined is meant to give insight and help address the research questions for this study. Ceramic technology and artistic decorations are the manifestation of the interaction or interrelation between societal goals, ideology and human capabilities on one hand and their environment on the other hand at every given time. Thus the interplay of the society, their ideology, the environment, individual capabilities (techniques, knowledge and skills) and their goals constitute the complete culture of a

group of people including the people of Yikpabongo. Comparatively, an attempt is made to explain how technology, human capacity, social system, ideological reasons and the environment give rise to the production of ceramic vessels and their decorations in order to meet societal goals. Diagrammatically, this can be represented as an organogram in fig 14.

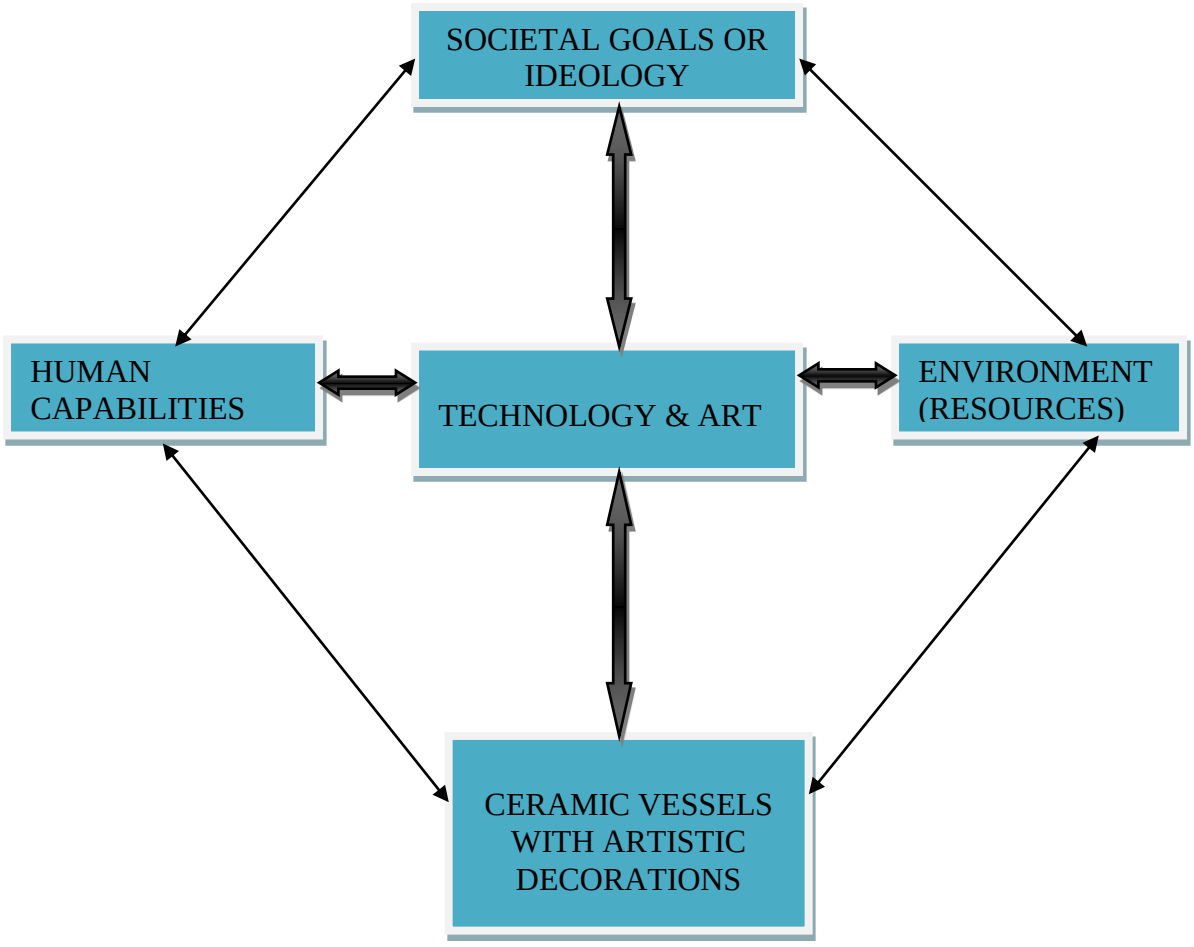


Figure: 14: The diagrammatic representation of the conceptual framework of the study

This adapted model was based on the principles of the grounded theory introduced by Glaser & Straus in 1967 in a publication, *'The Discovery of Grounded Theory'*. Grounded theory simply means inductively developing a concept or model from an empirical data. Thus allowing the data to speak for themselves rather than forcing to explain empirical data with a preconceived model in understanding a

phenomenon. There is the need to understand technology and the ideology behind artistic decorations from the above perspective in order to explain the excavated ceramics from Yikpabongo. However this requires a reasonable explanation of what constitutes the society, the environment, ideology, individual capabilities (skills, knowledge and techniques) and societal goals.

The potting process entails contributions from the above concepts to obtain the finished product. According to this paradigm, the potting tradition includes the environment which is seen as the wheels that carry the available natural resources at human disposal at every given time. This comprises the soil, climate and the vegetation which determine the available natural resources of a given area which facilitate the potting process. The geographical distribution of resources in Ghana from the coastal lowlands through the forest and the savanna belt provides the means by which the people subsist and cater for their basic needs. These resources comprise but are not limited to stones, metal, leather, wood, cotton and clay.

The availability of these resources in a given location or society influences or reflects in their material culture. For instance, the ceramicist or potter uses clay which is available in the environment, plants (firewood and grasses) as fuel for firing the objects and tools and equipment (seeds, calabash and cob) that are acquired locally in the environment (Craven 2010). Another environmental factor that plays a very key role in the pottery manufacturing process is sunlight. That is, before the mined clay is prepared it is left to dry for a certain number of days depending on the quantity (volume) and level of atmospheric heat. Also, constructed vessels are kept to dry in the shade with the aid of atmospheric air as desired by the potter (Kroger 2010 personal discussion). The environment is paramount in potting industry. The potter's raw material, tools, and the energy needed for the production of the vessels are made possible by the resources from the environment.

Technology on the other hand is the making, modification, usage and knowledge of tools, techniques and craft in order to solve a problem, improve preexisting solution to a problem or achieve a goal (www.wikipedia.com 2012). In this perspective, technology can be seen as the means or medium that individuals use or adapt in order to cope with the environmental conditions. These are strategies used in an attempt to control, contain or overcome the prevailing challenges whether political, social, economic or religious (Leslie White as cited by Gosden 1999:160). Potters do these through skillful techniques and application of knowledge and experiences. Such skills in most cases were acquired over the years and each society has different resources that it specializes in exploring for its livelihood. In the case of Yikpabongo, ancient potters specialized in making various vessels using resources (clay, tools and fuel) obtained from their environment or locality. Dewey (1985 as cited in Ellis 2012) argued that technology in general is both human activity and a means to an end. Ceramic technology involves both the human activities that produced the vessels as well as the technological activity involved in the making and use of the vessels.

According to material posted in Wikipedia (January 2012), society is the term used to describe the system in which people live together in a particular location or area with a shared value, customs, traditions, laws and beliefs. For the purpose of this research the society is seen as the vehicle that provides the structures or the force that drive the ideological aspect of culture at a given time. An ancient society like Yikpabongo comprises human agents (individual capabilities) and the environment. These elements combine in an organized manner to achieve societal goals. The mechanism by which such a society attains its goals includes technology. Ceramic technology from Yikpabongo is therefore a production or reproduction of the indigenes emanating from ideology and the interplay of the various social elements identified above. Societal norms and ideology affect individual behavior and in many circumstances influence decision making regarding choices that people make. The morphology of the pottery vessels reflects the cultural affiliations of its makers and to a lesser extent of its users. The

society is also a reflection of the set of ideas and unwritten beliefs and traditions (ideology) that is behind technology. From the above, ceramic technology and the artistic decorations from Yikpabongo to some degree reflect the nature of environmental resources, ideology and the skill of the people.

These concepts are manifested in the unique pottery vessels and other aspects of the culture. The meanings behind the production of these things often vary from place to place. These are based on the ideology and what the goals of the society are or want to achieve for the production of a particular technology. Also, the type of society and the cognitive aspiration of the potter influence the vessel form, type of decoration, construction method as well as the function of vessels they produced. Skimore (2007:1& 2) argued that the artifacts are the fossilized ideas of the culture which produced them and this can provide behavioral pattern of a particular culture. Also each culture possesses mental template or ideas as to the proper form its product should take. Decorative patterns on pottery vessels are also expressions of these mental templates. The ceramic technological processes are surrounded with myths and taboos. These are a predominant feature of the ideology and cognitive practices of most ancient societies and Yikpabongo is not an exception. Therefore the excavated vessels and decorations are not just aesthetic looking containers but a reflection of societal myths, taboos and ideology governing the potting process.

Similarly, the societal goals in this context refers to the needs, desires, targets and objectives that people aspire to achieve or attain in a particular cultural setting. The basic needs of life are food, clothing and shelter. This cannot be achieved without technology, available natural resources and peoples with the requisite techniques and skills in the society to solve these problems. Therefore, the ceramic vessels excavated from Yikpabongo are the various receptacles that ancient society used to provide and cater for their needs; be it social, political, religious or economic. Human quest for survival is so paramount that every society or social system thrives on daily basis to develop a medium

or mechanism by which their wants and needs could be satisfied and ceramic technology is one of the media. The taste and preferences of the society are often curtailed by income levels desire for fashion and change. However, such limitations do not serve so much on how potters shape and decorate their vessels to serve various needs.

Another perspective for studying the excavated pottery of Yikpabongo is to understand agency or human capacity (Dobres & Hoffman 1994). This perspective refers to the ability of the potters to apply available knowledge, skills and techniques acquired through their experiences in the potting process to transform the natural resources in order to change their circumstances, surroundings and the environment at large. Also, the form and size of the vessels and decoration of the ceramic objects are conceived in the mind of the potter which is influenced by the potter's beliefs, customs, identity and the social values and norms which are all indispensable aspects of a society's ideology or cognitive attributes.

In terms of ceramic technology, most ancient societies like Yikpabongo exhibit mastery of work. They tend to have the capacity of selecting and controlling quality clay, choosing and manipulating tools, exhibiting creativity by the construction and decoration of the vessels and firing the vessels to achieve a productive potting process. Yikpabongo ceramics are a key to understanding social relations and frames of mind. This is because ceramics are often produced for family members, friends, and the market. Also family size and socio-religious activities influence the scale of production as small or large family may require different kinds of vessels for different socio-economic and religious activities in the society.

In a patriarchal community like Yikpabongo, this study cannot be conclusive without discussing the role of gender in the ceramic life of the research area. In most societies in Ghana, the potting traditions

are a preserve for women just like in most ancient African societies (Craven 2010, Crossland 1989 David et.al 988:367). It is only in few cases that men and children tend to support or engage in the business of potting. In such cases, men and children tend to provide support in the area of labor at the various stages of the potting process. Most women engage in potting either on part time or full time bases. Men on the other hand, engage in farming activities as a full time occupation. Although women (potters) are not held in high esteem they play very important roles in the society as they produce vessels that are very important in all aspects of life.

2.2.1 Understanding Indigenous Ceramic Art in the context of Ceramic Studies

Art is a complex word in terms of definition. This is because art can be a creation of beautiful or a thought provoking work. This can be achieved through artistic skills and techniques involving the production of visual representations. It is a human endeavour than a natural occurrence. In other words, art is the product of creative human activity in which materials are shaped to convey ideas, emotions or experiences. Indigenous art work depends mostly on the traditions and beliefs of the makers and users within a cultural tradition and the environment (fig 14). The term 'art' and the use of art objects in most African contexts have nuanced meanings. An art work is not just something created to be hanged on an African wall or viewed from a distance but rather it serves a utilitarian (functional) purpose. In effect, it forms an integral part of the daily lives of the user. To this extent, artistic ceramic objects like pottery are of no exception since they are often made for a purpose and meaningfully serve culinary and aesthetic functions in an African kitchen or living space.

African art often reflects cultural and ideological values based on a society's historical background and beliefs. The function and style of different pieces of artwork are usually handed down from generation to generation. For instance, the size and shape of the vessels discussed at the beginning of this chapter are often reproduced by experienced potters based on the predetermined need (e.g., cooking, storage)

that the society has solved. Also, the decorative motifs or styles on the vessels also discussed at the beginning of this chapter represent the culture, belief system, geographical location or the available resources in their environment. In sum, although art differs by societies and regions in terms of forms (design) and materials used, the aesthetic and symbolic elements provide the common ground for understanding the art in an African context. The aforementioned viewpoints suggest that an art, from African perspective, is intended to portray and symbolizes ideas, beliefs, status and workmanship. The aesthetics and functional aspects are intertwined, as such the artistic aspect of African culture or art ought to be analyzed in terms of specific societal contexts where they are used; whether prehistoric or historic (Anquandah *In Prep*).

It is worth noting that art in most indigenous societies, such as Yikpabongo, is the representation of the belief in the supernatural which is an integral part of their traditional set up. Therefore to know and understand the history or the past of the people of Yikpabongo one has to observe the excavated ceramics as they are a vivid description of the past and could provide useful guide as to how the people and their culture had evolved technologically and artistically. In this thesis, attempts have been made to evaluate the relationship and the connectedness of technology, the society, ideology, human capabilities, the societal goals and the environment. Also, this study has attempted to demonstrate how these concepts enable this project to address some of the key gaps within the existing research in the area to date. The focus on human capabilities enables this project to address the crucial role played by the potter in the pottery production process. The focus on the society/ the social system provides insight on the ideology and socio - religious aspect of the ancient cultural lifeways.

The focus on the analysis and description of technological and decorative attributes on the excavated ceramics enables this thesis to address the major roles that technology plays in the life of the people of Yikpabongo in order to provide insight into how the vessels were made, how they were used, where

and when the vessels were made /used, the way in which the use of the vessels influence pottery production and how they were distributed for their economic underpinnings. Lastly, the focus on the concept of environment assists this thesis to address the important role nature plays in the life of humanity. Furthermore, the author attempts to develop an approach that is comprehensive and empirically grounded which will provide a coherent conceptual framework within which to study ceramic technology and decorative art in ceramic studies.

CHAPTER THREE

RESEARCH METHODS FOR THE STUDY

"Case studies can provide rich and significant insight into events and behaviours. It does also provide a humanistic, holistic understanding of complex situations and as such are valuable research tools." (P. A. Brown 2008:10).

According to Creswell (1998:62), case study research holds a long distinguished history across many disciplines therefore this case study has been carried out to throw more light on the complexities of the ceramic technology of ancient Yikpabongo. This chapter discusses the various research methods and techniques that were used in the study of the archaeological remains discovered at Yikpabongo. It will help to explore, unearth and describe what actually happened or prevailed in the past concerning ceramic technology and decorative arts in order to provide insight into the ancient culture of the people of Yikpabongo. The chapter also covers information on how the archaeological data were derived, time dimension for the entire research work, population and sampling techniques, instrumentation and statistical analysis of finds.

Various sets of methods were employed to unearth adequate data for this research. This is because research on ceramic technology of a past society like Yikpabongo cannot be carried out effectively with a single technique. The purpose of the study as revealed earlier on, is to analyze the data on ceramic technology and decorative designs in the archaeological records, in order to establish a ceramic typology based on the evidence of technological and decorative attributes. It is also meant to ascertain the source of clay raw material for the excavated potsherds from the site.

The questions confronting this study which were consequently assessed are as follows: What are the attributes of mound D excavated ceramics from Yikpabongo? What were the source(s) of raw material for constructing the ceramics? Where were the ceramics manufactured? What tempering materials were used? What method was used in constructing the vessels? What mode was employed for baking the vessels? Is there evidence of ceramic production at Yikpabongo or were the used ceramic objects imported from another area? How important were ceramics in the life of the people? What meaning or significance may be attached to the artistic decorations and symbols on ceramic vessels from Yikpabongo? To address the above questions, a multi-source approach was adopted.

3.1 Archaeological investigation at Yikpabongo

Ceramics technological studies based on carefully collected field samples and identification of well defined problems can significantly advance the understanding of human development and ways of life (Matson 1963: 498).

It is against this background that this section is set out to discuss and provide information on the various archaeological methods, techniques and excavation processes undertaken at the site. A pre-excavation survey was carried out at mound D where surface finds were collected. The excavation and analysis of field samples from the selected trenches will help us to understand whether ceramic production at Yikpabongo was a product of technology and art.

3.2 - Procedure and time

This research was carried out in two phases as follows:

- The fieldwork for the first phase started on the 3rd and ended on the 13th of January 2010 at Yikpabongo. During this period a 2m x 3m trench was excavated on a mound marked as D.

The materials or artifacts obtained as finds were transported to the Department of Archaeology for analysis.

- The fieldwork for the second phase of the research was done from 8th – 18th January 2011 at Yikpabongo. Another 2m x 1m trench was excavated during the period. Analysis and interpretation of the datasets were completed after this period.

3.3 Description of the site

Due to the nature of the land (relatively flat) at Yikpabongo it was prudent to excavate a mound rather than a flat place. A mound is a mass of piled earth, a small hill or a heap. Archaeologically it is believed that mounds found on relatively flat lands could be the site for burials, deposits of waste materials in the past or ruins of ancient buildings. It was for this reason that a mound was selected for excavation at Yikpabongo. Refer to the next page for the map on the distribution of mounds at the research site:

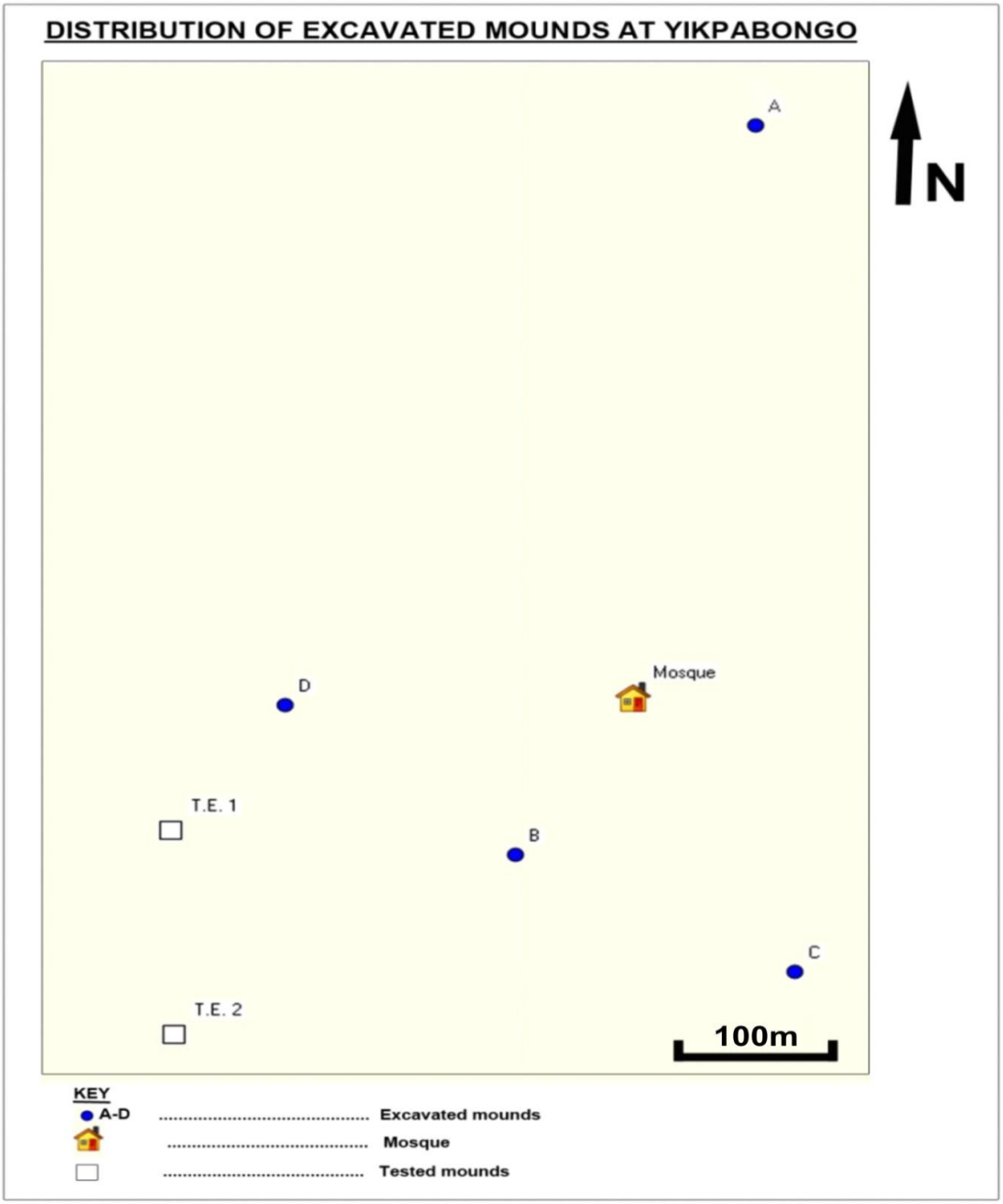


Figure 15: Distribution of excavated mounds.

The above (fig 15) shows a base map of the excavated mound in relation to other excavated areas by previous studies cited in this research. The mounds (B, C, T.E. 1 & T.E. 2) were excavated by Kankpeyeng & Nkumbaan. The mound 'A' is one of the stone circle mounds excavated by Anquandah. The site marked 'D' is the excavated mound under current study.

Sites ‘A’ and ‘B’ are 548 meters and 202 meters respectively from the excavated mound ‘D’ which is currently under study. The area marked ‘C’ is another excavated mound which is 622 meters from mound ‘A’, 235 meters from the Mosque and 459 meters from the mound marked ‘T.E. 2’. Similarly, the mound marked ‘T.E. 1’ is 150 meters from ‘T.E. 2’ and 126 meters from the mound marked ‘D’ which is the area for this study. From the distribution of the mounds in the area, it is clear that probably the mounds represent the use of space or settlement pattern in the past. This is typically seen in settlements of the savanna areas where households are not clustered but are widely set apart as compared to forest and coastal settlements.

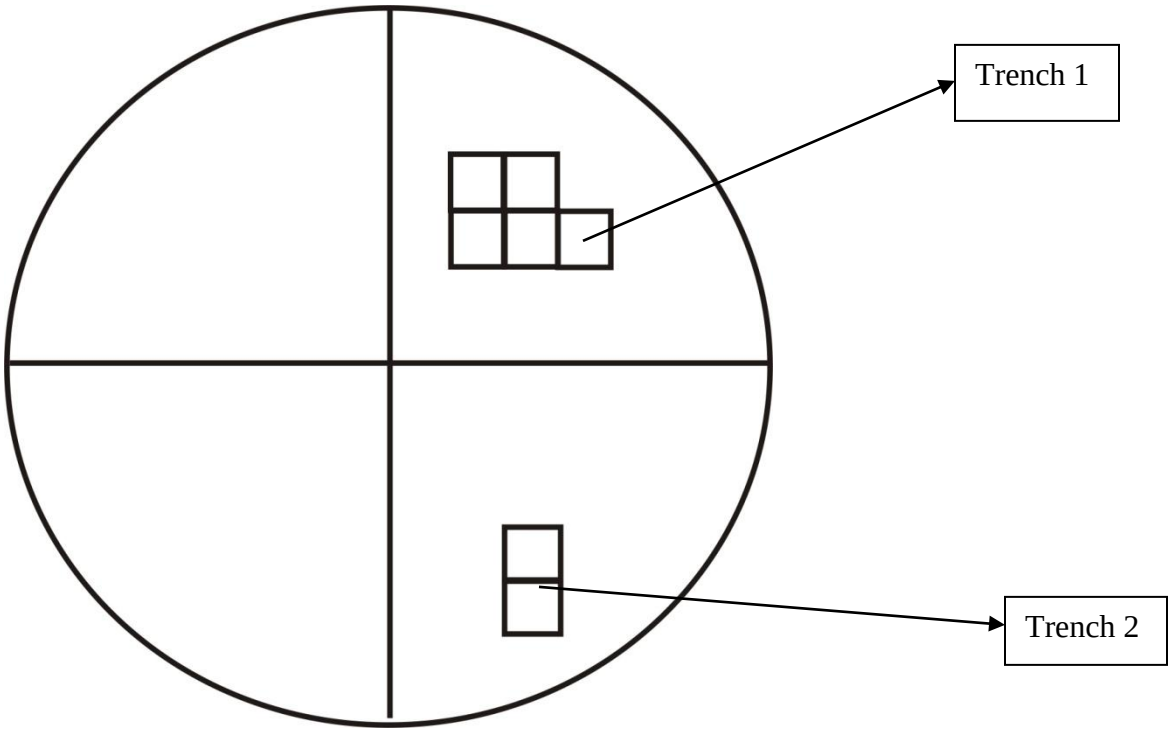


Figure 16: A hypothetical Site plan of the excavated mound D

The selected mound D which was excavated had a kraal on it that houses cattle. The unoccupied area was covered with shrub *(sida acuta*). The circumference of the mound measured 91m with an east-

west diameter of 30m and north-south diameter of 28m. No traces of building were observed on the surface however there was a foot path leading to the Kraal. It is probable that human activities and erosion have erased traces of past human settlement on the mound. The land was cleared and a grid was laid on the site after the datum was established on the northern slope of the mound. The first trench was located on the northern part of the mound which seemed likely to provide artifact (fig 17 & 18).

Figure17: A photograph of the northern side-view of mound D.

Figure 18: A photograph of the west side-view of mound D

Figure19: Photograph of postholes encountered at a depth between 5cm -25cm of trench I mound D

Figure20: Photograph of pot discovered in situ from trench I, mound D

Figure21: Photograph showing a burial covered with potsherds decorated with roulette impression and bracelets at 163cm depth of trench I mound D.

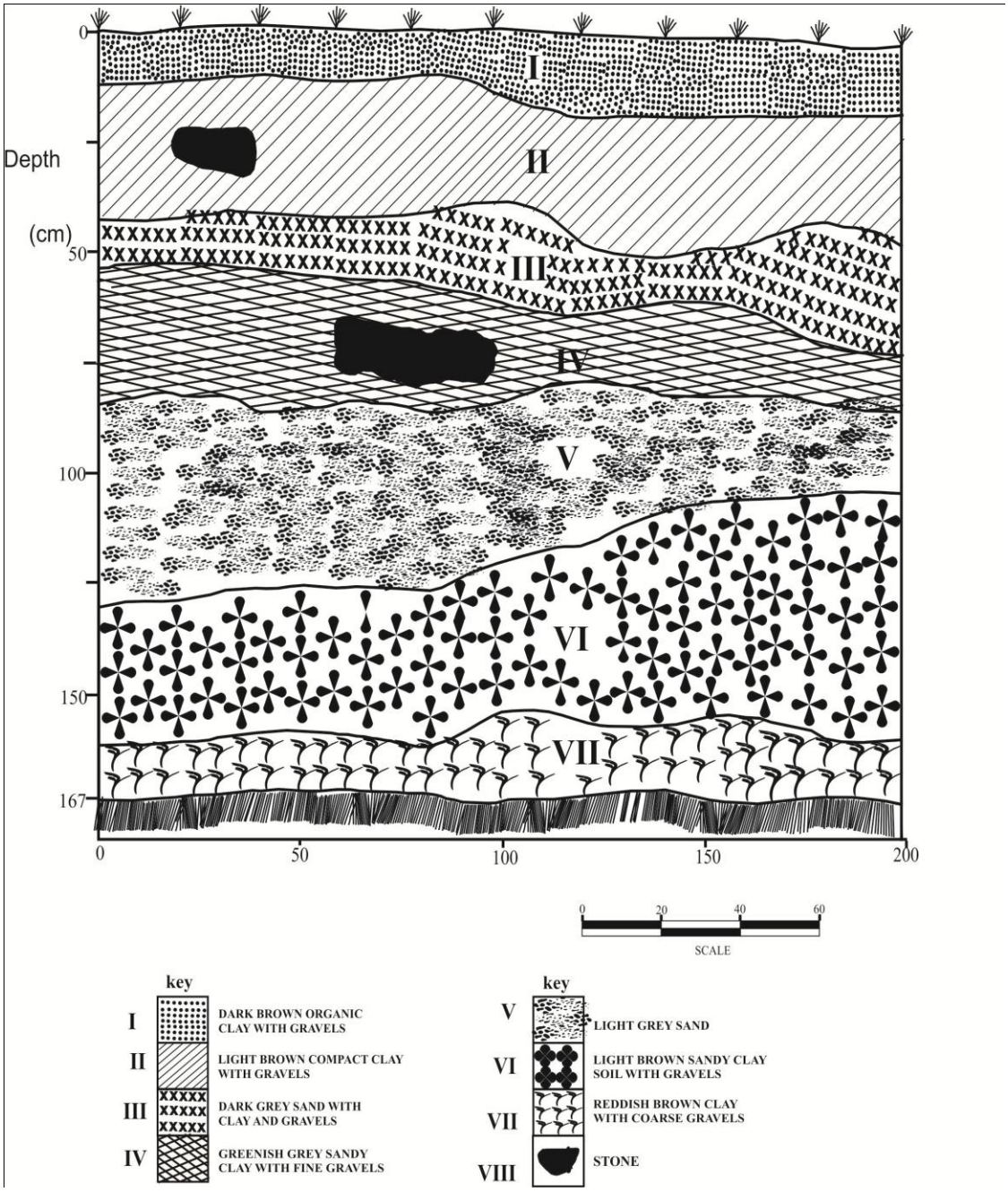


Figure22: The soil profile of the southern wall of trench I on mound D.

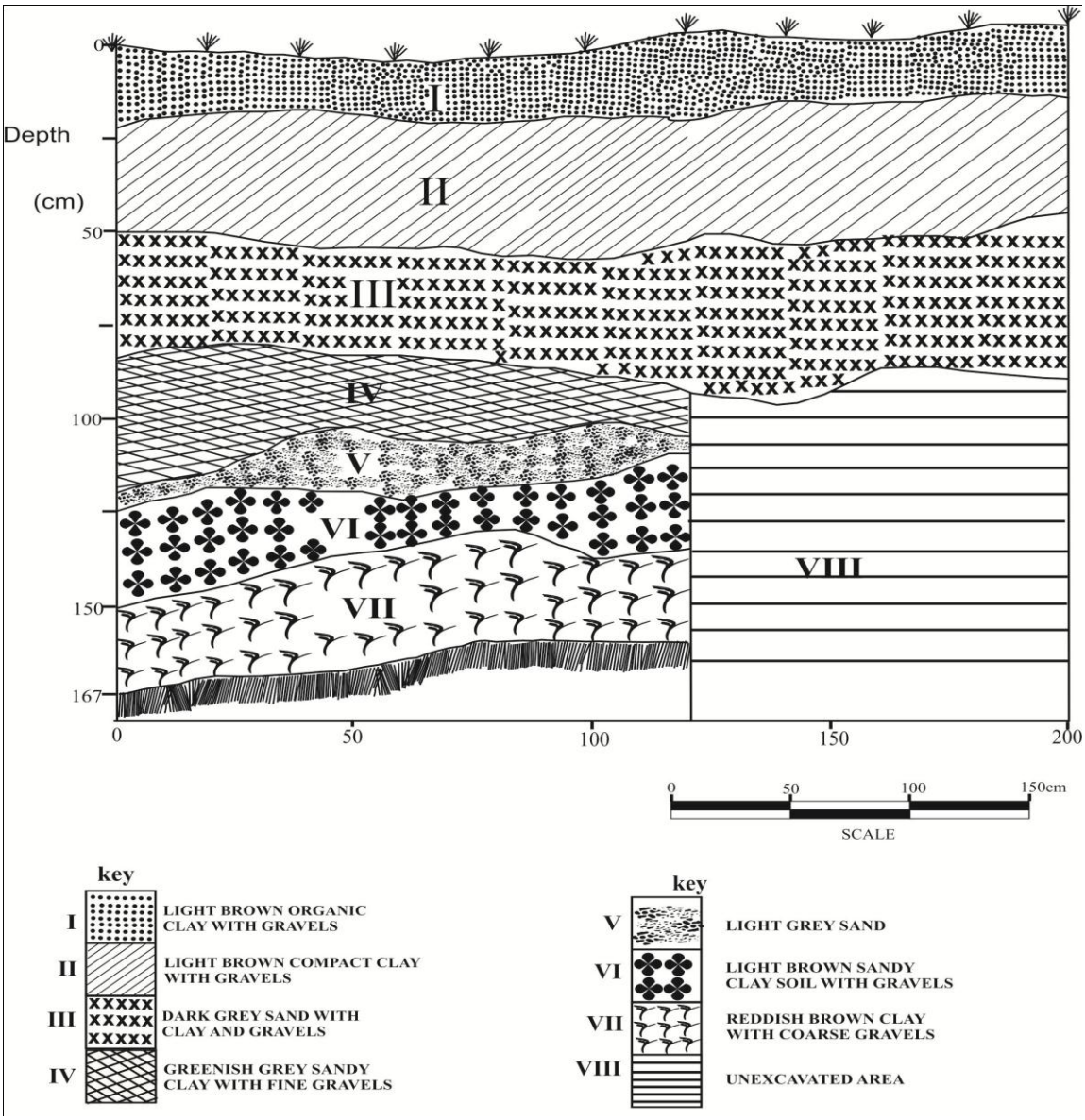


Figure 23: The soil profile of the western wall of trench I on Mound D

The excavation of trench 1on mound D was based on arbitrary levels of 10cm intervals. At the depth of 167cm the trench reached the sterile level. All the excavated soil were collected and sieved to recover small finds which could not be handpicked. The finds were bagged according to the respective level where they were retrieved during the excavation and were labeled with the site provenience information. The profile was drawn to scale and the soil texture and colour were recorded as shown in

figure 22 and 23 and tables 2 & 3. Photographs were taken throughout the excavation process; especially whenever artifacts were located or identified and retrieved.

The artifacts discovered were washed thoroughly before they were bagged and packaged in boxes and transported to the Department for post field analysis. The excavation of trench 1 (2m x 2m) yielded a good profile of seven distinctive levels. The colour and texture of the layers in the trench were homogeneous hence only the south and west walls were drawn (see fig 22 and 23 and table 2 for details). In same vein, the south wall was drawn and it showcased the same profile as described above. However, due to the discovery of a full large pot, the trench was extended on the northern side by one meter and this increased the dimensions of the trench to 3m X 3m. The first three layers were excavated with the expanded dimensions whilst the last four layers were restricted to the normal 2m X 2 m dimension.

Table 2: Summary of the soil profile and findings of trench I mound D

LEVEL / DEPTH	NATURAL STRATIGRAPHY	FINDINGS
Surface	Surface Soil	Potsherds and stones
Level I Opening level 0 Closing level 5 cm	Dark brown loamy soil with plant residues	Pottery, postholes
Level II Opening Level 5cm Closing Level 15cm	Dark brown sandy loam	Stone artifacts pottery, posthole,
Level III Opening Level 15cm Closing Level 25cm	Dark brown sandy loam	Grinding stone, pottery and postholes.
Level IV Opening Level 25 cm Closing Level 30 cm	Dark Brown Sandy loam	Potsherds and stone boulders
Level V Opening Level 30cm Closing Level 40cm	Dark brown sandy loam	Potsherds and grinding stone
Level VI Opening Level 40cm Closing Level 60cm	Sandy loam with traces of charcoal intrusion	Potsherds, burnt daub and stone artifacts. A feature reminiscent of a house floor at a depth of 56cm.
Level VII Opening Level 60cm Closing Level 70cm	Clayey soil with traces of charcoal	Pot, potsherds grinding stones, burnt floor.
Level VIII Opening Level 70cm Closing Level 80cm	Reddish brown compact sandy silt.	Potsherds, stone boulders, bones
Level IX Opening Level 80 cm Closing Level 90 cm	Reddish brown compact sandy silt.	Potsherds and traces of charcoal
Level X Opening Level 90cm Closing Level 100cm	Reddish brown sandy silt	Potsherds, bone, traces of charcoal

Level XI Opening Level 100cm Closing Level 110cm	Reddish brown sandy silt	Potsherds, bones, stones
Level XII Opening Level 110cm Closing Level 130cm	Reddish brown sandy silt	Shaped pieces of stone, extensive layer of ash, potsherds
Level XIII Opening Level 130cm Closing Level 150cm	Reddish brown sandy soil	Potsherds, stones
Level XIV Opening Level 150cm Closing Level 170cm	Dark clay with pebbles	Skeletal remains, metal ankle bracelet, fauna, potsherds

Trench II was a 1m x 2m excavated on the southern part of Mound D. The location seemed likely to be a midden which would provide some reasonable evidence that would help in reconstructing the history of the site. The excavation was based on arbitrary level of 5cm and in some cases or level 10cm intervals. The trench reached the sterile level at the depth of 150cm. All the excavated soils were sieved with 1/4 mesh screen to track all small finds which could not be handpicked. All artifacts were labeled and bagged separately. Photographs were taken throughout the excavation process. The soil profile was also drawn (see fig 26 & 27). The significant finds were analyzed and classified as decorated ceramic pieces, rim fragments and bases. The rest of the potsherds were treated as non diagnostic or undecorated sherds. These were counted, recorded and stored for future studies. However, the decorated pieces and rim types were counted and bagged for laboratory analysis.

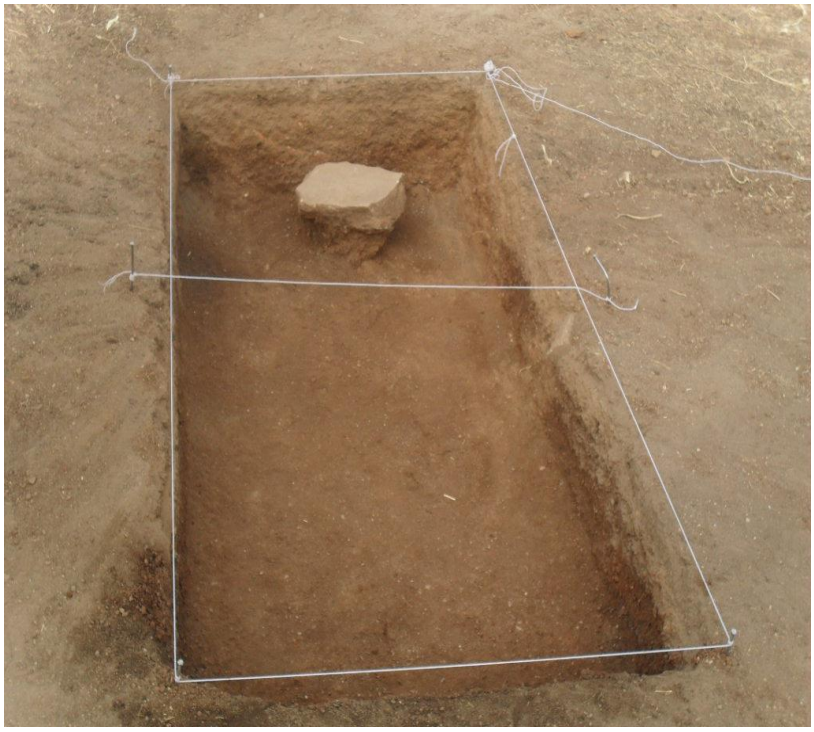


Figure 24: Exposed boulder in trench 2 on mound D

Figure 25: Excavated trench 2 on mound D

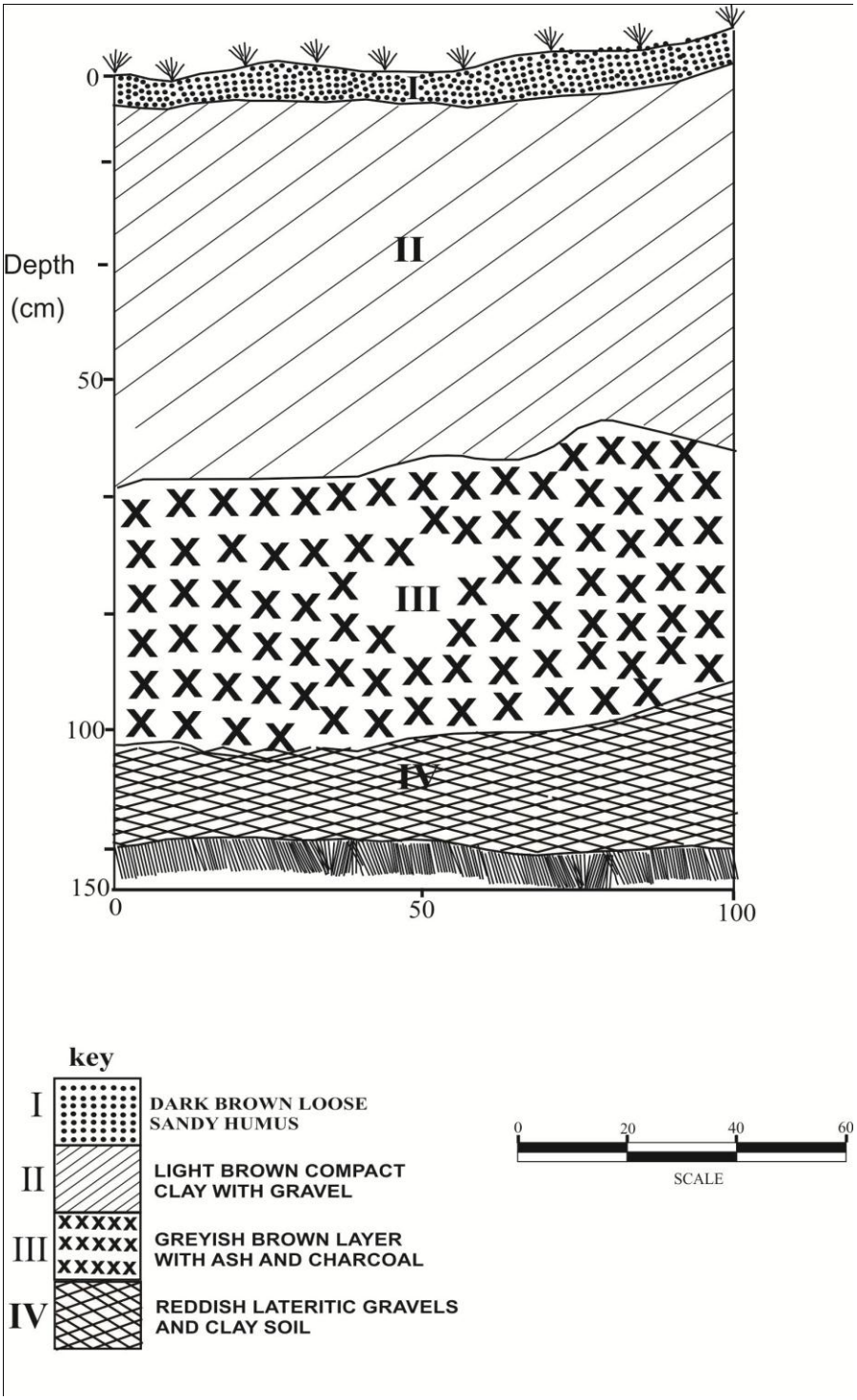


Figure 26: The Soil profile of the western wall of trench II on mound D.

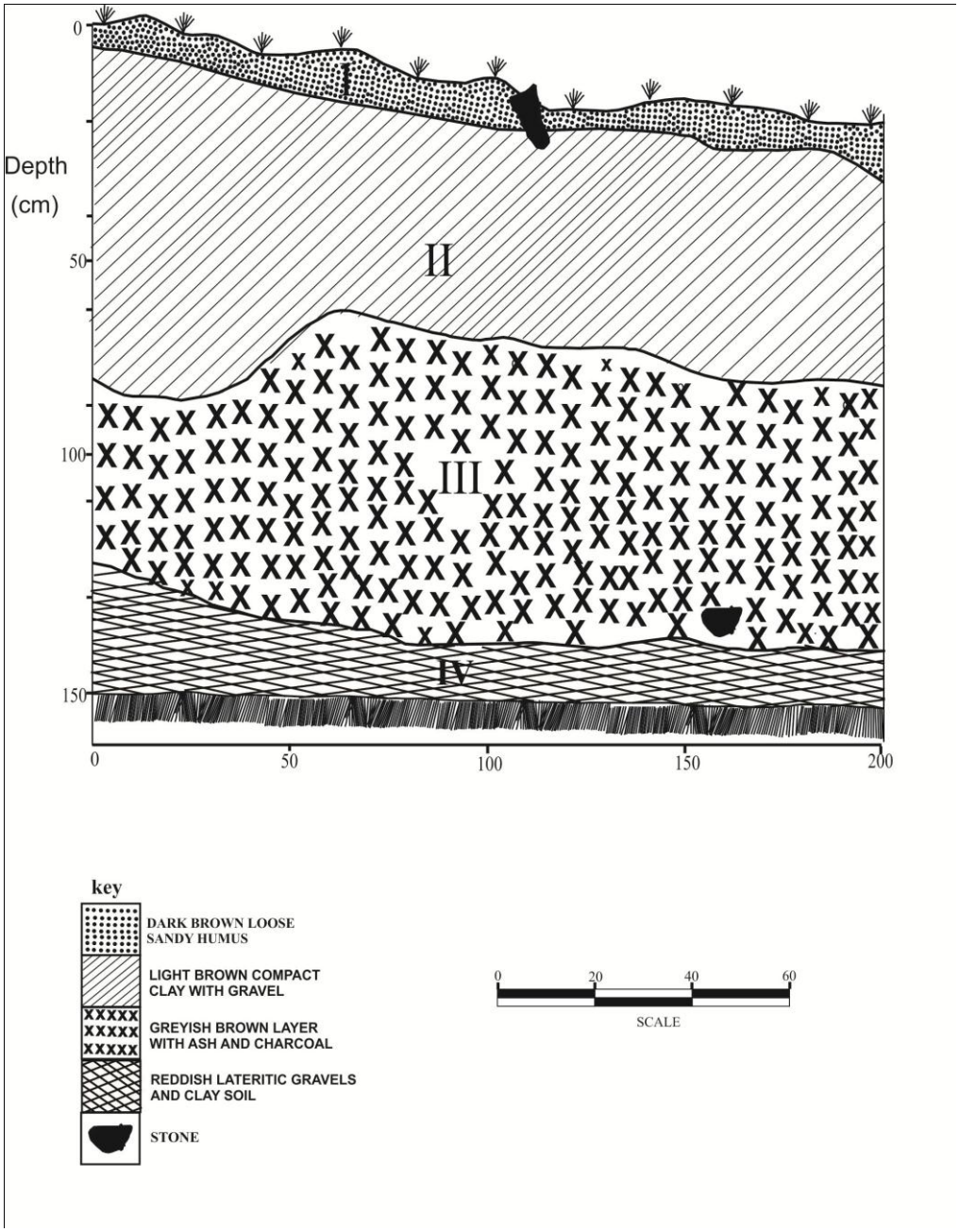


Figure 27: The soil profile of the southern wall of trench II on mound D.

Table 3: Summary of soil profile and findings of trench II, Mound D

LEVEL / DEPTH	NATURAL STRATIGRAPHY	FINDINGS
Surface	Surface Soil	Potsherds and grinders
Level I Opening Level 0cm Closing Level 10cm	Dry compact brownish clay and gravels section – dark brown loose loamy soil with gravels.	potsherds, grinders, boulder
Level 2 Opening Level 10cm Closing Level 20cm	Reddish dry compact clay with gravels	Exposed boulders and potsherds
Level 3 Opening Level 20cm Closing Level 40cm	Wet soil with gravels and traces of charcoal.	Grinding stone, bones, pieces of charcoal, teeth, daub and potsherds.
Level 4 Opening Level 40cm Closing Level 60cm	Wet soil gravels with patches of reddish orange soil.	Potsherds, stones with mica, stones without mica, stone with silver like substances and daub.
Level 5 Opening Level 60cm Closing Level 80cm	Grayish loose soil with traces of ash and charcoal.	Bones, daub, potsherds, shells, teeth, grinding stone, ash pellets and charcoal.
Level 6 Opening level 80cm Closing Level 100cm	Loose burnt sand with patches of ashes and charcoal.	Bones, teeth, shell, potsherds and grinders.
Level 7 Opening Level 100cm Closing Level 120cm	Grayish loose sand with large deposits of ash.	Bones, bones with teeth, teeth, potsherds, grinder, daub and ash pellet.
Level 8 Opening Level 120cm Closing Level 140cm	Red compact wet soil with gravels and patches of wet sand of mica.	Potsherds.

3.4 Summary of finds

The analysis of archaeological materials obtained from trench I and II excavations on mound summarized in table 4 below.

Table 4: Numerical summary of the cultural remains from mound D

MATERIALS	TRENCH I	TRENCH II	TOTAL
Pottery	1,252	1,772	3,024
Stone boulders	4	-	4
Bones	2	53	55
Daub	1	5	6
Metal rings	2	-	2
Grinding stones	3	2	5
Ash pellet	-	11	11
Pebble	-	1	1
Grinders (Quern)	4	2	6
Shells	-	36	36
Teeth	-	7	7
FEATURES			
Postholes	4	-	4
Floor	1	-	1
Burial	1	-	1

The bulk of the cultural materials recovered were fragmentary potsherds representing 95% of total finds. A complete vessel was also uncovered and retrieved as a find which had not been included in the above analysis. Other finds were rocks, stones, daub, metal rings, grinding stones, lateritic ash, pebble, grinders (quern), shells and teeth. Apart from the above, features comprising house floor, postholes and a burial were found during the excavations. To ensure proper classification of finds, teeth, bones and shells were sent to a specialist for identification. Both field and post field analyses were carried out. Details of this are discussed later in this chapter. A chemical analysis of sixteen (16) samples was carried out at the Geological Survey Department. The analytical samples were made up of five (5) soil samples of the excavated strata and ten (10) potsherds samples from both trench I and II on mound D and a sample of modern clay from Fumbisi.

3.5 Laboratory Analysis

In the same vein, the excavated ceramics assemblage from mound D was analyzed with both hands and visual examination of the individual fragment. In order to achieve the goal of this study the excavated ceramics in this assemblage were counted to separate diagnostic vessel fragments from un-diagnostic fragments. The un-diagnostic fragments were counted, recorded and discarded on the field while the diagnostic fragments were analyzed individually based on its characteristic attributes. Pot and vessel fragments with similar attributes were carried out to provide answers for research questions. The various recorded attributes were used to describe the vessels as shown in the tables in the next chapter.

A data base of the result was created in Microsoft excel to facilitate the inventory and statistical analysis of the data. Samples of the vessels were drawn based on their attributes such as vessel form, type of decoration and type of rim. The statistical analysis was based on the provenance of the excavated ceramics and was sorted according to the temper, paste, surface treatment, preparation,

surface colours, type of decoration and vessel type. A random sample was selected for the measurement of the thickness of its body wall and rim. The temper/inclusion was identified by physical observation of the fragments to ascertain the type of temper present in the raw material because there was no powerful magnifying glass or hand lens to assist in that regard. Despite this challenge every effort was made to provide a credible analysis of the temper or inclusion.

The X- ray fluorescence was employed to determine the major and minor elements present in the clay sample from Fumbisi, soil samples from the profile from both trenches I and II and the sample of the excavated ceramics from mound D at the Geological Survey Department. In all, twelve elements (major oxides) were identified as follows: Na_2O, MgO, AL_2O_3, SiO_2, P_2O_5, SO_3, CL, K_2O, CuO, TiO_2, MnO, and Fe_2O_3. It further identified twenty- four (24) minor elements which were labeled as: V, Cr, Co, Ni, Cu, Zn, Ga, As, Rb, Y, Zr, Nb, Mo, Sn, Cs, Ba, La, Ce, Hf, Ta, Pb, Bi, Th, and U. The clay sample from Fumbisi and the soil sample were tested without any preparation while the potsherds were crushed into powder. For the preparation of the pellet one needs die, mill, press, mixing containers, weighing balance and spatulas. The pellet was prepared with 4 grams of soil sample and 0.9 grams of Hoechst wax as an additive.

The chemical composition of both the major and minor elements of excavated ceramics (10 samples) and soil sample (5 samples), were subjected to statistical evaluation. The average score for each oxide and element was calculated and the standard deviation derived. Similar data relating to the clay sample from Fumbisi was also analyzed and statistically computed. Details of this procedure can be seen at the appendix. The standard deviations were used to calculate the correlation co-efficient using the excavated materials on one hand and the Soils obtained from the excavated pit on another. The procedure was repeated using same finds from the excavated pit on one hand and the clay samples obtained from Fumbisi. This technique was used to establish the relationship between the excavated

ceramics, soil samples from the excavated pit and the clay samples obtained from a present source (Fumbisi) of the raw material used. The essence of correlation was to determine the soil sample which best fits as the source of the ceramics retrieved.

Correlation coefficient is a numerical index that reflects the relationship between two variables (Salkind 2011:77). The value of this descriptive statistic ranges from -1 to +1. This study has employed the Pearson correlation model because the technique/tool examines the relationship between two variables. This was deemed appropriate because the study was comparing two variables such as XRF spectrometry data relating to pot sherds and soil from the excavation at Yikpabongo and pot sherds (Yikpabongo) and clay samples from Fumbisi. Therefore, the data obtained from the XRF spectrometry relating to the finds - soil samples from the excavated pit and clay samples from Fumbisi (current source of raw materials - were correlated statistically to obtain correlation coefficients.

The correlations were done separately to ascertain the relationship between the excavated finds (X) and the soil from the excavated pit (Y) in one analysis. Later, the experiment was also repeated using the excavated finds (X) and clay samples from Fumbisi (a current source of raw material). From the above, the expected results should vary from positive one (which connotes a very strong relationship) to a negative one (which connotes a very weak relationship). In statistical modeling the expected correlation co-efficient is normally stated as $r = -1 \leq 0 \leq +1$. A correlation co-efficient of zero connotes that there is no relationship between the correlating variables. Also a very strong correlation of +1 is ideal however, co-efficient of at least 0.5 - 0.99 suggest direct relationship and the relative strength of correlation is described in the same order as strongly positively related to very strongly positively related. On the other hand a co-efficient of 0 - 0.49 suggest that there was either no relationship at all or the variables were weakly positively related. The reverse of this interpretation applies equally to an adverse co-efficient of -1 to zero.

Besides the physical analysis of excavated ceramics, X-ray fluorescence method was also used to determine the source of the clay used in making the excavated ceramics. There are considerable numbers of literature on ceramic studies of northern Ghana. But the studies were based on typological or physical analysis of finds as opposed to chemical analysis as a method of investigation (Schwartz 2010:26). This study resorted to the use of chemical (compositional) analysis to trace the source of clay used in the manufacture of the excavated ceramics from Yikpabongo. Although compositional analysis techniques have been available for over a century, the past three decades have witnessed remarkable improvement in technology which has impacted positively on the technique. The technique has therefore achieved a level of sophistication and precision which is sufficient to be used in ceramic sourcing.

Chemical or compositional analysis has many analytical approaches that could be used for the study of ceramics. These approaches include petrographic analysis; thin-section analysis; neutron activation analysis (NAA) and X-Ray Fluorescence (XRF) analysis. Each of the above approaches has sub-techniques which could be useful. However, this study adopted the XRF techniques to study the elemental composition of the ceramics retrieved at Yikpabongo. The sub-technique of XRF used in this study to determine the chemical composition of the excavated ceramics, soil and the clay sample is called the XRF spectrometry. Since the mid 1950s the use of both physical and chemical techniques to examine archaeological finds has grown rapidly (Glascock 2008:1). According to Pamela Schwartz XRF was first proposed by Glocker and Schreiber in 1928 but its application in archaeological studies or research has been more pronounce within the past three decades. To her, XRF analysis has been successfully used for ceramic sourcing. The technique measures the average score or variable of each major oxides in percentage (%) terms and the minor elements are measured in part per million (ppm).

The technique was selected based on its ability to provide accurate or precise conclusion as compared to the situation where finds were merely examined physically and conclusions made subjectively. Furthermore, mathematical or statistical tools can be applied on the analytical data obtained from XRF analysis to determine the source of raw material of the excavated ceramics. The XRF data can also be used to evaluate other research objectives and has been considered very useful analytical technique for research, generally. Some archaeologist have commended the technique and strongly recommended it for ceramic study. XRF analysis can therefore aid in the identification of similarities and source of excavated pottery.

3.6 Ethnographic studies

'Ethnographic parallels in fact afford only clues in what direction to look for an explanation in the archaeological records itself' (Spence 2010:6)

It is against this background that this section is set out to discuss, document and provide information on the ceramic technological and artistic process at Fumbisi (see fig 1 for map of the study area). Also, it is to assess potting process in relation to the ritual (ceremonies), values and habits that are associated with the potting industry. The potting process in this context comprises tools, clay source, clay preparation, construction, decoration, drying, firing and use. This was possible because it was observed that currently there are no potters at Yikpabongo. However a number of them exist at Fumbisi which is deemed to be the centre of production and distribution of pottery products. Hence, the ethnographic study on the potting production at Fumbisi. From the ethnographic study of the Fumbisi area, potting was found to be the preserve of women and is a taboo for men to produce or distribute pottery products or even support their spouses in that business.

3.7 Manufacture: Clay

The main activity undertaken during the pottery production are identification of the type of raw materials needed and the place where the clay could be mined, the acquisition or hiring of the relevant tools for the extraction of clay and related raw materials; the extraction or mining of the clay and related raw materials, portage of raw materials and preparation of clay for the construction of the vessels. The main raw material for making pots is clay. It was observed during the survey or interview that the clay in the Fumbisi community was not of the quality needed for making the vessels. Therefore the nearest point for mining clay for pottery was over 20 kilometers to the north of the Fumbisi township (fig 28). However, abundant clay deposit at the Fumbisi area was ideal for pottery making and no royalties or fees were paid for its mining or extraction.

The journey for the acquisition of the raw materials (clay) was, mainly made on foot with potters carrying all the necessary tools and equipment on their heads, hand and on their back. The mined clay was conveyed back home by head portage due to lack of modern transport. The clay mine sites also function as farmlands. However the farmers do give way to the miners in line with custom and tradition. Pastoral nomads had to relocate their herds whenever their pasture was identified as the new site for mining clay. This cultural arrangement supports the prospects of a vibrant ceramic production in the area. The major impeding constraint is transportation to and from the mine site. The need for modern means of extracting or mining the clay and carriage of the raw materials is crucial for the sustenance of the potting industry.

The tools employed in extracting clay for pottery production were hoes, picks axes, cutlasses and pans. The cutlass was used to clear the land surface with suitable clay deposits. Hoes and pick axes were used to dig or mine depending on the thickness or density and dryness or depth of the clay

deposit. Furthermore, hoes were used to gather the mined clay samples and these were scooped into the pan and carried to the point of production

Figure 28: Photo showing the clay mining site in Fumbisi.

Before leaving the site, the surface materials which were removed before the fine clay samples were mined were used to cover the "eye" of the site. The eye is the exact spot where the clay is dug in the pit. It is believed that without covering the "eye" of the site, the rims of the pots will develop cracks after firing (see fig 28). This belief was inherited from the predecessors and has been preserved to date. An evaluation of the above tradition in the light of modern scientific knowledge showed that the practice actually preserves the site from contamination and undue exposure to the vagaries of the weather. The covering also prevents excessive dryness or flooding of the mined site.

When mined clay is collected into a pan and it's being lifted from the floor of the mine to the head, the porter is debarred from making any noise until the entire load sits on the head. This is done to ensure that finished products do not develop cracks. The belief has been sustained since antiquity and it was

generally accepted that those who refused to follow the norm experience cracks in their finished products. No special ritual is required for initiating a person into the potting craft except that the potential potter is briefed to observe all the taboos associated with extraction of raw materials as narrated above. The trade is handed down along family lines and through repeated trials by observing and experimenting. Naturally talented persons are able to learn faster whilst others have to observe and practice regularly.

3.7.1 Clay preparation

After transporting the clay from the mine site to Fumbisi, the raw materials undergo a preparatory phase. That is, the mined clay is left to dry for three days depending on the quantity (volume) and level of atmospheric heat (see fig 29). It was amazing to see how the potters were able to determine atmospheric heat without the aid of any instrument. No special reasons were assigned for the above treatment of the raw materials. It is a tradition that has been handed down and inherited or swallowed hook line and sinker. It is likely that the drying process could have caused chemical reactions in the clay at the micro level into a state suitable for the clay to be malleable for completing the pottery manufacturing process.

Figure 29: Mined clay being dried in the sun before preparation.

After the clay has been dried for three or more days to the satisfaction of the potter, water is added to humidify it for three days in a broken pot and covered with plastic bags or damp sacks (see fig 30). This tends to prevent dehydration and thus maintain the moisture content of the clay. The moist clay is then wedged after the above process until it reaches the preferred plasticity for moulding. The wedging process is to homogenize the clay to remove all bubbles or unwanted materials like stones, root debris and other roughages. The ethnographic study also revealed that no temper is deliberately added to the wedged clay at this stage in the manufacturing process (see fig 31).

Figure 30: Photo of clay being moisturize in a discarded vessel before wedging.

Figure 31: Photos showing wedged clay ready for construction with calabash tool at Fumbisi.

3.7.2 Construction

At this stage the actual construction or moulding of the ceramic or pot begins. Due to the dryness of the winds in Northern Ghana during the harmattan season, the clay paste is worked on in the morning or as early as possible to prevent solidification or caking of the paste. However, this is not the case in the rainy or wet season. This is because the relatively wet environment enables the paste to be worked on at any time. Unfortunately, the wet season is not very suitable for potting because it is difficult to mine or extract clay. The mould of ceramics may go bad when exposed to rain or leakages in the storage area. There are many methods of constructing pottery vessels. These include paddle and anvil, pinching, 'slabbing', wheeling and moulding. The method used by the people of Bulsa in the West Mamprusi District of the Northern Region is the coiling method. Coiling is a method of forming or constructing pottery by building up the walls with sausage like rolls of clay and smoothening clay over the joints.

The tools used at this stage are pieces of calabash, pebble, knife and cement paper. Some potters acquired these tools by themselves whilst others inherit them from their mothers or mothers-in-law. However the tools are locally made, and are not expensive hence they are not difficult to obtain. Unlike most potters, who construct their pots on boards/wheels, the people of Fumbisi work on the floor. In constructing the pot, the potter sits on the floor with the legs opened and then sets the base of the vessel by sprinkling fine sand on the floor where the pot will be constructed (see fig 32). This aids easy turning of the vessel. An amount of wedged clay is cut and stuck to the ground as the base. The potter then uses her hand to create a very wide round cavity in the clay to set the base of the pot or vessel.

Figure 32: Photo showing the lump of wedged clay for the start of the vessel by the potter.

Subsequently, sausage – like rolls of clay between one to two inches thickness are used to build the walls/body of the pot. The shaping depends on the experience and desired thickness expected by the potter. More coils are then added, moulded and smoothened until it gets to the neck of the pot or vessel. During the construction process, the potter will at a point stand, bend or move around the

object depending on the size, design, stage and height of the ceramic. In the process of construction, no one is allowed to enter the room or ply the space or the area occupied by the potter in order not to distract her focus or attention. This has been observed as a rule for potting over the years. It is imperative to create room for concentration as the potting process requires a steady hand, focused eye and mind.

A piece of calabash is used to smoothen both inside and outside of the pot while the construction progresses. As the potting advances, the coils are made to close up to provide the neck. Smoothening is constantly done on the surface of both inside and outside with calabash to provide the desired outlook. After the neck stage is reached in the construction of a pot, an everted rim is produced with the coil of clay placed outside and pressed to fix on the neck (see fig 33). However, bowls and some ritual objects are fitted with inverted rims at the neck (fig 40). Then water is sprinkled on the object under construction before the potter uses wet cement paper to smoothen the rim to make it fine and nice (fig 33).

Figure33: Photo showing a complete constructed pot

Round or convex (egg-like) shaped pots are left to dry after the rim has been fixed and properly smoothened. Afterwards, it is turned upside down then more clay is added to produce a round or a convex base by using a knife to aid the design process. Large pots are made in sections; that is, after the base is set, coils of clay are laid to build the wall of the pot in stages. They are left to dry before construction continues. When half of the vessel is made and the rim duly fitted, it is left to fully dry to make it strong. Afterwards, it is turned upside down for more coils of clay to be added to form the convex base in stages until completion. Before the pot is fully dried the potters use their expertise to control and manage the thickness. This is usually achieved through the use of calabash to scoop surplus clay from the walls of the pot.

Due to lack of standards and individual creativity, the pots are not produced to scale therefore there are disparities in the thickness of the walls of the various parts. With storage pots, the thickness of the lower parts tends to be heavier than the upper parts. But cooking vessels have thin walls so as to save energy during cooking. The pots are left to dry under a shed or a room until they are fully dried. A final smoothening is done with pebbles or wet cement papers before they are further shaped by scrapping of excess clay with knife. At this stage cracks are mended.

Figure 34: Photo showing the beginning of bowl being constructed.

Figure 35: Photo showing a constructed food serving bowl from Fumbisi.

3.7.3 Decoration

When the surface of the constructed vessel is well burnished, it is left to dry until the vessel becomes leather-hard. At this stage decorative designs are made around the neck of the vessel. These designs are individualized according to the preference of the potter and are made at the upper part of the vessel. The pots are left to dry for a day or two then a red clay that is acquired from Wiega is used to prepare a red pigment. This pigment is used to paint or colour the decorated upper part or carinated portions of the pot with the aid of a bundle of guinea fowl feathers before firing (see fig 36).

Potters decorate their wares for various reasons. Some of the motives uncovered through this research are that the potters decorate to enhance the beauty (aesthetics) of the vessels. Also, the designs indicate the identity of the potters. Finally, potters decorate their wares in order to enhance effective handling and usage of the products for domestic and religious purposes.

Figure 36: Photo showing a vessel with a decorative design and red-slipped ready for firing

3.7.4 Drying and Firing

The pots are left to dry under a shed or a room until they are fully dried. A final smoothening is done with pebbles or wet cement papers before they are further shaped by scrapping of excess clay with knife. At this stage cracks are mended. The pots are left to dry for a day or two then a red clay that is acquired from Wiega is used to prepare a red pigment. This pigment is used to paint or colour the decorated upper part or carinated portions of the pot with the aid of a bundle of guinea fowl feathers before firing (see fig 36). The number of days used in drying the pots varies, however the potters normally want to produce enough stock before firing. Like most communities in Ghana, firing of ceramics at Fumbisi takes place in the open

The firing site is created by digging a shallow pit in the ground round the settlement, a place where the smoke from the fire will not affect the neighbors (as seen in fig 38). Dried cow dung is then spread on the ground in the shallow pit before tree barks example (*Bridelia ferruginea*), millet straw and grass are placed on them. The pots are laid or arranged on them carefully to prevent damage. They are actually laid in a mound like shape and supported with millet straw and lateritic stones. The heap of pots is completely covered with barks, millet straw and grass before the pile is set ablaze to fire the pots or ceramics (see fig 37). Fuel obtained from barks, millet straw and grass abounds in the community hence firing is effective resulting in high quality pots

.

The firing process often lasts between half to one hour depending on the sizes of pots being fired. A long stick is used to pick the pots in turns out of the ashes to facilitate easy cooling. After the ceramics have cooled considerably, they are dipped into a solution prepared from *dawadawa* pods to provide a glossy surface and to strengthen the pots after firing. This is mostly done for food-serving bowls and cooking pots to perfect the surface furnishing and provide a sparkling surface. Another treatment is applied to the ceramics using a solution prepared from ebony fruits. With the aid of a bundle of guinea

fowl feathers or empty millet combs this solution is applied along the geometrical shapes and lines on the pots while the ceramic is still hot and this leaves black decorations at the upper part of the pots making them very attractive and easy to identify (see fig 38).

Depending on the time or season, the whole potting process could take between 18 and 20 days or more before they are ready for sale. This is because most potters engage in the art as a secondary occupation. Fumbisi is a peasant community hence potting occupies the off-farming season when the people take a break from strenuous farming activities.

Figure 37: Photo showing a potter firing the finished vessel in the open air.
Anna Craven 2011

Figure 38: Photo showing fired vessels and post fired treatment with plant solution

Figure 39: Photo showing experimented Pot and bowl from Fumbisi.

Figure 40: Photos showing vegetable dyed food serving bowls from Fumbisi. .

The above ethnographic data on the potting tradition at Fumbisi have provided pictographic evidence and helped to explain variations in the archaeological data in the area of vessel shapes, decorations, surface treatment, firing process and uses. Also, it has provided insightful data about how the environment, ideology and technology and art affect the archaeological remains. The next chapter will throw more light on this.

CHAPTER –FOUR

DATA ANALYSIS AND DISCUSSION

This chapter has two main sections. The first section focused on the physical examination of the excavated ceramics to provide data on the past technological and stylistic attributes. The second section focused on the analysis of the X-ray fluorescence elemental composition of the excavated ceramics, soil sample from the excavated trench and clay sample from Fumbisi. The questions confronting this study which are assessed in this chapter are as follows: What are the attributes of the excavated ceramics from mound D? What were the source(s) of raw material for constructing the ceramics? Where were the ceramics manufactured? What tempering materials were used? What method was used in constructing the vessels? What mode was employed for baking the vessels? Is there evidence of ceramic production at Yikpabongo or were the used ceramic objects imported from another area? How important were ceramics in the life of the people? What meaning or significance may be attached to decorative art and symbols on ceramic vessels from Yikpabongo?

4.1 Ceramic analysis

The goal of this section is to provide classification, description and illustration of the ceramic assemblage for mound D. These include body fragment, rim and vessel forms used to identify the stylistic and technological attributes of the assemblage. The assemblage represents a 5^{th} - 7^{th} century AD society from just one radiocarbon date provided (See Appendix II). From the map showing the distribution of the excavated mounds in Yikpabongo (see fig. 15), this site (mound D) just represents the material culture of a household. Even so, the entire mound was not excavated. A review of the profile of the trenches indicates an undisturbed site but the discovery of a human burial at the sterile level of 163cm introduces a new dimension. The issue prompted by the discovery of this burial is to ascertain whether the burial was there before the settlement or vice versa. A total of 3,024 excavated

ceramics represent the ceramic assemblage for this study. The nature of the excavated ceramics informs on the quality of preservation. That is, they were well preserved; except that the pot discovered in situ was very fragile and needed field treatment before being transported to the department for further treatment and analysis. There was variability in terms of vessel form, rim type decoration, surface treatment and so on. Details of these, is discussed in subsequent tables and graphs below.

The above table provides the types of decorative motifs identified on the potsherds from trench I. From the above, it is indicated that most or large numbers of the potsherds have roulette motif (422). Also eighty-three (83) have multi- decorations or complex designs which exhibit punctation over roulette impressions, groove bands with triangular punctuation, incised lines over roulette impressions (see figure 62 & 63 on decoration for details).

Table 5

POTTERY ANALYSIS FROM 'MOUND D' (TRENCH 1)								
PROVENANCE		**DECORATION**						
Level	**Depth (cm)**	**Groove**	**Incision**	**Punctation**	**Roulette**	**Multi-Deco**	**Perforated**	**Eroded**
0	Surface	0	0	0	1	0	0	0
1	0 - 5	0	0	0	0	1	0	0
2	5 - 15	4	8	2	36	1	2	0
3	15 - 25	0	3	3	36	0	0	0
4	25 - 30	0	9	3	68	1	0	0
5	30 - 40	0	4	3	23	3	0	0
6	40 - 60	1	3	9	76	18	0	0
7	60 - 70	0	1	0	12	2	0	7
8	70 - 80	0	1	1	13	1	1	0
9	80 - 90	0	1	0	9	8	0	0
10	90 - 100	6	9	1	80	20	2	1
11	100 - 120	0	0	0	23	7	2	0
12	120 - 170	0	0	0	39	9	0	0
	Inside Pot	0	0	0	6	11	0	0
	Total	**21**	**40**	**22**	**422**	**83**	**7**	**8**

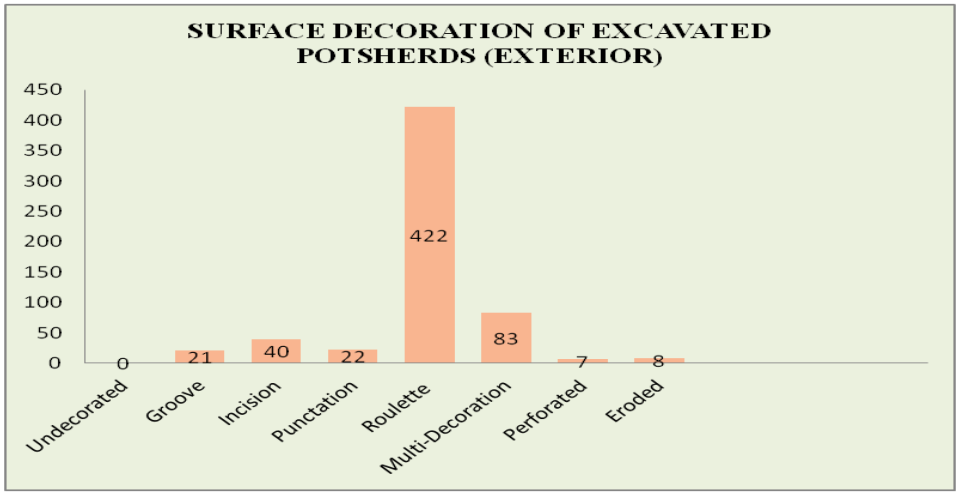


Figure 41: The above graph shows the various decorative techniques from trench I

Table 6

POTTERY ANALYSIS FROM MOUND D (TRENCH I)								
PROVENANCE		**SHERD TYPE**						
YK4-10	**level/depth**	Indeterminate	Rim	Neck	Shoulder	Body	Base	Pedestal
Trench 1	Surface	0	1	0	0	1	0	
1	L EVEL 1	0	2	0	0	8	0	0
1	LEVEL 2	0	19	0	0	51	0	0
1	LEVEL 3	0	16	2	0	39	0	0
1	LEVEL 4	1	17	0	0	81	0	0
1	LEVEL 5	0	8	0	0	35	0	0
1	LEVEL 6	0	21	0	0	104	0	0
1	LEVEL 7	0	8	0	0	20	0	0
1	LEVEL 8	0	2	0	0	16	0	0
1	LEVEL 9	0	4	0	0	18	0	0
1	LEVEL 10	0	23	6	0	115	0	0
1	LEVEL 11	0	8	6	0	29	0	0
1	LEVEL 12	0	8	0	0	43	1	1
1	INSIDE POT	0	5	2	0	29	1	1
	Total	**1**	**142**	**16**	**0**	**589**	**2**	**2**

The above data has been graphed below:

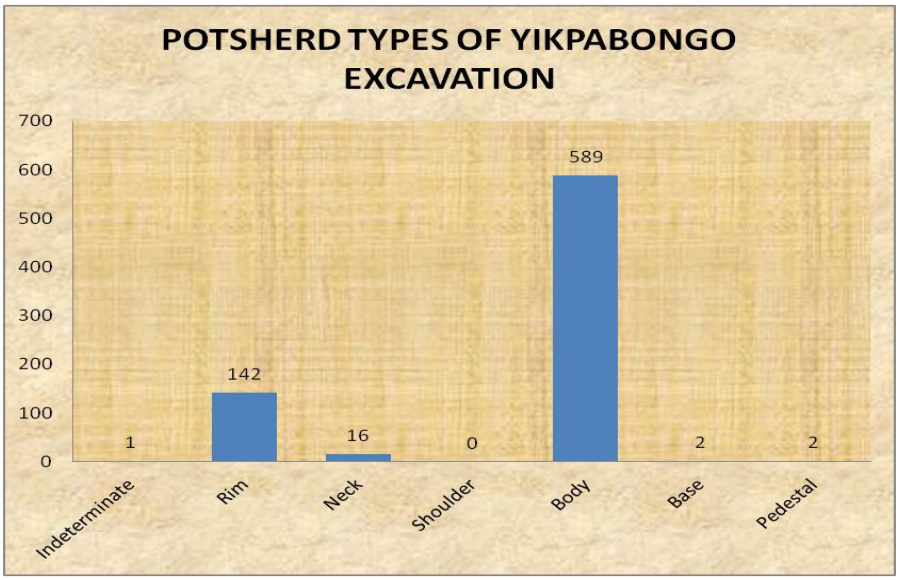


Figure 42: A graph showing the various parts of the vessels excavated from trench I

Table 7

POTTERY ANALYSIS FROM Mound D (TRENCH 1)					
PROVENANCE		**RIM FORM**			
Level	**Depth (cm)**	Straight	Everted	Inverted	Uncertain
0	Surface	0	1	0	0
1	0 - 5	2	0	0	0
2	5 - 15	3	8	8	0
3	15 - 25	1	12	3	0
4	25 - 30	1	10	6	0
5	30 - 40	0	8	0	0
6	40 - 60	5	13	3	0
7	60 - 70	3	4	1	0
8	70 - 80	2	0	0	0
9	80 - 90	0	3	1	0
10	90 - 100	0	8	15	0
11	100 - 120	0	8	0	0
12	120 - 170	0	3	5	0
	INSIDE POT	0	1	4	0
	Total	**17**	**79**	**46**	**0**

The above data has been graphed below:

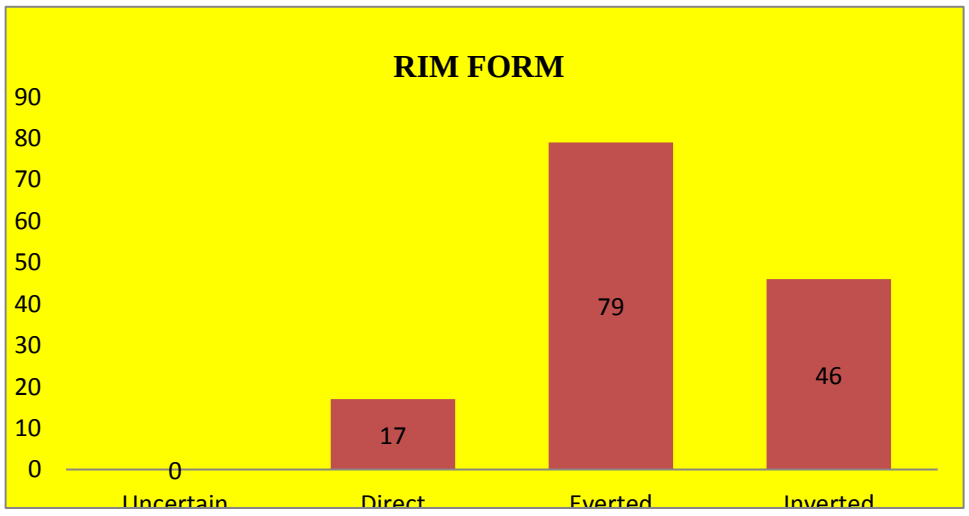


Figure 43: A graph showing the various rim forms from trench I

Table 8

POTTERY ANALYSIS FROM MOUND D (TRENCH 1)								
PROVENANCE		**SURFACE COLOUR**						
Level	**Depth (cm)**	**Eroded**	**Black**	**Gray**	**Y - O Brown**	**Red**	**B - R Black**	**Brown**
0	Surface	0	0	0	0	1	0	1
1	0 - 5	0	3	0	0	4	0	3
2	5 - 15	4	3	0	1	27	15	20
3	15 - 25	0	2	0	0	11	25	19
4	25 - 30	0	18	0	0	25	4	52
5	30 - 40	0	8	0	0	12	8	15
6	40 - 60	0	13	1	0	15	6	90
7	60 - 70	2	2	2	0	6	1	15
8	70 - 80	0	6	0	0	0	1	11
9	80 - 90	0	6	0	0	0	2	14
10	90 - 100	0	82	0	0	45	4	13
11	100 - 120	0	7	0	0	31	0	5
12	120 - 170	0	17	0	0	28	7	0
	INSIDE POT	0	18	0	1	1	10	7
	Total	**6**	**185**	**3**	**2**	**206**	**83**	**265**

KEY TO TABLE LABELS: **Y-O** - Yellowish-Orange **B-R** - Brown-Red

The above data has been graphed below:

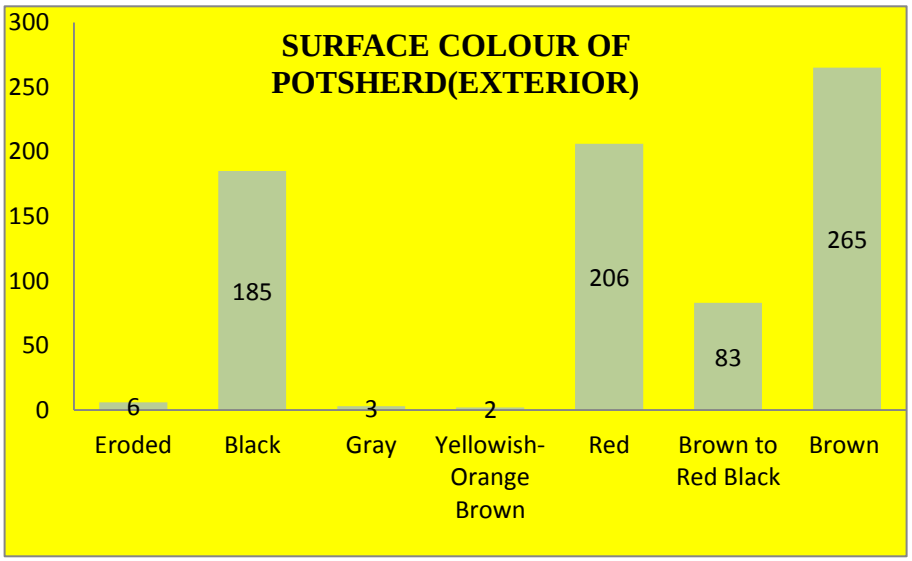


Figure 44: A graph showing the various surface colour of the excavated potsherds from trench I

Table 9

POTTERY ANALYSIS FROM MOUND D (TRENCH 1)					
PROVENANCE		**TEXTURE IN TERMS OFTEMPER/INCLUSION**			
Level	**Depth (cm)**	**Very Coarse**	**Medium**	**Fine**	**Coarse**
0	Surface	0	1	1	0
1	0 - 5	6	1	3	0
2	5 - 15	29	1	37	3
3	15 - 25	46	0	4	7
4	25 - 30	64	0	34	3
5	30 - 40	22	5	14	2
6	40 - 60	47	0	16	62
7	60 - 70	10	0	12	6
8	70 - 80	9	0	9	0
9	80 - 90	19	1	1	1
10	90 - 100	101	2	41	0
11	100 - 120	35	3	1	4
12	120 - 170	49	0	3	0
	INSIDE POT	33	0	4	0
	Total	**470**	**14**	**180**	**88**

The above data has been graphed below:

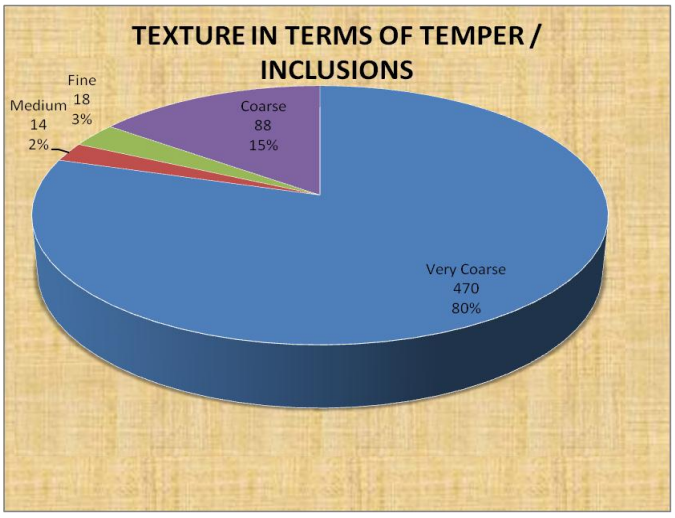


Figure 45: A graph showing the texture of the fabric in terms of temper / inclusion.

Table 10

POTTERY ANALYSIS FROM MOUND D (TRENCH 1)			
PROVENANCE		**POT SHERD SIZE**	
Level	**Depth (cm)**	**< 3cm**	**> 3cm**
0	Surface	0	2
1	0 - 5	10	0
2	5 - 15	43	27
3	15 - 25	23	34
4	25 - 30	66	33
5	30 - 40	25	18
6	40 - 60	72	53
7	60 - 70	6	22
8	70 - 80	16	5
9	80 - 90	12	10
10	90 - 100	81	63
11	100 - 120	4	39
12	120 - 170	2	50
	INSIDE POT	6	31
	Total	**366**	**387**

The above data has been graphed below:

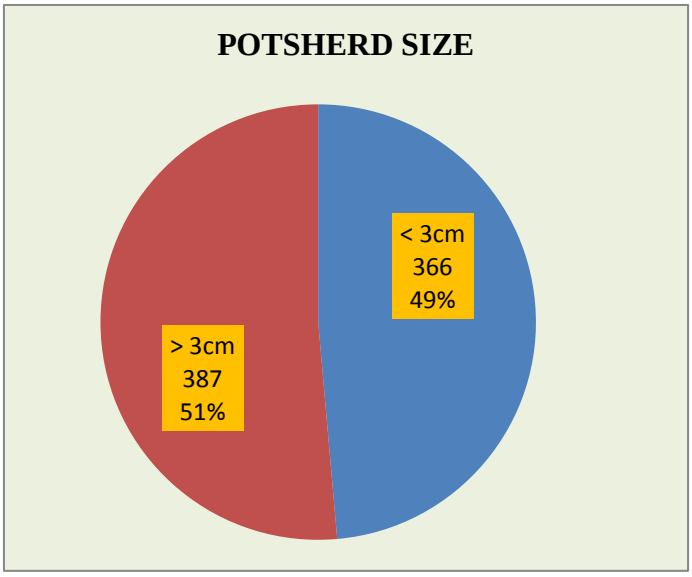


Figure 46: A graph showing the size of the potsherds from trench I

Table 11

POTTERY ANALYSIS FROM MOUND D (TRENCH 1)								
PROVENANCE		**SURFACE TREATMENT**						
Level	**Depth (cm)**	**None**	**Eroded**	**Slightly Burnished**	**Burnished**	**Micaceous**	**Smudged**	**Red Slipped**
0	Surface	1	0	0	0	0	0	1
1	0 - 5	9	0	0	0	0	0	1
2	5 - 15	36	10	0	3	14	1	6
3	15 - 25	13	5	0	11	5	19	4
4	25 - 30	18	5	18	2	41	12	3
5	30 - 40	14	4	2	2	3	11	7
6	40 - 60	29	2	42	13	0	29	10
7	60 - 70	7	9	0	4	2	3	3
8	70 - 80	12	1	0	1	1	3	0
9	80 - 90	7	0	2	5	1	7	0
10	90 - 100	106	0	0	23	10	3	2
11	100 - 120	21	0	1	1	7	1	12
12	120 - 170	24	1	1	17	0	0	9
	INSIDE POT	1	0	7	10	11	0	8
	Total	**298**	**37**	**73**	**92**	**95**	**89**	**66**

The above data has been graphed below:

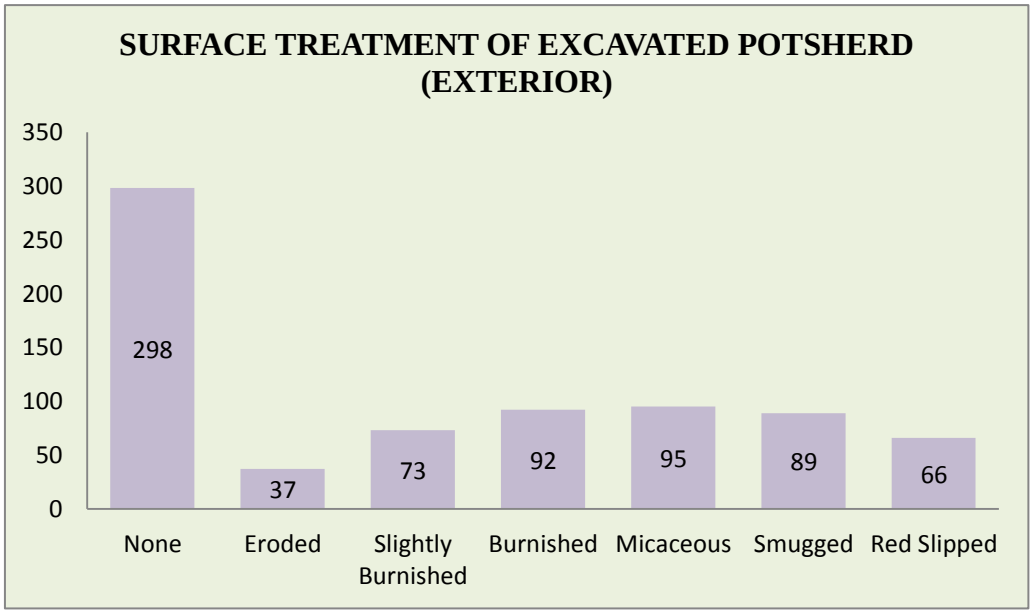


Figure 47: A graph showing the various surface treatment techniques from trench I

Table 12

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVENANCE		SHERD TYPE						
Level	**Depth (cm)**	**Indeterminate**	**Rim**	**Neck**	**Shoulder**	**Body**		**Base**
1	0 – 10	0	0	0	0	0		0
2	10 - 20	0	0	0	0	0		0
3	20 - 40	0	7	2	0	14		0
4	40 - 60	0	0	0	0	0		0
5	60 - 80	0	29	0	0	56		0
6	80 - 100	0	27	2	0	72		1
7	100 - 120	0	3	0	0	3		0
Total		**0**	**66**	**4**	**0**	**145**		**1**

The above data is graphed below:

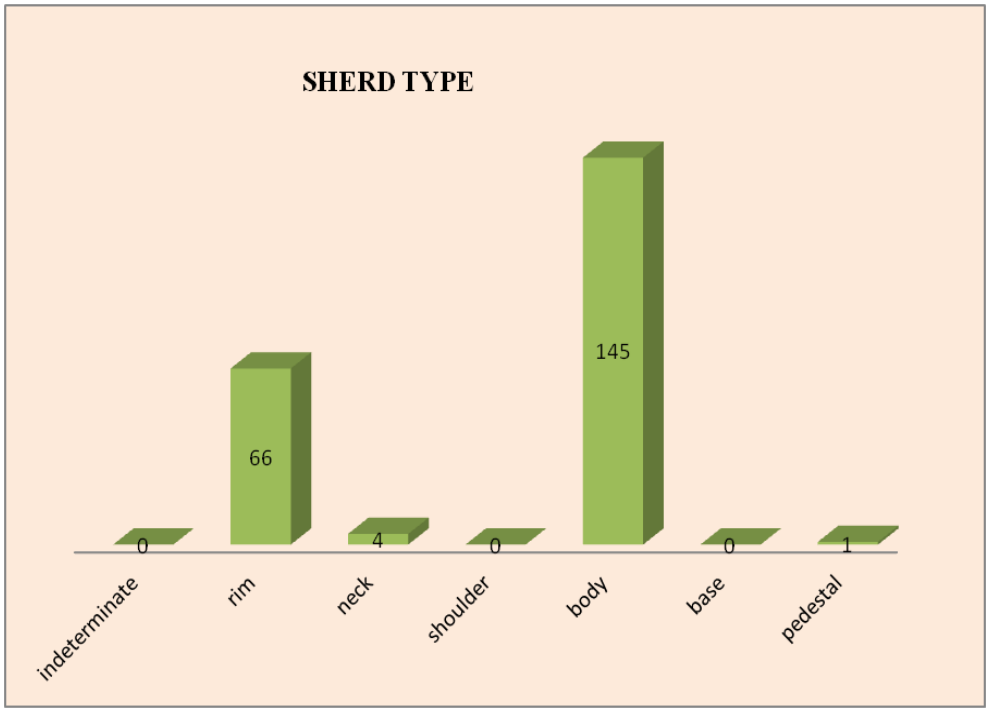


Figure 48: A graph showing parts of vessel from trench 2.

Table 13

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVENANCE		RIM FORM			
Level	**Depth (cm)**	**Uncertain**	**Direct**	**Everted**	**Inverted**
1	0 - 10	0	0	0	0
2	10 - 20	0	0	0	0
3	20 - 40	0	0	4	3
4	40 - 60	0	0	0	0
5	60 - 80	0	2	24	3
6	80 - 100	0	6	21	0
7	100 - 120	0	1	1	1
Total		**0**	**9**	**50**	**7**

The above data is charted below:

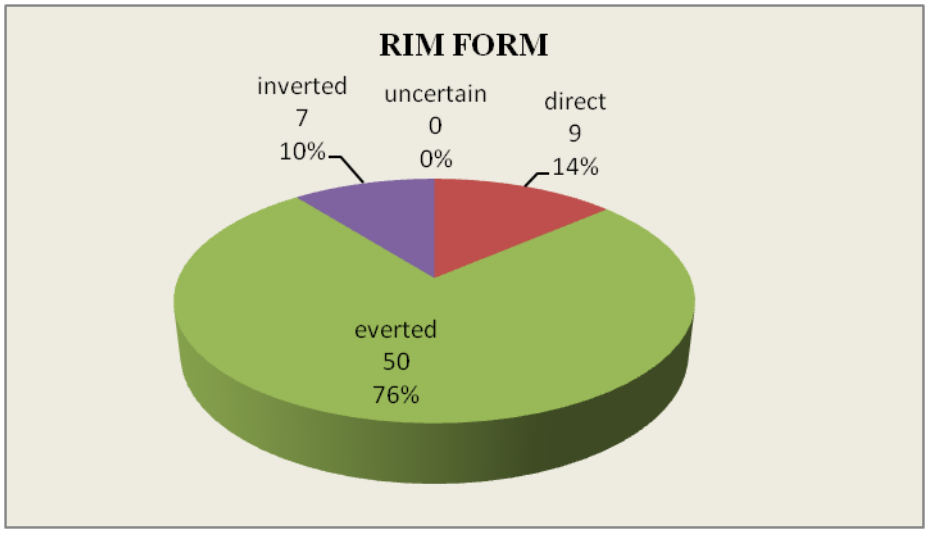


Figure 49: A graph showing various rim forms from trench 2

Table 14

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVENANCE		SURFACE COLOUR						
Level	**Depth (cm)**	**Eroded**	**Black**	**Gray**	**Red**	**Y - O Brown**	**B - R Black**	**Brown**
1	0 - 10	0	0	0	0	0	0	
2	10 - 20	0	0	0	0	0	0	0
3	20 - 40	0	6	0	3	0	2	12
4	40 - 60	0	20	0	25	0	0	12
5	60 - 80	0	28	0	16	0	1	40
6	80 - 100	1	24	7	44	0	10	16
7	100 - 120	0	0	1	0	0	1	4
Total		**1**	**78**	**8**	**88**	**0**	**14**	**84**

The above data has been graphed below:

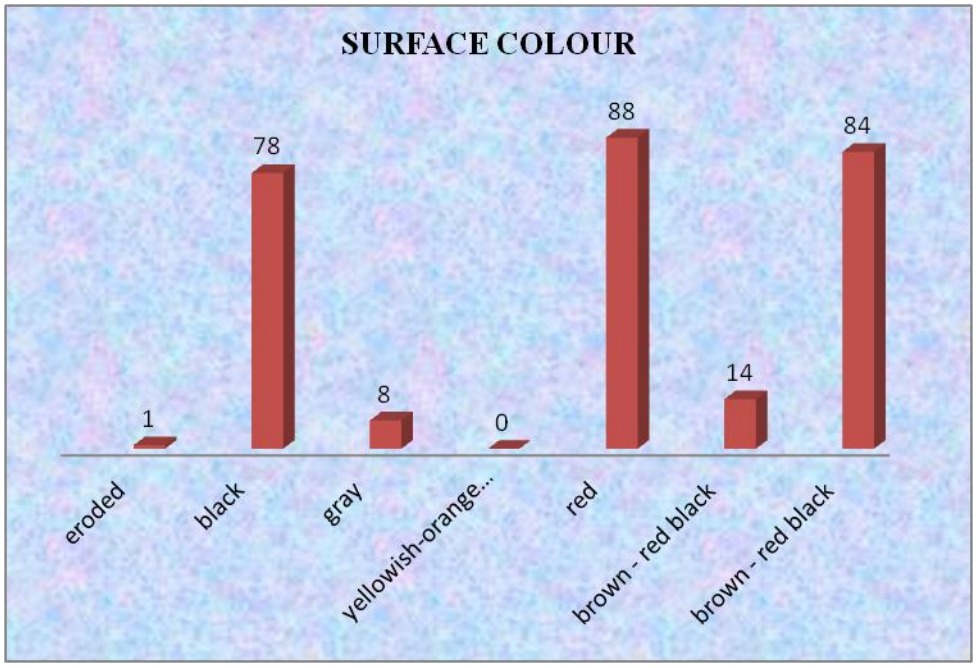


Figure 50: A graph showing the various surface colour for the excavated potsherds from trench 2

Table 15

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVENANCE		TEXTURE IN TERMS OFTEMPER/INCLUSION			
Level	Depth (cm)	Very Coarse	Medium	Fine	Coarse
1	0 - 10	0	0	0	0
2	10 - 20	0	0	0	0
3	20 - 40	0	9	14	0
4	40 - 60	17	26	14	0
5	60 - 80	3	10	67	5
6	80 - 100	27	18	34	23
7	100 - 120	4	1	1	0
TOTAL		**51**	**64**	**130**	**28**

The above data has been charted as follows:

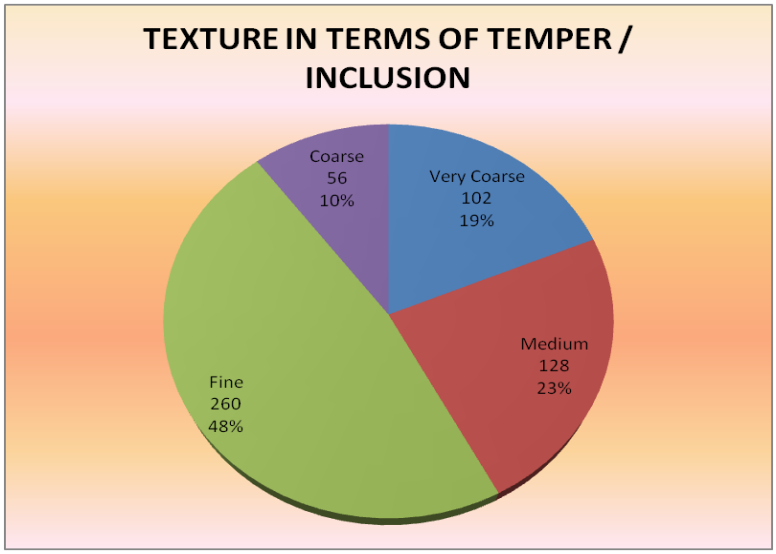


Figure 51: A Pie Chart showing the Texture of the Fabric in terms of Temper / Inclusion

Table 16

POTTERY ANALYSIS FROM MOUND D – 11 (TRENCH 2)

PROVINANCE		POTSHERD SIZE	
Level	**Depth (cm)**	**<3CM**	**>3CM**
1	0 - 10	0	0
2	10 - 20	0	0
3	20 - 40	17	6
4	40 - 60	34	21
5	60 - 80	67	18
6	80 - 100	56	46
7	100 - 120	4	2
TOTAL		178	93

The above data has been charted below:

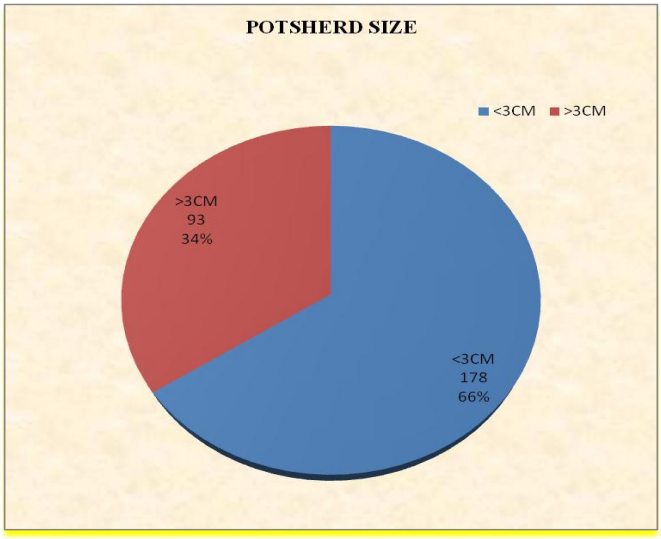


Figure 52: A chart showing the size of the excavated potsherds from Mound D

Table 17

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

BODY THICKNESS	QUANTITY	PERCENTAGE
0 - 0.9	240	45.28
1 - 1.9	272	51.32
2 - 2.9	14	2.64
3 - 3.9	4	0.75
TOTAL	**530**	**100.00**

The above data has been charted below:

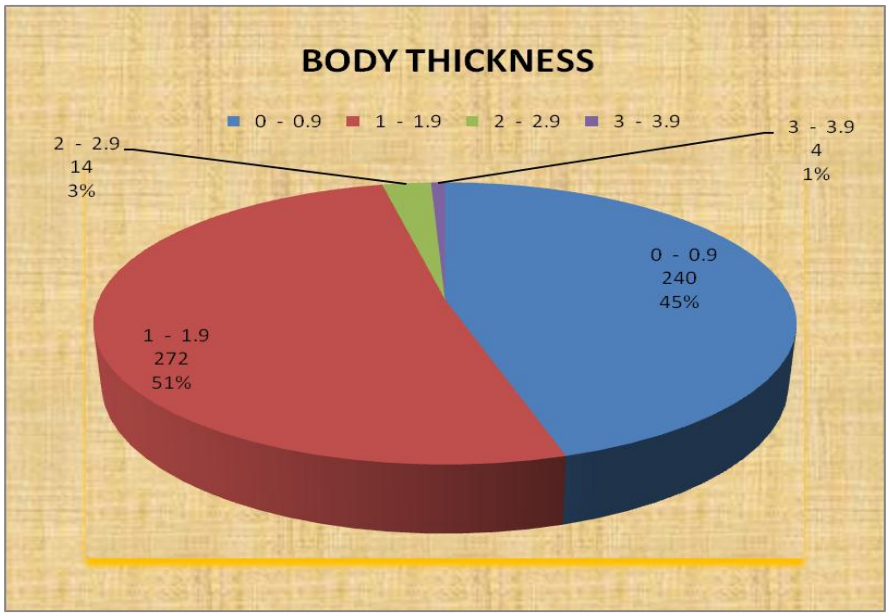


Figure 53: A graph showing the body thickness of sherds of the excavated potsherds from mound D.

Table 18

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVENANCE		SURFACE TREATMENT						
Level	**Depth (cm)**	**None**	**Eroded**	**Slightly Burnished**	**Burnished**	**Micaceous**	**Smudged**	**Red Slipped**
1	0 - 10	0	0	0	0	0	0	0
2	10 - 20	0	0	0	0	0	0	0
3	20 - 40	9	2	0	8	2	2	0
4	40 - 60	47	0	0	1	9	0	0
5	60 - 80	50	2	0	8	7	10	8
6	80 - 100	48	5	2	12	18	11	6
7	100 - 120	1	1	0	1	1	2	0
Total		**155**	**10**	**2**	**30**	**37**	**25**	**14**

The above data has been graphed below:

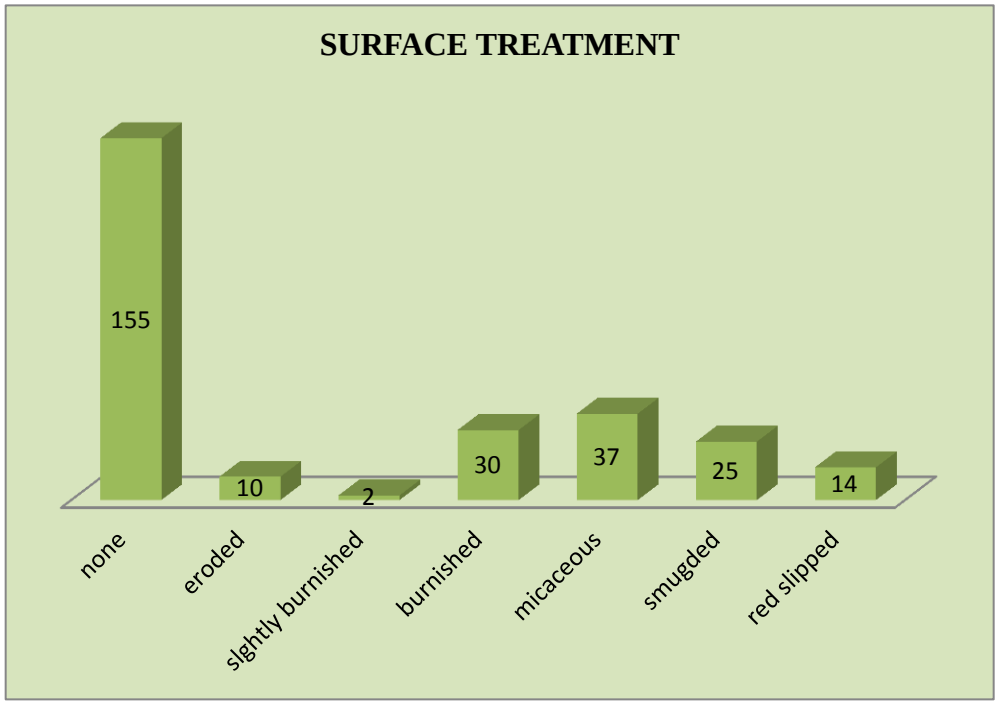


Figure 54: A graph showing the various surface treatment techniques from trench 2

Table 19

POTTERY ANALYSIS FROM MOUND D (TRENCH 2)

PROVINANCE		DECORATION						
Level	**Depth (cm)**	**Undecorated**	**Groove**	**Incision**	**Punctation**	**Multi-Deco**	**Roulette**	**Perforated**
1	0 - 10	0	0	0	0	0	0	0
2	10 - 20	0	0	0	0	0	0	
3	20 - 40	5	0	3	1	5	9	0
4	40 - 60	1	3	2	0	9	40	2
5	60 - 80	23	1	4	1	0	55	1
6	80 - 100	24	5	5	1	34	54	3
7	100 - 120	2	0	0	1	1	2	0
Total		**55**	**9**	**14**	**4**	**49**	**160**	**6**

The above table provides the types of decorative motifs identified on the potsherds from trench 2. From the above, it is indicated that most or large numbers of the potsherds have roulette motif (**160)**. Also forty-nine (**49**) have multi- decorative or complex designs, which exhibit punctation over roulette impressions, groove bands with triangular punctuation, incised lines over roulette impressions (see figures on decoration for details). The above data has been graphed below:

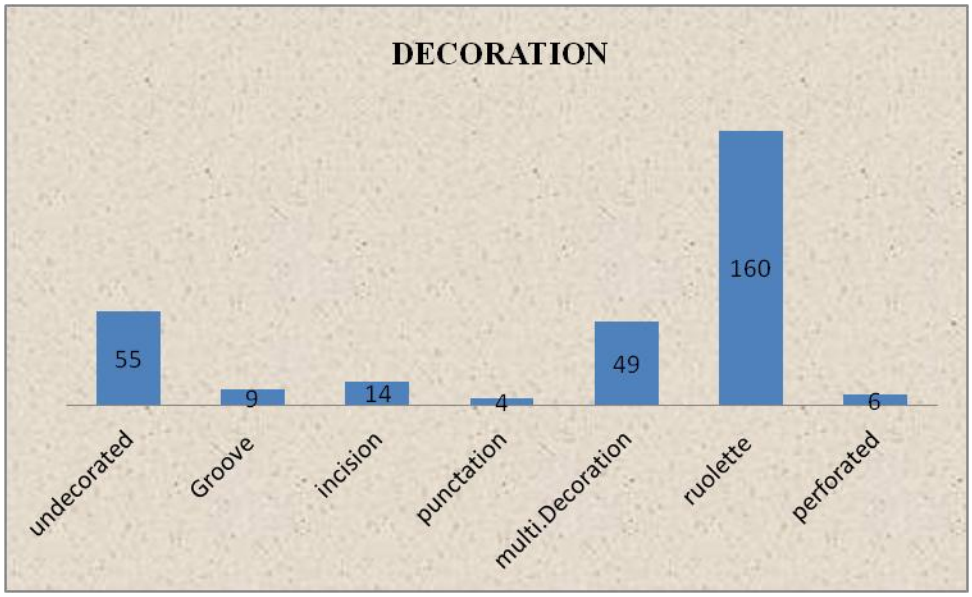


Figure 55: A graph showing the various decorative techniques from trench II

The excavation yielded 3,024 potsherds and a complete pot. The surface finds and excavated mound formed 95.33% of the total artifacts retrieved from the mound. The whole pot that was recovered was similar to the potsherds from the archaeological records in terms of thickness, rim form, fabric, surface treatment and preparation and decorative techniques. The gauze bandage was removed to enable cleaning and washing. Upon the removal of the gauze bandage, the pot got disintegrated during washing. The pieces were washed and dried and have been preserved. Adhesive glue was used to aid the reconstruction process. Due to the weight and size of the pot, it took the reconstruction team about three (3) months to complete the process. The process has been captured on camera and snapshots are displayed in figures below.

Figure 56: Photograph of pot being prepared for washing from Mound D.

Figure 57: Photograph of the collapsed pot during washing from Mound D.

Figure 58: Photograph of the reconstructed pot from Mound D.

4.2 Typology: Jar forms

Typology for the purpose of this research was based on similarities in surface treatment, decoration, rim form/lip, rim diameter, type of fabric and base and vessel forms excavated from mound D. The archaeological remains exhibited a variety of vessel forms. Two main categories of vessel forms were identified, these were bowls and jars. The jars which had either coarse or very coarse fabric texture were sub divided into large and medium vessels. The large jars were characterized by globular shape, round base, wide mouth everted rim with very coarse paste and quartz inclusions, thick walls, decorated with roulette banded with punctates and incision. The interior of the vessels and the neck are red-slipped. These are mostly used as storage containers (liquids and cereals). The uses of the vessels were derived from the ethnographic data from Fumbisi.

The second category was the medium size jars which are globular in shape, round base, everted rim on short neck with coarse paste, quartz and speck of mica inclusion, burnished and red slipped at the upper part of the vessel with incised and roulette decorations. Similar vessels occurred at Birifoh-Sila Yiri, Tando and Yikpabongo (Anquandah 1998, Saako 2009, Mohammed 2010). The jars have average diameter of 30cm and a wall thickness of 1cm-3.9cm. In all, six (6) different jar types were identified and the jars form 70% of the total ceramic assemblage.

Figure 59: Hypothetical illustration of pot (jar) discovered from Mound D.

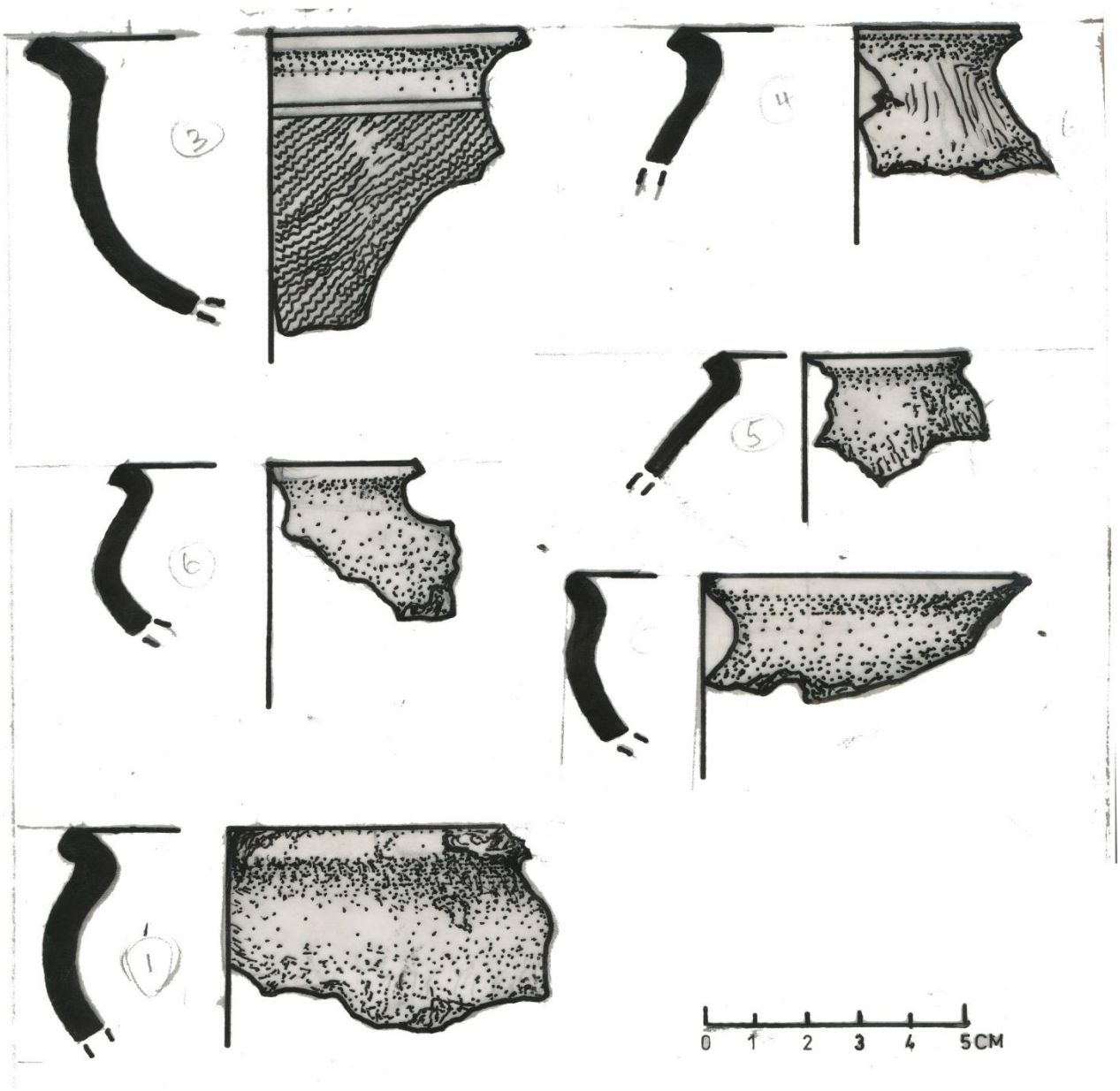


Figure 60: Illustration of jar forms from mound D.

4.2.1 Bowl forms

The second category was bowls. These generally consist of small and medium bowls which have fine and medium fabric texture. The small bowls were hemispherical with plain body, inverted rim (about nine (9) centimeters high) and a rim diameter of fourteen (14) centimeters with a body thickness of 0.9cm. This category exhibited both round and flat/ring bases as shown in the images in figure 38. They have burnished surfaces at both interior and exterior with specks of mica on a fine grain paste and well fired used as serving or for medicinal purposes. On the other hand, direct and everted-rim large bowls had decorations on the body below the rim. They also had both ring/flat and round bases (see fig 61). They have an average rim diameter of 24cm and a height of 16.5cm. They are burnished and red-slipped on both the interior and the exterior with a body thickness ranging between 1-1.9 cm. Mica specks and quartz were occasionally present in the paste and well fired probably used as serving or for medicinal purposes. Details of these are exhibited on figure 61 above. The presence of mica flecks in the clay raw material is an indication that the bedrock of the area is from mica schist, mica gneiss or weathered Precambrian mica schist which has flecks of mica. The mica inclusions in the clay from Fumbisi show the nature and type of clay the potters used in that geological location (Adjadeh November 2012 soil scientist- University of Ghana personal conversation).

From the illustration below (fig 62 & 63), the decorative techniques on the excavated ceramics consist of roulette, incisions, punctates, grooves and channels below the rim and on the body of the vessels. Lastly, there were two different pedestal bases and a perforated base. The perforated potsherd had body thickness of 3.4cm with the distance between the holes ranging from 1cm - 2cm which were made before the vessels were dried and fired. The sherd had black paste which may probably be as a result of usage. The perforated vessel was probably used for washing vegetables (Beaudry et.al April 2013:35), sieving vegetables and smoking meat (Mohammed 2010).

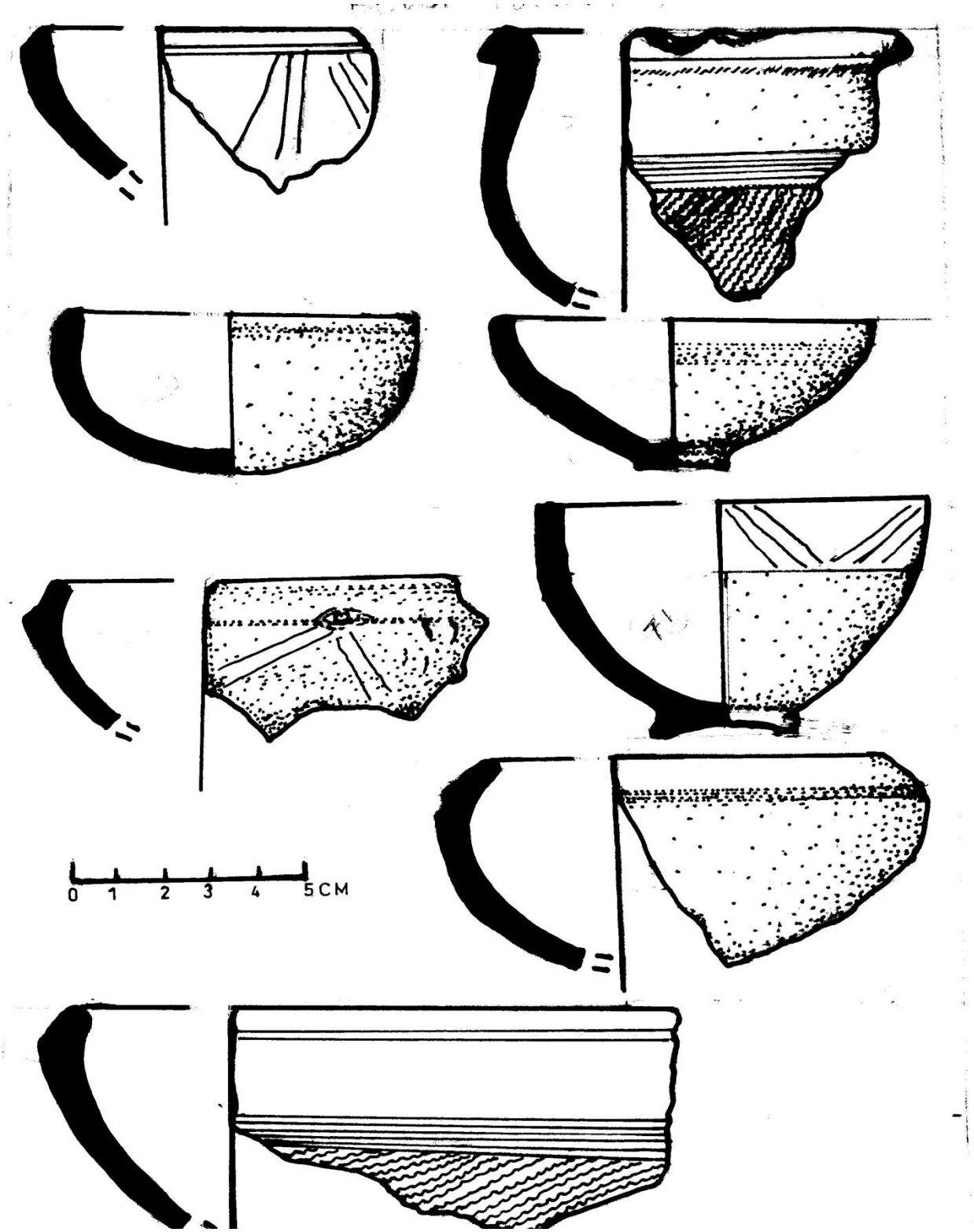


Figure 61: Illustration of bowl forms discovered from mound D.

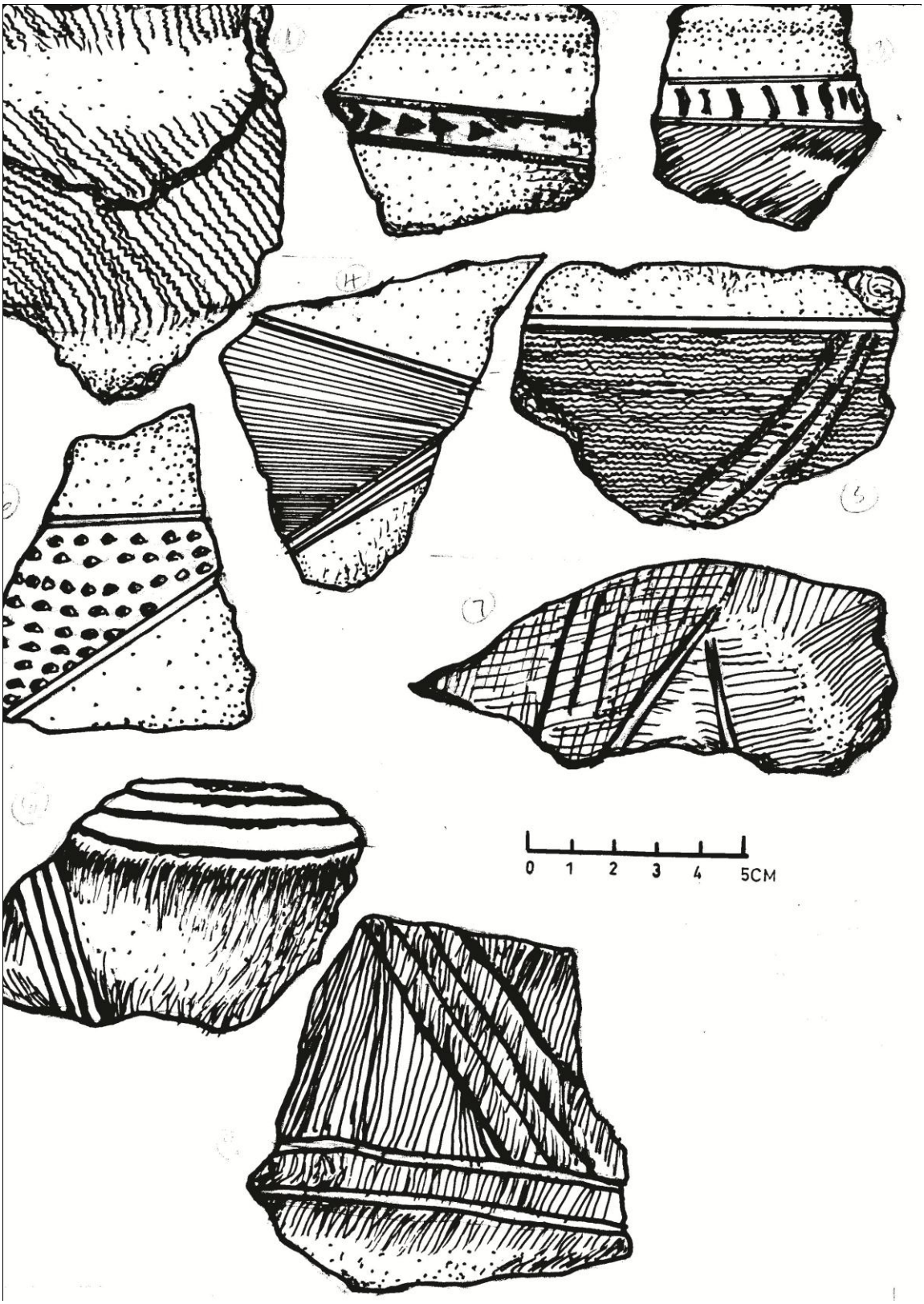


Figure 62: Illustration of the various decorative techniques from mound D.

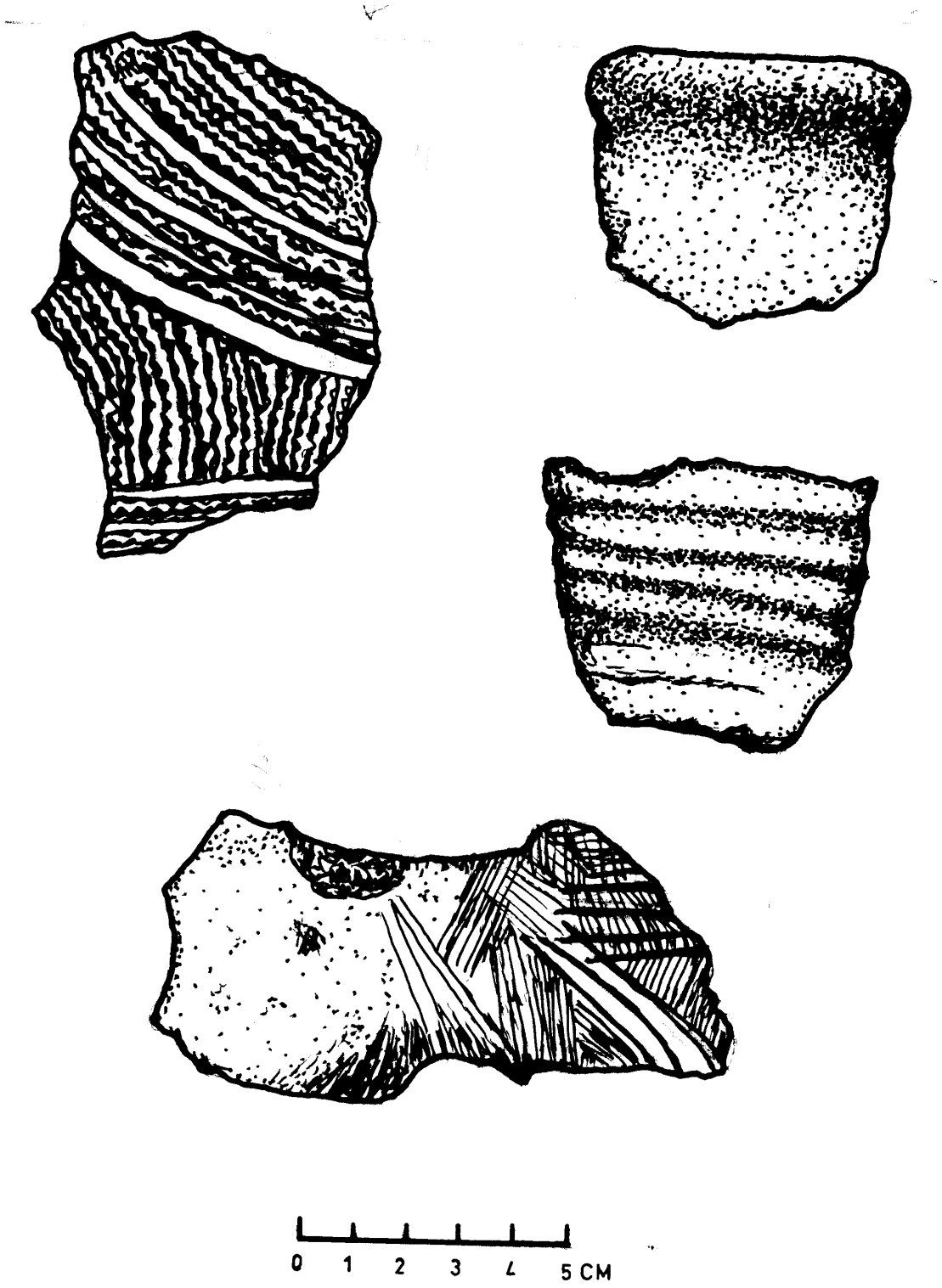
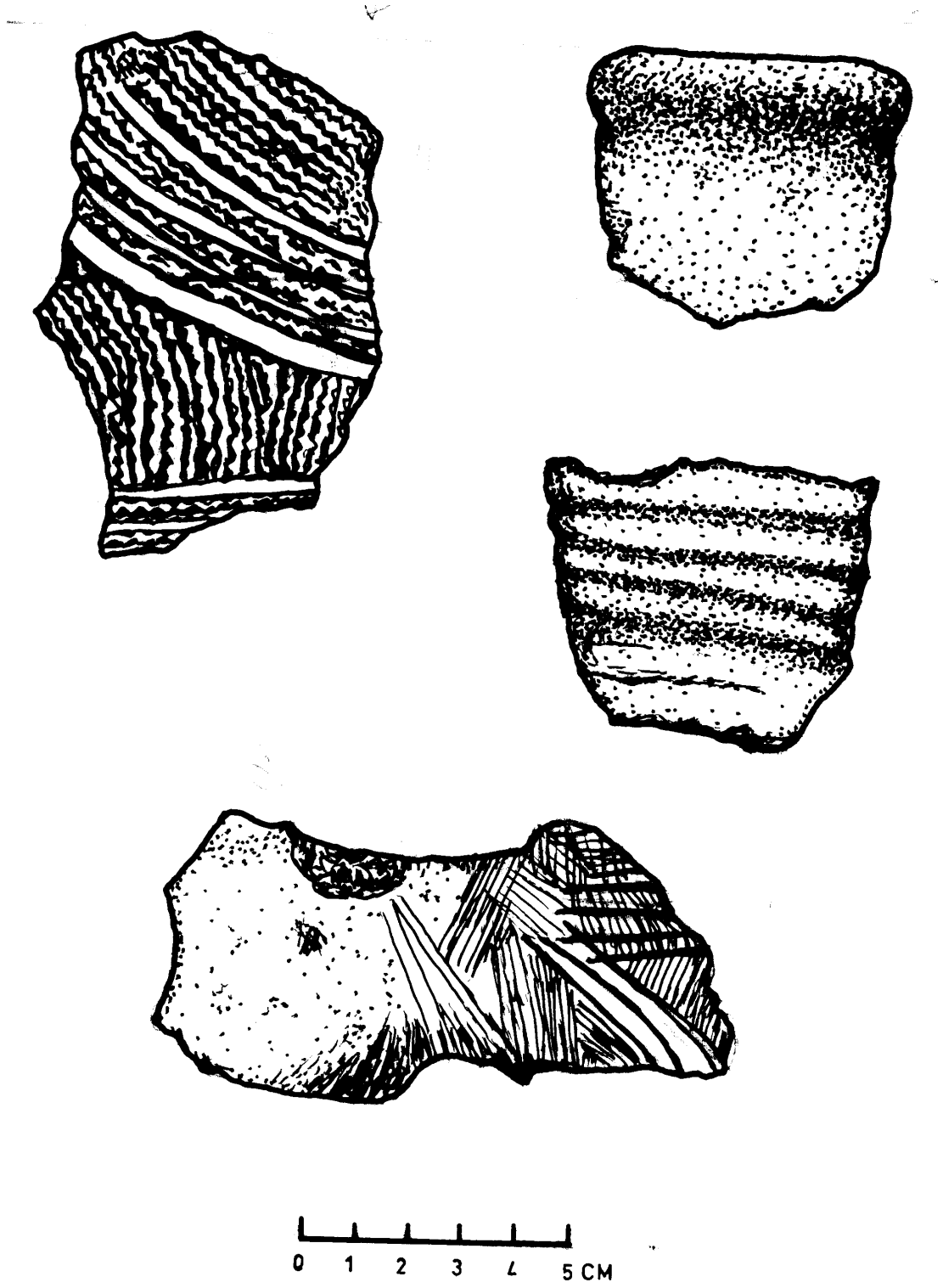


Figure 63: Illustration of the various decorative techniques from mound D.



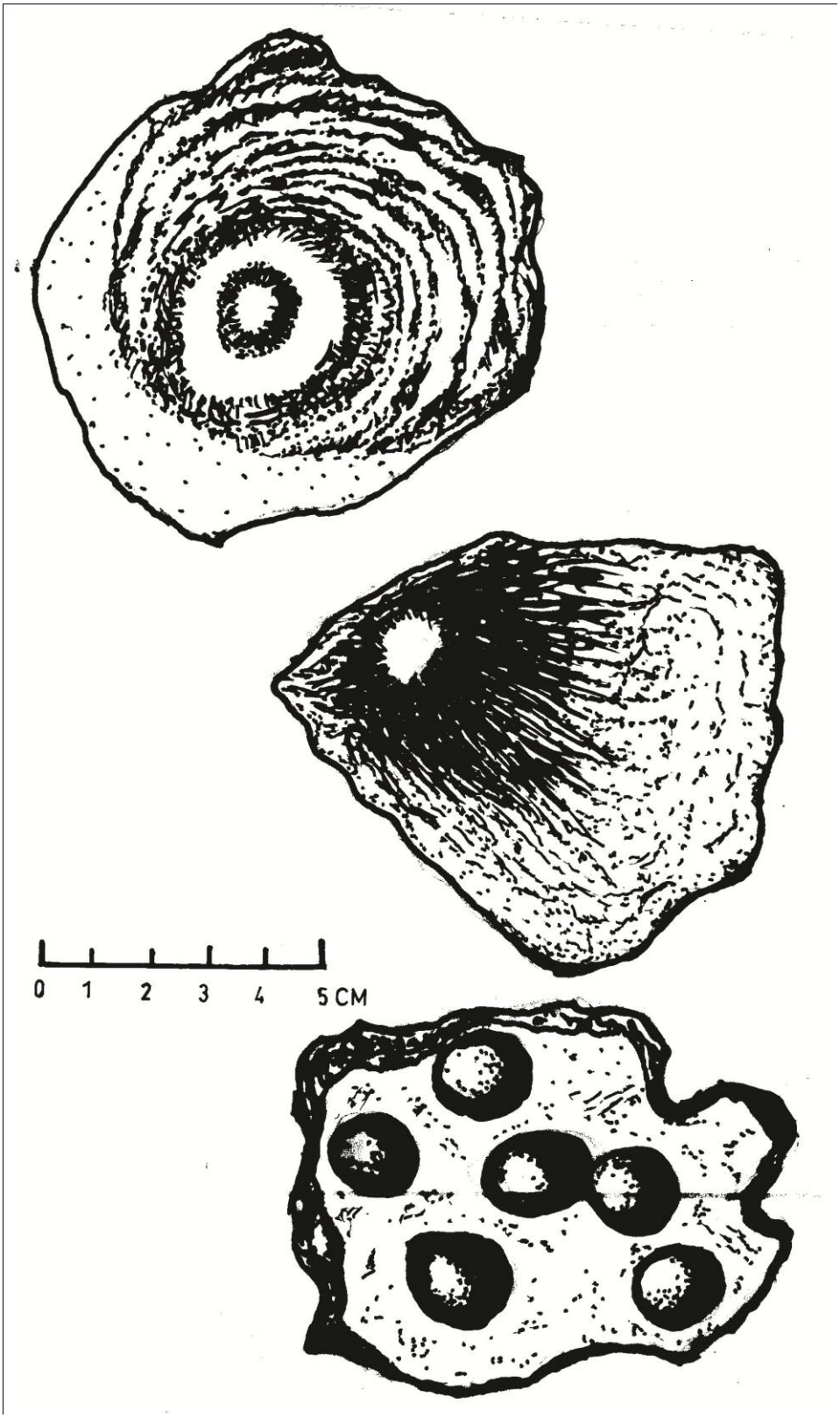


Figure 64: Illustration of pedestal base and perforated base from mound D.

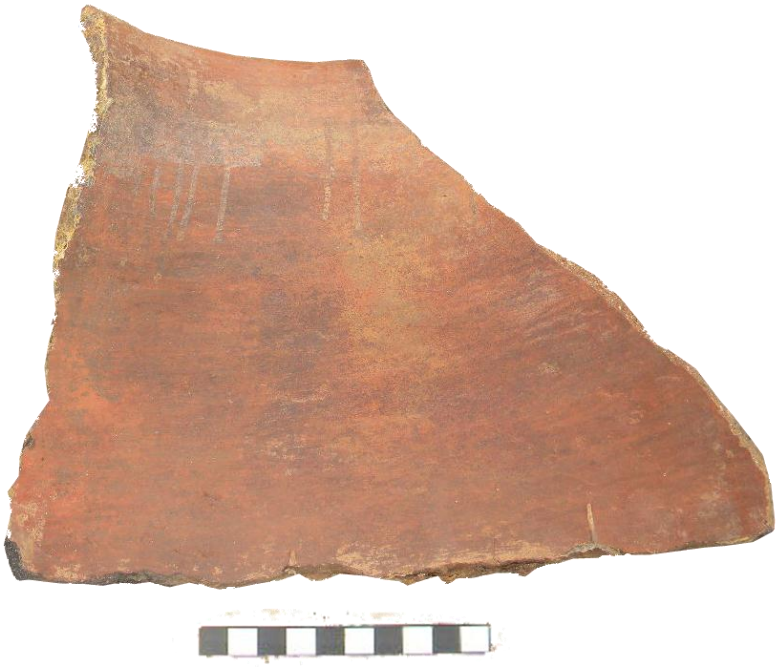


Figure 65 Photo of potsherd showing coil technique of moulding

Both the physical and chemical examination of the excavated ceramics from mound D shows similarities between the characteristic of the paste used. The above shows preliminary evidence in support of a possible use of common source of clay raw material for the vessels. But the only difference is seen in variability in decorative designs as shown in (fig 62&63). The excavation of mound D at Yikpabongo has added to the existing data on ceramic from the Northern half of Ghana. On the basis of chronology per the radiocarbon date, Yikpabongo is within Daboya but it pre-dates Banda, Tong Hills, Tando-Yikora and Birifol-Sila sites. Also, similarities were observed between these sites in terms of methods of constructing the vessels, thus all were hand built.

There were further similarities in terms of surface treatment, vessel forms, rim and base forms and decorative techniques of the ceramics studied. For instance, the Daboya wear and use of the red slipping, roulette, incision, punctation and groove decorations which are either single or a combination

(multi-decoration) are similar across the northern sector and the sub-region as a whole. These were as a result of trade contact, migration and intermarriages among ethnic groups (Shinnie & Kense 1989, Anquandah 1989, Saako 2009, Mohammed 2010 & Insoll et.al 2011). Another way of interpreting the above trend could probably be that potting is a way the makers express their ideological (philosophical) and religious thoughts. Since the people in the Northern sector of West Africa in general and Ghana in particular share common beliefs, values, norms and tradition the similarities manifested in their material culture (ceramics) was inevitable.

In other words, ceramic objects such as bowls and jars have been the medium used by human societies to express symbols, beliefs and identity (Rowe 2003:1). From the above discussions, the vessel form, decorative styles and possibly the functions of the ceramic vessels are the visible output of the joint effort of the potters in the society to carry social and ideological messages based on the production and use of these vessels. They are not just excavated vessels or relics but rather a representation of the ancient culture and history of their makers and the users. This attests to Crossland's (1989) assertion that "ceramics should not be regarded as mere physical objects to be classified to bring order to a large and otherwise confusing body of data but must rather be regarded as cultural and historical objects with a potential for the reconstruction of the cultural history of its users". Another scholar, Hodder (1982) is of the view that "the meaning of decoration on prehistoric pot and paintings may be symbolic codes within the social structure, therefore symbolic structure and social function must be considered as interdependent".

4.3 X-ray fluorescence elemental analysis

X-ray fluorescence spectrometry analysis was done to analyze the samples retrieved and soils or raw material used at the mound D site of Yikpabongo. This technique or analytical method was only used to determine the elemental composition (mineralogical analysis) of inorganic materials (especially

ceramics) by analyzing the major oxides and minor elements in a tabular form to facilitate comparative studies and evaluation (Schwartz 2010:44). X-ray fluorescence spectrometry analysis was chosen as the appropriate technique to determine the origin of the ceramics retrieved from the mound D site at Yikpabongo.

This analysis was based on an assumption that the excavated ceramics were either from Yikpabongo, Fumbisi or elsewhere. That is, if the excavated ceramics were not made from raw materials derived from Yikpabongo or Fumbisi, then it might have been imported from any other community apart from the two. Appendix I details the results of the X-Ray Fluorescence analysis done by an expert at the Geological Survey Department of Ghana. Each of the samples was listed with the specific elements for the major oxides measured in percentage (%) and minor elements stated in 'part per million (ppm). For this study, both the major and minor oxides were considered for the analysis.

The report entails the analysis of all the ten samples retrieved from the excavated trench. Data from these finds were grouped together and an average calculated to represent one variable. Data relating to the five samples of soil taken from the excavated trench were also grouped together and averaged to represent another variable (soil from excavated trench). Finally, the clay sample from Fumbisi was also analyzed in similar manner as the final variable. The major oxides were considered separately from the minor elements. Statistically, an average (that is, the addition of all the individual elements divided by all the elements for the entire sample) was extracted from each set of data before an average deviation was computed.

Furthermore, standard deviation was computed for all the data before the Pearson correlation coefficient was determined. The correlation coefficient is a measure of the relationship between two variables. It defines whether two sets of data are positively related or negatively related. Sometimes

the product suggests that the variables are unrelated at all. This approach to interpreting data is universal and widely used by researchers. The products of these relationships could provide a guide to determine the similarities and differences between the clay and soil samples and the excavated ceramics.

Standard deviation in this contest is a statistical measure of precision in a set of numbers using values clustered around the mean (Schwartz 2010:44). The comparison of the average and standard deviation of each element for both the excavated ceramics and the soil samples could suggest the source of raw materials for the excavated ceramics. The ceramics retrieved from the trench was compared with both the elements of the soil and that of the clay sample from Fumbisi.

A number of conclusions were drawn from the analysis of the X-ray fluorescence data for this study. First and foremost the percentage of S_1O_2 and the ALO_3 of the major oxides indicated a ratio of 2:1. Therefore the type of clay used can be said to be 2:1 type of clay. Secondly, a high percentage of that S_1O_2 element present in the excavated ceramics is an indication that the vessels were fired below 900^{o}C (Adjadeh November 2012 personal conversation). Thirdly the XRF data suggested that there is a very strong relationship (correlation coefficient) at a level of 0.82 between the excavated ceramics and the clay samples from Fumbisi for the major oxides (Salkind 2011:88). This is undisputedly high suggesting that the vessels were either made at Fumbisi and transported or imported to Yikpabongo or the clay for making the ceramics were acquired from Fumbisi and used for the craft at Yikpabongo.

However, there was equally strong relationship between the soil sample and the excavated ceramics from Yikpabongo at a significant level of 0.61 indicating that only 0.39 of the correlation was unaccounted for. The above relationship presents a complication that needs to be examined carefully. Firstly, it is possible that since Fumbisi and Yikpabongo are in the same geographical area a common

or similar geological structure or parent material supported the formation of the respective soils. However, differences in weathering and other influences on the land might have affected the homogeneity of the respective soil properties. The above could account for the difference in coefficients.

Another dimension is that the finds had been processed before usage and also stayed longer in the soil and might have had their original properties affected through chemical changes or metamorphosis hence the disparities. The X-ray fluorescence data suggest that there were higher micro elements in the excavated ceramics as compared to the macro elements. This was probably due to addition of tempering materials or red slipping by potters, or effects of usage, weathering or leaching which led to loss of mineral substances in the vessels buried in the ground.

Furthermore, the relics also correlated positively with the soil sample from the excavated trench, one would therefore want to ascertain whether the soils from the trench could even be a probable source of raw material. This argument is strengthened by the fact that landmass or soil of an area may not be homogeneous and for that matter if a different clay site in Yikpabongo had been used, soil sample from the excavated trench may not be a perfect source of proof of raw material for their manufacture. Another argument is premised on past migration, that is, the ancient community was occupied by people from Fumbisi who migrated to Yikpabongo with their vessels (Schwartz 2010). It is possible that migrants from Fumbisi or a place where the soil properties which were found in the relics existed had migrated and settled at the site of research. This could have produced similar results.

In-spite of these arguments, the data gathered from the research and subsequent results from the statistical interrogations is conclusive. This position underpinned current practice at the research site as far as ceramic acquisition and usage is concerned. The above position is also strengthened by the

strong relationship between the minor elements of the excavated ceramics and the clay from Fumbisi with a significant level of 0.62. This indicated that either the vessels were imported from Fumbisi or the clay raw material. Also the result of the X-ray fluorescence analysis indicated the excavated ceramics were statistically similar and suggested that the clay raw materials used to construct the vessels were from the same origin (Schwartz 2010:50).

The findings from above goes a long way to answer the research questions on the source(s) of raw materials used for constructing the excavated ceramics. In a nutshell, the above analysis illustrated that the excavated ceramics were probably imported from Fumbisi. As indicated above, the X-ray fluorescence data analyzed for this study for the excavated ceramics, soil and clay samples both, the major oxides and the minor elements indicated that Fumbisi was probably the source of the clay used for the excavated ceramics. In all twelve (12) different elements in concentration of percentage (%) and twenty (24) mineral elements in concentration of part per million (ppm), the clay sample from Fumbisi showed strong relationship in correlation between both major and minor elemental concentrations to the excavated ceramics which indicate that the vessels were imported or produced at Fumbisi. Thus they were not native to the soil in which they were excavated. In other words, the excavated ceramics have a closer resemblance to the clay from Fumbisi than the soil in which they were found. The use of X-ray fluorescence as an analytical technique to determine the source of the raw material and where the excavated ceramics were manufactured has been unearthed by this study. Another important analytical process which is dealt with in the ensuring section is based on technological and stylistic attributes of excavated ceramics.

The following features and eco-facts are additional discoveries that were added to the existing data to aid reconstruction of the history of the people of Yikpabongo.

4.4 Features: Postholes

Four postholes were recovered between 5cm – 25cm of trench I on the northern part of mound D (fig 18). It was probable that postholes were made for structures erected in front of rooms and at the center of a house for shade or to provide a veranda. Also, sheds were erected as butchering sites for roasting and drying game meat by hunters or serve as a grinding site for traditional medicine. Lastly, it was also possible that the postholes were used to construct a Kraal for the cattle which were on the top of the mound.

4.4.1 Burial

Another unique feature about this excavation of the settlement mound was the discovery of a human burial at the depth of 163 cm which was a sterile level consisting of lateritic soil. The burial was covered with thick and large potsherds with roulette decorative impressions. There were two metal rings around the leg of the skeleton. A similar human burial, covered with large fragments of ceramic were encountered in Birifoh-Sila Yiri. This has provided insight into the function of ceramics and the burial practices in the past (Saako 2010).

4.4.2 Floor

A feature reminiscent of the floor of a house appeared at a depth of 56 cm. This was an evidence of indigenous architecture. The study revealed that the floor "zinge" was probably made by beating the ground with wood as in pounding to create a compacted gravel surface which was probably polished with a vegetable solution. This architectural design attested to the relatively high level of architectural techniques and skills in the past. .

4.7 Special finds

The special finds in this context consist of all other finds except stones, pottery and features. In the trench I, level 3 produced a pebble, while at a depth of 128cm an extensive layer of ash was discovered.

The ash layer probably signified a refuse dump or a place where ash from the hearths or the cooking area were deposited. Also at a depth of 40cm – 60cm, a burnt daub was retrieved and this was probably served as hearth. The southern trench produced the following special finds: at the depth of 40cm - 60cm traces of charcoal were uncovered; 3 pieces of stones with mica and 2 pieces of stones with silver-like substances were found. Further, eleven (11) pieces of ash pellet were retrieved at a depth of 100cm – 120cm.

Also there were 36 pieces of oyster shells *(praeexogyra acuminata*) probably have been acquired from the local stream. This was an indication that the people in the past exploited or relied on the streams in their surrounding for their livelihood. Oyster shells were also recovered in Birifoh-Sila Yiri which was used for food (Saako: 2010). Lastly, 55 cow bones and 7 cow teeth were discovered from the archaeological record which was an indication of the use of livestock.

4.7 Stone

The excavation yielded large quantities of stone objects and these can be classified as rocks, grinders and grinding stones. There were three different kinds of grinding stones uncovered during excavation. The first one has a flat surface and could be a grinding medium for nut and cereals. There was a second type which has deep galley and a ball-like grinder. The third type had a shallow galley with a ball-like grinder and as such, could be used for food processing or milling vegetables and nuts. The rocks that were discovered from the excavation were probably derived from the muscovite biotite schist rocks around the village. Some of the rocks were used to support the post holes. Similar examples were found in the 1985 excavation (Anquandah 1998).

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1 Summary

The main thrust of this thesis was to evaluate ceramics as product of technology and decorative art from the archaeological records at Yikpabongo. This project examined how ceramics can reflect and constitute technology and art through-out the potting process. The study was aimed at analyzing the data on ceramic technology and decorative designs, establish ceramic typology based on the evidence of technological and decorative attributes and lastly, to ascertain the source of clay raw material for the excavated ceramics from Yikpabongo. Specifically, the study answered questions on the attributes of the excavated ceramics, source of clay used, tempering material used if any, method employed for the construction and firing of vessels, and the importance of ceramics in the life of the ancient people.

The study used archaeological excavation as the main research method in assessing the materiality of mound D at Yikpabongo. Samples of the excavated ceramics were also analyzed using X-ray fluorescence spectrometry, the Pearson correlation co-efficient and the Microsoft excel office tool for the statistical analysis. The findings from the archaeological excavation were ceramics, stone boulders, bones, daub, metal ring, grinding stones, ash pellet, pebble, grinders (quern) oyster shells and teeth. The features found include postholes, floor and a human burial. The excavation yielded 3,024 potsherds and these were analyzed. Large quantities of the potsherds were undecorated, type of the excavated potsherds were body, rim, pedestal base and perforated.

Everted, inverted and direct rim forms were identified. The surface treatment technique discovered were red-slipping, burnishing, dyeing and hand smoothing. Decorations on the excavated ceramics

consist of groove, incisions, punctates, roulettes and channeling. The surfaces of the potsherds were eroded, rough or smooth. The colour on the surface of the potsherds were brownish red, brown, black, red, gray yellowish brown with fine, medium and coarse paste. The thickness of the body potsherds ranges from 0-3.9cm which is an indication that the ancient people produced and used large storage vessels. This argument is strengthened because large quantities of potsherds were decorated with the roulette impressions.

Also, the presence of red slipping as form of surface finish and decorative techniques both on the exterior and the interior of the vessels is to make the vessels more watertight which can be used to store liquids. Similarly, the large quantities of body sherds and the sizes of the excavated potsherds is an indication that large storage vessels were used. Two types of vessels identified were bowls and jars. . The results of the X-ray fluorescence indicated that Fumbisi was the most likely source of the clay used to manufacture the excavated ceramics.

The ethnography conducted at Fumbisi revealed that vessels were hand-built using the coiling method and they were fired in open fire. Clay raw materials and tools for potting are acquired locally and is a preserve occupation for women. Also quartz and mica inclusions in the paste occurred naturally in the clay. Food processing, serving of food, storage of (cereals and grains), smoking of meat and sieving or washing of vegetables were the probable function of the vessels in the past. Also ceramic vessels are used in shrine context. The discovery of the ceramic objects in the household midden context indicated that they were associated with domestic life hence, mound D can be said to be a settlement mound with a radiocarbon date of 5^{th} to 7^{th} century AD.

5.2 Conclusion

Ceramic studies continue to be the leading source of data to archaeologist in their bid to study pre-historic societies. This study was set out to explore and describe the technological perspective of ceramic tradition in Yikpabongo with the goals of identifying technological attributes, decorative treatment, establishing ceramic typology and tracing the source of clay raw material used for the excavated ceramics. Archaeological survey was the main method used for the data collection process. The concept employed for this is that ceramic technology and artistic decorations are the manifestation of the interaction or interrelation between societal goals, ideology and human capabilities on one hand and their environment on the other hand.

Technology and artistic decoration, societal goals, ideology, human capabilities and the environment are manifested in the unique pottery vessels and other aspects of the culture. The meanings behind the production of these things often vary from place to place. These are based on the ideology and what the goals of the society are: That is what the people want to achieve from production determines the particular technology. Also the type of society and their cognitive aspiration of the potter influence the vessel form, type of decoration, construction method as well as function of vessels they produced. The artifacts are the fossilized ideas of the culture which produced them and this can provide behavioral pattern of a particular culture.

The Koma area society seems to have skilled artisans in ceramic production both in domestic wares and figurative arts for religious, cultural festivals, funerals and social life. The society was made up of smelters, smiths, potters, jewelers, carvers and millers. Similar techniques are displayed in the decoration of pottery vessels and also on the figurative arts. Anquandah (*In prep*) notes that, "the new and unique aesthetic current characterized by the exquisite portrayal of the clay medium of a complex of geometrical forms and motifs – cones, pyramids, cuboids, cylinders, triangles and circles in a way

that is unparalleled and in any other culture or civilization in West Africa. All these are embedded or rooted in the worldview of their makers.

The outstanding potting tradition of the people of Yikpabongo in Northern Ghana provides an insight into their artistic culture in the past which flourished and has now has disappeared. There is evidence of such artistic inclination of the potters by looking at the variability in forms, decorative motifs and surface finish of the excavated vessels. In terms of the figurative art, there was a wide range of decorative motifs/pattern which included incisions, grooves, punctates, string and carved roulette impressions, red slipping on the surfaces of the excavated vessels. In terms of surface colour, the presence of iron in most clay has significant effect. The ceramics mostly appear in orange, orange red or brownish orange as a result of the use up of iron compounds in the clay during the firing process. In the area of plastic decoration such as incision, impression, stamping, punctating and grooving the ceramics exhibited decorative techniques, which were probably made by similar people or people with similar ideology, culture, religion or beliefs.

Also, the decorations may probably relate to the practices of body scarification (body marking) of the people of Northern Ghana. This is often represented as incised patterns on ceramic objects. Parallel, vertical and diagonal lines mostly found on the body of the people are represented on the upper part of the vessels. Furthermore, a multiple decoration techniques characterized by roulette impressions on incision punctate and stamping also mimic the form of body adornments. Furthermore, burnish and red-slip surface treatments are visible on vessels. These surface treatments and decorative arts were appropriated, transformed and recontextualized by the makers of these objects from Yikpabongo and were used for the creation of their identities. The intent behind the reproduction of specific motifs signifies that a meaning was attributed to them making them functionally symbolic and not just a decorative technique.

Also each culture possesses mental template or ideas as to the proper form its product should take, decorative pattern on pottery vessels are also expressions of these mental templates. The ceramic technological processes are surrounded with myths and taboos. These are a predominant feature of the ideology and cognitive practices of most ancient societies and Yikpabongo is not an exception. Therefore the excavated potsherds and decorative designs on them are not just aesthetic looking containers but a reflection of societal myths, taboos and ideology governing the potting process.

This study also combined both the traditional and the technical (scientific) approach for the analysis of the excavated ceramics. The attributes used in the analyzing the excavated ceramics were paste characteristics, vessel form, vessel colour, wall thickness, decorative style, temper and surface preparation/treatment which has provided very useful information about ceramic tradition in Yikpabongo. Ceramics, stone boulders, bones, grinding stones, grinders, oyster shells, cattle teeth, postholes, floor and a burial are an indication that the mound probably was a settlement/habitational mound which has provided useful insight into the nature of the possible livelihood that characterized the past community. This has broadened our horizon about the use of space in ancient Yikpabongo.

Also, the radiocarbon date of 5th to 7th century AD obtained for the excavated mound has brought a new dimension to the chronology of the ancient Yikpabongo when compared with previous work in the area, because it suggests an earlier occupation than what had been uncovered by previous studies. The span of a Century is significant to suggest that life had existed at Yikpabongo before the 6th Century AD date uncovered by previous research. It can be said that Archaeologically Yikpabongo is a site which had mounds for ritual, burial and settlement areas.

Ceramic production as an indigenous industry makes use of indigenous raw materials and tools which is difficult to find in the archaeological records. However, from the X-ray fluorescence analysis and

the subsequent correlation computation it was evident that the ceramics retrieved from excavation related more positively with the clay from Fumbisi than the soil sample from the excavated pit. It could therefore be inferred from the X- ray fluorescence analysis that the ceramics were not produced locally. This position is strengthened by the fact that people at present day Yikpabongo go as far as Fumbisi to procure or acquire ceramic wares for domestic and other uses.

Also from the X-ray fluorescence analysis and the subsequent correlation computations one is tempted to conclude that the ceramic wares retrieved from the excavated trench were either manufactured at Fumbisi or the clay for making the ceramics were acquired from Fumbisi and used for the craft. Given the fact that the relics also correlated positively with the soil sample from the excavated trench a complication arises as to whether the soils from the trench could even be a probable source of raw material. This argument is strengthened by the fact that landmass or soil of an area may not be homogeneous and for that matter if a different clay site in Yikpabongo had been used, soil sample from the excavated trench may not be a perfect source of proof of raw material for their manufacture.

Another argument is premised on past migration. That is, it is possible that migrants from Fumbisi or a place where the soil properties found in the relics existed had migrated and settled at the site of research. This could have produced similar results. In-spite of these arguments, the data gathered from the research and subsequent result from the statistical interrogations is conclusive and this position underpinned current practice at the research site as far as ceramic acquisition and usage is concerned.

Furthermore, from the ethnography and the physical examination of the large potsherds and the pot, it was revealed that the vessels were hand-built using the coiling method, as there were marks of coils in the interior of the vessel fragments. What was also clear was that the same technique was employed

for different kinds of vessels (both bowls and jars) this technique is similar to the findings in the earlier work in the area. It was also realized that ceramic objects are very important in the past life of the people of Yikpabongo. This is because the excavated mound D depicted a household, therefore looking at the quantity of sherds and the level of variability in terms of decoration and forms, it can be inferred that ceramics were very important object to the people.

That is, ceramic products were / are used for various purposes spanning religious to domestic affairs. From the analysis of rim form, rim diameter, thickness of potsherd walls, height of vessel and the potsherd type, it can be inferred that the vessels were used for storage purposes (both liquids and grains), food processing, serving, medicinal, the perforated vessels were for smoking and washing vegetables. These functions are similar to the data from the previous works on ceramics at the northern sector of Ghana. The discovery of the human burial covered with large potsherds also gave insight into a very important function that ceramics served – that is, they were used for mortuary or burial purposes.

The material culture can be said to be associated with a house or settlement mound when compared with the material culture associated with the stone circle mounds published in previous research. It was observed that terracotta figurines which are synonymous with Yikpabongo were totally absent from the relics discovered from the mound. This observation brings a new dimension to the research work at Yikpabongo in terms of the use of space. Further, the site was a complex one indicating human life ways such as food processing, burial practices and the use of domestic space.

Also the radiocarbon date of 5^{th}-7^{th} century AD obtained from mound D has brought a new dimension to the chronology of the ancient Yikpabongo when compared with previous work about the area, because it suggests an earlier occupation than what had been uncovered by previous studies. The span

of a century is significant to suggest that life had existed at Yikpabongo before the 6th century AD date uncovered by previous research. It can be said that archaeologically, Yikpabongo is an area (site) that had mounds which served as shrines (ritual), burial and settlement purposes.

This study has revealed that the chemical composition analysis of the excavated ceramics, clay and the soil from the excavated profile using X-ray fluorescence spectrometry and other similar techniques can provide useful insight for archaeological interpretation. The strength of this approach over conclusions based on physical examination of the potsherds is that it allows for an inter-disciplinary approach to the evaluation of finds before conclusions are drawn. With this approach it has been possible to establish past trade network or socio-economic interactions between the people of ancient Yikpabongo and Fumbisi. Above all, the detailed analysis of the general characteristics of the artifacts, eco-facts and the ethnographic data, the study has provided insight into ancient food processing, consumption, storage (cereals, grains and liquids) of the dwellers of mound D at Yikpabongo.

This study shows a very strong correlation between the excavated ceramics and the clay from Fumbisi. What this research has not made clear is the geology of the region. Further research is needed to clarify the relationship that existed between ancient Yikpabongo and Fumbisi by the technical/scientific approach. There is little doubt that information yielded by such an approach can enable a better and further conclusion. Also further study should focus on the excavation of the entire mound to have a complete assemblage of data associated with the occupational mound. Finally, forensic analysis could be applied or used to evaluate the human remains uncovered during the excavation to establish clues that will help to reconstruct the past of Yikpabongo and also postulate what the mound represented in that ancient settlement.

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AAPENDIX I

GEOLOGICAL SURVEY DEPARTMENT

DATE

X-RAY FLUORESCENCE LABORATORY RESULTS **30/05/2011**

Major Oxides from Yikpabongo

ELEMENTS (%)	POTSHERD SAMPLES			SOIL - YIKPABONGO			CLAY - FUMBISI
	AVG	AVG DEV	STAN DEV	AVG	AVG DEV	STAN DEV	AVG
Na_2O	2.29	0.50	0.64	1.36	0.76	**1.11**	2.13
MgO	2.18	0.22	0.34	2.31	0.46	0.55	1.89
Al_2O_3	18.27	1.76	2.11	11.97	6.32	7.52	19.85
SiO_2	42.69	2.95	3.73	41.06	13.04	18.08	57.09
P_2O_5	0.62	0.35	0.44	1.50	0.86	1.08	0.77
SO_3	0.05	0.02	0.03	0.12	0.13	0.19	0.07
Cl	-	-	-	-	-	-	-
K_2O	1.51	0.25	0.38	0.99	0.44	0.58	1.62
CaO	1.30	0.24	0.35	14.46	14.77	18.98	1.12
TiO_2	0.09	0.03	0.04	0.32	0.18	0.26	0.70
MnO	5.51	0.69	0.82	1.80	2.74	3.83	0.11
Fe_2O_3	0.49	0.08	0.10	2.31	1.34	1.84	4.61
L.O.I	25.12	2.41	3.30	21.86	6.23	7.70	10.10
TOTAL	100.06	0.44	0.65	100.05	0.16	0.20	100.06

CORRELATION (STAN DEV)

Potsherds versus Soil from excavated pit at Yikpabongo	**0.611294723**	**0.61**
Potsherds versus Clay Fumbisi	**0.817921315**	**0.82**

Appendix I
(continued)

X-RAY FLUORESCENCE LABORATORY RESULTS **DATE 30/05/2011**

Minor Elements I from Yikpabongo

ELEMENTS (ppm)	POTSHERD SAMPLES			SOIL - YIKPABONGO			CLAY - FUMBISI
	AVG	AVG DEV	STAN DEV	AVG	AVG DEV	STAN DEV	AVG
V	306.90	43.48	59.78	394.00	170.40	257.14	860.0
Cr	471.70	217.64	256.46	324.80	143.04	170.95	374.0
Co	33.61	4.71	6.16	26.94	8.73	11.45	35.6
Ni	29.73	5.86	6.51	31.98	19.49	27.69	22.6
Cu	36.63	11.94	14.28	28.02	8.50	9.95	28.8
Zn	53.56	6.37	7.52	60.82	10.98	14.09	46.0
Ga	19.90	1.82	2.13	13.98	7.34	8.68	16.6
As	1.51	0.43	0.53	1.48	0.77	1.13	2.3
Rb	48.00	10.76	13.54	42.72	21.50	26.01	87.1
Y	332.54	115.51	141.28	796.74	499.11	601.31	125.1
Zr	3.08	2.97	4.20	4.12	3.67	5.21	8.1
Nb	173.06	59.93	89.61	325.86	200.13	237.13	620.0
Mo	7.10	3.04	4.01	8.40	11.57	7.67	16.4
Sn	3.24	0.51	0.70	3.74	0.46	0.26	4.3
Cs	8.11	0.21	0.27	7.50	0.36	0.21	7.3
Ba	1,163.00	368.40	469.89	711.62	294.99	194.09	592.1
La	22.83	9.12	12.62	18.82	10.30	6.93	15.0
Ce	53.99	26.61	36.09	65.76	75.33	53.19	59.0
Hf	6.61	0.85	0.96	12.14	6.57	4.36	17.5

Ta	6.63	0.82	0.97	6.86	1.89	1.11	6.4
Pb	3.89	2.67	3.22	7.24	11.08	6.41	15.9
Bi	1.38	0.08	0.09	1.62	0.23	0.23	1.5
Th	1.72	0.67	0.89	2.08	2.21	1.43	3.0
U	7.17	0.60	0.79	7.40	3.05	2.79	6.3

CORRELATION CO-EFFICIENT	STANDARD DEVIATION	
Potsherds versus Soil from excavated pit at Yikpabongo	**0.529049**	**0.53**
Potsherds versus Clay Fumbisi	**0.622068**	**0.62**

Appendix II

BETA Received Due Submitter No. Service Material Pretreatment Measured Age 13C/12C Conventional Age 2 Sigma Calibration.

Report Completed
274105 YK10410B AMS-Standard delivery (charred material): acid/alkali/acid 1470 +/- 40 BP -24.9 o/oo 1470 +/- 40 BP Cal AD 540 to 650 (Cal BP 1410 to 1300)

274104 YK103N10L2 AMS-Standard delivery (charred material): acid/alkali/acid 970 +/- 40 BP -26.0 o/oo 950 +/- 40 BP Cal AD 1010 to 1170 (Cal BP 940 to 780)

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----- End forwarded message -----

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Appendix III

FIELD RECORD FORM

SITE……. DATE……

UNIT…….. RECORDER…….

LEVEL……... EXCAVATOR…….

Description…….. Photographs……..

Depth……..

DESCRIPTION OF SOIL (Include colour, texture, charcoal content).

SUMMARY OF ARTIFACTS (Draw significant finds).

ADDITIONAL FIELD OBSERVATION (Note features, disturbance).

INDICATE NORTH SCALE KEY

Sherd Type	**Rim Form**	**Colour**	**Sorting**	**Temper**	**Surface preparation**	**Surface Treatment**	**Decoration**	**Use Wear**	Form Type
1.indeterminate	1. Uncertain	1. Eroded	1.Well-coarse	1. Uniform	1. Eroded	1. None	1.Undecorated	1. None	1.indeterminate
2. Rim	3.Direct/Vertical	2. Black	2.Well-mad	2.Rounded	2. Rough	2. Eroded	2.Shallow groove-incision	2. Charring Int	2. Cup: Small Vessel
3. Neck	4. Everted	3. Gray	3.Well-fine	3. Sub-angular	3. Evened	3. Slightly Burnished	3. Incising	3. Charring Ext	4. Medium Pot Fragment
4. Shoulder	6. Inverted	4.Yellowish orange-brown	4.Poor-Coarse	4. Angular	4. Smooth	4. Burnished	4. Punctation		5. Large pot Fragment
5. Body		5. Red	5.Poor-mad	5. Micaceous	5.Eroded& Smooth	5. Micaceous	5. Applique	4. Charring int&ext	6. Carinated
6. Base		6. Red to Red Black	6. poor-fine			6. Smudged	6. Raised bands	5. Fire red int	
7. Pedestal		7. White				7.White Slipped	7. Straited	6. Fire red Ext	
8. Leg		Brown				8. Red Slipped	8. Roullette Stamped	7. Fire red int & ext	
9. Handle						9. Slipped &Burnished	9. Stamped	8. Abr	
10. Spait		**PAST**					10.Cord-Mark	Added/War n surface	
11. Lid		20.. Same External					11. Burnished		
		21. Same Internal					12.Hand-paint		
		22. Ssame Throu out					13.Wide groove		

		23. Ext & int. present					14. Stamped groove		
							15. perforated		
							16. Multiple Decoration		
							17. Eroded		