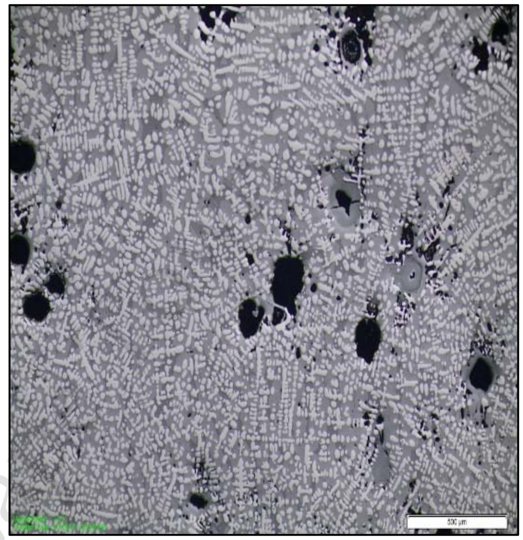
ARCHAEOLOGY AND ARCHAEOMETALLURGY IN LIMPOPO PROVINCE OF SOUTH AFRICA: CASE STUDIES OF EARLY IRON AGE SITES OF MUTOTI AND THOMO



Thesis presented for

The Degree of Doctor of Philosophy in the Department of Archaeology

UNIVERSITY OF CAPE TOWN

By

NDIVHUHO ERIC MAṰHOHO

Supervised by

PROFESSOR SHADRECK CHIRIKURE

May 2020

Abstract

Decades of archaeological research have established the chronology of the history of culture by farmers in northern South Africa from the beginning of the first millennium AD to the recent past (1900). This thesis sought to explore the archaeology and archaeometallurgy of the early inhabitants of the Lowveld region. Rigorous methodological and theoretical approaches, which include Ethno-Historical, archaeological and archaeometallurgical studies, were employed to acquire the relevant information required to address research problems. Ceramic typology and settlement pattern studies were used to establish the culture-history to contextualise Iron Age sites, while Optical Microscopy, X-Ray Fluorescence analysis (XRF) and Scanning Electron Microscopy (SEM) were used to investigate the metallurgical remains to understand metal production technology. Both Mutoti and Thomo sites share several similarities, namely, they are situated near the perennial streams, the presence of metal-production sites and the predominant pottery types, consisting of short and long neck vessels dominated by comb stamping, incision and punctate decorations on the rim, neck and shoulder of the vessels. Ceramic tradition analysis revealed that both Mut 2 and Thomo combine ceramic designs and attributes that appeared in the region near the beginning of the first Millennium AD, that is the Urewe and the Kalundu traditions. Garonga Phase tradition developed from the Urewe tradition which represent the first facie, represented by the Silver Leaves sites of the Kwale branch ceramic tradition which dates to AD 280- 420 and the Kalundu tradition (which starts from Happy Rest and progresses to Diamant - Phase 2) which dates from the sixth century AD, both traditions share distinctive ceramics styles and decoration attributes (Burrett, 2007; Huffman, 2007). The radiocarbon-based chronology suggests that Mut 2 and Thomo sites were occupied contemporaneously and dated to AD 650-850. Analysis of the distribution of materials objects across Mut 2 site revealed active participation in both local and international trade network (Soapstone and Islamic ceramics) operated at a village status. Some of the craft production related evidence include metal production, eggshell beads and cloth manufacturing. Metal production was regarded as signature of power and authority in Iron Age period (Herbert, 1996). More research may strengthen this observation.

Key Words: Iron Age, Farming communities, Ceramics, Archaeology, Archaeometallurgy, XRF, SEM

Declaration

I, Ndivhuho Eric Maṱhoho, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

I empower the university to reproduce for research either the whole or any portion of the contents in any manner whatsoever.

Signature: Signed by candidate

Date: May 2020

Acknowledgements

Admittedly the time required to produce this research document was very limited, and the pressure to complete was immense. This thesis owes much to the comments and advice of my supervisor Professor Shadreck Chirikure for all his unwavering support and advice, and for providing a grant-holder linked bursary and analytical costs from his NRF Research Grant. The University of Venda Capacity Development Grant also funded the research. Some of the materials in this thesis are based on cultural materials collected as part of a Cultural Resource Management (CRM) project conducted during the construction of Nandoni Dam. I want to express my gratitude to Marko Hutten and Stephan Gaigher for providing archaeological material remains excavated from Mutoti (MUT 2-Nanḓoni Dam) excavated under the aegis of Archaeo-Info (Marko, Stephan and Eric) and now stored at the University of Venda Museum. I also appreciate the following individuals: Dr. Foreman Bandama for redrawing ceramic profiles and site maps, Prof. Mashudu Mashige for commenting on my first draft.

Table of Contents

Abstract 1
Declaration 2
Acknowledgements 3
Table of Figures 8
CHAPTER ONE: INTRODUCTION 13
1.1.Introduction 13
1.2. Culture history of the research area: From Early Iron Age to recent Past 15
1.3.Archaeometallurgy 21
1.4. Statement of the Problem 23
1.5. Research Aims 24
1.6. Background to the sites 25
1.6.1. Sites location, relief and drainage system 25
1.6.2. Present regional climate 27
1.6.3. Existing land use 29
1.6.4. Mut 2 Early Iron Age site 29
1.6.4.1. Geology 29
1.6.4.2. Vegetation 31
1.6.5. Thomo Early Iron Age site 33
1.6.5.1. Geology 33
1.6.5.2. Vegetation 35
1.6.6. Summary 37
1.7. Thesis organisation 38
CHAPTER TWO: LITERATURE REVIEW 40
2.1. Introduction 40
2.2. Historical background of the pioneers in the research area. 40
2.3. Previous work in the area. 42
2.4. A review of Iron Age Ceramics within the Lowveld and culture historical sequence. 48
2.5. An overview of settlement pattern studies in the Lowveld region (Soutpansberg) 58
2.6. Summary 64
CHAPTER THREE: THE HISTORY OF IRON PRODUCTION AND TRADE IN SOUTHERN AFRICA 65
3.1. Introduction 65
3.2. Origin of African Metallurgy: Archaeological observations and Interpretation 66

3.3. A Brief Background to trade and documented trade routes within the Soutpansberg. 73
3.4. Ethnographies of iron production in Sub-Saharan Africa 78
3.5. Ethnography of Venda smelting: the accounts of Mrs. Gieseke and re-enactment of the 20th Century 81
3.6. Ethnographic accounts at Schynshoogte farm (Formerly known as Tshimbupfe) 86
3.7. Summary 94
CHAPTER FOUR: ARCHAEOLOGICAL DATA COLLECTION STRATEGY 95
4.1. Introduction 95
4.2. Archival and Collection Studies 96
4.3. Archaeological Surveys 98
4.4. Results of the Surveys 101
4.5. Grid System at Thomo site 108
4.6. Controlled surface collections 109
4.7. Thomo Iron Age site excavation and documentation 109
4.8. Summary 114
CHAPTER FIVE: ARCHAEOLOGICAL DATA ANALYSIS 115
5.1. Introduction 115
5.2. Ceramic theory 115
5.3. Analytical method 118
5.4. Vessels Shape and Forms 122
5.6. Decorations techniques and Motif 124
5.7. The results of the analysis 128
5.8. Spindle whorls 130
5.9. Discussion 131
5.10. Summary 131
5.11. Other cultural material remains from Mut 2 site 132
5.11. Exotic Ceramics 132
5.12. Archaeozoological Studies 134
5.12.1. Introduction 134
5.12.2. Species distribution in the Lowveld region 135
5.12.3. Methodology 136
5.12.4. Identification 136
5.12.5. Bone quantification 136
5.12.6. Relative abundance of taxa 138
5.12.7. Minimum number of individual (MNI) 138

5.12.8. Skeletal parts representation 138
5.12.9. Archaeozoological Studies Results 140
5.13.1. Ostrich eggshell Beads 142
5.13. 2. Discussion 144
5.14. Descriptions of other retrieved artefacts 146
5.14.1. Stone artefacts 146
5.14.2. Discussion 146
5.15. Metal, Slags and furnace linings 148
5.16. Descriptions of ceramics from Thomo site 148
5.17. Limitations 150
5.18. Summary 151
CHAPTER SIX: ARCHAEOMETALLURGICAL STUDIES 152
6.1. Introduction 152
6.2. Archaeometallurgical theory 152
6.3. The types of metallurgical remains sampled for microscopic investigations 155
6.4. Macroscopic examination and sampling for microscopic and elemental studies. 157
6.5. Optical microscopic examination 158
6.6. Results for optical microscopy 158
6.6.1. Flow slag 158
6.6.2. Furnace slag 166
6.6.3. Unidentifiable and smithing slags 167
6.6.4. Bloom/crown materials 168
6.6.5. Presumed Ores 169
6.6.6. Furnace wall (Linings) 171
6.6.7. Tuyere fragments 172
6.6.8. Elemental analyses using XRF Spectrometry 174
6.7. Summary 182
CHAPTER SEVEN: DISCUSSION 184
7.1. Introduction 184
7.2. The chronology of Mut 2 and Thomo Iron Age sites 184
7.3. Distribution of activities and status at Mut 2 site 187
7.4. Distribution of activities and status at Thomo site 192
7.5. Spatiality of iron production at Mut 2 and Thomo sites. 193
7.6. Sociology of Iron Production 193

7.7. The Implications of the study 195
CHAPTER EIGHT: CONCLUSION AND PROSPECTS 204
8.1. Introduction 204
8.2. Mut 2 and Thomo sites in the regional context 206
8.3. Conclusion 208
8.4. Direction for future research 208
9. REFERENCES 210
APPENDIX 1: 239
Description of excavation after Archaeo-Info 2000 report 239
The Central Part of Mut 2 Excavations 239
APPENDIX 2: 252
List of structures/ Features excavated from Mut 2 site after Archae-Info 2000 report. 252
APPENDIX 3: 258
MUT2 site, ACCESSION LIST, after Archaeo-Info 2000 report. 258
Non-diagnostic potsherds 263
APPENDIX 4: 265
Thomo site, ACCESSION LIST. 265
APPENDIX 5: 266
Sample Ceramic data recording form. 266

Table of Figures

Figure 1: The study area 27
Figure 2: Mut 2 site geological map 30
Figure 3: Mut 2 site vegetation map. 33
Figure 4: Thomo Iron Age site geological map 34
Figure 5: Thomo Iron Age site vegetation map. 36
Figure 6: View of the iron production furnace photographed by H Gross in 1888 on the farm Schynshoogte, Soutpansberg (Macmillan, 1927). 68
Figure 7: Remains of a Venda furnace documented at farm Schynshoogte (Vuu) while other remains of a triangular furnace with three inlets slots was documented at Thomo site; a similar furnace was also documented at Mut 26 iron production site (where Nanḓoni Dam is located today) and Massorini near Phalaborwa. 71
Figure 8: Copper smelting furnace and entrance of prehistoric mine documented in Phalaborwa, photo credits U.S. Küsel (1979). 72
Figure 9: Copper smelting furnaces documented in Phalaborwa area, photo credits U.S. Küsel (1979). 72
Figure 10: Some of the well-known footpaths that linked different regions of the Lowveld and adjacent areas (After Moffet, 2017:60). 78
Figure 11: Venda women collecting clay soil for the manufacturing of furnace and tuyeres. Photo credits U.S. Küsel (1979). 83
Figure 12: Reenactment of clay preparation and manufacturing of tuyere process. Photo credits U.S. Küsel (1979). 83
Figure 13: Bellow making process. Photo credits U.S. Küsel (1979). 84
Figure 14: Reenactment of furnace structure construction and bellow expansion using clay soil. Photo credits U.S. Küsel (1979). 84
Figure 15: Ore collections and haulage from the mining sites to smelting area. Photo credits U.S. Küsel (1979) 85
Figure 16: Charcoals and iron ore reduction process. Photo credits U.S. Küsel (1979). 85
Figure 17: Iron ore smelting and smithing. Photo credits U.S. Küsel (1979) 86

Figure 18: Example of the Venda blue glass beads (Vhulungu ha Maḓi) note the cream white object (Ivory) and the brown copper foiled around the beads. 93
Figure 19: Map of the study area 96
Figure 20: View of Thomo site 1, towards the north. 103
Figure 21: Nsami river bank form the edge of Thomo Early Iron Age several archaeological materials have been washed down the river banks. 104
Figure 22: High slag concentration at Thomo site 1. 104
Figure 23: Triangular furnace structure documented at Thomo site 2. 105
Figure 24: View of Thomo site 2 (Occupational site) towards the Nsami River bank. 105
Figure 25: Half complete vessel in association with bottom grinding stones and burnt daga fragments with pole marks impression. 106
Figure 26: One of two open shafts exposed by miners when they were extracting hematite stone. 106
Figure 27: Some of the archaeological sites documented around Thomo village. 108
Figure 28: View of the test blocks to be excavated. 111
Figure 29: Excavated test trench layer 1. 111
Figure 30: Excavated trench 1 Profile 112
Figure 31: Excavation process at Thomo site 1. 112
Figure 32: Screening of the excavated soil. 113
Figure 33: Thomo site plan. 113
Figure 34: Mut 2 vessels and form (Ceramic profiles drawn by Foreman Bandama) 123
Figure 35: Mut 2 Ceramic Decoration Motifs and techniques (Ceramic profiles drawn by Foreman Bandama). 126
Figure 36: Schematic representation of Mut 2 site ceramics, showing types of vessels and decoration layouts (Drawn by Foreman Bandama). 127
Figure 37: Images of incomplete spindle whorls from Mut 2 site. 130
Figure 38: Brown and Blue glazed exotic ceramics. Photo credits M. Hutten (2000). 133
Figure 39: Some of the analysed faunal remains. 139
Figure 40: Image showing ostrich eggshell beads from Mut 2 Iron Age site. 143
Figure 41: Some of the diagnostic ceramics from Thomo Early Iron Age site showing cross-hatched designs, punctate on the neck and multiple bands on the neck. 149

Figure 42: View of the ceramics sherds collected from Thomo sites (Drawn by Foreman Bandama). 150
Figure 43: Sampled archaeometallurgical remains from Thomo site comprised of a mix of tuyeres and flow slags. 156
Figure 44: Some of the mounted archaeometallurgical remains. 157
Figure 45: Photomicrograph of a slag from Mut 2, specimen sample Mut 2/98/Slag/013/02 showing dendrites of wüstite and magnetite embedded in a matrix of fayalite and glass; the sample had cracks and gas bubbles. 160
Figure 46: Photomicrograph of a slag from Mut 2, specimen sample Mut 2/98/Slag/001/02 showing porosity, dendrites of wüstite fayalite and glass matrix 160
Figure 47: Photomicrograph of a slag specimen from Mut 2, sample Mut 2/98/Slag/009/01 showing abundance of free iron oxides which is a proxy of strongly reducing conditions, ... 161
Figure 48: Same sample Photomicrograph showing abundance of free iron oxides which is a proxy of strongly reducing conditions, ... 161
Figure 49: Photomicrograph of a flow slag from Mut 2, specimen sample Mut 2/98/Slag/001/03 showing wüstite, metallic iron droplets, blocky fayalite porosity and the glass matrix. 162
Figure 50: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/11/02/001A showing metallic iron droplets (Bright white), in a matrix of fayalite and second generation wüstite on the glass. 162
Figure 51: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/11/02/001A showing concentration of metallic iron droplets, and second generation wüstite on the glass and gas bubbles. 163
Figure 52: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/slag/23/11/02/009b showing wüstite on the glass and fayalite matrix, note cracks and gas bubbles. 163
Figure 53: Photomicrograph of a slag specimen from Thomo site 1, sample Thomo1/17/Slag/08 showing wüstite on the glass and blocky fayalite matrix; note gas bubbles. 164
Figure 54: Photomicrograph of a slag specimen from Thomo site 1, sample Thomo1/slag/23/11/02/009a showing wüstite, line of magnetite skin on the glass and fayalite matrix with gas bubbles. 164

Figure 55: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/slag/23/11/02/009C showing dendritic wüstite on the glass and fayalite matrix; note gas bubbles. 165
Figure 56: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/17/slag/2 showing dendritic wüstite on the glass and fayalite matrix, note gas bubbles. 165
Figure 57: Micrograph of the furnace slag from Thomo site showing fayalite in a glass matrix with voids and dendrites of wüstite, (Sample Thomo 17/furnace slag/07). 166
Figure 58: Micrograph of the furnace slag from Thomo showing fayalite in a glass matrix with voids and dendritic wüstite (Sample Thomo 09A). 167
Figure 59: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/17/slag/08 showing partially reduced oxide; note gas bubbles. 168
Figure 60: Photomicrograph of a bloom specimen from Mut 2, sample Mut2/98/ Slag/001/01 showing fragments of rusty, highly magnetic and corroded materials rich in metallic iron. 169
Figure 61: Photomicrograph of a hematite ore specimen Thomo mine (23)11/02/001. The specimen shows iron oxide cracks and clay minerals. 170
Figure 62: Photomicrograph of a hematite ore specimen from Mut 2 site, specimen Mut2/98/ore 02 shows iron oxide cracks and clay minerals. 170
Figure 63: Photomicrograph of a furnace linings from Thomo site specimen Thomo 17/furnace linings/012 showing quartz and clay materials. 171
Figure 64: Photomicrograph of a furnace linings from Thomo site specimen Thomo 17/furnace wall/10 showing metallic droplets, quartz and clay materials. 172
Figure 65: Photomicrograph of a tuyere fragment from Mut 2 site, specimen Mut2/98/Tuyere/011/02 showing quartz, cracks, metallic droplets in matrix of blocky fayalite. 173
Figure 66: Photomicrograph of a tuyere fragment from Mut 2 site, specimen Mut 2/98/Tuyere/011/03 showing quartz, cracks, metallic droplets. 173
Figure 67: Tenary plot diagram for Thomo site. 176
Figure 68: Tenary plot diagram for Mut 2 site. 180
Figure 69: Mut 2 site plan adapted from Archaeo- Info report (2000). 190

List of Tables

Table 1-1: Botanical names of trees and grasses identified at Mut 2 site near Ṱhohoyanḓou...... 32

Table 1-2: Botanical names of trees and grass and herbs identified at Thomo site, near Giyani . 37

Table 2-1: The chronology of Early Iron Age, represented by sites that are found in and outside the Limpopo region. Some of the phases represented by these sites are found in the research area but others are not…………………………………………………………………………....57

Table 3-1: Some of the observed rituals and taboos associated with Venda iron smelting 88

Table 4-1: List of archaeological sites documented at Thomo village…….………..………...107

Table 5-1: Vessels Wavelength Dispersive X-ray Spectrometry decoration techniques…........129

Table 5-2: Vessels decoration techniques…………………………………………………....129

Table 5-3: Showing categories of non-identifiable bone fragments……………………………141

Table 5-4: Results of the faunal remains, species and amount as represented from archaeological assemblages (After Archaeo- Info 2000) …………………………..................................142

Table 6-1: Results of XRF Analyses from Thomo site……………………………………........175

Table 6-2: Results of XRF Analyses from Mutoti site…………………………………………179

CHAPTER ONE: INTRODUCTION

1.1. Introduction

Debate on the origins and the spread of Iron Age communities into southern Africa has been ongoing for almost a century. It gains momentum, cools, and gains momentum again thereby explaining areas of uncertainty that remain. The central thesis accounts for the presence of Iron Age peoples through the migration of the Bantu southwards from the north into southern Africa early in the first millennium AD (Russels and Steele, 2009; Russels *et al*., 2014; Warren, Hall, Rodger-Ackermann, 2015). In the process, the early farmers brought with them pottery making, metallurgy, sedentism and crop agriculture and animal husbandry (Pwiti, 1996). However, some archaeologists reject this conclusion in favour of local development (Gramly, 1978). This anti-migration hypothesis proposes that farming, herding, metallurgy and the diagnostic ceramics style were introduced separately to indigenous populations and should be considered equally as a mechanism of change along with population movement (Huffman, 2007; Gramly, 1978). Even though the understanding projected by the anti-migration hypothesis is valid in some cases, the migration hypothesis is pertinent to this study owing to its general acceptance (Pwiti, 1996).

It is generally believed that Iron Age people moved into current day South Africa by c. AD 200, entering Limpopo Province either by moving down the coastal plains, or by using a more central route (Maggs, 1994). It seems more likely that the first option was what brought people into the study area. From the coast, they followed various rivers inland. What could have driven Iron Age communities into the Limpopo Province is of concern and not known. The movement of wild game and people with and / or without livestock might have been the reason behind settlement choice. It is indisputable that the natural environment might have played a dominant role even though the fact has not yet been determined (Katsamudanga, 2007). These Iron Age people were cultivators; they preferred the rich alluvial soils, lived in semi-permanent villages. Regional mobility would have been common if livestock such as cattle, sheep and goats were part of their herds. The Iron Age period of southern Africa has been defined and characterised by the appearance of distinctive pottery wares. The period is mainly distinguished from that of the Stone Age people by very impressive diagnostic and undiagnostic ceramics (Huffman, 2007, Huffman *et al.*, 2020). Furthermore, the period is associated with the introduction of metalworking (Friede, 1979), crop agriculture and sedentism (Maggs, 1980; Phillipson, 2005). Based on their knowledge and technological innovation such as metal production, these communities were labelled *Iron Age Communities* in southern Africa. The label has been criticised and alternatives such as *Agro pastoral communities, agriculturalist, farming communities* and *Chifumbaze Complex* have been brought forward (Hall, 1978; Sinclair *et al.,* 1979; Maggs, 1992; Pikirayi, 1993; Pwiti, 1996; Mitchell, 2002; Phillipson, 2005).

The term 'Iron Age' has been explicitly borrowed from European prehistory although it is still a useful short term for the larger concept (Bandama, 2013; Bandama *et al*., 2018; Huffman, 2007; Pwiti, 2005). Current understanding resulting from documented sites seems to propose that Iron Age sites distributions are along the Soutpansberg, covering both the north and south of the mountain stretching towards the south of the Garonga Nature Reserve and southeast of the Kruger National Park. A good example which demonstrates the presence of Early Iron Age sites in the Waterberg has been recently excavated near Thabazimbi (Huffman, *et al.,* 2020). No records exist to date of the presence of Early Iron Age sites along the Limpopo River valley. However, the only existing records are of people who grew out of first settlers. These communities known as Zhizo are known at places such as Schroda and Pont Drift in the Middle Limpopo Valley. Furthermore, spatial distribution of the Zhizo community spread across southeastern Botswana and southwestern Zimbabwe (Antonites, 2014; 2016). It is believed that this community crossed the Limpopo River and established themselves in the Limpopo Valley (Hanisch, 1980; Antonites, 2016). Regionally, occurrence of Early Iron Age sites seems to mark the southern limits of viable sorghum and millet agriculture determined by suitable summer rainfall (Warren, 2013). The generally accepted Early Iron Age chronology covers the period AD 200-900 while the Late Iron Age began around AD 1000 and lasted until the mid-19th century (Huffman, 2007). Iron Age divisions are sometimes disputed, with ongoing debates questioning the sharp discontinuity in ceramic typology, stylistic attributes and language. The argument brought forward is centred on Early Iron Age ceramic characteristics which are not visible on Late Iron Age ceramics. This division is, however, arbitrary because some ceramic traditions such as Eiland overlap into the second millennium AD and were contemporaneous with those belonging to the Middle and Late Iron Ages (Huffman, 2007; Calabrese, 2007).

The view that Iron Age communities throughout the East and southern Africa share a remarkable degree of homogeneity is widely accepted (Philipson, 2005:249). In cementing, Early to Late Iron Age cultural traits transmission, Huffman (2007:335) could demonstrates that Shona is an eastern Bantu language that evolved directly out of the Early Iron Age in southern Africa. The subsequent section considers the culture history of the study area covering profound and diverse Iron Age tradition, phase and facie.

1.2. Culture history of the research area: From Early Iron Age to recent Past

Generally, the northern extreme of South Africa is known as the Lowveld region. The earliest recorded agropastoral farmers belong to the Chifumbaze Complex or Early Iron Age (Phillipson 2005), which is subdivided into two streams: a western Kalundu Tradition and an eastern Urewe Tradition (although this is not universally accepted) (Huffman and Herbert, 1994/1995; Huffman, 2007:122). According to Huffman (2007: 117) tradition is formed by ceramics units that belong to a larger cluster. Each unit belongs to a time segment or phase while changes in facies through time lead to the existence of new branches or sub-branches.

Kalundu tradition ceramic sites extend from Angola, through Zambia, Botswana, and Zimbabwe into South Africa (Mitchell, 2002: 267; Mitchell and Whitelaw, 2005: 221; Phillipson, 2005: 249). Sites that represent the Kalundu tradition within our area are represented by Klein Africa and Happy Rest (De Vaal, 1941; Prinsloo, 1974; Campbell, van Waarden and Holmberg, 1996). Urewe Tradition was named after a site in southwestern Kenya, with sub-ceramics styles recognised in Rwanda, adjacent parts of D.R. Congo, in southern Uganda, Tanzania and southwestern Kenya (Philipson 2005). The (Urewe) tradition is further sub-divided into the Nkope and Kwale branches, and then sub-branches into different facies and phases (or temporal and spatial styles) (Philipson, 2005; Huffman, 2007). Urewe tradition first appeared on the western side of Lake Victoria around the middle of the last millennium BC. The tradition gradually expanded to the northern and eastern side of the basin. Archaeological records, in conjunction with radiocarbon dates, demonstrate a rapid dispersal of iron-using farmers extending southwards through Mozambique, Malawi, eastern Zambia and Zimbabwe into Swaziland and adjacent parts of South Africa. By about 3rd century AD this tradition had expanded southwards as far as KwaZulu-Natal (Philipson, 2005:250-51). It is generally believed that Urewe area may best be considered as representing two or three separate facie or "streams" of which some of the Early Iron Age sites of the Limpopo Province probably derived directly.

The Kalundu and Urewe traditions are referenced to initiate discussions on the archaeology and archaeometallurgy of Iron Age sites. These two traditions have contributed highly towards the understanding of early farming communities' lifestyles (Warren, 2013).

The radiocarbon-based chronology for the Iron Age in the Limpopo Province is well established, with a broad outline well represented by the site of Silver Leaves (Kwale branch) near Tzaneen (Klapwijk, 1974; Mitchell and Whitelaw, 2005; Huffman, 2007). Silver Leaves facies date between AD 280 and 450 (Silver Leaves - 250-395, Pta 2360, Pta 2459, Pta 914). Similar dates also came from Eiland sites discovered a few kilometres southeast of Tzaneen in the Limpopo Province (the old Northern Transvaal). On the early sites, there is direct evidence that cultivation was extremely limited, but impressions of *Pennisetum millet* seeds were discovered at the type site of Silver Leaves. This was the principal evidence of the earliest Iron Age penetration with the then dominant crop being brought in and introduced to the region (Klapwijk, 1974).

Based on current evidence, pre-colonial metal production slag at Silver Leaves could be associated with the earliest manifestation of metal technology ever known in the region. The presence of slag in Early Iron Age sites directs attention to investigate the nature of production at very early sites. Silver Leaves sites chronology was then followed by Happy Rest, with sites dating between AD 450 and 750 (Eiland Salt Works-AD 390-435, Pta 1524, Pta 1608, Pta 1607, Wits 764, Happy Rest-AD 430-555, Pta 2421-Klein Africa 415-535, Pta 1168) (Huffman, 2007). Happy Rest and Klein Africa are archaeological sites which were identified near the Soutpansberg (Prinsloo, 1974; Huffman, 2007). Another piece of archaeological evidence of great significance located outside the Limpopo Province was the discovery of an archaeological site near the present town of Lydenburg in the Mpumalanga Province. The Lydenburg archaeological assemblage consists of the remains of the well-known seven terracotta heads (Lydenburg Heads). The site was radiocarbon dated AD 470, becoming the oldest African Iron Age artwork ever found below the equator (Inskeep and Maggs, 1975). However, Whitelaw and Mitchell (2005) argue that the site may date to the 10th century AD.

The Early Iron Age sequence has for long been viewed as evolving within the above-mentioned period. However, a group that represents the latter phase of Early Iron Age sites has been recently discovered and assigned Garonga Phase (AD 750-1000). The distribution of Garonga was assessed based on a limited database (Burrett, 2007; Meyer, 1986; Huffman, 2007). Garonga Phase sites mostly range between AD 750 and 1000 (SK 17.2 bone AD 800, Pta 3507) (Burrett, 2007; Huffman, 2007). Subsequently, these dates appear to represent a latter phase of Early Iron Age occupation in the region. Of great importance is the small surface collection by Rob Burrett (2007) after which the full distinct ceramic stylistic repertoire of Garonga Phase sites began to emerge and become widely known. A major limitation to these sites studies is due to sites scarcity. Current archaeological knowledge of Garonga Phase sites distribution is represented by site near Mica and Kruger National Park (Meyer, 1986; Burrett, 2007). Garonga Phase sites distribution, material culture and settlement organization are not widely known throughout southern Africa. According to Huffman (2007) material culture can express group identity because it forms a repeated code of cultural symbols. Documented Iron Age sites over much of southern Africa are marked by the presence of burnt daga fragments, remains of hut floors and raised granaries, the presence of metal productions and ash middens with ceramics and faunal assemblage. These features provide a background to the general understanding of Iron Age Archaeology (Huffman 2007). There is an assumption that Iron Age distribution extends beyond the borders of South Africa, to locales such as Swaziland, Mozambique and Zimbabwe. However, this has not yet been verified. Often, the so-called Early Iron Age survived into the early second millennium AD (Huffman, 2007). In the Shashi-Limpopo, Huffman has re-introduced the term Middle Iron Age covering the period AD 1000 to AD 1300 with the Late Iron Age beginning afterwards.

The last period of pre-colonial occupation is characterised by the introduction of the Letaba ceramics. The Letaba ceramics are mostly dominated by open bowls and globular pots with decoration attributes such as cross hatchings, spaced bands, cross-hatched triangles, herringbone, graphite and ochre burnish. Most of these ceramics were dominant among the northern Sotho/ Bapedi and Vhaveṋḓa who settled on stone-walled sites. At present, it is not clear, but, judging from the pottery found at different locales, it appears that the early occupation associated with the Vhaveṋḓa could have occurred any time between AD 1400 and 1450 (Loubser, 1991; Mafukata, 2015). It is associated with the collapse of Mapungubwe and intrusion of people making Khami ceramics. Their amalgamation created Thavhatshena, which developed into Letaba (Huffman 2007). This period is associated with regional population movement, conflict and change which, in a large part, set the scene for the current population situation within the study area. There is no doubt that some of the archaeological sites found here belong to the pre-Vhavenḓa nation. Unfortunately, the Vhavenḓa history is so complex and a subject of unending disputes amongst different parties and dynastic groups which inhabit the territory. Writings of the early 1930s have placed Vhavenḓa as composite people who don't see themselves as a culturally homogenous or politically united nation. Oral traditions suggest that most of the important migrations to the territory known today as Venḓa came from the north of the Limpopo River. During these migration periods, there are two particularly significant groups in the history of the area (Stayt, 1968; Loubser, 1991). Vhavenḓa of today are descendants of various groups, and previous studies coupled with old traditions agree that there was, at one stage, an aboriginal population in the region called Vhangona. However, writers such as Van Heerden and Mudau (n.d:227) maintain that when Vhangona came into the region, they found Vhalembethu, Vhaṱavhatsindi and Vhatwanamba of Tshivhula already in occupation. The arrival of the Singo drove away some of the Vhatwanamba of Tshivhula, forcing them to settle in what is today Blouberg, while the remaining group reside at Khomele in the north-eastern side of Nzhelele Valley (Mafukata, 2015). Subsequently, erroneous recordings of the historiography and ethnography of Vhavenḓa by Van Heerden and Mudau (n.d) recorded Tshivhula as a Mungona, for example whereas Tshivhula is conclusively and widely acknowledged as a Twanamba senior chief (Mafukata, 2015).

During the early Singo dynasty, it was previously rare for people to admit that they are descendants of the Vhangona for fear of being persecuted as despised sub-cultural group. Grounded on this understanding which relegated Vhangona chiefs into commoners under the Singo dynasty, the Vhangona chief and tribal cohesion is not recorded in the Vhavenḓa historiography or perhaps it was intentionally omitted. Records of the existence of a Vhangona chief's kraal that belonged to Chief Raphulu has been documented located on the mountain of Vuvha near a small hill called Tshivheulwa (Van Heerden and Mudau, n.d:227). Furthermore, records of the existence of Vhangona ruins around Doli Doli Mountains have been acknowledged. The current Vhangona descendants are even laying various claims with the South African Government for recognition of their dynasty within the Vhembe District. Amongst other claims of the Vhangona descendants, there is Vhangona Kingship claim lodged with the South African Government Commission on

Traditional Leadership by one Tshidziwelele Nephawe who argued he was a direct living descendent of the Vhangona Kingship and wanted ownership of the so-called Vendaland (Mafukata, 2015).

The historic period started c. 1840s, with the arrival of the first white settlers in the region. These movements into the northernmost parts of the Limpopo Province brought with them elephant hunting and ivory trade which were the most important economic activities of Europeans, who depended increasingly on African marksmen, as elephant herds retreated north into the tsetse belt. Thus, many African hunters were equipped with guns while on expedition to raid settlements for black ivory (Boeyens, 1985;1991). Everything was purely enforced by the settlers whose aim was to gain control of fertile areas. This resulted in certain areas south of the Soutpansberg becoming the border between cultural groups as influenced by the early trade routes system via Mozambique. Later, tension developed between these cultural groups, giving rise to armed conflict. For example, Soutpansberg commandant J.H Jacobs led a patrol against Rasikhuthuma, son of the Venda King Ramabulana, in 1855, after Joao Albasini had accused Rasikhuthuma of stock theft. In the attack on Tshitungulu, Rasikhuthuma's stronghold subjects were shot and 76 cattle, 108 sheep and goats as well as 13 young Africans were captured and divided amongst the Boer's commanders. In the same year (November 1855), L.M. Bronkhorst raided Ramabulana where eleven people were killed, and five children were taken and divided amongst the burghers.

In 1860, J. du Plessis led a commando against Chief Mashau, because reportedly the chief was disobedient; livestock, women and children were taken as spoils of war. From this point raids were confined almost entirely to Africans from whom the Boers claimed tribute which is equated with indentured children. Indenture system as well as slavery in the Soutpansberg occurred between 1848 to 1869, where young children were classed as *inboekenlinge* (the so-called 'apprentices' another name for slavery). These children were displaced from their areas with some being taken as far as Pretoria. Another example of conflict in the region is that of King Makhado-Boer war which ended when Makhado died in September 1895; alternatively, during Mphephu's defeat by the Boers and his subsequent exile in Zimbabwe in 1898 (Tempelhoff and Nemudzivhadi, 1999). Considering the period that these historical sites were occupied, some of these sites also feature in the early historic writings. For example, the Magoro site near the Middle Letaba Dam and the Songozwi site on the Soutpansberg.

The geographic distribution of the Letaba ceramics which locally exhibits considerable specialisation and has found manifestation even among Vhavenḓa (Huffman, 2006) is not restricted within the Limpopo Province as previously assumed. Recent studies documented the existence of Letaba ceramics in other provinces such as Gauteng and Mpumalanga. Archaeological evidence in support of this development springs from collected assemblages associated with the Northern Ndebele and Koni archaeological sites excavated near Pietersburg (Loubser, 1981). Similar ceramics were uncovered in the Witwatersrand and Magaliesberg sites (Mason, 1983; 1986; Evers and van der Merwe, 1987:105). These extensive ceramic distributions have been corroborated by Huffman (2006) who identified Letaba pottery near Bushbuckridge in the Mpumalanga Province. These ceramics are predominately thinner wares carrying painted or textured designs. They represent the latter segment of the Iron Age tradition (Evers, 1981; Antonites, 2013).

Archaeologically some ceramic (pottery) connections between the Letaba style and the current ceramic apprenticeship share vessel forms, decoration motifs, layout and placement as observed by Evers (1974;1975;1979;1981) and these were assumed to be a regionally restricted. Van der Merwe and Scully's (1971) comparative analysis of Letaba shards against modern pottery produced in the Phalaborwa area shows stylistic similarity. This industry dominates the latter archaeological sites which incorporate settlements, stone-walled sites and pre-colonial industries which include mining and metal-production sites. The cause of this wide ceramic distribution is still not yet fully understood. However, it could be attributable to cross cultural intermarriages and / or regional trade network systems which dominated the latter part of the Late Iron Age.

The illuminating view accounting for the spread of Letaba ceramics is that of Liesegang (1977) who posits that the entire region from Limpopo Valley towards the Oliphant and Crocodile Rivers was under the rule of a Vhavenḓa Monarch in the mid-18th century. This is the most critical period of the Late Iron Age which witnessed an increase in trade contacts dominated by clay vessels and metal production at its peak. Settlements dominated by stone architecture in this period are also being connected to communities' upheavals. Oral tradition theorised the presence of Vhavenḓa in the Phalaborwa area, whilst van Warmelo's account mirrored that the Musina Clan came from Phalaborwa. As metallurgists, they left Phalaborwa and moved northwest towards the Soutpansberg and settled at a hill called *Balahe* (*Groot Bulaai*). The tribe moved in search of the copper ore deposits which were found at various places around Musina (Mamadi, 1941:85, Hanisch, 1974:250) as they melted copper. In the meantime, the reason why Letaba ceramics' distribution is widely confined in the Lowveld could be interpreted in terms of growing socio-political complexity when societies are assumed to have transformed largely from egalitarian modes of formation to Chiefdoms (Pikirayi and Lindahl, 2010). However, this interpretation will only come to light after the data archived in various laboratory analyses has been completed. Available radiocarbon dates for Letaba ceramics range from the 17^{th} century to the 19^{th} century (Evers, 1981; Evers and van der Merwe, 1987). This cultural history is essential for explorations of the technologies such as metallurgy practised by Iron Age Communities from their initial appearance until the dawn of colonialism. The study of metal production falls within the sub-discipline of archaeometallurgy described below.

1.3. Archaeometallurgy

Archaeometallurgy can simply be defined as the study of metal production debris and metal artefacts from archaeological sites (Miller, 2003; Miller and Killick, 2019). Evidence of metal production has been recorded throughout the province in places such as Silver Leaves (Klapwijk, 1974), Eiland Salt Works (Evers, 1974) Nanḓoni (Fish, 1995), Phalaborwa (Evers and van der Merwe, 1987; Thondhlana, 2013; 2016; Moffet, 2016; Moffet, Hall and Chirikure, 2020; Miller and Killick, 2019), Musina, (Mamadi, Dzivhani, Motenda and Mudau, 1940; Joubert, 2019) Vuu or Tshimbupfe (Maṱhoho, 2012; 2016) with more than 20 sites recently geo-referenced near Nsami River around Thomo village. During the Iron Age period, mining and metallurgy were largely limited to the exploitation of iron and copper ore for the manufacturing of utilitarian and decorative implements. In general, the scale of iron production at Iron Age sites ranges from small to large, indicating the possible role of metallurgy in local and external consumption (Maggs, 1992). Metal-production sites are well represented by dense or scattered slag concentrations, broken burnt daga fragments from collapsed furnaces, ore, hammer and anvil stones and broken pieces of tuyeres fragments. Some of these sites revealed the existence of Iron Age sites with iron production as early as AD 350 to the beginning of colonisation in the late 19^{th} and early 20^{th} centuries. Within the Limpopo Province, metal production can be associated with the Vhavenḓa, Shangaan and Bapedi peoples (Bonner and Carruthers, 2003; Huffman and Hanisch, 1987). Very few of these sites have been subjected to intensive research. It is mainly Mapungubwe (Meyer, 1999), Nanḓoni (Fish, 1995), Klein Africa (Prinsloo, 1974), Silver Leaves (Klapwijk, 1973; 1974), Harmony Eiland (Evers, 1974;1975 &1979) and Kruger National Park (Meyer, 1986) that have been the subjects of studies.

In general, the pre-colonial metallurgy of the Lowveld (Limpopo Province) has been studied from several perspectives such as the ethno-historical (van der Merwe and Scully, 1971) and the earth and engineering approaches (Killick and van der Merwe, 1979; Miller *et al.,* 2001; Thondhlana 2013; 2016; Stephens, Killick, Wilmsen, Denbow and Miller, 2020). The raw materials fed into the process often have a genetic relationship with the products and waste materials. Metal production debris such as slags, furnace linings, tuyeres and iron ores which were studied reflect microstructures that contain histories of technological processes that they underwent (Bachmann, 1982). For example, slag contains small crystal particles characterised by a distinctive shape, size and alignment which, when analysed, provides useful information for reconstructing past metal-production processes, technology and the maximum temperatures at which the furnace was operating. Metallographic analysis assists us in reading this information from slag and other remains (Miller and Whitelaw, 1994; Miller and Killick, 2004; Chirikure and Rehren, 2006; Chirikure, 2015; Stephens *et al*., 2020). These technological data are crucial in drawing parallels between metal production and technological practices at Early and Late Iron Age sites. There is a gap in the understanding of the technology and whether the processes changed or remained the same over time. The most important question in Iron Age archaeology of southern Africa relates to the spatial organisation of iron production sites in relation to occupational zones (Chirikure, 2005). Tentative archaeological investigations in the Limpopo Province show the existence of triangular furnace types in both Early and Late Iron Age periods (Maṱhoho, 2012). These results show that there may be a break in the spatial organisation of metalworking between the EIA and LIA. Although furnace types changed in this area, the changes are attributed to new groups coming in and not to technological considerations. As such, more studies by archaeometallurgists are needed to reconstruct the technology and phases of production represented by metallurgical remains. Traditional archaeometallurgy was preoccupied with exploring transformation from combined technological, economic and environmental perspectives. It was less concerned with the socio-cultural dimensions of material processes. However, it is self-evident that archaeometallurgy can no longer afford to ignore the anthropological dimensions which constitute a resilient component of pre-industrial metal production technology (Chirikure, 2015). Therefore, it is universally acknowledged that metal production and use in the past was simultaneously technical and socio-cultural with the result that it produced and reproduced. Anthropological knowledges have been advanced to explain the rituals and taboos associated with iron production (Chirikure, 2015; Maṱhoho, Moffet, Bandama and Chirikure, 2016). These models could contribute greatly towards an understanding of social and political organisations, the economy and subsistence of the Iron Age.

Archaeometallurgical studies contribute to the reconstruction and understanding of the different stages in the metal-production cycle, the efficiency of the technology, the economy and even societal organisations. Since objects accumulate histories over time, it should be possible to reveal the relationship between people and objects by unravelling objects' histories (Gosden and Marshal, 1999). Beyond this there was a desire for this kind of exploration in the province since data from the research have broader implications on settlement patterns, ceramics and archaeometallurgical studies.

1.4. Statement of the Problem

Garonga Phase has not yet successfully received great attention and as a result, debates about organisation of settlements and nature of technology remain unresolved. Neither is the distribution of Garonga fully known. These issues are currently covered, not in detail, in only two available archaeological sources, Burrett (2007) and Huffman (2007). Owing to a lack of information, it is not clear whether what is known about Garonga reflects archaeological reality or opportunistic discovery of sites (Pwiti, 1996).

Another crucial problem relates to what cultural processes might have promoted the merger of Kalundu and Urewe given that Garonga is a mixture of two (i.e. Urewe and Kalundu) stylistic codes, shapes and motifs. The question becomes, how did this happen? Was the combination intentionally done to denote certain meanings? If so, does this give alternative insights into the ways which people perceived and fashioned their lives? Considering the research problems outlined above, a case is presented demanding a cross-examination of archaeological material remains in the quest to recognise the origin of Garonga Phase presumed to represent the transitional phase between Early and the Late Iron Age Periods.

Burrett (2007: 164-165) notes - "*these sites represent the origin, perhaps one of the regionally specific ceramic groupings that emerged in the complex social development that represent the Early Iron Age in southern Africa"*. And yet, no clear evidence of this had ever been presented in archaeological discourse. In view of the above, it is important to note that the distinction between the Early Iron Age and the Late Iron Age is that some Late Iron Age ceramics styles do not appear to be derived, in any way, from the local Early Iron Age styles. Part of the Garonga Phase has been told mainly from ceramics surface collections without the actual analysis of those from stratified deposits (Burrett, 2007; Huffman, 2007). In this regard, the archaeology of the Garonga Phase is still within an exploration phase. This thesis seeks to take these issues forward by analysing the recovered collection and datable materials from stratified context of Mutoti Iron Age site, housed at the University of Venda and furthermore, by conducting surveys and excavations at Thomo Iron Age site to yield such diagnostic materials for further laboratory investigation. Both collections provide insight into the past lifeway while building up the regional sequence of Culture history (Pwiti 1996).

1.5. Research Aims

This investigation seeks to build and expand on the existing Iron Age knowledge in the study area. The broader aim of the study is to explore the archaeological evidence with specific reference to social and political organisation through ceramics and archaeometallurgy. The second aim is to provide a database upon which a more secure cultural historical framework can be reconstructed. Occurrence of Early Iron Age sites south of the Soutpansberg suggests the presence of farming communities away from the mountains. To address the above issues, the objectives of the research are to:

- Investigate the evidence of Early Farming Communities south of the Soutpansberg. It is necessary to define the cultural sequence in the research area and relate it to already known categorisation elsewhere.

- Examine archaeological characteristics of Mutoti Iron Age site using archaeological collections housed at the University of Venda, Anthropology Museum and Thomo Iron Age site by analysing ceramics and through radiocarbon dating.
- Explore the social, political and economic organisations associated with these sites (Mut 2 and Thomo Iron Age sites)
- Characterise archaeometallurgical remains to recognise metal production and its associated technology.
- Evaluate any form of exchange systems and contact between Early Iron Age communities and the outside world. Establishing areas or places of contact in the research area is key towards the understanding of the material culture that can relate to the transitional phase. Preliminary investigations would be centred on analysis of foreign and internal ceramics assemblages recovered from these sites to integrate the results against current state of knowledge.

1.6. Background to the sites

1.6.1. Sites location, relief and drainage system

The study area is in the northernmost part of South Africa within the Limpopo Province (Figure 1). The region borders Zimbabwe toward the north, Botswana to the west and Mozambique to the east. The study area lies between 22°-24° South and 30° East at the heartland of Venḓa and Giyani. This area is demarcated south of the Soutpansberg between the Luvuvhu and Nsami Rivers towards the western boundary section of the Kruger National Park.

The topography of the study area varies from a zone of high mountain range towards the north, represented by the Soutpansberg to medium-range mountains and, further south-east, represented by Drakensberg which lies on a north-south axis. Geomorphic features observed in the study area are mountains, hills, valleys and plains. Geologically, the study sites vary considerably, with a high elevation attributed to volcanic activities. However, folding could also be attributed to some of the relief sections. The bluff is shaped by a belt of sandstone hills and ridges consisting of sediments belonging to the Goudplaats Gneiss and Giyani's geological characteristics (Anhaeusser, 1992; Brandl and Kroner, 1993; Mucina and Rutherford, 2006).

The relief is characterised by a single basic unit (Lowveld) formed by eastwards surface drop with occasional diorite dykes (volcanic intrusion) between sandstone belts at certain intervals. The slopes contain a series of north-easterly trending foothill spurs dominated by upper reaches of perennial and non-perennial streams. The Lowveld is an area that has an elevation of between 500 and 1000 feet above sea level. This topography is noteworthy as it can be associated with farming activities, defense from predators or militaristic communities and water accessibility throughout the dry seasons. The physical situation is also interrelated to temperatures where communities may avoid settling in certain areas because they are either too cold or too hot as crops may not grow well at certain altitudes or areas. The consequence of landscape in settlement preference is most noticeable when it is transformed into elevation and slope.

The relief of the study area has resulted in relative slow-flowing perennial streams, namely, Luvuvhu, Nsami, Greater, Little, and Middle Letaba and the Olifants. These streams flow towards the Indian Ocean via Mozambique. The runoff is highly seasonal and variable, with discontinuous flow in several non-perennial streams. All perennial streams are recharged by several tributaries which sustain serious flow through the wet season (December to April) or after heavy rainfalls. Numerous earthen and concrete impoundments (dams) were constructed to harvest rainwater on several perennial streams. Dams are an apparent sign of good precipitation which is also good for groundwater recharge in the region. This regional precipitation has given rise to springs, fountains and wetlands.

The study area has two primary ground water aquifers that are defined by the local geology, namely, Goudplaats Gneiss and the Giyani group (Mucina and Rutherford, 2006). Generally, the farming communities established themselves on easily cultivatable areas characterised by alluvial and colluvial soils and they practised varied farming activities which included herding domestic cattle, sheep and goats (Plug, 2000; Mitchell, 2003; Gillson and Ekblom, 2009).

The vegetation is also a functional variable on its own as it is associated with edible plants for both humans and animals. Diverse vegetation characteristics have been recognised and they include woodland, forest and grassland. These types of vegetation attract different animal species and offer opportunities for different crops, although sometimes imposing constraints on the exploitation of the resources. It is indisputable that the current vegetation has influenced soil qualities, pasture and functions of ground water. In understanding the vegetation types, we can distinguish between favourable and unfavourable environments for settlement.

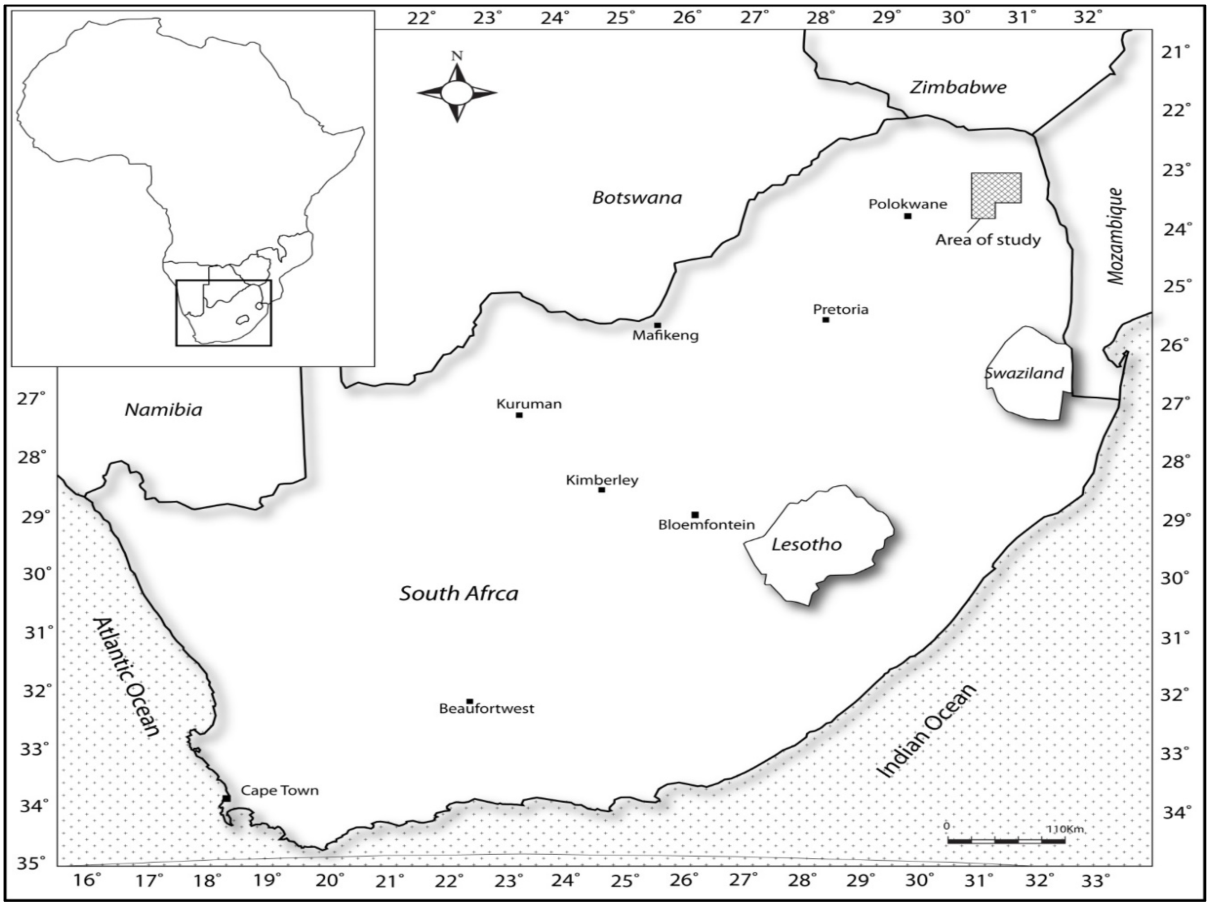


Figure 1: The study area

1.6.2. Present regional climate

The present regional climate varies from sub-tropical to semi-arid. The northern and western parts of the study area experience a dry, hot-steppe semi-arid climate, with a cool climate along the escarpment. The Luvuvhu area is characterised by subtropical temperatures with a high humidity. Large variations were observed for seasonal temperatures; in the south-eastern part (Giyani) maximum temperatures are experienced in January and minimum temperatures occur, on average, in July. The study area is governed by the same atmospheric circulation that controls the summer rainfall (Gillson and Ekblom, 2009). Two distinct seasons characterise the region – a wet season from roughly November to April and a dry season from approximately May to October. The rainfalls occur due to the southward movement of the Inter-Tropical Convergence Zone (ITCZ) and the dry season occurs when the ITCZ retreats northward. The oceans play important roles in the region's climatic conditions. The eastern coast of the region is influenced by the southward-flowing Mozambican current that brings warm and humid air from the equator and produces a humid, warm climate. By contrast the west coast of the region is influenced by the cold Benguela current from the Atlantic Ocean that produces a drier climate. In the interior of southern Africa there is a strong gradient from east and west; however, sections of the study area are affected by the Mozambican current (Gillson and Ekblom, 2009).

The weather patterns outlined above must have been important for the prehistoric communities. Air currents which are either north-easterly (moist and warm) or south-easterly (moist and cool) are equally important in the weather pattern of the region. The precipitation pattern is basically influenced by the orographic rain consequence of the Drakensberg which joins the Soutpansberg at a right angle. These types of rainfall occur frequently along the escarpment with the mean annual rainfall varying accordingly from 1000mm in the central parts, to 300mm in the west and 400mm in the east. The rain season extends from December to April in the form of heavy downpours and occasional long spells of light drizzle.

Precipitation is consequently a significant variable because it ensures a convenient wide diversity of edible flora, good pasture for game and livestock, good crops and wild plants. In addition, rainfall revitalises river-flow status throughout the year because of the generated runoff. Huge variation has been observed for summertime seasonal temperatures and irregular hailstorm events have been recorded recently within the study area. Long-term rainfall records exist from several South African Weather Service Meteorological Stations throughout the Lowveld; that is, Levubu, Ṱhohoyanḓou, Giyani and Hans Merensky School (weather stations). Temperatures are high and most daily maximums are more than 30 degrees Celsius throughout the year. Generally, the study area falls within frost-free zones. Phalaborwa and Musina have been classified as uncomfortably hot areas within the region. Heat can be viewed as a constraint on some human occupations although it ceases to be a major factor when viewed alongside other environmental factors.

1.6.3. Existing land use

The geological distribution generally conforms to the soil division linking the lowland, lower river valley and the upper valleys. The upper valley, which is predominately along the Soutpansberg escarpment, comprises mainly commercial farms and forestry estates. Documents suggest that commercial forestry farms have existed in the region since 1911 and that these agricultural activities destroyed most of the farming community sites along the escarpment, since it was unusual to conduct environmental impact assessment processes during the apartheid era.

The area's agriculture consists of dry land, irrigation and livestock and game farming. There is substantial irrigation which depends on boreholes, dams and rivers. The lowland (Venḓa and Giyani) is still under communal land ownerships represented by villages, small towns and family subsistence agricultural plots. However, the lower river valley, especially along the perennial streams, has been converted into flood-plain agricultural fields due to the presence of arable fertile land. Some of these areas were converted into dam basins (Nanḓoni and Nsami dams). The geology of the study area has a distribution of useful minerals and certain types of mineral rocks were previously extracted, namely, gold near Malamulele, copper ore at Phalaborwa and mica mineral extracted from the Mica area. Some old mines characterised by open pits and trenches have been recorded near Vuu village, Thomo village and Phalaborwa. These mines were associated with extraction of hematite, magnetite and copper ores.

1.6.4. Mut 2 Early Iron Age site

1.6.4.1. Geology

The geology and soils are dominated by Achaean basement rocks of the crystalline complex represented by the Goudplaats Gneiss, and further south, Mpuluzi granite (radian) which is younger, from the major basement geology of the area. The Goudplaats Gneiss occurs from 250-

700m altitude (see figure 2). To the south, the outcrop is bordered by younger overlying sedimentary strata divided by major surface water bodies. To the north, the geology of the study area is divided by the Soutpansberg groups (volcanic rocks) and to the east it borders the Drakensberg basalt of the Lebombo Mountains (Brandl, 1986; 1987; Anhaeusser, 1992).

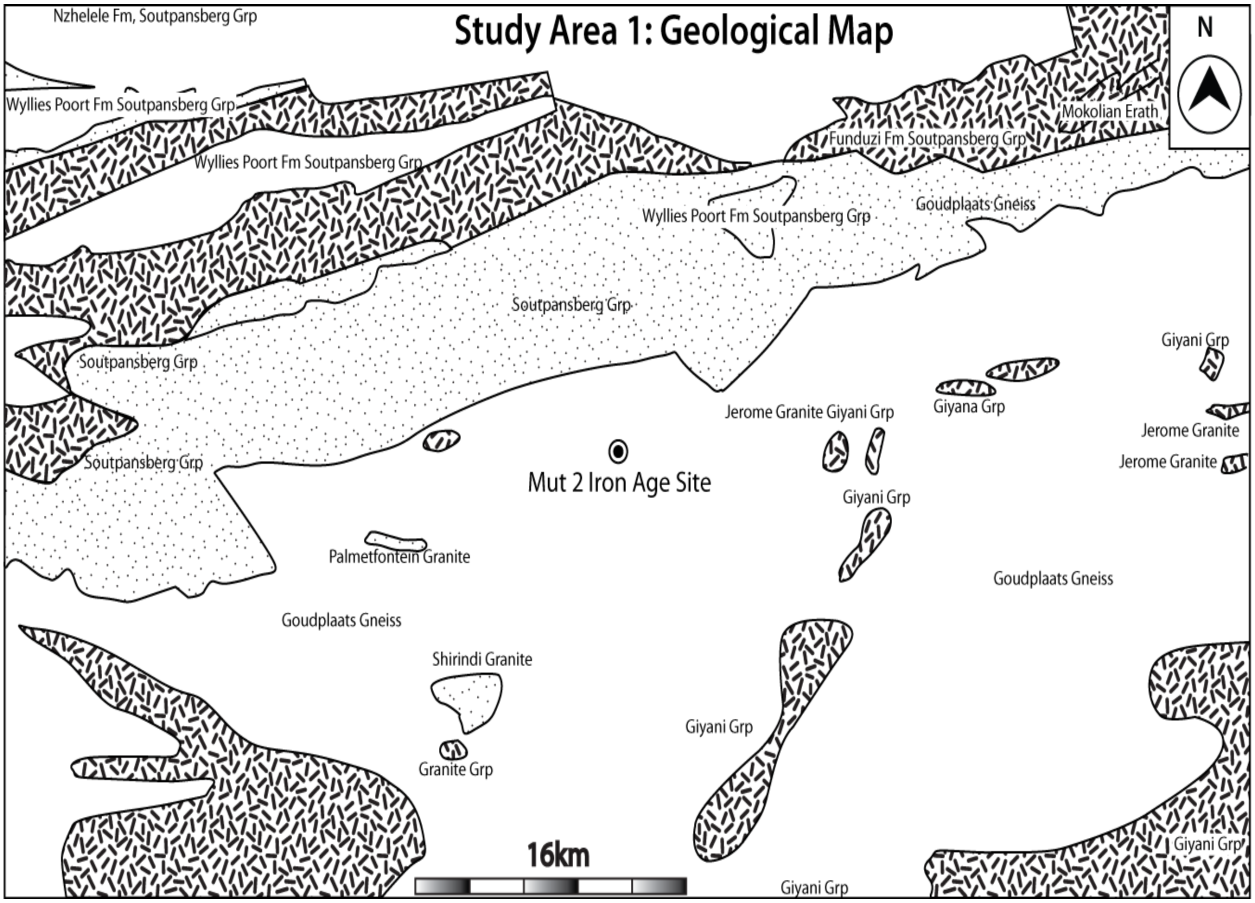


Figure 2: Mut 2 site geological map

Geologically the region is characterised by a wide spectrum of granitoids of various types and composition. The gneiss bodies range from homogenous to strong layered, leucocratic felsic to mafic, dark grey to fine-grained pigments of mineral varieties (Brandl, 1986; 1987; Anhaeusser, 1992). The previous subdivision of the strongly migmatised gneiss and less migmatised Goudplaats gneiss is no longer regarded as tenable, thus, granite gneiss which occurred between the Murchison (Gravelotte group) and the Pietersburg-Giyani greenstone belts were grouped together under the term ‘Greater-Letaba Gneiss’ (Brandl and Kroner, 1993).

The rocks are bound in the southeast by the Letaba shear zone. The soil zones are quite complex with land pockets which derive sandy soils in the upland and clayey soil with sodium content in the lowlands from weathered Achaean granite and gneiss (Mucina and Rutherford, 2003). This type of geology has had important implications for human communities in both prehistoric and modern times. Generally, rich sections with varied minerals and prehistoric mining activities have been recorded throughout the province for example, iron ore (magnetite and hematite) at Vuu, Tshivhulana and Thomo (Maṱhoho, 2012). Copper at Musina and Phalaborwa, tin at Rooiberg, coal at Tshikondeni. Other minerals documented in the region include gold near Malamulele and elsewhere in the Kruger National Park, evidence of gold- and diamond-mining activities represented by the Gerber's mine has been documented (Hopkins, 2014). The geology provides useful raw materials such as availability of clay materials along the riverbanks. Clay materials form the core of archaeological studies because it is used in house structure constructions and for making ceramics. Currently there are several isolated locations along the Luvuvhu River where women from nearby local villages collect clay soils for household chores such as floor and lapa preparations. Subsequently, the banks of the Luvuvhu River consist of alluvial reddish-brown fertile soils. Flood plains agriculture benefited from these types of soils and they are considered suitable for sorghums and millet cultivation since the Early Iron Age to recent past (Shenjere, 2011). Early farming communities with their knowledge of soils and geology derived from vegetation indicators, must have used this soil characteristics in and around the study area (Manyanga, 2001). Soil characteristics are important to the farming communities as these affected their choices in field location and indigenous crop production (Nyamushosho, *at al*., 2018).

1.6.4.2. Vegetation

The geology of the study area has given rise to the granite lowveld vegetation which forms a north-to-south belt on plains east of the escarpment from Ṱhohoyanḓou in the north and continues southwards with an eastwards extension on the plains around the Murchison range as well as southwards to Mica and Hoedspruit. Substantial parts of this vegetation type are found in the Kruger National Park (Acocks, 1953; Low and Rebelo, 1996; Mucina and Rutherford, 2003).

Granite Lowveld vegetation dominates the study area with gallery forests on the margins forming a belt along the river's alluvium areas (Mucina and Rutherford, 2006; Gillson and Ekblom, 2009) (see figure 3). Rainfall is one of the main factors that shape riverine vegetation. The vegetation of the study area consists of tall shrubs and deciduous trees with open spaces which permit growth of a variety of both unpalatable and palatable grass (Acocks, 1975). The vegetation has had important economic implication in agropastoral communities. A large proportion of this vegetation is characterised by edible shrubs and bulbs, bushes, trees and varied grass species consumed by livestock such as cattle, sheep and goats and wild animals. Availability of livestock pastures could be considered in conjunction with arable land. (Table 1-1 provides Mut 2 site vegetation list). The study area has a moderate dense low woodland on the deep sand. Dense thickets dominate the top and bottom pieces of land characterised by different plant species. Identified plant, herbs and grass species are presented in a table below:

Table 1-1: Botanical names of trees and grasses identified at Mut 2 site near Ṱhohoyanḓou

Trees	Grass
Acacia nigrences, Dichrostachys cinerea, Acacia karoo, Acacia nilotica, Albezia harveyi, Combretum apiculatum, Combretum imberbe, Combretum collinum, Peltoforum africanum, Tereminalia sericea, Grewia bicolor, Sclerocaya birrea, Lannea schwenfurthii.	*Pogonarthria squarrosa, Tricholaena monachne, Eragrostic rigidor, Themeda trianda, Panicum maximum, Aristida congesta, Sporobolus nitens, Urochloa mosambicensis, Chloris virgata, Eragrostics gammiflua*

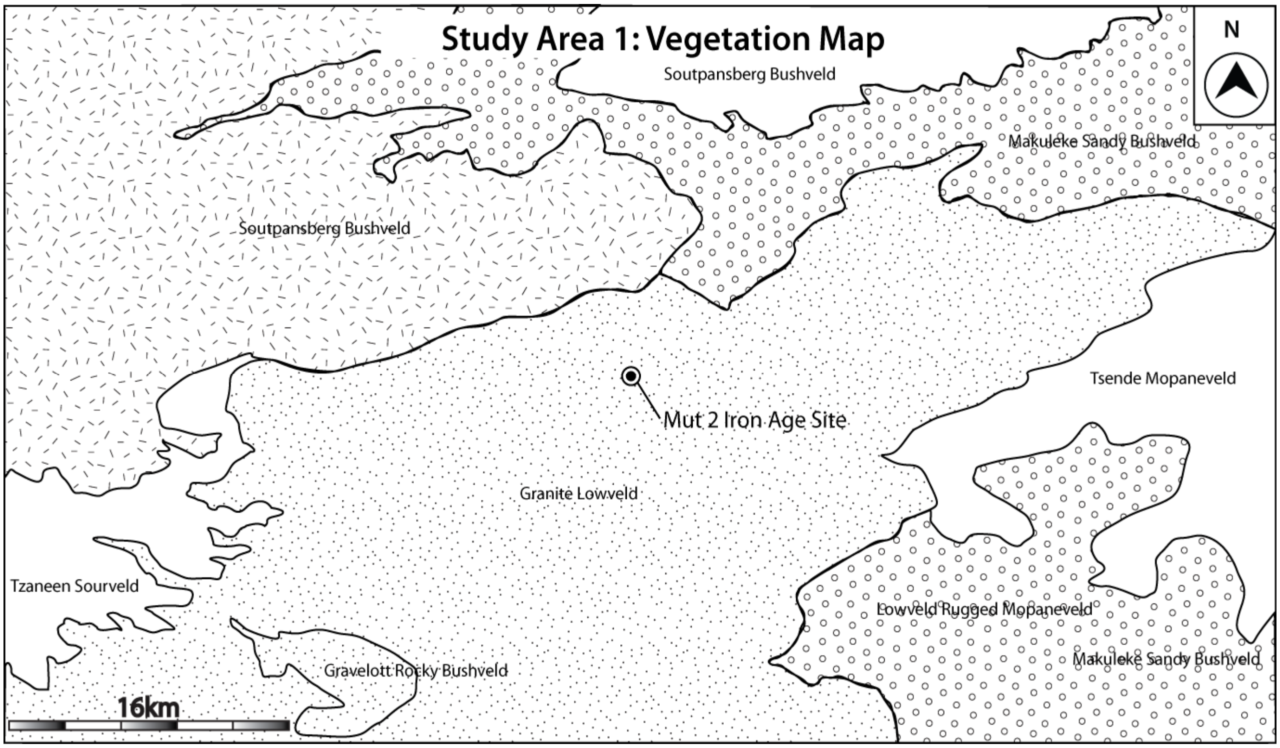


Figure 3: Mut 2 site vegetation map.

1.6.5. Thomo Early Iron Age site

1.6.5.1. Geology

The area falls within the north-eastern Kaapvaal Craton (Anhaeusser, 2006). The Giyani groups' type of geology stretches southeast of Giyani in the west of Shimuwini and Boulder Camp towards the rugged area of the Oliphant River valley south of Phalaborwa, and from Greitjie in the west to the Maveni River to the east (Mucina and Rutherford, 2006) (see figure 4). The area is located at an altitude of 250-550 metres above sea level.

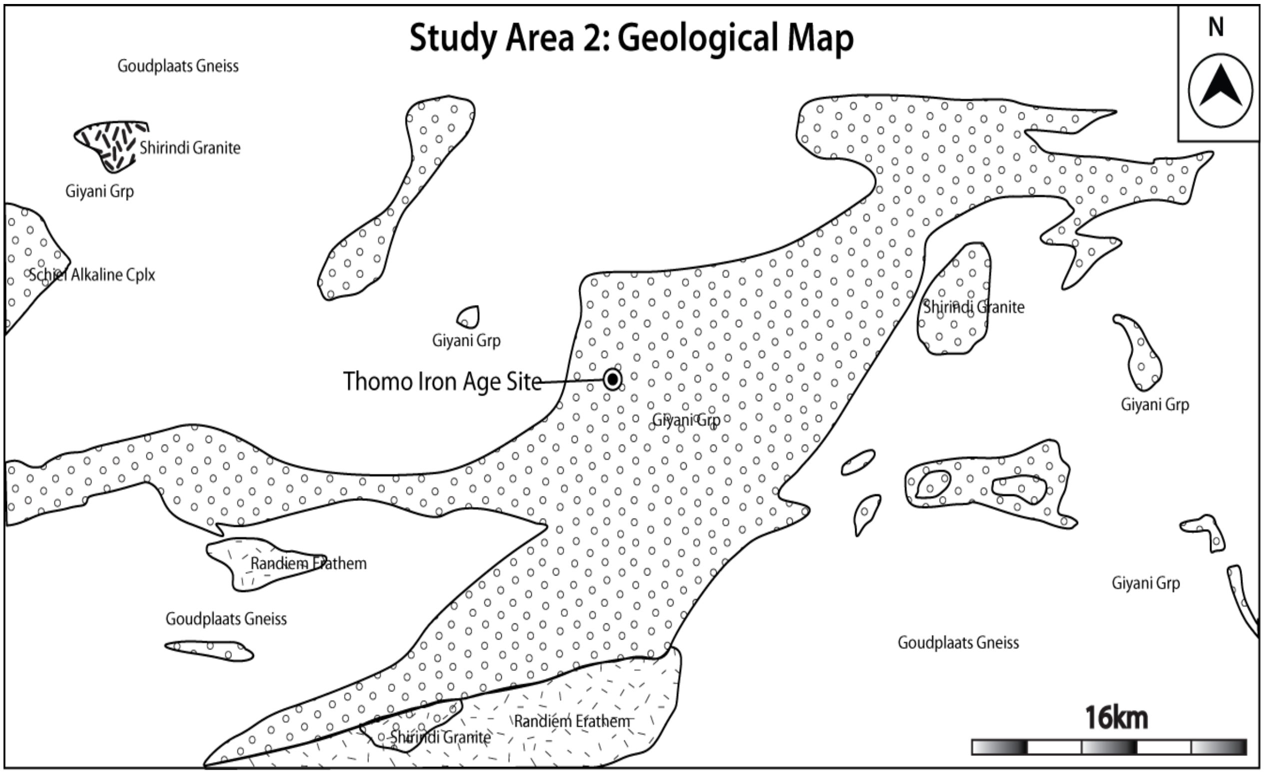


Figure 4: Thomo Iron Age site geological map

The geology of the area is characterised by meta-volcanic ultramafic rocks which include schistose, komatiite and komatiite basalt of the Giyani greenstone belt. Massive and sill-like intrusive bodies occur within the Greenstone belt, as well as Xenolithic remnants in the surrounding gneiss (Anhaeusser, 2006). The presence of Khavagari schist belt has been noted towards the south-western part of the Giyani greenbelt. The schist is characterised by ultramafic rocks associated with the Luonde intrusion, which has been interpreted by Prinsloo (1977) as a deformed sheet-like intrusion forming disconnected hills of serpentinite covered by large birbinite (Anhaeusser, 2006).

Prinsloo (1977) notes that serpentinite occurred from altered harzburgite. Serpentinite host tremolite-actinolite, talc-tremolite, and tremolite-cholite schist which contain magnesite minerals. The mineral has been mined in the past for traditional and ceremonial purposes. Consequently, there exist several quarries within the study area (Van Zyl *et al.,* 1942). Historical open pits mine with wooden logs and several iron smelting sites were recorded along the Nsami River near Thomo village (Maṱhoho, 2012).

Approximately 20 kilometres east of Giyani Township, several greenstone xenoliths occur within the Groot Letaba Geiss. These rocks are largely altered to amphibolites containing trenolite-actinote and some magnetite (Anhaeusser, 2006). Currently there are no age-dates of ultramafic rock available; however, metavolcanics rocks in the greenstone belt, including Groot Letaba Geiss between the Murchison and Giyani Greenstone belt, have provided Pb-Pb zircon evaporation age-range between c.3203-3171 Ma (Brandl and Kroner, 1993; Kroner *et al.,* 2000).

Geological examination indicates that the ultramafic bodies within the Giyani region are likely to be older than the upper-age limits supposed (Kroner and Brandl, 1993). In most of the area around Giyani greenstone belt, a medium-grained, whitish or locally pinkish leucocratic gneiss occurs and is associated with subordinate bands transgressing the foliation. This process can be clearly identified where quality outcrop reflects two-phases forms alternating 1-10 wide concordat layers (Kroner and Brandl, 1993). The current landscape features are characterised by extremely irregular plains with steep slopes and several prominent hills. The Oliphant River has more dissected and steeper slopes than the northern part of this unit. Common identifiable soils are red-yellow apedal, freely drained, but also shallow and stony, especially in the east. The dominant soil forms are mainly Hutton, Mispah and Glenrosa.

1.6.5.2. Vegetation

The vegetation of the area is dominated by Lowveld rugged Mopani, with dense shrubs, occasional trees and a sparse ground layer. The woody plants become dense where fire is not a threat due to the rocky terrain. Vegetation is more open which permits undergrowth during rainy seasons. This vegetation unit extends to Kruger National Park (see figure 5 below for vegetation distribution map).

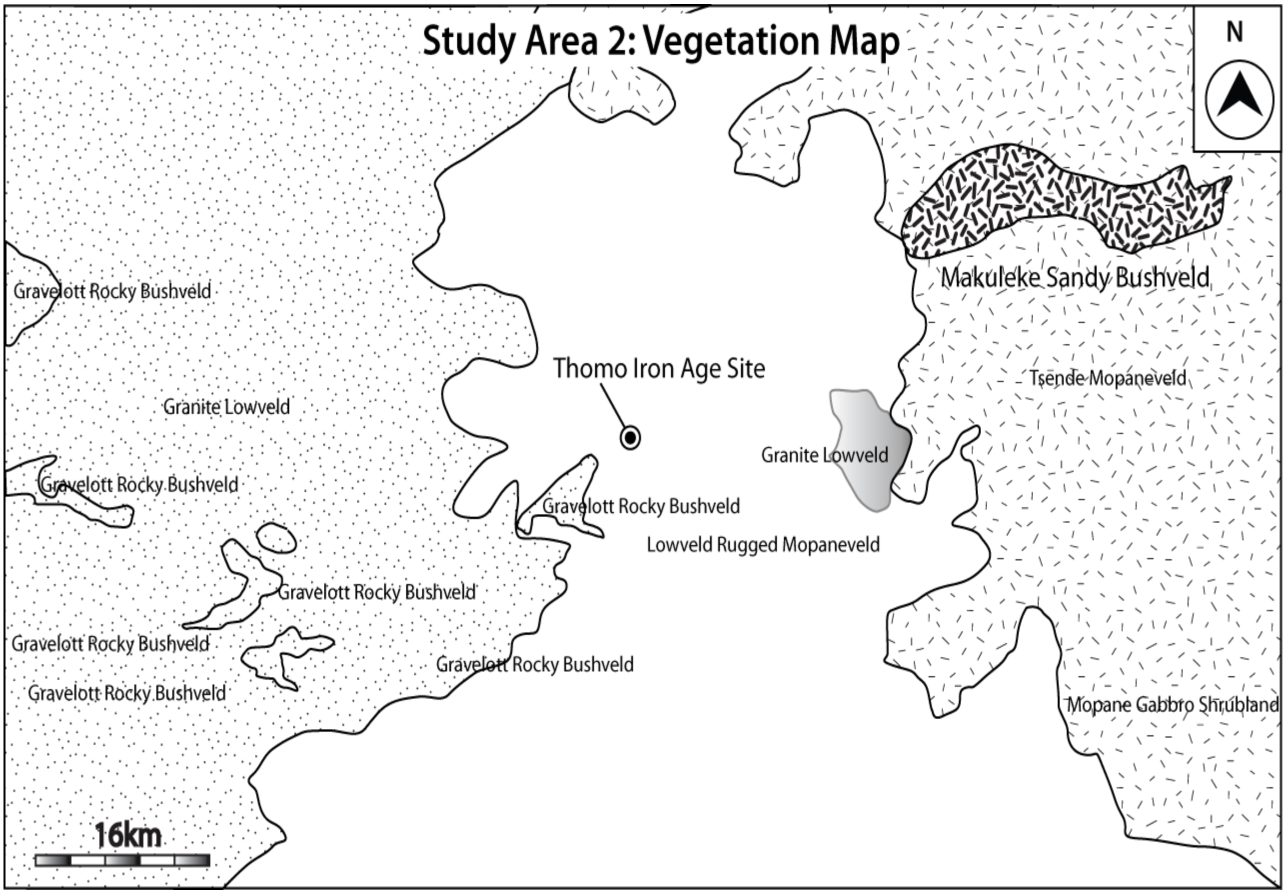


Figure 5: Thomo Iron Age site vegetation map.

The presence of mopani trees in this unit is essential as their leaves provide valuable fodder and are browsed by both domestic and wild animals (Kelly and Walker, 1976:574). According to Manyanga (2000), plant species in semi-arid zones adapted to fluctuating soil moisture conditions and dry spells within the growing seasons. Mucina and Rutherford (2006) note six grass species within the study area (see Table 1-2 below).

Table 1-2: Botanical names of trees and grass and herbs identified at Thomo site, near Giyani

Trees	Grass	Herbs
Acacia exuvialis, Acacia nigrences, Dichrostachys cinerea, Acacia karoo, Acacia nilotica, Combretum apiculatum, Combretum imberbe, Combretum collinum, Combretum hereroinse, Boscia albitrunca, Tereminalia sericea, Grewia bicolor, Grewia villosa, Sclerocaya birrea, Lannea schwenfurthii.	*Aristida congesta, Ennea pogon cenchroides, Melinis repens, Sporobolus anicoides, Bothriochloa radicans, Panicum maximum.*	*Crabbea velutina, Heliotropium steudneri, Hemuzygia eliotti, Hibiscus sidiformis, Phyllanthes asperulatus, Xerophyta retineuris*

1.6.6. Summary

In conclusion, current evidence shows that the Lowveld is characterised by a wide array of archaeological sites with cultural material remains that represent diverse timelines. Sufficient evidence relating to ceramics, settlement patterns, metal productions and radiocarbon dates were used to provide culture history of the region. Most sites documented have impressive ceramics, metal production debris such as slags, furnace and tuyere remnants representing both the Early and Late Iron Age periods. Cultural material remains provide a working platform to understand past metal production technology. The metal production process requires intricate multi-stage planning, material collection, smelting and tool manufacturing. This involves a range of innovative social communication skills. This study seeks to address some of these using the examples of the Garonga sites Mutoti and Thomo. Below is the thesis organisation.

1.7. Thesis organisation

To better understand the origins of Early Iron Age period, a review of past archaeological research studies conducted within the Limpopo province, particularly north and south of the Soutpansberg is presented in Chapter Two. It provides how scholars approached the archaeology of the Early Iron Age. The focus is on establishing what has been done to date, and the current state of research, highlighting gaps in the available database, as a way of determining relevant discussions and presentations. However, previous archaeological surveys and research in the region have not produced a coherent and reliable picture on cultural continuity and change occurrence in the economic and political life of the early farming communities. To complement this background, information on sites, ceramics, settlement patterns and associated archaeometallurgy are discussed. This region has been viewed as a changing cultural landscape in line with cultural landscape studies which underline the relationships between space, time, environment and culture (Aston, 1985; Welinder, 1988).

Chapter Three focusses on the importance of the history of iron production in the Limpopo province. Different themes which include consultations of historical and oral traditions, ethnographic re-enactments and experimentation conducted to date in a quest to understand indigenous metal production technology and practice as well as associated written accounts are revisited to see how other scholars have advanced archaeological debates to recent past.

Chapter Four is concerned with data collection strategies. These include archival study, surveys and excavations. The former describes sampling procedures related to archaeological survey and excavation, as well as the analysis of materials in the field. Chapter Five is concerned with presenting ceramics, the ceramic theory and methodological principles and protocols followed in typological classifications used to describe the ceramic materials to assign aforementioned ceramics within the existing culture-historical sequence and analysis adapted for this study are discussed. As rightly noted from the collected artefacts, ceramics are the largest artefacts categories recovered from Mut 2 while Thomo site assemblage are dominated by metal production slags. Chapter Six is dedicated to present archaeometallurgical remains, the associated archaeometallurgy theory, analysis, results and discussions.

Chapter Seven provides a wide range of discussions in the context of stored archaeological material remains including other miscellaneous objects (cultural material remains, for example, faunal, porcelains, slag and metal objects). The chapter discusses the implication of the above results, within a broader context before drawing up the conclusion. Key issues raised in the beginning of the chapters are revisited in Chapter Eight which highlights some broader regional implications and provides recommendations and suggestions for future study before presenting the references and appendices.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

The previous chapter highlighted diverse regional existence of Iron Age archaeology and its subsequent archaeometallurgy. The significance of existing knowledge is that it provides the basis for new ways to investigate the past ways of life. This chapter reviews previous research conducted in the north and south of the Soutpansberg region and how this informs the research questions for the present study. The chapter starts with a brief historical background of the documented early pioneers, explorers and geologists who laid a historical foundation for archaeological understanding of the social, political and economic organisation of the Iron Age communities who occupied the region. A thematic review of the archaeology research on pre-colonial societies, with a special reference to the archaeology is presented.

2.2. Historical background of the pioneers in the research area.

Current state of evidence on the history and the archaeology of the region was first recorded in the late 19th century when the region witnessed contact between literate and non-literate societies, (Pikirayi, 1993; Maṱhoho, 2012; Maṱhoho *et al.,* 2016). It was during this period that early missionaries, pioneers and prospectors reached the northernmost region of South Africa (Mason, 1969; Delius *et al*. 2014). A synthesis of their early writing appears in many forms and covers a wide variety of subjects. Historians have drawn upon some of these documents written in Portuguese and some that were translated to other languages (Pikirayi, 1993:15). These early writings recognised oral traditions as the prominent sources of information collected from different Late Iron Age communities to understand and unravel their social, political and economic organisation. Despite being biased, most written sources were essentially descriptive and focussed on identifying cultural groups, armed with the mission in search of precious metals ores such as copper, tin and gold. However, if the current state of information is combined with archaeological research, a clearer picture starts to emerge (Delius *et al*., 2014).

An exceptional example of the earliest historical documents on the Lowveld plateau is that of the German missionary Alexander Merensky in 1862. Historical documents suggest that he explored north of the Olifants River and traversed the Lowveld and gave an account of African chiefdoms who practised metal production in the 18^{th} century (Delius *at al*., 2014). Another account is that of the German geologist, Karl Mauch, who entered the province in 1868 and provided a well-established account of the community in the Phalaborwa area practising metal production. Considerable primary evidence was based on personal observations on mining and copper production activities in the area. Similar activities were later recorded by Trevor, (1912), Mellor, (1906), Hall, (1912), Schewellnus, (1937) and Verwoerd, (1956). Given the above records from different historical sources, what has been referred to as the first European pioneers in the interior is not an accurate reflection of the history of the area. This early literature was influenced by the political doctrine that created an insulated space for the Europeans to observe the region as 'the white man's land' as Van Jaarsveld (1975:62) puts it. The history of the Africans had to be recorded for them by civilised whites as an ascription of European superiority over Africans (Giliomee and Schlemmer, 1985:1-2).

It is upon this reasoning that Chirikure *et al.,* (2018) opine that documentary historical sources should be used with caution not as facts without rigorous criticism. Currently it is now well understood that historical and archaeological data must be independently evaluated to develop a clear picture of the past. Early literature shows that the first Europeans to see the Transvaal arrived in early 1725 under Frans de Kuiper, who was sent into the interior by Jan van de Capelle, head of the Dutch fort (*Lydzaamheid*) in Delagoa Bay (Mason, 1962). Van de Capelle's manuscripts mentioned the east-coast trade in tin which came from the interior of the Transvaal. There are records of a transaction of 46kg of glass beads being exchanged for 56 small bars of tin (Mason, 1962: 431). Trade and exchange patterns in prehistoric societies have also been reconstructed through the study of archaeological collections. The presence of material commodities in an archaeological context whose natural distribution is limited, has been viewed as an indication of interaction. Interaction occurred on several levels, for example trade and exchange and gifts. Trade relations and routes that connected southern Africa and the outside world were established through the analysis of glass beads, porcelain ceramics and fine ware and cloth (Chiripanhura, 2017).

The participation of southern African Iron Age communities in the Indian Ocean trade coincides with the increased number of glass beads found on southern African Iron Age sites. Some of the beads were confirmed through the analysis of glass beads (Wood, 2000; 2005; 2011; Robertshaw *et al.,* 2011; Prinsloo *et al.,* 2012; Daggett *et al.,* 2016). This historical trade network has been corroborated by the Portuguese map of 1893 which confirms the presence of early trade routes between southern Africa, and the east coast of Mozambique (De Vaal, 1984). It is possible that this tin may have been produced in the Rooiberg region (Bandama, 2013; 2018). Some of the reconstructed trade routes that traverse the study area connect with the Indian Ocean coast following major perennial streams.

Between the 1820s and 1830s, explorers wrote about the presence of Late Iron Age communities with settlements dominated by stonewall, livestock enclosures and metal production areas documented in the Transvaal. For example, John Campbell's description of the Kaditshwene is well known in the history of archaeology (Mason, 1962). In 1838, Bronkhorst, a Voortrekker diarist under Andries Potgieter recorded the first description of historical metal production technique among the Late Iron Age ethnic group (Pedi) in the Soutpansberg area (Mason, 1962). By the end of the 19th century, geologists and prospectors began to discover traces of prehistoric iron, copper and tin mining in the Transvaal (Mason, 1986). In 1866, Andrew Anderson reported the presence of an old mine with shafts and adits and the presence of African villages enclosed by stone walls (Mason, 1962).

2.3. Previous work in the area.

The area north of the Soutpansberg has a history of archaeological research dating back to the 1930s. In late 1932, Mapungubwe was discovered and a team of multidisciplinary specialists was consolidated to start with the first major archaeological excavations in the Limpopo Valley. Team members included Leo Fouche, C van Riet Lowe, Neville Jones, J.S. Schofield and G. Gardner in charge of the study of site culture; A. Galloway took charge of the human remains, while G. H. Stanley and O. Beck gave advice on metallurgy and glass beads (Mason, 1962).

By early 1933, exploratory excavations started on top of Mapungubwe Hill (Fouche, 1937; Hanisch, 1980). Since these early investigations had preconceived ideas about the nature of the site, they paid little attention to excavation procedures, while best practice standards were not in place. Failure to document features and cultural material remains by means of archaeological standard best practice led to the loss of valuable information that could have been used to comprehend the cultural development of the archaeological site. Most excavated deposits were not sieved to retrieve minute objects. Rather, they were cast-off to the so-called northern section of Mapungubwe Hill (northern Dump). The activities were conducted to speed up the excavation process. This limitation later drew much criticism (Pikirayi, 1997b: 68-76; Murimbika, 2006: 28). When Gardner took over in 1935, he exposed a prehistoric settlement at K2 site, well represented by hut floors. In 1940, excavation at both sites ceased due to the intervention of World War II (Hanisch, 1980). A recent Mapungubwe Hill rehabilitation project (2003-2007) excavated the northern dump section in a quest to uncover soil materials to be used in the rehabilitation process. The process yielded several cultural materials remains such as gold beads, gold foil, glass beads and diagnostic ceramics.

Further south of the Soutpansberg, by early 1933, mineral prospecting activities north of Phalaborwa area uncovered several archaeological sites. Van der Merwe performed the first archaeological excavation in Phalaborwa in 1965. He uncovered five furnace structures, and collected related ceramics associated with the Letaba tradition (More, 1974; Mason, 1962: 380). Major attractions in this area were the prehistoric metal production and mining sites. Several mines were opened, most of which were situated on top of earlier ones and responsible for the destruction of several archaeological sites associated with precolonial and prehistoric copper and iron ore mining in the area (Van der Merwe & Scully, 1971; More, 1974).

Furthermore, in 1937, D.S. van der Merwe discovered sites characterised by furnaces, slag concentration, terraces, ruins, soapstone objects and graves in the Letaba District (Evers, 1974). It was during the same year that Schewellnus (1937) reported the discovery of a smelting furnace, salt factory, and terrace walls near Tzaneen area. Elsewhere in the region, near the Soutpansberg, an Early Iron Age (Happy Rest) site was discovered in 1941 by De Vaal. Written documents suggest that it was during the same year in which De Vaal identified another stone terracing site near Blouberg. Just ten years later, another Iron Age site at Brodie Hill village was discovered. It was at the same period (1950) when Humphries began work in the Makgabeng area and reported the presence of rock-art painting which dated to the unrest period of the 19th century (Mason, 1969). Humphries produced the first radiocarbon dates of the Makgabeng site. The discovery of Brodie Hill sites acknowledged the presence of Early Iron Age sites in the interior and complemented De Vaal's work in filling Iron Age gap between well-known sites from the north, south and west of the Soutpansberg (Mason, 1962; De Vaal, 1941).

In 1947, Bates gave details of salt works near Eiland and furnaces and middens from nearby farms in the Letaba district. Results from early pioneers have generated a massive body of knowledge on farming societies while developing a more comprehensive database (Maggs and Whitelaw, 1991). Between 1953-1954, after the end of the Second World War, Pretoria University, under the leadership of Prof Eloff, commenced with the excavations at Mapungubwe southern terraces, K2 and Mapungubwe Hill. During this period, Eloff's excavations exposed a large area at Mapungubwe exposing hut floors and collecting cultural material remains such as ceramics, glass beads, gold beads, faunal assemblages and human remains (Mason, 1986).

A detailed scientific investigation effort in the Lowveld started with excavations by Mason at Phalaborwa in 1962. Several test trenches in terraced settlements of the Lolwe Mountain (Synite Hill) were excavated and documented (Mason, 1968; 1986). Later, during the year 1965, van der Merwe further excavated settlement and metal-production sites in Phalaborwa. During late 1970 - 1973, research investigation (surveys and excavations) shifted from Phalaborwa towards the Murchison Mountain, Tzaneen and Kruger National Park (van der Merwe and Scully, 1971; Krause, 1978; 1985; Evers, 1975). Intensive research investigations marked a turning point in addressing a more multifaceted and diverse research agenda in the history of archaeology. This subsequent period witnessed researchers commissioned to provide field museums with artefacts collections for exhibitions (Evers, 1975). The early farming communities' chronological sequences started to emerge with Silver Leaves site sitting on top of the culture historical sequence of the region (Klapwijk, 1974; Huffman, 2007). Excavation at Silver Leaves produced evidence of metal production and faunal assemblages (Klapwijk, 1973; 1974). Klapwijk and Huffman (1996) maintain that another undated site north of Tzaneen with similar ceramic affinities has been recorded on the farm Reubander in the Soutpansberg area. The site had ceramics which included fluted bows and bevelled jars which demonstrate a high ceramic affinity with Silver Leaves and other early farming community sites within the region and beyond South African boundaries (Klapwijk and Huffman, 1996).

The Silver Leaves ceramics attributes have been noted near Maputo in Mozambique where they are referred to as Matola (Morais, 1988; Sinclair *et al.,* 1993a; Mitchell, 2002), in Swaziland (Prince-Williams, 1980), Zimbabwe (Huffman, 1978a) and Limpopo Province, South Africa (Klapwijk, 1974).

A structured survey identified several sites including Eiland and Harmony sites (Evers, 1974). Systematic archaeological excavations of the lowest stratification at Eiland site yielded ceramic vessels with strong resemblance to the assemblages excavated at Silver Leaves site (Klapwijk, 1973; 1974; Evers, 1975). Similar investigations were conducted by Evers at a single component site of Harmony (Evers, 1979). The site produced two different ceramic assemblages. The first ceramics encountered from the top-most level of Harmony site bear resemblance to those that were uncovered at the Eiland site. This ceramic assemblage was initially wrongly classified as Silver Leaves tradition (Evers, 1979). However, there exist differences in fluted and bevelled ceramics, while unknown jar type vessels were present, making it difficult to place these ceramics within the Silver Leaves tradition. With new analytical techniques and field methods, re-examination of these ceramics shows that these ceramics belong to a widespread tradition which comprised Harmony and Eiland and was re-interpreted as Letaba tradition ceramics (Evers, 1979). The Letaba tradition falls within the Late Iron Age period and most sites likely range from AD 1600 to 1840 (Huffman, 2007). Similar ceramics were documented in several areas of the region by van der Merwe and Scully (1971) for Phalaborwa area, by Mason (1968) for Nareng and the Venda Village at Tshimbupfe area by Evers (1975).

Happy Rest and Klein Africa archaeological sites, were first reported in 1941 by De Vaal near the Soutpansberg area, subjected to scientific investigations in 1974 by Hergaard Prinsloo. These two sites were understood to fall within the earliest component of Iron Age Phase that occupied west of the Soutpansberg (Prinsloo, 1974). Excavations uncovered ceramic shards with structural codes that are different from Silver Leaves site ceramics; some of these ceramics had thick rims and multiple bands of mixed decoration techniques. Analysis of Happy Rest and Klein Africa ceramics were identified to represent Kalundu tradition in the Soutpansberg (Huffman, 2007). In addition to the above, a human skeleton was uncovered buried in a sitting position inside a cattle kraal. Analysis of the skeletal remains identified morphological features of an African individual.

In the Limpopo Valley, the discovery of Schroda archaeological site encouraged research interest in the early 1980s. The site was excavated by Edwin Hanisch as part of his master's studies programme. The site falls within the Zhizo Phase and excavations uncovered evidence of ivory working, the first time that this was documented in the region (Hanisch, 1980; Huffman, 2007). Cultural assemblages collected include, ceramics, glass beads, clay figurines, faunal remains and ivory bangles (Hanisch, 1980). Unique of the most outstanding discoveries from this site was the presence of ceramic figurines mostly of humans and animals. It is projected that these figurines were ethnographically linked to initiation ceremonies (van Schalkwyk and Hanisch, 2002; Murimbika, 2006).

In the north of the Soutpansberg, the presence of Mutamba archaeological site – which forms part of the Mapungubwe polities located a distance away from the Mapungubwe kingdom – from very early on attracted interest in the development of social complexity of early civilisation. However, reading from recent investigations conducted at Mutamba sites by Antonites (2012) shed more light.

Mutamba was occupied from the late 12th - 13th centuries AD, the period in which Mapungubwe elite sought to centralise power and material wealth. It became clear that in most cases the voice of materials culture excavated from Mutamba sites was silenced and selectively applied to support the existing grand theory of the day that the Mapungubwe kingdom controlled access to materials wealth. The research demonstrated that Mutamba communities, by residing away from the Mapungubwe kingdom, where political power was maintained, and moving to generalised subsistence production, the distribution of important items from Mutamba assemblage revealed that the hinterland communities could use their position to acquire trade goods usually restricted to elite societies which were part of the Mapungubwe kingdom polities (Antonites, 2012).

Generally, the presence of Early Iron Age and related sites distributions in the region attracted interest in the understanding of social complexity. As such, the picture available is still to change due to limited investigations conducted to date. Garonga Phase period is not well covered in the archaeological literature. The discovery of Mut 2 site away from the Soutpansberg in 1995 by Edwin Hanisch generated a new line of archaeological evidence. Excavations of the site yielded materials remains such as distinct ceramic, burnt daga fragments and metal production debris. Finalisation of the excavations encountered many products such as soapstones, Islamic ceramics, slags and ivory bangles. These collections from Mutoti Iron Age site are housed at the University of Venda, Anthropology Museum and can be easily assessed and studied. Museum collections play a valuable role in allowing archaeologists to address a variety of research questions and are particularly useful for developing new understanding since Mutoti Iron Age site has been destroyed during the construction of Naṋḓoni Dam.

When excavated from archaeological sites, objects become collections that are stored in archives such as museums. Because collections, even for individual sites, accumulate from different periods, their study provides an unrivalled understanding of the societies and cultures that produced the objects and used them. They also tell us more about collection and curation practices. This materials' evidence-based approach to the past minimises uncontrolled speculation. An example which demonstrates the importance of engaging with collections is that of Antonites' (2014; 2016). His re-assessment of archaeological collections from Schroda demonstrates the socio-political and economic organisation of the Zhizo community. The research revealed that food items were used as gift exchange and as tribute, therefore food ways are embedded in everyday life. As objects are central to human activities, past and present, they are invaluable in understanding human behaviour. Anthropological studies illustrate that objects, in some societies, take on the personalities of people or have lives that are like persons hence making it possible to write the biographies of objects just as we write the biographies of people by following objects' lives from birth to life and death (Hoskins, 1998; Chiripanhura, 2017). Pikirayi and Lindahl (2013) support the multidisciplinary approach which includes ethnohistory and ethnography studies to understand the meaning centred around artefacts collection.

In a quest to unravel meaning of pottery, Pikirayi and Lindahl (2013) recently conducted ethnohistorical and ethnographic studies in Venda, South Africa and Zimbabwe and concluded that ceramic production amongst rural communities provides the basis on which a wide range of social issues are discussed and observed to critique archaeological collections. Their studies highlighted the value of ethnographic and ethnohistorical studies in pottery inquiry in illuminating the functional aspect of ceramics within a wide range of social aspects, which includes exchange, rituals and ceremony. Elsewhere in Zimbabwe, Chiripanhura (2017) demonstrated the importance of engaging with collections housed at different institutions that characterised Great Zimbabwe and concluded that foreign glass beads did not replace locally produced ones such as ostrich eggshell and metals beads.

A great deal of attention has been on the understanding of the Early Iron Age sites distribution in the region (Maggs, 1980). Of significant importance are the recent studies conducted by Huffman *et al.,* (2020) at Rhino Early Iron Age site near Thabazimbi. The excavation yielded numerous hut and granaries structures, burnt daga fragments and two types of ceramic facies, namely the Happy Rest and the Mzonjani. A ceramic fragment believed to be part of a terracotta head was uncovered. The site has been dated to 750-800AD. This period, according to Huffman, belongs to the drought period.

Elsewhere in the region, similar archaeological research was conducted; for example, the investigation of small-scale mine activities associated with the 20th century near Maremani Nature Reserve (Joubert, 2019). A significant amount of research has been conducted on the technology and sociology of copper and iron production in the Lowveld including Phalaborwa (van der Merwe and Killicks, 1979; Pistorius, 1989; Miller *et al*., 2001, Miller and Killicks, 2004; 2019; Thondhlana, 2013; 2016; Killicks and Miller, 2014; Killicks *et al*., 2016; Moffet, 2016; Moffet *et al*., 2020). In the Kruger National Park, Meyer's fieldwork identified twenty different industries and clusters of related sites. Nine of these sites are considered as dating to the first millennium, the most important being the Silver Leaves-related sites (Ma38), the Mutlumuvi Complex and the Eiland-related sites which are southern and northern variants of the same ceramic entity as well as the Lydenburg-related sites and the Tsende industry and its later components (Meyer, 1986).

2.4. A review of Iron Age Ceramics within the Lowveld and culture historical sequence.

According to Huffman (2007:104) material culture expresses identity. As such, small sets of designs occur on a wide variety such as house form designs, ceramics, baskets, drums, skin aprons and beads work. These repeated codes help in understanding group identity. The integrated designs encoded in objects communicate social messages to the people of the same group. The designs and colour application speaks volumes, furthermore, encoding symbolic meaning. A single style or large design field that is easily recognized by outsiders helps in the contribution of group identity. For example, wearing of white, or white-and-red bead work in association with the application of mixed Vaseline or animal fat and red ochre over ones' body represents an initiate (sangoma initiate or from initiation school).

As these example shows, ceramics products are part of the larger design fields shared by all members of the community. Subsequently, in the archaeological discipline, ceramic assemblages are the major artefacts category in southern African Iron Age and are used as a source of enquiries to understand relative chronology, identifying prehistoric human groups, and tracing people movements from one area to another (Pikirayi and Lindahl, 2013:2). Ceramics are an active part of prehistoric societies and are material culture with distinct/diagnostics attributes where the maker and the user belong to the same or outside material group (Huffman, 2007:104, Pwiti, 1996). Ceramic typology is central to the current discussion of Iron Age period in the region, using the most widely accepted approach developed by Huffman (1980) which employed multi-dimensional analysis of vessel profile, decoration layout and motif to understand and reconstruct different types (Mitchell, 2002: 262). Ceramic forms the basis for the definition of culture, tradition, phases and facies (Pwiti 1996:142). Ceramic typology and settlement studies were used to establish the culture-historical context of the region. According to Pikirayi (1997b; 1999:187) ceramics reflect human organisation, interaction and group arrangement as they give the impression that the site was connected to the initial production and distribution of pottery (Pikirayi, 1999:187). However, a summary suffices for this study.

Although radiocarbon date estimates are available for various sites, different ceramic styles, decoration layout and motif have been studied within the region and beyond South African boundaries. However, some regional ceramic syntheses conducted to date reflect Early Iron Age sequence which comprises Silver Leaves facies (280-450 AD) which mark the arrival of the Early Iron Age farming communities with a high proportion of fluted rims on bowls and multiple bevelled rims on jars. The vessels are represented by strong inverted-necked jars, with simple decorations just below the rim, and a simple discontinuous motif on the shoulder (Maggs, 1980;

Klapwijk, 1973; 1974; Mitchell, 2002:269). Bowls are carinated with or without multiple horizontal fluting at the upper portion. Maggs (1980) named this ceramic “Matola” due to its closest link with Mzonjani and Silver Leaves. The characteristic pottery together with metal slag, tuyere showed that these early people were iron-working agriculturalists (Klapwijk, 1974).

These facies-sites distributions in the region are very limited; however, similar sites with similar dates came from the earliest levels of the Eiland Salt Works site (Eiland, 2/74; 4/74; 6/74), Harmony sites 65/72, and at Landraad near Gravelotte (Evers, 1974). These sites were discovered a few kilometres south, and southeast of Tzaneen Central Business District.

Data on the Reubander site is inaccessible and unpublished. However, the archaeological material remains are kept at the Anthropology Museum at the University of South Africa (Klapwijk and Huffman, 1996). Similar ceramics affinities have been recorded in Mozambique at areas such as Eduardo Mondlane University Campus (Sinclair, Nydolf and Wickman-Nydolf, 1976), Matola IV (Cruz e Silva, 1976; Morais, 1988), Kwale (Soper, 1967), Nkope (Robinson, 1970) and Broederstroom (Mason, 1973; 1974a; 1974b). The re-excavation of Matola IV site by Morais in 1982 produced radiocarbon dates from the range AD 70± 50 (R1327) and 230 ± 110 (St 8546) to 480±80 (St 8547). A common resemblance of ceramics probably reflects a common origin of traditions (Evers, 1974:57).

Mzonjani facies (450-750 AD) ceramics comprised pottery fragments dominated by recurved jars with combs stamped on them or incised bands of hatched or herringbone motifs placed below the rim and in the neck. Prinsloo (1974) acknowledges that sites such as Happy Rest and Klein Africa share ceramics characteristics and thus he assigned them as Matakoma ceramics, with a wide distribution that extends to the Limpopo Valley, where Meyer excavated similar ceramics at Mapungubwe (Meyer, 1980:277-278). South of the Soutpansberg, similar ceramic shards were excavated at Eiland Salt Works (Eiland Salt Works-AD 390-435, Pta 1524, Pta 1608, Pta 1607, Wits 764) along the Letaba River in the Kruger National Park by Meyer (1986:274), the Waterberg area by Aukema (1988) and in the Mpumalanga region by Maggs and Whitelaw (1991).

Adjoining the Soutpansberg, thin-walled Bambata ceramics were recovered on an open camp (Smith and Hall, 2000). The sighting of these ceramics led to the advance of the viewpoint that

Happy Rest farming communities were not the first farmers to settle in the Soutpansberg (Smith and Hall, 2000). It is arguable that these shards indicate a pre-Happy Rest date for the first appearance of Bambata in the 1st century AD, but with possible overlap with Happy Rest material up to AD 400. There is still uncertainty of where these thin-walled ceramics originated from and what their primary use was (Smith and Hall, 2000). Therefore, very little is known about them. Mesthie (2002:50) contends it is not possible to date with certainty the arrival of the early-farming communities into the region.

The Garonga Phase Period (750-900 AD) has not enjoyed extensive archaeological coverage like other Iron Age phases, such as Silver Leaves, Happy Rest and Eiland. The Garonga-Phase ceramics are represented by a combination of both Mzonjani ceramics (AD 450-750) and the Silver Leaves (AD 280- 420). The Mzonjani tradition has been described by Hall (1980), Maggs (1980), Whitelaw and Moon (1996) and Burrett (2007) as ceramics with distinctive averted rims on the jars. Bands of rims with decoration consisting of incised hatching, crosshatching, alternating blocks (rarely triangle) or parallel lines such as bands often accompanied by grooves or line of punctures on the upper rim at its junction with the lip. Small pendent triangles at the point of inversion are common. Sometimes these decorations are represented by various spaced motifs occasionally occurring on the body of the jar. An example of similar type of ceramics (Kalundu tradition - Diamante phase 2) date to AD 750-1000 (Huffman, 2007). These ceramics are characterised by a combination of features like the presence of recurve jars, multiple bands and herringbones. Some of the ceramics have decorations on the shoulder or occupying broad areas incorporating the neck, shoulder and lip as well as the use of ladders and stamped combs in addition to incisions. These ceramics are also characterised by open or hemispherical bowls with decoration on the rim or dropped to the lower rim. Another attribute associated with this tradition is the presence of interlocking triangles and decorated necked bowls.

Burrett (2007) opines of the existence of these sites in the Greater Makalali Nature Reserve near Mica in the Lowveld of Limpopo Province. The site is located on the northern banks of the Kameelsloot River. Of importance to this study is the archaeological work conducted at Mut 2 Early Iron Age site. The site is situated 10 kilometres south east of the Ṱhohoyanḓou CBD in the area where Nanḓoni Dam is situated today.

Most of the ceramics retrieved from Mut 2 site have been classified as unglazed ceramic, fired refined clay with temper addition (for example, coarse sand) and the representative sample of diagnostic shards assemblage became sufficient to reconstruct the multidimensional analysis which included three variables, namely, vessel profile, decoration motif and decoration layout position. These ceramic assemblages showed significant correlations in style and decorative motives with ceramics from other early farming community sites in the region such as Happy Rest, Klein Africa and Silver Leaves.

Data from Mut 2 site reflected similarity on ceramics assemblages documented from the top to the bottom layers of the excavations. These similarities apply to the shards recovered from the excavated pits used as underground cereals storage (a feature of southern African early farming communities' sites) were the same as those uncovered from the village horizons. Ceramic samples from Mut 2 show no changes in pottery style and decoration which may reflect a single, constant phase of the Mut 2 village occupation. A detailed ceramics analysis of Mut 2 site will be discussed at a later stage in this document.

A recent excavation of the early farming community site near Thomo village reflected that the site shared ceramic similarity with those sites documented elsewhere in the region. The site is located below the Nsami Dam near Giyani. Most of the ceramic shards' decoration techniques include punctures on the rim and multiple bands in the neck region. The decorations were placed on the rim, neck and on the shoulders/body. In general, the ceramics from this site closely resemble those observed from other early farming community sites within the region, particularly Mut 2 and Garonga site (Maṱhoho, 2012).

Currently radiocarbon dates support a continuation from Garonga Phase to Eiland Phase. The Eiland ceramics have been collected from excavation at Eiland Salt Works (Evers, 1974). Their styles are characterised by finely executed herringbone, crosshatching and graphite or ochre burnish placed on the rim and neck of slightly necked jars (Loubser, 1988). Eiland ceramics are widely distributed across the Limpopo Province and have been recorded to stretch from Tzaneen region to the eastern Botswana region (Klapwijk, 1974; Denbow, 1981; Hall, 1981; Loubser, 1981; More, 1981) while the southern boundary is most likely the Magaliesberg (Evers, 1987:43; Loubser, 1988). The presence of Eiland ceramics has been recorded in the Limpopo Valley, near the Shashi-Limpopo confluence, the M3 ware from Mapungubwe (Schofield, 1937:10-12; Fouche,

1937) and various Toutswe sites (Denbow, 1983). Schofield (1937) and Gardner (1963:202-226) have recorded similar ceramics characterised by black burnished shouldered jars and a straight-sided beaker from K2 site. Loubser (1988) observed that Matakoma (Happy Rest tradition) decorated wares were also present in the Eiland ceramics, but significant differences were observed in stylistic design and attributes. Most Eiland sites date between the eleventh and thirteenth centuries (More, 1981). Examples of these ceramics were uncovered at Kgopolwe (1000-1300 AD) which are distinguished by the presence of herringbone and the presence of cross-hatched bands (Evers 1981). The end of the Eiland tradition in this region is marked by the appearance of Moloko traditions as defined by Evers (1981:98; 1983:263). These types of ceramics are derived from Icon facies (1300-1500 AD) at the Moloko Branch and the Moor park facies (1350-1750 AD) (Huffman, 2007).

The Moloko ceramics are characterised by multiple bands of incised, hatched or stamped motifs and the presence of graphite and ochre burnish are common (Loubser, 1988:25). The Moloko ceramic sequence (associated with ancestral Sotho-Tswana groups) is divided into three phases – Phase 1 (AD 1300-1500) Phase 2 (AD 1500-1700) and Phase 3 (1700-1840). Moloko ceramics have been reported at Icon site (Hanisch, 1979), Soutpansberg (Loubser, 1988), South Waterberg (Rooiberg) (Hall 1981; 1985, Bandama, 2013; 2018), Central Transvaal (More, 1981) Southern Transvaal (Taylor, 1979) Phalaborwa, (Evers and van der Merwe, 1987) and Magaliesberg (Mason, 1973; 1974; 1986).

Prejudice in the early archaeological thinking was that these ceramics could not be associated with any of the known ceramics in southern Africa (Hanisch, 1979:72). This likelihood has been prolonged so that the place of Icon in the context of the Iron Age of southern Africa is somewhat uncertain, with difficulties as to the origins of Icon or whether it developed into any of the other known pottery traditions (Hanisch, 1979). Hall (1981; 1985) identified similar Moloko ceramics acknowledged by Hanisch (1979) at Icon site (Pta, 1652-AD 1330 ±50) at the Rooiberg unit 3 assemblages (South Waterberg) while Maggs type N in the Orange Free State records similar ceramic design. Evers (1981: 98; 1983: 263) identified this type of ceramic as an ancestral Sotho/Tswana ceramic south of the Soutpansberg. Mason (1985:10 1986: 41), Maggs (1976:284) and Loubser (1988:25) projected that Moloko tradition continued into historic periods among various Sotho-Tswana communities; the tradition is well signified amongst the Ba-Pedi ceramics of the Limpopo Province (Collet, 1982:42).

Khami ceramic ware has been identified across the Limpopo River, within the Soutpansberg region, these vessels appeared in the archaeological records at the same time with the Moloko tradition (Loubser, 1988). Documents suggest that these ceramics are commonly found in central and northern Zimbabwe (Khami ruins near Bulawayo) (Mukwende, 2016). According to Beach, Khami ruins occurred because of the Torwa dynasty. Mukwende's (2016) analysis of Khami's archaeological collections housed at the Museum of Human Sciences and the Natural History Museum in Harare and Bulawayo, Zimbabwe respectively revealed that the Zimbabwe Culture Capital of Khami represents a continuity with the Woolandale chiefdoms that settled in the southwestern parts of the country and in the adjacent areas of Botswana. For a very long time, Khami was regarded as an offshoot of Great Zimbabwe (Robinson, 1959; Huffman, 1984; Pikirayi 2001). However, a consolidated analysis of pottery, faunal remains, beads, stone architecture and metallurgical objects revealed that, other than drystone walling, the material objects from the two sites lacked any traits that could suggest that they were successor states. Instead, the study showed that Khami began as a fully developed cultural unit and that the site was constructed over a long period, with construction being motivated by several expansionary factors (Mukwende, 2016; Chiripanhura, 2017:17).

Khami ceramics represent the second phase of Zimbabwe tradition, characterised by bands of panel decorations—including incised bands of counter-hatched triangles or chevrons and panels of diamonds or squares combined with ochre and graphite (Hall, 1909:262; MacIver, 1905:46; Caton-Thompson, 1931:182; Robinson, 1959:115-116: Thorp, 1984:60-67; Huffman, 1978a:94). The presence of Khami ceramics could attest to the early Shona expansion into the Soutpansberg region (Loubser, 1988). The study of archaeological collections such as ceramics has also unearthed various forms of interactions in the past, since most of the ceramics were uncovered concentrated at sites characterised by Zimbabwean type of architecture (stone walling) constructed on elevated slopes or hills within the Soutpansberg (Loubser, 1989).

Through combining radiocarbon dates with ceramic analysis, Van Warden (1987) managed to show that between early fourteenth and mid-fifteenth centuries, the Khami ceramic users were also present in Botswana. Similar radiocarbon dates reflect that these groups of people occupied north of the Soutpansberg between the middle fifteen centuries and the seventeenth century (Huffman & Hanisch, 1978; Huffman, 1986). The existence of these ceramics in the region is attributed to the Shona territorial expansion to the Soutpansberg region. The ceramics evolved out of the local overlap and interaction between Khami and Northern Sotho ceramic users (Loubser, 1988;1989). Synonymous ceramics assemblages have been excavated from the upper level at Eiland, Harmony, Phalaborwa and the Soutpansberg (van der Merwe and Scully 1971; Evers, 1974;1975) these ceramic traditions were labelled the Letaba ceramics due to the spatial distribution within the region (Evers 1974; Loubser, 1988). However similar ceramics have been documented in the Eastern Transvaal (van der Merwe and Scully, 1971; Meyer, 1986), central Transvaal (More, 1981) southwestern Mozambique (Krige, 1937; Liesegang, 1977; Scully, 1978) and south Zimbabwe (Cooke, 1970).

The Letaba ceramics are characterised by open bowl and globular pot with attributes such as crosshatching, bands of spaced hatched or crosshatched triangles, herringbone, graphite and ochre burnish (Chatterton, Collet & Swan, 1979:109-119). Looking closely at the ceramic attributes of both recent Vhaveṋḓa and Northern Sotho ceramics decorations and the spatial distribution of archaeological sites in the northernmost parts of South Africa, Loubser (1989) managed to cement the local origin hypothesis for the Vhaveṋḓa people. Two schools of thought had dominated interpretations of Vhaveṋḓa history. On one hand, scholars who base their arguments on ethnographic evidence had insisted that the Singo people traced back to either Congo or the Great Lakes were the true Vhaveṋḓa (Van Warmelo, 1956; 1974; Wilson, 1969) while the other school has pushed for a local origin hypothesis. Loubser (1989) decided to study the Vhaveṋḓa material objects to trace their origins. He came to the recognition that the Vhaveṋḓa identity came out of the interaction that occurred between the Shona-speaking people who had migrated from Zimbabwe settling in the Northern Transvaal and the Sotho inhabitants. Dated sites, ceramic styles and settlement patterns revealed that the Shona-speaking people had ruled north of the Soutpansberg at least since the 12th century while the Sotho speakers probably lived in the Soutpansberg since the early 14th century (Loubser, 1989; Chiripanhura, 2017).

Oral traditions suggest that the Soutpansberg was occupied in successions. Loubser's (1989) hypothesis has been corroborated by Lukhaimane (Undated:6) who maintained that the group that claims to be the real Vhaveṋḓa was not the original occupants of Veṋḓaland. Tradition established that the original inhabitants were Vhangona, those of Ṱhohoyaṋḓou crossed the Limpopo and settled along the Soutpansberg range, they found another tribe, the Vhangona, in occupation of the territory. The third group that settled in Veṋḓaland before the unification of Vhaveṋḓa were the Vhambedzi who spoke Lumbedzi and were recorded to have come from Malungudzi hill in Zimbabwe under Chief Luvhumbi. It was only through the military victory that the Singo dynasty claim to be the real owner of the region. Based on the oral tradition, one gets an impression that these early communities were wanderers who perhaps never considered the region as their permanent home, however, archaeological studies to date revealed that the region was occupied since the 1st millennium to the recent past. Table 2-1 below provides a list of Early Iron Age (EIA) sites distribution within the Lowveld and beyond the South African borders.

Table 2-1: The chronology of Early Iron Age, represented by sites that are found in and outside the Limpopo region. Some of the phases represented by these sites are found in the research area but others are not.

Archaeological sites	Period	Radiocarbon dates and sample numbers	Published sources and sites excavators
Urewe tradition (Kwale branch) Silver Leaves sites			Klapwijk (1974), Cruz e Silva (1976), Dart & Beaumont (1969), Hall & Vogel (1978), Huffman (1978), Klapwijk & Huffman (1996), Morais (1988), Meyer (1986), Senna-Martinez (1976), Sinclair *et al.,*(1987), Mitchell (2002)
Matola	EIA	(R1327, st8546) Dates ranges:110-24 and 240-520AD	
Silver Leaves	E IA	(Pta 2360, Pta 2459, Pta 901 Pta 914) Dates ranges: 250-395 and 420-545 AD	
University Campus	E IA	(St 9836, St 9838) Dates ranges: 220-410 and 420-600 AD	
Zitundo	E IA	(St 8909, St 9811, St 8912) Dates ranges: 150-420 and 255-540 AD	
Mzonjani Facie Burgersfort	E IA	(Pta 8949) Dates ranges: 450-750 AD	Evers (1975, 1977, 1981, 1982a 1988), Hall (1980), Nienaber, Prinsloo & Pistorius (1997), Prinsloo (1974), Huffman (2007), Mitchell (2002)
Eiland Saltworks	E IA	(Pta 1524, Pta 1608, Pta 1607, wits 764) Dates ranges: 390-435 AD	

Happy Rest	E IA	(Pta 2421) Dates ranges: 430-555 AD	
Klein Africa	EIA	(Pta 1168) Dates ranges: 415-535 AD	
Lebalelo	EIA	(Pta 8772) Dates ranges: 685-AD	Huffman (2007)
Garonga Phase	EIA	(Sk 172-bone, Pta 3507) Dates ranges: 800-900 AD and 750-1000 AD	Burret (2007), Huffman (2007)

2.5. An overview of settlement pattern studies in the Lowveld region (Soutpansberg)

To understand the social complexity of the early farming communities, we need to establish the relationship between artefacts, features and activity areas within the settlement (Huffman, 2007). Settlement organisation models are particularly useful in investigating sites and settlement relationship. Settlement pattern has been described by Maggs (1976) as the regular ordering of the artificial components within a settlement. The position of settlement relates to one another and to aspects of the physical environment. Iron Age settlements have been recorded to exist in savannah environment (both grassland and wooded regions), situated in valley bottoms and next to streams or water sources (Maggs & Ward, 1984; Maggs, 1994/1995; Badenhorst, 2009). The need for water is one of the factors which might have a bearing on the settlement pattern (Pikirayi, 1993). At both local and regional levels, human populations were very low. Some archaeologists suggest that during that time, farming communities had contact with other farming communities in the region as well as the hunter-gathering communities (Badenhorst, 2009; 2010).

Most of the early farming communities have been recorded over much of the region as an indication of agro-pastoral settlement or early villages (Maggs, 1980b). Settlement classifications were recorded and analysed with specific reference to site location, construction techniques, location of huts and their relationship to other features (Huffman, 2007). The best-preserved settlement organisation ever recorded is represented by a circular pattern (Maggs, 1976). This pattern is widely distributed in the region and had similar characteristics to those of sub-Saharan Africa (Mallow, 1963).

One of the oldest settlement patterns in the Soutpansberg area ever recorded has one or several livestock dung concentrations (Loubser, 1988). This type of settlement schema fitted well with what has been developed by Kuper (1982b) and Huffman (2007) as the Central Cattle Pattern (CCP). The settlement is characterised by cattle kraal at the centre of the settlement, used as burial places for high-status individuals. The huts are arranged around the kraal while the kraal also operates as grain storage facility with sunken grain storage pits (Huffman, 2007:25). This model has been derived from the eastern Bantu ethnographic model that shares a patrilineal ideology, where men are associated with pastoralism and women with agriculture (Kuper, 1982b). This type of settlement is similar in the arrangement of livestock enclosures, although separation of adult livestock and calf enclosures have also been identified (Huffman, 2007).

This settlement pattern reflects the socio-economic reality where cattle have a high symbolic and religious significance as reflected in the position of their enclosures (Maggs, 1976). Evidence for the CCP has been reported from Early Iron Age sites in South Africa, including in Ndondondwane (Greenfield *et al.,* 2000; Greenfield & van Schalkwyk, 2003; Greenfield and Miller, 2004), Nanda (Whitelaw, 1993) and Kwagandaganda (Whitelaw, 1994) in KwaZulu-Natal as well as Broederstroom (Huffman, 1990; 1993), Zhizo sites in Zimbabwe, adjacent parts of Botswana as well as the Limpopo Valley (Robinson, 1960; Huffman, 1973, 1984; Hanisch, 1980; Denbow, 1982; Kiyaga-Mulindwa, 1992; Campbell *et al.,* 1996). It has been projected that most of the Zhizho sites conform to the Central Cattle Pattern (Murimbika, 2006).

Hanisch (1980) encountered two settlement patterns during his excavations of Schroda and Pont Drift within the Limpopo Valley. The lower level was dominated by the presence of hut floors, and absence of a livestock kraal in the central part. The second pattern was characterised by small kraals amongst the huts. There is an absence of large kraals, but rather a series of smaller kraals that occur in the central part of the archaeological site. Huts were erected around the central area thereby protecting livestock. The second village differed from the first village because these huts did not surround the kraal and midden. The kraal and midden were placed right against the rocky outcrop. At Pont Drift, Hanisch found very few living-in huts remains on top of the ridge. The huts occurred in association with grain-bins remains. The settlement was identified as a large village compartmentalised into smaller units (Hanisch, 1980).

Also worth noting in this context is the work by Murimbika (2006) at K2 site in the Limpopo Valley. Murimbika (2006) drew a conclusion that K2 archaeological site started as a Central Cattle Pattern, but at some point, cattle were shifted from the centre. This change was interpreted as a major shift in spatial organisation, which corresponded to a change in socio-political and economic relationships. Cattle were separated from the central space; this shift reflected the rise of a new form of wealth associated with the East Coast Trade Network (Murimbika, 2006).

The first Millennium AD Central Cattle Pattern lacks stone construction, with the economy characterised by livestock and agriculture (Maggs, 1976; 1980; 1984). There is extremely limited evidence that shows that trade with the coast did take place (Mason, 1962: 431). During the Middle Iron Age (AD 900-1300) significant changes occurred; settlements were in uplands (Maggs and Wards, 1984), hilltops and promontory raised areas (Loubser, 1988). This settlement pattern could have been brought up by the socio-political development in the Limpopo Valley as there were overwhelming activities such as farming production, co-ordination and control over economic, social and religious events.

It has been widely accepted that CCP dominated the Early and Middle Iron Age sequences; however, there have been reactions levelled against the model (Hall, 1987; Badenhorst, 2010). Hall (1984) challenged the political stand of the model, while indicating the model as theoretical stand still. The model gives the impression of resilience to the epistemological changes since its introduction. Some of the issues raised are questions on what informed settlement patterns in those Iron Age communities without domestic livestock. Indirect evidence suggesting the likelihood of the absence of the predictions of the model in the Early Iron Age occupation, may be seen in the absence of livestock kraals (Badenhorst, 2010).

Stone buildings became regular features of farming communities especially south of the Zambezi (Mason, 1969). Arrival of Africans - Nguni, Sotho, Tswana, Vhaveṋḓa and Shona speakers - in southern Africa brought with it new building styles, different settlement locations, ceramic and other forms of material culture (Badenhorst, 2010). They interacted with each other and absorbed farmers who already lived in the region (Hammond-Tooke, 2004; Huffman, 2007; Hall, 1986; Mitchell, 2002; Philipson, 2005). These intensified farming activities and the dominance of cattle in the region (Badenhorst, 2010). Various states formations appeared during the second millennium AD following the development of early state systems such as Mapungubwe within the Limpopo Valley, including Great Zimbabwe, Khami and Dzata 1 and 11 (Mitchell, 2002; Huffman, 2007).

The Late Iron Age (AD 1300-1820s) was mostly characterised by socio-political complexity, higher population, environmental degradation, intensive hunting, overgrazing and extensive use of stones as construction materials (Maggs, 1976; Badenhorst, 2009). Before the arrival of the Late Iron Age farmers, there was little evidence suggesting the dominance of stone constructions. In fact, available evidence rather suggests the absence of stone constructions as a precursor at Early Iron Age sites. Presences of stone terraces have been recorded in agricultural ploughing zones. Terraces are part of important principles and agricultural practice. They occur when the scattered stones are cleared from the main field and placed in rows of lines for easy cultivation (Murimbika, 2006). Terraces control soil erosion and increase crop production. A variety of crops grow very well in terraced land, because burnt vegetation, decomposed wood and leaves and ash rejuvenate and fertilise the soils which promotes growth of certain agricultural plants (Smith and Price, 1994; Rodriguez, 2006; Badenhorst, 2010).

Terraces date to the second millennium AD and are commonly associated with sites using stone construction dating mostly to the Late Iron Age (Evers, 1980; Mason, 1969). Stone terraces have been recorded throughout southern Africa; for example, in parts of Zimbabwe (Robinson, 1966), Limpopo and Mpumalanga (Trevor, 1930; Mason, 1968; van der Merwe and Scully, 1971; Evers, 1973; 1975; 1981; Marker and Evers, 1976; Collet, 1982; Plug and Pistorius, 1999; Soper, 2002).

These terraces were used for agricultural and settlement purposes. Some of the investigated terrace walls had evidence of remains of small houses built in the middle (van der Merwe and Scully, 1971; Pistorius *et al.,* 2001). Middle and Late Iron Age periods settlements have been recorded north and south of Soutpansberg. Loubser (1988: 35) found that terraces were in different areas for example, on top of the mountain, hilltop and raised areas. Syntheses of ethnographic data by Loubser (1988) show that most of these settlements are represented by stonewall ruins. These ruins were ethnographically associated with the royal families ascribed to the early Shona, Vhaveṋḓa and Sotho-Pedi.

These stonewall ruins represent significant complexity and know-how on construction using stone materials. Stone innovation construction is attributed to the latter periods of the farming community. However, specific prejudice in the early writing about stonewalls was towards African authorship of this innovation, the writing was in favour of foreign influence from Semitic or Arab races. This settler mentality was widespread in southern Africa during this time, and this prejudice is best known in relation to the magnificently stonewall-built site of Great Zimbabwe (Bent, 1892; Hall and Neal, 1902; Hall, 1905)

Stonewall villages occur over much of the Limpopo Province. A more detailed description of these stonewalls was given by Loubser (1988), who also noted that some of these stonewalls had similar design to stonewalls north of the Limpopo River in Zimbabwe. From the cultural historical perspective, there are several specifications mostly for specific areas. These classifications usually emphasise construction techniques, type of coursing, height, shapes and internal divisions (Huffman, 2007:31). This is so because power and status are thought to manifest in the archaeological record using symbols; these codes can be massive or small; large-scale public architectural constructions or alternatively attributes of personal status (Chiripanhura, 2017).

Loubser (1988) compared the stonewalls and concluded that there are four categories or patterns identified within the Soutpansberg region, besides terraces and CCP pattern. The first settlement is characterised by regular-coursed walls, arranged in tight semi-circles and irregular enclosure. Dung concentrations occur some distance away from the course wall. House remains occur among the walls but sometimes extend beyond the limits of the walls. Similar types of settlement were recorded north of the Limpopo River in Zimbabwe (Caton-Thompson, 1931:166). The settlement patterns were associated with sacred leadership and class distinction (Huffman, 1982; 1986c; 1996b; 2007). The settlement organisations were clearly registered in stone wall architectural design (Maggs, 1976). The type of settlement was identified as Zimbabwe pattern and only occurred to the north of the Soutpansberg Mountain. These sites were situated on elevated areas (slopes and hills) and were well defined by walls, with larger settlements comprising substantial numbers of units (Maggs, 1976).

The defining walls were constructed to safeguard children and livestock and keep enemies out of the settlement (Mallow, 1963:27). According to Loubser (1988:35), there are variations of these stonewalls from fine to coarse elementary circles to massive structures; however, they were all occupied at the same historical time. These types of settlement pattern separate ruler, wives and servants (Huffman, 2007).

The second settlement pattern is characterised by short sections of walls that were semi-coursed and had long sections of roughly stacked walls, represented by the Dzata type that shares similar attributes with Zimbabwe pattern (Loubser, 1988). The third settlement pattern is distinguished by stacked terraced walls with characteristics such as boulders and angular rocks set on the edge. The walls demarcate the main residential area, arranged in interlinking terraced enclosures. Dung concentrations were commonly associated with the front section of the wall. Small dung concentration occurred within one of the terraces; both characteristics of the Dzaṱa and Zimbabwe stonewalls. Settlements are on steep gradients such as hilltops and vertical cliffs (Loubser, 1988).

The fourth type of settlement pattern recorded stretched from Soutpansberg further to the south, up to the Phalaborwa area. This type was first reported in 1863 as fortified villages with walls by Abasing (Boeyens, 1985:9). Synonymous terraced villages have been described by early European missionaries and travellers (Beuster, 1879:237; Gottschling, 1905:369; Munnik, 1920:132; Mauch, 1987; Burke, 1969:124). These types of settlements were ascribed to the early Shona, Vhavenḓa, Ndebele and Sotho-Pedi. Most of these sites are indicated by the presence of certain types of trees namely: *Aloe marlothii, Adonsonia digitata, Acacia ataxantha, Euphobia ingens and Ficus sp*. These settlement patterns were commonly found in the plains covering large areas characterised by palisade and burnt daga fragments in the leader's area. They occurred because of forced abandonment of fortified Mutzheto settlement. More complex regional settlement distributions are now emerging, and farming communities had different settlement patterns from early to late period (Loubser, 1988).

2.6. Summary

The numerous investigated farming community sites in southern Africa have allowed reconstruction of various aspects of life of past societies (Pwiti, 1993). Sufficient evidence exists to paint a clear picture of the early pioneers through archaeological investigation conducted in the region. Ceramics form the largest artefact category recovered from all sites within the study area and beyond (Pikirayi, 1993). These ceramics have been used by archaeologists as the earliest expressions to represent the presence of cultural groups. From these ceramics review, the synthesis presents an understanding of the region to have been occupied by Iron Age communities from different periods. Data from both ceramics and settlement patterns helps to construct culture and historical sequences and to demonstrate the presence of distinct phases of Iron Age development. A synage has been created where Iron Age period ceramics have been distinguished and correspond with associated settlement patterns.

A reasonably complete sequence of sites occupation has been constructed from as early as 280 AD to the latter 19^{th} centuries. The beginning of the later Iron Age in the region is characterised not only by an abrupt change in ceramic style but by other cultural and perhaps economic changes, involving site location, architecture and aspects of technology (Maggs, 1976).

Specific settlement types were described, and inferences were made. This short account on settlement patterns recorded within the study area show how archaeologists examine pattern in relation to social organisation. Settlement description combined with ceramic analysis has been an integral part of archaeological interpretations for decades. As clearly outlined, the settlement patterns are dominated by early and late occupational periods. In terms of the settlement pattern of the Soutpansberg, the identified sites seemed to fit well within the later Iron Age occupation dominated by stone construction technique. What emerged from the literature review is of immense importance and has laid a useful foundation for this study. The next chapter discuss the history of iron production in the region, supported by evidence from settlements, across space and time.

CHAPTER THREE: THE HISTORY OF IRON PRODUCTION AND TRADE IN SOUTHERN AFRICA

3.1. Introduction

This chapter focusses on earlier investigations into the origin of African metallurgy, archaeological observations, interpretations and ethnographies of iron production in sub-Saharan Africa, Venda and re-enactment of the 20th century and associated observed taboos. The study categorises major themes which researchers have engaged over the years. On current evidence the origin of the metal working technology (De Maret and Thiry, 1996; Miller and Killick, 2004; Holl and Zangato, 2010), and the socio-cultural metaphors associated with production (Schmidt and Mapunda, 1997) are perhaps the major topics. Given that these are disparate issues, researchers have used several methodologies ranging from earth and engineering approaches (see for example Killick, 1990; Okafor, 1993) to historical and ethnographic approaches (see for example Schmidt, 1978; 1997; Maggs, 1992).

African metallurgy as a process involved several stages that encompassed mining, smelting and smithing to convert minerals into functioning objects (Miller, 1997). The process of smelting required raw materials such as ore, air, fuel and clay for making furnaces and blow pipes (Haaland, 2004). The ores were reduced by carbon monoxide produced through the incomplete combustion of carbon to create a solid bloom of iron and slag waste products (Miller and Killick, 2004). Bloomery iron was produced in a reducing atmosphere at temperatures ranging between 1100 and 1300 °C and had impurities such as occluded charcoal and slag (Rostoker and Bronson, 1990). As such, it was refined in the forges, most of which were open hearths where the usable metal was also fabricated into objects in an oxidising atmosphere (Miller and Killick, 2004; Friede, 1986). The remains from iron production include slag, collapsed furnaces, broken tuyeres and remains of ore. These are the remains that are also used to identify indigenous metal-production sites in the archaeological record (Maggs, 1982; Miller, 1997; Schmidt, 1997).

The production of metals was metaphorically associated with human reproduction (Childs, 1991; Herbert, 1993; Schmidt, 2009). As such it was associated with rituals and taboos. Overall, the significance of the indigenous iron production extends beyond the simple economic importance of metal in African economies and had far-ranging impacts on agriculture and food processing, warfare and trade networks (McCosh, 1979; Maggs, 1992; Childs and Killick, 1993; Schmidt and Mapunda, 1997; Chirikure *et al.,* 2009).

3.2. Origin of African Metallurgy: Archaeological observations and Interpretation

The debate on the origins of African metallurgy has been ongoing for almost a century, although it has gained momentum over the past few decades (De Maret and Thiry, 1996; Killick, 2004; Alpern, 2005; Phillipson, 2005; Holl and Zangato, 2010). Iron metallurgy was established in West Africa by about 500 BC, and in central and East Africa by around the same time (Holl, 2009; Killick, 2009). In southern Africa, the advent of iron metallurgy was associated with the appearance of the farming communities related to the Bantu-speaking groups, early in the first millennium AD (Phillipson, 2005; Childs and Killick, 1993; Miller, 2001).

Sub-Saharan metalworking began with the working of iron and copper. This contrasts with the Eurasian case, where the process of metalworking began with copper, followed by bronze until the mastery of the more complex process of iron reduction (Miller and van der Merwe, 1994; Killick, 2004; Bandama, Chirikure and Hall, 2013). The initial thoughts on the origins of African metallurgy suggested that African metallurgy originated from the Middle East with Egypt and Phoenician North Africa acting as possible conduits (Kense, 1985). One of the complicating factors in this thinking is that the dating of iron in Egypt seems to be contemporary with that in the supposedly receiving areas of West and East Africa (Holl, 2009). This dating evidence has encouraged the growth of the viewpoint that iron metallurgy may have developed independently in the sub-Saharan region. As such, the origins of African metallurgy are controversial, and there exist two schools of thought in the origins of metallurgy debate (Chirikure, 2015).

The central thesis in the external origins hypothesis is the question of how sub-Saharan Africans could start by working iron without a prior apprentice stage. The technology of iron smelting is so complex that in pre-colonial Africa, where there is no prior evidence of experimentation, we should consider an outside origin for the technology (Philipson, 2005). This hypothesis is weakened by the lack of evidence supporting a north-to-south movement. For example, the radiocarbon dates in conduit areas of north Africa are either contemporary or younger than those in sub-Saharan Africa making it difficult to sustain the north-to-south transmission of knowledge. Some archaeologists have therefore argued that sub-Saharan metallurgy developed independently. Holl and Zangato (2010) obtained dates of between 3000 and 2000 BC for sites in Gabon and the Central African Republic. For instance, radiocarbon dates from sites on the Congo coast range from 2310+-70BP and 1440+-100BP before the appearance of metallurgy in southern Africa (Miller, 2001). They cite these early dates as evidence that metallurgy developed independently in sub-Saharan Africa (Holl 2009). However, the contexts from which the charcoal used to produce these early dates was recovered cannot be trusted (see Pringle, 2009) thereby weakening the local origins thinking. Therefore, there is no consensus regarding the origins of metalworking in sub-Saharan Africa (Killick and Gordon, 1988; McIntosh, 1994; Killick, 2001; 2004; Mitchell, 2005; Holl, 2009).

Southern Africa is, however, different because metallurgy emerged only in the early first millennium AD (200 AD) associated with the Bantu migrations. Early and Late Iron Age communities both worked iron and copper (Mason, 1962; Maggs, 1982; Huffman, 2007). Iron was mainly used to produce tools for heavy duty tasks such as farming and making weapons of war but in some cases, it was used for making ornamental items (Maggs, 1992). Thus, in the 2000 years of farming history, iron played a significant role, and not surprisingly, was worked in our area. The material fingerprints of this technology have been found in several places in contexts that demonstrate the socio-political significance of the technology (Miller *et al.,* 2002; Maggs, 1982).

Archaeological and literature surveys revealed the existence of metal-production sites from as early as the 1st millennium until the beginning of colonisation in the late 19th and early 20th centuries. In general, the scale of iron production encountered in the Soutpansberg ranges from small to industrial sites, indicating the possible role of metallurgy in local and external consumption (Maggs, 1992). Irrespective of size, iron production sites in this part of Limpopo Province are characterised by the presence of collapsed furnaces, slag mounds, isolated slag scatters, remnants of ore and broken tuyeres. Studies of metal innovation and its correlates have been pre-empted in core periphery models that elevate elite centres and relegate non-hierarchical periphery to handmaiden roles (Bandama, 2013). As a result, areas that are not historically associated with large, centralised polities, particularly south of the Soutpansberg, were overlooked even though the latter host abundant iron resources. Several metal-production sites and associated ore mines have been recorded at different areas of the region, on the farm Schynshoogte 29LT about three kilometres from the town of Vuwani (Bullock, 1936; Maṱhoho, 2012) near Tshivhulana Mountain, and on the outskirts of Thomo village just north-east of Giyani and on top of Ha-Lambani Mountain (Maṱhoho, 2012). These remains are typical of indigenous iron production documented in other parts of sub-Saharan Africa such as Malawi (Killick, 1990), Tanzania (Schmidt, 1997) and Nigeria (Okafor, 1993). In addition, Schynshoogte 29LT Farm (Vuu Village) hosts a complex of iron production sites previously referred to as the Tshimbupfe furnaces (see for example Friede, 1979). One of the sites is well known from a famous photograph taken by H Gross in 1888 and was also mentioned in the 1936 account of the Iron Mountain by Bullock (1936) (see figure 6 below).

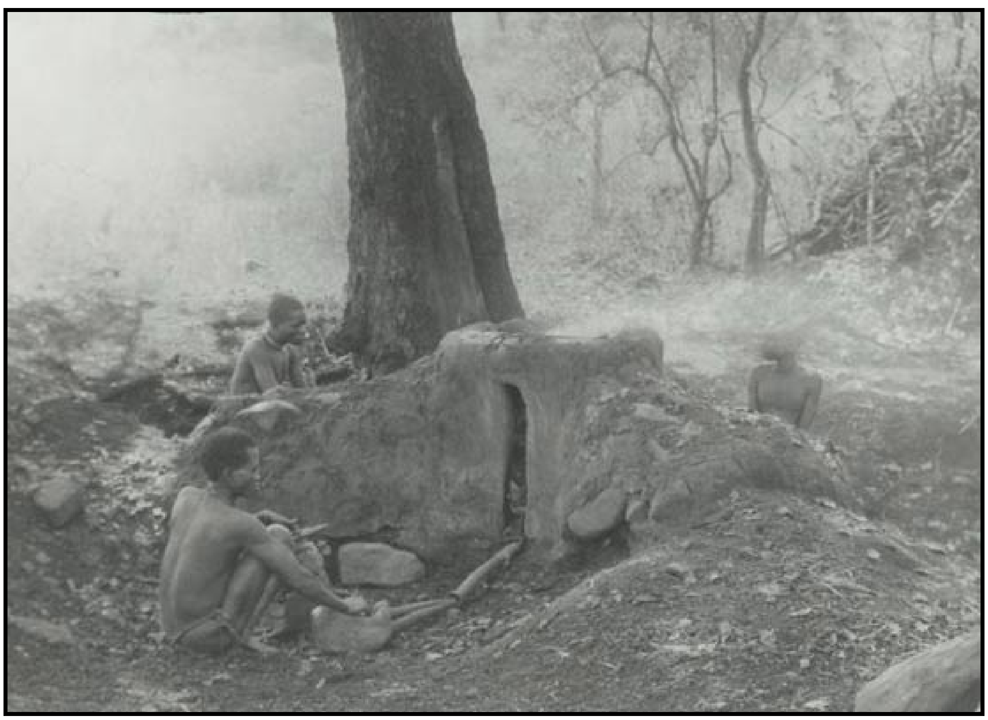


Figure 6: View of the iron production furnace photographed by H Gross in 1888 on the farm Schynshoogte, Soutpansberg (Macmillan, 1927).

Although heavily damaged, this furnace is still in existence and has been documented and referred to in the following works: Distant (1892:107); Junod (1927:138); De Vaal (1952:590-596); Küsel

(1979:47) and Gross (1888). Beuster (1879) and Stayt (1968) noted that the major product of metal production within the region was large iron hoes. These large hoes were an important medium of currency and were traded in quantities, while corn was traded in exchange for magnetite / hematite ore from the Iron Mountains south of the Luvuvhu River (Stayt, 1968:61). Apart from metal hoes, other metal products fashioned in the region include spears, arrow heads, adzes and axes, while iron bars have been uncovered and recorded elsewhere in Southern Africa.

The earliest known preserved metal-production sites that represent the 1st millennium in South Africa are Silver Leaves and Broederstroom archaeological sites. They are well represented by substantial quantities of slag (Huffman, 2007; Miller, 2001; Klapwijk, 1974). According to Miller (2001) prospecting, mining and metal production in the Limpopo region intensified towards the end of the 1st millennium because by the beginning of the 2nd millennium, gold and tin were being produced and some new form of metal artefacts were made. Bauman (1919), Trevor (1920), Hall (1981) and Bandama (2013) confirm that Rooiberg area had abundance of mines and tin production sites. Some of these tin mines reached at a depth of 16 metres and had underground shafts and narrow adits (0.3 to 0.4m wide and 10m deep) (Ibid: 2013). Narrow adits such as these have been reported in the prehistoric copper mines of Phalaborwa and Musina (Ibid: 2013). Investigations revealed that an estimate of 100 000 tons of ore were mined in precolonial times from which about 18000 tons of tin were produced (Bandama, 2013).

Archaeological review shows that copper, like iron, has been another metal that was exploited by the prehistoric communities. However, the current mining setups have been sighted on prehistoric mines. Remains of crude furnaces, broken pieces of tuyere and slags were uncovered at various localities of the region namely: Phalaborwa and Messina (Musina). Extensive copper ore, having been smelted by ancient workers, came from Msingalele Kop, located two miles east of Musina's Central Business District. Stayt (1968:63) opines that the extraction of copper-rich ore found at the surface and down by inclined excavation to the depth of about 80 feet. Hanisch (1974:50) opines that several tons of copper were transported to the coast for export to the north. Records confirm that on 6th January 1498, Vasco da Gama arrived at a certain river north of Delagoa Bay and noted Africans in possession of large quantities of copper. Previous archaeological research in Phalaborwa identified the region as one of the main metal producing areas, strongly influenced by the presence of mineral resources, as both metals ores (iron and copper) were extracted and melted concurrently in this region. Phalaborwa metal production fed into local, regional and global exchange networks (Scully 1978; Pistorius 1989; Miller *et al*., 2001). The above has been corroborated by Mason (1986:71), that copper functioned as ornamental materials for trading purposes. Early documents also mentioned a trade for iron for consumption in India (Huffman, 2007). Archaeological sites documented near Lolwe Hill (also known as Loolekop, or Lulu Kop) include Kgopolwe, Nagome and Shankare (Moffet, 2016). These sites were occupied in the early 10th to 13th centuries and a later occupation occurred from the 18th and 19th centuries (van der Merwe and Scully, 1971; Evers and van der Merwe 1987; Miller *et al*., 2001; Moffet, 2016). Prehistorical mines and copper smelting furnaces were recorded, and some extracted for museum exhibitions (see figure 9 for copper smelting furnaces). Records now exist of different types of furnaces used in pre-colonial metal production. Two different types of low shaft furnaces with three tuyere slots were recorded: their distribution stretches from Phalaborwa in the southeast and towards the Soutpansberg in the north.

However, the only major difference is that one is cylindrical while the other is triangular (Figure 7). The cylindrical one is associated with the Vhavenḓa and has been reported from archaeological contexts. Its distribution extends from Gravelotte near Tzaneen in the south towards the northern part of the Soutpansberg (Küsel, 1974). Mitchell (2002) contends that the cylindrical furnace type with three tuyere inlets is commonly found from the east of the Limpopo Province extending towards the north as far as Musina all the way to Vereeniging. A similar type of furnace was recorded at Schynshoogte Farm at Vuu site 1. The triangular furnace was recorded at the site of Mut 26 at Nanḓoni Dam and Thomo site 2 near Nsami Dam (See below photographs, Figure 7).

Figure 7: Remains of a Venda furnace documented at farm Schynshoogte (Vuu) while other remains of a triangular furnace with three inlets slots was documented at Thomo site; a similar furnace was also documented at Mut 26 iron production site (where Nanḓoni Dam is located today) and Massorini near Phalaborwa.

Both furnaces (cylindrical and triangular) had three tuyeres and were powered by either pot or bag bellows. The tuyeres were introduced into the furnace through the vertical slits. It was maintained elsewhere that triangular furnaces dominated metal production in the Late Iron Age phase (Miller *et al.,* 2001).

Descriptions of furnaces recovered archaeologically were undertaken in terms of their stylistic attributes with a focus on the area in which they were found (Mason, 1969; Küsel, 1974). Different furnaces were identified from several sites throughout southern Africa; however, the use of visual methods alone in the previous studies compromised certain classifications. Preliminary observations of furnace typologies and associated metallurgical assemblages by Mason (1969); Küsel (1974) suggested eight furnace typologies based on two different criteria, namely, morphology and location; however, some of these typologies are not widely distributed within the study area and therefore are not important for this study (See below photographs of some of the copper smelting furnace and historical mine documented in Phalaborwa) (Figures 8 and 9).

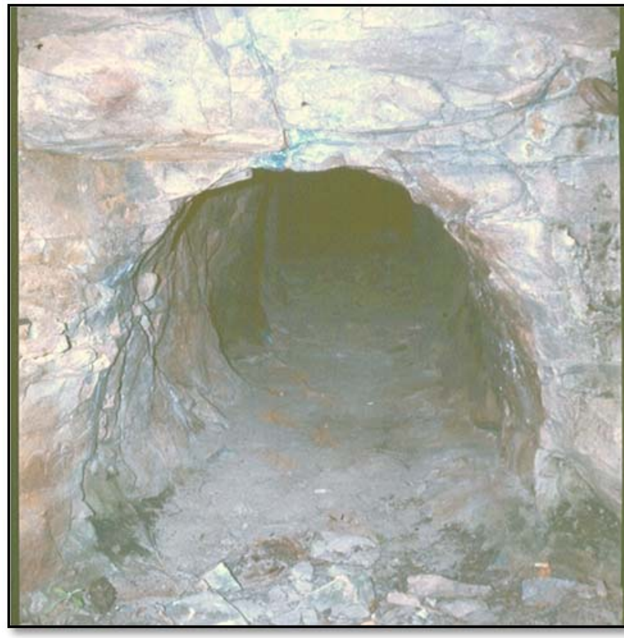



Figure 8: Copper smelting furnace and entrance of prehistoric mine documented in Phalaborwa, photo credits U.S. Küsel (1979).


Figure 9: Copper smelting furnaces documented in Phalaborwa area, photo credits U.S. Küsel (1979).

Records show that some of the archaeological remains of the area such as mines, furnace structures and metal debris have been disturbed by the open cast Phalaborwa mines which have a current depth of about 800m (Miller *et al*., 2001:402). Eighteenth-century records studied by Liesegang (1977) report of mining of gold in the region. However, no archaeological confirmation of prehistoric gold mining in the region is available yet (Miller, Killick and van der Merwe, 2001:402). Current knowledge about gold objects came from Mapungubwe archaeological site; this includes: Golden rhinoceros, golden bowl, golden sceptre, foil fragments, bangles and golden beads (Meyer, 1998:214). Recent excavations of elite graves from Thulamela archaeological sites in the Kruger National Park also uncovered human skeletons with gold spiral bangles and gold beads (Gold Fields Review, 1996/97). Across the Limpopo River, documents suggest that Great Zimbabwe produced more than 2000 ounces of gold ornaments which was removed and melted down into ingots (Hall and Neal, 1902).

3.3. A Brief Background to trade and documented trade routes within the Soutpansberg.

The consumption and distribution of metal, with specific reference to iron, copper and tin resources within the Soutpansberg region have led to intensified Iron Age interaction. A more complex regional distribution and consumption pattern is now emerging (Bandama, 2013; 2018). The subsequent review of available evidence on trade is aimed at investigating how less stratified communities interacted with the elite through the exchange of, or participation in, local, regional and international trade. Goods were procured from expert craftsmen. Grain, meat, cattle and goats, fowls, iron hoes and spears were exchange commodities. Barter and payment for special services were the only two mechanisms by which goods were circulated and thus made more widely accessible in the region (Hammond-Tooke, 1937:126).

Exchange and participation in local, regional and international trade led to the existence of a new class of communities. Some kin-based entrepreneur traders operating within delineated routes emerged within the interior of Zimbabwe and South Africa (Bandama, 2013: 40). These kin-based groups emerged (*Vashambazi* or *Magwamba*) and probably operated on trade routes that existed long before the Portuguese entered the country. Swahili traders made use of *Vashambazi* to trade long before the arrival of the Portuguese (Mudenge, 1988:44). They were later recruited by the

Portuguese to trade on their behalf. For example: The chief of Thomo village (study area), was born in Mozambique and came to South Africa as one of Joao Albasini's army regiments; he was one of the prominent *Magwamba* kin-based group who operated between Tshivhulana trading post and Mozambique. During Albasini's reign in the region he was given piece of land as a form of compensation near the Nsami River. However, after the death and the burial of his father in Mozambique and the discovery of diamonds in Kimberley, he went to the diamond fields in search of greener pastures; unfortunately, it is still not yet known if he arrived in Kimberley and practised trade systems or died on the way to Kimberley (R. Mabunda 2010, pers. comm).

Records from Zimbabwe confirm that even the Shona kings and chief had their own *Vashambazi* whom they organised and equipped with royal merchandise for exchange with Portuguese and other Shona groups (Bhila, 1982:251). Tsonga speakers also participated in the local and long-distance due to the need to acquire non-local resources (Bandama, 2013). Throughout southern Africa, the use of a middleman in handling of trade affairs, supply and demand of commodities was centred on these groups of people. Goods offered were ivory, iron, copper, gold, and animal skins which were exchanged for cloth and beads (Hammond-Tooke, 1937:127).

Commodities became associated with certain cultural groups, for instance gold, iron and copper mining and trade were historically associated with Shona, Lemba, Venḓa and Pedi and Phalaborwa speakers (van Warmelo, 1946; Parson, 1973; Liesegang, 1977; Bandama, 2013). While tin, bronze was produced and traded by Sotho-Tswana (Liesegang, 1977). Consequently, Tsonga group had to rely on trade with their neighbouring groups such as Lemba, the Venda, Sotho-Tswana and the Shona. One influential document posits that Tsonga were the Venda customers (Stayt, 1968:75).

Ethnographic accounts mentioned that the Tsonga of Mpfumo area first brought glass beads and cloth to Venḓaland from Mozambique coast (van Warmelo, 1940). Records show that the Venda supplied tin which they got from mountains (possibly from Rooiberg) further away from Dzaṱa (Venda capital) (Liesegang, 1977). Metal production flourished during the 2nd millennium when hoes were made in great quantities. When shortages occurred, an exchange was arranged, with most transactions done by bartering process. Iron ore or finished metal products were traded for mielies, while two hoes equalled to one goat (Stayt, 1968).

Using the knowledge base derived from the African middleman, Europeans could document existing early trade routes from the interior leading to East Africa (Mozambique). Most of the described trade routes transverse alongside perennial streams' banks for various reasons, namely, for easy access to drinking water since they could not carry gallons of drinking water for a long distance nor heavy trade goods. The rivers also provide orientation and direction since all streams from the interiors discharged their water into the Indian Ocean via Mozambique. Furthermore, iron production demanded lots of water to enable the construction of the furnace and tuyeres and during metal production activities. Only those trade routes that transverse across the study area will suffice for this study. One of the regular trade routes developed from Inhambane through the Limpopo River near its junction with the Luvuvhu River traversing across the Tshikundu Hill. Historical documents suggest that the route was followed by Joaquim de Santa Rita Montanha and Lieutenant Antonio de Souza Teixeira, assisted by African guides, in 1855 towards the Soutpansberg for trade with the Boers. The route also appeared on the Portuguese Map of 1893 (De Vaal, 1984).

The route followed the Limpopo Riverbank across Matsambo, Shingwedzipoort in the Lebombo Mountains towards Mocane where the route ends. However there exist two alternative routes that start from Shingwedzipoort: the first one transverse along the Shingwedzi River bank towards Tshivhulana hill (records show that the area is rich in iron ore deposit—with several iron production sites recorded; and furthermore, historical records show that the area was a trading post between Giyani and Venḓaland to the north). According to recent archaeological sites survey, several metal production and mining sites were recently documented along the Nsami River, most of which were identified at Thomo Village. The spatial distribution of these sites seems to corroborate what De Vaal (1984) documented. This trade route transverse alongside the Luvuvhu River bank leading to Elim (Elim was also one of the well-recognised historical trade posts) while north of the Middle Letaba River some few kilometres from the well-known Magoro Hill, there occurred an isolated hill not far from the Middle Letaba River. The hill is located on the southern outskirts of the Olifantshoek village known as Tshiphophi. According to oral traditions and local informant, Mr William Mkhari, an elderly man of the Shangaan origin, the area dated to the early 1800s, previously used as trading post for locally manufactured iron tools as well as livestock, particularly cattle (R. Mkhari pers. comm, 2002). The most satisfying explanation for the occurrence of the site seems to be that it was an iron-trading site with production capabilities in the valley. The inhabitants were of Nguni / Tsonga descent and probably inhabited this area during the early eighteenth century. Radiocarbon analysis results from bone samples collected from the site suggest even a bit earlier with a calibrated date of 1657 (1663) 1668; 1782-1793 AD (Pta. No. 8505) (Maṱhoho, 2002 conference presentation).

The occupational site probably consisted of only a few men and woman who specialised in trading with the local communities, because these people would have a vast stock of trading goods while being the only few people occupying the hill. The trading post on top of the hill was obviously a defensive choice as well as being prominently visible from the surrounding areas. In support of the above section of the lower Middle Letaba River, several iron production sites were documented.

Occurrence of these sites at certain intervals seems to corroborate the viewpoint that trade houses were constructed and scattered across the trade routes in the interior to provide shelters to these traders during the nights. The second route follows the Shingwedzi from Inhambane across the Shilowapoort, then transverse along the Klein Letaba River towards Ha-Masia, Kurhuleni, Ha-Mashau leading to Albasini farm Goedwensch. The route was used by van Rensburg in June 1836 as an interior route to Mozambique (De Vaal, 1984).

The second route that is transverse across the study area is the one documented from Elim, Pafuri, Inhambane and Delagoa Bay. The route was documented starting from Elim traversing towards the east, across Karringmelk non-perennial stream, Welgevonden, Mashau hill towards Tshimbupfe (Schynshoogte) and further east of Xikundu hill following the Luvuvhu Riverbank to Pafuri. The route transverses towards the Limpopo River south of Chikwalakwala towards Matsambo across the Shingwedzi poort. Documents suggest that the route was previously used by Joao Albasini and his men on their hunting expeditions. On the 23rd of June 1856, the route was used by De Santa Rita Montanha back to Inhambane (De Vaal, 1984:9) (See figure 10 for diverse regional trade routes).

Similar routes were documented originating from Zimbabwe to the Musina copper mine and the Rooiberg tin mine (Caton-Thompson, 1931:12). Documents suggest that the most important metal that was commonly found in abundance was copper. Early copper workings have been recorded in localities such as Musina and Phalaborwa. This metal was entirely valued as a store of wealth, used for making ornaments or ornamentation of utensils and jewellery but was rarely used for tools and weapons (Hammond-Tooke, 1937:114; Miller and Killick, 2019; Stephens *et al.,* 2020). For example, among the Vhavenḓa, a piece of worked copper was commonly used in conjunction with ivory pieces to form a complete part of blue glass beads (Vhulungu ha maḓi) (See figure 18).

However, records show that areas such as Leeuwpoort, Blauwbank and Rooiberg host an abundance of tin mineral. Presence of tin ore has been archaeologically confirmed by research conducted by Hall (1981) and Bandama (2013) who documented mines with shaft and adits and several tin production sites. Trade in tin objects has been confirmed by historical Portuguese documents where tin objects came as far as the interior of Dzaṱa which was the capital of Vhavenḓa under the Singo dynasty. The third route emanates from the Saltpan (Soutpansberg) traversing towards Ha-Tshivhase. The region hosts one of the well-renown sites that existed for the past centuries as the salt production site. However similar sites occur further south-east of the Soutpansberg region at areas such as Eiland and Harmony. Most of these areas attracted Iron Age communities due to the abundance of salt minerals. Evers (1988) recorded several carved soapstones that were used in the evaporation of salt water in the vicinity.

De Vaal (1984:11) had also reflected this, his rationale being that trade route traverse alongside the Sand, Mutamba and Nzhelele River banks and then at some stage the route transverse near Dzata towards Tswime Mountain joining the existing route from Delagoa Bay to Mashonaland at Phiphiḓi waterfall. This historical route has been developed into a tarred road across the Nzhelele valley connecting the National tarred road (N1) at Wyliespoort. Here one of the most important archaeological sites that represent the presence of Early Iron Age communities in the region is situated: Klein Africa site (Prinsloo, 1974). Historical trade route that transverse the region linked early minerals mines and metal-production sites between southern Africa and the east coast of Africa, particularly Mozambique.

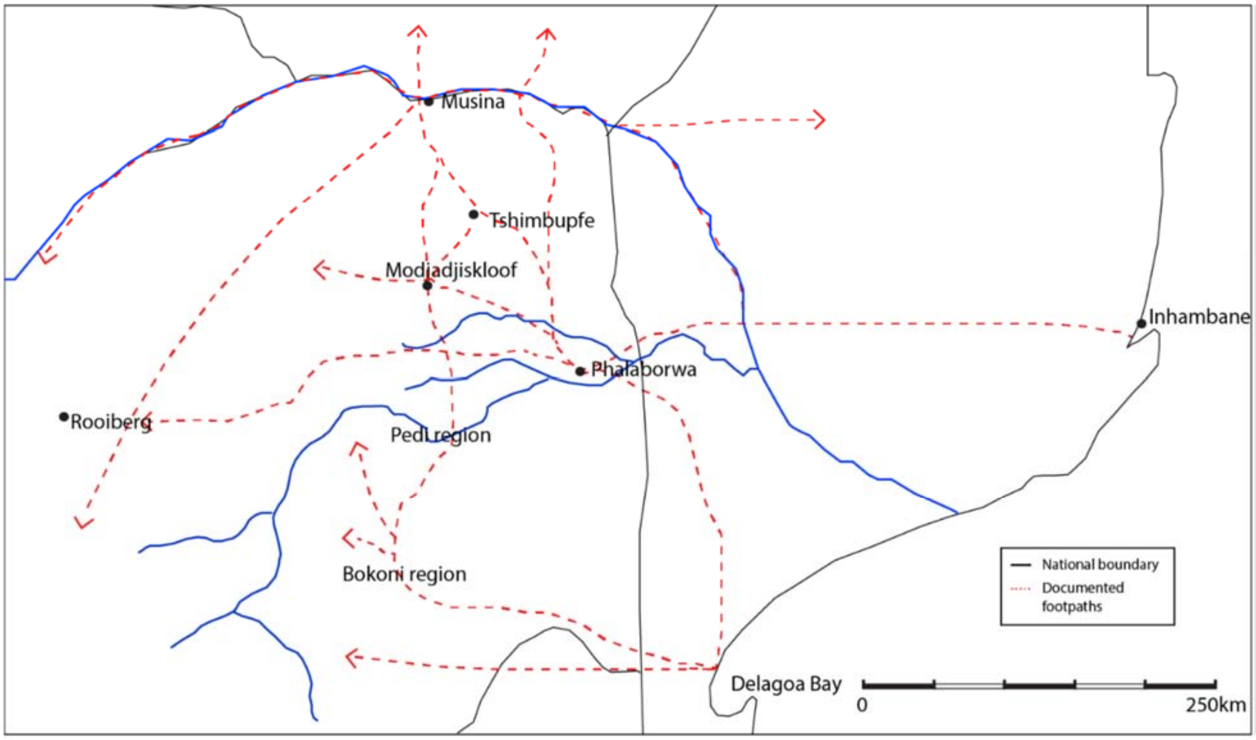


Figure 10: Some of the well-known footpaths that linked different regions of the Lowveld and adjacent areas (After Moffet, 2017:60).

3.4. Ethnographies of iron production in Sub-Saharan Africa

Indigenous African iron production has enchanted European observers from the early or mid-19th century up to the early days of colonialism (Campbell, 1822; Cline, 1937). During this time, the missionaries, travellers and hunters often recorded the different activities in the iron production cycle / raw material acquisition, smelting, smithing and distribution and consumption of finished products. Because the smelters and smiths did not write down their recipes, the observations made during this period form a critical component of available databases on pre-industrial methods of iron working in sub-Saharan Africa (Kense and Okoro, 1993). From the 1960s onwards, scholars of different academic persuasions became interested in recording surviving practices of iron smelting before they became extinct (van der Merwe and Avery, 1987; Killick, 1990; Rowlands and Warnier, 1993; David *et al.,* 1989; Schmidt, 1996). These salvage ethnographies recorded critical information on the production chain from prospecting for ores through smelting to fabricating finished products. Most of the studies, however, focussed on cultural aspects with little attention invested in analysing the remains from the smelting re-enactments to understand the technology. The few exceptions are Schmidt (1997) and David *et al.,* (1989) who studied the slags using techniques from earth sciences and engineering to give an insight into issues such as efficiency of reduction and the quality of the products.

The ethnographies have demonstrated that iron production was invariably through the bloomery process in which ores of iron were reduced to metal by carbon monoxide. However, there was massive technological variation between the regions with some communities taking advantage of the concept of pre-heating to produce steel of variable carbon content (Schmidt, 1997). In others, such as the Mafa of Cameroon, the smelters produced cast iron (David *et al.,* 1989).

One aspect that has attracted much research attention is the so-called magical or symbolic aspect of pre-industrial smelting. Many ethnographic studies have demonstrated that pre-colonial iron production was metaphorically linked with human reproduction (van der Merwe and Avery, 1987; Childs, 1991; Herbert, 1993; Childs and Killick, 1993; Schmidt, 1997; Schmidt and Mapunda, 1997; Haaland, 2004; Reid and MacLean, 1994). According to Schmidt (2009), the process of iron smelting metaphorically equated the furnace to a female body which was impregnated by the smelters to produce a child in the form of iron. Iron was so highly valued in society that it was associated with economic prosperity. Archaeologically, this procreational paradigm is adequately supported by the existence of iron smelting furnaces decorated to give the appearance of female body parts. Childs (1991) has shown that the Shona furnaces were decorated with female breasts, waist belts and navels. Amongst the Toro of Uganda, the bellows were regarded as male and they were used to metaphorically impregnate the woman (furnace) through the tuyeres (Childs, 1998).

Not surprisingly, the process of iron smelting was associated with a series of rituals and taboos. For example, just as human reproduction was done in private, smelting was conducted in secluded areas (van der Merwe and Avery, 1987). In contrast, the process of smithing was less ritualised and was conducted in public. According to Killick (1990), the Phoka smelters of Malawi were forbidden to sleep with their wives the night before smelting for the "adultery" with real wives would result in failed smelts. Some archaeologists in southern Africa have extended this smelting outside–smithing inside dichotomy to the Early Iron Age. For example, Huffman (2007) believes that the remains of iron working recovered from inside Early Iron Age settlements such as Broederstroom were from smithing because taboos would have necessitated the separation of smelting from living areas. However, the work of Maggs (1992) in KwaZulu-Natal has demonstrated numerous cases where smelting was practised inside villages. Maggs's work therefore demonstrates a diachronic development in the spatial organisation of metal working which must be given more attention by researchers. Iron production was also a gendered activity which often excluded women from the process. There were taboos that barred menstruating women from going near the smelting site, touching the ore or entering the mines.

The process of smelting also highlighted the general ideas that pervaded society (Childs and Killick, 1993). For example, it was believed that if not neutralised using medicines, the power of sorcerers or malevolent forces could result in failed smelts (van der Merwe and Avery, 1987, Schmidt and Mapunda, 1997). Animals were offered as sacrifices either to appease the ancestors or seek their protection. Many sub-Saharan smelting groups dug holes at the base of the furnaces and planted various types of medicines there. Rowlands and Warnier (1993) have documented this practice in the Cameroon grasslands just as Schmidt (1997) has in Tanzania. This belief in witchcraft guided the choices made in all facets of iron production technology where ancestors and medicines provided protection against evil or malevolent forces (Schmidt and Mapunda, 1997).

Indigenous knowledge systems such as iron production and associated technologies have been extensively recorded by early explorers and missionaries. They left useful accounts documenting iron production mostly collected as first-hand observations (Cline, 1937; Kense, 1983; Schmidt 1996; Kense and Okoro, 1993; Miller *et al.,* 2001). This information covered the entire production process as well as the associated rituals and taboos. In the late 1960s, archaeologists collected oral traditions and conducted smelting re-enactments to salvage the process before it went extinct (Schmidt, 1978). Schmidt's (1978) direct historical approach demonstrated the utility of using oral traditions to amplify deep time iron smelting. The major advantage of Schmidt's work is that it unpacked most of the biases associated with ethnocentrisms and has shown innovations in the supposedly unchanging African bloomery process (Schmidt, 1996). Brown (1995) studied the ethnographies of iron smithing in Kenya, highlighting the techniques of forging and tools used. In sub-Saharan Africa, the work of Maggs (1992) ranks as one of the most detailed historical accounts of metallurgical specialisation. Maggs has outlined the process of iron production that sustained the Zulu state. The specialist workers focussed on producing the iron while the king provided supplies such as food. All this information is essential in animating the process of iron production in our area where the Lemba have been associated with specialist metal working (Stayt, 1931; Mamadi, 1940). To benefit from a rich body of ethnographies in the broader sub-Saharan region, this section focusses on the ethnographies of iron production in general before focussing on the Soutpansberg region. This approach allows a cross-regional comparison of iron production practices which will no doubt amplify our appreciation of Africa's technological past. With this brief overview of ethnographies of iron production, the next section focusses on the study area, drawing parallels to observations made elsewhere in sub-Saharan Africa.

3.5. Ethnography of Venda smelting: the accounts of Mrs. Gieseke and re-enactment of the 20th Century.

Although many highly informative Venda ethnographies on indigenous iron production exist, the most detailed ethnographic account is that provided by Mrs. E.D. Gieseke, wife of the head of the Tshakhuma Mission Station, Reverend Gieseke (Miller *et al.,* 2002). Mrs Gieseke observed that Venda men collected haematite ores for smelting at their workplaces. Like other observers, she mentions that Venda iron smelting was metaphorically linked with human gestation and procreation. Smelters practised sexual abstinence with their real wives during smelting.

The Venda also used medicines which were planted in a pit at the bottom of the furnaces to guard against evil forces (Küsel, 1974). This account shows that as far as the anthropological dimensions are concerned, Venda iron smelting was like that of the Barongo in Tanzania (Schmidt, 1996), the Shona in Zimbabwe (Childs, 1991; Herbert, 1993) and the Babungo of Cameroon (Rowlands and Warnier, 1993). It was associated with medicines which were designed to neutralise the power of evil forces whose influence could lead to unsuccessful smelts.

Mrs Gieseke's very balanced account can be contrasted with that of Carl Beuster of the Berlin Missionary Society which was established in Venda in 1872. Beuster observed that the Venda smelters used parts of human fingers for making medicines to place underneath the furnaces. However, in cases where smelters exhausted their supply, they scavenged the dead for fingers. Van der Merwe and Scully (1971) have described the presence of human digits in a pot excavated at the bottom of a furnace, showing that there is some truth in Beuster's observation. However, Beuster exaggerated his observations to suit contemporary notions of an uncivilised Africa. Schmidt (1996) has also observed this tendency to exaggerate issues by early missionaries and other observers. Kirkaldy (1999) posited that some missionaries' attitudes were very Eurocentric and their environmental thinking and understanding regarding African forests and mountains symbolised the existence of a wilderness of wild animals, dangerous and threatening to the mission station. Their perception was centred on the understanding that the mission station was referred to as God's garden in the heathen wilderness. They saw hardship, danger and darkness in the environment within the Christian eye perspective.

In the first half of the 20th century, several westerners were fascinated by the process of indigenous iron smelting. They organised many re-enactments in which Venda and Shona smelters showcased their industrial techniques. In 1936 an event was organised to celebrate the Empire in Johannesburg. Several Venda smelters were brought together to smelt as a way of providing entertainment for the visitors. (Küsel, 1974) laments that no record was kept of these firing demonstrations, an omission which has deprived future generations of useful knowledge. However, they offered a consistent record of which raw materials were used in the iron production process.

Further demonstrations of Venda iron smelting techniques were conducted by Piet and Andries Tshovhoṱe in 1950. This prompted the Archaeological Research Unit of the University of Witwatersrand to undertake experiments with prehistoric metal production technology (Küsel, 1974; Mason, 1974; 1986; Carstens, 2003). Below Figures, 11-16, is the photographic representation of the iron smelting process re-enactments.

Figure 11: Venda women collecting clay soil for the manufacturing of furnace and tuyeres. Photo credits U.S. Küsel (1979).

Figure 12: Reenactment of clay preparation and manufacturing of tuyere process. Photo credits U.S. Küsel (1979).

Figure 13: Bellow making process. Photo credits U.S. Küsel (1979).

Figure 14: Reenactment of furnace structure construction and bellow expansion using clay soil. Photo credits U.S. Küsel (1979).

Figure 15: Ore collections and haulage from the mining sites to smelting area. Photo credits U.S. Kϋsel (1979).

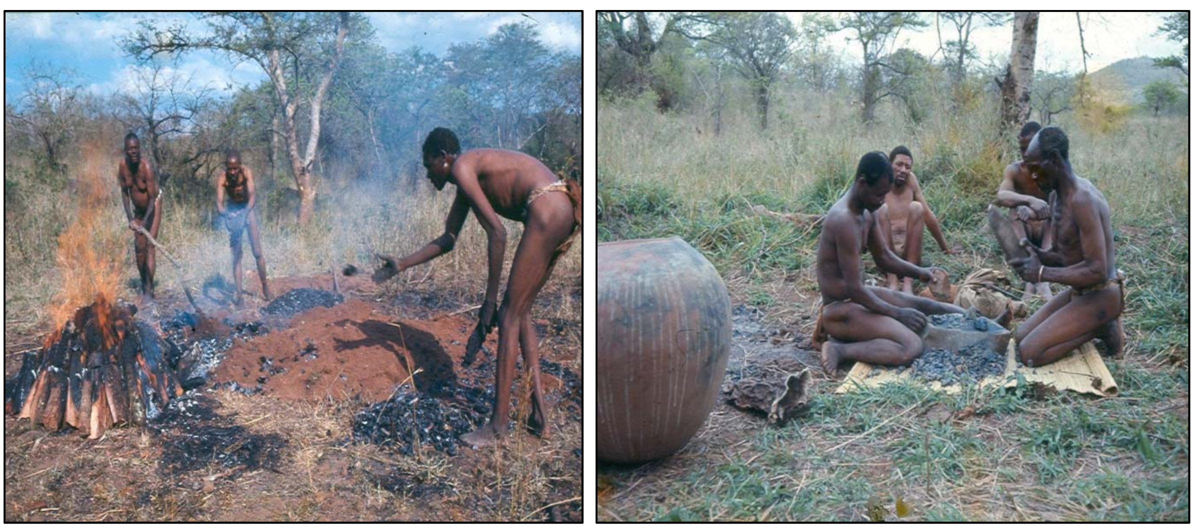


Figure 16: Charcoals and iron ore reduction process. Photo credits U.S. Kϋsel (1979).

Figure 17: Iron ore smelting and smithing. Photo credits U.S. Kϋsel (1979).

3.6. Ethnographic accounts at Schynshoogte farm (Formerly known as Tshimbupfe)

To add to this existing wealth of knowledge about cultural representation of iron production, I conducted interviews in different areas namely: Vuu, Ha-Masia (Vyeboom) and at Ha-Lambani. The interviews were conducted to examine ritual processes and taboos observed during indigenous Venda iron smelting. Although Lambani village is not part of the immediate study area (it is located approximately 90 kilometres northeast of the Vuu area) the area was included because of the presence of remnants of indigenous metallurgy and ancient iron ore mining on top of the Tshilamba Mountains. Petrus Mbulaheni Maphalu, Petrus Ndou Ḽithole (since deceased), Nelson Ramathithi (chief of Vuu area) and Chief Lambani of Ha-Lambani proved to be ideal candidates for the interview. The informants have detailed knowledge of the complexity of the technological enterprise that iron smelting serves. Their account is therefore of considerable interest. Both Mr. Maphalu and Mr. Ḽithole participated in iron smelting and forging processes in their youth when they operated bellows (known as '*mvutho*') under their fathers' supervision (Petrus Maphalu and Petrus Ḽithole pers. comm. 2008).

Mr. Maphalu posited that within the study area there were three families who practised iron smelting, namely the Ne-Vuu or Tshiṱavha, the Maphalu and the Ḽithole families. Each family had its own iron smelting area as well as a forging site. He further maintained that the term Vuu is the original name of the study area derived from the sound "Vuu, Vuu" made by the bellows during the smelting process. Hence the name Ne-Vuu means the owner of the place where bellows were worked (Vuu). Chief Nelson Ramathithi is therefore ceremoniously known as Ne-Vuu or Tshiṱavha, the name derived from the iron mountain. Mr. Maphalu grew up within the Vuu area, where his father and Ne-Vuu (Tshiṱavha), practised as smelters and traditional healers. At some point Ne-Vuu or Tshiṱavha conducted initiation schools for boys in the nearby mountains, where the informant was one of the initiates. He further maintained that iron smelting and circumcision schools share similarities in the observed taboos. For example, smelters, instructors and initiates were mandated to the practice of sexual abstinence (See below Table 3-1 for a thematic illustration of observed taboos).

Furthermore, the two cultural practices involved the use of medicines and excluded some categories of women. If these taboos were not observed, then something strange or bad could happen. These taboos were also enforced by locating smelting and circumcision in secluded areas. The master iron smelter conducted rituals before and after the iron smelting process, just as the head of the initiation school was responsible for rituals during initiation. Mr. Maphalu maintained that it was Ne-Vuu and his father's responsibility to choose suitable sites for iron smelting.

Table 3-1: Some of the observed rituals and taboos associated with Venda iron smelting

Iron smelting rituals and associated taboos
• Iron smelting transformed ore into iron and had symbolic correspondence to birth.
• The process is associated with reproductive symbolism.
• Not all sites and trees were suitable for iron smelting; certain trees and areas were avoided.
• The chief/head smelt took great care in selecting smelting areas, guided by ancestors. • Smelting ended with the sacrificing of a goat or sheep to appease the ancestors. • The preparation of medicines to protect the furnace from spells was considered an essential part. • Smelting was often accompanied by planting medicines underneath the furnace floor while some powdered ones were sprinkled on the furnace superstructure. Traditional beer was poured on the ground to appease ancestors and as contempt for evil forces.
• Most of the iron smelters were medicine men who personally conducted the rituals.
• The industries were conducted away from the village settlement, protected by medicines and charms.
• Strict sexual abstinence was mandated.
• Menstruating women were avoided and were not allowed to touch ore or charcoal and were believed to be harmful to the smelt.
• Any failure was either ascribed to acts of sorcery or displeasure of ancestral spirits and even the transgression of sexual and marital norms.
• Iron smelting process and rituals were conducted by half-naked or naked men.

In many African societies, strict sexual abstinence was usually mandated for all male iron workers during smelting. The smelters were believed to be the husbands of the female furnaces during smelting operations. Similar taboos were observed among Venda of South Africa, the Chewa of Malawi, the Shona of Zimbabwe and the Fipa of Tanzania (Chirikure 2015, Maṱhoho *et al.,* 2016; Schmidt, 2009; Childs and Killick, 1993).

The taboos observed during smelting and initiation pervaded the Venda worldview. For example, menstruating women among the Venda are believed to be dangerous such that they were forbidden to enter cattle kraals and fields. Any transgression on their part would make the land unproductive while cows would produce less milk. There were consequences for women who flouted this taboo. For example, the menstruation cycle could go on and on incessantly. Furthermore, the presence of menstruating girls or women would make pumpkin leaves rot if they entered the field. A series of ritual performances and taboos observed when smelting iron ran parallel to those that were practised during initiation schools for boys and girls among the Venda. The informants noted that during these rites of passage, iron smelting activities were halted. It was feared that the young initiates could die because circumcision time was considered dangerous.

Furthermore, iron smelting sites and initiation schools for boys were built at some distance away from the village to keep sexually active women and sorcery away. It was also believed that staging these two activities simultaneously would affect enrolment and food supply for the initiates. Circumcision is sometimes called *Mulilo*, meaning fire, as parents abstain from sexual activities if they have sent their children to the circumcision school. It was believed that two fires, one from iron production and another from circumcision could affect the work of smelters. In the Domba (the traditional Python dance for young Venda maidens) a fire which extinguished when the ceremony ends, was usually placed in the middle of the dancing arena (Petrus Maphalu pers. comm. 2008).

The Venda iron smelting has great affinities to the Barongo process documented by Schmidt (1997) in that when new iron smelting sites were chosen, the chief ritual specialist and head smelter were responsible for selecting suitable smelting places. This practice was very consistent, based on the understanding of the paradigm in which iron smelting activities were practised regarding associated cosmology and rituals. Ceremonial ritual was often accompanied by sprinkling of powdered medicine, and the pouring of traditional beer to appease the ancestors as well as to show contempt for evil influences (Schmidt and Mapunda, 1997).

It was believed among the Venda iron smelters that certain types of trees were not suitable for iron smelting activities, based on the belief that they were used as gathering points by witches, and therefore were associated with bad luck and had to be avoided. After the smelting site had been demarcated, a range of activities took place relating to the construction of the furnace and tuyeres. A small ritual pit was excavated by the Vhavenḓa at places such as Vuu in the centre of the furnace where medicines were placed to interdict bad influences. The medicine used by the Venda was commonly known as *Mushonga wa malingwa*. The well documented belief systems of the Barongo furnace had a central pit, where medicine within the range of bark, tubers, wood and leaves were carefully packed into the pit (Schmidt, 2009). The medicine is believed to cure infertility; one of the medicines has bright red sap in its bark symbolic of menstrual blood. Similar furnace holes dating to the first millennium A.D. have been found in prehistoric furnaces in East and Central Africa (Chirikure, 2015; Maṱhoho *et al.,* 2016; Childs and Killick, 1993).

My interviews indicated that the Venda cylindrical furnace type just like the Barongo furnace (Schmidt, 2009) lack external representation of gender, but the smelting process is characterised by rich details about the internal ritual of transformation that embody the furnaces. Among the Venda it is believed that smelters impregnate the furnace to produce a child iron, making the furnace a female body. Similarly, Fipa furnaces were treated as a new bride, decorated with flowers and covered by black cloth commonly used during wedding ceremonies (Schmidt, 2009). These elaborate ceremonies were, however, absent in Venda smelting.

The informants narrated a short description of the construction of the bellows and tuyere pipes. Most bellows were of the bag type and were made from goatskins, but pot bellows were occasionally used. Sometimes, ritually sacrificed goat skin was used for making bellows. The skins were tanned and carefully treated with animal fat (from cattle and sheep) to keep them elastic. Antelope horn (preferably waterbuck) was then attached to the bellows and connected to the clay tuyere leading to the clay furnace. Apparently, this process was undertaken by an expert. Tuyere pipes were made from dense clay plastered around a prepared piece of wood which was smeared with animal fat for easy retrieval. The tuyere was then fired to make the pipe more durable (Chirikure, 2015; Maṱhoho *et al.,* 2016).

Maphalu's father smelted iron in the early mornings before the sun rose, assisted by family members. They preferred to use charcoal made from various trees such as *Combretum collinum* and *Combretum imberbe*. It was taboo to start furnace fires by collecting burning wood stumps from the household fire. Furnace fires had to be generated by rubbing *Sclerocaya Birrea* and *Annona senegalensis* roots. This fire manufacturing technique is regarded as one of the oldest fire-making technologies in the entire history of the Venda of the northern region.

Chief Lambani of Ha-Lambani village maintained that within their area they preferred to use charcoal from trees such as *Burkea africana*, *Albizzia versicolor*, *Terminalia prunioides*, *Terminalia sericea* and *Combretum collinum*. Of these species list, only two taxa fall within the hard-wood category, namely *Terminalia prunioides* and *Terminalia sericea.* Chief Lambani further posited that within his area, the family that dominated iron smelting was the Nemaseṱoni family originating from the Vha-Mbedzi clan and he said that they were also associated with rain-making rituals. The Vhaṱavhatsindi of Ha-Lambani learnt the art of iron smelting from the Vha-Mbedzi (Chief Lambani pers. comm. 2008).

The informants were asked why they preferred to use variable bush willow and other soft-wood tree species for making charcoal for iron smelting and were asked if they were not mistakenly referring to Rooibos (*Combretum apiculatum)*, a tree species which has hard, heavy heartwood resistant to termites and is used for fencing posts, house construction and fire wood. Although this species produces good charcoal that can burn for up to 12 hours, the informants maintained that iron smelting is a delicate process which involves the blending of different tree species of hard and soft wood for charcoal (Johannes Maphalu, Chief Lambani, Petrus Ḽithole pers. comm. 2008).

After the exposed deposit at the Tshiṱavha area (Vuu site) was exhausted, there were other areas that had an abundance of iron ore such as Ha-Magoro, the Tshivhulana area and an area close to Madzivhaṅombe along the Nsami River near Giyani. It is quite likely that the large number of exposed shallow trenches around the Vuu Mountain were the result of past excavations of ore deposits.

Mr. Petrus Ndou Ḽithole maintained that for the construction of furnaces, his father preferred termite hills which were dug into a bowl shape. They prepared the platform by wetting and compacting the ground until the area was flat. When the area dried, they smeared it with cattle dung and a layer of soil. Mr. Ḽithole reiterated that the iron ore came from Ha-Tshiṱavha (Ha-Tshiṱavha being another name for Vuu). The Ḽithole family preferred to use an open pit bowl furnace for smelting and preferred to smelt during the day. The favoured tree used to produce charcoal was *Combretum collinum*. They preferred to use leather pouches to transport iron ore from Vuu Mountain.

Vuu chief, Nelson Ramathithi, indicated that iron smelting furnaces were used by members of his family and that the activities were performed underneath a jackal-berry tree. He confirmed that iron ore was mined near Vuu Mountain. Ore was collected from the same area by people from different villages as far away as Vuvha, Ha-Makuya and the Ha-Lambani areas. While ore collectors were on their way back from Vuu Mountain, they believed that the ore should rest only at a certain river known as Mbwedi. The name of this river is derived from a Venda word meaning iron ore and it is located approximately 35 km from the Vuu area. It was understood that the river was the only place where they could rest, with the ore being placed inside the water as it was believed that it should be cooled at the river to produce effective and good quality iron once it was smelted. Iron smelting communities within the region had substantial interaction despite their diverse cultural backgrounds. They had contact through trade and exchange relations that involved the bartering of ore for commodities such as maize. Now Ne-Vuu was so successful economically that he even supplied Chief Makhado Ramabulana Mphephu with iron spears and hoes in tribute.

Iron production within the Vuu area was conducted by a hierarchical grouping of lineages. It was dominated by the ruling lineage with overall control of the society, although the economic trade routes are still not known. Vuu was referred to as the master of iron smelting technology within the Venda lands and the technology was implemented with the political leadership playing a role in the smelting. The leaders were responsible for the control of surplus from generation to generation. The Vuu Chief's mother maintained that the past Chief of the area also learnt iron smelting at an early age from his father and that the technology was passed from one generation to the next. What has been narrated by the informants can be attested by the remnants of burnt clay furnaces observed during the site visit. Furnace remains could be seen underneath a jackal-berry tree at Vuu Site 1 and at other associated archaeological sites within the area. The Venda iron products include ceremonial and ritual implements such as hoes, spears and axes. The ritual hoe was described as a small, hoe-like charm which was produced solely for ceremonies and ornamentation and which was decorated with stone beads or blue glass beads (Vhulungu ha maḓi) and worn around the neck (See below Figure 18 an example of blue glass beads).

Figure 18: Example of the Venda blue glass beads (Vhulungu ha Maḓi) note the cream white object (ivory) and the brown copper foiled around the beads.

Certain individuals, especially women, wore these ritual hoes, known as 'Malembe', around their waists. Such items were in great demand as every household across the different clans within the Venda community had ritual elements (Tsanga) and owned ordinary hoes, axes, spears and arrows. Corroborated by Stayt (1968) iron weapon and implements are today so rare that they are regarded as sacred objects, because they are believed to carry the connection between the ancestors who owned them. Different types of hoes were produced including one used as a form of currency to pay for cattle, largely in marriage exchanges. According to Stayt (1968:61) African metallurgy played an important part in the industrial life of these peoples.

3.7. Summary

In conclusion, the history of metal production, ethnography and re-enactment of the 20th century within the study area has been extensively collected and has been an integral part of how these relate to southern African archaeological interpretations. These studies provided important details on the full production process from raw material procurement to smelting. Possible exchange trade routes links documented within the study also provided clues on the organised-distance trade that existed between the interior of southern Africa and the East African coast. Recently collected oral traditions at Schynshoogte farm now suggest that similar taboos were also associated with initiation schools among Venda of the Limpopo Province. Vuu site still exists and the ethnography provided a means to understand iron production in the area. The next chapter discusses the archaeological data collection strategy used for this study.

CHAPTER FOUR: ARCHAEOLOGICAL DATA COLLECTION STRATEGY

4.1. Introduction

The research area is situated south of the Soutpansberg, on the lower Luvuvhu and Nsami Riverbanks. Mut 2 site is about 7 kilometres east of Ṱhohoyanḓou Central Business District (CBD) while Thomo site is about 5 kilometres east of Giyani CBD. The research area is defined by 22°-24° latitude and 30° longitude (see figure 19 for sites location). The region borders Kruger National Park and Mozambique to the east (Sofala and Chibuene trading ports) and the Soutpansberg (Mountains) and the Limpopo Valley to the northwest.

This area has not received much attention because researchers were interested in areas such as Limpopo Valley and the region of Phalaborwa. It is now known that Iron Age communities moved into the interior away from the Soutpansberg and occupied the lower section of the river valleys (Maṱhoho, 2012, Maṱhoho *et al*., 2016). Current knowledge about the Iron Age sites distributions in the region is patchy, compared to the Limpopo River Valley. In the area under study, very few research works have been conducted; of prime importance is the excavations of Silver Leaves, Happy Rest and Klein Africa (Prinsloo, 1974; Klapwijk, 1974). Detailed data collection strategy for both Mut 2 and Thomo Early farming community sites are presented in this chapter. Both sites conform with the early farming community sites location model that shows ideal settlement location near freshwater resources, arable land, and abundance of wild animals (Maggs, 1980a).

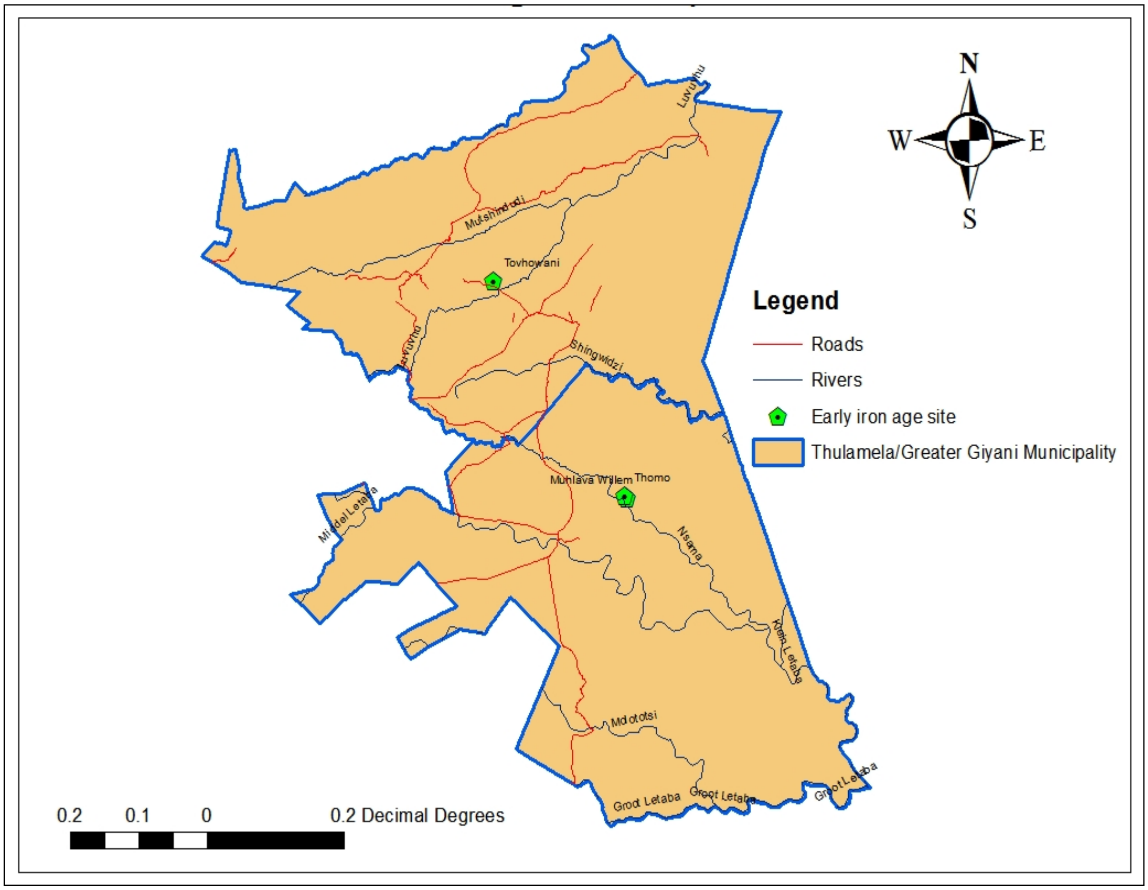


Figure 19: Map of the study area

4.2. Archival and Collection Studies

To inform fieldwork, an archival study was conducted to establish and characterise categories of Iron Age sites documented to date and their material remains. This study is within the context of a qualitative and quantitative research, with the previous chapter which focussed on the history of metal productions, ethnographic observations and interviews as the main strategy utilised to collect relevant data (de Vos, Strydom, Fouche and Delport, 2001:314). An ever-increasing body of ethnographic and archaeological literature shows that prehistoric communities depended on domestic and non-domestic resources; they exploited a variety of environmental zones for their subsistence strategies. Records show that such sites are situated near water sources (Huffman, 2007). Research efforts have therefore concentrated on a review of relevant topographical maps, geological and archaeological journal articles, literature books and historical work conducted within the region. The sources referring to the Soutpansberg and its surrounding have been used to locate, date and describe the cultural context of some of the archaeological sites in the area thought to have been occupied by the Iron Age communities. Written sources were consulted selectively where several reports of ephemeral small sites have been described from archaeological literature, for example Bristol farm Iron Age site (Fish, 1995) represented by metal slag and a few diagnostic sherds scattered on plough field zone. Bristol farm archaeological materials were made available for the study, where certain ceramics were revisited and analysed at the Schoeman's Museum (Louis Trichardt-Makhado offices).

The initial Mut 2 site excavations were conducted by Edwin Hanisch and latter work was finalised by Archaeo-Info, Northern Province. All archaeological material remains collected from Nanḓoni Dam Project are housed at the University of Venda with other specialised collections from various archaeological sites, for example, collections from Stayt and Pontdrift archaeological sites. Mut 2 site collection is unique and provides a distinct antiquity which represents the Early Iron Age Socio-political complexity. This category of cultural material assemblages are very rare in the region and not widely known. Forming part of a wide Mut 2 data collection are field notes, excavation maps, photographs and cultural materials remains (faunal, ceramics, slag). Over the years, scholars have endeavoured to understand production, distributions and consumptions by studying objects which are central to human activities, past and present. Collections studies provides a better understanding of processes associated with the broader social and political context of the lost society. The collection has been kept inactive and not once explored since it was brought to the University of Venda. The importance of collection studies is that data is readily available. As such, this invites an enquiry to understand the complexity of Mut 2 site from objects left behind by its inhabitants.

Mut 2 collections were considered within the context of investigating site status, access to resources and the space utilisation. Beyond the general artefacts' distribution, objects characteristics reflect the exploitation of a range of resources. Data from this site is easily retrieved and readily available to the researcher; this includes the final report on Mut 2 site excavations which is available for public consumption on South African Heritage Resources Agency Heritage Information Systems (SAHRIS). Given the importance of this collection, the objective was to identify patterns to understand the organization of ceramics collection and explore regional implications of economic strategies. Objects are the main sources of archaeological enquiries. The scientific analysis of archaeological objects helps to interpret many aspects of archaeological interest such as production and manufacturing process or to provenance raw materials and artefacts. The collection was used to explore the level of interaction that was taking place among Early Iron Age communities (Chiripanhura, 2017:20). As with all data collection techniques, document study also has disadvantages of which the most important is the incompleteness, for example the 1997-1998 excavation report that is not available as well as some of the cultural materials remains that could have been kept as personal souvenirs. This is one of the major problems, that there are existing gaps in the database that cannot be filled in any other way (de Vos *et al*., 2001:317). Both secondary and primary accounts were targeted as the original written works that represent the author's own experience and observations. Based on that document, authenticity and reliability was evaluated.

4.3. Archaeological Surveys

Archaeological data collections involve three basic procedures, namely: site reconnaissance, survey and excavations (Renfrew and Bahn, 2016:73-128). The choice of sampling techniques depends on the kind of communities and associated units and what is already known about it (Sharer and Ashmore, 1979: 100). Qualitative research approach was employed in archaeological surveys. Probabilistic sampling strategy was used to maximise the likelihood that archaeological sites data collected are representatives of the total data pool used in sites interpretation. According to Orton (2000), probabilistic sampling technique is the way of achieving a representative of reliable data with less than total coverage. Archaeological investigation demands that only the available data be collected from specific sites under investigation (Sharer and Ashmore 1979). In this instance, archaeological sites were grouped and selected using informal criteria such as prominence and accessibility. The choice of investigating Early Iron Age sites was encouraged by the need to explore unknown regions south of the Soutpansberg. Sites search was aimed at discovering potential archaeological sites that could provide useful data to address important unresolved questions centred around Early Iron Age communities in Southern Africa.

The survey was aimed at distinguishing archaeological sites from modern to prehistory even though both sites can still render information on subsistence (Odell, 1985:22). This baseline information was useful in developing some sampling approaches for archaeological sites that meet the requirements to fall within the scope of this research. The survey also invested great attention in the use of available local knowledge of the area sourced from the local informants. It became apparent to conduct fieldwork to observe and document information about sites distributions and the nature of sites and to collect relevant sample for further laboratory studies. The surface survey was aimed at documentation of artefacts, scatters and mounds and collecting baseline information (ceramics and metallurgy). Artefacts are especially informative in that they represent one of the basic means by which communities manipulated their environment to provide food, shelter and other necessities (Odell, 1985:22).

To redress research gaps and explore the potential of the research area, fieldwork was directed to the Nsami River catchment. Standard archaeological fieldwork procedures were used (Roskams, 2002). Operating within the archaeological framework, systematic survey was achieved through an intensive systematic foot-survey structured in a stratified random sampling using quadrants along pre-defined linear transects (Orton, 2001). Surface surveys are usually conducted as a means of locating sites for excavations (Dunnell and Dancey, 1983:268). Traditionally, sites are places or areas where artefacts are found and are the basic entities of archaeological analysis. All sites with observable evidence of settlement features such as burnt daga fragments were mapped, while the surface scatters were collected to facilitate chronological assessment (Renfrew and Bahn, 2016). The reason for the survey was to document and provide an inventory of resources (archaeological sites) within the Nsami River while, in addition, the survey sought to assess the existing state of knowledge on Iron Age sites distribution south of the Soutpansberg and provide a redress of resource inventory.

The Nanḓoni River catchment was assessed by Edwin Hanisch as part of the Cultural Resource Programme initiated by the Department of Water Affairs for the Nanḓoni Dam construction. In summary, he documented approximately 69 heritage sites and 1400 graves. Generally, the survey documented sites distribution on ridges and spurs located along the Luvuvhu River and its tributaries. These sites are characterised by ceramics, metal debris scattered on the surface, low stone wall and terraces, recent past mud houses structures.

Hanisch's transect survey identified one large Early Iron Age site, situated on a raised platform formed by the Luvuvhu River. The site has been pronounced to have been situated on a flat top section of a hill, which forms an L-shape or is boomerang shaped. With the east-west diameters of the hill measured at approximately 120 metres and the north-south diameters at approximately 150 metres. The entire site measures approximately 1800 square metres (Archaeo- Info, 2000). Documented cultural materials remains from site Mut 2 include, surface scattered burnt daga fragments, metal slag and ash middens. Unique ceramic type with distinct decoration techniques placed Mut 2 site at the centre of enquiries. Sites as early as Mut 2 as observed from ceramics have been recorded to date on the lower lying area approximately 80 kilometres east of the Soutpansberg. This site is currently highlighted because it represents the time of great interest and is extremely rare and not well understood since there are limited written sources that provide a full insight on Early Iron Age way of life. This phase has been defined and narrowly interpreted based on surface collected ceramics (Burret, 2007; Huffman, 2007). There are instances where Garonga Phase ceramics were erroneously misinterpreted as Happy Rest type sites.

Thomo site survey was conducted by the researcher assisted by three community members. Iron Age sites were identified and classified based on features and objects such as ceramics, daga fragments and metallurgical debris. This was achieved because the process was conducted during the winter months when the vegetation along the Nsami River was dry and the region was experiencing drought, therefore water level inside the Nsami Dam was very low. The survey identified historical mines and numerous smelting precincts nearby. The area contained an intact smelting furnace, tuyere and hammer stones (GPS S 23º.15.28.00 and E 30º.46.53.09). Owing to years of constant exposure to harsh weather, the furnace superstructure is visible from the surface. The structure is triangular with each wall measuring 1 metre in length. From the surface, furnace wall measured 25cm, with the top section of the furnace wall broken.

Very few sites were identified outside the dam basin, this includes recent past mine shafts, occupational and iron production sites. Thomo site was identified approximately 400 metres from the intact furnace structures on the bank of the Nsami River. The site was noted due to the high concentration of slag and few diagnostic sherds on the surface. According to Dunnell and Dancey (1983:270) surface data have two powerful advantages over buried sources: First, they constitute a body of information that can be obtained on a regional scale; secondly, they can usually be acquired at a fraction of the cost of excavating materials. Surface collected pottery samples were placed in a relative chronology based on the well-dated ceramics sequence for the region. The dominant method of classifying ceramics in South Africa is that of Huffman (2007) which combines shape profile with decoration techniques and motif. There appears to be a traditional mistrust of surface deposit. This suspicion arises because of the obvious ease of lateral displacement and the selective destruction of artefact on the surface (Ibid: 1983;269). Based on the above, Thomo site was scheduled for intensive investigation since subsurface deposits originate as surficial ones. As rightly noted from Burrett (2007), surface reconnaissance produced primary archaeological data (ceramics and slag) of a scope and character entirely consistent with and necessary to a regional frame of reference. Burrett has presented one means of securing useful information in this kind of situation from the Garonga site. Controlled surface collection was carried out at different sites around Thomo village. The assessment was used to evaluate both chronological position and different activities and functions of sites (Shrare and Ashmore, 1979). In addition, ceramic assemblages, profiles and motif from various Iron Age sites namely: Kruger National Park (Meyer, 1986), the Greater Makalali Nature Reserve (Burret, 2007) and west of the Soutpansberg on the farm Bristol (Fish, 1995) were used for comparative analysis.

4.4. Results of the Surveys

The survey along the Nsami River documented sixteen (16) archaeological sites comprising metal production sites and mining areas. The majority of these sites are metal production precincts found scattered inside and below the Nsami Dam basin, most of which are situated on the riverbanks. A very big metal production site was recently disturbed during the construction of Thomo Primary School building. Most of these sites had evidence of metal production in the form of slag, broken pieces of tuyere fragments, broken furnace structures. Site five (5) GPS (S 23º, 15. 34. 03.¨ and E 30º, 47, 09.06¨). located on the eastern bank of the Nsami River is one of the exceptional cases because the site seems to exhibit remains of burnt houses structure floors, diagnostic and undiagnostic ceramics, some with graphite application dominated by crosshatchings, grinding stones and burnt daga fragments with pole imprint marks. Similar diagnostic impressions have been documented within Iron Age sites (Huffman, 2007). The fieldwork managed to document sites from different periods of occupations from the Early Iron Age to the historical period (see documented sites, Figures 20- 27 and table 4-2). Thus, sites in this vicinity are small and do not have large middens nor high ceramics concentration. However, in terms of the surface distribution of the remains, only one site qualified to be selected for further investigations. Thomo 1 site was exceptional because the site exhibits a combination of ceramics and metallurgical debris (see figure 22). Thomo site is located on a flat section of the eastern bank of the Nsami River (GPS Co-ordinates South 23^0.15.47.06 and East 30^0. 47. 13. 02). The site is situated approximately 800 metres below the Nsami Dam wall. The site covers approximately an area of 80 m X 80 m in size. Surface ceramics, shape profiles and decorations and the presence of metal production in the vicinity suggest that the site represents some of the Early Iron Age activities. Again, given the type of ceramics and decoration attributes documented at Thomo site, the combination of these assemblages provides important perspectives on operational strategies of the site. The objective after the encounter of Thomo site was to explore the identity and the organization of the site; the area was scheduled for a thorough investigation.

The mining area is located on flat section of land with isolated hills. The area is about 10 kilometres northeast of Thomo village (GPS S 23º, 11. 33. 6.¨ and E 30º, 45, 39.8¨). The mining area is characterised by scattered long but shallow trenches as well as triangular open ditches. Two open shafts were observed at an interval of 50 metres. The first shaft is approximately 10 metres deep and has two visible tunnels on the eastern section of the shaft. The second shaft is characterised by two separate long trenches, one of which contains a shaft of undetermined depth. Ore and bended ore stones were collected from the surface of the mines.

Figure 20: View of Thomo site 1, towards the north.

Figure 21: Nsami Riverbank forms the edge of Thomo Early Iron Age. Several archaeological materials have been washed down the riverbanks.

Figure 22: High slag concentration at Thomo site 1.

Figure 23: Triangular furnace structure documented at Thomo site 2.

Figure 24: View of Thomo site 2 (Occupational site) towards the Nsami Riverbank.

Figure 25: Half complete vessel in association with bottom grinding stones and burnt daga fragments with pole marks impression.

Figure 26: One of two open shafts exposed by miners when they were extracting hematite stone.

Table 4-1: List of archaeological sites documented at Thomo Village

Thomo Sites	GPS Co-ordinates	Description
Thomo 1	GPS South 23^0.15.47.06 & East 30^0. 47. 13. 02	Early Iron Age site, metal-production site with few ceramics.
Thomo 2	GPS South 23^0.15.28.00 & East 30^0. 46. 53. 09	Metal-production site, well represented by a triangular furnace structural design, on the eastern side of the Nsami Riverbank.
Thomo 3	GPS South 23^0.15.20.07 & East 30^0. 47. 13. 09	Metal-production site (unknown period since the site has been destroyed by the construction of new school building and assembly point).
Thomo 4	GPS South 23^0.15.38.09 & East 30^0. 47. 08. 01	Metal-production site situated on the western bank of the Nsami River (indicated by slag).
Thomo 5	GPS South 23^0.15.34.03 & East 30^0. 47. 09. 06	Residential site with house structure remains, and Letaba ceramics. The site is located on the eastern bank of the Nsami River.
Thomo 6	GPS South 23^0.15.57.00 & East 30^0. 51. 35. 02	Metal-production site situated on the bank of a non-perennial stream at Khakhaṅwa village (indicated by a heap slag).
Thomo 7	GPS South 23^0.14.29.05 & East 30^0. 46. 01. 01	Metal-production site situated on an ant hill (submerged inside the Nsami Dam).
Thomo 8	GPS South 23^0.14.19.02 & East 30^0. 46. 07. 03	Metal-production site, indicated by four intact furnace structures and scattered slag (submerged inside the Nsami Dam wall).
Thomo 9	GPS South 23^0.14.16.03 & East 30^0. 46. 09. 06	Metal-production site situated on Nsami and Rhisele Rivers' confluence, slags covered about 40 X 40 M of slag distribution.
Thomo 10	GPS South 23^0.13.41.02 & East 30^0. 46. 06. 01	Metal-production site situated on the Nsami River tributary (furnace) (submerged inside the Nsami Dam).
Thomo 11	GPS South 23^0.13.34.02 & East 30^0. 46. 01. 09	Metal-production site situated on an ant hill, cluster of three furnace structures (submerged inside the Nsami Dam).
Thomo 12	GPS South 23^0.13.21.08 & East 30^0. 47. 13. 09	Metal-production site, slag distribution covers 50 X 50 m (submerged inside the Nsami Dam).
Thomo 13	GPS South 23^0.13.17.05 & East 30^0. 45. 51. 08	Metal-production site, at the confluence of Gololo and Rhisele Rivers; these rivers discharged water to Nsami Dam (submerged inside the Nsami Dam).
Thomo 14	GPS South 23^0.13.08.06 & East 30^0. 45.48. 00	Metal-production site, slag concentration along the Rhisele Riverbank (this is a non-perennial stream that recharged water during rainy season to the Nsami Dam).
Thomo 15	GPS South 23^0.14.24.08 & East 30^0. 46. 24. 04	Metal-production site, slag concentration and tuyere fragments, remains of triangular furnace and graphite painted ceramics (inside Thomo Heritage Park).
Thomo 16	GPS South 23^0.14.36. 06.03& East 30^0. 46. 16. 07	Metal-production site, slag concentration, tuyere fragments on top of an ant hill.

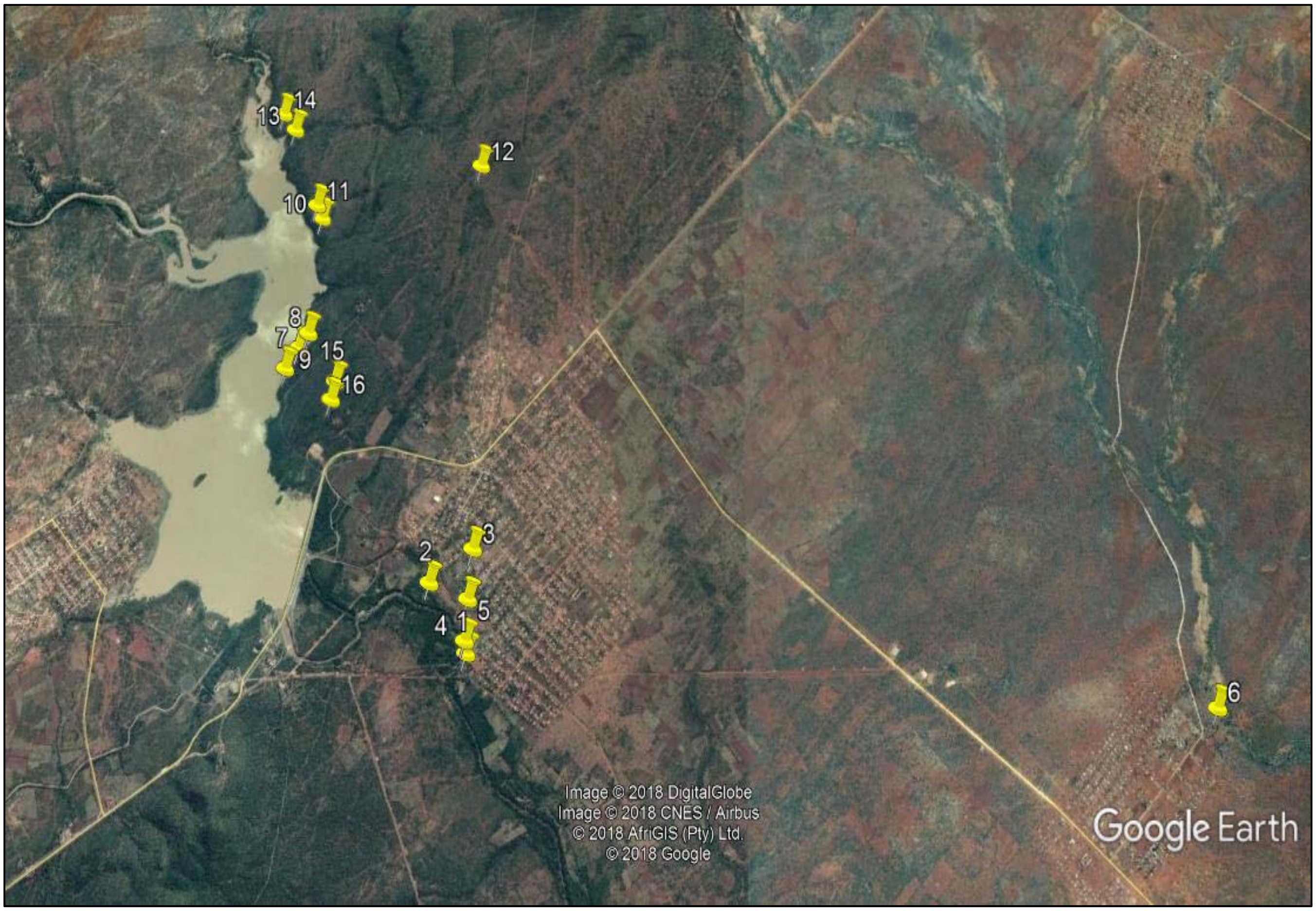


Figure 27: Some of the archaeological sites documented around Thomo village.

4.5. Grid System at Thomo site

As prelude to excavation, vegetation was cleared by temporary labourers appointed from Thomo village. The process facilitated a smooth grid system setup. Site grid has been defined by Sharer and Ashmore (1979:186) as a co-ordinate system for recording the precise location of any point. The site grid was characterised by lines running north-south (Meridian) and east-west (Baseline) with the datum point situated on the westernmost point of the site. Blocks measuring 2X1M were laid out and numbered alphabetically and numerically from west to east and from south to north. Due to the extreme position of the datum point on the far western side of the site, which was near the middle of the north/south extent of the site, it was necessary to allocate a higher alphabetic number to this point to incorporate blocks lying south of it. The entire site was covered systematically, and extensions of grid became a continuous process between different phases of archaeological work.

4.6. Controlled surface collections

As rightly noted, the intellectual enquiry passes through sequence of developments which start with the collection of materials, classification and explanation of any pattern derived at (Roskams, 2001). The surface collection strategy became a common method of site evaluation where information was generated to identify activity areas for further investigations. Areas with high ceramic concentration further south of the high slag concentration area next to the Nsami Riverbank was identified. The ceramics were found mostly out of their primary context, which serves as a useful indicator of surface distances due to existing foot path, power and pipelines disturbances on the site. To gain more information on the nature of site, a controlled surface collection around the edges of the site was conducted. To generate more data sets, sampling surface remains was controlled by the grid system. Only diagnostic pottery shards with decoration or recognisable profile and metallurgical remains were collected (Renfrew and Bahn, 2016).

4.7. Thomo Iron Age site excavation and documentation

To obtain well-resolved samples for further laboratory analysis, the research strategies were exploratory and comparative. Excavations were carried out at Thomo site. The excavated areas were selected after extensive surface surveys which were aimed at understanding the distribution of artefacts and features. The excavation programmes were aimed at recovery of datable archaeological material remains to understand site's culture historic sequence. The programmes were considered to address several questions, among them, reconstruction of site's chronology, subsistence and other economic pursuits. A permit was obtained from the South African Heritage Resources Agency (SAHRA Permit Number 80/10/003/51). The excavations followed international best standard procedures observed throughout the world and were conducted according to the National Heritage Resources Act 25 of 1999. The procedures involved include establishing baselines (Datum points) and excavation grids system to control artefacts' proveniences. Excavations take the form of trenches whereby units of measurement are in metres

(M), conducted in arbitrary spits of 10 centimetres (CM) to expose subsurface artefacts and their occurrence patterns. Trenches were laid over surface indications of features such as areas where there is high slag concentration. In several cases, trenches were also dug in areas with no visible indications of any activity to establish the nature and the use of such area. Patches of burnt daga fragments were approached with interest as it was anticipated that they could indicate a previously unknown feature in the Early Iron Age archaeology of the region (Dreyer, 1992). The layer 1 formed part of hard compacted footpath that transverses the site dominated by reddish brown humus topsoil 10cm thick going down to 20cm. This contained high slag concentration and few diagnostic and non-diagnostic ceramics. Few burnt faunal remains were documented from this layer. Layer 2 was reddish light brown soil with no cultural material remains; due to the absence of cultural material remains, the layer was treated as sterile soil. Evidence of soil erosion was visible through the entire site. The soils from excavation trenches were sieved layer by layer using a hand-operated double 2mm and 4mm sieve respectively to recover micro artefacts such as glass beads and / or bone points, which are important for relative dating (See figure 32). The documentation process was done in line with the archaeological standards and principles. A standardised form for each excavation was used (see Figure 30). The forms enable the researcher to compare different structures and features exposed from different layers of activities. Also, a few diagnostic and undiagnostic ceramics belonging to the Early Iron Age period were collected. Owing to the presence of high slag concentrations with limited diagnostic ceramics on the surface, Thomo excavations were conducted to obtain well-resolved samples for ceramic and radiocarbon dating and archaeometallurgical studies in the laboratory.

Figure 28: View of the test blocks to be excavated.

Figure 29: Excavated test trench layer 1.

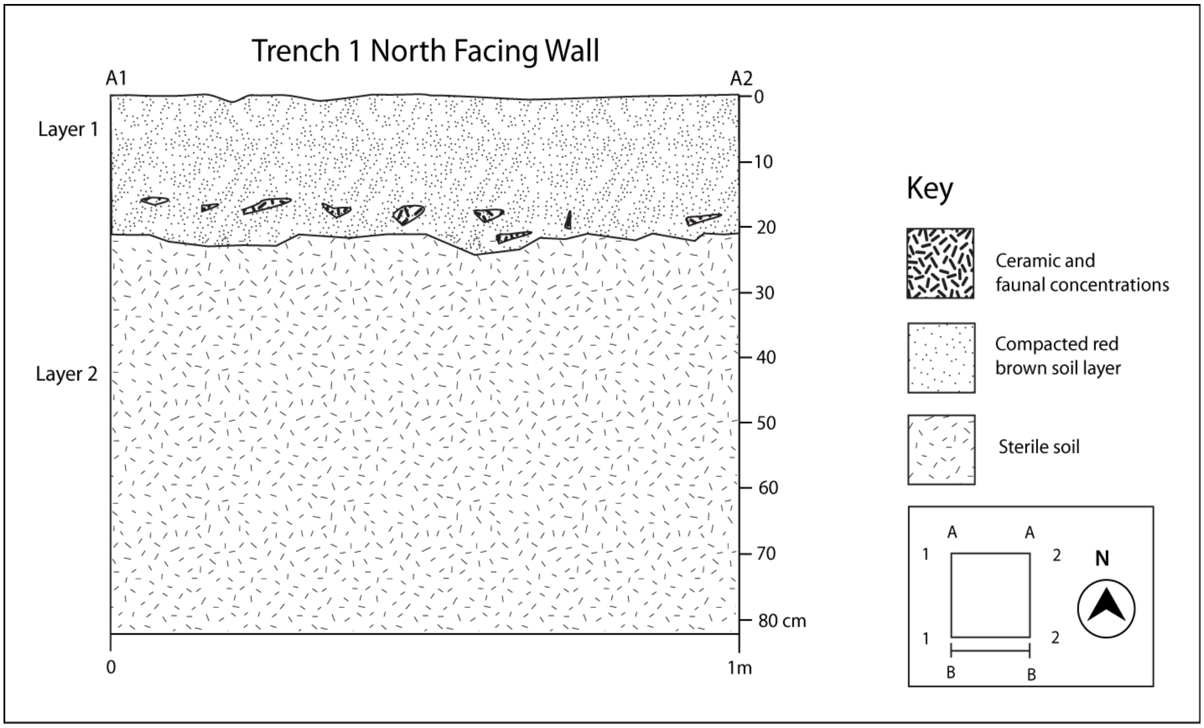


Figure 30: Excavated trench 1 Profile

Figure 31: Excavation process at Thomo site 1.

Figure 32: Screening of the excavated soil.

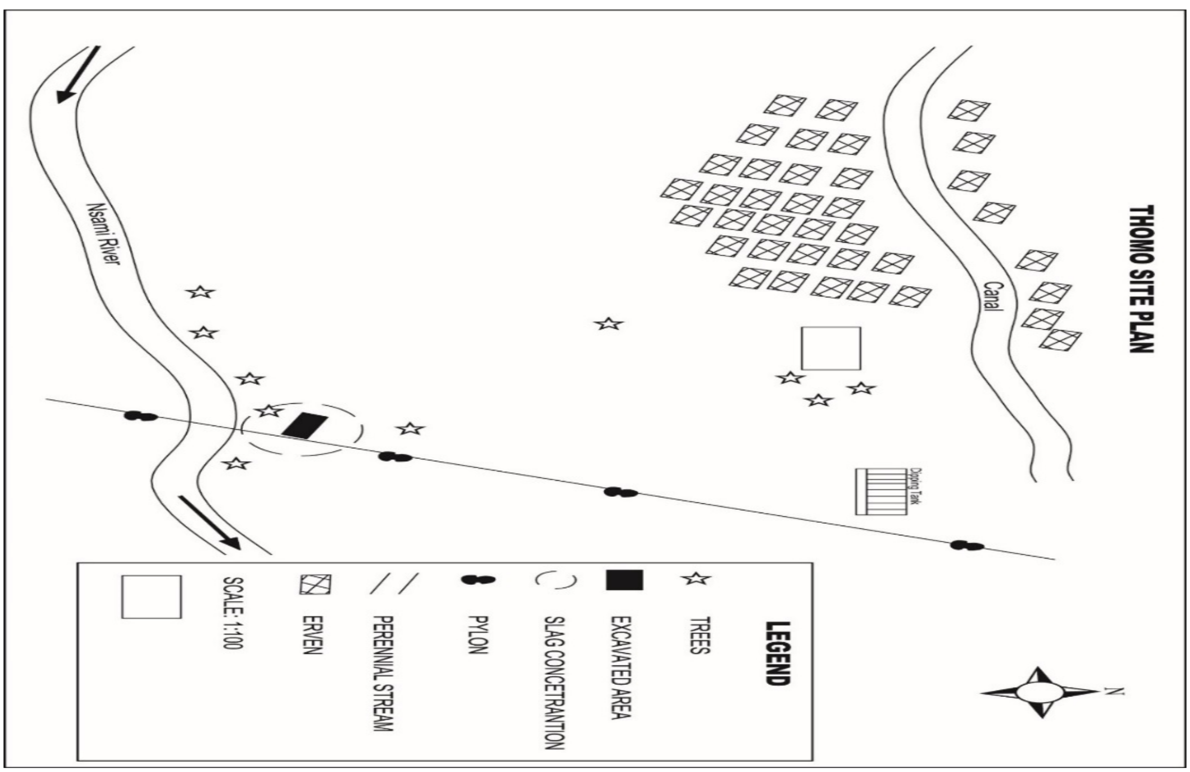


Figure 33: Thomo site plan.

4.8. Summary

In conclusion, the methods such as auguring investigation, used to survey underground features and the distribution of archaeological materials have uncovered features and areas of ceramic concentrations. However, most of the detailed structures outlined were obtained from excavations and grading activities. The excavation trenches were open at different places at the centre of Mut 2 site aimed for gaining a view of spatial organisation and information about levels of occupation and techniques of construction. Varied construction techniques were observed from the archaeological remains; these were in terms of the size of the houses, thickness of the burnt daga fragments, raised grain-bin floors, hut foundations and underground storage pits filled with ash concentration and broken pieces of ceramics and animal bones. The excavation programmes encountered various vessel profiles and decoration techniques, which include comb stamping, incision, crosshatching, etc. All these vessels shards were collected from various programmes such as excavation, surface and grading activities. The excavation provided reasonable information on the spatial layout of the site as well as activity area.

The aim of the undertaken excavation at Thomo site was to assess iron production activities since the site had an abundance of slags; some of the collected items included 23 ceramic shards; furnace remains were properly documented near a site, tuyere fragments, slag concentrations, hammer stones and remains of ores. Unequivocally, these can be linked to metal production in the study area. Although archaeological finds of complete furnaces are rare, an almost complete triangular furnace was encountered near the study area. An analysis of the distribution of material culture on the surface revealed that the site could be used only for iron production due to the unavailability of hut and daga fragments. To further understand the technology of metal production, samples were collected for dedicated archaeometallurgical studies in the laboratory. The other archaeological finds were studied to understand the full cultural context in which the metallurgical remains were recovered. Some of the problems addressed in the beginning of the study may be clarified by the excavations undertaken.

CHAPTER FIVE: ARCHAEOLOGICAL DATA ANALYSIS

5.1. Introduction

This chapter presents the ceramic analysis and other cultural material remains (faunal and imported ceramics) data from the research areas. Conversant with Mut 2 collection and excavated material remains from Thomo Iron Age site, it is now possible to establish how Mut 2 and Thomo sites were operational. The biggest ceramic assemblage came from Mut 2. These ceramics were of prime importance and the artistic side provided evidence on the technological information and how certain fine wares were made (Orton, Tyers and Vince, 1993). This section presents the types of archaeological material remains uncovered and methods of analysis employed. The typological classification has been used to describe the ceramic materials. Abundance of ceramics in archaeological records perhaps depended upon the need for the products of craft (Gramly, 1978:110). Records shows that Iron Age communities' industries included pottery manufacturing, salt making, metal production and tool manufacturing, as well as ivory working. Hunting for big game such as elephants for ivory for export was largely centred on collaborations with other Iron Age communities. Other relevant information includes diet evidence acquired from animal remains analysis, which also provides an indicator of the environmental conditions associated with the region. The spatial layout and function of the sites are discussed in relation to the uncovered artefacts and features.

5.2. Ceramic theory

Ceramics form the material culture, the physical remains by which almost all prehistoric societies are defined. For the past century, ceramics have been the most important source of investigation by archaeologists for several reasons (Pikirayi, 1993; 2007; McIntosh, 1995; Cruz, 2003; Kelly and Norman, 2006; Huffman, 2007). Huffman's rationale was that ceramics reflect group identity (Huffman, 1971a; 1978; 1980; 1989a; 2007). Ceramic style is seen to relate to societies (e.g. van Warden, 1998; Reid and Segobye, 2000). Approximately all archaeological methods attempted to position style as a communicator of identity and used ceramics to establish chronologies (Pikirayi, 2007). These cultural material remains are different and display diagnostic attributes and designs which form part of certain standard cultural packages (Pwiti, 1996). People shared different ceramic cultural symbols that could only be understood by members of those traditions, because ceramic styles, motifs and attributes are structured symbols with social meaning (Huffman, 2007). These attributes are encoded using arbitrary and geometric symbols encrypted on ceramics vessels (Evers, 1988). Archaeologically, culture units usually are defined and equated with ethnic groups and ceramics have been directly linked with group identity (Pikirayi, 1993; 2007; Lindahl and Pikirayi *et al.,* 2010). The resultant terminology - ceramic tradition (archaeological culture as defined by pottery type) Phase (the time segment of a tradition) and facie (geographical area occupied by archaeological culture) constituted the basis / theory on which human group identities, including ethnicity, were constructed (Pikirayi, 2007).

A framework for the identification of Iron Age groups in southern Africa was developed by Huffman (1980) through the analysis of ceramics. His rationale was that cultural groups can be distinguished from each other, based on variations of their material objects which create a stylistic identity unique to each cultural group. Huffman (1980), therefore, argued that since ceramics have stylistic variables (based on three aspects: vessel shape, decoration motif and design layout) that can be quantified, they can be used in identifying prehistoric groups. For example, southern African early and later farming communities have been differentiated through ceramics typologies and decoration placement (Huffman, 2007). A broad ceramic division has been recorded from various sites within the province. The ubiquitous nature of ceramics in southern African Iron Age settlements meant that ceramics were mostly produced locally within each individual community to meet their needs, thus promoting the development of a group-based style that could be used by archaeologists to correlate with archaeological cultures (Huffman, 1980). By focusing on several variables, Huffman's (1980) framework became known as the multidimensional approach. The multidimensional approach has been used by Huffman and subsequent scholars to build a ceramic relationship that translates to cultural group relations. Huffman revealed a relationship between pottery of various regional groupings which followed a north-south trend from Uganda, Kenya, Tanzania, Zambia, Zimbabwe and South Africa and concluded that farming communities originated from the north and migrated into southern Africa. Pikirayi and Lindahl (2010; 2013) believe that ceramic analysis can go beyond defining culture sequences and identifying human groups through engagement with ethno-historic and ethnographic records as well as the technology of ceramic production processes. They advocate that the ethno-historic record is awash with clues for understanding issues such as function of pottery and meaning within a given cultural landscape. However, Huffman's (1980) multidimensional approach has been criticised (Hall, 1984; Pikirayi 2007; Mtetwa *et al.,* 2013) for if ceramic boundaries were all-inclusive and subsuming other material evidence, giving the impression that other material had no contribution to understanding identities of prehistoric groups, it remains the dominant method of establishing culture-historical sequences in the Iron Age of southern Africa. Hall (1983) argued that the methodology of ceramic typological classifications' main concern appeared to have been the definition of ethnic groups instead of the understanding of prehistoric lifeways and traditions of the regions' past. Pikirayi (1997) has also argued that ceramic studies need to provide more information on the producers and users of objects, rather than focusing on their typological and material attributes.

In this regard, several factors have been offered to explain the changes that are noticed in ceramic styles: migrations have been cited as one such factor, while local interaction, intermarriages and diffusion could be cited as another factor. Archaeologists throughout the world use material objects as symbols that represent specific cultural groups (Boas, 1927; Schofield, 1948; Hodder, 1982; de Boer, 1985; Evers, 1988; Shennan, 1989; Philipson, 2005; Huffman, 2007; Pikirayi, 2007).

Ceramics have also been analysed to understand social relationships in past societies, the rationale being that the way people make or use pottery is an expression of social meanings, values and other activities such as social structure, use of space and ritual. Pikirayi (2007) used ceramic style to investigate patterns and mechanisms of communication among the Iron Age groups in southern Africa. Social affiliations were used strategically to maintain contact and co-operation among societies living in different localities. Ethnicity and class are frequently used for dealing with social identities as features of the social landscape (Shortman, 1989). Social identities are recognised in archaeological material remains, based on patterned distribution of symbols (Hodder, 1982a). A commonly held assumption in these studies is that style, as expressed in building designs and techniques, ceramics and artwork can be group specific. The analysis varies from the core-concept approach, which uses consistent combinations of vessel, shape, decoration technique, layout motif as well as multi-dimensional approaches (Huffman, 1978; 1985; 1980). Pottery may be used as indicators of past subsistence activities, agriculture, trade and exchange (Pikirayi, 1996).

Several researchers in southern Africa have successfully used ceramic evidence in reconstructing regional culture histories; for instance, Pikirayi (1993) used ceramic designs and attributes to reconstruct ceramic sequence of Zimbabwean historical periods. He could demonstrate that ceramic spatial distribution within the Zimbabwean historical periods was dominated by two kinds of ceramic typologies, hence could analyse imported ceramics to establish their places of origin. Using this kind of approach, it may become possible to adopt a more rewarding treatment analysis of Garonga ceramics. In terms of symbolism, Evers *et al.,* (1988) suggested the reasons are enshrined within the philosophies and ideologies of different social systems that produce them. On the aspect of group identity, they believe some decorations were an extension of designs on human bodies and other forms of material culture; thus, Evers *et al.,* (1988) qualified decorations as useful in tracing group identity although they disputed the idea of differentiating the social systems that produced these using differences in decoration motifs and techniques, arguing that changes in these aspects were not always an indication of culture change but rather changes in styles and decorations within similar time and space. Other scholars also note co-occurrence of ceramic decorative styles on other media, such as female bodies (Collet, 1993) granaries (Bent, 1892; Collet, 1993) furnaces (Ndoro, 1991; 1996) stonewalling (Robinson, 1965) and terracotta products (Inskeep and Maggs, 1975; Evers, 1982). These patterns symbolise social identity and need not be restricted to specific regions (Shortman, 1989). Ceramic theory assists in positioning ceramic style of archaeological sites. Ceramic style is the communicator of sites' identity. Objects reflect society and individuals who make, own and use them; a physical representation of our desire within the limitation imposed by the technology, economic circumstance and social acceptability (Chiripanhura, 2017:69). It is arguable that this theory will enable the development of culture historic sequence while identifying ceramics assemblages acquired through regional cultural interactions.

5.3. Analytical method

Analysis of ceramic material remains helps to interpret many aspects of archaeological interest such as the technology of production, manufacturing process or prominence (Chiripanhura, 2017:69). The analysis was aimed at investigating the following: are the differences between the regional styles at traditional or facie / phase levels? Are boundaries between the style sharp or diffuse? Is the nature of stylistic variation within cluster random or systematic? These questions will allow us to assess the nature of Iron Age context and to answer important questions. They also provide indirect information on the nature of interaction between cultural groups (Evers, 1988). The objective of the ceramic analysis is to build up a picture on ceramic variation by studying the co-occurrence of different types or characteristics in different contexts and enabling us to create a sequence of relative dates (Pikirayi, 1993).

To establish a sequence for the research sites, analytical procedures that reflect group identity at an assemblage level were used. Diagnostic shards were defined in terms of shape form, decoration technique, layout and motif. This was conducted to address questions of relative chronology, to recognise prehistoric human group identities and trace regional people movement and contacts (Pikirayi & Lindahl, 2013). A very large sample of diagnostic and undiagnostic shards uncovered during the excavation and surface collections makes this classification tentative. Generally, most of the diagnostic sherds fit in within the diverse Iron Age ceramics categories. A data recording form was designed to capture individual sherd summaries that would then be analysed using the quantitative approach (Pikirayi, 1993:121, Orton *et al.,* 1993:76) (see appendix 5, sample ceramic data recording form).

Vessel forms are determined by their intended function and vary over time in terms of how they were made, what they were made of, what they were used for, probably where they were made and certainly by whom they were made (Pikirayi 1993; Pikirayi & Lindahl, 2013; Nyamushosho and Chirikure, 2020). This was achieved by dividing ceramics into broad functional classes based on their form type (for example, necked jars, bowls and globular pots) and vessel parts (rim, shoulder, body and base or a combination of these attributes) (see figures 51-53). Large collections of ceramic materials were ordered into classes (Ibid: 1993), while smallest sherds between 1-3 square centimetres were grouped as fragments except rims and neck (Pikirayi, 1993). Ceramic fragments were grouped per surface treatment, counted and weighed. Unfortunately, Thomo site ceramics were represented by very few fragmented diagnostic sherds. The absence of clear representative diagnostic ceramics at Thomo site brought up weaknesses of pursuing ceramic typological method. However, these few fragments were carefully used to establish ceramic style and indicate position in sequence as demonstrated by previous researchers (Evers and van der Merwe, 1987; Sampson, 1988; Loubser, 1991; Sadr and Sampson, 1999; Pikirayi, 1993; Huffman, 2007). Ceramic spatial distribution suggests that these diagnostic potsherds share common boundaries; this makes these entities especially amenable to analysis and enables us to determine the nature and distribution and to determine if there is any evidence of cultural change or ceramic stagnation across the space and time (Evers, 1988).

All ceramics, including broken pieces of tuyere fragments, were washed in water and a hard-bristled brush was used to remove the soil attached to the ceramics. After cleaning of dirt, the ceramics were left in the sun to dry before they were assigned permanent assertion numbers and packed into labelled bags. The cleaning process is conducted to expose distinguishing attributes used to understand the culture historical chronology of the sites and cultural groups. Layout modes were determined by a combination of decoration type, while classes were derived from the combination of layout modes and profile modes. This is achievable because it has been demonstrated by Huffman (1980; 2002; 2007) that pottery was an active part of culture and a representative part of the larger style; it can be used to recognise groups of people in the archaeological records. Where complete vessels were scant, the analysis was limited to available variables, although qualitative comments about the motifs and profiles modes were made. The advantage of using this approach is that it makes it easier to relate ceramics from the study area to those that were uncovered from other sites within the region.

Ceramic style generally reflects group identity; therefore it is used here to refer to vessels which have similar characteristics, including fabric, form and decorations (Huffman, 1971; 1978; 1980; 1989a; 1989b; 2007). Early and late farming communities have been defined by typology and ceramic tradition and have been used to delimit cultural boundaries (Philipson, 1974; 1976; 2005; Huffman, 2007; Pikirayi, 1993). To generate a stylistic class, three variables were considered (profile, design layout and motif categories). Profile refers to the vessel shape, while design layout refers to the organisation of decoration in view of decoration placement. The motif categories refer to the complete decoration combination. The last two variables mean that whole vessels are needed to define stylistic classes (Huffman, 2002; Bandama, 2013; 2018). Complete vessels do include sherds that retain all the possible decoration areas observable within an assemblage. Undecorated sherds with rim or a recognisable profile were also retained as diagnostic pottery because they are useful in establishing profile categories but used to establish stylistic classes. Several related stylistic classes will then form a ceramic unit, called facie and belong with a tradition (cluster of facies) (Huffman, 2007; Bandama, 2013; 2018).

When vessels occur in a consistent style and in identical fabric they are referred to as a ceramic type (Anderson, 1984; Pikirayi, 1993). A ceramic style is regarded here as a consistent association of types and a tradition as the period of manufacturing techniques or a decoration and shape style (Pikirayi, 1993). The term sub-tradition may be used when the geographical limits of the tradition have not been adequately defined. Diagnostic ceramics recovered from surface collections, excavations and under the grader's blade were analysed. The study was predominantly limited to decorative motif. Motifs were easy to establish, compared with previous studies in the region Burret (2007); Huffman (2007); Prinsloo (1974); Klapwijk (1974); Evers (1974); Fish (1995). There is consistency in terms of the clay material used; the ceramics were homogenous reddish-brown, oxidised, reduced fired dark-brown clay. The ceramic sherds' surface was smoothed, polished and burnished with red ochre. The use of ochre on ceramics seems to represent the earliest decoration process on ceramic. Ethno-archaeological research (Krause, 1985; Van der Lith, 1972; Antonites, 2013) indicate that colour-decorated ceramics are obtained by using graphites, hematite-rich ochre or magnetite: When crushed into powder, mixed with water or animal fat, they produce coloured paint, graphite yields a shiny grey-black paint while hematite produces red paint. The overall state of ceramic preservation varies considerably; however, the general state of preservation at Mut 2 site was good. Ceramics were classified according to the following states of preservation:

(i) Pottery that was well preserved with all attributes.
(ii) Pottery preserved with some attributes identifiable (in such cases the decoration may not be clearly identifiable).
(iii) Pottery that is heavily fragmented and presented as very small potsherds that cannot be reconstructed and whose vessels cannot be identified (this is quite normal with surface recovery).
(iv) Pottery that has been exposed to fire and thus baked at high temperatures causing it to be brittle, cracked or partially vitrified (in some cases some attributes may not be clearly defined).

(v) Pottery that has been exposed to fire as in above, but later further exposed to the elements of nature, like rain (and subsequent weathering), human and animal activity (for pottery recovered on the surface), and subsequent burial, for pottery recovered from beyond the surface. In cases like these, the pottery may be brittle and the decorations slightly to fully unidentifiable, particularly in the case of graphite burnishing and stamping.

5.4. Vessels Shape and Forms

Shards were categorised per vessel parts of rim, neck, shoulder body and base or combination of both. A combination of the vessels' profiles and the placement of decoration (layout) produced 78 classes with various subclasses in some of them (see figure 34). Some of the classes were represented by only one vessel, but a larger sample would increase these numbers. The sub-classes were derived from the different decoration techniques used on the different layout. For example, layout A (rim) of two vessels were both decorated: one with A (comb stamping) and the other with C (cross hatchings), in so producing two sub-classes. There were decorated body shards that could not be identified with any basic vessel groups and consequently these were labelled non-diagnostic decorated shards. They could not be ignored because their decorations were useful in creating the range of decoration motifs (Huffman, 2007).

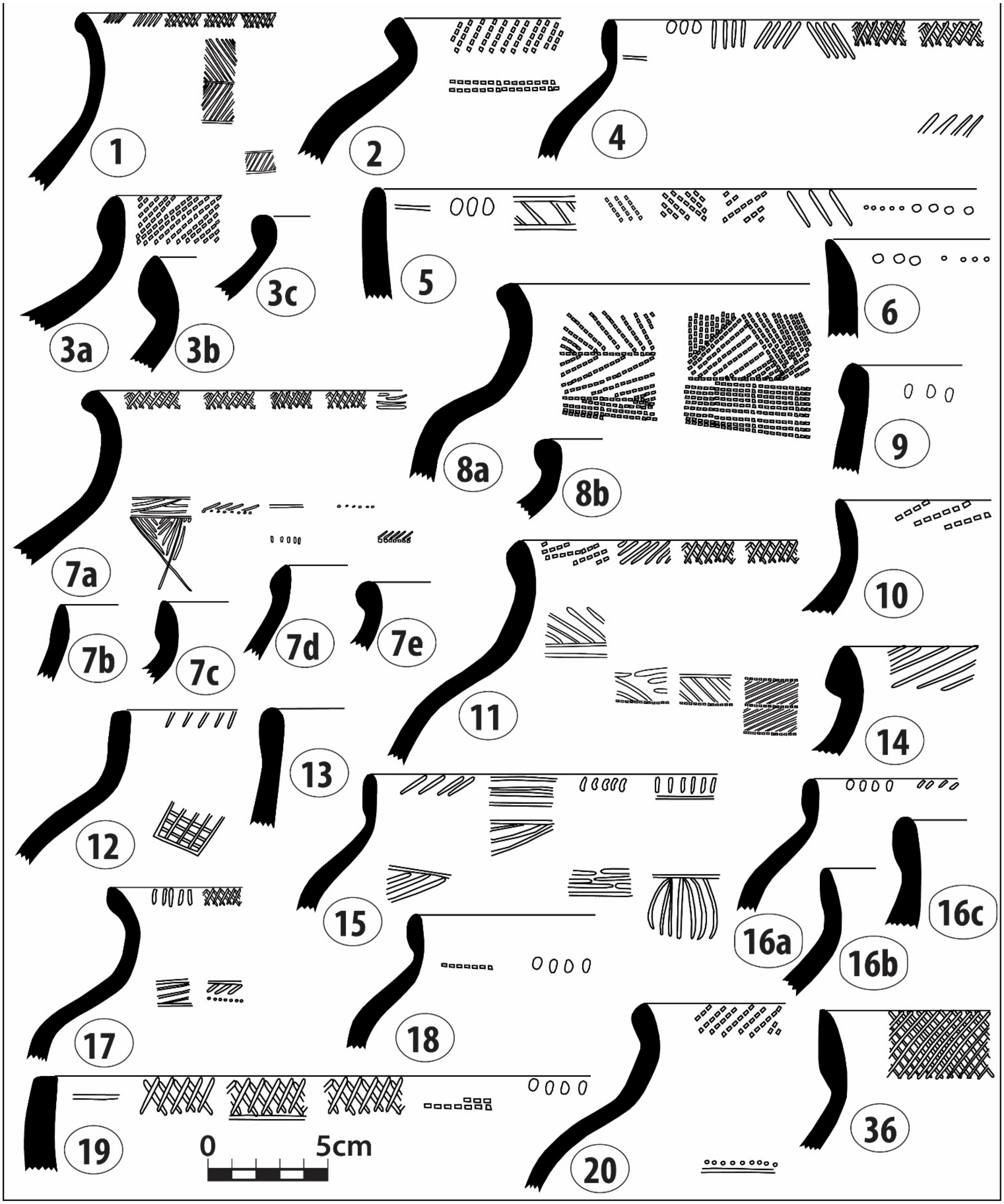


Figure 34: Mut 2 vessels and form (Ceramic profiles drawn by Foreman Bandama)

5.6. Decorations techniques and Motif

Of the diagnostic sherds, only 11 percent of the pottery were not decorated of which 9,5% were open bowls. Most of the assemblages consisted of recurving vessels (73,5%), with open bowls (20%), in-turned bowls (4,5%) and necked pots (2%) making up the rest; 24% of these vessels had no decoration on the rim and 30% had crosshatching; 22% had incisions, 23% had comb stamping and only 1% had comb stamping with incisions. Looking at the decoration on the body of the vessels (including neck, shoulder and body), the majority (42%) had bands of incisions, followed by bands of incisions combined with comb stamping bands (6%), crosshatching (3%), stilus or punctate forming bands (3%) and punctate with incision (5%), completed the above-mentioned Mut 2 site assemblages (see figure 34 and 35). Decorations were executed on five positions namely: outside rim, neck, neck-shoulder, shoulder and body. Seven decoration techniques were identified from Mut 2 site ceramic assemblages, namely: Comb stamping, incision, stilus or punctate, applied, bobbles /bosses, perforations and no decoration. Below is a brief description of each of the seven decoration techniques.

- **Technique A:** Comb stamping

This involved the use of a multi-toothed tool or comb, square or triangular in cross section pattern which was then impressed into the plastic surface of the vessel and with continuous stabbing, produced a repeated pattern on the vessel (Pikirayi, 1993).

- **Technique B:** Incisions

This technique is produced by cutting into the pot with a sharp instrument while the clay surface is removed or cut away from the vessel surface. Broad line incision (grooving) involves the use of blunt tool to scour wide or broad, but shallow lines on the vessel's surface. This does not involve the removal of clay or cutting the clay surface (Ibid, 1993).

- **Technique C:** Stilus or Punctate

This involves stabbing of the clay surface with dots, points or hollow core using either some sharp pointed or blunt tools. Some motifs resulting from this technique were probably produced using reeds or folded copper beads.

- **Technique D:** Applied

This involves the addition of clay to the original vessel surface. Some vessel analysed had a cordon: a projecting thin strip of clay applied horizontally, usually decorated with alternating diagonal impressions; sometimes they were grouped into three.

- **Technique E:** Bobbles/Bosses

These are clay additions on the original vessel surface, which appear on the vessels as pimples or nipples mostly placed on the shoulder of the vessels. In some cases, sherds exhibit finger impressions. This occurs when the potter pushes the surface of the vessel inwards to make a series of concavities or pushing a finger outward on the wall of the vessel.

- **Technique F:** Perforation

Sherds with holes cut through the surface (spindle whorl). Only two sherds without the central hole (incomplete) spindle whorl from Mut 2 site exhibit these characteristics.

- **Technique G:** No decoration

These ceramics had no decoration, and they are well represented within various categories, namely long-necked vessels, necked vessels, wide rim diameter, necked globular vessels, and vessels with short narrow necks.

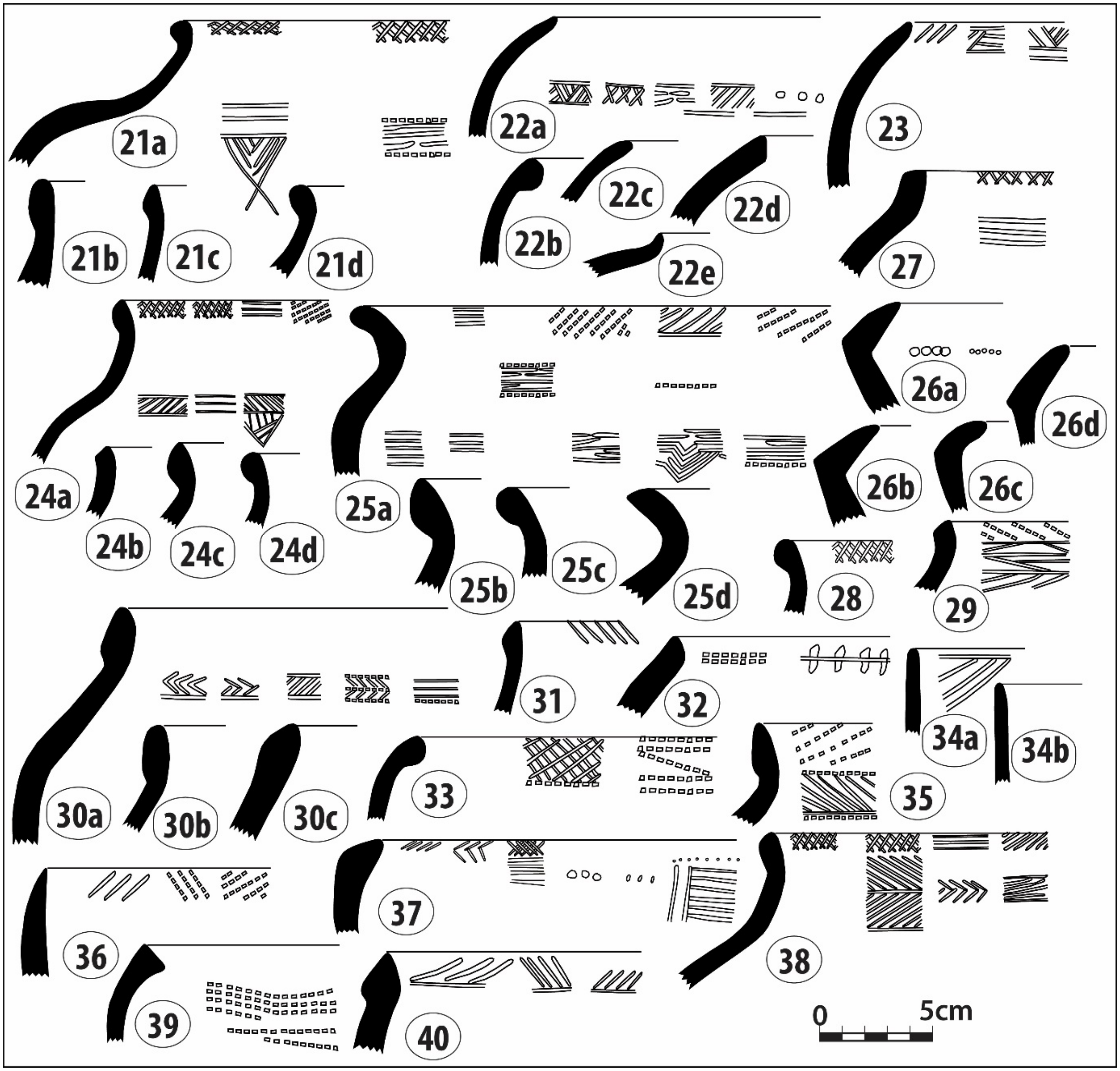


Figure 35: Mut 2 Ceramic Decoration Motifs and techniques (Ceramic profiles drawn by Foreman Bandama).

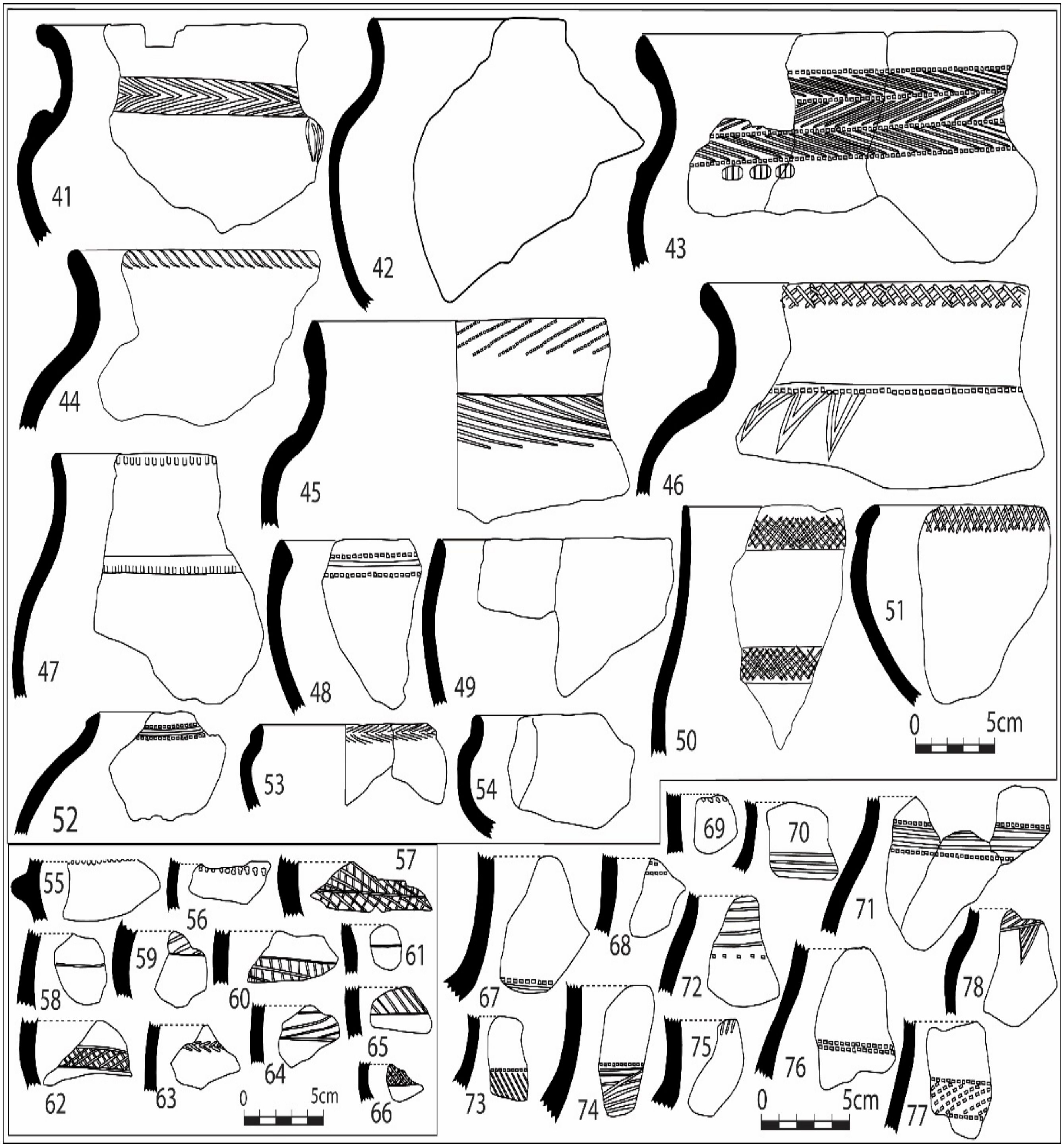


Figure 36: Schematic representation of Mut 2 site ceramics, showing types of vessels and decoration layouts (Drawn by Foreman Bandama).

5.7. The results of the analysis

The analysis benefited from the well-developed data capturing sheet, used to capture attributes such as ceramic decoration, colour, surface treatment and ceramic density (see Appendix 5). Of 6766 potsherds analysed, 6652 were recovered from 94 grid squares, while 114 vessels were acquired through surface collection. Out of the total 6766, approximately 6256 were classified as non-diagnostic (due to the absence of ceramic decorations). An estimated 510 vessels were used in the multi-dimensional classification procedures; however, there were hundreds of decorated body sherds that could not be classified because of their size and fragmented state; therefore, they were placed into possible classes. Only diagnostic ceramics were used in the pottery analysis. The analysis was based upon the division of pottery into three basic vessel shape groups, namely, necked vessels, globular vessels, and bowls. The presence or absence of each motif and the motif group was then recorded for each category. The presence and absence of motif were only used in cases where the size of the sample for each category was disparate. Analysis of the distribution was done to answer two questions: Are different artefacts categories decorated with motifs of the same style? If so, how representative is pottery of that general style? The individual ceramics with motif were calculated and the percentage to each category with specific reference to the total range of motif and motif group assigned (see tables 5.1 and 5.2).

Those that could not be identified into specific categories were analysed as indeterminate, and such a category only pertained to the necked vessels. Decoration positions were rim, neck and shoulders for necked jars. Other related ceramics collected from Mut 2 consisted of short, necked jar, globular vessel, open and deep bowls (Huffman, 2007; Burrett, 2007). The study did not establish whether the use of decorative motif was restricted by gender to specific categories; however, ceramic categories in general were used by both men and women (Evers, 1988).

Table 5.1: Vessels decoration techniques.

Decorated rims **Decorated techniques**	**Amount**	**Index**	**Percentage**
A. Comb stamping	26	0.22807	23
B. Incisions	25	0.21929	22
C. Cross incisions	35	0.30701	31
D. Stilus (punctates)	0	0	0
E. Stilus with incisions	0	0	0
F. Comb stamping & incisions	1	0.00877	0.9
G. No decorations	27	0.23684	24
Total	114	0.99998	100

Table 5-2: Vessels decoration techniques.

Decorated vessels (neck, shoulder, body)	**Amount**	**Index**	**Percentage**
A. Comb stamping	7	0.06140	6
B. Incisions	48	0.42105	42
C. Cross incisions	3	0.02631	3
D. Stilus (punctates)	3	0.02631	3
E. Stilus with incisions	6	0.05263	5
F. Comb stamping	21	0.18421	18
G. No decorations	26	0.22807	23
Total	114	1.00598	100

5.8. Spindle whorls

Presence of spindle whorls in archaeological records represents evidence of spinning and weaving cloth. The only site where archaeologists uncovered piece of cloth is Ingombe Illede (Chiripanhura, 2017: 194). A total of two spindle whorls came out of the collection; both spindle whorls were incomplete, they were found in association with pottery (Figure 37). The spatial distribution of the spindle whorls indicated that the household likely relied on a combination of activities and that the residents of Mut 2 were far from self-sufficient. They would have engaged in trade both within and beyond the site to meet their necessities. The development of cotton in southern Africa has been viewed as following international and / or regional trade. Cotton craftsmanship is believed to have spread from the east coast into southern Africa (Chiripanhura, 2017: 194).

Figure 37: Images of incomplete spindle whorls from Mut 2 site.

5.9. Discussion

Mut 2 site pottery assemblages produced varied vessels, dominated by recurved short and long necked jars. Vessels' shapes, decorations, motifs produce varied sub-classes dominated by deep and shallow bowls with intentionally bevelled rims. The last category includes a high percentage of globular vessels. Judging from ceramic results, Mut 2 is a single component Iron Age site occupied for a long time before its abandonment. Ceramic analysis identified no ceramic changes in terms of ceramics collected from the surface of the site as well as those potteries uncovered from the lower levels of the excavations. Judging by the nature of ceramics, it can be suggested that the inhabitants did not change their ceramic structural codes; however, regional trading patterns and intermarriages could be reconstructed from predecessors' Iron Age communities who occupied the region before Mut 2 site came into existence. Mut 2 site ceramic analysis exhibits a new ceramic evolution, following the combination of Kalundu and Urewe ceramic characteristics. Recurved jars with comb stamped, incised bands of hatched or herringbone motif placed below the rim and neck are the major Kalundu ceramics characteristics (Huffman, 2007; Burret, 2007), whereas Urewe ceramics are dominated by a high proportion of fluted rims and a simple discontinuous motif on the shoulder. Bowls are carinated with or without multiple horizontal fluting at upper portion (Maggs, 1980; Klapwijk, 1974; Mitchel, 2002). Recovery of two incomplete spindle whorls at Mut 2 site proves the widespread spinning and weaving of cotton at the site.

5.10. Summary

The excavations yielded numerous and diverse materials of archaeological importance. A substantial proportion of the remains recovered from the excavations consisted of the local ceramics. The excavated ceramics were described and compared according to Huffman (2007) typological classifications. Mut 2 ceramics were dominated by the presence of a diverse proportion of recurved jars and bowls with many variations and different decoration techniques; a clear picture started to emerge reflecting towards the existence of Early Iron Age community in the area. Ceramic analysis has shown a single occupational unit that evolved for an extended period before the site was abandoned. Judging from ceramic analysis, similar ceramic types and decorations have been reported elsewhere in the Limpopo Province: those collected from Garonga Nature Reserve (Burret, 2007) and Kruger National Park (Meyer, 1986). The analysis will be useful when used in relation to other uncovered materials remains, as such patterns related to information being obtained from faunal, site plan and archaeometallurgy.

5.11. Other cultural material remains from Mut 2 site

5.11. Exotic Ceramics

Exotic goods have been part of the indigenous South African culture and tradition since they were imported into the region. This occurred because of trade and exchange relationships between southern Africa, East Africa, Middle East, India and China. Exotic goods have the potential to illuminate the chronology and livelihood of precolonial societies that consumed them as ornaments or trade goods. Glass beads and exotic ceramics have been identified as the earliest evidence of trading relations between southern Africa and the outside world (Pwiti, 1991; Bandama *et al.*, 2018). The site of Chibuene in Mozambique is believed to have been the main port of entry for trade goods (glass beads, glass and exotic ceramics) between AD 700-AD 1000 (Wood, 2000; Sinclair *et al*., 2012). Based on this rationale, many studies have been undertaken throughout the world (Wood, 2000; Mason and Tite, 1997).

After AD 1200, there was a shift of trade monopoly; it is believed that Kilwa became the central distribution point for trade goods that entered Africa. The presence of exotic trade goods in archaeological assemblage have the potential to inform understanding of social organisation and economic influence within southern African political spheres (Daggett *et al*., 2016). The dominant view has been that at some point in time import commodities replaced cattle as a form of wealth and status (Hall, 1986; Huffman, 2000; 2009; Mitchell, 2002). The value of imported commodities lay in the rarity and they provided an avenue to power because they represented a form of wealth that could be stored and distributed differently from cattle. Exotic ceramics and beads have been interpreted as a symbol of power and status in southern African archaeology. Imports in archaeological assemblage have been used to explain settlements organisation; for example, Great Zimbabwe glass beads were identified as an elite residence (Pwiti, 1991; Huffman, 2000; 2009).

Two pieces of glazed ceramics uncovered at Mut 2 site were sent for further investigations at the Research Laboratory for Archaeology and History of Art at Oxford University (UK) (Archaeo-Info, 2000).

Figure 38: Brown and Blue glazed exotic ceramics. Photo credits M. Hutten (2000).

Clay material analysis shows consistency in the production of pottery with high content of calcium, magnesium and iron oxide characteristics. Copper and sulphur are the main ingredients that make up the brown glazed colour, while the blue green colour originated from high copper and iron content (Archaeo-info, 2000).

The beginning of the Islamic period revolutionised the style and ceramic technological production of glazed ceramics (Matin, Tite and Watson, 2018). Glazed ceramics innovation shows a sophisticated understanding of empirical glaze chemistry (Wood and Tite, 2009). An Islamic contribution to the history of ceramic wares were glazed in cobalt blue, brown glazed, painted in copper, tin and silver-rich pigments. Mason and Tite (1997) published compositional data for opaque white glazed ceramics from Basra, Samarra and Nippur. This industry is thought to have been based in the city of Basra, which was a port and an important centre for Abbasid culture and commerce (Wood and Tite: 2009).

The history of glazed ceramics demonstrates the development of fine glazed ceramics in the Middle East (Matin, Tite and Watson, 2018). A clear picture started to emerge, which demonstrates that Mut 2 site occupants contributed to the early long-distance trade networks with the outer world. Combination of the analytical data from the study area and the absolute dating chronology demonstrates that glazed opaque wares originated in the early 700 AD during the Caliph Dynasty. It might be possible that trade was just an economic activity which could be undertaken by whosoever had interest in it if they had means of acquiring the goods to supply the markets (Chiripanhura, 2017). Trade goods such as glass beads and opaque wares could have been exchanged for goods such as ivory, animal skin, hippopotamus tusk. Antonites also came across imported items, such as iron, gold, copper and marine shells at Mutamba and concluded that if such hinterland sites had access to a collection of artefacts traditionally considered to be restricted, it shows that they had significant power in shaping their acceptance of exotic goods. Recovery of two exotic shards at Mut 2 indicates that the site also participated in long-distance trade. Sinclair *et al.,* (2012) pointed to Chibuene and Kilwa trading centres as the entry ports of trade goods such as glass beads and exotic ceramics into southern Africa. Mason and Tite (1997) identified Middle East (Iraq) as the main production centres of opaque wares; this shows that Mut 2 site contacts with the outside world began earlier and continued into 1000 AD.

5.12. Archaeozoological Studies

5.12.1. Introduction

Faunal remains are one of the most common finds of many archaeological excavations. The remains often accumulate as waste over a period, they represent the remains of numerous animals that were once present at the site for different purposes. A primary purpose of faunal studies is to understand the relationships between humans and the environment (Plug, 1984; 2000; Voight and Plug, 1984; Chiripanhura, 2017). The studies provide information about the daily life and the living conditions of the community. The study provides results of past human activities such as selective hunting, specific butchering activities and in the case of domestic animals, morphological modification of the animal itself. The main function of analysis of faunal materials is to assist in determining the economic basis of culture. It provides valuable information about the diet and subsistence practices. Animal remains can be used to understand a variety of issues in the study of societies such as environment, subsistence, hunting practice, political and social organisation, settlement pattern and resource use.

The remains (animal bones) can be used to reconstruct extinct species, exchange and in the identification of social status and ethnicity. Faunal and Taphonomic analysis revealed that the region was different from today. Records show an abundance of surface water because of higher rainfall (Plug, 1989). The movement of the Iron Age community into the region increased grass cover by eradicating bush cover through slash-and-burn and livestock-grazing activities (Smith, Thorp and Hall, 2007). The arrival of Iron Age communities transformed the regional landscape, attracting other wild animal grazers such as zebras, as well as various predators. It has been argued by Best (2003) that in regions with access to both terrestrial resources in abundance, community evolved in subsistence strategies such as specialised wildlife hunting and food processing and storage. In contrast to the above, the study area is one of the resource regions with a variety of wild animals, varied species of fish and other procured raw materials and at logistical locales. Faunal remains analysis contributes to the reconstruction of precolonial environments. Mut 2 faunal assemblages' analysis enabled the reconstruction of the diet of the Iron Age community, species they exploited and the economic activities (hunting animals, animal husbandry and craft) in which they engaged.

5.12.2. Species distribution in the Lowveld region

The current species list was drawn from nearby Kruger National Park, where more than twenty-five (25) species of wild animals exist. Some of the cited animals include: Buffalo, common duiker, eland, impala, kudu, reedbuck, wildebeest, zebra, hippopotamus, bushbuck, warthog, waterbuck, rhinoceros, lion, leopard, giraffe, etc. The compilation of this species list was of prime importance to understand environmental changes that could have taken place since the Early Iron Age period.

5.12.3. Methodology

The preliminary sorting and cleaning was conducted in the field laboratory (caravan). Soft brushes were used to remove dirt or attached soil to expose finer details such as cut marks as well as bone taxonomy. Identification is a multi-step process that involved deciding what element is represented by the specimen as well as the taxonomic category. Quantification defines characteristics that clearly differentiate among groups. The remains were separated from the rest of the cultural materials and further sorting and cleaning was done in the National Flagship, Ditsong Museum, where identifiable and non-identifiable faunal remains were separated.

5.12.4. Identification

Identification of faunal specimens is based on the morphological features. Broader taxonomic categories and species were derived using a comparative collection housed at Ditsong Museum. The skeletal part representation used for taphonomic analysis ranged from long bones of both the fore and hind limb, humerus, femur, radius, ulna, carpals, metapodials and phalanges. The fragmentary nature of the faunal assemblage made it impossible to distinguish between sheep and goats; they are therefore grouped as Sheep / Goats (*Orvis / Capra*).

5.12.5. Bone quantification

Bone quantification is necessary as it enables the comparison of animals used through time and space. It involves statistical analysis that ranges from expressing abundance in relative terms to calculating diversity. Mut 2 non-identifiable fragments were placed into six categories which included enamels, skulls, ribs and vertebral fragments, bone flakes and miscellaneous (Table 5.3). These bones were classified as non-identifiable due to incompleteness. Rib and vertebral bones were grouped as non-identifiable fragments due to the difficulty in identifying them to species. Weathered, broken and skeletal parts consisting of all bone fragments beyond recognition were all classified as miscellaneous skeletal parts. The comparative collection was completed by the list of species known to exist in the region.

Table 5-3: Showing categories of non-identifiable bone fragments.

Fragments	**Description**
Enamel	Constitutes all teeth fragments
Skull	All fragments identified to have come from the skull
Ribs	All rib and rib fragments
Vertebral	All vertebral column fragments
Bone flakes	Bone fragments from long bone shaft
Miscellaneous	Skeletal parts consisting of all bone fragments beyond recognition

5.12.6. Relative abundance of taxa

Number of Identifiable Specimens (NISP) and the Minimum Number of Individuals (MNI) were used to establish the relative abundance of taxa in the Mut 2 site faunal assemblage. Relative frequencies of taxa were used to evaluate the relative importance of animals in diets obtained through various subsistence strategies. NISP denotes number of bones or bone fragments that can be assigned to an assemblage; this method is used to measure taxonomic abundance present in faunal analysis. This method assumes that the number of identifiable skeletal parts of those species in the sample reflect the relative abundance of those species' samples (Plug, 1984). NISP counts were determined by counting all the identifiable fragments or complete anatomical units of a species present in the sample. Faunal assemblage contains remains of wide variety of animals which ranged from large to small bovids and carnivorous animals. The method treats each specimen as a separate entity.

5.12.7. Minimum number of individual (MNI)

MNI denotes the minimum expected number of animals in the excavated sample (Plug, 1984). MNI counts are based on the occurrence of the most abundant skeletal parts of each species in the sample. MNI counts thus indicate what the absolute lower limit for the original number of individuals may have been at a site.

5.12.8. Skeletal parts representation

The most integral part of the quantification process is the identification of the faunal assemblage skeletal parts. The most dominant anatomical parts identified for Mut 2 site are tarsals, carpals, phalanges and teeth (see figure 39). Their high number reflects the relative abundance in most mammalian species.

Figure 39: Some of the analysed faunal remains.

5.12.9. Archaeozoological Studies Results

In this section, results of the taxonomic analysis of faunal remains from Mut 2 site in the university of Venda collection are presented. The total Mut 2 faunal sample comprised 2689 bones and achatina shell fragments. A total of 225 bone fragments with a weight of 1572g were identifiable. The NISP and MNI counts reflect the importance of both herding and hunting presenting a mixed economy. The collections had bovid species ranged from small, medium to large antelopes. Table 5-7 presents all species recovered from Mut 2 site and identified from the analysis. The blue wildebeest was another species in the bovid III size species class of animals that was identified. Impala and grey duiker represent the small antelopes' species remains. *Bos Taurus*, *Ovis and Capra* were well represented in the faunal assemblages' indication the importance of livestock to Mut 2 community. Due to the fragmentary nature of the assemblage, more of the bones were brittle and could not be identified to either species or animal size. The non-identified sample was mainly composed of bone flakes and miscellaneous fragments. An estimate of approximately 6% of the bones were damaged by cut- and chop marks, approximately 12% were gnawed, 37% were weathered and 38% were unmodified.

The overall species-specific was taken as an average representation of Mut 2 site which subsequently present correlation of 62,5% of the total assemblage dominated by wild animal. *Bos Taurus* faunal assemblage covered roughly 7.5%, while 20% of the analysed faunal assemblage were from non-domestic Bovidae II species. Of the total identifiable Bovidae II bones it was therefore possible that roughly 10% originated from *Ovis / Capra.* These statistics indicated that the primary subsistence basis for Mut 2 community showed reliance on wild animals revealed by a high proportion of game faunal remains in contrast with domestic livestock. *Bos Taurus* MNI (16) were exploited to a lesser extent in comparison to sheep and goat. Amongst the faunal assemblage were remains of juvenile *Ovis / Capra*. Records of slaughtering juvenile animals have been reported in Great Zimbabwe, a symbolism of social stratification where the elite were fed with young, prime and tender meat (Thorp, 1984; Shenjere, 2011). No foetal and neonate animals were identified (Shenjere, 2011).

Both terrestrial and aquatic species are well represented in the faunal collections and include achatina shells, while fish and birds' remains were common recovery. However, their representation was very minimal as compared to wild animals. Fish remains were noted with interest as an indication of exploitation of aquatic resources possibly from the nearby Luvuvhu River. Non-food species found within Mut 2 assemblage include three carnivores' remains: two from the lion species and one of a non-specific large carnivore.

Some of these bones, however, showed taphonomic evidence as results of both natural and cultural bone modifier activities. Two ivory bangles (Mut 2/99/139 and Mut 2/99/277) made from elephant ivory were retrieved and analysed from the assemblage. One bangle measured 38mm in width and was 18mm thick. The edges of the bangle were rounded, smoothed, and had a distinctive circular shape. Three fragments of the second bangle measured 14mm in width and were only 5mm thick. These fragments could not be fitted to each other. Fragmented link shafts and burnished bone point.

Table 5-4: Results of the faunal remains, species and amount as represented from archaeological assemblages (after Archaeo- Info 2000).

No	**Species**	**Amount**
1.	Bovidae II	24
2.	Bovidae II Juvenile	1
3.	*Orvis / Capra*	12
4.	*Orvis/ Capra*, Juvenile	1
5.	Grey duiker *(Sylvicapra grimmia)*	2
6.	C/F Impala (*Aepyceros melampus)*	1
7.	Bovidae III domestic	1
8.	Bovidae III non-domestic	1
9.	*Bos Taurus*	16
10.	C/F *Bos Taurus*	2
11.	Waterbuck *(Kobus ellipsiprymnus)*	4
12.	Burchell's Zebra *(Equus burchelli)*	4

13.	Blue wildebeest (*Connochaetes taurinus)*	3
14.	Land snail *(Achatina sp)*	10
15.	C/F Eland (*Taurotragus oryx)*	1
16.	Bovidae IV	1
17.	Buffalo *(Syncerus caffer)*	1
18.	Giraffe (*Giraffa Camelopardalis*)	1
19.	Elephant (*Loxodonta Africana)*	2
20.	Lion *(Panthera Leo)*	2
21.	*Carnivores* large	1
22.	*Avis* medium sized	1
23.	Sable *(Hippotragus niger)*	1
	Total:	225

5.13.1. Ostrich eggshell Beads

Beads took either a regular or irregular disc shape, made locally out of ostrich eggshells (Shenjere, 2011). A total of 56 ostrich eggshell beads and three pieces of ostrich eggshell were recovered from Mut 2 site occupational zone (Figure 40). All the ostrich eggshells were either cut or curved and took the shape of a disc. All beads must have been worked at Mut 2 site as indicated by waste materials, presence of grooved stones discussed elsewhere in this document and incomplete beads that were discarded or were still in the manufacturing process. It might also have been the case that these people traded with the hunter gatherers of the Late Stone Age. Such interaction was reported by Smith *et al.,* (1991). It might also be the former gatherers were present as clients who provided ostrich shells and beads as trade items (Chiripanhura, 2017).

Figure 40: Image showing ostrich eggshell beads from Mut 2 Iron Age site.

5.13. 2. Discussion

A clear picture on the exploitation pattern and the perspective about the role of animals in Early Iron Age economy and diet emerged from the analysis (Manyanga, 2001; Shenjere, 2011). Herding and hunting form the main central role and there is a general agreement that Mut 2 community relied on wild animals, complemented by domestic species. Bones from both food and non-food animals are well represented and are the results of human activities. Cattle are the most important animals of the southern African early farming community (Voight and Plug, 1984). Judging from the analysis, roughly 17,5% of the total faunal assemblages analysed from Mut 2 site are characterised domestic livestock of which 7,5% were *Bos Taurus* (Cattle) and 10% were identified as *Ovis / Capra* (sheep / goats). The overall total number of livestock kept at Mut 2 site is questionable. This low faunal percentages could have been triggered by environmental factors of the region. There are only three recognised cattle-grazing regions in South Africa, namely the Mopane veld, the arid Lowveld and the sour Lowveld; only the first two are relevant to this study (Bosman, 1976). The Mopane veld stretches from Kruger National Park via Giyani and covers sections south of the Luvuvhu River valley. The veld has a low carrying capacity but is highly nutritious as the mopane leaves can be browsed by cattle, sheep and goats. Cattle can also tolerate hot and dry conditions and can grow relatively large on these grazing areas (Plug, 1989).

However, gaps in archaeological records exist; judging from the records, very little is known of Iron Age animal breeds in nearby regions such as Mozambique (Plug, 1988;1995). The arid Lowveld dominates most of the area between the Oliphant and Letaba Rivers; its carrying capacity for domestic animals is low and grazing is of inferior quality (Plug, 1989). Obviously, livestock populations could have been disadvantaged by the fluctuation of rainfall and the geographic distribution of endemic diseases such as Nagana caused by tsetse flies, foot-and-mouth and various tick-borne diseases (Plug, 1989; Meyer, 1986). The earliest archaeological evidence for cattle in South Africa came from Happy Rest and Kwagandaganda archaeological sites (Prinsloo, 1974; Voight and Plug, 1984).

It can be argued that the distribution of different parts of cattle anatomy is closely related to social and political relationships. There are dietary differences that appear to reflect social status.

Occupants within a homestead are ranked; those from the lower-status areas received mainly skull and less meaty lower limb bones, higher status areas included a greater proportion of upper limb bones, especially forelimb. Archaeologically these differences in body parts distribution are clearly visible from faunal assemblage. The examination of cattle remains also showed quite clearly that domestic cattle did not play a significant role in the economy of the site. Subsistence strategies also reflect a variety of responses to human-to-environment interaction and human-to-human interaction. Faunal evidence indicates that hunting, snaring and fishing supplemented their diet. Apart from fish and bird species' faunal remains, small mammals were identified; however, these remains were damaged before they were excavated due to exposure to harsh weather conditions, yet most of the faunal remains were analysed and species were identified.

Duiker, impala, waterbuck, wildebeest, zebra, eland, buffalo, elephant, and sable antelope were wild species exploited at Mut 2 site. However, it was also noted that, apart from providing meat, wild species such as lion and unidentifiable carnivores remains constitute Mut 2 faunal assemblage. The presence of lion metapodial whose consumption has not been recorded in archaeology may represent status of Mut 2 occupants. Lions, particularly the males, have been an important symbol for thousands of years. Generally, the most consistent definition of lions is in keeping with the lion as a symbol of royalty and bravery. In ancient Mesopotamia, a lion was regarded as a symbol of kingship, while in Middle Eastern culture (Arabic Persian) a lion was regarded as a symbol of courage and bravery. Non-food animals' species have been recorded from divination of traditional healers (Thorp, 1984; 1995). For example, among the Vhaveṋḓa traditional healers, lion metapodials are commonly used in divining dice sets. Most of the bones originate from butchered animals and are mixed with other faunal remains. Large pieces show traces of cut marks. Faunal remains studied have also enabled the reconstruction of past environments since we possess knowledge of the animals. Presence of achatina shells and small mammals' fauna in the archaeological assemblage are particularly good indicators of past environment because they have specific habitats requirements. Plug (2000) faunal remains analysis in the region revealed that the prehistoric climate of the region was wetter than today. At present this region receives a rainfall total of 1000mm.

5.14. Descriptions of other retrieved artefacts

5.14.1. Stone artefacts

Several stone artefacts were recovered from the excavations as well as the grading activities. From the retrieved sample, two of the stone artefacts were similar in shape and size and the third small one had more grooves. The first two stones were flat and had a single groove across the length of the stones. The first stone artefacts (Mut 2/ 99 / 289) measured 69mm in length and the groove measured 6,7mm in width. The second stone artefacts (Mut 2/ 99 / 278) measured 84mm in length and the groove measured 6,3mm. The third, small stone (Mut 2 /99 / 141) was round and had several grooves cut into the stone at different angles. The grooves were smooth on the inside; however, fine striations were noted. The stone measured 45mm in length and on its width measured 26mm in diameter. The stone had four grooves of which two crossed each other and the third groove was characterised by a single line while the fourth groove was broken off. The grooves measured approximately 8mm across. Both these stones were most probably used in the manufacturing of ostrich eggshell beads. A large, fragmented piece of soapstone (Mut 2 /99 /140) was also recovered from the graded heap during site destruction. The stone measured 251mm in length and 138mm in diameter. The stone is carved into a bowl or plate with a smooth interior and a rough exterior. Several cut marks and indentations were observed on the hollow side of the stones which could be attributed to human activities.

5.14.2. Discussion

Early farming communities used stones for a variety of purposes: grinding stones for grain or colouring matter, cylindrical beads and grooved stones for making shell beads, pipe, bowls, metal moulds, large vessels and bored stones (Mason, 1969). The longstanding view is that Mut 2 inhabitants participated in internal trade. The presence of soapstone at Mut 2 assemblage shows access to locally produced but restricted items. Evers (1974) revealed that soapstone was used as containers to evaporate brine water in the process of harvesting salt. Salt is a scarce dietary necessity and was at its utmost importance during the farming community period. Therefore, most the farming communities' settlements were demarcated in close proximities to natural resources or along major trade routes. This pattern is evidenced by the presence of a soapstone quarry site adjacent to saline springs at Harmony and Eiland sites. Many of these sites seem to have been situated to expedite trade of salt and semiprecious soapstones (Evers, 1979). For example, Baleni salt springs (Antonites, 2016) less than 60 kilometres from Phalaborwa, were exploited from the Early Iron Age, associated with Mzonjani ceramics (AD 350-650); these springs appear to have been continually exploited up until historical period.

The soapstone bowl was carved to evaporate and crystallise salt. Soapstone bowls have been found in the Letaba district (Bates, 1947; Schwellnus, 1937; Mason, 1962; Witt, 1966; Evers, 1979). Letaba district is the only known region in the Limpopo Province with the geology that supports the existence of talcose or chlorotic schist. The geology supports an abundance of soapstone and the site is approximately than 60 kilometres from Mut 2 site. Previous archaeological investigations revealed worked outcrops of soapstone dated to Iron Age period located approximately 2,5 kilometres northwest of the salt factory along the Makutswi River. Records show that a total of 657 fragments of bowls were discovered. The bowl shapes were irregular owing to the original shapes of the soapstone chunk, round or ovoid shapes. The bowls tended to be shallow with a smooth interior, usually less than 10cm deep, with a rough outer surface (Evers, 1979). The bowls were made in the same way, showing that early farming community used some wood-working techniques in making these stone objects (Mason, 1969).

The 19th century writing shows that salt was scarce in some areas such as Sekhukhune land where pioneers in the Soutpansberg made huge profit from selling salt made at Saltpan in the Soutpansberg. Barend Johannes Venter recalled exchanging twenty-two bags of maize cobs in Sekhukhune land for two bags of salt. A supply of grain was an important staple carbohydrate that could have been acquired by producing goods for exchange (Swan, 2007). It is suggested here that the use of local resources to participate in trade has been one of the human responses to unpredictable agricultural ventures in the past. Agricultural failure due to environmental constraints such as drought could sometimes be offset by obtaining foodstuffs from successful early farming communities in exchange for trade goods or labour (Beach, 1977; Swan, 2007). Salt was also the subject of tithe payable to the chief in whose territory the salt factory was located, another indication of the value of the substance (Evers, 1974). Owing to the known use of soapstone from other archaeological sites such as Harmony and Eiland (Evers, 1979;1981) it could be indicated that soapstones were used to evaporate brine in the salt-manufacturing process. Goods could theoretically have been traded with other communities on the fringes of the region, roughly 90 kilometres to the north-west and south-east, where significantly higher rainfall would have increased the chances of agricultural success. Therefore, soapstones are important in untangling some of the network that the community of Mut 2 engaged in.

5.15. Metal, Slags and furnace linings

An understanding of metal production is necessary in the identification of production area and mode of production and for understanding the consumption pattern of various products at a site. Traces of metal production were observed at Area 3; the site is located 400 metres northeast of Area 1, which was classified as an occupational zone. The area covered approximately 5 metres' radius, characterised by a thin layer of slag, broken pieces of burnt daga, pieces of tuyere fragments and scattered potsherd. Herbert (1996) is of the view that by focusing attention on the metal artefacts and debris of metal working, one can yield more information about political power. Surface collection was conducted at the following blocks: AJ 106, 99, 107: AI 99, 100 and 106 and AC 84, 88, 94 and 95 and three bags full of slag materials were collected. Two investigation trenches were opened, to understand the nature of the deposit and to determine if there existed a furnace structure underneath the ground. Metal production debris were studied to characterise and understand the nature of metal production at Mut 2 site. The distribution of metal debris suggests that craft production at Mut 2 site was mainly homestead based, controlled by few people. The quantity of slag amount does not support large-scale production.

5.16. Descriptions of ceramics from Thomo site

To understand the relative chronology of Thomo site, a description of the pottery from the sites was conducted. The most dominant method of classifying ceramics in southern Africa is that of Huffman (2007) which combines different shape profiles with decoration techniques and motifs.

Owing to heavy vessel fragmentation and the small number of samples from our sites, general descriptions of the ceramics are given. Although largely descriptive, this approach can identify and characterise ceramic traditions making it possible to relate ceramics from our sites to sequences established elsewhere in northern South Africa. In the absence of radiocarbon dating for our sites, this was a robust method of establishing relative sequences for the excavated sites.

The ceramics from this site were retrieved through surface collection and excavation. The number of both diagnostic and undiagnostic potsherds was, however, small (see figure 41 and 42). On average, the pots were well made and fired. The decoration techniques included punctate on the rim and multiple bands in the neck. Some of the sherds had herringbone, comb stamping while others had incisions combined with spaced pendent triangles on the shoulder of the pot. Other ceramics decoration was placed on the rim, the neck and on the shoulders/body.

Figure 41: Some of the diagnostic ceramics from Thomo Early Iron Age site showing cross-hatched designs, punctate on the neck and multiple bands on the neck.

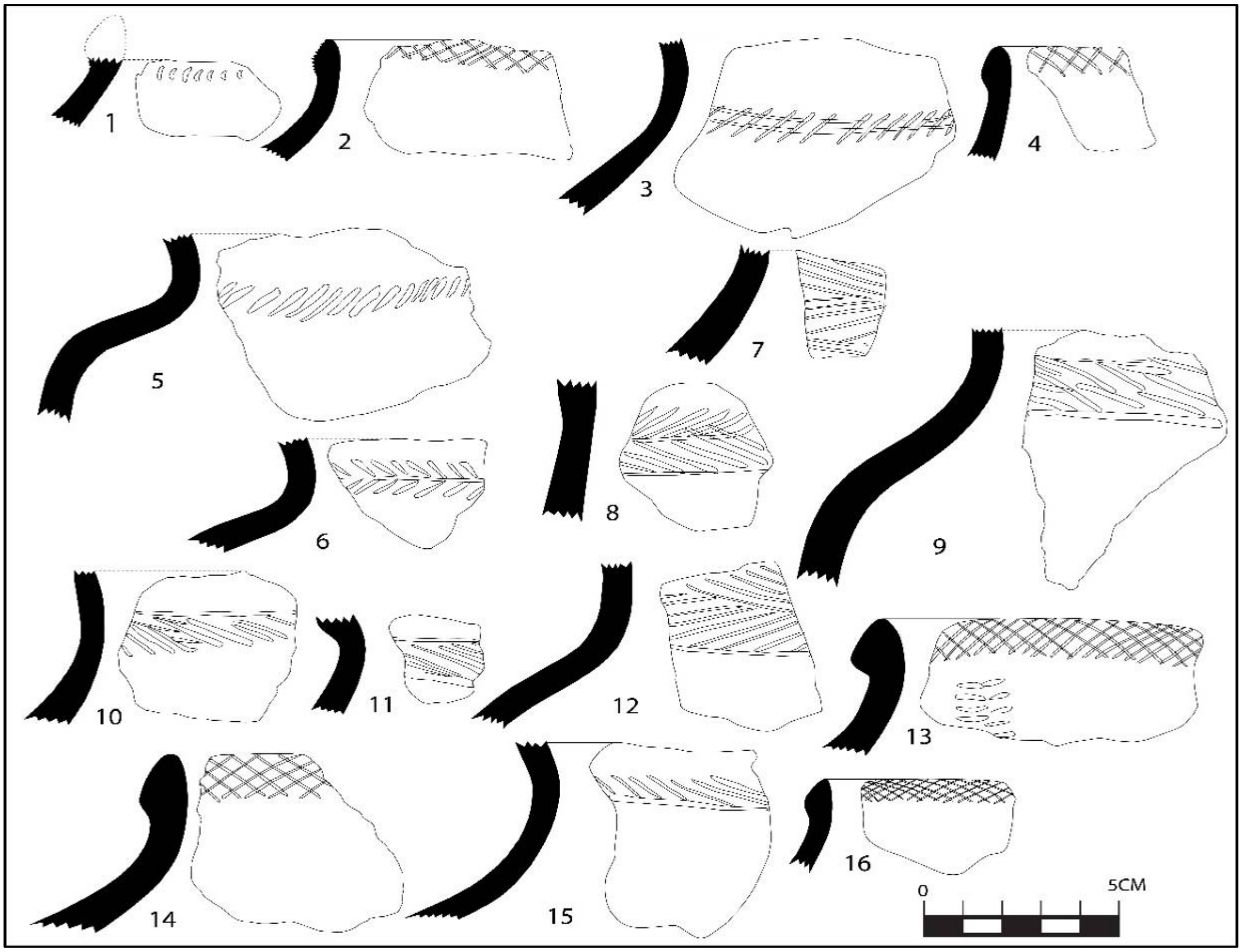


Figure 42: View of the ceramics sherds collected from Thomo sites (Drawn by Foreman Bandama).

The decoration on the potsherds from Thomo closely resembles those observed at other Early Iron Age sites in the region, particularly Mut 2 site ceramics. Preliminary analysis has shown that Thomo metal-production sites were operated by an Iron Age farming community. A charcoal sample (Beta-536384) was submitted at Beta Analytic (USA) and dated Thomo sites to (655-774 Cal AD).

5.17. Limitations

A very minimal ceramic sample was uncovered and collected from the surface of the site; the absence of ceramics on this area is possibly because the site is a metal-production site dominated by slag fragments unlike an occupational site. It was impossible to perform advanced statistical calculations such as discriminant analysis. This limitation does not negate the significance of the conclusion reached since vessel types and ceramics codes are represented across Thomo site.

5.18. Summary

Unfortunately, Thomo site produced metal-production materials dominated by slag, broken pieces of tuyere fragments and broken pieces of hematite ore. Ceramics were represented by very few diagnostic ceramics. Ceramic comparison with those collected from Mut 2 site has been conducted and judging from vessel shapes as well as decoration layout, there were similarities. It is arguable that the metal production at Thomo site was conducted by Iron Age communities who utilised single ceramic styles; however, the differences between preceding decorative motifs, patterns such as punctate, incised and crosshatching could be associated with earlier Urewe and Kalundu ceramic traditions. These ceramic traditions seem to have influenced Thomo site ceramics. Working of ivory probably to produce ornaments was practised by the inhabitants of Mut 2 site while Thomo site specialised in metal production. Iron slag remains at Thomo site seem to have spread throughout the site as was probably the case with other industrial activities. Soapstones were recovered from the excavation; these finds are peculiar, given the location and the topography—these rock materials are not common in the surroundings. Only further investigations can help; however, these might be artefacts that were brought into Mut 2 archaeological site through internal trade systems with other Iron Age communities. Some of the retrieved stone items uncovered include hammer, grooved stones used to sharpen bone points, and manufacturing of ostrich eggshell beads or ivory bangles—all these represent utilitarian functions.

CHAPTER SIX: ARCHAEOMETALLURGICAL STUDIES

6.1. Introduction

This chapter presents archaeometallurgical analyses of materials collected from the surface and from excavations. Some of these metal production debris were identified from the Mut 2 site collections housed at the University of Venda. Investigation focusses on the documentation and classification of metallurgical remains using laboratory analytical techniques. Archaeometallurgical remains such as slag, collapsed furnaces, broken tuyeres and ore were analysed to understand the technological history of metal production at Mut 2 and Thomo site. According to Thondhlana (2008:9; 2013), detailed analysis of metal objects from archaeological sites of the southern African region is still in its infancy stage. This contrasts with the development of ceramics and faunal studies (Miller, 2003). The practical reason for this scenario includes lack of both competent personnel and well-equipped laboratory infrastructures. The study will have an enormous potential to contribute to our understanding of the past dynamic social, economic and political sphere in southern Africa. Overall, the significance of the indigenous iron production extends beyond the simple economic importance of metal in African economies and had far-ranging impacts on agriculture and food processing, warfare and trade networks (McCosh, 1979; Maggs 1992; Childs and Killick, 1993; Schmidt and Mapunda, 1997; Chirikure *et al.,* 2009).

6.2. Archaeometallurgical theory

Archaeometallurgy studies seem to be firmly rooted in archaeological studies, since it combines geology, anthropology, ethnoarchaeology and archaeological theories. More recently, the theoretical advances and the anthropological models have increasingly contributed to the contextualisation of analytical data. For example, iron ore cannot be smelted if there is insufficient fuel available (Killick, 2004). During the 1980-1990, archaeometallurgy researchers started to pay more attention to other associated remains especially metal production by-products such as slags, tuyeres, furnace linings and crucibles. The power to use refractory materials such as tuyere, furnace linings and slags in understanding metal production technology as a move towards the contextual approach was first put to the test by Bachmann by introducing a checklist for excavators with expected and possible classes of archaeometallurgical, geological and archaeological materials

(Bachmann, 1982:2-7). Just like archaeological investigation, metal objects or metallurgical remains are now at the centre of enquiries, making archaeometallurgy an interdisciplinary tent that draws methods and theories from materials science, social archaeology and material culture studies.

Archaeometallurgy studies started to adopt a post-processual approach with its obsession with symbolic meaning of archaeological artefacts as opposed to their properties. In some counter development, scholars of technology in archaeology and anthropology have established sounder conceptual framework and analytical methodologies (Dobres, 2000; Thondhlana, 2008:4; 2013). However, according to Killick (2004), sophisticated methods in the study of technology were developed as a multidisciplinary approach rooted in various disciplines such as history, archaeology, science and engineering. Its base increased dramatically and diversified the study of ancient metal technologies. With the adaptation of new analytical techniques such as SEM-EDS, archaeometallurgy studies were now also concerned with materials characterisation.

While the impetus of social significance and symbolic value originating from the technical system were studied as part of reconstruction that involved mining, smithing and casting (Herbert 1984), the laboratory analytical approach demonstrated metal workers' technical versatility (Holser, 1988a; 1988b; 1995; Letchman and Holm, 1990). Holser (1984) is of the view that metal workings are socio-culturally significant; therefore, the analytical data are used to support archaeological arguments based on the manipulation of metal technology in a politico-religious context. According to Killick (2004), technology in pre-industrial societies creates people as well as products. Therefore, technologies in these societies are embedded within the social relationship, and thus the study of technology is enshrined in the technological process concept (Martnon-Torres, 2002). This is a process by which naturally occurring raw materials are selected, shaped and transformed into usable cultural products, the process will be adapted as the working definition (Schlanger, 2005:25). It is based on this view that the evolution of cultures has been characterised by morphological changes in materials with cultural epochs bearing technological names, for example Stone Age, Bronze Age and Iron Age (Dobres, 2010).

Throughout the archaeological researches, technology became the vehicle of all the investigations made up of materials remains of people's activities and has been equated with technology such as stone tools, pottery sherds and metal slag (Dobres, 2010). This materialistic approach that focusses on prehistoric technologies is explicitly grounded in materialist paradigm. Binford (1965:209) defined technology as man's extra-somatic means of adaptation. It has been argued by Dobres (2010) that technology shapes most of cultures' economy, social organisation, politics and identity formation, social value and symbolic constructs.

The study focusses on behavioural chain analysis investigating extraordinary details on the physical categorisation of operation, and body gestures ancient technicians employed to make, use and repair objects (Dobres, 2010). For example, Holser (1995:100) said investigations on gold and silver bells, rings, ornamental shields and large ornamental tweezers in West Mexico could reveal that when metalworkers produced their artefacts, they were not interested in the final product but in the sound and colour of the product. The ancient technologies served as a visual and auditory system that symbolically defined the elite and sacred sphere of activities. The emphasis of the technology was to develop sound and specific colour in objects worn by elites and nobles; also associated with ritual.

The study of metal production technology is important because the process clearly brings out the unintended activities which humans might fail to document, or even narrate. The properties, performances of furnace structure, operation of bellows and varied materials used in the production chain have become the focus of the analysis. It is this call for a holistic understanding of the relationship between human beings and their artefacts that makes this approach novel in deepening our insight into how technology changed over time and space in the study area (Schmidt, 1978; Lemonier, 1990; Thondhlana, 2008; 2013;). The study is grounded on an empirical analytic approach focussed on artefact design, manufacture and the use as well as cognitive, symbolic and social factors shaping technological action (Dobres, 1999b; 2010:107).

6.3. The types of metallurgical remains sampled for microscopic investigations

Records advocate that the region has been celebrated for its high quality of metal ore, with exceptional examples documented at Tshimbupfe area (Vuu and Thomo villages) (Bullock, 1936; Maṱhoho, 2012). Regrettably, just how this ore was used in the early metal production is the subject on which, until recently, archaeology and experimental archaeometallurgy has had extraordinarily little to say. Archaeological sites survey and excavations echoed that remains such as slag, broken pieces of tuyere and furnace wall, as well as hammers and anvil stones represent a metal-production site. These materials were collected, and some retrieved from the storerooms for further laboratory investigations (see figure 43). To expose a new line of enquiry, these sites exhibit numerous stimulating features of metal production such as the presence of still intact furnace structures and numerous small-scale metal-production sites alongside the Nsami River. From the collected iron production debris, it is possible to deduce and understand the raw materials and technological process practised. Descriptions of archaeometallurgical remains from both Thomo and Mut 2 sites were made using the field identification manuals of Bachmann (1982). The outer appearance and forms of the remains were entirely based on the way remains were seen from the surface or excavations. Archaeometallurgy can simply be defined as the study of metal production debris and metal artefacts from archaeological sites (Miller, 2003). It contributes to the understanding and reconstruction of the different stages in the metal-production cycle, the efficiency of the technology, the economy and even societal organisation. The relevant stages of prehistoric metallurgy are mining, beneficiation, smelting, smithing, trade and use. Prehistoric iron smelting technology is characterised by solid state reduction of iron oxide into a spongy mass of iron called bloom and Ferro silicate slag (Miller, 2003; Charlton *et al.,* 2010).

Typically, the remains from pre-industrial metal production include slag, broken tuyere, and collapsed furnace lining walls (see figure 43 and 44). The raw materials fed into the process often have a genetic relationship with the products and waste materials. For example, Panther (2006:285) argues that the clay used for furnace structure, including tuyeres and temper added to clays used as furnace lining, plays an important role in the formation of slag, particularly when high-grade iron ores were smelted. Other researchers such as Fulford and Allen (1992) and Thomas and Young

(1999) demonstrated that the furnace lining constituted about 30% of the smelting slag formed through their analysis of smelting waste from archaeological sites where relatively high-grade ores were smelted. The microstructures of these remains generally contain the histories of technological processes that they underwent (Bachmann, 1982).

For example, slag contains small crystal particles characterised by distinctive shape, size and alignment which, when examined, provide useful information for reconstructing, among others, past reduction techniques and the operating furnace temperatures. The removal of the slag and its morphology depends on the type of furnace used while redox conditions result in distinct compositional patterns in the slag microstructure (Bachmann, 1982; Kiriama, 1987). Metallographic analysis aids us in reading this information from slag and other remains (Miller and Whitelaw, 1994; Miller and Killick, 2004; Chirikure and Rehren, 2006). This section focusses on the archaeometallurgical work carried out in the Materials Laboratory of the Department of Archaeology and sample characterisation was achieved by using standard methods of archaeometry which involved chemistry and physics to identify and understand their chemical composition (Bachmann, 1982). X-ray Fluorescence analyses were performed in the Geological Sciences Laboratory at the University of Cape Town, under the guidance of Professor Phil Janney.

Figure 43: Sampled archaeometallurgical remains from Thomo site comprised a mix of tuyeres and flow slags.

Figure 44: Some of the mounted archaeometallurgical remains.

6.4. Macroscopic examination and sampling for microscopic and elemental studies.

The initial technique employed in the Material Laboratory involved washing and sorting the archaeometallurgical remains. This process removes earthen dirt attached to the sample, while visually categorising the sample accordingly. All the sampled remains from each site were grouped by context and were fitted into several classes consistent with the stages that they represented in the production chain. The remains were categorically grouped into ore, smelting slag (flow and furnace), remains of blooms, smithing slag, broken tuyeres and remnant furnace walls. The furnace slags and flow slags are products of iron smelting typically produced in a bloomery process (Killick and Gordon, 1988). Slags are silicates, an admixture of other compounds; they are artificial minerals and in terms of their composition they always resemble their naturally occurring equivalents: they are subjected to analysis to understand the different phases of iron production (Bachmann, 1982). Samples from diverse groups were photographed, sectioned and mounted as polished blocks for optical microscopy (see figure 44). The other half was taken to the Department of Geological Sciences for XRF Analysis. Overall, eighty-four (84) samples were prepared for optical microscopy and these were all studied using an Olympus BX51 Petrographic/Metallurgical microscope mounted with an Olympus SC30 camera. Resource constraints dictated that we only selected few samples from both sites representing all the identified materials for XRF.

6.5. Optical microscopic examination

Prepared polished blocks were studied with an Olympus BX51 Petrographic/Metallurgical microscope, using plane polarised reflected light. Specimens were placed on the microscope stage perpendicular to the optical axis. The microscope was equipped with a digital camera to capture the micrographs. Under the beam of light, the different phases appeared in different shades of colour: fayalite appears as medium-grey lathes ranging from blocky to skeletal in texture, while wüstite crystals can be identified as light-grey dendrites or rounded egg-shaped crystals (Miller and Killick, 2004). Metallic iron appears as bright white with the voids and porosity appearing as black.

6.6. Results for optical microscopy

Vitreous materials (from smelting and other metallurgical practices) relics were studied together with remnants of ore to characterise them microscopically. Samples from the production process were sub-divided between furnace slag (formed in the furnace), tap slag (formed when the furnace is tapped to remove molten metal), and crucible slag (Betancourt, 2006:137). All these materials share the characteristics of being vitreous; however, they can differ from one another in their composition and microscopic texture (Bachmann, 1982). The information from the microstructures was recorded to reconstruct the process of metal working represented by the remains (Chirikure and Rehren, 2006).

6.6.1. Flow slag

Flow slag was defined as slag that had a clearly defined macroscopic flow texture, often resembling volcanic lava, while other samples are striated or layered. The surface has different appearances; however, slags are resistant to weathering. They are well represented by highly reflective, smooth and rounded surfaces. Their identification was based on visual and microscopic study (Chirikure and Rehren, 2004:138). The presence of high-iron silicates content gave the sample black or dark-grey colour; however, the samples varied in appearances, texture and specific gravity, the effect of heat on the ore initiates reaction inside the furnace and is invariably related to the formation of slag which serves as process indicator (Bachmann, 1982:3).

Slags act as collectors for impurities introduced into the process by ores; they are a complex mixture of many constituents with a wide range of composition, namely: oxides, phosphorus, borates, sulphides, furnace lining, charcoal ash, carbides and pure metals (Bachmann, 1982). Therefore, the final composition of slags are the results of several factors with the above-mentioned elements being the relics of the original charge (whether there was some addition or part of the ore or furnace lining in slag composition). Some of the analysed slags pieces are dense and heavy while other pieces exhibit considerable variation in physical characteristics such as being lightweight. The typical microstructure consists of glassy matrix, free from inclusion, like mineral grains and fragments of charcoals while other samples show veinlets of pure metals (Bachmann, 1982).

According to Morton and Wingrove (1969) glasses in slag are generally considered to be anorthite like composition formed if the molten slag is cooled rapidly. The presence of glass also depends on the composition of the melt. Lack of certain ingredients promoting crystallisation may play a part as the non-equilibrium of certain processes (Bachmann, 1982:15). The flow slag from both sites (Mut 2 and Thomo sites) had similar mineralogical composition dominated by skeletal fayalite (Fe_2SiO_4), dendritic and occasional egg-shaped wüstite, which were all sitting on the glassy matrix (see figure 45-50). A slag in this true sense is a once-molten silicate or silicate mixture, therefore the presence of hercynite spinels visible implies that slag cooled rapidly as demonstrated by the presence of skeletal fayalite and dendrites of wüstite. Some of the slag samples, when sectioned, show the presence of gas bubbles as well as cracks (see figure 45). Overall, the microstructure of the flow slag demonstrates that the slag became liquid at elevated temperatures and cooled rapidly (Chirikure and Rehren, 2006).

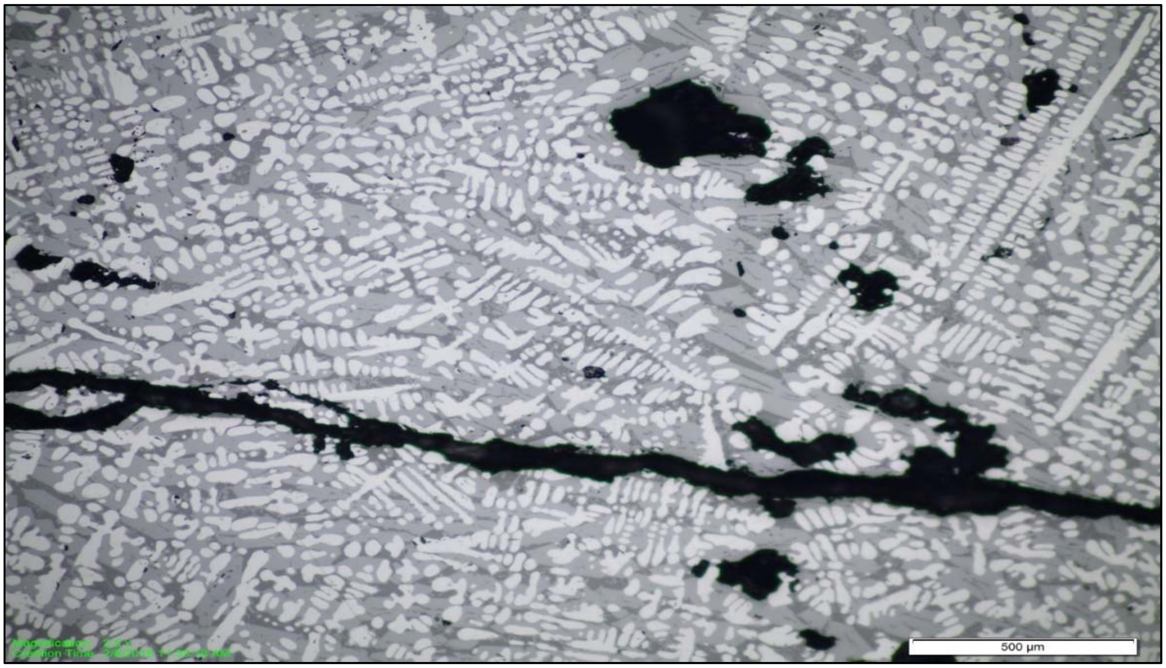


Figure 45: Photomicrograph of a slag from Mut 2, specimen sample Mut 2/98/Slag/013/02 showing dendrites of wüstite and magnetite embedded in a matrix of fayalite and glass; the sample had cracks and gas bubbles.

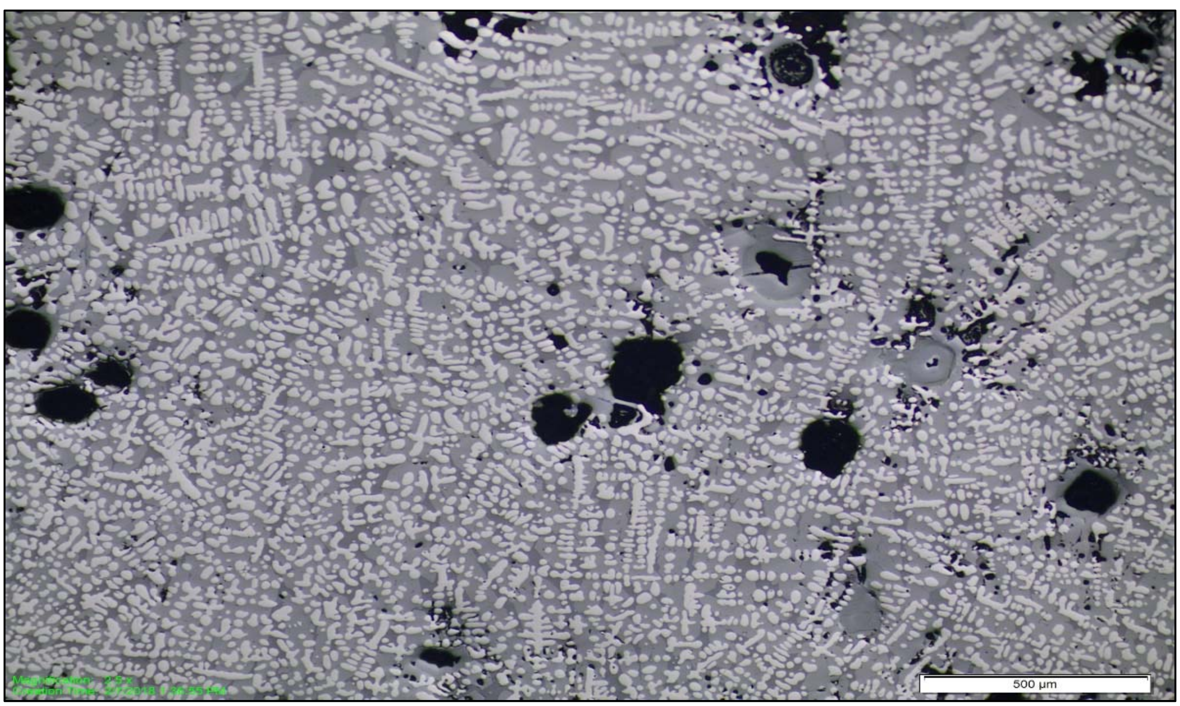


Figure 46: Photomicrograph of a slag from Mut 2, specimen sample Mut 2/98/Slag/001/02 showing porosity, dendrites of wüstite fayalite and glass matrix.

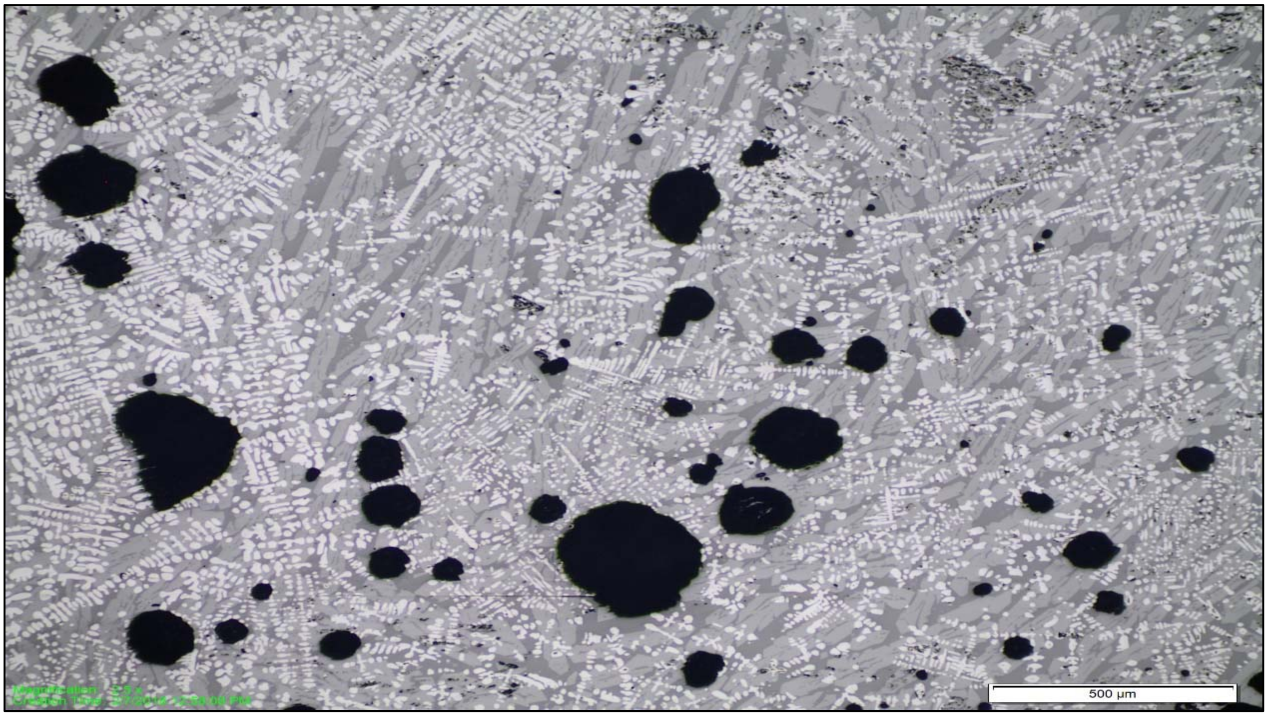


Figure 47: Photomicrograph of a slag specimen from Mut 2, sample Mut 2/98/Slag/009/01 showing abundance of free iron oxides which is a proxy of strongly reducing conditions.

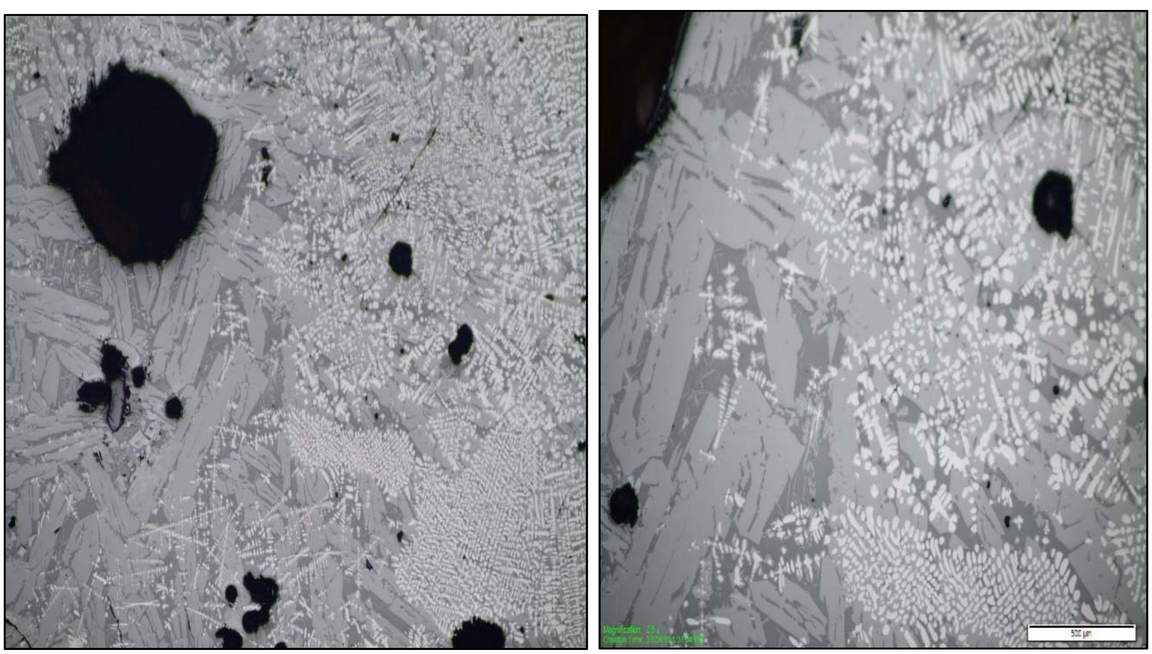


Figure 48: Same sample Photomicrograph showing abundance of free iron oxides which is a proxy of strongly reducing conditions.

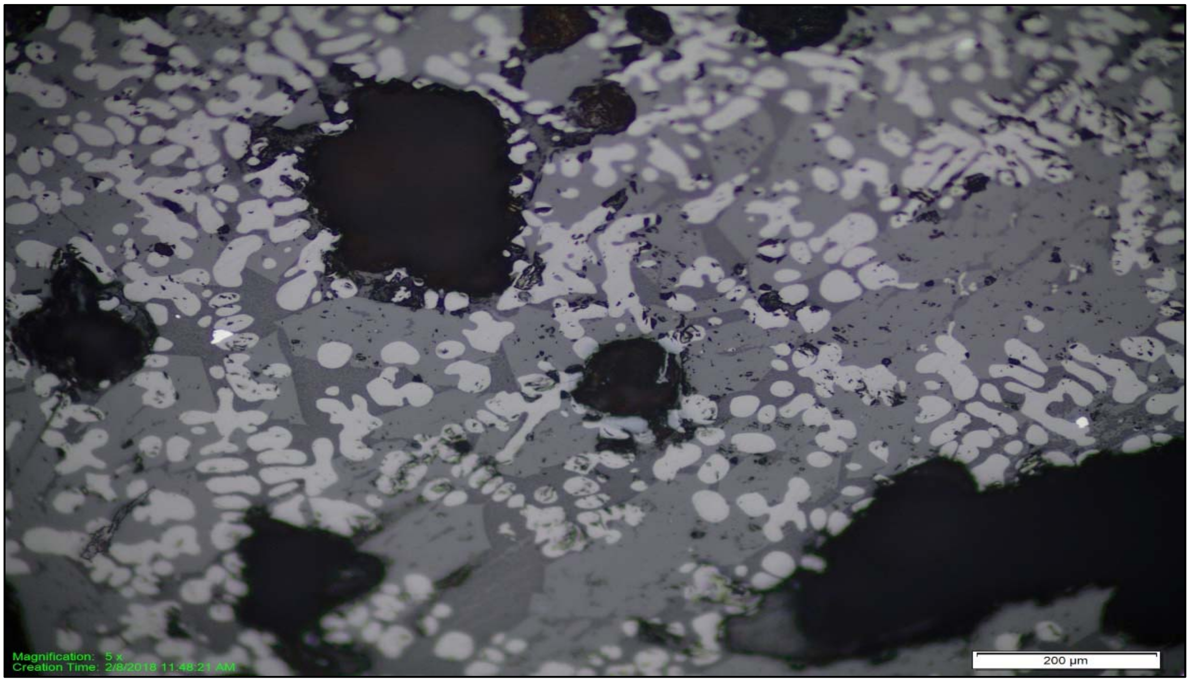


Figure 49: Photomicrograph of a flow slag from Mut 2, specimen sample Mut 2/98/Slag/001/03 showing wüstite, metallic iron droplets, blocky fayalite porosity and the glass matrix.

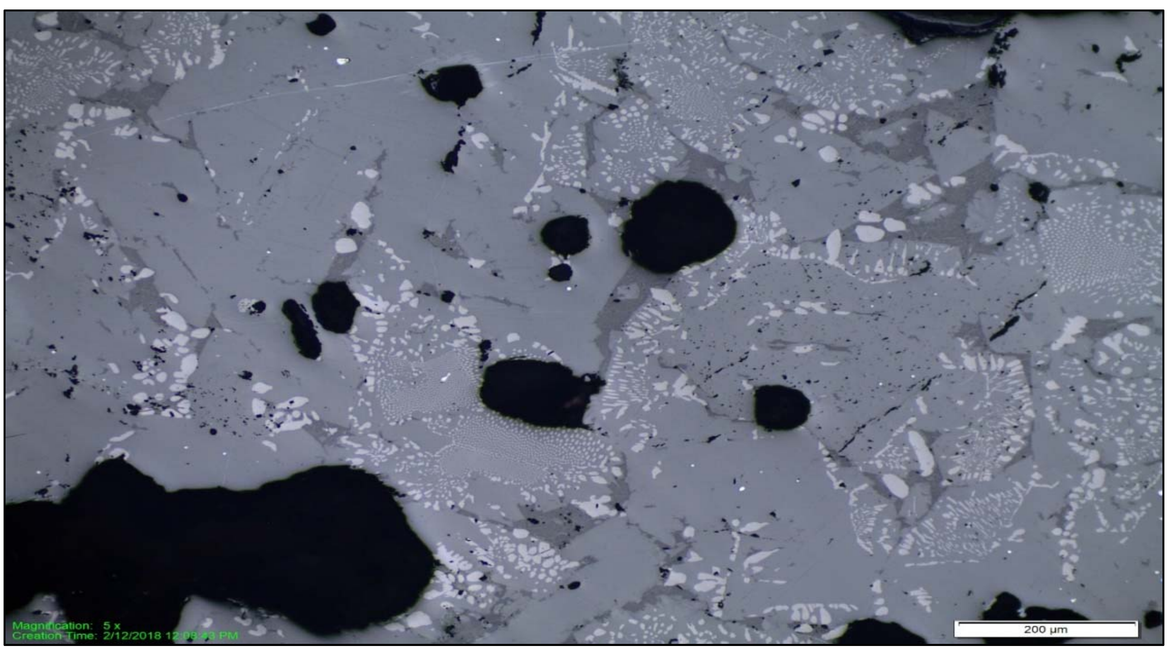


Figure 50: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/11/02/001A showing metallic iron droplets (bright white), in a matrix of fayalite and second generation wüstite on the glass.

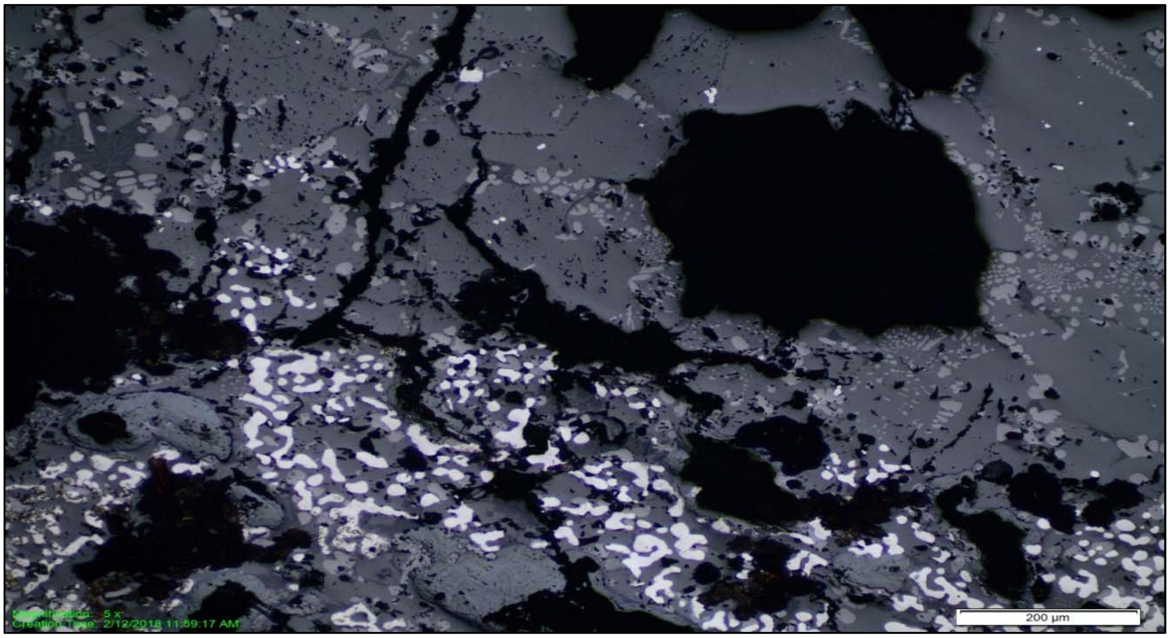


Figure 51: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/11/02/001A showing concentration of metallic iron droplets, and second generation wüstite on the glass and gas bubbles.

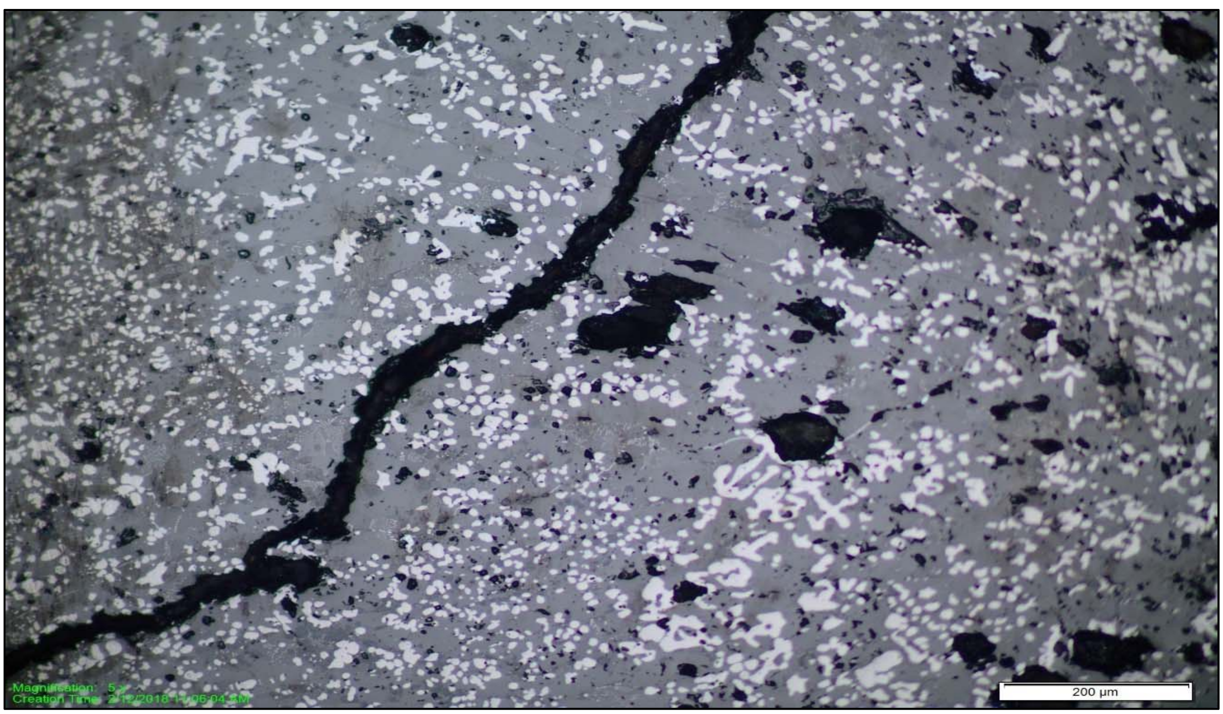


Figure 52: Photomicrograph of a flow slag from Thomo site 1, specimen sample Thomo1/slag/23/11/02/009b showing wüstite on the glass and fayalite matrix, note cracks and gas bubbles.

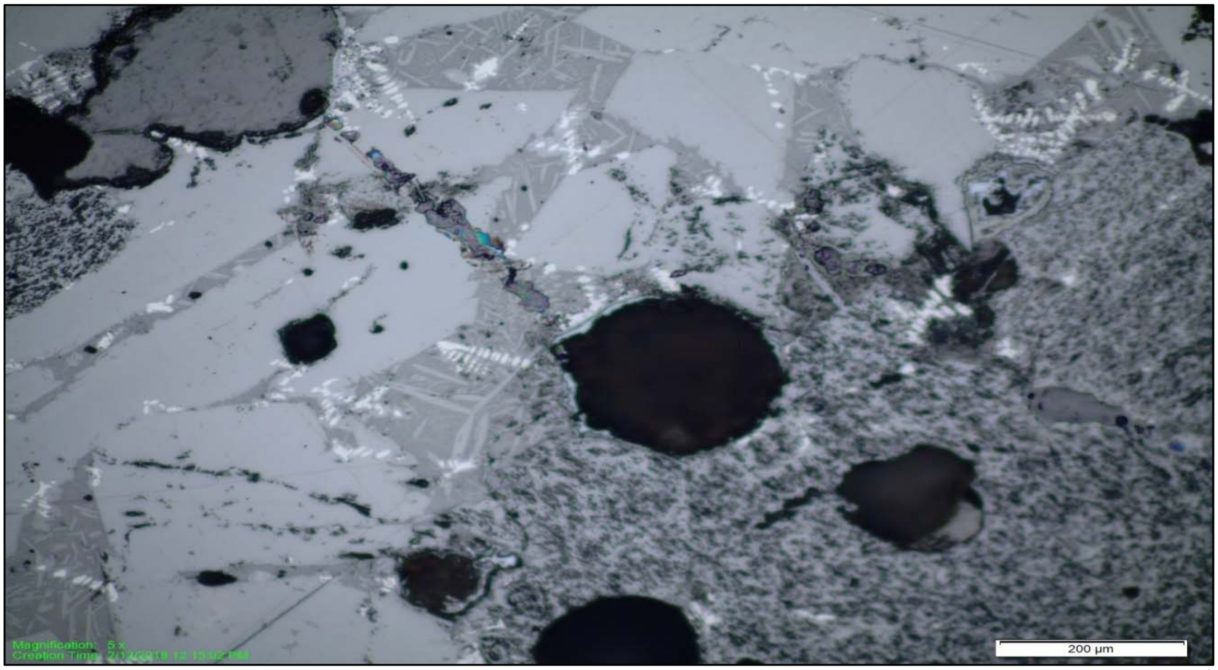


Figure 53: Photomicrograph of a slag specimen from Thomo site 1, sample Thomo1/17/Slag/08 showing wüstite on the glass and blocky fayalite matrix; note gas bubbles.

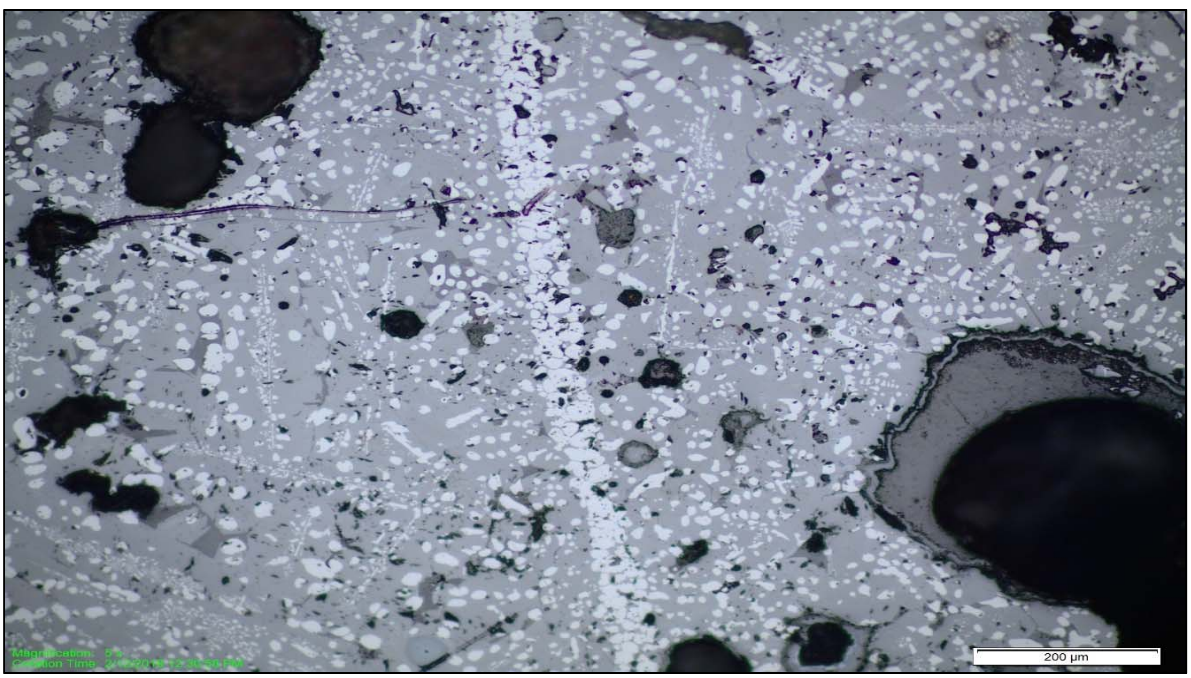


Figure 54: Photomicrograph of a slag specimen from Thomo site 1, sample Thomo1/slag/23/11/02/009a showing wüstite, line of magnetite skin on the glass and fayalite matrix with gas bubbles.

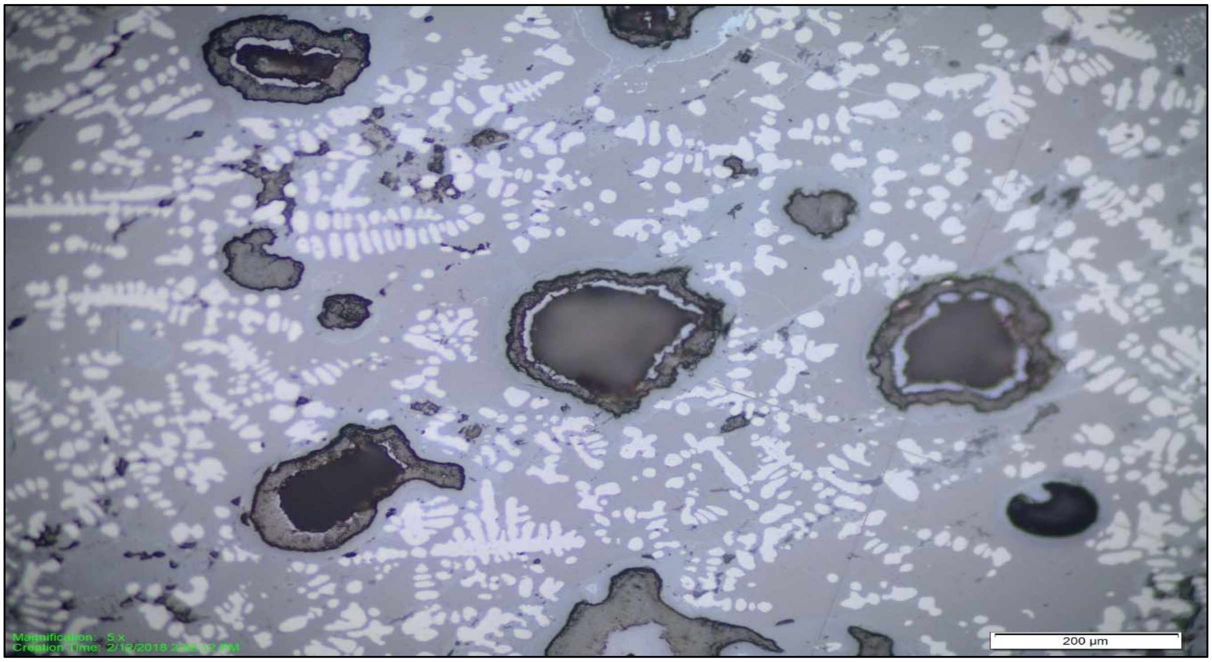


Figure 55: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/slag/23/11/02/009C showing dendritic wüstite on the glass and fayalite matrix; note gas bubbles.

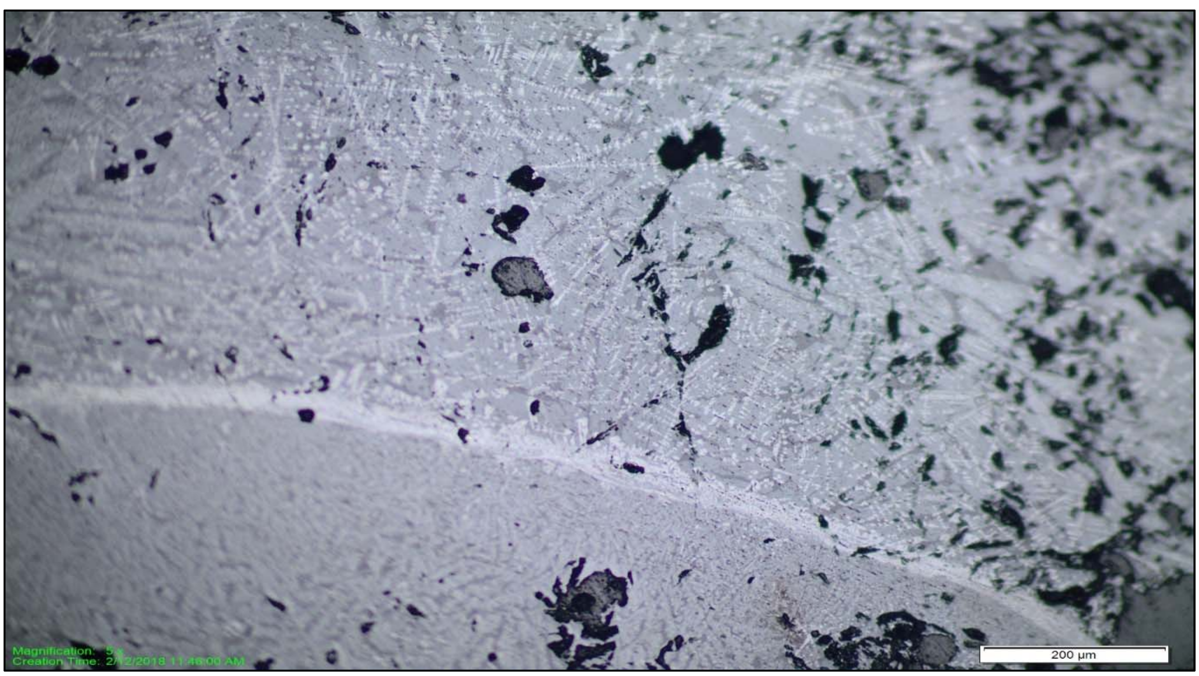


Figure 56: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/17/slag/2 showing dendritic wüstite on the glass and fayalite matrix; note gas bubbles.

6.6.2. Furnace slag

This type of slag was formed and solidified at the base of the furnace (Chirikure and Rehren, 2004:140). The furnace slag could be macroscopically differentiated from flow slag by the lack of flow structure and variance in degree of porosity (see figures 57 and 58). It was influenced by the cooling condition inside the furnace as shown by the presence of occluded charcoal, wood ashes and charcoal impressions as well as gas bubbles. Site Mut 2 did not produce any furnace slag from the analysed sample; no record exists of the presence of furnace structure associated with metal debris collected around the Mut 2 site. All samples analysed came from Thomo1 site, characterised by fayalite and wüstite sitting on the glass matrix.

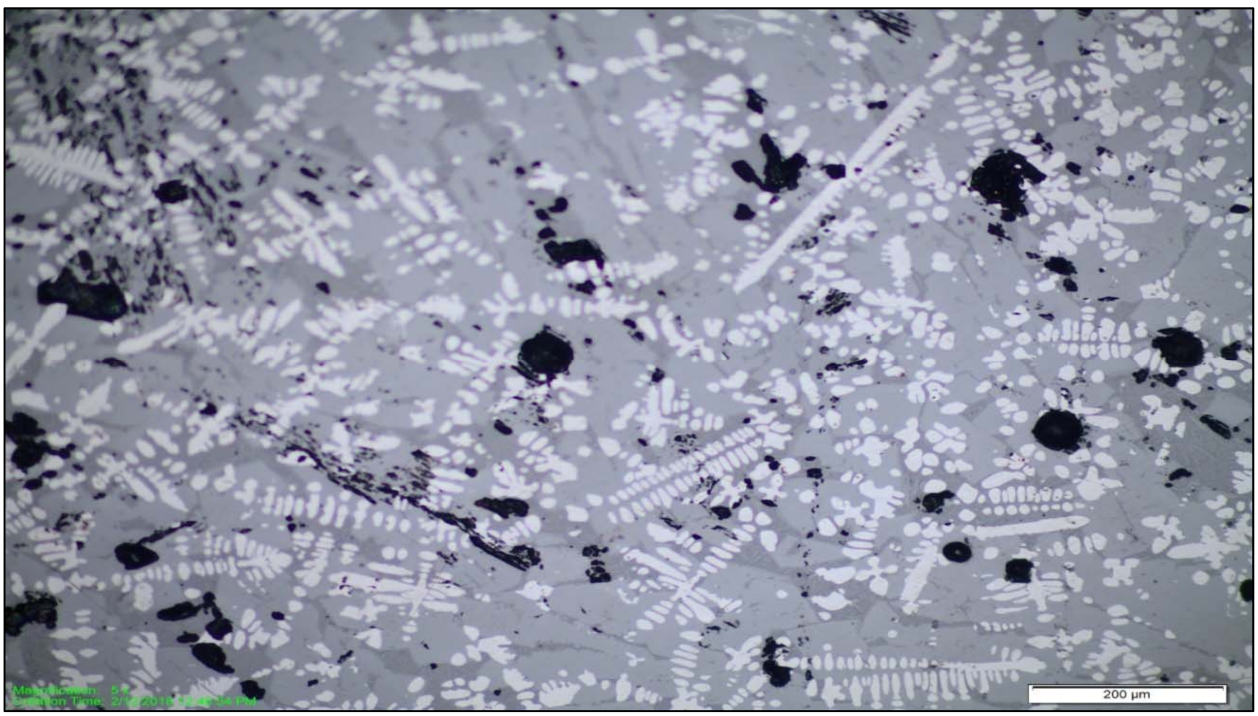


Figure 57: Micrograph of the furnace slag from Thomo site showing fayalite in a glass matrix with voids and dendrites of wüstite (Sample Thomo 17/furnace slag/07).

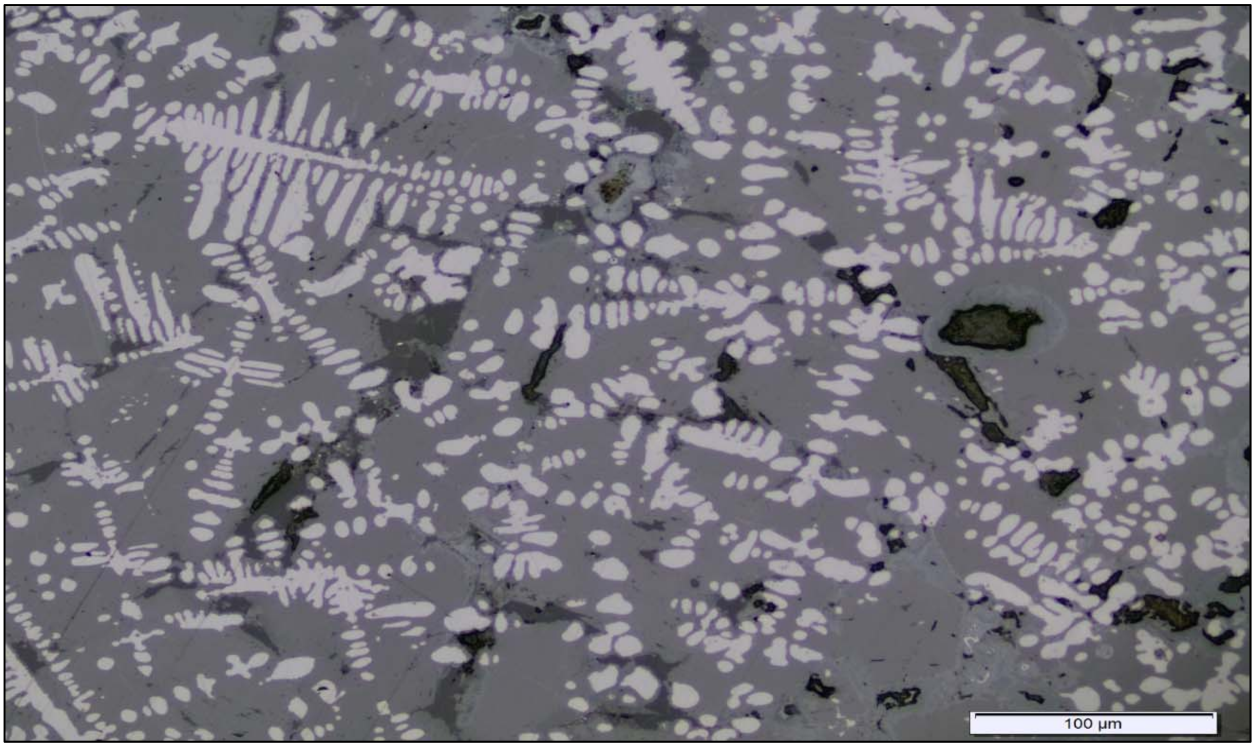


Figure 58: Micrograph of the furnace slag from Thomo showing fayalite in a glass matrix with voids and dendritic wüstite (Sample Thomo 09A).

6.6.3. Unidentifiable and smithing slags

It is difficult to distinguish smithing and smelting slags analytically (Bachman, 1982). However, certain slags were categorically classified as unidentifiable or smithing slags. Their microstructure was different from both the furnace and flow slags. They depicted heterogenous portions that were dominated by angular wüstite in glass matrix of fayalite with unrelated minerals. Angular fayalite is associated with slow cooling that happens inside the smelting furnace (Chirikure, 2006), suggesting that the process may have stopped before the material had completely reacted. In some instances, partially reduced hematite was visible, confirming that hematite ores were probably melted (see figure 59). Slags debris collected from Mut 2 site were collected in association with hammer, anvil and grooved stones underneath a *Sclerocarya Birrea* tree within the residential zone. When analysed they revealed considerable inhomogeneity compared to other slags. They were dominated by wüstite and metallic iron droplets. Variation in slag is attributable to mineralogy ascribed to major oxides composition associated with different degrees of smelting efficiency and the effects of differences in cooling rates (Lyaya, Chirikure, Janney and Rehren, 2020). Rapid cooling favours glass formation while slower cooling allowed mineral such as leucite ($KAISI_2O_6$) to crystallise (Miller, Boeyens and Küsel, 1995:41).

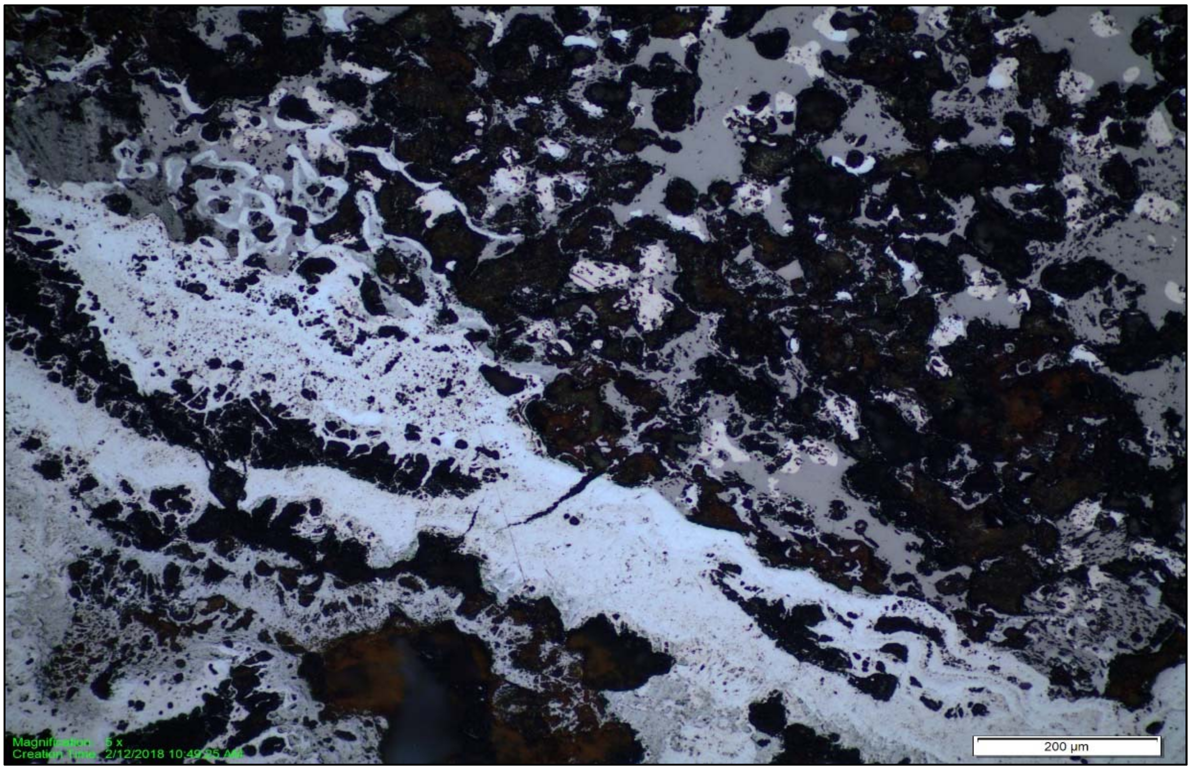


Figure 59: Photomicrograph of a slag from Thomo site 1, specimen sample Thomo1/17/slag/08 showing partially reduced oxide; note gas bubbles.

6.6.4. Bloom/crown materials

Bloom consist of fragments of rusty, highly magnetic and corroded materials rich in metallic iron (Chirikure and Rehren, 2004: 142). It is still characterised by an abundance of slag and charcoal inclusion. Several slag fragments from both Mut 2 and Thomo sites had charcoal impressions and were very rusty. When sectioned using a diamond saw, large particles of metallic iron became visible (see figure 60). This led to their classification as blooms. While some of them contained nodules of unreduced ore, others had areas of metallic iron interspersed with fayalite and wüstite. Corrosion phases were also visible on the samples.

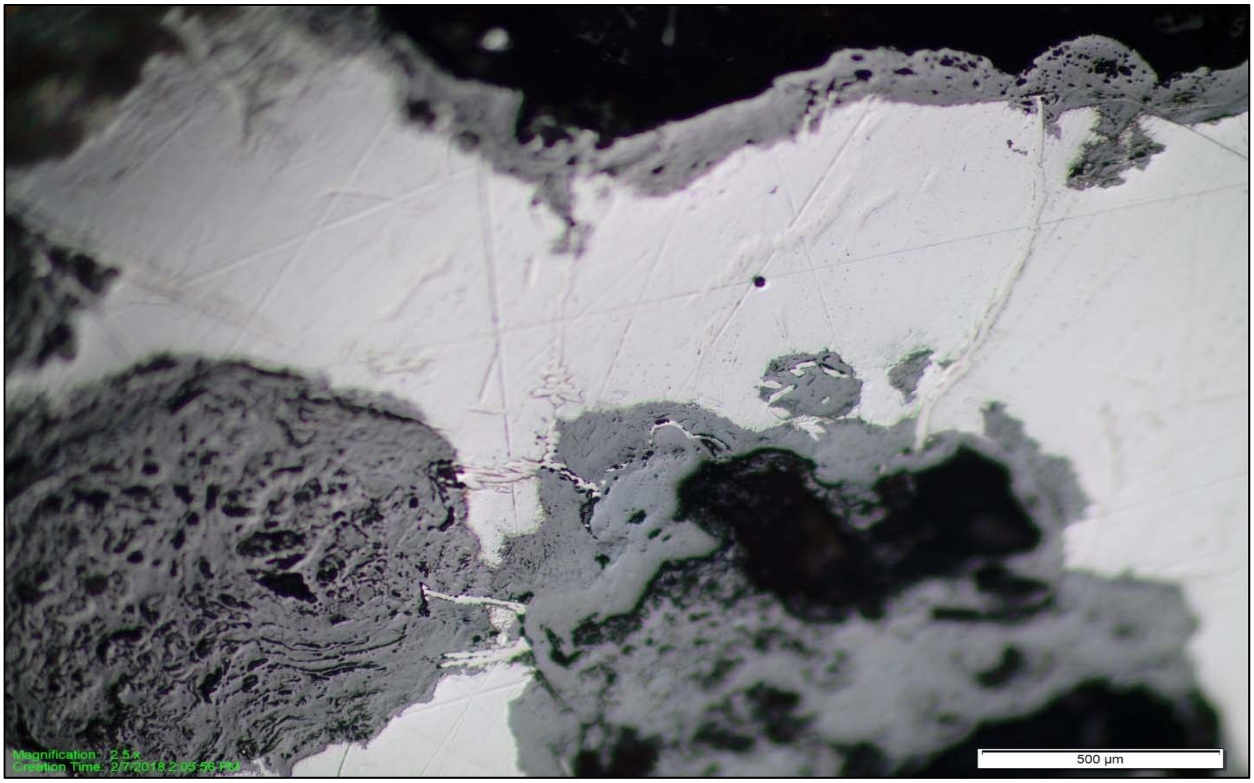


Figure 60: Photomicrograph of a bloom specimen from Mut 2, sample Mut2/98/ Slag/001/01 showing fragments of rusty, highly magnetic and corroded materials rich in metallic iron.

6.6.5. Presumed Ores

Ore has been defined as iron-rich stones (Chirikure and Rehren, 2004:142). Several pieces of possible ore were collected in association with slag and broken pieces of tuyere fragments from both archaeological sites. All samples qualify as ore because metal is economically extractable from it. A single type of ore was analysed and has been macroscopically identified as hematite which was dark maroon in colour and very heavy. Figure 61 and 62 show microscopically examined samples dominated by iron oxide as the dominant phase but had more quantities of clay materials.

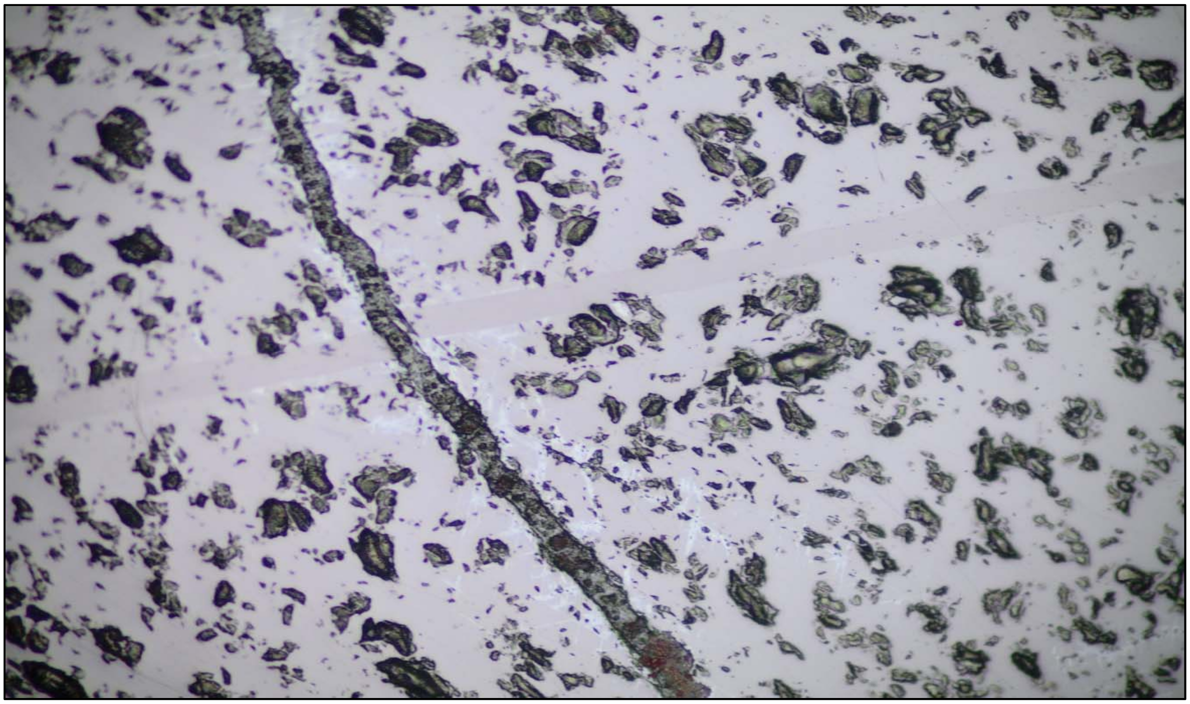


Figure 61: Photomicrograph of a hematite ore specimen Thomo mine (23)11/02/001. The specimen shows iron oxide cracks and clay minerals.

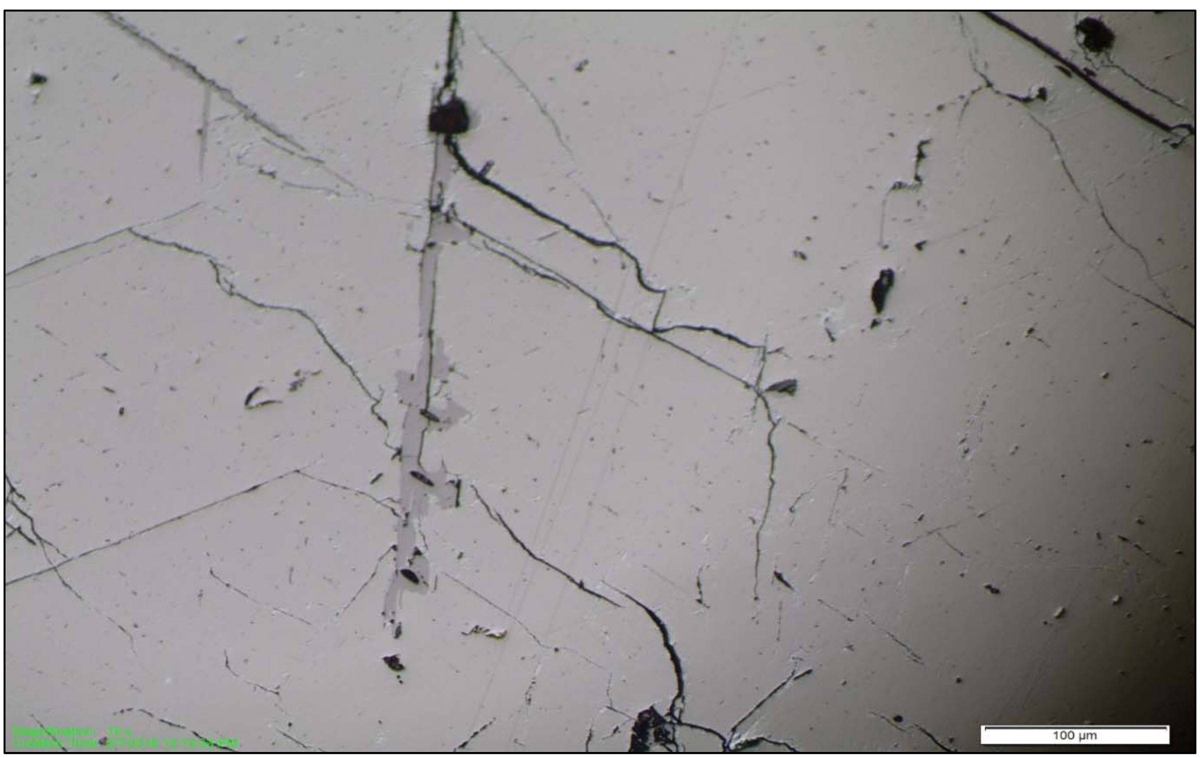


Figure 62: Photomicrograph of a hematite ore specimen from Mut 2 site, specimen Mut2/98/ore 02 shows iron oxide cracks and clay minerals.

6.6.6. Furnace wall (Linings)

The furnace interior wall was vitrified; these collected sample fragments had dark, glassy materials adhering to their internal surface (see figure 63). The glassy matrix occurred on the inside of the furnace lining because the area has been in contact with heat and reaction while the exterior is unvitrified. The thickness of the coating varies considerably; some was usually less than 5mm. The coating was rough with slag droplets and smooth, an evidence that it was liquid formed mostly because of condensation of hot vapours discharged from the bottom of the furnace. Slag droplets and small solid particles carried upwards inside the furnace due to the force of draft probably added to the clay materials that form the furnace interior (see figure 64). Condensation collected while the smelting operation was in progress because the top furnace wall and chimney were cooler than the bottom section. Analysis of the furnace lining at microscopic level revealed materials composed of a glassy matrix containing numerous inclusions of slag and iron oxides droplets. The magnetite occurs as dendritic crystals cooled quickly. Grains of quartz are present as relics of clay materials used in the construction of furnace wall (Betancourt, 2006:140).

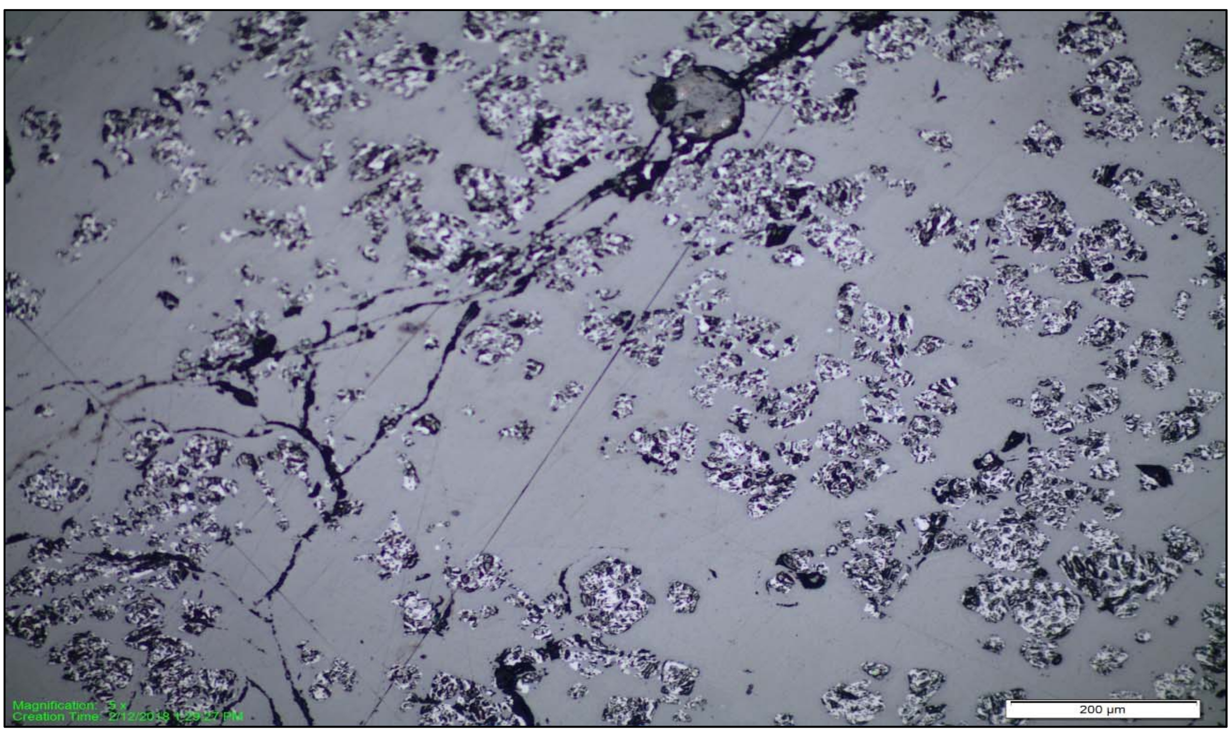


Figure 63: Photomicrograph of a furnace linings from Thomo site specimen Thomo 17/furnace linings/012 showing quartz and clay materials.

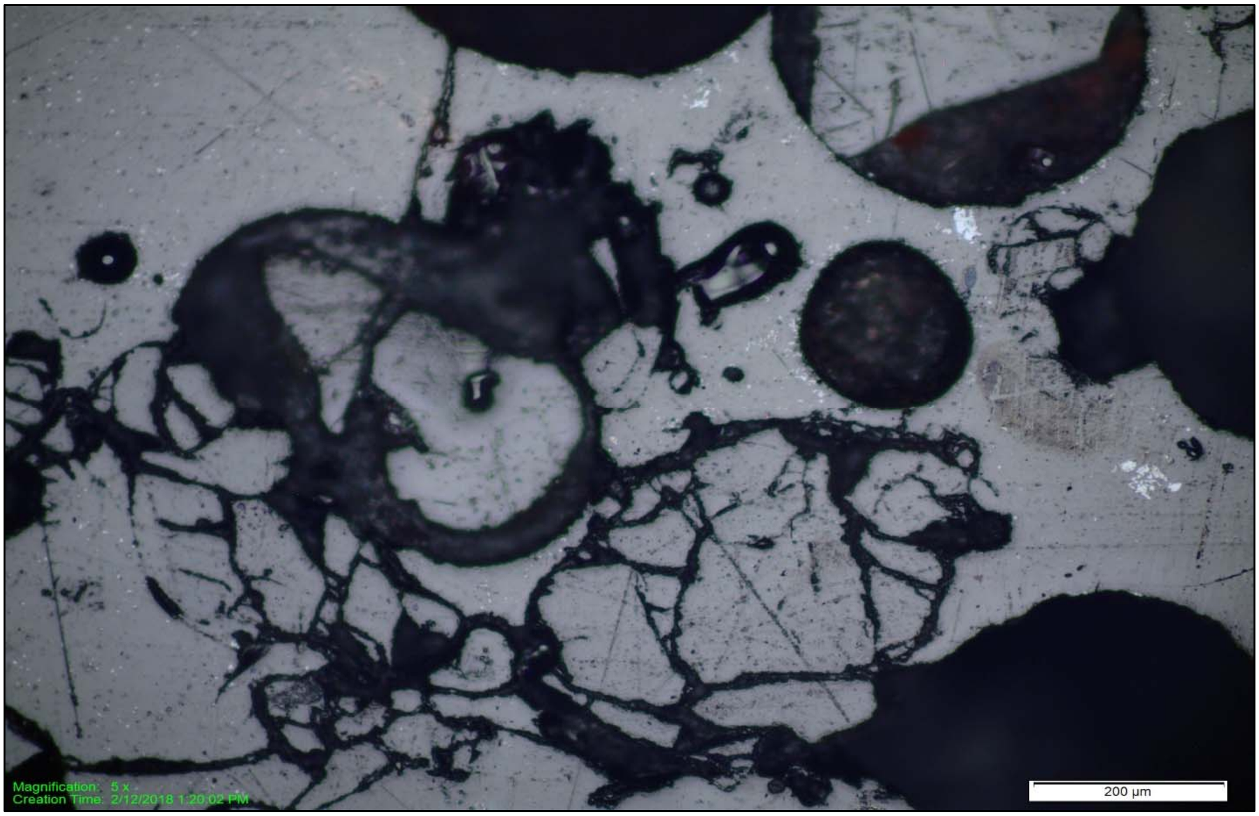


Figure 64: Photomicrograph of a furnace linings from Thomo site specimen Thomo 17/furnace wall/10 showing metallic droplets, quartz and clay materials.

6.6.7. Tuyere fragments

These were clay pipes that supplied air from the bellows to the furnace (Chirikure and Rehren, 2004:141). The ends of the pipes that were inside the clay furnace were vitrified due to the heat reaction inside the furnace. Fragments of vitrified tuyere from both sites were chosen and subjected to optical microscopy (see figures 65 and 66). The analysis shows grains of quartz inclusion with partly vitrified matrix constituting up to 80% of the entire material, while the hercynite spinels were about 15%; the rest being slag layer with minute particles of metallic iron attached on the inner, vitrified side. Temperature gradient from the outside to the inside is visible (Chirikure and Rehren, 2004:145).

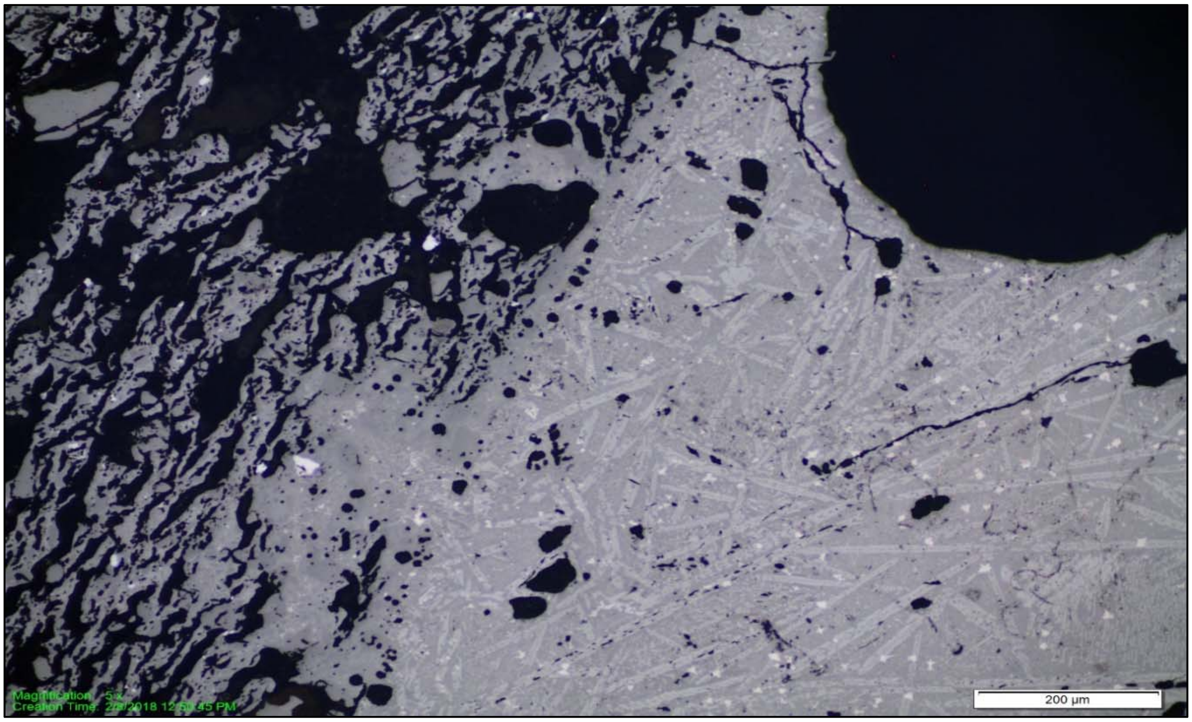


Figure 65: Photomicrograph of a tuyere fragment from Mut 2 site, specimen Mut2/98/Tuyere/011/02 showing quartz, cracks, metallic droplets in matrix of blocky fayalite.

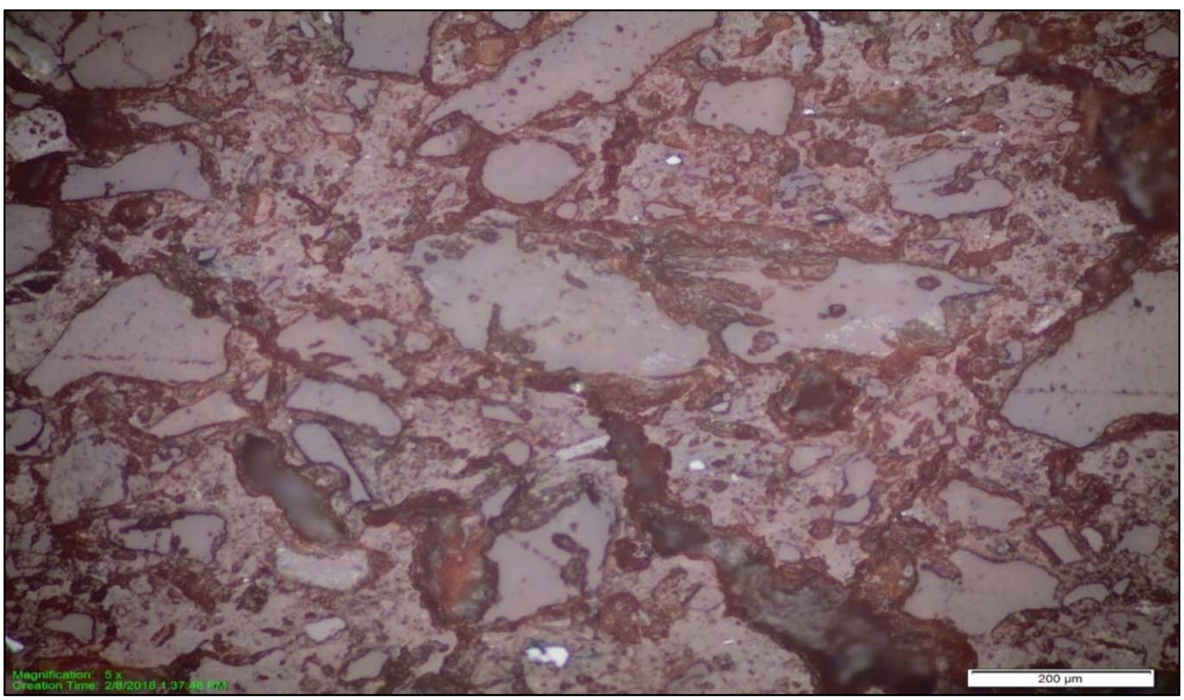


Figure 66: Photomicrograph of a tuyere fragment from Mut 2 site, specimen Mut 2/98/Tuyere/011/03 showing quartz, cracks, metallic droplets.

6.6.8. Elemental analyses using XRF Spectrometry

To gain reliable analytical data and to provide a basic characterisation of the technology and to facilitate discussion of the relationship between the ore, tuyere and furnace materials, the predominant sectioned samples were sent for WD-XRF (Wavelength Dispersive X-ray Fluorescence) analysis in the Geological Sciences Department at UCT. Tables 6-1 and 6-2 provide the results of XRF analyses. The sample preparation involved crushing the samples and grinding them into a powder. They were left in an oven overnight to dry. The powder was fused with borate-based flux and pressed to form disks / pellets. The XRF machine used allowed for the determination of loss of ignition (LOI) from the ground samples by passing them through several blasts with progressively higher temperatures. Loss of ignition is a process where the water content of the samples is measured through different stages of the analysis. This basic WD-XRF method could quantify essential major and minor oxide components of the sampled slags, tuyeres and ore.

Table 6-1: Results of XRF Analyses from Thomo site

Sample	**THOMO-1/009A** FURNACE SLAG	**THOMO-1/009B** FURNACE SLAG)	**THOMO-1** HEMATITE ORE	**THOMO-MINE** HEMATITE ORE
SiO_2	25.060	24.372	23.385	0.702
TiO_2	0.139	0.140	0.145	0.149
Al_2O_3	2.506	2.517	2.606	2.695
Fe_2O_3	73.774	74.104	76.726	79.336
MnO	1.249	1.255	1.299	1.343
MgO	1.543	1.550	1.605	1.660
CaO	0.633	0.635	0.658	0.680
Na_2O	0.149	0.150	0.155	0.160
K_2O	0.173	0.174	0.180	0.186
P_2O_5	0.139	0.140	0.145	0.149
SO_3	0.024	0.024	0.025	0.026
Cr_2O_3	0.016	0.016	0.017	0.017
NiO	0.014	0.014	0.015	0.015
H_2O-	0.121	0.115	0.082	1.447
LOI	-6.002	-5.314	-7.383	11.370
Total	99.539	99.892	99.660	99.937

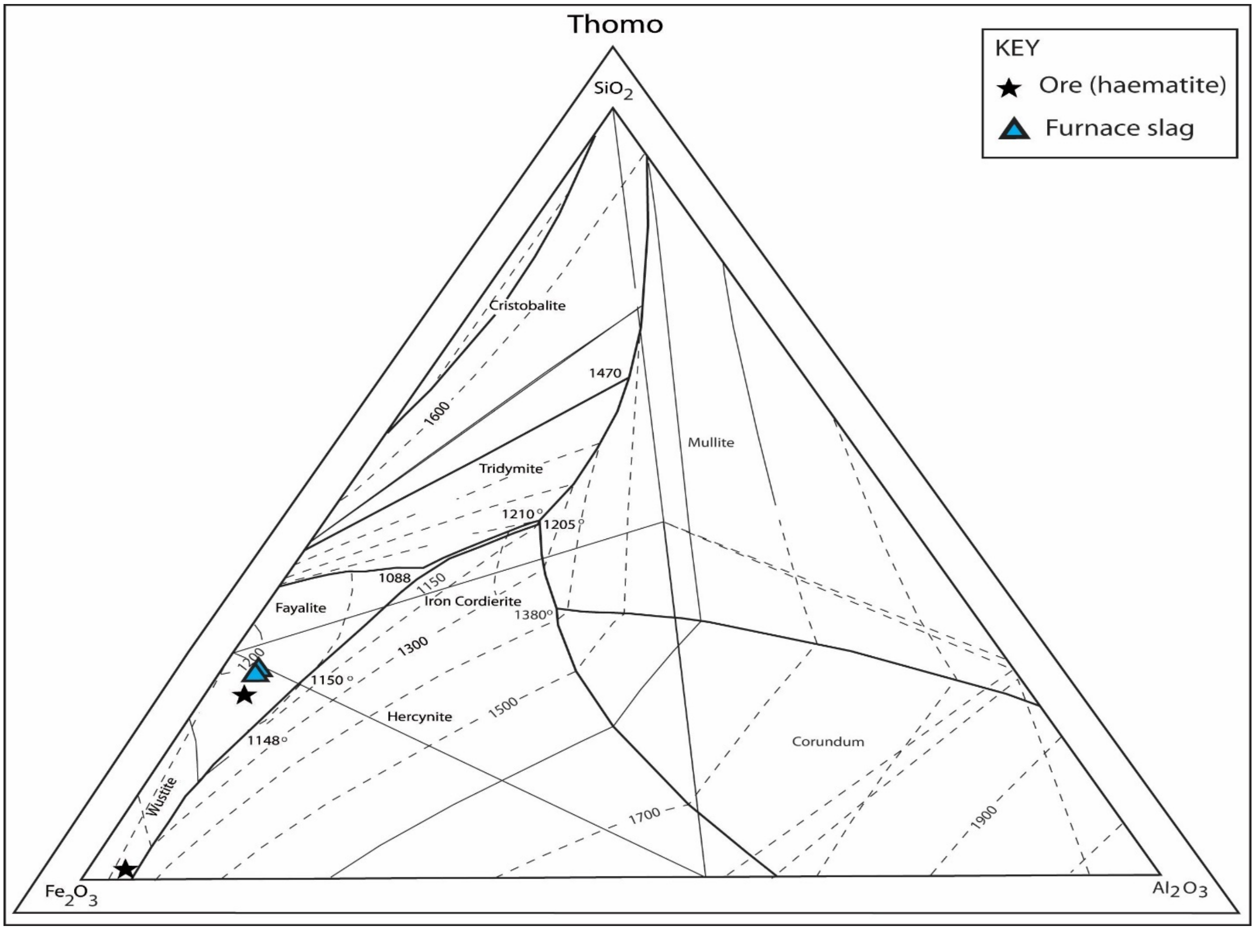


Figure 67: Tenary plot diagram for Thomo site

The WD-XRF analysis of the remains from the production cycle has revealed the presence of a high-level content of iron oxide in both the ore used and in the slag samples. Paying attention to the issue surrounding iron oxide, it is appropriate to examine the technological technique used in metal production. The basic argument is that slag should share similar chemical and mineralogical signatures derived from the ore. It is interesting to compare the chemical compositions of slags to that of the locally sourced ore to assist as a guide to the location of the mine where the ore was procured. High grade hematite ore were used at Thomo metal production site, this ore had few gangue minerals as presented by Scanning Electron Microscope. Re-evaluation of the presented evidence raises strong doubts because bloomery iron production involves the solid-state reduction of iron oxide and was the predominant means of producing iron metal; therefore, the simple removal of iron oxide from ore cannot result in the formation of slag. Ostensibly, the same line of reasoning can be extended to conclude either that the smelters used a different blend of ore or other materials that must have contributed to the smelting process (Veldhuijzen and Rehren, 2007). Recent archaeological investigations maintain that reduction technology was well adapted to the exploitation of high-grade magnetite and hematite ore (Maṱhoho, 2012, Maṱhoho *et al.,* 2016). Slags are a result of the nature of the ore body and this requires a silica-rich and lime-containing flux addition to facilitate slag formation. Slag is formed when silica (SiO_2) reacts with iron (Fe_2O_3) at high temperature (Charlton, Crew, Rehren and Shennan, 2010). Sometimes the slags absorbed lime from the charcoal fuel; burnt charcoals are known for their lime content (Friede, Hejja and Koursaris, 1982:39).

To estimate the working parameters, redox conditions in the furnace which used Fe_2O_3-SiO_2-Al_2O_3 were plotted (Figure 68). Ore and crown plot in the rich phases, but most furnace and flow slag plot in the fayalite-wüstite region of the Fe_2O_3 -SiO_2 -_Al_2O_3 plot, closer to what Rehren *et al*., (2007) call Optimum 2. Thus, the clustering of these slags around Optimum 1 may, as suggested by Kiriama (1987), reflect the use of iron-rich ore. However, Optima 1 and 2 do not have fundamentally different melting temperatures and the system would not favour one over the other when a liquid slag is forming at around 1200°C (Rehren *et al*., 2007; Maṱhoho *et al*., 2016).

It is possible that the smelters may have added sand as a flux to facilitate slag formation (Miller and Killick, 2004). This is also strengthened by the fact that the ratio of alumina to silica in the ores is 1:3, approximating that of natural clays. In contrast, the ratio of alumina to silica in the slags is 1:12, implicating the addition of silica to facilitate slag formation from elsewhere. It seems clear that this practice provided the necessary ingredients for Early Iron Age metal production. Miller and Killick (2004) have argued that smelters at Phalaborwa probably added sand quartz to facilitate the smelting process of high-grade ore; this practice had a wide distribution in what is now Limpopo Province. All the ores and slags have minor levels of manganese indicating that they have a genetic relationship. Typically, there is a strong interaction between CaO and MnO, these two elements are responsible in the upkeep of mutual ratio in slag during the reduction process.

Manganese and calcium are of immense importance for thermodynamic and physical properties of slag phase. An increase of slag basicity and the decrease of CaO gravity reduces the amount of MnO content on slags. Considerably, all slag samples contain gangue minerals from parent ore, impurities derived from fuel ash, and furnace linings.

The slags also contain enriched amounts of earth alkali and alkali elements. Generally, the levels of iron oxide in the slags are extremely high such that it is tempting to conclude that the reduction was not efficient. This, however, would not be a fair conclusion given that efficiency is a multifaceted variable. Some technologies were poor in slag metal separation but saved time and energy which meant that they could produce more iron in a short space of time (Chirikure and Rehren, 2006). A comparison of the microstructure and chemistry of the remains of iron production from the Early and Late Iron Age sites revealed that the ore resources in the study area were exploited by the diverse groups at different times. In summary, the context of archaeometallurgical assemblages from Thomo site generates a strong impression that well-established and dedicated metal-production operations form part of a wider regional web of activities that dominate the Early Iron Age period. However, it is difficult to separate Early from Late Iron Age metal production debris using both chemical and physical methods.

Table 6-2: Results of XRF Analyses from Mutoti site

Sample	Mut 2 98/Tuyere 011/01	Mut 2 98/Tuyere 011/03	Mut 2 98/Tuyere 011/05	Mut 2 98/Tuyere 011/07	Mut 2 98/Slag 001/02	Mut 2 98/Slag 001/03	Mut 2 98/Slag 009/01	Mut 2 98/Slag 009/03	Mut 2 98/Slag 013/01	Mut 2 99/) Ore 03
SiO_2	63.91	61.80	63.52	63.22	17.59	16.89	22.20	13.51	17.51	0.10
TiO_2	1.26	1.01	1.45	1.29	0.32	0.24	0.47	0.45	4.85	1.39
Al_2O_3	18.01	22.97	17.08	19.14	3.37	3.19	4.78	3.30	7.07	0.43
Fe_2O_3	9.22	7.76	10.47	9.47	78.35	77.08	73.07	84.72	69.99	99.26
MnO	0.08	0.08	0.10	0.06	0.03	1.16	0.10	0.07	0.42	0.26
MgO	0.83	0.53	1.03	0.78	0.98	2.40	1.01	0.89	2.17	1.28
CaO	0.96	0.40	1.49	1.15	1.12	1.97	1.36	1.10	0.70	0.00
Na_2O	2.20	0.61	2.22	2.08	0.64	0.53	0.51	0.47	0.36	0.34
K_2O	1.53	1.57	1.90	1.63	0.63	0.57	0.78	0.57	0.31	0.00
P_2O_5	0.04	0.01	0.10	0.03	0.33	0.42	0.22	0.18	0.18	0.02
SO_3	b. d	b. d	b. d	b. d	0.03	0.04	0.02	0.01	0.02	b. d
Cr_2O_3	0.02	0.01	0.01	b. d	b. d	b. d	b. d	0.02	0.01	b. d
NiO	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
H_2O-	0.02	0.84	0.06	0.37	0.37	0.26	0.17	0.10	0.18	0.03
LOI	1.01	2.05	0.09	0.78	-4.07	-5.10	-5.01	-5.36	-4.39	-2.89
Total	99.26	99.67	99.54	100.04	99.70	99.68	99.70	100.05	99.41	100.23

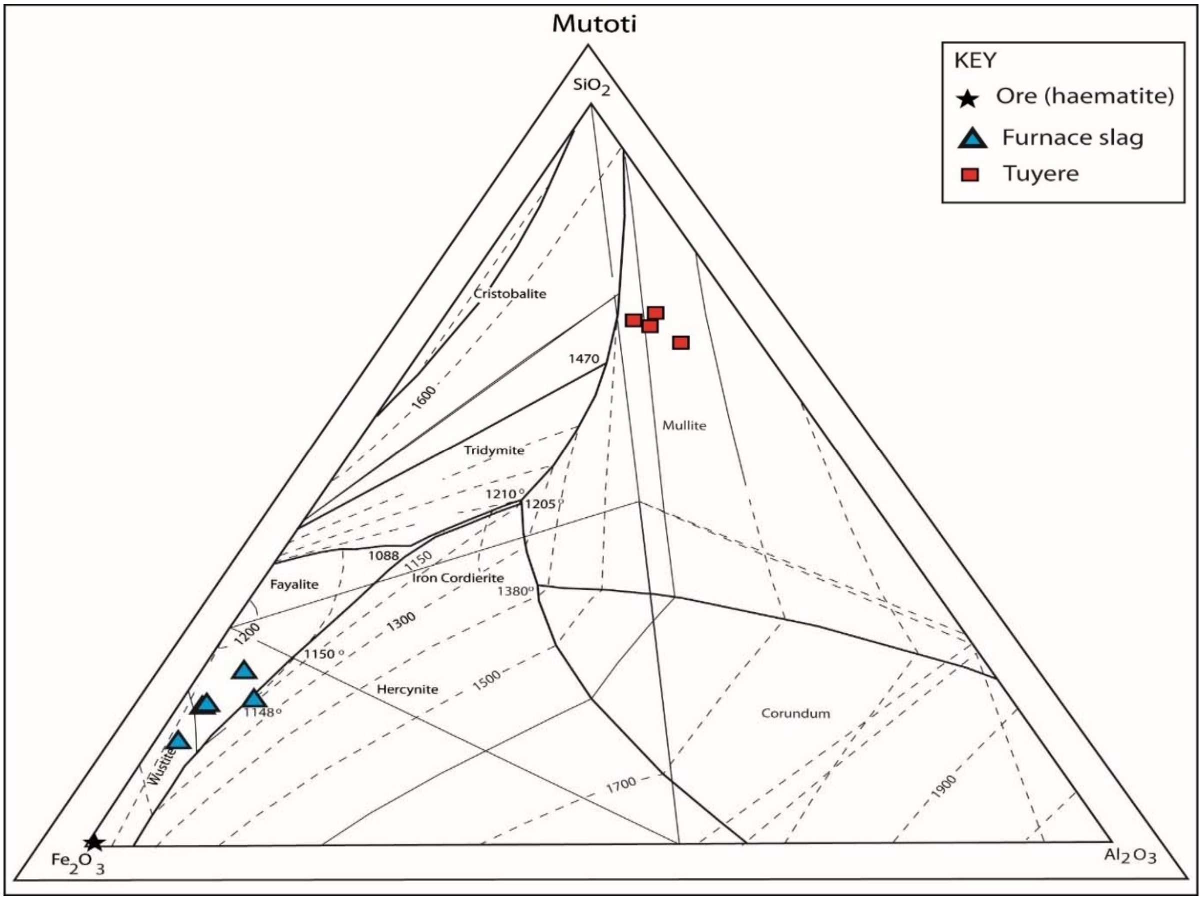


Figure 68: Tenary plot diagram for Mut 2 site.

The WD-XRF compositional data are consistent with the microstructural observation under investigation. Mut 2 site remains from the production cycle have revealed relatively high concentrations of silicon dioxide (SiO_2) content. This element compound is formed when silicon is exposed to oxygen at elevated temperature conditions (Tylecote, 1976:43). The presence of silicon dioxide in the sample represents the primary phase that may be used in the estimation of the furnace temperature and the condition of silica formation. Silica (SiO_2) are the most abundant nonferrous components commonly found in clay and sand quartz and melt at the temperature of 1723^{o}C (Charlton *et al.,* 2010). Judging from the amount of silicon dioxide present, it is tempting to conclude that due to the heterogenous nature of clay materials, the high amount of silica is the major constituent of sand particles that may have been used in the construction of tuyere or this implies deliberate addition of sand as flux as the major common practice documented elsewhere in southern Africa.

A slight difference in alumina content on slag samples has been observed; possibly this could have been brought up by the systematic variation in composition consistent with different fluidity of slag types (Chirikure and Rehren, 2006). Slag samples from Mut 2 sites had similar distinctive chemistries, with quantities of wüstite ($Fe_{1-x}O$), spinel oxide (zn, mg, fe, cu), silicate, glass, feldspar and sulphide metallic inclusion. The significant distinct phase observed in the slag sample had fayalite (Fe_2SiO_4) and anorthite (Ca_2 (mg, fe, zn) Si_2O_7) bearing matrix. Fayalitic iron slag forms at temperature between 1100-1250ºC (Rehren, Charlton, Chirikure, Humphris, Ige and Veldhuijzen, 2007). There is a high amount of silica relative to alumina on all slag samples; an indication of certain contributions of silica from the furnace wall and tuyere fragments (Chirikure and Rehren, 2006:47). Some of the slag samples have high levels of iron oxide (see figure 47 and 48), suggesting that the smelting technology left a lot more unreduced iron oxide in the slag. There are instances where abundance of free iron oxides suggests a proxy of strongly reducing conditions. The contribution of fuel ash to the slag formation process is visible through the enriched amounts of calcium in the slag that contrast with the extremely low readings of this element in the slag samples. This observation is also consistent with what has been documented by (Friede *et al.*, 1982:39) who examined slags from Venda land containing high lime value; this could be attributed to the fact that slag absorbed lime containing flux from the charcoal fuel. This is also consistent with the microscopic observation where leucite was identifiable in the slags.

The generation of above constituents is an indication that slag underwent a cooling process. The common practice in the iron-production process is that spinels are the first crystallisation phase, forming euhedral crystal or large zone crystal, while dendritic wüstite aggregates form at the beginning of the slag melt solidification (Tylecote, 1976). The ore at Mut 2 site is characterised by low manganese (with the ratio of about 1:28) and low alumina content. Ore sample from Mut 2 site (Haematite average of 99.26) has elevated levels iron oxide and generally low gangue materials. This type of ore sample is relatively free from titanium and has amounts of silica (with the ratio of about 0:10) This chemistry seems to have been inherited by the slag and clays because Mut 2 slag are generally low in Titanium (TiO_2). Despite this, it appears that this type of ore had a wide distribution in the study area. Similar chemical constituents have been observed at Thomo site. Comparative studies of ores from the Rooiwaters Complex in Limpopo Province, South Africa, demonstrated that for indigenous iron works to process very high-grade Titania-rich ore with few gangue minerals, some sand may have been deliberately added as a flux (Miller and Killick, 2004; Killick and Miller, 2014:242). In Kenya, however, Iles and Martinon-Torres (2009) suggested that clay may have significantly contributed towards the fluxing of ilmenite-rich magnetite sand, though in some cases, smelters blend iron-rich with iron-poor ores, in the process introducing gangue materials that made slagging easier (Iles, 2014).

6.7. Summary

This chapter has shown that metal production at Mut2 and Thomo sites was an activity that was undertaken. Elemental and microscopic analysis shows that metal workers were masters of their speciality. Production technology and debris analysis at both sites are consistent with previously documented examples from sub-Saharan Africa and beyond. It became apparent that the metal-production technology conformed to the bloomery process conducted in forced drought furnaces as noted elsewhere within the region. Judging from the surface scattered debris, it can be concluded that Mut 2 site metal production was aimed for a homestead subsistence while Thomo site produced for commercial use. There are many types of craft products that were manufactured at both sites. Analysis shows that smelters played with the system, for example by adding sand to flux the reaction and facilitate the formation of slag as well as the exploitation of hematite (Fe_2O_3) which was locally sourced. Fuel ash, as shown by the presence of alkali elements, also contributed to the furnace reactions as fluxing agent (Rostoker and Bronson, 1990). The existence of a high amount of bloom fragments in one area suggests that some smelts failed or were terminated before the slag could drain from the formed metal. Currently it is not yet known whether furnaces of distinctive design have any effect in the iron production. The archaeological investigation has, however, encountered two furnace types with diachronic implications. These are an earlier triangular type and a later cylindrical one (often referred to as the Venda type in the literature) (Maṱhoho, 2012). A comparison of the microstructure and chemistry of the remains of iron production from both Thomo and Mut 2 sites revealed that hematite ore were exploited during the Early Iron Age period. This analysis shed insight on the natures and technology and phase of metal production represented by metallurgical remains from both Thomo and Mut 2 sites. Having presented the trends displayed by each form of material culture, the next chapter presents an overall discussion showing how these help in the understanding of lifeways of Mut 2 and Thomo communities.

CHAPTER SEVEN: DISCUSSION

7.1. Introduction

This chapter provides a discussion which is based on the findings presented in previous chapters. In preceding chapters, the implication of the results of each form of materials objects were considered in isolation. However, these results are correlated in this chapter for an enhanced understanding of Mut 2 and Thomo in respect of Iron Age period. The distribution of cultural material objects at Mut 2 and Thomo sites are used to reconstruct the lifeways of the inhabitants. The aim is to see how information obtained from ceramics, faunal and settlement pattern and the archaeometallurgical analysis complemented each other. When considered together, do they reveal the chronology of the sites? What does the distribution of objects tell us about various activities conducted at the sites? Where are these activities located within sites? The results of the current study are strongly indicative of trends and patterns at the archaeological sites.

7.2. The chronology of Mut 2 and Thomo Iron Age sites

Chronology is crucial to understand the various elements of Mut 2 and Thomo site and the relationship between Early Iron Age Communities. Information obtained from the analysis of various forms of material objects presented in previous chapters, supplemented by radiocarbon dates has shown that the rise of Mut 2 and Thomo sites can be explained considering their predecessors namely: Kalundu and Urewe traditions. Culture historically southern African Iron Age represents the last 2000 years and has been divided into the earlier and later periods. The Early Iron Age has been broadly sub-divided into three facies comprising Silver Leaves facies (280-450 AD), Mzonjani facies (450-750 AD). Silver Leaves and Mzonjani facies co-existed in the region prior the advent of Garonga facies (750-900 AD) (Huffman, 2007).

Archaeological records demonstrate the presence of Kalundu tradition ceramic sites distributed from Angola towards South Africa (Mitchell, 2002: 267; Mitchell and Whitelaw, 2005: 221; Phillipson 2005: 249). Klein Africa and Happy Rest sites are the only known Kalundu tradition sites in the Limpopo Province (De Vaal, 1941; Prinsloo, 1974; Campbell, van Waarden and Holmberg, 1996).

Based on archaeological materials records assemblages belonging to Urewe, the stream has been subdivided into two sub-streams known as Nkope, and the coastal stream, known as the Kwale. Both are believed to have been originated from the Great Lakes. The Kwale traditional stream is believed to have reached as far as KwaZulu-Natal while the Nkope only reached the inland interior, as far as the Limpopo Province (Mitchell, 2002: 267; Phillipson, 2005: 250-4). Sites attributable to a later Nkope occur in the Limpopo-Shashe basin as Gokomere / Zhizo, dated to the seventh-to-tenth centuries, with Schroda as an example (Hanisch, 1980; Mitchell and Whitelaw 2005; Phillipson, 2005; Huffman, 2000; 2007). Giliomee and Mbenga (2007:25) are of the view that Kalundu communities moved into the study area and secured political, social and economic power of the region. This territorial expansion into the region was more often by means of slow diffusion of small communities, incorporation of weaker groups and formation of alliances or establishment of patronage between incoming and existing communities (Giliomee and Mbenga, 2007). Ceramics analysis shows that there is a wide ceramic distinction between the Kalundu and Urewe traditions.

Sites that represent the Kalundu tradition within the region date from the 6^{th} century AD; however the integrity of the Happy Rest facie (Phase 1) remains imprecise, because the known collection is mixed, derived from multi-component sites (De Vaal, 1943; Prinsloo, 1974;1981). Diamant facie (Phase 2) represents the Kalundu tradition, the facies date to AD 750-1000 (Huffman, 2007). Previous research noted that all ceramic styles thought to have derived from Transvaal variants of the Kalundu tradition have been interpreted as a separate branch that represents a new tradition. Based on ceramics scale characteristics, the differences are obvious and the Kalundu and Urewe traditions have been interpreted separately (Huffman, 2007).

Burret's (2007) rationale is that Kalundu tradition, specifically Diamant, represents a different structural code to the Urewe tradition. It is characterised by a combination of the following features: recurved jars, decoration on the shoulder or occupying a broad area incorporating both the neck and shoulder, lip decoration, the use of ladder and comb stamping in addition to incision as decorative techniques, the use of interlocking triangles, presence of open and hemispherical bowls with decorations on the rim or dropped to the lower rims, necked bowls with decorations on the neck.

Mut 2 and Thomo ceramic analysis shows that these ceramics depict borrowed concept and profiles that are common from both Urewe and Kalundu tradition. In fact, there is a continuation of Kalundu pottery style with Urewe ceramic attributes. Burret (2007) and Huffman's (2007) preliminary study of Garonga Phase ceramics revealed striking similarities. Burret (2007) had also reflected this; his rationale being that Kalundu and Urewe people had interaction or marriage alliances. These groups' ceramic codes and symbols could only be well understood by members who produced them, since ceramic styles, motifs and attributes are structured symbols with social meaning. A widespread notion exists, where Garonga Phase progressed and started to appear from AD 750 if not earlier. Even the exotic ceramics analysis shows that Mut 2 site engaged in international trade systems where they supplied ivory and animal skins as trade goods in return received exotic goods such as glazed ceramics and porcelains. Regional archaeological records show both Urewe and Kalundu archaeological sites within 90 kilometres' radius.

Grounded on the distances between documented sites, it is arguable that Iron Age predecessors had interactions and marriage alliances with each other, yet they retained their own, distinctive ceramic shapes and cultural symbols. With more similarities and continuation in pottery technology in terms of vessel type and shape, decoration techniques and motif, it is probable that this is evidence of Iron Age predecessors expanding their territory. It has been shown that Iron Age communities occupied areas in proximity to water sources; they constructed houses in daga, poles, lattice and had thatched roofs. Most of these occupational zones when abandoned are burnt. Their settlements are based on Central Cattle Pattern theory. Based on these similarities in site locations and settlement patterns, it has been suggested that people responsible for Mut 2 and Thomo site were Iron Age communities. Settlement at Mut 2 site appeared to have been centred on raised platforms of the Luvuvhu Riverbank. As the population of the area continued to increase, some people might have moved north and north-east of the site.

The earliest occupation of Mut 2 site is dated AD 652 (658) (663) from charcoal Sample (Pta. 8000). No different occupation could be derived from the ceramics analyses or from archaeological deposits (Archaeo-Info, 2000). Apart from Mut 2 site, Thomo site dated (655-774 AD) sample (Beta-536384). The results of radiocarbon dating indicated an occupation phase between 650-1000 AD. The recovered two pieces of brown- and blue-glazed ceramics pre-Islamic wares dated to the same period (700-975 AD). The emergence of these communities was contemporaneous. These findings cement Burret's argument that the Garonga Phase represents the latter transitional period of the Iron Age. The period is well represented by distinct ceramic profiles and structural codes well-grounded within the Kalundu and Urewe traditions. Huffman (2007) supports observation by Burret (2007) that Garonga Phase ceramics are dominated by recurved jars with decorations on lip, neck and shoulders. The population of Mut 2 Site has bearing on the population estimates. It can be argued that its population was less than 100. This conclusion is further supported by the absence of big middens. The archaeological investigations revealed 18000sq metres of occupational zone dominated by 23 huts structures and 40 grain bins (Archae-Info, 2000). Burned daga fragments with pole and lattice impression marks at Mut 2 site demonstrate with certainty that the site was burned and abandoned. The chronology developed from material object analyses (ceramics and radiocarbon) seems to paint a clear picture of the origin and the development of Mut 2 and Thomo Iron Age site.

7.3. Distribution of activities and status at Mut 2 site

Distribution and frequency of occurrence of various activities has been used to understand the distribution of material objects across the site. At Mut 2 site, an understanding of distribution pattern was crucial in reconstructing various activities engaged in by the past inhabitants as well as revealing control of activities. Mut 2 site excavation did not cover the entire site; however, during the destructions process of Mut 2 site, the grader exposed huts, grain bins and underground storage pits structures (see figure 69). The distribution of these structures covered the entire Area 1 site. The grading process was of prime importance to investigate, and clearly separate, the sequence of occupations and to study change of occupation, architectural designs and the settlement progress through time. Features uncovered were visible and a detailed comparison of the site layout was documented after excavations. Mut 2 site settlement arrangement demonstrated burnt houses and associated grain bins, these well represented by burnt rubbles on top of gravel floors. Hut and grain-bins structures were undoubtedly erected out of poles and lattice framework which was covered by mud / daga as reflected from the observed burnt daga fragments with pole, lattice and grass impressions. All structures documented from the top section of the graded layer had a circular structural design. Similar structural designs have been archaeologically reported throughout the South African Iron Age settlements. It is arguable that the surrounding Lowveld bushveld complex provided Mut 2 communities with perfect wood for constructions, industrial and domestic use. Unfortunately, the type of wood used in house constructions could not be determined since most of the poles were burnt down and reduced to charcoals. The investigation revealed the presence of the uniform distribution of huts, grain bins and underground pits covering 18000sq metres.

The radius of the hut floors differs significantly, some of the exposed floor remains measured 1,7 while others were 2,3 metres' radius. The observed space in between structures was 6-10 metres or more from each other. Numerous daga fragments collected varied in thickness and this probably influenced the quality of the construction. Hut floors could only be identified as daga gravel and ashy soil mixture found at the bottom of dilapidated structures. The floors were built directly onto the ground, while grain bins appear to have been raised and rested on poles and grass platforms. These grain-bin foundations were raised about 30cm above the ground. A total of 23 hut structures were excavated and cleared as features, 40 grain storage remains, 11 pits and 8 ash concentrations were documented. As the village expanded, they probably built new structures over existing foundations and fireplaces due to a shortage of space. It can be concluded that Area 1 of Mut 2 site was an occupational zone. Evidence of smithing was noted within the occupational zone, well represented by smithing slags as well as hammers and anvil stones.

It has also emerged that Mut 2 site participated in trade, livestock rearing, hunting, fishing, crop cultivations, cotton weaving and metal production. A wide distribution of ostrich eggshell beads, arrow bone link shaft, brown- and blue-glazed ceramics shows that Mut 2 inhabitants participated in internal and international trade. The production of ostrich eggshell beads, bone link shafts has long been thought to be speciality of Stone Age hunter-gatherers. Their presence in the Iron Age community has been interpreted as contact with hunter-gatherers.

The presence of spindle whorls points to cotton weaving. Metal production was conducted on the edge of the village. Surface metal debris revealed a production designed to meet the demands of individual units. Slag, tuyere, pieces of hematite, eggshells, eggshell beads and grooved stones were some of the craft production related evidence at the site.

In the archaeological realm, Early Iron Age settlement pattern is believed to conform with Central Cattle Pattern theory. Mut 2 site exhibits unusual settlement pattern not yet clear at the regional level, there seems to be an absence of Central Cattle Pattern (CCP) (Figure 69). What needs to be investigated further is why Central Cattle Pattern did not exist and what is the significance of the documented settlement pattern at Mut 2 site. Briefly the Central Cattle pattern is characterised by a cattle kraal, male domain in the centre, where men and other high-status people were buried, sunken grain pits and raised grain bins for the storage, a public smithy and an assembly area, where men resolved disputes and made political decisions. The outer residential zone that surrounds the kraal became the domain of married women, incorporating households (Huffman, 2007). It is difficult to conclude much about the site layout plan; however, the lack of cattle kraal at the centre of the site suggests that the settlement may not have been on a circular plan, it extended linearly along the Luvuvhu River bluff with house structures throughout the entire site; rich deep alluvial sand soils for agriculture are present on the lower Luvuvhu floodplain.

However, its location is close to the stream with agricultural activities on the floodplain. The Central Cattle Pattern (CCP) which was advocated as a dominant model on Early Iron Age sites did not seem to be applicable on Mut2 site, largely because no cattle kraal was found at the central part of the site (see figure 69). One of the siting factors on the absence of cattle kraals at Mut 2 site could be associated with the presence of Nagana diseases caused by the presence of tsetse flies in the region. However, one cannot rule out the fact that the livestock were very minimal. Not every household had cattle; however, the increased importance of cattle as time went on probably influenced the CCP layout so that the houses were arranged in circular form around the cattle byre as was common in latter times but the antiquity of this practice is uncertain (Connah, 2004).

There is a significant change in settlement pattern, as we have seen at Mut 2 site. Mut 2 settlement pattern tends to display less uniformity and more regional diversity than those noted at other early farming community sites. Evidence for the Central Cattle Pattern has been reported from Early Iron Age sites in South Africa including Ndondondwane (Greenfield and van Schalkwyk, 2003;

Greenfield and Miller, 2004), Nanda (Whitelaw, 1993) and Kwagandaganda (Whitelaw, 1994) in KwaZulu-Natal as well as Broederstroom (Huffman, 1990; 1993; 2007) in the North-West Province (Badenhorst, 2009). The distinctiveness of the settlement layout at Mut 2 site unequivocally does not resemble the Central Cattle Pattern as a projected settlement model that dominated Iron Age sequence. The settlement pattern has demonstrated Mut 2 site level of organisation above the household level. Valid assumptions are that Mut 2 site may suggest a level of community. The settlement pattern exhibits preference for raised ground at the bank of the river or stream. This trend is synonymous with early farming communities at both local and regional level. Apart from the hut structures and grain-bins foundation, several deep lying pits with ash mixture filled with broken potsherds, and animal bones were documented. However, no dung deposit could be found in the settlement horizon. Synonymous pits have been documented at Klein Africa (Prinsloo, 1989), and Steelpoort (Huffman, 2007).

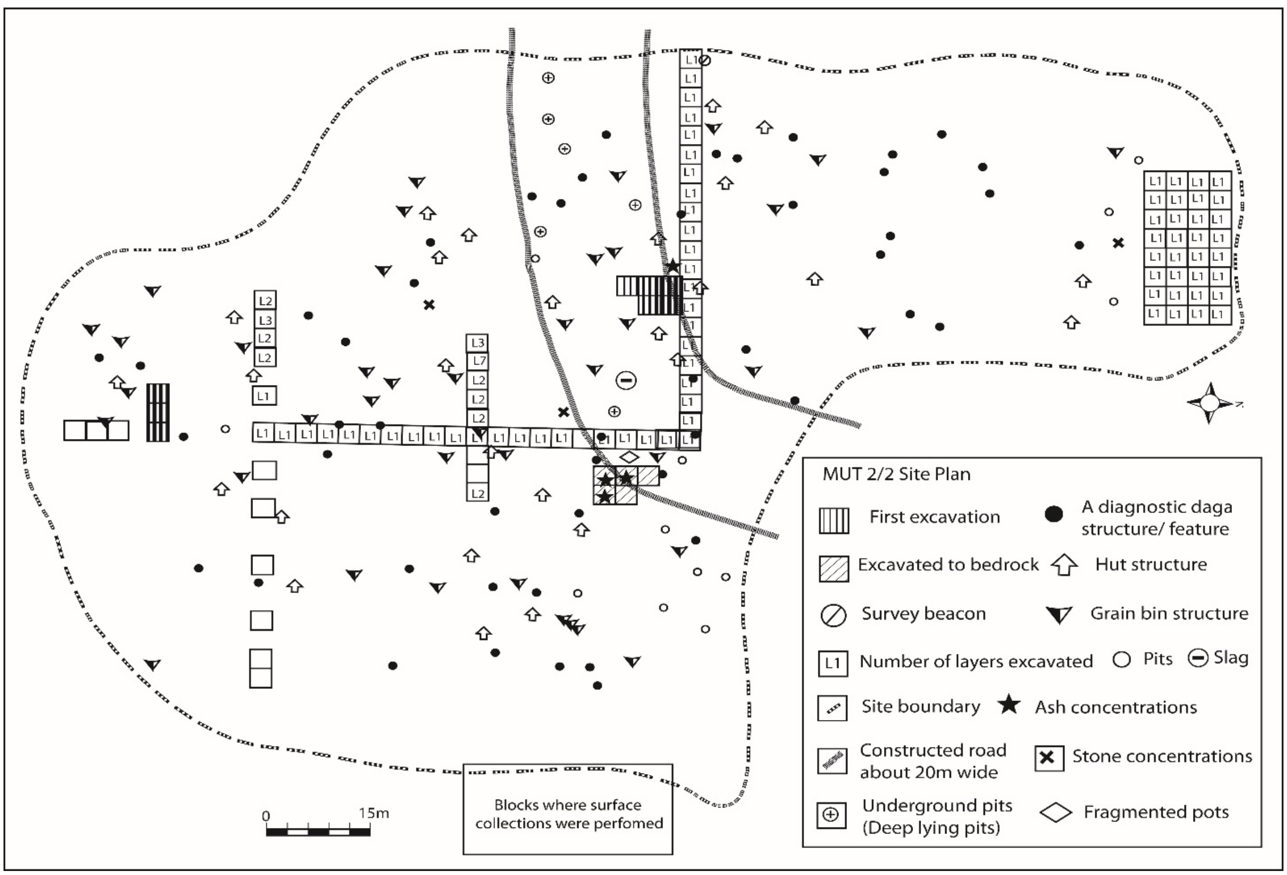


Figure 69: Mut 2 site plan adapted from Archaeo-Info report (2000).

Archaeometallurgical remains at Mut 2 site demonstrated a diachronic picture that reflected metal production as well as smithing knowledge domain. Generally, indigenous iron production required mastery of not just the technology but also of the surrounding physical and social environment. In both the archaeological, ethnographic and historical records, the process of iron production involved raw material selection, processing, smelting, smithing use and discard. Several decision-making processes can be read from the archaeometallurgical remains.

At Mut 2 iron production area, rich hematite ore were used. This technological decision enabled the smelting of high-grade ores (hematite) which had few accessory minerals. The process of smelting required maintaining a balance between several variables such as fuel, air and ore for it to succeed. Research has also demonstrated that Mut 2 inhabitants could select clay extraction sources good enough to withstand the heat to prevent crumbling of furnaces and tuyeres. The iron-production area was located on the edge of the village possibly to exclude social groups such as women and children. In some cases, furnaces were lined with clay with fluxing properties. The technological data revealed bloomery metal production was practised. Archaeometallurgical analysis suggests that the technology of iron production was relatively stable during the Early Iron Age period (Maṱhoho *et al*., 2016).

Archaeometallurgical analysis shows that metal production was limited to village consumption. The scale of metallurgy seems to have intensified with time such that later sites contained more evidence of metal working than ealier ones (Chirikure and Rehren, 2006; Maṱhoho *et al*., 2016). For example, evidence from sites such as Squares near Phalaborwa that dates from the 1700s onwards shows that the later Iron Age period was marked by an unprecedented, intensified exploitation of mineral resources (Miller *et al.,* 2001; Maṱhoho *et al.,* 2016). Within the Nanḓoni Dam, largescale iron melting precincts were recorded on both riverbanks. However, most of these sites represent the Late Iron Age period. This research also revealed evidence of smithing as noted by the presence of smithing slags, hammer and anvil stones within the occupational zone of Mut 2 site. The physical process of smithing and forging metal into utilitarian tools or jewellery could safely be done in the village. The process is no longer jealously guarded, while associated metal production taboos are no longer observed.

7.4. Distribution of activities and status at Thomo site

At Thomo site, an understanding of distribution patterns was crucial in reconstructing various activities engaged in by the past inhabitants. The investigation revealed a uniform distribution of slag layers, with areas of high concentration on the Nsami Riverbanks. Slag, tuyere fragments, and iron ores debris represent metal-production sites. The archaeological investigation encountered a triangular furnace type with three tuyere openings and iron production conformed to the bloomery process. Smelters, however, played with the system, for example, by adding sand to flux the reactions and facilitate the formation of slag (Rehren *et al.,* 2007). The archaeometallurgical analyses revealed that the fuel ash as shown by the alkali elements contributed to the furnace reactions and as reported elsewhere, performed the function of a fluxing agent (Rostoker and Bronson, 1990). The technology of reduction was well adapted to the exploitation of high-grade haematite ores. These were all locally available.

It has emerged that there is a need of water in metal production, therefore sitting of Thomo site in proximity to Nsami River might be one of the factors. Judging from surface scattered metal production debris it can be concluded that metal production practices at Thomo were conducted to meet the regional demand. The wide distribution of slag concentration shows that the area was used for commercial metal production. Judging from slag distribution, it is assumed that Thomo participated in metal product trade, where utilitarian metal artefacts associated with agriculture and hunting were produced for trade and exchange. Metal was regarded as the signature of power and authority (Herbert, 1996). Slags, tuyeres and iron ore were some of the craft production related evidence at site. The similarity in chemical and mineralogical composition of Early and Late Iron Age slags confirms the observation made by Miller and Killicks (2004) and others that it is often difficult to distinguish slags from different periods. Because few finds of finished iron objects were found from our study, we are precluded from making statements about Iron Age metal fabrication technologies. The research has demonstrated the existence of a high amount of bloom fragments in one area which suggests that some smelts possibly failed or were terminated before the slag could drain from the formed metal.

7.5. Spatiality of iron production at Mut 2 and Thomo sites.

One of the most important questions in Iron Age archaeology of southern Africa related to the spatial organisation of iron production in relation to settlements. Huffman (2007) contends that throughout the Iron Age, iron was smelted outside villages because of its association with transformation and accompanying rituals. Admittedly, the research has demonstrated that smelting was done within the edge of the village precinct. Maggs (1992) has observed this practice at several sites in KwaZulu-Natal. Maṱhoho (2012) recorded smelting conducted within the walled enclosure which was part of the village at Mut 26 Late Iron Age site. At Thomo, an EIA site, smelting was done within the village precinct (Maṱhoho, 2012:106) However, the smelters at Vuu (LIA) site were located away from the village demonstrating variation within the LIA. Then, these results show that there may be a break in the spatial organisation of metal working between the EIA and LIA. As such, more studies by archaeometallurgists are needed to reconstruct the technology and phases of production represented by metallurgical remains from the EIA villages, to argue that typically smelting would be done away from villages because of a similar worldview is simply not enough (Huffman, 2007).

7.6. Sociology of Iron Production

Overall, the significance of the indigenous iron production extends beyond the simple economic importance of metal in African economies and had far-ranging impacts on agriculture and food processing, warfare and trade networks (Maggs, 1992; Child and Killick, 1993; Chirikure *et al.,* 2009). Ethnographically, ceremonial iron objects such as hoes, arrow heads and spears were often viewed as objects of heredity that passed from lineage of past generations (see for example Childs and Dewery, 1996) and were regarded as family possessions that could not be exchanged for any commodity. However, and in contrast, utilitarian objects changed hands in a different sphere of exchange (Herbert, 1993; Hall, 1987). Besides this sociological and utilitarian value of iron objects, the production of iron was associated with socio-technical rituals that embedded the technology in the society (Childs and Killick, 1993; Killick, 2004; Herbert, 1993; Chirikure, 2015, Maṱhoho *et al.,* 2016).

Iron smelting was metaphorically linked with human reproduction and procreation as both processes (childbirth and iron smelting) represent transformation or creation through heat. The furnace was seen as a womb that was fertilised with raw materials in the presence of heat to produce a child in the form of a bloomery iron (Childs and Killick, 1993; Schmidt 2009; Herbert, 1993; Chirikure 2015; Maṱhoho *et al.,* 2016).

Because of this link with procreation, a series of taboos were practised. For example, all smelters were often required to practice sexual abstinence. Failure to adhere to this taboo could lead to unsuccessful smelts. Since human reproduction was a private activity, smelting was often practised away from the village in seclusion, guarded by charms and medicine (Miller *et al*., 2004; Schmidt, 2009; Chirikure, 2015). The ritual taboos associated with giving birth were also applied to smelting. Among the Vhavenḓa, for example, when a woman was about to give birth, she was placed in seclusion and by extension, smelting was done away from the village (Miller *et al*., 2004). Once ore had been successfully reduced ("born"), the metal was no longer seen as dangerous and it could be taken back to the village, just as the mother came out of seclusion once her child was born (Haaland, 2004). Therefore, the physical process of smithing and forging metal into tools or jewellery could safely be done in the village. In addition, menstruating women were neither allowed in mines nor permitted to touch the ore as they were regarded as unclean and their impurity was regarded as harmful to the smelt (Chirikure, 2015; Maṱhoho *et al*., 2016).

Another important sociological issue obtaining from Venḓa iron production is the correspondence which it shared with male circumcision. The most common characteristic relates to taboos which dominated both processes. It was contended that if abstinence were not observed, death or failed smelts could result. Iron smelting and circumcision school activities were not staged simultaneously; the reason for observing this custom was the fear that young initiates may die as circumcision and iron-smelting processes were dangerous (Maṱhoho, 2012). It could be argued that Thomo was the leading site as reflected by the existence of the largest quantities of production debris when compared to Mut 2 site.

7.7. The Implications of the study

Ceramic analyses revealed that the noticeable amalgamating features of farming communities are centred on food and resource procurement and acquisition. Iron Age communities were self-sufficient regarding food. It has been argued by Best (2003) that in regions with access to both terrestrial and aquatic resources in abundance, the community will have evolved in subsistence strategies which require the co-operation of a sizeable number of individuals using specialised hunting, food processing and storage techniques. In contrast to the above, the study area is one of the resource regions with a variety of raw materials and wild animals at logistical locales. Such strategy is believed to encourage social stratification and intergroup rivalry, conflict and exclusion (Ibid: 2003). The ceramic evidence for local development, in contrast, concerns stylistic continuity rather than a few isolated attributes and the continuity should be an outgrowth of change forming the sequence of ancestral phase (Huffman, 1989).

Huffman (1989) is of the view that if local development occurred, then the continuity should be parallel to the sequence of changes that occurred elsewhere in the related branch because both branches originated from the same non-verbal code of communication. At all times throughout the two sequences, there is evidence that facies chronologically overlapped and that communities who shared different ceramics stylistic shapes and codes shared the landscape and clearly interacted. The interaction marks a universal evolutionary phase where cultures were organised into cultural areas / regions in which cultural traits are shared (Antonites, 2012).

Interaction has been defined as the exchange of materials, ideas, beliefs and information between members of different corporate groups (Odess, 1998). Interaction played a central role in the development of human societies at all levels of complexity because it provides access to materials not locally available and facilitates the exchange of information that is critical in determining the long-term adaptability of a group (Ibid: 1998). This would have developed into acculturation, which placed the dynamism of culture change on continuous first-hand contact between donor and recipient (Urewe and Kalundu) (Antonites, 2012). Ceramic style therefore has the potential to illuminate local interaction (Antonites, 2012). Diachronic ceramic studies presented compelling evidence of autochthonous development. However, it is still not yet known how this entity spread within the province and perhaps beyond the South African borders. However, Childe (1958) acknowledged environmental conditions as constraining or allowing for culture change and he viewed diffusion and migration as driving forces behind historical change. Ceramics analysis of both Mut 2 and Thomo sites generated classes out of the previously existing ones.

Judging from the number of structures uncovered at Mut 2 site, we see that Early Iron Age societies consisted of a small number of mutually independent lineage groups with political authorities derived from kinship relationships. Therefore, the demographic units of the early farming communities' sites are likely to be smaller as documented from archaeological sites of southern Africa. Subsequently, in the case of both Urewe and Kalundu communities, marriage alliances may have occurred. As a social process, interactions took place on a variety phenomenon articulated at individual, household and community scale. What is emphasised here is that these intermarriages between Kalundu and Urewe led to the emergence of a new group who established themselves as the political and cultural elite of the region.

A similar phenomenon has been recorded in the Soutpansberg. Settlements where Eiland ceramics predominate are only found in the Soutpansberg and south of Polokwane; however, isolated Eiland vessels have been found in Mapungubwe settlements. To date, this interaction has been part of the bride wealth exchange system (Calabrese, 2005; Antonites, 2012). Furthermore, Loubser (1988) has also identified a ceramics style referred to as Mutamba that he associates with local communities in the Northern Soutpansberg. Oral tradition suggests that a group which claim to be the real Venda today was not the original occupants. The region was occupied by independent small chiefdoms characterised by Vhangona who were described as poorly organised and were few in numbers and could therefore not give notable resistance against invaders. When the Torwa group (Singo dynasty) crossed the Limpopo River from Zimbabwe and settled along the Soutpansberg range, they found Vhangona in occupation of the territory. Several Vhangona chiefdoms were invaded and overcome, while others fled and stayed in other regions. During the invasion, the Singo dynasty subjected and practically exterminated the Vhangona, sparing only those Vhangona who were priests and rainmakers. For example, Luvhimbi was saved from the death during the invasion because he was believed to be a rainmaker. It is upon this military victory that a new political geography emerged and the Singo claimed to be the real owner of the region (Lukhaimane, Unpublished Manuscripts: 7). It is due to this inversion that intermarriages between the Singo and Vhangona in the region led to the amalgamation and formation of Vhaveṋḓa of today (Bonner and Carruthers, 2003:17). Available archaeological evidence demonstrated that this new group (Garonga Phase), flourished and occupied the lower lying area of Kruger National Park (Meyer, 1986), Garonga Nature Reserve (Burrett, 2007) along the Nsami and Luvuvhu Rivers (Archaeo-Info 2000 and Maṱhoho, 2012). It is arguably through interactions that technological, artistic and behavioural innovations were spread from cultural group to another, while the emergence of Garonga is likely a purely local phenomenon. Odess (1998) opines that this collaboration between Kalundu and Urewe as reflected on ceramics stylistic code may reflect change that previous archaeological studies did not recognise in the archaeological records. The inclusion of both Urewe and Kalundu ceramic codes represent a pattern that reflects the social context of production and consumption. The ability of ceramic traditions to reproduce themselves through recurring designs styles bespeaks interaction between potters and the communities who used their pots. Stahl (2002) notes that ceramics production exists in the realm of practical knowledge. This acknowledges that ceramics distribution may be congruent with ethnicity and language pattern (Antonites, 2012).

Indeed, in the case where language and / or ethnic group is the most significant interaction network for potters, it is expected that the production of ceramics with a similar style will conform to these patterns (MacEachern, 1998:114). Hammond-Tooke (1993) has also noted that the Iron Age homestead was the most basic social unit with a complete social and economic autonomy. However, a single homestead could not be entirely self-sufficient. Three things forced it to look outside its confines to other homesteads for its very existence. First, marriage: wives for homesteads and husbands had to be obtained from other homesteads. Secondly, seasonal economic tasks, such as elephant, buffalo, lion and leopard hunting demanded intensive labour beyond the resources of a single unit homestead as well as chores such as bush clearings, weeding and harvesting. Thirdly, there was the need for defence against both human and wild animal attack, therefore a single, isolated homestead was just not socially viable. When population size is small and homesteads are widely dispersed, the chance of extinction is relatively high; this can occur through a variety of random accidental or catastrophic events including reproductive outcome (Cashden, 1985).

There are perhaps some of the factors at work that are required to be examined, economic consideration is no doubt to be discerned everywhere; for example, there are certain regions where clay soil for making pots, and iron ore for making implements, exist in abundance. These raw materials could have been exchanged or bartered between the Urewe and Kalundu traditions. They collectively shared the same neighbourhood which emanated into direct and continuous contact, they did not lose their separate identities even after extended interactions (Hodder, 1982; Stone, 1995). Ethno-archaeological records put forward that even two cultural groups that have identical material culture may retain distinct ethnic identities and cultural attributes. For example, in East Africa two tribal groups, the Dorobo (Hunter-gatherer groups of Kenya and Tanzania) and the Samburu (Semi-nomadic pastoralist people of north-central Kenya), interacted frequently and have some common material culture assemblages. Their identities remain separate, however; each group has different social organization (Hodder, 1982). Elsewhere in East Africa, pottery of mat impressed or rock-stamped, dotted designs and that of the succeeding Neolithic tradition was found to have spread to a larger region of Africa and even beyond to Asia. The wide spread did not suggest migration of people but contact trading and exchange (Chami, 2007).

Cultural contacts led to the diffusion of information and ideas, often manifest in the appearance of new material cultural traits in each culture (Davis, 1983). For the sake of ceramic analysis, a culture in which an imported trait appear is termed the “recipient” culture. The culture in which the trait originated becomes the “donor” culture (Davis, 1983; Stone, 1995). Kalundu tradition absorbed Urewe cultural influences through intermarriages and acculturation, but they modified those influences to suit their own needs. Differences in style coupled with geographic separation may be interpreted as lack of interaction or caused by the death or geographical relocation of an individual (Best, 2003). The same cannot automatically be concluded when there is no geographic distance involved. Of course, an alternative hypothesis should be considered, that the Kalundu and Urewe traditions were diverse cultural groups, who only had formal relations, through contact, trade and intermarriages. Further work is required to investigate this.

While rates of interaction were relatively high, there is only limited evidence for extensive pottery exchange. The exchange of pottery might be the outcome of competition within social units over access to resources or alternatively, exchange might have been employed as a mechanism for creating alliances between social units in conjunction with other groups. This suggests that Garonga Phase ceramics form a transitional phase of ceramic development. Despite the gaps in the database of the first millennium ceramics, there is enough information to allow a glimpse of dichromic changes in the distribution of ceramic ware associated with 700 AD. Garonga ceramics show strong evidence that reflect a clear structured design to which the potter conformed (Evers, 1988; Burret, 2007). First Millennium AD southern African ceramics can be readily divided into thick and thin ware (Sadr and Sampson, 2006). The walled (>10mm) coarse surfaced, generally larger vessels seem to have their stylistic and technological origins to the north of the sub-continent (Sadr, 2008).

This direction of change whether body sherd thickness increased or decreased has been the subject of some dispute; however, an analysis of late prehistoric ceramics assemblages within the region suggests why this should be. Thick body sherds are significantly greater in the assemblages from Mut 2 site represented by several vessel types, design and decorations. When analysed, they depict rare combinations and when compared to those more widely distributed in the region from AD 280-600 they afford close resemblance to those from the early phases. Again, this conclusion is consistent with previous research by Meyer (1986) and Burret (2007). One of the hallmarks of the change within the Iron Age ceramics is the inclusion of jars in this phase.

Meyer's (1986) interpretation, in some respects, saw pottery variations and similarities in temporal terms. The best documented ceramic assemblages of this time so far have been documented from the Garonga site as well as Kruger National Park (Meyer, 1986; Burret, 2007). However, most of the ceramics collected from the Garonga site were collected from the surface of the sites (Burret, 2007, Archaeo-Info, 2000). Meyer (1986) has conducted inter-assemblage descriptions especially for early farming community sites. The distribution of these ceramics shows great similarities and varieties of exterior treatment have been recognised in the pottery ranging from polished surface to various forms of comb stamping, crosshatching and fine lines incising. These assemblages are widely distributed in the Kruger National Park (Meyer, 1986). These ceramic production styles appear to have placed more emphasis on finishing exterior and decoration motifs.

Synonymous cultural changes have been noticed and recorded in the region, archaeologists have reported Thavhatshena-like vessels in the northern and north-eastern Transvaal (Chatterton *et al*., 1979:117; Meyer, 1986:201) but due to the apparent scarcity of such vessels they did not recognise a distinct style (Loubser, 1989). Appearance of Thavhatshena ceramics was a unique occurrence, the ceramics show single bands of either chevrons, or herringbone normally restricted to Khami vessels. The type of vessels was reported for the first time within the Soutpansberg region together with ceramic assemblages with parallel bands of Moloko traditions on the necked jars; similar Thavhatshena bowls combine Moloko traditions on the vessels' lip decoration with the Khami traditions represented by the chevrons or herringbone (Loubser, 1989).

It is accepted that the amalgamation of Khami and Moloko stylistic elements on the Thavhatshena vessels reflected close interaction between the Shona and the Sotho speakers, then the merging of style must indicate the development of a new language (Loubser, 1989). By AD 1550, a new style known as Letaba had developed out of the merger between the Shona and the Sotho style, because Letaba ceramics are closely linked to people who speak Tshi-Venda, it is likely that a common Venda language emerged after less than a century of intensive interaction and intermarriages between the Shona and Sotho (Loubser, 1989). Similar examples came from the hint of some stylistic attributes from Eiland into Madikwe and the incised and comb-stamped character of Rooiberg ceramics shows that Eiland and Madikwe people interacted; Rooiberg is evidence of further interaction at the interface between Madikwe and Ntsuanatsatsi / Uitkomst (Bandama, 2013).

The difference in pottery style between Kalundu and Urewe may simply have been for this purpose. They may have interacted on a regular basis, but their relationship was defined through symbolic codes emphasised in ceramic decoration styles. This distinction in ceramic assemblages is intermediate between the facie / phase. However, some of these are reflected in ceramic classes present between Urewe and Kalundu traditions. Others include very detailed differences in the kinds and frequencies of designs presence of the necked vessels' placement of decorations (Evers, 1988). The differences between Urewe and Kalundu are at the traditional level. The differences are immediate and visual, and the hypothesis presented by the differentiation in style had progressed further to produce some new distinct phase or facie under study. Pottery style functioned as ethnic identity marker (Huffman, 2007). Thus far, we can see existing new styles of decorations that incorporate evidence for style merger, either with elements from two styles (Urewe and Kalundu ceramic traditions) on the same vessels or with approximately equal representation.

Garonga Phase ceramics has been an offshoot phase that represents Kalundu and Urewe ceramic codes as it appears in the archaeological records. It is arguable that the introduction of Garonga Phase ceramics did not represent just a change in ceramics and other technology, but a change in social and economic strategies, concerning the circulation of goods, ideas and people. Change can reflect transformation of the meaning system arising out of the social development such as those changes noted in the region. Synonymous changes have been noted in the ceramic sequence that resulted in the local development. The replacement of the Eiland and other facies by Moloko at the end of the 13th century involved the introduction of a new culture with different symbolic codes (Evers, 1988). Data from the Garonga phase show not only how complicated the entire ceramic and human settlement processes in the region are but also the potential for addressing change (Pikirayi, 1999). While the evidence from Mut 2 site indicates that Mut 2 and Thomo sites are of the Garonga Phase period as reflected by the sites' ceramics styles, the distinctiveness of the settlement layout at Mut2 site unequivocally links the occupation with what has not yet been documented on the Early Iron Age settlement pattern. Indeed, the appearance of Garonga settlement pattern at Mut 2 may be linked with the emergence of distinctive cultural groups that emerged from Urewe and Kalundu traditions. Drawing together the threads from site excavations and combining the process with artefacts analysis, and radiocarbon dates, a diachronic picture of early farming communities in the region emerges. The major component of this study was to recover an adequate and representable ceramic sample through surface collections and archaeological excavations. Ceramic collections consisting of 6766, with a total number of 78 vessels have been divided into classes based on the vessels' shape, rim and lip profile, location of decoration, motif and pattern (Evers, 1988, Huffman, 2007). Large numbers of the vessel types were dominated by recurving jars.

The vessels were mostly decorated on the rims, shoulders, with comb stamping, incision and cross-hatched decoration techniques being the most prominent. Based on the decorative techniques and ceramic motif, Mut 2 and Thomo ceramics depict synonymous ceramics with those identified by Burret (2007) at Garonga site. Through comparative ceramic analysis, it became evident that there was a significant correlation with ceramics of the Early Iron Age site of Nanḓoni (Fish, 1995), Garonga Nature Reserve (Burret, 2007), Klein Africa, and Happy Rest (Prinsloo, 1974, Huffman, 1980). The fact that Garonga Phase ceramics show remarkable uniformity on several sites within the region, may suggest the combination of both Kalundu and Urewe traditions. Kalundu and Urewe traditions are the predecessor of the only known ceramic style in central Africa. A close examination of the Garonga Phase ceramic traditions shows that it most probably evolved out of the overlap between Kalundu and Urewe tradition.

Garonga Phase ceramics exhibit a mixture of eastern and western traditions ceramics (Burret, 2007; Huffman, 2007). By contrast, Garonga ceramics style conducted two different streams of traditions so migration can be ruled out in favour of local development. If it is accepted that there is an overlap between early farming communities' predecessor ceramics, then it is an indication of the close interaction between Kalundu and Urewe; therefore, the development of Garonga Phase ceramics marks the beginning of regional changes associated with the transition from the Early to Late Iron Age (Huffman, 2007).

The relative appearances of new classes within a tradition probably heralds changes in the symbolic codes (Evers, 1988). The systematic change with evidence for style mergers with elements from two styles on the same vessels results in continuous change over space. Compelling evidence for merger is evident; this evidence has important consequences for the way people interact (Evers, 1988). There are some differences between western and eastern stream in terms of ceramic styles and design motif. Some of these are reflected in the classes present, others include very detailed differences in design frequencies. Detailed differences have been examined using surface samples from Garonga site in the Greater Makalali Nature Reserve (Burret, 2007). Ceramics collected from Thomo site and those collected from the top layer of Mut 2 site excavations were similar to the bottom layers. No changes in pottery production, style and decoration were noted, this led us to believe that there was one continuous phase of occupation at Mut 2 site.

The hypotheses that have arisen because of culture contact are arguably based on ceramic assessment of Garonga Phase, decoration style is the prime objective based on preceding design and decoration continuity that reflect Urewe and Kalundu traditions. Recurrence of complex combinations of motif in a tradition reflect combinations that were socially acceptable (Evers, 1988). The Iron Age ceramics analysis has remained in the domain of stylistic rather than technological analysis; of which now follows a standard approach developed by Huffman in 1980, who focussed on attributes of vessel profile: decoration layout and decoration motif to classify Iron Age pottery (Sadr, 2008). This classification could be accepted as part of an absolute reality. To summarise, the analysis presented here demonstrates that in about 750-1000 AD we may positively separate a regional change represented by Garonga ceramics style. Archaeological evidence of the Garonga Phase shows that this phase marks the Iron Age transitions from Early to Middle/Late Iron Age and is associated with the beginning and the spread of more advanced technologies, the evolution of new pottery styles and the exchange of rare commodities over increasingly long distances.

The nature of ceramic technical variations within the Garonga Phase is systematic: there is unconditional evidence for the merger of two distinct traditions. The boundaries between Kalundu and Urewe are in fact comparatively sharp; however, interactions across boundaries is present but the nature of interaction does not distort the transformations by merging of ceramic design styles (Evers, 1988). The ceramic differences are immediate and could be observed within the traditions' levels. The Garonga ceramics demonstrate a different symbolic code system which remained probably incomprehensible to people from other traditions. Some archaeologists believed that a single ceramic tradition and new economy spread over virtually the whole sub-continent at about AD 1000; however, others point to unrelated ceramic changes at different times and places, while others insist that relations of productions changed without any movement of people or obvious ceramic changes (Huffman, 1989). It is still not yet known if these non-verbal symbolic codes most likely were accompanied by some linguistic merge. It is still not yet known if the implication of this resulted in a certain new type of language (Giliomee and Mbenga, 2007).

CHAPTER EIGHT: CONCLUSION AND PROSPECTS

8.1. Introduction

The research has demonstrated the use of material objects to illuminate past life ways. By analysing Mut 2 site and Thomo site material culture, this research has managed to reflect on several issues that were either still not understood or speculated on. It is by studying the material objects that a more informed chronology of the Iron Age in the region was established. Even though more work is still needed to be done, the analysis of Mut 2 and Thomo site material culture has managed to show the development of the transitional Iron Age phase, termed Garonga Phase period. The development of social complexity in southern Africa has been explored in a linear model where the collapse of one ceramic unit led to the rise of another. The dominant view being that the disappearance of Kalundu and Urewe ceramic traditions led to the rise of Garonga Phase ceramics, whose collapse, in turn, led to the rise of the Late Iron Age ceramic sequence. This research has revealed that Kalundu and Urewe traditions coexisted within the 90-kilometre radius in the Soutpansberg region. It might be possible that both traditions continued to live as separate traditions in other areas where contacts and marriage alliances were not favoured. Mut 2 and Thomo sites were occupied by the same cultural group, influenced by the Kalundu and Urewe ceramic traditions. Material analysis signalled a well-defined ceramic advancement which reflects regional ceramic changes which in turn marks the transition between Early and Late Iron Age in the region.

The ceramic analysis revealed a single occupational unit, which demonstrates how Mut 2 and Thomo metal-production sites progressed in time. Throughout the occupation period, ceramics vessels were only restricted to globular, necked and open bowls that varied in sizes and shapes. The ceramic style not only reflected group identity but also communicated an active participation that integrated both Kalundu and Urewe traditions. The Garonga style has been used to describe certain things added to ceramics to communicate important boundaries (Antonites, 2012:36-37). Observable styles that dominate the Garonga Phase ceramics are decorations such as punctates (stilus), comb stamping, incision, cross incision, stilus with incision, comb stamping and incision. Symbolic system of a culture is encoded in its material culture. Thomo has very few and fragmentary ceramics with which to characterise them; moreover, the fragmentary nature of the ceramics means that a full scale multi-variant analysis is not possible.

The Garonga Phase period is well categorised by local and internationally imported goods well represented from Mut 2 site cultural assemblages. It is indisputable that the presence of glazed ceramics, ostrich eggshells, bone shaft links and soapstones are clear indications of internal and external trade network. On the local level, it reflects internal bartering or exchange systems which took place within the region and which can be used to understand the early farming communities' communication and goods-procurement strategy. Based on the current state of knowledge, these sites' distributions within southern Africa is not yet known, only represented by very few sites documented in the province to date.

Currently the presented archaeological results allow us to make few statements on the Early Iron Age communities, settlement, past diet and perhaps to generalise early community behaviour. Signs of fire and cut marks on faunal remains are evident as reflected on both game and domestic animals' faunal remains assemblages. Supplementary evidence on the subsistence behaviours was attained by close investigation of bones fragmentations. Furthermore, the communities hunted animals, and fished on the Luvuvhu River; faunal remains from both fish and bovids are well represented and could be distinguished between wild and domestic livestock. In addition, the distal fragments of faunal remains were often cut or dismantled, presumably to extract the bone marrow, which is today much cherished. Substantial amounts of faunal assemblages investigated reflect a high proportion of game faunal remains in contrast with domestic livestock. The region is in prime hunting grounds and elephant country; today the combination of dry land and vegetation and the number of rivers sustain large herds. Furthermore, an enormous drainage fed by periodic flooding is the major attraction and it was probably also a significant resource in the past. Together with fishing and hunting, the inhabitants of Mut 2 site practised the domestication of animals on the periphery. This may well have to correspond to environmental changes. However, absence or occurrence of cattle kraals possibly indicates environmental constraints such as the presence of Nagana and other related diseases. Cattle faunal remains were outnumbered, very few livestock were kept at Mut 2 site. In summary, faunal remains identification generated valuable information about the past environment and Iron Age Community diet. Uncommon remains such as bone points recovered from Mut 2 site excavations advocate the used of bones as some raw materials. Bone points are usually well cut and well made with smooth surfaces. The excavations also uncovered ivory bangles, presumed to have been manufactured at Mut 2, since several grooved stones were collected from an area believed to have been where ivory and bone points were made.

8.2. Mut 2 and Thomo sites in the regional context

The northernmost region has always constituted a favourable zone, benefitting from a productive and relatively good agricultural environment, though certain parts of the region experience Nagana diseases spread by tsetse flies. The technology of metalworking would no doubt have assisted towards these livelihood endeavours. There are many reasons for the location of both Mut 2 and Thomo and the aspects have been the focal point of most previous research, and have been underlined throughout this work. The development of early farming communities near streams functions as a source for good agricultural activities on the floodplain; however, with specific reference to Thomo site, water played a dominant role in the metal-production process. These Early Iron Age sites are located at the perfect zone that could function as fundamental part that supported interactions and trade, since historically documented routes transverse across these sites. Trade with both contemporaneous sites to the north and south of the Soutpansberg was possible. Furthermore, these sites are not located far from the Mozambique coast. The Soutpansberg area, including Kruger National Park is major elephant country today, this could have prompted Swahili and Arab traders in the Sofala region to the discovery of new source of ivory in the interior of South Africa (Huffman, 2007). Excavations at Mut 2 site uncovered ivory bangles. Similar materials were also noted at Schroda site in the Limpopo Valley by Hanisch (1980) in association with exotic glass beads which could be linked directly with the Indian Ocean commercial network. Garonga Phase sites were not isolated; they drew upon some extensive networks on both local and international trade contacts with the interior and East Africa.

As already examined that Early Iron Age communities engaged in trade and exchange systems, traces of such exchanges have been found to date. Control over production, exchange and consumption constitute the political economy of a society (Moffet, 2016). Through the interaction, metal informs political economy on a local, regional and global scale. Studies of the organisational relationships and the social context of technology and production is central in the understanding of the organisation of communities in different periods of the past. Trade, innovation and specialisation informs the political stratification. Specialisation in metal production has been widely considered within the context of the socio-political complexity (Chirikure, 2007). Metallurgy contributed to state formation through the control over resource and through manipulation of metal workers' symbolic powers (Moffet, 2016). Excavations at Mut 2 site yielded a wide range of finds, including local products, acquired by Mut 2 communities through bartering systems with other Iron Age communities. The study of archaeological collections from Mut 2 has also unearthed various forms of interactions in past societies, e.g. roughly carved soapstones. Evers' (1979) analysis of soapstones excavated at Eiland, Harmony and other related sites in the Limpopo Province of South Africa enabled him to challenge the longstanding model of relations between Iron Age communities, that soapstone was used to evaporate salt from brine springs. Records and geological analysis show that soapstone materials are in abundance within the Letaba district. This points in the direction that salt was a trade commodity among the early farming communities (Evers, 1979). Contrast analysis of material remains from both sites drawing much interest from previous research conducted in the region to date have been made to localise Mut 2 in relation to its development. However, we are still not certain if Garonga Phase developed into Middle or Late Iron Age to mark apparent cultural changes in the region at AD 1000.

The technology of metalworking and the variability of its spatial organisation resonate widely within Bantu Africa. For example, at Shankare in Phalaborwa, specialist iron and copper villages were built on the edge of a small kopje (Thondhlana, 2013; Thondhlana *et al.,* 2016; Moffett, 2016). Detailed mapping of Shankare found no central cattle kraals. Similarly, Njanja iron production in central Zimbabwe would be located inside villages or outside. Key determinants of location included availability of raw materials such as water, clays, firewood and so on (Pwiti 1996). River valleys also had fertile soils thereby uniting most factors essential for sustaining an agropastoral way of life. This underscores the point that technologies such as metalworking were socially embedded, and at the same time were part of daily strategies adopted by successive communities to eke out a living from the environment and its potentials and limitations.

8.3. Conclusion

This study has documented some important aspects such as the archaeology, technology, sociology and the economy associated with the Early Iron Age sites. Available radiocarbon dates, ceramics analysis as well as exotic ceramics were used to create a cultural historical sequence of the region. The resolution of the chronology has permitted us to understand in broad terms Iron Age communities' lifeways at Mut 2 and Thomo Sites. Despite different periods, ceramics analyses provide a perspective, enabling us to identify and separate Iron Age structural codes. Ceramic style in terms of classes frequencies was not perceived as accidental but as a process perceived to represent predecessors' traditions codes that mark societal changes. For Iron Age communities' survival, they exploited the lower lying floodplains for agriculture, while abundant natural resources and game roamed freely. Hunting was done for two aspects; namely, subsistence and to acquire animal skins and ivory for trade. They participated in trade networks; this was revealed by the presence of exotic ceramics, link shaft and carved soapstone. It was revealed that bloomery process dominated the Iron Age metal production, while the dominant furnace structure used was triangular. This indicated that indigenous smelters were conservative. The environment, abundance of natural resources, ore, game and clay for making ceramics, construction of furnace could be the drawcards that forced Iron Age communities to prefer this region.

8.4. Direction for future research

More work needs to be done to understand the metalworking consumption patterns in the region. There is information to be obtained from the intra-site spatial organisation; the meaning and absence of Central Cattle Patterns as the dominant settlement model for Iron Age communities could be reserved for future research. Garonga Phase qualifies to be studied as a separate socio-political unit that represents Early Iron Age as reflected by ceramic stylistic codes as Meyer (1988) Burret (2007) Huffman (2007) have noted. It is still difficult to demonstrate whether these group differences are the result of ethnic concepts. Garonga Phase sites discovery within the region might represent a minority cultural group within the region that could have ethnicity bearing; however, such assumption has not yet been demonstrated in the Iron Age studies. This study presented a model intended to generate debates in the current Iron Age discussion. This theme is still in an infancy stage and has not been dealt with in more detail due to sites shortages in the region. The future research should be directed in understanding transitional Iron Age development on a regional scale incorporating Botswana, Mozambique and Zimbabwe. It is still not yet known if the Garonga Phase tradition developed into the advent of Vhalembethu, Vhaṱavhatsindi, Vhatwanamba or the Vhangona ethnic group who claim to be the first group to occupy the region before the unification of Vhavenḓa under the leadership of the Singo dynasty. Though this research highlighted some of the key areas that cover Garonga Phase economies, which incorporate iron smelting, trade, herding and settlement pattern, conclusions given in this work are only tentative. Future studies should be dedicated to exploring more Garonga sites for more secure provenance evidence. The search for better preserved sites should be given priority because they would allow a better and clearer reconstruction of the contextual archaeology and to provide more secure interpretations.

9. REFERENCES

Acocks, J.P.H. 1953. Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa*, No. 28: pp 1-192.

Acocks, J.P.H. 1975. Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa*, No. 40: pp 1-150.

Alpern, S. 2005. Did they or didn't they invent it? Iron in sub-Saharan Africa. *History in Africa*. Vol. 32: pp 41-94.

Anderson, A. 1984. *Interpreting Pottery*. London: B.T. Batsford

Anhaeusser, C.R. 1992. Structures in granitoid gneisses and associated migmatites close to the boundary of the Limpopo Belt, South Africa. Precambrian Res., 55: pp 81-92.

Anhaeusser C. R. 2004. Paleoarchean to Mesoproterozoic (c. 3500-1000 Ma) ultramafic and mafic intrusions of the Kaapvaal Craton and neighbouring metamorphic belts: a review. Inform. Circ. Econ. Geol. Res. Inst., Univ. Witwatersrand, Johannesburg. 384: 63 pp.

Anhaeusser, C.R. 2006. A re-evaluation of Archean intracratonic terrane boundaries on the Kaapvaal croton, South Africa: collisional suture Zone. In Reynold, W.U. and Gibson, R.C. (Eds)., Process on Earth. *Geological Society of America*. Special Paper. 405: pp 193-210.

Antonites, A. R. 2012. Political and economic interaction in the hinterland of the Mapungubwe polity, C AD 1200-1300, South Africa. PhD dissertation, Yale University.

Antonites, A. R. 2014. An archaeological investigation of the Zhizo/Leokwe foodways at Schroda and Pontdrift, Limpopo valley, South Africa, PhD thesis, Yale University.

Antonites, A. R. 2016. Zhizo and Leokwe period Human remains and Burial practices at Schroda. *The South African Archaeological Bulletin*. Vol 71. No 203, pp14-26.

Archaeo-Info. 2000. Final Archaeological Mitigation report on the Early Iron Age site Mut 2/2 site, Compiled for the Department of Water Affairs and Forestry.

Aston, M. 1985. Interpreting the landscape: landscape archaeology in local studies. London: B.T. Batsford.

Aukema, J. 1988. *Lepalala 'n argeologiese opname*. Unpublished Unisa report 88/6b. Pretoria.

Avery, D.M. 1982. The micromammalian fauna from Border Cave, Kwazulu, South Africa. *Journal of Archaeological Science* 9, (2): pp 187-204.

Bachmann, H. 1982. The identification of slags from archaeological sites. *Institute of Archaeology*, Occasional Publications No 6.

Badenhorst, S. 2009. The Central Cattle Pattern during the Iron Age of southern Africa: a critique of its spatial features. *The South African Archaeological Bulletin*, Vol. 64. No. 190: pp 148-155.

Badenhorst, S. 2010. Descent of Iron Age farmers in southern Africa during the last 2000 years. *African Archaeological Review*, Vol. 27: pp 87-106.

Bandama, F. 2013. The Archaeology and technology of metal production in the Late Iron Age of Southern Waterberg, Limpopo Province, South Africa, PhD dissertation, University of Cape Town.

Bandama, F., Chirikure, S., Hall, S., & Shuro, I. 2018. Iron fabrication during the "Age" of Tin and Bronze in the southern Waterberg of Limpopo, South Africa. *Studies in the African past*. Vol. 13/14. pp 1-19

Bandama, F., Chirikure, S., & Tinguely, C. 2018. Measly but Motley and Manifest: The typological and chemical characterisation of glass beads from the southern Waterberg, Limpopo Province of South Africa. Journal of Archaeological Science: Reports 18. pp 90-99

Beach, D.N. 1977. The Shona economy: Branches of production. Palmer, R. and Parsons, W. (Eds), The roots of rural poverty in central and southern Africa. London: Heinemann: pp 37-65.

Bent, J.T. 1892. *The ruined cities of Mashonaland.* London: Routledge.

Best, A. 2003. Regional variation in the material culture of hunter gatherers. Social and ecological approaches to ethnographic objects from Queensland Australia, Bar S1149. *Archaeopress.*

Betancourt, P.P. 2006. Other Metallurgical Materials. *Hesperia supplement*. Vol. 36: pp 137.147. The Chryso Kamino Metallurgy and its Territory.

Beuster, C.L. 1879. *Das Volk der Vawenda. Zeitschrift der Gesellschaft Fur erdkunde*. Vol.14 Berlin

Bhila, H.H.K. 1982. Trade and politics in a Shona Kingdom. London: Longman.

Binford, L.R. 1962. "Archaeology as Anthropology" *American Antiquity* 28: pp 217-225.

Bonner, P., & Carruthers, E. J. 2003. Thee recent history of the Mapungubwe area, Mapungubwe Cultural heritage resource Survey, commissioned by the Department of Environmental Affairs and Tourism. Unpublished report.

Brown, J.B. 1995. Traditional metal working in Kenya: Oxford: Oxbow Publishing.

Bullock, J.B. 1936. Primitive iron smelting in South Africa. Johannesburg, Empire exhibition.

Burrett, R.B. 2007. The Garonga Assemblages. *South African Humanities,* Vol 19, pp 153-166. Pietermaritzburg.

Boas, F. 1927. *Primitive art*. New York: Dover.

Boeyens, J.C.A. 1985. *Die Konflik tussen die Venda en die Blankes in Transvaal, MA thesis, Universitiet van Pretoria.*

Boeyens, J.C.A. 1991. *ZwartIvoor: Inboekelinge in Zoutpansberg*, 1848-1869. *South African Historical Journal*, Vol. 24: pp 31-66.

Brandl, G. 1987. The Geology of the Tzaneen area. Explanation sheet 2330. (1:250000 Geological series) *Geol. Surv. S. Afri.,* 55 pp.

Brandl, G. & Kroner, A. 1993. Preliminary results from single zircon studies from various Archaean rocks of the north-eastern Transvaal. Abstr.16th coll. African geology, Mbabane, Swaziland. 1: pp 54-56.

Calabrese, J.A. 2000. Interregional Interaction in southern Africa: Zhizo and Leopard's Kopje relations in Northern south Africa, southwestern Zimbabwe and Eastern Botswana, AD 1000 to 1200. *African Archaeological Review,* Vol.17, No.4: pp 183-210.

Calabrese, J. A. 2007. *The emergence of social and political complexity in the Shashe-Limpopo valley of South Africa. AD 900 to 1300: Ethnicity, Class and Polity*. Oxford: Archaeological Press.

Campbell, J. 1822. *Travel in South Africa,* 1: London: Francis Westerly.

Campbell, A. C., Van Waarden, C. & Holmberg, G. 1996. Variation in the Early Iron Age of southern Botswana. *Botswana Notes and Records,* Vol. 28. Botswana Society: pp 1-22.

Caton-Thompson, G. 1931. *The Zimbabwe culture: Ruins and reactions*. Oxford University Press

Chami, F.A. 1998. A Review of Swahili Archaeology: *African Archaeological Review* 15/3: pp 199-221.

Chami, F.A. 1999. Graeco-Roman trade link and the Bantu migration theory. *Anthropos*., Vol. 94: pp 205-215.

Chami, F.A. 2007. Diffusion in the studies of the African Past: Reflections form new archaeological findings. *The African Archaeological Review.* 24/1/2: pp 1-14.

Chatterton, J.F., Collet, D.P., & Swan. J.T., 1979. A Late Iron Age village site in the Letaba District, Eastern Transvaal. *South African Archaeology Society*, *Goodwin series,* 3

Charlton, M.F., Crew, P., Rehren T, & Shenan S. 2010. Explaining the Evolution of Iron Making recipes-an example from North west Wales. *Journal of Anthropological Archaeology*, doi:10.1010/j. jaa 2010.05.001.

Childs, S. T. 1991. Style, technology and iron smelting furnaces in Bantu-Speaking Africa. *Journal of Anthropological Archaeology*, Vol. 10: pp 332-359.

Childs, S. T. & Killick, D. 1993. Indigenous African Metallurgy nature and Culture, *Ann. Rev. Anthropol*. Vol. 22: pp 317-337.

Childs, S. T. & Herbert, E. W. 2005. Metallurgy and its consequences. In A.B. Stahl (ed) *African archaeology: a critical introduction*. Oxford: Blackwell Publishing: pp 276-300.

Chirikure, S. 2005. Iron production in Iron Age Zimbabwe: innovation or stagnation? Unpublished PhD. Thesis. UCL. Institute of Archaeology.

Chirikure, S. & Rehren, T. 2004. Ore, Slag and furnaces: Aspect of iron working in the Nganga Complex. *African Archaeological Review.* 21: pp 135-152.

Chirikure, S. & Rehren, T. 2006. Iron smelting in pre-colonial Zimbabwe: evidence for diachronic changes from Swart Village and Baranda, northern Zimbabwe. *Journal of African Archaeology*, Vol. 4: pp 37-54.

Chirikure, S. 2007. Metals and society: iron production and its position in Iron Age communities of southern Africa. *Journal of Social Archaeology*, Vol. 7, No 1: pp 74-103.

Chirikure, S., Burret, S. & Heiman, R.B. 2009. Beyond furnaces and slags: a review study of bellows and their role in indigenous African Metallurgical process, *Azania*: *Archaeological Research in Africa.* 44: 2: pp 195-215.

Chirikure, S. 2015. *Metals in the past societies*, Global perspective on indigenous African Metallurgy, Springer.

Chirikure, S., Frederiksen P. D. & Manyanga, M. 2018. Adaptation, Craftscape and Knowledge networks: Introductory remarks on historical ecology and state formation in Southern Africa. *Azania:* Archaeological Research in Africa. Vol. 53: No 4: pp 425-438.

Chiripanhura, P. 2017. Archaeological collection as a prime research Assets: objects and Great Zimbabwe's Past. University of Cape Town (Unpublished PhD Thesis)

Cline, W. 1937. *Mining and metallurgy in Negro Africa*. Menasha: George Banta Publishing Co.

Collet, D.P. 1982. Model of the spread of the Early Iron Age. In C. Ehret and Ponasky (eds): pp 182-198.

Collet, D.P. 1985. The spread of Early Iron-Producing Communities in Eastern and Southern Africa Cambridge. (Unpublished PhD, thesis, Cambridge University).

Collet, D.P. 1993. Metaphors and representations associated with pre-colonial iron smelting in Eastern and southern Africa. Shaw, T., Sinclair, P., Andah, B and Okpoko, J. (Eds) *The Archaeology of Africa: Foods, Metals and Towns*. London: Routledge: pp 499-511.

Connah, G. 2004. *Forgotten Africa, an Introduction to its archaeology*. Routledge

Cooke, C.K. 1970. Shelters for Stone Age man shown in the paintings of Rhodesia. *South African Archaeological Bulletin* 25: pp 65-66.

Cruz e Silva, T. 1976. Preliminary report on an Early Iron Age site Matola IV 1/68. In J. Marais (ed.), *Iron Age Research in Mozambique: collected Preliminary Reports*. Maputo: Centro de Estudos Africanos, Universidade Eduardo Mondlane.

Daggett, A., Wood, M. and Dussubieux, L. 2016. Learning from Glass Trade Beads at Thabadimasego, Botswana. In Sadr, K; Esterhuysen, A and Sievers, C (eds.) *African Archaeology Without Frontiers: Papers from the 2014 Pan African Archaeological Association Congress.* Johannesburg: Wits University Press: pp 127- 142.

David, N.J., Heimann, R., Killick D. J., & Wayman, M. 1989. Between Bloomery and Blast Furnaces: Mafa Iron Smelting Technology in North Cameroon. *African Archaeological Review* 7: pp 183-208.

Davidson, B. 1967. The African past, chronicles from antiquity to modern times, the universal library, Grosset & Dunlop, New York.

Davis, D.D. 1983. Investigating the diffusion of stylistic innovation. *Advances in Archaeological Method and Theory* 6: pp 53-89.

de Boer, W.R. 1985. Pots and pans do not speak, nor do they lie: The case for occasional reductionism. Nelson, B.A. (eds), Decoding prehistoric ceramics. Carbondale: southern Illinois University press: pp 347-57.

De Maret, P. & Thiry, G. 1996. How old is the Iron Age in Central Africa? In P.R. Schmidt (ed.). *The culture and technology of African iron production* Gainesville: University Press of Florida: pp 29-39.

Delius, P., Maggs, T. & Schoeman, A. 2014. Forgotten World: The Stone-Walled Settlements of the Mpumalanga Escarpment, Johannesburg: Witwatersrand University Press.

Denbow, J. 1982. The Toutswe tradition: A study in socioeconomic change. In Hitchcock & M. Smith (Eds) *Settlement in Botswana*. Heinemann. Johannesburg: pp 73-86.

Denbow, J. 1986. A new look at the later prehistory of the Kalahari. *Journal of African History*, Vol 27: pp 3-28. Great Britain.

Denbow, J. 1990. Congo to Kalahari: data and hypothesis about the western stream of the Early Iron Age. *African Archaeological Review*. Vol. 8: pp 141-175.

De Vaal, J.B. 1943. *n Soutpansbergse Zimbabwe*. *South African Journal of Science,* Vol. 40: pp 303-22.

De Vaal, J.B. 1952. *Ysterbewerking in Venḓa land.* YSKOR Nuus. Julie: pp 589-596.

De Vaal, J.B. 1984. *Ou handelsvoetpaaie en wapaaie in Oos-en Noord-Transvaal*, (ed.), *Contree*, Tydskrif vir Suid-Afrikaanse stedelike en streekgeskiedenis, No 16 Julie. pp 5-15.

de Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. 2001. *Research at the grass roots for the Social Sciences and Human Service Professions*. 3rd ed. Pretoria: JL Van Schaik Publishers.

Distant, W. 1892. *A Naturalist in the Transvaal*. London: Pd. H. Porter

Dobres, M.A. 1995. Gender and Prehistoric Technology: On the Social Agency of Technical Strategies. *World Archaeology*. Vol 27: No1: pp 25-49.

Dobres, M.A. 1999b, Technology and Chaines. The processual unfolding of technique and technician. *The social Dynamic of technology: Practice, Politics and world views*, Washington, DC Smithsonian Institute Press: pp 103-114.

Dobres, M.A. 2000. *Technology and Social Agency*. Blackwell Publisher. Oxford.

Dobres, M.A. 2010. Archaeologies of technology, *Cambridge Journal of Economics*, Vol. 34, 1: pp103-114.

Dreyer, J.J. 1992. The Iron Age Archaeology of Doornpoort, Winburg, Orange Free State. *Navorsinge van die Nasionale Museum Bloemfontein,* Vol. 8, Part 7, Human Science.

Dunnell, R.C. & Dancey W.S. 1983. The Siteless survey: A regional scale data collection strategy. *Advances in archaeological Method and Theory*, Vol. 6, Springer: pp 267-287.

Dzivhani, S.M., Mamadi, M.F., Motenda M.M & Mudau, E. 1940. The Copper Miner of Musina and the early history of the Soutpansberg. Department of Native Affairs, Union of South Africa.

Esterhuysen, A.B. 2008. Ceramics alliance; Pottery and the History of Kekana Ndebele in the Old Transvaal. In N. Swanepoel, A.B. Esterhuysen and P. Bonner (Eds), *Five Hundred years rediscovered: Southern African precedents and prospects*. Johannesburg: Wits University Press.

Evers, T.M. 1973. Three Early Iron Age sites in the N.E. Transvaal Lowveld. South African *Journal of Science.* 69: 325.

Evers, T.M. 1974. Three Iron Age industrial sites in the Eastern Transvaal Lowveld (Masters dissertation, University of Witwatersrand.

Evers, T.M. 1974. Iron Age trade in the Eastern Transvaal, South Africa, *South African Archaeological Bulletin,* Vol. 29, No 113/114: pp 33-37.

Evers, T.M. 1975. Recent Iron Age Research in the Eastern Transvaal, South Africa. *The South African Archaeological Bulletin,* Vol. 30. No 119/120: pp 71-83.

Evers, T.M. 1977. Plaston Early Iron Age Site, White River District, Eastern Transvaal, South Africa. *The South African Archaeological Bulletin,* Vol. 32, No 126: pp 170-178.

Evers, T.M. 1979. Salt and Soapstone Bowl factories at Harmony, Letaba District, Northeast Transvaal. *South African Archaeological Society, Goodwin series, No 3*. Iron Age studies in southern Africa: pp 94-107.

Evers, T.M. 1981. The Iron Age in the Eastern Transvaal. In E.A. Voight (ed.), *Guide to the Archaeological sites in the Northern and Eastern Transvaal*. Pretoria: Transvaal Museum: pp 65-109.

Evers, T.M. 1982. Excavation at the Lydenburg Heads site, Eastern Transvaal, South Africa. *South African Archaeological Bulletin.* 37: pp 16-33.

Evers, T.M. 1988. The recognition of groups in the Iron Age of southern Africa; Doctoral theses, University of Witwatersrand, Johannesburg

Fagan, B.M. & Van Noten, F. 1964. Two Channel-Decorated pottery sites from Northern Rhodesia. *Man,* Vol. 74: pp 15-16.

Fish, W. 1995. *Plough zone Archaeology*: Unpublished Bristol excavation report. Schoemansdal Museum, Department of Arts and Culture, Limpopo Province.

Friede, H.M. 1975. Notes on iron Age copper-smelting technology in the Transvaal. *Journal of the South African institute of Mining and Metallurgy*: pp 221-232.

Friede, H.M. 1977. Iron Age Metal working in the Magaliesberg area, *Journal of the South African institute of Mining and Metallurgy*: pp 224-232.

Friede, H.M. 1979. Iron-smelting furnaces and metallurgical traditions of the South African Iron Age. *Journal of the South African Institute of Mining and Metallurgy,* Vol. 79: pp 372-381.

Friede, H.M. 1980. Iron-smelting furnaces and metallurgical traditions of the South African Iron Age. *Journal of the South African Institute of Mining and Metallurgy* 80: pp 156-165.

Friede, H.M., Hejja, A.A. & Koursaris A. 1982. Archaeo-Metallurgical studies of Iron-smelting slags from prehistoric sites in southern Africa. *Journal of the South African Institute of Mining and Metallurgy*: pp 38-48.

Fouche, L. 1937. *Mapungubwe*. Cambridge: Cambridge University Press.

Gardner, R., Wells, L.H. & Schofield, J.F. 1940. The recent archaeology of Gokomere, southern Rhodesia. *Trans. roy. Soc. S. Afr.* Vol. 28, No 3: pp 219-53.

Giliomee, H. & Schlemmer, L. 1985. *Up against the fences: Poverty, Passes and Privileges in South Africa*, David Phillip Publisher

Giliomee, H. & Mbenga, B. 2007. *New History of South Africa*, Tafelberg, Cape Town

Gillson, L. & Ekblom, A. 2009. Untangling Anthropogenic and Climate influences on riverine forest in the Kruger National Park, South Africa, *Vegetation History and Archaeo-botany*, Vol. 18, No 2: pp 171-185.

Gramly, R.M. 1978. Expansion of Bantu-speakers *versus* Development of Bantu Language and African culture *in situ*: An Archaeologist's Perspective. *The South African Archaeological Bulletin,* Vol. 33 no. 128: pp 107-112.

Greenfield, H.J. & Van Schalkwyk, L.O. 2003. Intra -settlement social and economic organization of Early Iron Age farming communities in southern Africa: view from Ndondondwane. *Azania* 38: pp 121-137.

Greenfield, H.J. & Miller, D. 2004. Spatial patterning of Early Iron Age Natal Production at Ndondondwane, South Africa: the question of cultural continuity between the early and Late Iron Ages. *Journal of Archaeological Science,* Vol. 31: pp 1511-1533.

Gottschling, E. 1905. The Bawenda. A sketch of their history and customs. *The Journal of the Anthropological Institute of Great Britain and Ireland,* Vol. 35: pp 365-386.

Gosden, C. & Marshal, E. 1999. The cultural Biography of objects. *World Archaeology,* 31(2): pp 169-179.

Gordon, R.B. 1996. American Iron 1607-1900. Baltimore: The Johns Hopkins University Press.

Gross, H.F. 1888. *Pictorial description of the Transvaal*. London: Macmillan.

Haaland, R. 2004. Iron smelting - a vanishing tradition: ethnographic study of this craft in south western Ethiopia. *Journal of African Archaeology,* Vol. 2: pp 65-81

Hall, R.N. & Neil, W. 1902. *The ancient ruins of Rhodesia*: Methuen

Hall, A. L. 1912. *Geology of the Murchison Range and district: Union of South Africa Geological Survey Memoir* 6. Pretoria: geological survey.

Hall, M. 1984a. The burden of tribalism: the social context of southern Africa Iron Age studies. *American Antiquity* 49: pp 455-467.

Hall, M. 1984b. Pots and Politics: Ceramic interpretation in southern Africa. *World Archaeology,* Vol. 15, No 3, Tylor & Francis Ltd: pp 262-273.

Hall, M. 1986. The role of cattle in southern African Agro-pastoral societies: more than Bones alone can tell. Prehistoric Pastoralism in Southern Africa. *South African Archaeological societies Goodwin Series,* Vol. 5: pp 83-87.

Hall, M. 1987. *The changing past: farmers, kings and traders in Southern Africa*, *200-1860*. Cape Town: David Phillip.

Hammond-Tooke, W.D. 1993. *The roots of black South Africa*. Johannesburg: Jonathan Ball.

Hanisch, E.O.M. 1974. Copper working in the Messina District. *Journal of the South African Institute of Mining and Metallurgy*:74 (6): pp 250-253.

Hanisch, E.O.M. 1980. An archaeological interpretation of certain Iron Age sites in the Limpopo/Shashi Valley. Masters dissertation, University of Pretoria.

Hanisch, E.O.M. 1997-1998. *Archaeological sites Excavation Reports for Nanḓoni Dam Project.* Unpublished reports.

Hanisch, E.O.M. 2002. Schroda: the archaeological evidence. In J.A. van Schalkwijk & E.O.M. Hanisch (eds) *Sculptured in clay: Iron Age figurines from Schroda, Limpopo Province,* South Africa. Pretoria: National Cultural History Museum: pp 21-39.

Hanisch, E.O.M. 2011. *A first synthesis of the environmental, biological and cultural assets of the Soutpansberg. http://www.soutpansberg.com/workshop/synthesis/archaeology.htm.* Accessed on 23 March 2011.

Herbert, E.W. 1984. Red gold of Africa: *Copper in precolonial history and culture*. Madison: University of Wisconsin Press

Herbert, E. 1993. *Iron, Gender and Power: Rituals of Transformation in African societies*. Bloomington: Indiana University Press

Hodder, I. 1982a. *Symbols in Action*: *Ethno-archaeological studies of Material Culture*. Cambridge: Cambridge University Press.

Hodder, I. 1982b. *Symbolic and structural archaeology*. Cambridge University Press, Cambridge, UK.

Holl, A.F.C. 2000. Metal in precolonial African society. M.S. Bisson, Childs, S.T. de Barros, P. and Holl, A. (Eds), Ancient African metallurgy. Walnut Creek: Altamira Press

Holl. A.F.C. 2009. West African early metallurgies: new evidence and old orthodoxy. *Journal of World Prehistory* 22: pp 415-438.

Holl. A.F.C. & Zangato, E. 2010. On the iron front: New evidence from central Africa. *Journal of African Archaeology* 8(1): pp 7-41.

Holser D. 1995. Sound, Color and Meaning in the metallurgy of ancient West Mexico. *World Archaeology* 27: pp 100-115.

Hopkins, R. 2014. Historical sites of Kruger National Park.

Huffman, T.N. 1970. The Early Iron Age and spread of the Bantu. *South African Archaeological Bulletin,* Vol. 25: pp 3-21.

Huffman, T.N. 1971. A guide to the Iron Age of Mashonaland. *Occasional Papers of the National Museum of Rhodesia,* Vol 4, No1A: pp 20-44.

Huffman, T.N. 1974c. The linguistic affinities of the iron age in Rhodesia. *Arnoldia (Rhod.)* Vol. 7, No7: pp 1-12.

Huffman, T.N. 1977. The origins of Leopards Kopje: an 11th century Difaqane. *Arnoldia (Rhod*) Vol. 8, No 23.

Huffman, T.N. 1978. The Iron Age of the Buhwa district Rhodesia. *Occasional Papers of the National Museums and Monument of Rhodesia* Vol. A4, No3: pp 81-100.

Huffman, T.N. 1980. Ceramic, classification and Iron Age entities. *African Studies*, Vol. 39, No2: pp 123-174.

Huffman, T.N. 1986. Iron Age Settlement pattern and the origin of class distinction in south Africa: *Advances in World Archaeology*, 5: pp 291-338.

Huffman, T.N. & Hanisch, E.O.M. 1987. Settlement hierarchies in the Northern Transvaal: Zimbabwe ruins and Venda History. *African Studies* 46 (1): pp 79-116.

Huffman, T.N. 1989a. Ceramics, Settlement and Late Iron Age Migrations. *The African Archaeological Review,* Vol. 7: pp 155-182. Springer.

Huffman, T.N. 1989b. *Iron Age Migrations: The ceramics sequence in southern Zambia, Excavations at Gundu and Ndonde*. Johannesburg: Witwatersrand University Press.

Huffman, T.N. 1993. Broederstroom and the Central Cattle Pattern. *South African Journal of Science.* Vol. 89: pp 220-226.

Huffman, T.N. 2001. The central cattle Pattern and Interpreting the Past. *South African Humanities*, Vol. 13: pp 19-35.

Huffman, T.N. 2002. Regionality in the Iron Age: the case of Sotho-Tswana. *Southern African Humanities* 14: pp 1-22.

Huffman, T.N. 2004. The archaeology of the Nguni Past, *Southern African Humanities*, Vol. 17: pp 57-79.

Huffman, T.N. 2007. *Handbook to the Iron Age: The archaeology of pre-colonial farming societies in southern Africa*. Scottville: University of KwaZulu-Natal Press.

Huffman, T.N., Whitelaw, G., Tarduno, J.A., Watkeys, M.K. & Woodbone, S. 2020. The Rhino Early Iron Age Site, Thabazimbi. *Azania Archaeological Research in Africa*. pp 1-30

Inskeep, R.R. 1962. Some Iron Age Cultures in Northern Rhodesia. *South African Archaeological Bulletin.* 17(67): pp 136-80.

Inskeep, R.R. & Maggs, T.M. 1975. Unique art objects in the Iron Age of the Transvaal. *South African Archaeological Bulletin 30*: pp 114-138.

Inskeep, R.R. 1978. *The peopling of southern Africa,* David Philip, Johannesburg.

Joubert, M. 2019. An Archaeological and Historical Investigation of the 20th century European Mining Activities on the Farm Berkenrode in the Maremani Nature Reserve, Musina Limpopo, South Africa, MA thesis, University of Pretoria.

Junod, H.A. 1927. The life of a South African tribe. London: Macmillan

Junod, H.A. 1962. The life of a South African tribe. London: Macmillan

Katsamudanga, S. K. 2007. Environment and Culture, a study of Prehistoric settlement patterns in the eastern Highlands of Zimbabwe, PhD thesis. University of Zimbabwe

Kelly, R.D. & Walker, B.H. 1976. The effects of different forms of land use on ecology of the semi-arid region in south-eastern Rhodesia. *Journal of Ecology* 64: pp 555-576.

Kense, F.J. 1983. *Traditional African iron working*. Calgary: Department of Archaeology, University of Calgary

Kense, F.J. 1985. The initial diffusion of iron to Africa. In R. Haaland & P. Shinnie (Eds). *African iron working: ancient and traditional*. Oslo: Norwegian University Press: pp 11-27.

Kense, F.J. & Okoro, J.A. 1993. Changing perspective on traditional iron production in west Africa. In T. Shaw, P. Sinclair, B. Andah, & A. Okpoko (eds.), *The archaeology of Africa: Food, Metals, and Towns*. London: Routledge: pp 449-458.

Klapwijk, M. 1973. An Early Iron Age site near Tzaneen North-Eastern Transvaal. *South African Journal of Science* 69:324.

Klapwijk, M. 1974. A preliminary report on pottery from the North-Eastern Transvaal, South Africa. *South African Archaeological Bulletin* Vol. 29: pp 19-23.

Klapwijk, M. & Huffman, T.N. 1996. Excavation at Silver Leaves: a final report. *South African Archaeological Bulletin*. Vol. 51, pp 84-93.

Killick D.J. & Gordon, R.B. 1988. Mechanism of the bloomery process. In *Proceedings of the 26th International symposium on Archaeometry*. Toronto: pp 120-123.

Killick, D.J. 1990. *Technology in its social setting: bloomery iron- working at Kasungu, Malawi,* 1860-1940. Unpublished PhD thesis. Yale University.

Killick, D. J. 2004. What do we know about African iron working? *Journal of African Archaeology* 2: pp 97-112.

Kiriama, H.O. 1987. Archaeo-Metallurgy of Iron Smelting slags from a Mwitu Tradition site in Kenya. *The South African Archaeological Bulletin*. Vol. 42, No146: pp 125-130.

Krause, R.A. 1978. "Towards a formal Account of Bantu Ceramics Manufacture" in R.C. Dunnel and E.S. Hall (Eds)., *Archaeological Essay in Honour of Irving B. Rouse*. the Haque: Mouton: pp 87-120.

Krige, E.J. 1937. "Notes on the Ba-Phalaborwa and their Morula complex" *Bantu Studies* 11: pp 357-366.

Kuper, A. 1982. Wives for cattle: Bride wealth and Marriage in Southern Africa. Routledge and Kegan Paul, London.

Küsel, U.S. 1974. Extractive metallurgy in Iron Age South Africa. *Journal of the South African Institute of Mining and Metallurgy* 74: pp 246-249.

Lemonier, P. 1990. *Technological choices: Transformation in material culture since the Neolithic.* London: Routledge.

Leppan, H.D. & Bosman, G.J. 1923. *Field Crops in South Africa*. Johannesburg*:* Central News Agency.

Lindahl, A. & Pikirayi, I. 2010. Ceramic and Change: an overview of pottery production techniques in northern South Africa and eastern Zimbabwe during the first and second millennium AD. *Archaeological and Anthropological Sciences,* Vol. 2, No, 3: pp 133-149, Springer.

Liesegang, G. 1977. New light on Venda traditions: Mahumane's account of 1730. *History in Africa,* Vol. 4: pp 163-181.

Loubser, J.H.N. 1988. Archaeological contributions to Venda ethno history. PhD dissertation. University of the Witwatersrand, Johannesburg.

Loubser, J.H.N. 1989. Archaeology and early Venda History. *South African Archaeological Society Goodwin Series*, Vol. 6: pp 54-61.

Loubser, J.H.N. 1991. The ethno archaeology of the Venda-speaker in south Africa. *Navorsinge van die Nationale Museum Bloemfontein* 7: pp 146-464.

Low, A.B. & Rebelo, A.G. 1996. *Vegetation of south Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism.

Lyaya, E., Chirikure, S., Janney, P.E. & Rehren, T. 2020. A Technology of Multiple Smelting Furnaces per Termite Mound: Iron Production in Chongwe, Lusaka, Zambia. *Journal of African Archaeology 1(aop)*. pp 1-19.

McCosh, F.W. 1979. Traditional Ironworking in Central Africa with some reference to the ritualistic and Scientific aspect of the industry, *Zambezia*, Vol. Vii (ii)

MacEachern, A.S. 1998. Scale, style and cultural variation: technological traditions in the Northern Mandara Mountains. Stark, M.T.(Ed), *The Archaeology of social boundaries*. Washington, DC: Smithsonian Institute Press: pp 107-131.

Mafukata, M.A. 2015. Mandevu. *Journal of Arts and Humanities* Vol.04. No.01: pp 14-26.

Maggs, T.M. 1976. *Iron Age Communities of the southern Highveld* (Occasional Publication 2) Pietermaritzburg: Natal Museum.

Maggs, T.M. 1980a. The Iron Age sequence south of the Vaal and Pongola rivers: some historical implications. *Journal of African History* 21: pp 1-15.

Maggs, T.M. 1980b. Msuluzi confluence: a seventh century Early Iron Age site on the Tugela River *Annals of the Natal Museum* 24: pp 111-145.

Maggs, T.M. 1982. Mabhija: pre-colonial industrial development in the Tugela Basin. *Annals of the Natal Museum* 25: pp 123-141.

Maggs, T.M. 1984. The Iron Age south of the Zambezi, in Klein, R. G. *South African Prehistory and Paleoenvironments.* A.A. Balkema/Rotterdam

Maggs, T.M. & Ward, B. 1984. Early iron Age site in the Muden area of Natal. *Annals of the Natal Museum* 26: pp 105-140.

Maggs, T.M. & Whitelaw, G. 1991. A Review of recent archaeological research on food-producing communities in southern Africa. *Journal of African History*, Vol. 32: pp 3-24.

Maggs, T.M. 1992. "My father's hammer never ceased its song day and night": The Zulu ferrous metalworking industry. *Natal Museum Journal of Humanities*, Vol. 4: pp 65-87.

Maggs, T.M. & Whitelaw, G. 2005. The Archaeology of southernmost Africa from C.2000BP to the early 1800. A review of recent research. *The Journal of African History,* Vol. 46. No 2: pp 209-241.

Mamadi, M.F. 1940. History of the Sebola (Tshivhula) people. In *The Copper Miner of Musina and the early history of the Soutpansberg.* Edited by N. J. van Warmelo. Vol. 81-83. Pretoria. South African Department of Native Affairs. Ethnological Publication 8:

Manyanga, M. 2000. Choices and Constraints: Animal Resources Exploitation in Southeastern Zimbabwe AD 900–1500. Uppsala: *Societas Archaeologica Upsaliensis*

Manyanga, M. 2001. Choices and constraints: animal resource exploitation in southern Zimbabwe: *Studies in African archaeology* 18. Uppsala: *Societas Archaeologica Upsaliensis*

Manyanga, M. 2003. Settlement Pattern in the Shashi-Limpopo Valley. In Chami, F.G. Pwiti and C Radimilay (eds), Climate change, Trade and models of production in Sub Saharan Africa. *Studies in the African Past* 3. Dar es Salaam. University press: pp 21-38.

Matin, M., Tite. M., Watson, O. 2018. On the origin of the beginning of Tin-opacified ceramic Glazes: new evidence from Early Islamic Egypt, the Levant, Mesopotamia, Iran and Central Asia. *Journal of Archaeological Science*, Vol.97: pp 42-66.

Martinon-Torres, M. 2002. Chaine Operatoire: the concept and its application within the study of technology. *Gallaecia*. 21: pp 29-43.

Martinon-Torres, M. 2005. Chemistry and crucibles in the renaissance laboratory: An archaeometric an historical study. Unpublished PhD, University College of London.

Mason, R.J. 1952. South African Iron Age pottery from the southern Transvaal. *South African. Archaeological. Bulletin.* Vol. VII (26): pp 70-79.

Mason, R.J. 1962. *Prehistory of the Transvaal.* Johannesburg: Witwatersrand University, press.

Mason, R.J. 1968. South African Iron Age and present-day Venda architecture and pottery from the Northern Transvaal, South Africa. *African Studies*. Vol. 27: pp 181-188.

Mason, R.J. 1969. Iron Age stone artefacts at Olifantspoort, Rustenburg District and Kaditshwene, Zeerust District. *S.Afr.J.Sci*.65(2): pp 41-43.

Mason, R.J. 1973. First Early Iron Age settlement in South Africa: Broederstroom 24/73 Brits District, Transvaal. *S.Afr.J.Sci.* 69: pp 324-326.

Mason, R.J. 1974. Background to the Transvaal Iron Age-new discoveries at Olifantspoort and Broederstroom. *J.S.Afr.Inst.Min.Metall.*74: pp 211-216.

Mason, R.J. 1986. Origins of Black people of Johannesburg and the southern western central Transvaal AD 350-1880. *Occasional paper* 16; Johannesburg: University of the Witwatersrand Archaeological Research Unit.

Mason, R.B. & Tite M.S. 1997. The beginning of tin-opacification of Pottery Glazes. *Archaeometry* 39,1: pp 41-58.

Maṱhoho, N.E. 2012. Indigenous Iron production south of the Luvuvhu River, Limpopo Province, South Africa, Unpublished M.Phil. dissertation, University of Cape Town.

Maṱhoho, N.E. & Bandama. F., Moffet. A.J., Chirikure. S. 2016. A technological and anthropological study of iron production in Venda, Limpopo Province South Africa; *Azania, Archaeological Research in Africa.*

McIntosh, S.K. 1994. Changing perception of West Africa's Past: archaeological research since 1988. *Journal of Archaeological Research, 2* (2): pp 165-198.

Mellor, E.T. 1906. The geology of the district about Haernetsburg, Leydsdorp and the Murchison Range. Annu. Rep. Geol. Surv: pp 21-52.

Meyer, A. 1986. *'n Kultuurhistoriese interpretasie van die Ystertydperk in die Nationale Krugerwildtuin*. Doctoral thesis, University of Pretoria.

Meyer, A. 1999. The Archaeological Site of Greefswald: Stratigraphy and chronology of the sites and a History of investigations. University of Pretoria, Pretoria

Miller, D. & Van der Merwe, N.J. 1993. Early Metal working in sub- Saharan Africa, A review of recent Research. *Journal of African History*, Vol. 34.

Miller, D. & Van der Merwe. N.J., 1994. Early Metal working in sub-Saharan Africa: a review of recent research. *Journal of African History,* Vol. 35: pp 1-36.

Miller, D. & Whitelaw. G. 1994. Early Iron Age metal working from the site of Kwagandaganda, Natal, South Africa. *The South African Archaeological Bulletin*, Vol. 49: pp 79-89.

Miller, D., Boeyens J.C.A. & Kϋsel, M. 1995. Metallurgical analysis of slags, ore and metal Artefacts from archaeological sites in the North-West Province and Northern Transvaal. *The South African Archaeological Bulletin 50*, no 161: pp 39-54.

Miller, D., Killick, D.J. & Van der Merwe, N.J. 2001. Metal working in the Northern Lowveld, South Africa. A.D. 1000-1890. *Journal of Field Archaeology 28,* No 3/4: pp 401-417.

Miller, D. & Killick D.J. & Mulaudzi, M. 2002. An historical account of iron smelting in the Lowveld, South Africa, *Historical Metallurgy,* 36(4): pp 112-121.

Miller, D. 2003. Indigenous copper mining and smelting in pre-colonial southern Africa. In Craddock, P. & Lang, J. (eds) *Mining and Metal Production through the Ages*: pp 101-110. London: British Museum.

Miller, D. & Killick, D.J. 2004. Slag Identification at southern African Archaeological sites. *Journal of African Archaeology,* Vol 2(1): pp 23-47.

Miller, D. & Killick, D.J. 2019. Non-Ferrous Metal artefacts from the Northern Lowveld, South Africa, ca.1000CE to ca.1880 CE. Journal of Archaeological Science: Report 24913-923.DOi:10.1016/J-Jasrep.2019.03.014

Mitchell, P. 1996. Exchange and Interaction in south eastern Africa: Marine shells and Ostrich eggshell. *The African Archaeological Review*, Vol. 13, No 1: pp 35-76.

Mitchell, P. 2003. The Archaeology of South Africa. Cambridge University Press. Cambridge.

Mitchell, P. & Whitelaw, G. 2005. The Archaeology of southernmost Africa from c.2000 BP to the Early 1800s: A review of Recent Research: *The Journal of African History*, Vol. 46, No2: pp 209-241.

Moffet, A. 2017. Phalaborwa where the Hammer is heard: Crafting together the Political economy of Iron Age Community in southern Africa, AD 900-1900. Unpublished PhD thesis.

Moffet, A., Hall, S., & Chirikure, S. 2020. Crafting Power: New perspectives on the Political economy of southern Africa, AD 900-1300. *Journal of Anthropological Archaeology* 59.101180

More, C.E. 1974. "Some observations on ancient mining at Phalaborwa": *Journal of the South African Institute of Mining and Metallurgy*, Vol. 74 (6): pp 227-231.

Morais, J. 1988. *The early farming communities of southern Mozambique*. Stockholm Central Boards of National Antiquities.

Morton, G.R. & Wingrove, J. 1969. Constitution of Bloomer slags: Part 1. Roman. *Journal of Iron and Steel Institute*, 207: pp 1556-1564

Mtetwa, E., Pikirayi, I., & Manyanga, M. 2013. Ceramics in Zimbabwe: Thinking beyond traditional approaches. In M. Manyanga & S. Katsamudanga (Eds). Zimbabwean Archaeology in the Post-independence era. Sapes Books

Mucina, L. & Rutherford M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland, *Strelitzia 19*. South African National Biodiversity Institute. Pretoria.

Murimbika, M. 2004. Communicating with the dead: an ethnoarchaeological interpretation of Shona mortuary practices. In: T. Oestigaard, N. Anfinset & T. Saetersdal, eds, Combining the past and the present: archaeological perspectives on society. BAR International Series 1210. Oxford

Murimbika, M. 2006. Sacred powers and rituals of Transformation: An Ethnological study of rainmaking rituals and agricultural productivity during the evolution of the Mapungubwe state. AD 1000 AD 1300. Unpublished PhD Thesis, University of the Witwatersrand.

Ndoro, W. 1991. Why decorate her? Zimbabwe 3 (1): pp 60-65.

Ndoro, W. 1996. Towards the meaning and symbolism of archaeological pottery assemblages. G. Pwiti and Soper (Eds) Aspects of African Archaeology: *Papers from the 10th Pan African Association for Prehistory and Related Studies* 773-780. Harare: University of Zimbabwe publication.

Nyamushosho, R.T. Chirikure, S., Bandama, F. & Mukwende, T. 2018. Are drylands marginal? The case of Mananzve, Shashi region, south western Zimbabwe. *Azania: Archaeological Research in Africa,* 53(4): pp 439-476.

Nyamushosho, R.T. & Chirikure, S. 2020. Archaeological implications of ethnographically grounded functional study of pottery from Nyanga, Zimbabwe. *Quaternary International*. https://doi/10.1016/j.quaint.2020.03.041

Odell, H.G. 1985. Small sites archaeology and use- wear on surface collected artefacts. *Midcontinental Journal of Archaeology*, Vol. 10, no 1: pp21-48.

Orton, C., Tyers, P. & Vince, A. 1993. Pottery in archaeology, *Cambridge manuals in archaeology*, Cambridge University Press.

Orton, C. 2000. Sampling in Archaeology. *Cambridge manuals in archaeology.* Cambridge University Press.

Paynther, S. & Tite, M.S. 1999. Report on the Examination of Glazed Pottery Sherds from an Early Iron Age site in the far Northern Province, South Africa. Research Laboratory for archaeology and the History of Art. University of Oxford, Unpublished report.

Philipson, D.W. 1968a. The Early Iron Age in Zambia: regional variants and some tentative conclusions. *Journal of African History*, 9(2): pp 191-211.

Philipson, D.W. 1968b. The early iron age site at Kapwiribwe, Lusaka. *Azania* 3: pp 87-105.

Philipson, D.W. 1974. Iron Age history and archaeology in Zambia. *Journal of African History*, 15: pp 1-25.

Philipson, D.W. 1976. The Early Iron Age in eastern and southern Africa critical re appraisal. *Azania* 11: pp 1-23.

Philipson, D.W. 1977. *The later Prehistory of Eastern and Southern Africa*. Heinemann Publication, London.

Philipson, D.W. 1993. *African archaeology*, Cambridge University Press.

Philipson, D.W. 2005. *African archaeology*, Cambridge: 3rd edition, Cambridge University Press.

Pikirayi, I. 1993. The Archaeological identity of the Mutapa State. Towards an historical archaeology of northern Zimbabwe. *Studies in African archaeology 6. Societas Archaeologica Upsaliensis.* Uppsala. PhD thesis, Uppsala University.

Pikirayi, I. 1996. Ceramic and Culture change in northern Zimbabwe on the origin of the Musengezi tradition in Pwiti, G. & R. Soper (ed) *Aspect of African Archaeology,* Papers from the 10th congress of the Pan African association for Prehistory and related studies. University of Zimbabwe publication.

Pikirayi, I. 1997. Pots, people and culture: An overview of ceramic studies in Zimbabwe, In Pwiti, G.& Contributors (ed) Cave, Monuments and texts: Zimbabwean Archaeology today, *Studies in African Archaeology 14,* Uppsala, 159.

Pikirayi, I. 1999. Taking southern African ceramics studies into the Twenty-first century: A Zimbabwean perspective. *The African Archaeological Review,* Vol. 16. No 3: pp 185-189.

Pikirayi, I. & Pwiti, G. 1999. State, Traders and Colonists; History in Zimbabwe. *Society for Historical Archaeology*, Vol. 2: pp 73-89.

Pikirayi, I. 2007. Ceramics and group identities: Towards a social archaeology in southern African Iron age ceramic studies. *Journal of Social Archaeology*, 7: pp 286-298.

Plug, I. 1989. Aspects of Life in the Kruger National park during the Early Iron Age. *South African Archaeological Society, Goodwin Series*, Vol. 6: pp 62-68.

Plug, I. & Pistorius. J.C. 1999. Animal remains from industrial iron age communities in Phalaborwa. *South African Archaeological Review*, 16(3): pp 155-184.

Plug, I. 2000. Overview of Iron Age fauna from the Limpopo Valley. In M. Lesley, & T.M. Maggs (ed.), African Naissance: *The Limpopo Valley 1000 years Ago*. *South African Archaeological Society Goodwin series 8*. Cape Town: South African Archaeological Society: pp 117-126

Pwiti, G. 1996a. Trade and economies in southern Africa: The archaeological evidence. *Zambezia 1*8,119-129.

Pwiti, G. 1996b. Continuity and Change: an archaeological study of farming communities in northern Zimbabwe AD 500-1700. *Studies in African Archaeology 13.* Department of Archaeology Uppsala University.

Pwiti, G. 2005. Southern African and the east African coast. Stahl, A. (Ed), *African Archaeology: a critical Introduction.* London: Blackwell: pp 378-392.

Prinsloo, H. P. 1974. Early Iron Age site at Klein Africa. Wyliespoort, Zoutpansberg Mountains, South Africa. *South African Journal of Science.* 70: pp 271-273.

Reid, A. & MacLean, R. 1995. Symbolism and the social context of iron production in Karagwe. *World Archaeology* 27 (1): pp 144-161.

Reid, A. & Segobye, A. 2000. Politics, Society and Trade on the Eastern Margins of the Kalahari. *South African Archaeological Society Goodwin Series*, Vol. 8: pp 58-68.

Rehren, T., Charlton. M.F, Chirikure, S., Humphris, J., Ige, A. & Veldhuijzen, H.A. 2007. Decision set in slag- the human factor in African iron smelting in: S. La Niece, D. Hook, P. Craddock (Eds), Metals and Mines: Studies in Archaeometallurgy. London: Archetype Publications: pp 211-218.

Renfrew, A.C. & Shenan, A. 1982. Ranking, Resources, and exchange. Cambridge: Cambridge University Press.

Renfrew C. & Bahn, P. 2005. *Archaeology: Theories, methods and practice.* London: Thames and Hudson.

Renfrew, C. & Bahn, P. 1994. Archaeology: Theories, methods and practice. London: Thames and Hudson.

Robinson, K.R. 1959. *Khami ruins:* Cambridge. Cambridge University Press.

Robinson, K.R. 1961a. Archaeological report. *In Buffalo Bend Expedition*. Bulawayo: Rhodesian Schools Exploration Society: 16-19 Bulawayo

Robinson, K.R. 1961b. An Early Iron Age site from the Chibi District, Southern Rhodesia. *South African Archaeological Bulletin,* 16 (63): pp 75-102.

Robinson, K.R. 1966. Bambata Ware: its position in the Rhodesian Iron Age in the light of recent evidence. *South African Archaeological Bulletin* 21 (82): pp 81-85.

Robinson, K.R. 1973. The pottery sequence of Malawi briefly compared with that already established south of the Zambezi. *Arnoldia* (*Rhod*) 6 (18): pp 1-11.

Robinson, K.R. 1976. A note on the spread of Early Iron Age ceramic in Malawi: tentative suggestions based on recent evidence, *South African Archaeological Bulletin* 31(122-124): pp 166-75.

Robinson, K.R. & Sandelowsky, B. 1968. The Iron Age of northern Malawi: recent work. *Azania* 3: pp 107-46.

Rowlands, M. & Warnier, J-P. 1993. The magical production of iron in the Cameroon Grass fields, in The Archaeology of Africa: *Food, Metals and Towns,* edited by T.S. Shaw, P.J. J. Sinclair, B. Andah & A. Okpoko: pp 512-550. London: Routledge.

Roskams, S. 2001. Excavation. *Cambridge Manuals in archaeology.* Cambridge University Press.

Sadr, K. 2008. An Ageless view of first millennium AD southern African ceramics. *Journal of African Archaeology,* Vol. 6. No1: pp103-129.

Sadr, K, & Sampson, C.G. 1999. Khoekhoe ceramics of the upper Seacow River valley. *South African Archaeological Bulletin,* 54 (169): pp 3-15.

Sampson, C.G. 1988. *Stylistic boundaries among mobile hunter-foragers*. Washington, D. C. Smithsonian Institute Press.

Schmidt, P.R. 1997. Iron Technology in East Africa: symbolism, Science and Archaeology. Bloomington: Indiana University Press.

Schmidt, P.R. & Mapunda, B.B. 1997. Ideology and the archaeological records in Africa: interpreting symbolism in iron smelting technology. *Journal of Anthropological Archaeology,* Vol. 16: pp 73-102.

Schlanger, N. 2005. Chaine Operatoire: Archaeology: The key concept.

Schofield, J.F. 1942. A survey of the recent pre- history of southern Rhodesia. *South African Journal of Science.* 38: pp 81-111.

Schofield, J.F. 1948. Primitive pottery: An introduction to south African ceramics, prehistoric and proto-historic. (Handbook 3). Cape Town: *South African Archaeological Society*

Schwellnus, C.M. 1973. Short notes on the Phalaborwa smelting ovens, *S.Afr.J.Sci.* 33: pp 904-912

Scully, R.T.K. 1978. Phalaborwa oral traditions. Unpublished Ph.D. dissertation, University of California.

Shennan, S.J. 1989. Cultural transmission and cultural changes. *What's new: a closer look at the process of innovation*. London: Unwin Hyman: pp 330-346.

Shenjere, Plan. 2011. The animal economy of Prehistoric farming communities in Manicaland, eastern Zimbabwe. A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy of the Dar es Salaam. (Unpublished thesis)

Shortman, E. 1989. Interregional interaction in prehistory: The need for a new perspective. *American Antiquity,* Vol. 54: pp 52-65.

Smith, J., Lee-Thorp, J. & Hall, S. 2007. Climate change and Agropastoralism settlement in the Shashe-Limpopo river basin, southern Africa: AD 880 to 1700. *The South African Archaeological Bulletin*, Vol. 62, No 186: pp 115-125.

Sinclair, P.J.J. & Lundmark, H. 1984. A spatial analysis of archaeological sites from Zimbabwe, In Frontiers: southern African archaeology today, M. Hall; G. Avery, D.M. Avery, M. L. Wilson and A.J.B. Humphreys (Eds.),277-88. Cambridge Monographs in Africa archaeology 10, BAR international series 207. Oxford.

Sinclair, P.J.J. 1987. Space, Time and social formation: a territorial approach to the archaeology and anthropology of Zimbabwe and Mozambique, c.0-1700AD. Societas Archaeologica Upsaliensis, Uppsala

Sinclair, P.J.J. 1991. Archaeology in eastern Africa. An overview of current chronological issue. *Journal of African History* 32: pp 179-129.

Sinclair, P.J.J. & Nydolf, N. & Wickman-Nydolf, G. 1987. Excavations at the University Campus site 2532Dc1, Southern Mozambique.

Soper, R.C. 1971. A general review of the Early Iron age of the southern half of Africa. *Azania* 6: pp 3-27.

Soper, R.C. 2002. *Nyanga: ancient fields, settlements and agricultural history in Zimbabwe*. London: British Institute in Eastern Africa Memoir 16.

Stayt, H.A. 1931. *The BaVenda*. Oxford University Press for the International African Institute, Oxford.

Stephens, J., Killick, J.D., Wilmsen, E., Denbow, J., & Miller, D. 2020. Lead isotopes link copper artefacts from northwestern Botswana to the Copperbelt of Katanga Province, Congo. Journal of Archaeological Science 117.DOI:10.10.16/j-jas.2020.105124

Swan, L.M. 1994. *Early Gold Mining on the Zimbabwe plateau*, Studies in African Archaeology, Vol. 9. Societas Archaeologica Upsaliensis. Uppsala.

Swan, L.M. 2007. Early Iron manufacturing industries in semi-arid, south-eastern Zimbabwe. *Journal of African Archaeology,* Vol. 5. No 2: pp 315-338.

Tempelhoff, J. & Nemudzivhadi, H. 1999. Riding the storm of change: Makhado, Venda and the South African Republic (1864-1895) New Contree, Vol. 45. Pp 101-114.

Thondhlana, T.P. 2008. Prehistoric copper and copper alloy production in Northern Zimbabwe, Unpublished MSc dissertation, University College of London.

Thondhlana, T.P. 2013. Metalworkers and smelting precincts technological reconstructions of second millennium copper production around Phalaborwa northern Lowveld of South Africa. Doctoral dissertation, University College London, University of London.

Thondhlana, T.P. Martinon-Torres, M. & Chirikure, S. 2016. The archaeometallurgical reconstruction of early second-millennium AD metal production activities at Shankare Hill, northern Lowveld, South Africa. *Azania*: Archaeological Research in Africa. pp 327-361.

Thorp, C. 1984. *Faunal remains as evidence for social stratification at great Zimbabwe*, Unpublished MA dissertation, University of Witwatersrand

Tylecote, R.F. 1976. *A History of Metallurgy*. London: The Metals Society.

Trevor, T.G. 1912. Some observation on ancient Mine working in the Transvaal. *Journal of the Chemical, Metallurgy and Mining society of south Africa*, Vol.12: pp 267-275.

Van der Merwe, N.J. & Scully, R.T.K. 1971. The Phalaborwa story: archaeological and ethnographic investigation of a South African Iron Age group. *World Archaeology, 3:* pp 178-196.

Van der Lith, A.A. 1972. *"Die Keramiek van die Venda" In Ethnografiese Studies in Suidelike Afrika*. Edited by J. F. Eloff and R. D Coetzee. Pretoria: J.L van Schaik: pp 202-45.

Van Heerden, P.W. & Mudau, E.n.d. The ruins of Vendaland and the Legends of Ngoma Lungundu. University of Pretoria: pp 188-256.

Van Jaarsveld, F.A. 1975. From van Riebeek to Voster, 1652-1974: An introduction to the History of the republic of South Africa, Peskor.

Van Waarden, C. 1987. Places of historic and other interest in and around Francistown. Francistown: Stenographic.

Van Waarden, C. 1989. The granaries of Vumba: structural interpretation of the Khami period commoner site. *Journal of Anthropological Archaeology* 8, 2: pp 131-157.

Van Warmelo, N.J. 1953. *Die Tlokwa en Birwa van Noord Transvaal Ethnologiese Reeks* 29. Pretoria: State Printers.

Verwoerd, W.J. 1956. *"Sekere Produkte van Primitiewe Koper Yster, en Brons smeltery in Oos Transvaal met Besonder verwysing na Phalaborwa" Tegnikon* 9: pp 91-104.

Vogel, J.O. 1972. The Shongwe Tradition: The Early Iron Age pottery of the Victoria Falls region of Southern Zambia, *Zamb.Mus. J*.3: 27-34

Vogel, J.O. & Katanekwa, N.M. 1977. Early Iron Age pottery from western Zambia. *Azania 12:* pp 160-167.

Voigt, E.A. 1980. Reconstructing iron Age Economies of the Northern Transvaal: A preliminary Report. *The South African Archaeological Bulletin,* Vol. 35, No 131: pp 39-45.

Voigt, E.A. & Plug, I. 1984. Happy Rest: the earliest Iron Age fauna from the Soutpansberg. *South African Journal of Science,* Vol. 80: pp 221-227.

Warren, K., Hall, H. & Roger-Ackerman, R. 2015. Crano-dental evidence for inter-population homogeneity in the Archaeological record of southern African Iron Age peoples. *The South African Archaeological Bulletin*, Vol 70, No 201, pp 76-88.

Whitelaw, G. 1993. Customs and settlement patterns in the first millennium AD: evidence from Nanda, an early Iron Age site in the Mngeni Valley, Natal. *Natal Museum Journal of Humanities* 5: 47-81.

Whitelaw, G. 1996. Lydenburg revisited: another looks at the Mpumalanga Early Iron Age sequence: *South African Archaeological Bulletin* 51: pp 75-83.

Whitelaw, G. & Moon, M. 1996. The ceramics and distribution of pioneer agriculturists in KwaZulu-Natal. *Natal Museum Journal of Humanities* 8*:* pp 53-79.

Witt, J.R.G. 1966. Primitive salt production in the Transvaal Lowveld. *Scientific South African* 111:6: pp 21-24.

Wood, M. 2000. Making connections: relationship between international trade and glass beads from the Shashe-Limpopo area. In M. Lesley, & T.M. Maggs (ed.), African Naissance: *The Limpopo Valley 1000 years Ago*. (South African Archaeological society Goodwin series 8). Cape Town: South African Archaeological Society: pp 78-90.

Wood, M.H. 2011. Interconnections: Glass beads and trade in southern and eastern Africa and the Indian Ocean–7th to 16th centuries AD. Studies in Global Archaeology 17. *Societas Archaeologica Upsaliensis:* Uppsala.

Wood, M.H. Dussubieux, L, Robertshaw, P. 2012. The glass of Chibuene, Mozambique: New insights into early Indian Ocean trade. *South African Archaeological Bulletin*, Vol. 67, No195, pp 59-74.

Wood, M.H. & Tite, M. 2009. Blue and White, the early years: Tang China and Abbasid Iraq compared, *Transfer: The influence in China on World Ceramics. Colloquies on Art and Archaeology in Asia* No 24, School of Oriental and African Studies, London University: pp 21-45.

APPENDIX 1:

Description of excavation after Archaeo-Info 2000 report

The Central Part of Mut 2 Excavations

The central section of the site was the biggest of the other site sections in term of its radius and it was one of the most significant parts of the site where most structures and features were exposed during the archaeological excavations. Several structures were opened while some of them were subjected to extensive studies. The following excavations took place between April and June 1999 in the central part of the site: Block V17 (Test trench) and Block V23 (Test trench), Block V21, structure 140 (Grain-bin foundation), Block W21 & W22, structure 141 (Hut remains), Block AA26, feature 21 (Ash concentration), Block AC18, feature 33 (Pit). Block AD22, Structure 27 (Grain-bin foundation), Block AD15 & AE15, Structure 37 (Hut remains) Block AE26, Feature 20 (Pit).

Structure 140

Block: V21

Layer: L1-L3(0cm-45cm)

Size: 3mX3m

Grain-bin foundation

Description: The structure was exposed during the November 1998 excavations but was only excavated down to the layer 1 (-15cm) when the top of the structure was opened. Two further layers were excavated to expose the entire structure. The structure was situated approximately 125cm southwest of the hut structure excavated in Block V22 & W22. The structure Measured+-110cm (north/south) and was situated in the middle of block V21. The structure is characterised by a big lump of daga fragment with one big rock situated in the middle of the daga fragment. A small amount of soil mixed with ash concentration was noted between the daga fragments; no ceramic shards were noted during the excavation process. The daga concentration measured 15cm thick; however, variation exists by few centimetres towards the northern section of the structure.

The position of the structure adjacent to the hut remains as well as the shape of the structure denote a small grain-bin foundation.

Finds: Several eco-facts and artefacts were uncovered during the exaction in the same block especially on the eastern side, next to the hut remains.

Layer 1: Mut2/V21/L1 (Arbitrary 15cm), November 1998
Acc.no. Mut2/98/13: non-diagnostic potsherds X3
Mut2/98/14: diagnostic potsherds X2
Mut2/98/15: animal-bone fragments X20g
Mut2/98/16: rubbing stones potsherds X2

Layer 2: Mut2/V21/L2 (Arbitrary 15cm), June 1999
Acc.no. Mut2/99/198: diagnostic potsherds X4
Mut2/99/199: non-diagnostic potsherds X103
Mut2/99/200: animal-bone fragments X100g
Mut2/90/201: soil sample X850gram

Layer 3: Mut2/V21/L3 (Arbitrary 15cm), June 1999
Acc.no. Mut2/99/216: diagnostic potsherds X4
Mut2/99/217: non-diagnostic potsherds X32
Mut2/99/218: soil sample X500g
Mut2/90/219: animal-bone fragments X5g

Structure 141

Block: W22
Layer: L1-L5 (0cm-75cm)
Size: 3mX3m
Hut structure

Description: The structure was exposed during April 1999; the southern half of the structure was exposed, and it was decided to open the entire structure. Block W22 was excavated to investigate the presence of any feature or structure next to the identified structure 141. The entire remains of the structure were exposed at layer 3 (45cm). Another smaller structure was exposed just north of the hut structure (+- 40cm north) and was numbered 142 and it will be described next. Structure 141 was slightly oval shaped and measured +-220cm (north / south) and +- 200cm east /west. The structure consisted of a big lump of daga fragments with smooth, flat surfaces on some while others had a well-defined pole marks and lattice impressions. The big lumps of daga formed a top layer of the excavations covering smaller pieces of daga beneath them. Many potsherds and animal-bone fragments were also uncovered between the daga fragments. The remains from the soil profile measured between 25cm and 40cm in thickness. The northern section of the structure (Block W22) was further investigated where the large daga fragments were removed to reveal the underlying layers. The smaller daga fragments were mixed with gravel materials and ash soil. It was concluded that the heavy daga lumps represent a collapsed hut wall. A few burnt animal-bone fragments were collected from this layer (Mut 2/99/160) as well as small, vitrified dung (Mut 2/99/161) (+- 50g) and, besides the dung recovered from structure 27 (Block AD22), the only dung found on the site. From the profile it seemed as if the bottom parts of the wall were still in position. The bottom layer of the dilapidated structure consisted of daga gravel mixed with an ashy soil mixture. The layer was situated between two lumps of daga, which might have been the bottom part of the wall. No definite floor could be identified from the debris, but the daga gravel and ashy soil mixture suggested its existence, although the preservation was not in good condition. Underneath the layer of daga fragments and gravel, an ash layer was noted extending for approximately 110 centimetres from east to west, the structure covered the western 40cm of the lens. The structure was constructed directly on top of the ashy lenses. The actual size of the house was exceedingly small since the remains measured approximately 200cmX220cm. From the excavation, an estimated size of the structure could be determined, although the structure was in a dilapidated state and the preservation was not good. It measured between 160cm and 175cm and the walls measured approximately 5cm to 10cm thick. Pole impressions could only be seen on the burnt daga fragments. This is one of the best examples of structures excavated on site.

Structure 142

The structure was circular and measured approximately 90cm across. It was situated 40cm north of the abovementioned hut structure 141 and consisted of lumps of daga fragments and a few rocks. The remains measured 25cm thick and some of the daga fragments were retrieved from the structure as well as from the surrounding matrix. The structure was like the one excavated to the southwest of the hut structure in Block V21. Based on the remains layout, it was concluded that the structure was most probably a grain-bin foundation which could be linked to the hut structure.

Finds: the following finds listed were retrieved from both structure as well as the surrounding matrix.

Layer 1: Mut2/W22/L1 (Arbitrary 15cm)

Acc.no. Mut2/99/142: diagnostic potsherds X27

Mut2/99/143: non-diagnostic potsherds X121

Layer 2: Mut2/W22/L2 (Arbitrary 15cm)

Acc.no. Mut2/99/156: diagnostic potsherds X26

Mut2/99/157: animal-bone fragments X100g

Mut2/99/158: animal-bone fragments X300g

Mut2/99/159: non-diagnostic potsherds X309

Mut2/99/160: burnt animal-bone fragments X100g

Mut2/99/161: vitrified dung X50g

Layer 3: Mut2/W22/L3 (Arbitrary 15cm)

Acc.no. Mut2/99/177: animal-bone fragments X1900g

Mut2/99/178: animal teeth X500g

Mut2/99/179: animal-bone fragments X1800g

Mut2/99/180: diagnostic potsherds X27

Mut2/99/181: non-diagnostic potsherds X100

Mut2/99/183: link shaft X1

Mut2/99/184: fragmented pots X2

Mut2/99/185: rubbing stone X1

Mut2/99/196: charcoal X5g

Mut2/99/197: animal-bone fragments X100g

Layer 4: Mut2/W22/L4 (Arbitrary 15cm)

Acc.no. Mut2/99/191: animal-bone fragments X10g

Mut2/99/192: animal-bone fragments X100g

Mut2/99/193: soil sample 1300g

Mut2/99/194: non-diagnostic potsherds X10

Mut2/99/195: diagnostic potsherds X2

Feature 1

Block: Y37

Layer: L1-L2 (0cm to-30cm)

Size: 3mX3m

Islamic ceramic location

Description: Two fragments of Islamic ceramics were exposed by the grader in Block Y37 and it was decided to excavate the block in order to determine the presence of more fragments. A block of 3MX3M was excavated up to 30cm. The graded mound of soil was subjected to screening in an effort to acquire more fragments and other archaeological material remains. Only soil samples were collected from this block.

Finds: *Layer 1: Mut2/Y 37/L1* (Arbitrary 15cm)

Acc.no. Mut2/99/135: Islamic ceramic fragments X2g

Mut2/99/206: soil sample X750g

Feature 21

Block: AA26

Layer: L1-L7 (0cm to-105cm)

Size: 3mX1m

Ash concentration

Description: An oval-shaped ash concentration was identified in the central section of the site. It measured approximately 8m in length (north/south) and approximately 3m in width (east/west).

The ash concentration had a dark-grey colour which turned lighter or browner to the edges of the concentration. The western part of the concentration was the darkest in colour and it was decided to excavate a block on this side. A 3Mx1M trench was excavated to enable the investigation and to be able to interpret the soil profile of the trench to determine the shape and depth of the ash concentration. From the profile, it was evident that the ash concentration was disposed of in a pit that was dug into the ground. The pit had a descending angle of approximately 45 degrees, and it was approximately 1 metre deep. The bottom was flat, and the rest of the surrounding soil was archaeologically sterile. The ash deposit consisted of an ash / soil mixture with scattered potsherds, although few potsherds were recovered, soil samples were taken from every 15cm arbitrary layer. This ash concentration was the biggest example / feature on the site.

Finds: ***Layer 1: Mut2/AA26/L1*** (Arbitrary 15cm)
Acc.no. Mut2/99/208: diagnostic potsherds X18
Mut2/99/209: non-diagnostic potsherds X16
Mut2/99/210: soil sample X600g

Layer 2: Mut2/AA26/L2 (Arbitrary 15cm)
Acc.no. Mut2/99/211: soil sample X1000g
Mut2/99/212: non-diagnostic potsherds X27
Layer 3: Mut2/AA26/L3 (Arbitrary 15cm)
Acc.no. Mut2/99/247: soil sample X900g
Layer 4: Mut2/AA26/L4 (Arbitrary 15cm)
Acc.no. Mut2/99/247: soil sample X850g
Mut2/99/275: non-diagnostic potsherds X5
Layer 5: Mut2/AA26/L5 (Arbitrary 15cm)
Acc.no. Mut2/99/249: soil sample X1000g
Layer 6: Mut2/AA26/L5 (Arbitrary 15cm)
Acc.no. Mut2/99/255: soil sample X1100g

Feature 33

Block: AC18

Layer: L1-L3 (0cm to-cm 45cm)

Size: 3mX1m

Underground Pit

Description: This feature was exposed by the grader during the June 1999 excavations. The exposed surface of the feature showed a dark ash concentration with various potsherds mixed with rocks and few daga fragments. The feature was circular in shape and measured approximately 120cm in diameter. The southern half of the feature was excavated and from the profile it appears to be a shallow bowl-shaped pit. The deepest part of the pit measured 23cm. The top layer (arbitrary 15cm) contained large amount of potsherd and animal-bone fragments. The matrix in which these potsherds and animal bone were found consisted of a dark ashy soil mixture with few rocks and daga gravel. The top 14cm contained all the artefacts and animal-bone fragments and the bottom layer consisted of a dark ashy soil mixture with no artefacts. Soil samples were taken from all layers. Several fragmentary quartzite stone / rocks were also part of the backfill of the pit. To the southwest of the feature a stone concentration occurred approximately 30cm away. The stone concentration consisted of stones arranged in a circular shape and measured approximately 50cm across. No artefacts were uncovered associated with the stone structure, the matrix around was archaeologically sterile.

Finds: ***Layer 1: Mut2/AC18/L1*** (Arbitrary 15cm)

Acc.no. Mut2/99/220: diagnostic potsherds X18

Mut2/99/221: non-diagnostic potsherds X233

Mut2/99/212: animal-bone fragments X200g

Mut2/99/223: soil sample X800g

Layer 2: Mut2/AC18/L2 (Arbitrary 15cm)

Acc.no. Mut2/99/246: soil sample X600g

Feature 27

Block: AD22 & AE22

Layer: L1-L3 (0cm to-cm 45cm)

Size: 3mX2m

Grain-bin foundation

Description: The grader also exposed structure 27. It consisted of a layer of burnt daga fragments. In between the lumps of daga fragments, several potsherds were found. The remains of the structure measured approximately 140cm (north/south) and 125cm (east/west). A few rocks were also part of the structure and most of them were found near the edges of the structure. Some of the daga remains had pole and lattice impressions on them, although not as many as with other structures encountered on the site. A couple of *in situ* fragmented pots were among the remains. It was decided to excavate the southern half of the structure first which was in Block AD22. From the profile the structure measured between 8cm and 12cm in thickness, although it was not consistent. On the southern side of the structure, dark, ashy soil was observed, which went underneath the structure. After layer 1 was excavated it was clear that the structure was constructed on top of an ash pit. The ash pit comprised a dark ash / soil mixture and a grey / white ash lens to the east. Several small daga fragments and daga gravel were also present in the ash pit. Excavation proceeded to layer 2 and 3 for a half of a metre south of the structure. This enabled us to study the soil profile of the site. The pit was circular in shape and measured 110cm across. The dark ash / soil mixture formed the top layer, and the grey / white ash formed the bottom layer, which formed a lens into the darker layer on the eastern side of the pit. The pit measured approximately 25cm in depth and had a shallow bowl shape. At the bottom of the pit, more daga gravel and small daga fragments were present. The pit was directly underneath the structures, and contained several artefacts including potsherds, one link shaft and animal-bone fragment. It was clear from the excavation that the opened structure was a grain-bin foundation, because of the type of ceramics found mixed with burnt daga fragments and the size of the stones used in the construction of the base. It became clear that the structure was built on top of an ash pit, dug and filled earlier. Ash and soil samples were taken from the structure as well as from the pit.

Finds: *Layer 1: Mut2/AD22/L1* (Arbitrary 15cm)

Acc.no. Mut2/99/260: soil sample X600g

Mut2/99/284: diagnostic potsherds X5

Mut2/99/286: animal-bone fragments X300g

Mut2/99/287: vitrified dung X410g

Layer 2: Mut2/AD22/L2 (Arbitrary 15cm)

Acc.no. Mut2/99/256: soil sample X750g

Mut2/99/256: soil sample X700g

Mut2/99/258: animal-bone fragments X50g

Mut2/99/259: non-diagnostic potsherds X12

Mut2/99/279: link shaft

Layer 3: Mut2/AD22/L3 (Arbitrary 15cm)

Acc.no. Mut2/99/288: soil sample X350g

Mut2/99/288: soil sample X900g

Feature 20

Block: AE26

Layer: L1-L3 (0cm to-cm 45cm)

Size: 3mX1m

Underground Pit

Description: The feature was exposed because of the presence of contrasting colour compared to the rest already exposed. The site was characterised by dark, ashy soil with a defined circular shape and it measured approximately 110cm across. Several stones and potsherds were visible and on the north-eastern side, a fragmented pot was slightly damaged by the grader. The first-sized stones were arranged in the north-western side of the feature. It was decided to excavate the southern half of the feature to determine the depth and the shape of the pit. The pit measured 28cm at the deepest point and it was bowl shaped. The pit had no lining of any nature and it contained a dark, ashy soil mixture intermingled with small daga fragments and potsherds, but no animal-bone fragments. Potsherds were only recovered from the top of the first layers. The third layer, i.e. the soil surrounding the pit, was archaeologically sterile. Soil samples were taken from every layer.

Finds: ***Layer 1: Mut2/AE26/L1*** (Arbitrary 15cm)

Acc.no. Mut2/99/224: diagnostic potsherds X6

Mut2/99/225: charcoal X40g

Mut2/99/226: non-diagnostic potsherds X9

Mut2/99/213: soil sample X700g

Layer 2: Mut2/AE26/L2 (Arbitrary 15cm)

Acc.no. Mut2/99/256: soil sample X700g

Layer 3: Mut2/AD22/L3 (Arbitrary 15cm)

Acc.no. Mut2/99/288: soil sample X730g

The Northern Section

This section is one of the smallest areas and had few structures and features. The structures were widely spread, and they were not in a good state of preservation. It was difficult to identify good examples for further excavations. A hut structure (Structure 78) in Block AX10 and AX11, grain-bin foundation (Structure 81) in Block AZ6 and a small pit filled with bone fragments concentration (Feature 80) in Block AZ9 was chosen to be excavated.

Feature 81

Block: AZ6

Layer: L1-L2 (0cm to-cm 30cm)

Size: 3mX1m

Grain-bin foundation

Description: The feature was exposed characterised by several daga fragments and gravel materials. The structure was slightly oval shaped and measured approximately 115cm (east/west) and approximately 85cm (north/south). The burnt daga fragments formed a circle on the edges of the structure and few stones were also noted in between. The central part of the structure contained more daga gravel and fewer daga fragments. It was decided to excavate the northern half of the structure first. From the profile, the remains of the structure measured approximately 12cm, although it was thicker to the west than the east. No potsherds or any other artefacts were recovered from the structure. Only a few lattice impressions were observed on the daga fragments while the rest of the daga fragments were in a degraded state. Based on the size and shape of the structure, it was determined that the structure could be a grain-bin foundation.

Finds: ***Layer 1: Mut2/AZ6/L1*** (Arbitrary 15cm)

Acc.no. none

Layer 1: Mut2/AZ6/L2 (Arbitrary 15cm)

Acc.no. none

Feature 80

Block: AZ9

Layer: L1-L2 (0cm to-cm 15cm)

Size: 1mX1m

Small pit/Animal-bone concentration

Description: A small pit or animal-bone concentration was exposed during grading programme. Animal bones were disposed of in a small pit which measured approximately 35cm in diameter. Although the animal-bone fragments (and the pit) were damaged by the grader, it was still possible to retrieve most of them. The pit was very shallow and measured only 10cm deep. The bone fragments filled the pits but no other artefacts such as potsherds were found. The bones were in a very fragmentary state. This feature was the only feature of its kind where most bones were collected to determine species.

Finds: ***Layer 1: Mut2/AZ9/L1*** (Arbitrary 15cm)

Acc.no. Mut2/99/301: Animal-bone fragments.

Feature 78

Block: AX10

Layer: L1-L2 (0cm to-cm 30cm)

Size: 3mX1m

Hut structure

Description: This structure was exposed by the grader and although some damaged occurred, it was decided to proceed with excavation. The structure measured approximately 220cm from north to south and only 180cm from east to west, but it was damaged on the western side. The structure was situated on the side of the northern extension and the hill sloped down to the east. Because of the slope on the hill, the grader had to adjust and damaged was caused to the higher-lying parts. The remains of the structure consisted of several daga fragments occurring in the central part of the structure. It was difficult to determine the exact size and shape of the remains, but an estimate diameter of 220cm across was measured and a roughly circular shape was identified; only a few pole and lattice impressions were recognised on some of the daga fragments. No other indication such as a floor or pole remained. The excavation revealed that the remains formed a layer of approximately 10cm thick deposit.

Finds: ***Layer 1: Mut2/AX10/L1*** (Arbitrary 15cm)

Acc.no. none

Layer 1: Mut2/AX10/L1 (Arbitrary 15cm)

Acc.no. none

Conclusion

Few isolated complete pots were recovered from the site; however, all these pots were damaged by grading activities when removing the top sandy soil. Other ceramic pots were uncovered where several features were excavated.

Ceramic Pot 1: the pot was represented by the bottom half of the pot; the grader removed the top section of the pot. **Block: AE10; Acc. No Mut2/99/299.**

Ceramic Pot 2: nearly complete pot was uncovered in block AY12. Grading activities damaged some parts of the rim of the pot but most of the remaining potsherds were collected. **Block: AY12; Acc. No Mut2/99/300.**

Ceramic Pot 3: A pot with the top half placed next to the bottom section. With few animal-bone fragments. **Block: AH28.**

Acc. No Mut2/99/ 226 diagnostic potsherds

Mut2/99/227 non-diagnostic potsherds

Mut2/99/228 animal-bone fragments

APPENDIX 2:

List of structures/ Features excavated from Mut 2 site after Archae-Info 2000 report.

1. Islamic ceramic locality
2. Possible pit measuring approximately 90cm
3. Small daga fragment concentration
4. Fragmented pot
5. Possible grain-bin foundation, daga fragments and gravel associated with stones and potsherds
6. Small daga fragments concentration
7. Grain-bin foundation measuring approximately 140cm across
8. Possible pit with stones, daga fragments, potsherds, charcoal and ash
9. Ash concentration measuring approximately 3MX2M
10. Structure. Daga gravel concentration associated with three stones on the northern side.
11. Three possible grain-bin structures next to each other. Structure measured approximately 1m across and their size, shape and composition were the same
12. Fragmented pot
13. Medium daga, gravel concentration
14. Ash concentration measuring approximately 3,5MX3,5M
15. Structure measuring approximately 185cm across with stones and daga gravel
16. Fragmented pot
17. Possible grain-bin structure with daga fragments, daga gravel and stones measuring approximately 1,45m across
18. Stone concentration mixed with potsherds and daga fragments
19. Small daga fragments concentration
20. Excavated pit
21. Small daga gravel concentration
22. Small daga gravel concentration
23. Circular hut structure with big daga lumps, daga gravel measuring approximately 2M across
24. Medium sized daga gravel concentration
25. Medium sized daga gravel concentration (1M)

26. Small daga gravel concentration (0,5m)
27. Excavated grain-bin structure
28. Small daga concentration with potsherds and stone
29. Small daga gravel concentration measuring approximately 50cm
30. Possible grain-bin structure with daga gravel, daga fragments, stone, potsherds and animal-bone fragments
31. Small daga gravel concentration
32. Grain-bin structure with daga fragments, daga gravel, stones and scattered potsherds measuring approximately 110cm forming a well-defined circle
33. Excavated pit with small stones concentration to the southwest
34. Small stone and daga concentration
35. Possible grain-bin structure with stones and daga gravel measuring approximately 1,5m
36. Possible hut structure, badly damaged by grader, the remaining daga fragments and shape of the structure indicate the possibility of a hut structure
37. Excavated hut structure
38. A grain-bin structure with stones, daga gravel and daga fragment measuring 85cm
39. A hut structure with daga gravel, daga fragments and stones measuring 2,25m
40. A possible grain-bin structure next to another possible grain-bin structure, same size, composition and shape
41. Possible grain-bin structure
42. Small stone concentration
43. Possible grain-bin structure, consisting of stones, daga gravel and fragments measuring 140 in diameter
44. A hut structure with big daga fragments measuring 180cm
45. Fragmented pot
46. A possible hut structure slightly damaged on the southern side; the structure consisted of big lumps of daga fragments with pole and lattice impressions and few scattered potsherds
47. Medium-sized daga and stone concentration
48. Possible pit with potsherds, ash and daga gravel and daga fragments
49. Small daga gravel concentration (30cm)
50. Small daga gravel concentration (30cm)

51. Possible grain-bin structure consisting of daga fragments, which measured 80cm
52. A hut structure damaged on the southern side. The structure consisted mainly of daga fragments measuring approximately 2,25M in diameter
53. Possible grain-bin structure consisting of daga fragments with pole and lattice impressions
54. Stone and daga concentration
55. Small daga gravel concentration
56. A possible grain-bin structure slightly damaged, it consisted of daga fragments, stones and daga gravel concentration on the eastern side measuring 90cm.
57. A hut structure with a possible grain-bin structure right next to it. Both consisted of daga gravel, big daga fragments and stones.
58. A damaged grain-bin structure measuring 115cm
59. A possible hut structure consisting of stones and gravel and daga fragments.
60. A small daga fragments concentration
61. A small daga concentration with few potsherds
62. Fragmented pot
63. A large concentration of hut rubble, possibly the remains of a hut structure
64. Daga gravel concentration. The remains of a structure.
65. Excavated pit
66. Small daga concentration
67. Medium-sized daga concentration a possible grain-bin structure
68. A hut structure with big lump of daga with pole and lattice impression, the structure measured 2,05m in diameter
69. A possible hut structures
70. Medium-sized daga fragments concentration
71. Small daga and stone concentration
72. A well-defined grain-bin structure which measured 1,35 metres in diameter with daga gravel and fragments
73. A possible grain-bin structure with big lumps of daga and small concentration of charcoal on the south-eastern side.
74. Small stone concentration (40cm)
75. Small daga concentration (35cm)

76. Medium-sized ash concentration
77. Large rubble concentration, the structure measured 180m in diameter
78. Excavated hut structure
79. Small stone and bone concentration
80. Excavated bone concentration
81. Excavated grain-bin concentration
82. Possible pit filled with dark ash and daga gravel
83. Medium-sized daga concentration with ash and soil mixture
84. Small daga concentration (grain-bin structure)
85. Large daga concentration with ash and potsherd
86. Scattered daga fragments
87. Large concentration of daga gravel and fragments
88. Medium-sized daga concentration either traces of ash, it could have been a grain bin
89. Medium-sized daga concentration
90. Grain-bin structure with stone and daga fragments
91. Large hut rubble concentration, measuring 1.5metres in diameter
92. Small daga and stone concentration
93. Medium-sized daga structure
94. Scattered daga fragments with a large daga gravel concentration
95. Medium-sized daga gravel and daga fragments concentration
96. A possible hut structure according to the size, measured 2m in diameter
97. Small daga concentration
98. Small daga concentration
99. A possible grain-bin structure consisting of stone, daga gravel and daga fragments
100. Small daga concentration next to a small stone concentration
101. Small daga and stone concentration
102. Medium-sized daga and stone concentration
103. A possible grain-bin structure measuring approximately 130cm in diameter
104. Medium-sized daga and stone concentration
105. A possible grain-bin structure with daga fragments and daga gravel
106. Damaged structure with gravel and daga fragments

107. Medium-sized daga concentration
108. Small daga concentration
109. A grain-bin structure, consisted of daga fragments measuring 140cm in diameter
110. Two small daga gravel concentrations
111. A small stone concentration
112. A possible hut structure with a grain-bin structure
113. A possible hut structure
114. A well-defined and preserved grain-bin structure with big daga fragments (pole and lattice impressions) and daga gravel
115. An ash concentration, measuring 2Mx2M
116. A grain-bin structure with big daga fragments, stones and daga gravel
117. Large daga gravel concentration
118. Small daga and stone concentration
119. A possible grain-bin structure with daga fragments and daga gravel measuring approximately 140cm
120. A possible hut structure
121. A possible pit with ashy soil mixed with stones, potsherds and daga fragments
122. Small daga concentration
123. Grain-bin structure
124. Grain-bin structure next to hut structure measuring approximately 125cm
125. Excavated hut structure
126. Small daga concentration
127. A possible grain-bin structure indicated by daga fragments
128. A possible grain-bin structure measuring approximately 120cm
129. Medium-sized daga and stone concentration
130. A well-defined, possible hut structure consisting of big lump of daga fragments
131. Medium-sized daga and stone concentration
132. Scattered daga fragments
133. A daga gravel concentration with several daga fragments
134. Medium-sized daga concentration
135. Scattered daga fragments

136.Medium-sized daga concentration

137.Excavated grain-bin structure

138.Excavated grain bin

139.Excavated hut structure

140.Excavated grain-bin structure

APPENDIX 3:

MUT2 site, ACCESSION LIST, after Archaeo-Info 2000 report.

Access. No	Date	Context	Description	Amount
Mut2/99/122	22/06/1999	AF 39 Surface	Diagnostic potsherds	x 8
Mut2/99/123	22/06/1999	AF 40 Surface	Diagnostic potsherds	x 13
Mut2/99/124	22/06/1999	AE 40 Surface	Non-diagnostic potsherds	x 7
Mut2/99/125	22/06/1999	AF 41 Surface	Non-diagnostic potsherds	x 12
Mut2/99/126	22/06/1999	AC 45 Surface	Diagnostic potsherds	x 12
Mut2/99/127	22/06/1999	AC 45 Surface	Non-diagnostic potsherds	x 5
Mut2/99/128	22/06/1999	AB 44 Surface	Non-diagnostic potsherds	x 7
Mut2/99/129	22/06/1999	AA 42 Surface	Diagnostic potsherds	x 13
Mut2/99/130	22/06/1999	Z 42 Surface	Diagnostic potsherds	x 2
Mut2/99/131	22/06/1999	Z 42 Surface	Non-diagnostic potsherds	x 5
Mut2/99/132	22/06/1999	AB 40 Surface	Diagnostic potsherds	x 4
Mut2/99/133	22/06/1999	AB 40 Surface	Non-diagnostic potsherds	x 4
Mut2/99/134	23/06/1999	Surface	Diagnostic potsherds	x 365
Mut2/99/135	23/06/1999	Surface	Islamic ceramic fragments	x 2
Mut2/99/136	23/06/1999	Surface	Iron object (possible axe)	x 200 g
Mut2/99/137	23/06/1999	Surface	Non-diagnostic potsherds	x 1239
Mut2/99/138	23/06/1999	Surface	Drinking-vessel fragments	x 5
Mut2/99/139	23/06/1999	Surface	Ivory fragment	x 5 g
Mut2/99/140	23/06/1999	Surface	Soapstone fragments	x 1.9 kg
Mut2/99/141	23/06/1999	Surface	Grooved stone	x 1
Mut2/99/142	28/06/1999	W 22, L1	Diagnostic potsherds	x 27
Mut2/99/143	28/06/1999	W 22, L1	Non-diagnostic potsherds	x 121
Mut2/99/144	28/06/1999	W 22, L1	Daga	x 250 g
Mut2/99/145	28/06/1999	Surface	Diagnostic potsherds	x 125
Mut2/99/146	28/06/1999	W 21, L2	Diagnostic potsherds	x 21
Mut2/99/147	28/06/1999	W 21, L2	Non-diagnostic potsherd	x 131
Mut2/99/148	28/06/1999	W 21, L2	Animal-bone fragments	x 300 g
Mut2/99/149	28/06/1999	K 17, L1	Non-diagnostic potsherds	x 14
Mut2/99/150	28/06/1999	K 16, L1	Diagnostic potsherds	x 6
Mut2/99/151	28/06/1999	K 16, L1	Non-diagnostic potsherds	x 22
Mut2/99/152	28/06/1999	K 16, L1	Animal-bone fragments	x 120 g

Mut2/99/153	28/06/1999	Miscellaneous	Diagnostic potsherds	x 62
Mut2/99/154	28/06/1999	Miscellaneous	Non-diagnostic potsherds	x 1013
Mut2/99/155	28/06/1999	Miscellaneous	Animal-bone fragments	x 410 g
Mut2/99/156	28/06/1999	W 22, L2	Diagnostic potsherds	x 26
Mut2/99/157	28/06/1999	W 22, L2	Animal-bone fragments	x 100 g
Mut2/99/158	28/06/1999	W 22, L2	Non-diagnostic potsherds	x 309
Mut2/99/160	28/06/1999	W 22, L2	Animal-bone fragments	x 100 g
Mut2/99/161	28/06/1999	W 22, L2	Vitrified dung	x 50 g
Mut2/99/162	28/06/1999	Miscellaneous	Non-diagnostic potsherds	x 398
Mut2/99/163	28/06/1999	K 16, L2	Diagnostic potsherds	x 7
Mut2/99/164	28/06/1999	K 16, L2	Non-diagnostic potsherds	x 26
Mut2/99/165	28/06/1999	K 16, L2	Daga	x 50 g
Mut2/99/166	28/06/1999	K 16, L2	Stones	x 2
Mut2/99/167	28/06/1999	K 17, L2	Diagnostic potsherds	x 6
Mut2/99/168	28/06/1999	K 17, L2	Non-diagnostic potsherds	x 73
Mut2/99/169	28/06/1999	K 17, L2	Daga	x 150 g
Mut2/99/170	28/06/1999	K 17, L2	Animal-bone fragments	x 5 g
Mut2/99/171	28/06/1999	W 21, L3	Diagnostic potsherds	x 20
Mut2/99/172	28/06/1999	W 21, L3	Animal-bone fragments	x 210 g
Mut2/99/173	28/06/1999	W 21, L3	Animal-bone fragments	x 90 g
Mut2/99/174	28/06/1999	W 21, L3	Animal-bone fragments	x 100g
Mut2/99/175	28/06/1999	W 21, L3	Non-diagnostic potsherds	x 188
Mut2/99/176	28/06/1999	V 22, L3	Vitrified dung	x 80 g
Mut2/99/177	28/06/1999	W 22, L3	Animal-bone fragments	x 1.9 kg
Mut2/99/178	28/06/1999	W 22, L3	Animal-teeth fragments	x 50 g
Mut2/99/179	28/06/1999	W 22, L3	Animal-bone fragments	x 1.8 kg
Mut2/99/180	29/06/1999	W 22, L3	Diagnostic potsherds	x 27
Mut2/99/181	29/06/1999	W 22, L3	Non-diagnostic potsherds	x 160
Mut2/99/182	29/06/1999	W 22, L3	Animal-bone fragment	x 5 g
Mut2/99/183	29/06/1999	W 22, L3	Animal-bone fragment	x 5 g
Mut2/99/184	29/06/1999	W 22, L3	Drinking-vessel fragments	x 2
Mut2/99/185	29/06/1999	W 22, L3	Stone	x 1
Mut2/99/186	29/06/1999	K 18, L1	Diagnostic potsherds	x 8
Mut2/99/187	29/06/1999	K 18, L1	Non-diagnostic potsherds	x 47
Mut2/99/188	29/06/1999	L 18, L1	Diagnostic potsherds	x 6

Mut2/99/189	29/06/1999	L 18, L1	Non-diagnostic potsherds	x 68
Mut2/99/190	29/06/1999	L 18, L1	Rubbing stones	x 2
Mut2/99/191	29/06/1999	W 22, L4	Animal-bone fragments	x 10 g
Mut2/99/192	29/06/1999	W 22, L4	Animal-bone fragments	x 100 g
Mut2/99/193	29/06/1999	W 22, L4	Soil sample	x 1.3 kg
Mut2/99/194	29/06/1999	W 22, L4	Non-diagnostic potsherds	x 10
Mut2/99/195	29/06/1999	W 22, L4	Diagnostic potsherds	x 2
Mut2/99/196	29/06/1999	W 22, L3	Charcoal	x 5 g
Mut2/99/197	29/06/1999	W 22, L3	Animal-bone fragments	x 130 g
Mut2/99/198	29/06/1999	V 21, L2	Diagnostic potsherds	x 12
Mut2/99/199	29/06/1999	V 21, L2	Non-diagnostic potsherds	x 103
Mut2/99/200	29/06/1999	V 21, L2	Animal-bone fragments	x 100 g
Mut2/99/201	30/06/1999	V 21, L2	Soil sample	x 800 g
Mut2/99/202	30/06/1999	AA 29, L1	Diagnostic potsherds	x 10
Mut2/99/203	30/06/1999	AA 29, L1	Non-diagnostic potsherds	x 45
Mut2/99/204	30/06/1999	Z 33, L1	Diagnostic potsherds	x 13
Mut2/99/205	30/06/1999	Z 33, L1	Non-diagnostic potsherds	x 22
Mut2/99/206	30/06/1999	Y 37, L1	Soil sample	x 750 g
Mut2/99/207	30/06/1999	AA 29, L1	Distinctive potsherds	x 2
Mut2/99/208	30/06/1999	AA 26, L1	Diagnostic potsherds	x 18
Mut2/99/209	30/06/1999	AA 26, L1	Non-diagnostic potsherds	x 16
Mut2/99/210	30/06/1999	AA 26, L1	Soil sample	x 60 g
Mut2/99/211	30/06/1999	AA 26, L2	Soil sample	x 1 kg
Mut2/99/212	30/06/1999	AA 26, L2	Non-diagnostic potsherds	x 27
Mut2/99/213	30/06/1999	AF 26, L1	Soil sample	x 500 g
Mut2/99/214	30/06/1999	AE 26, L2	Soil sample	x 700 g
Mut2/99/215	30/06/1999	AE 26, L2	Soil sample	x 730 g
Mut2/99/216	30/06/1999	V 21, L3	Diagnostic potsherds	x 4
Mut2/99/217	30/06/1999	V 21, L3	Non-diagnostic potsherds	x 32
Mut2/99/218	30/06/1999	V 21, L3	Soil sample	x 500 g
Mut2/99/219	30/06/1999	V 21, L3	Animal-bone fragments	x 5 g

Mut2/99/220	30/06/1999	AC 18, L1	Diagnostic potsherds	x 18
Mut2/99/221	30/06/1999	AL 18, L1	Non-diagnostic potsherds	x 233
Mut2/99/222	30/06/1999	AL 18, L1	Animal-bone fragments	x 200 g
Mut2/99/223	30/06/1999	AL 18, L1	Soil sample	x 800 g
Mut2/99/224	30/06/1999	AE 26, L1	Diagnostic potsherds	x 6
Mut2/99/225	30/06/1999	AE 26, L1	Charcoal	x 40 g
Mut2/99/226	30/06/1999	AH 28, L1	Diagnostic potsherds	x 9
Mut2/99/227	01/07/1999	AH 28, L1	Non-diagnostic potsherds	x 23
Mut2/99/228	01/07/1999	AH 28, L1	Non-diagnostic potsherds	x 13
Mut2/99/229	01/07/1999	Y 13, L1	Charcoal	x 50 g
Mut2/99/230	01/07/1999	Y 13, L1	Non-diagnostic potsherds	x 21
Mut2/99/231	01/07/1999	L 17 & 18, L2	Diagnostic potsherds	x 45
Mut2/99/232	01/07/1999	L 17 & 18, L2	Non-diagnostic potsherds	x 69
Mut2/99/233	01/07/1999	L 17 & 18, L2	Animal-bone fragments	x 250 g
Mut2/99/234	01/07/1999	L 17 & 18, L2	Soil sample	x 900 g
Mut2/99/235	01/07/1999	L 17 & 18, L3	Soil sample	x 950 g
Mut2/99/236	01/07/1999	L 17 & 18, L2	Animal-bone fragments	x 200 g
Mut2/99/237	01/07/1999	L 17 & 18, L3	Diagnostic potsherds	x 7
Mut2/99/238	01/07/1999	L 17 & 18, L3	Non-diagnostic potsherds	x 10
Mut2/99/239	01/07/1999	L 17 & 18, L3	Animal-bone fragments	x 100 g
Mut2/99/240	01/07/1999	L 17 & 18, L3	Charcoal	x 10 g
Mut2/99/241	01/07/1999	AE 14, L1	Diagnostic potsherds	x 8
Mut2/99/242	01/07/1999	AE 14, L1	Non-diagnostic potsherds	x 19
Mut2/99/243	01/07/1999	AE 14, L1	Soil sample	x 700 g
Mut2/99/244	01/07/1999	Y 13, L1	Soil sample	x 850 g
Mut2/99/245	01/07/1999	Y 13, L2	Soil sample	x 1.3 kg
Mut2/99/246	01/07/1999	AC 18, L2	Soil sample	x 600 g
Mut2/99/247	01/07/1999	AA 26, L3	Soil sample	x 900 g
Mut2/99/248	01/07/1999	AA 26, L4	Soil sample	x 850 g
Mut2/99/249	01/07/1999	AA 26, L5	Soil sample	x 1 kg

Mut2/99/250	01/07/1999	Miscellaneous	Vitrified dung with Daga/pole marks	x 1.2 kg
Mut2/99/251	01/07/1999	AE 14, L2	Diagnostic potsherds	x 7
Mut2/99/252	01/07/1999	AE 14, L2	Non-diagnostic potsherds	x 15
Mut2/99/253	01/07/1999	AE 14, L2	Animal-bone fragments	x 50 g
Mut2/99/254	01/07/1999	AE14, L2	Soil sample	x 700 g
Mut2/99/255	01/07/1999	AA 26, L6	Soil sample	x 1.1 kg
Mut2/99/256	01/07/1999	AD 22, L2	Soil sample (grey)	x 750 g
Mut2/99/257	01/07/199	AD 22, L2	Soil sample (dark brown)	x 700 g
Mut2/99/258	01/07/1999	AD 22, L2	Animal-bone fragments	x 50 g
Mut2/99/259	01/07/1999	AD 22, L2	Non-diagnostic potsherds	x 12
Mut2/99/260	01/07/1999	AD 22, L1	Soil sample	x 600 g
Mut2/99/261	01/07/1999	J24, L1	Soil sample	x 600 g
Mut2/99/262	02/07/1999	AF 27, L1	Diagnostic potsherds	x 5
Mut2/99/263	02/07/1999	J 24, L1	Diagnostic potsherds	x 7
Mut2/99/264	02/07/1999	J 24, L1	Non-diagnostic potsherds	x 26
Mut2/99/265	02/07/1999	J 24, L1	Animal-bone fragments	x 50 g
Mut2/99/267	02/07/1999	J 24, L2	Diagnostic potsherds	x 6
Mut2/99/268	02/07/1999	J 24, L2	Non-diagnostic potsherds	x 49
Mut2/99/269	02/07/1999	J 24, L2	Animal-bone fragments	x 150 g
Mut2/99/270	02/07/1999	J 24, L2	Soil sample	x 1.2 kg
Mut2/99/271	02/07/1999	J 24, L3	Soil sample	x 900 g
Mut2/99/272	02/07/1999	E 18, L1	Diagnostic potsherds	x 6
Mut2/99/273	02/07/1999	E 18, L1	Non-diagnostic potsherds	x 12
Mut2/99/274	02/07/1999	E 18, L1	Soil sample	x 650 g
Mut2/99/275	02/07/1999	AA 26, L1	Non-diagnostic potsherds	x 5
Mut2/99/276	02/07/1999	Surface	Diagnostic potsherd	x 1
Mut2/99/277	02/07/1999	Surface	Ivory fragment	x 1
Mut2/99/278	02/07/1999	Surface	Stone	x 230 g
Mut2/99/279	02/07/1999	AD 22, L2	Link shaft fragment	x 1
Mut2/99/280	02/07/1999	AD 22, L2	Soil sample	x 1.5 kg

Mut2/99/281	02/07/1999	J 24, L3	Diagnostic potsherds	x 10
Mut2/99/282	02/07/1999	J 24, L3	Non-diagnostic potsherds	x 30
Mut2/99/283	02/07/1999	J 24, L3	Animal-bone fragments	x 40 g
Mut2/99/284	02/07/1999	AD 22, L1	Diagnostic potsherds	x 16
Mut2/99/285	02/07/1999	AD 22, L1	Non-diagnostic potsherds	x 22
Mut2/99/286	02/07/1999	AD 22, L1	Animal-bone fragments	x 300 g
Mut2/99/287	02/07/1999	AD 22, L1	Vitrified dung	x 410 g
Mut2/99/288	02/07/1999	AD 22, L3	Soil sample	x 350 g
Mut2/99/289	02/07/1999	AD 22, L3	Soil sample	x 900 g
Mut2/99/290	02/07/1999	E 18, L2	Soil sample	x 1 kg
Mut2/99/291	02/07/1999	E 19, L1	Diagnostic potsherds	x 5
Mut2/99/292	02/07/1999	E 19, L1	Non-diagnostic potsherds	x 6
Mut2/99/293	02/07/1999	AP 13, L1	Diagnostic potsherds	x 16
Mut2/99/294	02/07/1999	J 24, L4	Soil sample	x 2 kg
Mut2/99/295	02/07/1999	Miscellaneous	Diagnostic potsherds	x 206
Mut2/99/296	02/07/1999	Miscellaneous	Fragmented bone points	x 2
Mut2/99/297	02/07/1999	Miscellaneous	Stone	x 1
Mut2/99/298	02/07/1999	Miscellaneous	Non-diagnostic potsherds	x 1217
Mut2/99/299	02/07/1999	AE 10, L1	A broken pot	x 123
Mut2/99/300	02/07/1999	AY 12, L1	A broken pot	x 69
Mut2/99/301	02/07/1999	AZ 9, L1	Animal-bone fragments	x 450 g
Mut2/99/302	02/07/1999	Misc. finds	Charcoal sample	x 20g
Mut2/99/303	02/07/1999	Misc. finds	Soil sample	x 300g
Mut2/99/304	02/07/1999	Misc. finds	Diagnostic potsherds	x 73
Mut2/99/305	02/07/1999	Misc. finds	Iron object	x 1
Mut2/99/306	02/07/1999	Misc. finds	Non-diagnostic potsherds	x 112
Mut2/99/307	02/07/1999	Misc. finds	Soil sample	x 450g
Mut2/99/308	02/07/1999	Misc. finds	Soil sample from ash pit	x 480g
Mut2/99/309	02/07/1999	Misc. finds	Soil sample from ash pit	x 520g
Mut2/99/310	02/07/1999	Misc. finds	Animal-bone fragments	x 210 g

APPENDIX 4:

Thomo site, ACCESSION LIST.

Access. No	Date	Context	Description	Amount
Thomo 1 /23/02/001	23/02/2011	TT1/L1	Hematite ore	
			Slags	
/23/02/002			Slags	
/23/02/003			Tuyere fragments	
/23/02/004			Burnt daga fragments	
/23/02/005			Diagnostic ceramics	X16
/23/02/006			Undiagnostic ceramics	X41
/23/02/007			Faunal remains	
/23/02/008			Rusted slags	
/23/02/009		TT1/L2	Slags	
/23/02/010			Burnt daga fragments	
/23/02/011			Tuyere fragments	
/23/02/12			Diagnostic ceramics	X4
/23/02/13			Undiagnostic ceramics	X8
/23/02/14			Faunal remains	
/23/02/15			Charcoal samples	
/23/02/16			Slag samples	
Thomo Mines				
28/02/001		Miscellaneous	Hematite Ore samples	

APPENDIX 5:

Sample Ceramic data recording form.

Data capture sheet for recording stylistic and decoration attributes of pottery

Site name:...Test Pit:...Layer:...................................Sheet number:...............................

Shd No//	Vsl prt	Vsl shp	Lipform						Surface treatment				Colour					Fibre			Rimdi	Shds	Shdth	Tempr			T-Density			Tsi	D-motif	D-placement						D-technique					Photo No//	Ilstrtn Photo No//	Comments
			Sq	Ex	It	Rn	Be	Tap	Gb	Po	Ro	Bu	St	B	Rd	G	Gn	F	M	C				S	Q	Ch	Ab	Sp	mm			Ri	Ne	Sh	Bo	NR	RS	NRS	Inc	Cst	Pa	Crsh			

KEY: Shd No//-Sherd Number **Vsl prt-**Vessel part **Vsl shp-**Vessel shape **Sq**-Square **Ex**-Externally thickened **It**-Internally thickened **Rn**-Rounded **Be**-Bevelled **Tap**-Tapered **Gb**-Graphite burnishing **Ro**- Red Ochre **Po**-Polishing **B**-Burning **St**-Soot **Bl**-Black **Rd**-Red **G**-Grey **Gn**-Grey brown **C**-Coarse **M**-Medium **F**-Fine **Rimdi-**Rim diameter **Shds-**Sherd size **Shdth-**Sherd thickness **Tempr-**Temper **S**-Sand **Q**-Quartz **Ch**-Charcoal **T-Density-**Temper Density **Ab**-Abundant **Sp**-Spaced **Mm**-Minimum **Tsi-**Temper Size **D-motif-**Decoration motif **D-placement-**Decoration placement **Ne**-Neck **Sh**-Shoulder **Ri-**Rim **Bo**-Body **Bs**-Base **D-technique-**Decoration technique **Cst-**Comb stamping **Inc**-Incisions **Wf/b-**Wrapped fibre/bead Impression **Pa**-Punctation **Crsh**-Crosshatching **Ilstrtn Photo No//-**Illustration Photo Number