IRON AGE DECORATIVE METALWORK IN SOUTHERN AFRICA: AN ARCHIVAL STUDY

A portrait of a Housouana woman (Plate 63) by F. Le Vaillant   1772-1776

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ABSTRACT

This thesis addresses continuity and change in the manufacture and use of decorative metalwork in the Iron Age (200-1900 AD) of southern Africa, within a framework of archival studies and artefact studies theory. The thesis adopted a direct historical approach which exploited the huge database of existing information to create typologies of objects and processing techniques that are prominent in ethno-historical sources of the 19th and 20th centuries. This process enabled for the first time, a comprehensive mapping of object typologies and techniques of manufacture by ethnic groups thereby allowing cross cultural comparisons. Subsequently, the study explored the typology of objects utilized further back in the time of the Early Iron Age using archaeological evidence. It demonstrated that most of the objects used in the Iron Age were similar to those that were used in the 19th century. However, new innovations were made along the way with metals and alloys being constantly added to the range of materials worked. A dedicated visual study of fabrication techniques employed in the manufacture of ethnographic materials housed at Iziko Museum of Cape Town was carried out. The techniques gleaned from the macroscopic study were compared with those metallographically documented in the literature for the manufacture of Iron Age objects, further exposing continuity and change in metal fabrication. The social, economic and political role of decorative metalwork was hardly static, and varied from context to context and group to group.

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1.1: PREAMBLE

In broad terms, the region of southern Africa is defined by lands that lie approximately 15º degrees south of the equator, and below the Zambezi and Kunene Rivers (see Figure 1.1). In this region, the arrival in the first millennium AD of Black agro-pastoralists travelling south- wards brought their agricultural, potting and metallurgical skills. These communities were both pastoral and sedentary and built their villages along permanent water courses. During this initial period metal smiths worked only with iron and copper with the former metal being reserved for more utilitarian tasks while the latter was largely restricted to ornamental domains. In time, their activities expanded and at the turn of the millennium, when gold was extracted, the communities in the region became associated with the acquisitive desire and commercial activities of the Swahili and Arabs from the Indian Ocean coast, who penetrated the interior seeking tradable items such as ivory and animal skins and later precious metals (Freeman-Grenville, 1962; Pwiti, 2005; Killick, 2009; Wood, 2012). The incorporation of southern Africa into the Indian Ocean based long distance trade, interacted with local factors such as cattle husbandry, and agriculture among others to produce far- reaching social, economic, religious and political changes (Summers, 1969; Maggs, 1982; Maylam, 1989; Pwiti, 1991; Miller, 2002; Killick, 2009). These transformations took place at the pivot between first and second millennia AD (Maggs, 1982).

From 1500 AD Portuguese merchants arrived on the east coast of Africa seeking to displace the Arab traders in order to benefit from the gold trade (Summers, 1969). In the course of two centuries, they together with merchants from other European nations increased the importation of brass in a variety of forms to the populations of southern Africa by the 18th century. By the 19th century, in some areas in the region there was a greater focus on brass, for body ornamentation alongside bronze, copper and iron, the traditional alloy and metals for this purpose (Roodt, 1993, 1996; Pikirayi, 1993).

Archaeologists have recovered ubiquitous evidence of mining, smelting and smithing dating from the onset of metallurgy until colonialism gathered impetus, in the 19th century (Summers, 1969; Muller, 2002; Chirikure, 2010). The wide range of decorative items generated from metallurgy in southern Africa over the period of the past 1500 (ca. 400 to 1900) years was created initially from locally mined and smelted iron and copper, with a later addition of gold, bronze (an alloy of tin with copper) imported brass (an alloy of copper and zinc) and some lead (Miller, 1996). The nearly two millennia span of time in which this activity took place is divided into Early (ca. 400 to 1000), Middle (ca. 1000 to

1400) and Later Iron Ages (ca. 1500 to 1900) (Mason, 1974; Huffman, 2007). The Middle Iron Age is however restricted to the Middle Limpopo valley in other areas of southern Africa there is only an earlier and later Iron Age.

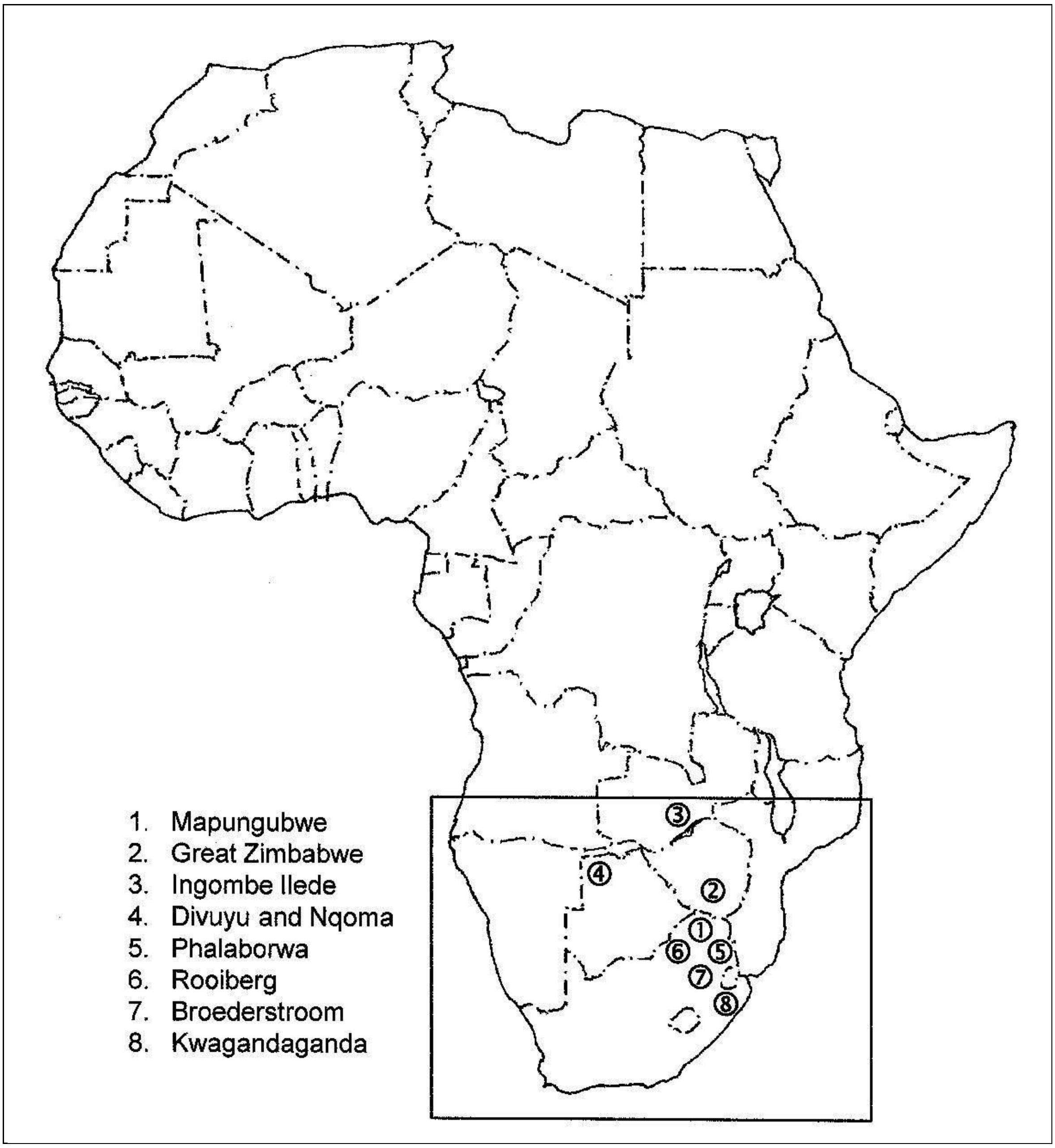


Figure 1.1 Shows the position of southern Africa within Africa and some of the archaeological sites mentioned in the text.

Over a century of research at Iron Age sites of varying periods exposed different categories of decorative metalwork such as bracelets, bangles, beads, neck-rings, pendants and ear- rings. Within a diachronic and synchronic framework, that draws from material culture theory, this thesis attempts to describe the wide distribution of decorative metalwork that was both worn and utilized by a variety of cultural groups in southern

Africa. According to Caple (2006), writing about archaeological research, as material culture, objects are reluctant witnesses to the past – they illuminate a wide variety of information about their producers and users. Amongst other aspects, such information covers the technological, social, political, economic and religious aspects of a group or society (Jones, 2001; Martinón-Torres & Rehren, 2008). Therefore, it is anticipated that a study of decorative metalwork from southern Africa will throw light on these specific issues as well as on the broader topics linked to within group and between group interaction, technological cross borrowing, innovation and the ways of life of Iron Age people (Miller 2002, Thondhlana & Martinón- Torres, 2009). According to Childs & Dewey (1996), a study of decorative metalwork found at archaeological locations permits the distinction between functional and expressive objects. Furthermore, by studying decorative metalwork and associated contexts, we can explore differences in rank and status across sites and periods thereby passing comment on consumption pattern differences between elites and non-elites in society (Kristiansen, 2007).

A dedicated literature search reveals that the earliest decorative metalwork to appear in southern Africa were the iron and copper beads recorded at places such as Broederstroom near Hartebeespoort Dam (Mason 1986), and Mabveni in south central Zimbabwe (Robinson, 1961; Friede & Steel 1975; Miller & van der Merwe 1994; Miller, 1995). However, recent work on glass beads by Wood (2012) suggests that the Mabveni objects may have come later than initially thought. The earliest objects date to the mid first millennium AD and are mostly small items such as beads. By the later first millennium, there was an increase in the range of decorative metalwork encompassing bangles, bracelets, pendants, beads and ear-rings.

Miller (1996), in a study of an inventory of decorative work from Nqoma and Divuyu in Botswana found that, by the early second millennium, gold and bronze appeared in southern Africa where these metals were used for creating ornamentation in the form of beads, bracelets and necklaces (Miller, 2002). Additionally, at places such as Mapungubwe and Great Zimbabwe, gold and bronze were used to make emblems of power. Good examples are the iconic Mapungubwe golden rhino and the barbed bronze spearheads from Great Zimbabwe (Caton-Thompson, 1931; Fouché, 1937; Oddy, 1984; Duffy, 2012). Similar objects were also recovered from Khami and other sites (Robinson, 1959). Some of the evidence of metalwork from elite sites was however destroyed by treasure hunters in the late 19th and early 20th centuries (Caton-Thompson, 1931; Fouché 1937, Hall & Neal 1972; Garlake, 1973; Meyer, 1998). From 1500 AD onwards decorative metalwork continued to be manufactured and used by these groups until colonization. Various European observers including Portuguese travelers recorded the objects used by the cultural groups with which they interacted. Indeed, a survey of this ethno-historical literature shows some common objects used by certain groups, for example the ear-rings worn by the Tswana and South Sotho (Campbell, 1822; Backhouse, 1844; Ellenberger, 1912; Ashton, 1938; Burchell, 1952; Casalis, 1965; Maggs, 1976; Morris, 1981; Miller et al., 1995; Hall et al., 2006). The survey also found some axes, metal sheet and wires which were used by these populations (Campbell, 1822; Moffat, 1842; Stayt 1931; Burchell, 1953; Shaw & Van Warmelo, 1974). Within southern Africa, from the Early Iron Age up to the 19th century, an extensive variety of ornaments was worn mainly by various sections of the populations for status endorsement and enhancement (Campbell, 1822; Ellenberger, 1912; Fouché 1937; Burchell, 1953; Oddy.1984; Herbert 1984; Kennedy 1991; Roodt, 1993). Implements for war, hunting, ceremony and ritual, in the form of spears, axes, adzes and knives were made generally of iron, while some of those were made of copper and bronze for ceremonial and ritual purposes (Caton- Thompson 1931; Snowden 1940; Robinson, 1959; Ellert 1984; Maggs, 1991; Herbert 1993; 1996).

Although researchers of various time periods have from a comprehensive perspective noted the presence of decorative metalwork objects, to date limited studies have been carried out of this important material culture category (with the exception of that done by Miller in 1996). And yet, this area of study is a repository of nuggets of information about the societies that made and used these objects (Miller, 2006). Moreover, a long term perspective on decorative metalwork illuminates changes and continuities across space and time as well as the ways in which metals contributed to the functioning and sustaining of the communities that made and used them.

1.2: THESIS AIMS

Against a background of a general neglect of decorative metalwork in the literature this thesis seeks to examine the decorative metalwork objects revealed throughout the Early and Later Iron Age periods.

The following sub-aims apply:

- To develop a diachronic perspective on the use of decorative metalwork in southern Africa from the Early Iron Age to the early 1900s
- To document and develop a synthesis of decorative metalwork used in southern Africa in the last two thousand years
- To map and develop a typology of decorative metalwork used during the Iron Age
- To identify the metal types and reconstruct the technology of fabrication invested in making the various objects using a range of published and unpublished sources and laboratory techniques

- To explore the socio-economic significance of the decorative metalwork in the Iron Age.

These aims are interrelated and the last sub-aim develops out of the others, showing that technological and sociological factors influenced each other.

1.3: THEORY AND METHODS

As a result of notable improvements in global archaeology, archaeological objects now feature prominently in the exploration and understanding of past societies, see for example Gosden, (2005) and Caple (2006). This development has also witnessed a rise in new theories dedicated to an improved understanding of various societies' use of the objects which they have left behind. This has in turn shifted attention back to existing collections, which when interrogated using the right questions, have the potential to create new or additional answers. Material culture theory is widely used by archaeologists and historians to understand objects because it illuminates information on their production and use (Miller, 1997).

Material culture theory is a term that appears to be relevant only in archaeology and anthropological studies as it is widely used by archaeologists and historians to understand objects as they illuminate information on their production and use including the people that benefit by their presence (Miller: 1997, Buchli, 2002). This why Caple (2006) has labelled objects reluctant witnesses to the past. Some researchers have even developed their research methods further to stress both the materials and the materialities fundamental to objects. It is this focus on the physical evidence of a culture in objects that were made by past societies that has promoted more intense investigation. Preston (2000: 22) has suggested that in studying material cultures it is that crafted objects are considered under two main aspects; firstly the form of the object : the materials from which they are made, and the shape that has been achieved through skill. The second factor is the uses to which the object is exposed. Other characteristics suggested by Preston (2000) are qualitative measurements, and relation to other objects under function. It is this decipherment of functions of durable objects that informs present day researches in the production capabilities of past populations. This means that when studying objects one can obtain information about materials making objects as well as the socio-cultural and symbolic meanings of these objects Jones (Jones, 2004). This is possible because objects are embedded in a cultural context.

One of the material cultural inspired theories that unifies material and cultural properties of objects and the processes from which they were produced is known as the *chaîne opératoire*. A broader understanding of the *chaîne opératoire* is appreciated in the dedicated studies of Schlanger (2005: 25) who stated that the concept of *chaîne opératoire* was the analysis of the 'operational chain' or the incremental progressions that an object is subjected to in its passage of construction, using natural materials, to the fully formed material objects for utilitarian and non-utilitarian uses. The incremental progressions or processes can be found in some archaeological records, although not all, especially when analysing metalwork from the use of raw materials to completed objects. An example of these activities is noted at the site of Bosutswe, Botswana, where metalwork was practiced over several centuries in the Later Iron Age revealing beads, bangle and wire-wound bracelets made of iron, copper, and bronze including metal tools (Denbow and Miller, 2007). From this site and others it is possible to assess the division between production and consumption and value of inter connecting life-histories of these objects as simultaneously social, technical and symbolic achievements (Schlanger: 28). This methodology refers to the sequence of operations invested in producing objects from raw material selection, in a pattern of manufacture, use, reuse and discard (Dobres, 2000). The holistic focus of *chaîne opératoire* places emphasis on the cultural choices and decision making process invested in the production and use of objects. This thesis uses the lens and framework provided by these theories in order to understand both the technical and social aspects of decorative metalwork made and used in southern Africa from the Early Iron Age to the early 1900s.

Within this theoretical framework, a stepped methodology starting with desktop studies and existing archival research is utilized. Primary and secondary sources are critically examined to understand both the types of objects used in the historical past, and the techniques of manufacture and associated social contexts.

In terms of primary sources there exists a significant number of reports, records and diaries from early adventurers, historians, travelers, missionaries, prospectors, traders, hunters and early ethnographers in the region in the 18th, 19th and early 20th centuries. Examples of these include: A. Sparrman writing in 1778 (Forbes, 1975); F. Le Vaillant 1781-1784 (1973); S. Daniell 1804 (Bradlow, 1976); W. Burchell in 1822 (1953); Gardener in 1836; G. Angas 1849 and T. Baines (1846) including Methuen (1846), Fleming, (1856), Shooter (1857) and Holden (1866). I have made use of early photography which records blacksmiths at work, the tools that they used, and their products especially spears and axes such as those seen in Bent (1982), Posselt (1926); Bryant (1949); Elliot (1978); McLaughlin (1982) and Maggs (1986). This information when carefully deconstructed and considered alongside archaeological evidence yields new information with the potential to deepen our understanding of decorative metalwork and its historical-cultural and social context. Due to the fact this work is also collection based, macroscopic studies of objects archived at Iziko South African Museum in Cape

Town are performed. The resulting usual information on object manufacture will be combined with cultural information to develop a holistic understanding of the context and significance of decorative metalwork and its role in southern Africa in the period under study.

1.4: LIMITATIONS

A comprehensive study of ornament and ceremonial artefacts is hampered by such limitations as a lack of extensive collections for analysis in terms of metals used, tools utilized and means and methods of fabrication. The foundation for this study is the archival literature dating from the earliest visitors to southern Africa as well as current contributions from a range of scholars and disciplines, including archaeologists, anthropologists, ethnographers, ethno-historians, and metallurgists. Some of their scholarly documents are illustrated with artist's impressions in pen and ink and water colours (Le Vaillant, 1781- 1784(1976); Daniell, 1804 (1976); Gardener, 1835; Angas, 1849). Many literary contributions have used photographs, a recording and art form with antecedents in the mid-19th century, and one that has been manipulated to direct incorrect or distorted information affecting local communities, their habits and customs, including the photographer's personal expressions or representations of the exotic and erotic for readers in their countries of origin (Webb 1974; Monti, 1987; Rippe, 2012).

A failure in current and archival literature is the lack of adequate descriptions of metallic small finds in archaeological sites, a passing comment on "copper wire fragments and copper-chain links or beads" were amongst the remains of a site in Botswana (Kiyaga-Mulindwa, 1991: 164). These sketchy records can be assessed against the comprehensive description of an archaeological site in Zimbabwe by Garlake (1970), where care was taken to list all the measurements of each metallic item found.

A further difficulty has been the nomenclature of ornamental finds in the form of solid bangles in terms of clearly differentiating these from flexible wire-wound bracelets. Thus it has been possible to read 'bangles' for 'bracelets' and vice versa (see Glossary). A similar confusion is the documented use of copper or iron 'rings' which in terms of their measurements, could be understood as beads. At times differentiation between metal beads and glass beads is not clearly articulated leading to misunderstanding of the composition of the cultural material of the community (Elphick, 1977).

With regard to actual ethno-historical literature, the question arises as to how much of it is trust-worthy? Thornton (1983) alerts readers to the misconceptions, myths and legends that have influenced visitor's backgrounds and knowledge prior to arrival at their destinations in southern Africa thereby inadequately observing their environments and delivering unfactual and incorrect information to their publishers. Publishers were known to 'cleanse' / sanitise or romanticise the literary contribution for public readership in order to sell their books (Dritsas, 2010: 117). Harkin (2010: 119) queries oral testimonies as reliable evidence arguing that "we cannot know them to be true", and asking questions "is this a form of denying a historical consciousness to" people? The positive aspects gained from the 19th century visitors to southern Africa in terms of research in this area is that records indicate that smithing was broadly practiced linked to cultural requirements and that significant information on material cultures were observed including the use of metallic decoration.

1.5: OUTLINE OF THE THESIS

The first chapter has provided a brief introductory historical background to the research in terms of the reliability and extent of archaeological evidence of the manufacture and the use of metal objects in southern Africa during the period under study, together with the research aims, the theory and the methods informing the research and the limitations.

Chapter two focuses on the background to the production and smithing of body ornament and expressive tools and the anthropology of metal working amongst indigenous African metal workers.

Chapter three considers the theory of artefacts and their significance within various cultural groups, and their material cultures linking this with the role these objects played in the lives of these populations. This information is derived from archaeological, anthropological and ethnographic accounts emerging from the 16th century.

Chapter four considers the combination of ethnographical and historical observations from published data. The data will be presented in a series of distribution maps and tables detailing sites where expressive ornamentation and tools have been recovered. The data will be sourced from literature dating from the late 18th century AD to the 20th century AD

Chapter five focuses on the archaeological information derived from archival and current literature dealing with 1500 years of metallurgical development in southern Africa.

Chapter six will combine macroscopic studies of a selection of objects from the Iziko Museum's collection and those published with micro-analyses of objects with a view to establishing which metals were exploited and the technologies used in their manufacture.

Chapter seven discusses the implications of these findings within the broader historical, anthropological and archaeological context linked with the social, economic and political situations that took place within a number of social groups in southern Africa. Suggestions for further research are noted.

Having given a preview of the outline of the thesis, I now endeavour to indicate that manner in which decorative metalwork in the Iron Age in southern Africa was influenced by a variety of factors, the decisive ones being its manufacture and its socio-economic significance.

2. CHAPTER TWO: METAL PRODUCTION AND SMITHING

2.1: INTRODUCTION

The range of metals found to be worked by various cultural groups in pre-colonial times in sub-Saharan Africa involves and includes at least four metals, iron, gold, tin, and copper and its alloys (Wagner & Gordon, 1929; Stanley, 1929, 1931; Fouché, 1937; Van der Merwe, 1980; Herbert, 1984, 1993; Miller & Van der Merwe, 1994, Miller, 1997, 2001). In sub- Saharan Africa (with the exception of the Sudan and the Horn of Africa) iron and copper technology appeared concurrently and reached southern Africa about 200 AD (Miller, 2002; Phillipson, 2005; Killick, 2014). Accompanying metal working technologies into southern Africa was a variety of other activities such as crop and animal farming in settled communities (Maggs, 1984; Miller & Van der Merwe, 1994). Iron was used for utilitarian purposes and also fulfilled a role in expressive forms for ornamentation and ceremonial artefacts (Childs, 1991a/c; Childs & Dewey 1996). Copper was considered by metal smiths to be a softer, more ductile metal than iron and was used for ceremonial tools and making ornamental objects (Herbert, 1984; Childs 1991; Bisson 2000). The smelting of copper, iron and tin followed the bloomery process in which high grade ores were reduced by carbon monoxide in charcoal fuelled furnaces of various sizes (Stanley 1929; Miller & Van der Merwe, 1994; Miller & Killick, 2004). For example, iron and copper were smelted in bowl, low shaft and tall natural draught furnaces (Bellamy, 1909; Küsel, 1974; Pole, 1985; Van der Merwe, 1980; Van der Merwe & Avery, 1987; Schmidt, 1996, 1997; Chirikure et al., 2009). Given its restricted occurrence in nature, it is possible that tin was smelted in bowl and low shaft furnaces as at Rooiberg (Miller & Hall, 2008; Heimann et al, 2010). The metal from the furnaces was further refined to remove occluded impurities. Once refined, the metal was then fabricated to produce a wide array of objects which were used in a number of settings. The production, distribution and consumption of metals fulfilled various socio-cultural functions which within different contexts, accorded different social statuses to both the producers and the users throughout the first and second millennia.

2.2 METAL PRODUCTION

2.2.1: IRON SMELTING

On current evidence the literature of the 20th and 21st centuries describing the ethnography, history and archaeology of indigenous iron smelting in Africa is extensive (see for example Cline, 1937; Herbert, 1994; Miller & Van der Merwe; 1994; Schmidt, 1997; de Barros, 1997; Chirikure, 2006; Bandama, 2013). According to these sources the smelting of iron was achieved through the smelting of ores such as magnetite, haematite and even laterite in charcoal fuelled furnaces. Iron smelting required a number of essential raw materials for it to be successful. These included suitable ore (Killick & Miller, 2014), charcoal (Horne, 1982) air (van der Merwe, 1980) and clay for making tuyères and furnaces (Chirikure & Rehren, 2006).

The air was supplied either by pumping bellows (bag and pot varieties) (Chirikure, et al., 2009) or was drawn in naturally through the principle of convection (Bellamy, 1909; Goucher & Herbert, 1996; Robion-Brunner et al., 2013). Hardwoods that burnt without producing too much ash were preferred for smelting (Horne, 1982). The different furnace types used to smelt iron include the bowl, shaft and tall natural draught furnaces (see Chirikure, 2015 for distribution). Low shaft and bowl furnaces were widely used in southern Africa but natural draught ones were only restricted to Malawi, Zambia and adjacent regions of Zimbabwe (Prendergast, 1975; Van der Merwe & Avery, 1985; Ndoro, 1994). In the seventies Prendergast (1975) excavated a natural draught furnace near Harare in Zimbabwe while 20 years later Ndoro (1994) documented a natural draught furnace also within Zimbabwe which represents the southernmost extent of natural draught furnaces. It is possible that tuyères fused in multiples at the Tswapong Hills in Botswana (Kiyaga-Mulindwa, 1993) were remnants from natural draught furnaces.

Although difficult to do, it is possible to infer and reconstruct furnace types used since the inception of iron smelting in the Early Iron Age. It appears that in the Early Iron Age furnaces were demolished after use and the remains discarded along with the waste smelting slag (Miller & Killick, 2004). These furnaces seem to have conformed to both bowl and low shaft types. The material signature for natural draught furnaces, particularly in the regions south of the Limpopo is poorly reported. The photographs below (Figure 2.1) show two types of furnaces, on the (left) the triangular form which was constructed for iron smelting and the circular shaped form (right) built for copper smelting. Both show ports for the use of tuyères at ground level and on the right, the furnace has a wide chimney in order to pour the charge through it.

Figure 2.1 This figure shows 1, (on the left), an iron-smelting furnace from Mashishimali hills on the farm “Square” and 2 (on the right), a copper-smelting furnace from Masêkê hill on the farm “Wegsteek”, Limpopo Province. (Photograph from More, C.E. 1974: 231).

The spades in the photographs give an idea of the furnace’s dimensions.

Once all the raw materials were gathered, the process of smelting began and was complete when the charge reached the bottom of the furnace. The ore underwent several chemical reactions from the top where conditions were oxidising to the bottom where conditions were reducing. The iron oxide was reduced to solid metal by carbon monoxide to produce metallic iron. Part of the iron oxide in the ore combined with impurities (gangue) to form slag (Miller, 2002; Miller & Killick, 2004). The bloom from the furnaces contained impurities that had to be expelled through refining or primary smithing. Repeated hammering of the bloom at red hot temperatures removed most of the impurities in the consolidation of the metal into a billet or ingot which was fabricated into different objects and was even traded in some areas. Smelting produced waste such as slag, collapsed furnaces and broken tuyères. The remnants from smithing also comprised slag, smith’s hearths and the objects themselves.

2.2.2: IRON SMITHING

Many scholars have acknowledged that iron smithing, particularly the fabrication of iron objects has not received the same attention as smelting (Cline, 1937; Herbert, 1984, 1993; Miller, 1997, 2002; Childs & Dewey, 1996; Brown, 2005; de Barros, 1997, 2000, Thondhlana & Martinón-Torres, 2009). There has been sparse investigation into the smithing techniques and processes from which billets of iron were formed into recognisable artefacts. The process of secondary smithing or fabrication required a number of tools such as an anvil, hammers, tongs and a pair of bellows (Miller & Van der

Merwe, 1994; Miller, 2002). A red hot billet was repeatedly hammered until it was cold and placed on the fire again, the process being repeated until the desired object was made. Items such as hoes, spears, knives, axes, small tools and body ornaments were made this way (Miller & Van der Merwe, 1994; Miller 1997). Often different pieces of metal were forged together (Childs, a/b; Childs & Dewey, 1996). Inadequate expulsion of slag in the metal led to the formation of stringers which can be metallographically identified (Stanley, 1931; Childs, 1991a; Maggs, 1986; Miller, 2002). The illustration (Figure 2.2) produced in the 19th century shows the public nature of smithing in the confines of a village environment. The relaxation of prohibitions against women at the smithing site is noted in the presence of a woman near the forge, and the dwelling hut nearby shows the village's proximity to the smithing activity. Archaeological research has exposed hoes, awls, axes, spears, arrows, beads, bangles and bracelets that were made throughout the Iron Age (Friede, 1975; Miller, 1996; Walker, 1991; Childs & Dewey, 1996; Miller 2002).

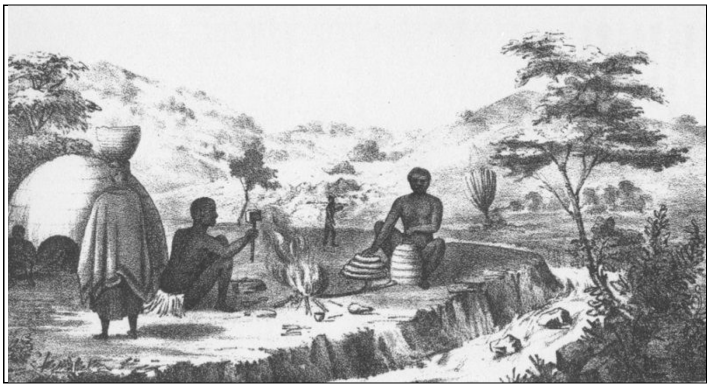


Figure 2.2 "Kaffirs smelting and forging". (*The past and future of the kaffir races in three parts*. Holden, W.C. 1866: 222)

2.2.3: COPPER SMELTING

Unlike iron smelting which has been found to be very widespread, copper reduction was with a few exceptions restricted to regions which hosted abundant ores such as Phalaborwa, Marothodi, Musina in (South Africa; Van der Merwe and Scully, 1971, Hall et al., 2006, Van Warmelo, 1940), Hurungwe in (Zimbabwe, Garlake, 1970, Swan, 2002, 2007), Eastern Botswana (Kiygaga-Mulindwa, 1993) and Katanga (DRC; Rickard, 1927). In some cases, small ore bodies were exploited while ore was also traded over large distances (Inskeep & Maggs, 1975; Maggs, 1976; Herbert, 1984; Miller & Whitelaw, 1994; Bisson 2000, Swan, 2007). The similarities between iron and copper smelting within relevant sites in southern Africa have been the focus of several South African investigators (Stayt, 1931; Van Warmelo, 1940; Van der Merwe & Scully, 1971; Hanisch, 1974; Friede, 1975; Miller & Sandelowsky, 1999; Miller 2002; Swan, 1998; Miller, 2002). The raw materials included suitable ores, clay, air and charcoal. Pot or bag bellows were used to generate the air (Chirikure et al, 2009). Copper was smelted in bowl, and low shaft furnaces (Schwellnus, 1936; Küsel, 1974). However, Bisson (2002) recorded an instance where copper was smelted in natural draught furnaces in Zambia during the early second millennium AD. In the environment of Phalaborwa, Van der Merwe & Scully (1971) encountered beehive shaped copper furnaces about a meter in height and in diameter at the base, while at the apex there was an aperture of about 30 to 45 cm in diameter. As far as ores are concerned malachite and azurite were some of the most commonly smelted types (Hammel et al. 2000). Ore was gathered and hammered into small nodules for easier decanting through the furnace's top chimney. When all the raw materials were gathered, the furnace was charged with alternating layers of charcoal and ore. The molten metal settled at the bottom of the furnace where it formed a puddle. This was processed in crucibles to remove occluded slag and other impurities (Stayt, 1931; Van der Merwe & Scully, 1971; Garlake, 1970, 1983; Herbert, 1984; Bisson, 1997, 2000). The refined metal was hammered into billets to produce a variety of objects. The refined copper metal was either cast or hammered to produce a variety of objects,

2.2.4: COPPER SMITHING

Limited information on copper smithing is available as most of the copper was cast into ingots at the end of the smelting process (Bisson 1975, 1997, 2000; Herbert, 1984). It appears that early copper smiths chose to manufacture copper items from cast ingots (Childs, 1991c). The processes of fabricating copper objects were the same as those invested in iron smithing. Ingots were hammered through cycles of hot and cold working until the desired shape was achieved. In contrast to iron copper is regarded as a highly malleable metal and can be cold-worked into desirable forms in workshop settings without leaving evidence of the activity taking place as heat was not required (Mapunda, personal communication, 2016). Often copper was also drawn or hammered to produce ornamental objects such as plate, wire, beads, chains ear-rings, flexible wire-wound bracelets, solid bangles and neck-rings (Stayt, 1931; Maggs, 1976; Davison, 1984; Herbert 1984; Calabrese, 2000; Swan, 2007). The copper wire drawing technique, dating from the Early Iron Age in southern Africa, was associated with the use of an iron wire draw- plate and vice (see Figure 2.4) (Fagan et al, 1969; Miller, 2002). This long narrow implement with its successively diminishing holes assisted in the preparation of fine wire for decorative purposes. The illustration shows the draw plate and tongs retrieved by the Krige's and placed in the collection of the Iziko Museum (van Schalkwyk, 1982; Davison, 1984). The fine wire was mainly used for wire-wound bracelets and the decorative wire work on handles of ritual items for ceremonial purposes (Junod, 1927; Childs & Dewey, 1996; Dewey, 1994). Hammered sheets of copper were cut into strips or thin rods with a chisel and bent around with the smooth surface exposed (Miller, 2002). Stayt (1931) noted that the Lemba made use of a small iron staple with two lines engraved across the face, called a *muvangwa*, used for cutting copper into short lengths for making large copper studs to be attached to bracelets.

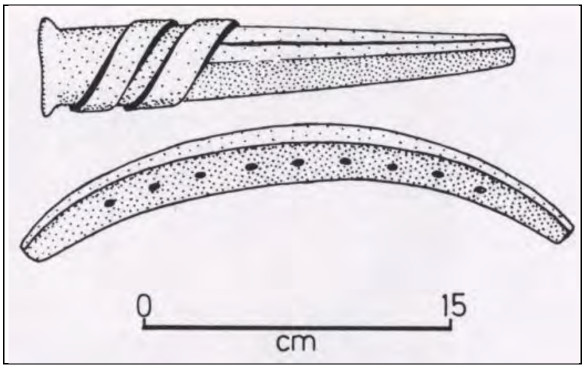


Figure 2.3 Lemba iron wire drawing tools. Examples in the IZIKO Museum (tongs (SAMAE 9898), and draw-plate (SAMAE 9896). (Davison, 1984: 136).

2.2.5: TIN SMELTING

Our understanding of indigenous tin smelting is largely conditioned by work done at Rooiberg since the 1900s. Rooiberg is the only unequivocal source of tin in pre-colonial southern Africa (Miller, 2002; Miller & Hall, 2008). Like copper and iron, tin smelting required smelters to assemble all the essential raw materials. Cassiterite is the most common ore type smelted at Rooiberg. It is possible that tin was smelted in bowl and low shaft furnaces (Trevor, 1930; Killick, 1991; Chirikure et al., 2010). Recent work has hinted at the possibility that tin was smelted in and around Rooiberg from the early second millennium AD (Bandama, 2013) and extended into the late 19th century (Hall, 1981; Chirikure et al., 2010). When all the raw materials were assembled, the process of smelting was initiated to reduce the ore.

Temperatures sufficient for tin smelting ranged between 1000 and 1200 degrees like those for copper and iron. Often, these high temperatures promoted the reduction of iron creating portions of iron tin alloy called hard head. The excess iron was removed in a secondary process (Killick, 1991). The refined metal was cast to produce a variety of ingots which were traded over large areas (see Figure 2.4). Tin was rarely used on its own for body decorative forms, but was mixed with copper to produce bronze, a highly valuable alloy during this period (Herbert, 1984).

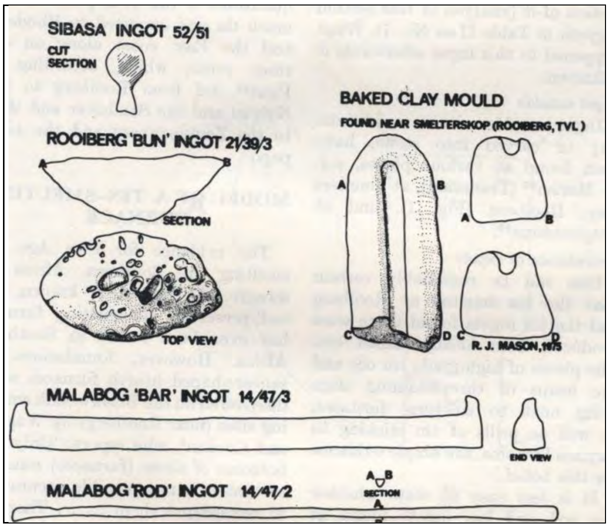


Figure 2.4 Some tin ingots from South African collections (Friede, 1976: 465).

2.2.6: GOLD MELTING

There is sparse information in the archival records on pre-colonial activities surrounding gold melting. Pre-colonial gold production from alluvial and hard rock sources has been broadly described by various scholars (Summers, 1969; Küsel, 1974; Phimister, 1974; 1976; Mudenge 1988; Swan, 1994, 1997; Hammel, 2000; Miller et al., 2001; Miller, 2002). Information is meagre on the earliest gold extraction, and may well have been in the form of alluvial panning (Swan, 1997). Once extracted from the above sources it was refined with methods of crushing and milling, the latter achieved with the use of dolly holes, otherwise mortars and pestles (Phimister 1976). Gold for melting purposes was gathered as dust or nugget form and stored in quills until delivered to the gold craftsmen (Swan, 1997). The dust was then molten in crucibles to consolidate it into usable metal. Crucibles with gold prills in the slag were recovered at places such as Great Zimbabwe (Bent, 1892, Caton-Thompson, 1931; Hall & Neal, 1972; Garlake, 1974), and at Thulamela, where a few crucible fragments bearing gold residue have been found in stratified contexts (Küsel, 1992; Miller et al., 2001).

The molten gold was either cast into thin bars or rendered as prills for further use, or traded as “very small beads and trinkets” as reported by the Factor at Sofala writing in 1513 AD (Fagan et al., 1969: 136, Ellert, 1993). Gold was also hammered to produce a wide variety of objects (Oddy, 1983, 1984; Mayer, 1998; Desai, 2001, Miller, 2002).

2.2.7: GOLD SMITHING

The study of collections of gold artefacts from sites in northern South Africa and Zimbabwe confirms that the gold working technology was similar to that used in copper working (Oddy, 1983, 1984; Desai, 2001; Miller, 2002). The main output observed from a number of sites was bead fabrication from gold hammer flattened and centrally punched prills, including those made from cut strips of gold plate wound around a former with ends butted (Desai, 2001). At Mapungubwe it was noted that wire was hammered into shape and used to make beads similar to those described above (Miller, 2002). At the same site hammered gold foil was put to several uses by gold craftsmen, mainly to cover pre-formed wooden shapes such as the rhinoceros and the gilded sceptre (Fouché 1937; Oddy, 1984; Meyer, 2000; Steyn, 2007; Duffy, 2012). Small square nails or tacks were made to attach overlapping pieces of foil to carved wooden forms which have since decayed (Caton-Thompson, 1931; Hall & Neal, 1972; Fouché, 1937; Oddy, 1983, 1984; Desai, 2001; Miller et al., 2001; Tiley, 2004; Duffey, 2013).

At two archaeological sites, Ingombe Ilede and Macardon, specialist gold craftsmen had mastered the casting of gold beads in a variety of shapes and sizes, from small to large, including some heavy specimens weighing as much as 70 g (2 oz. 5 dwts) and equally large beads from Mundi, Danangombe and Umnukwana Ruins (Hall & Neal, 1972: 94,145, 147). Spherical beads were noted from Macardon Claims (Jones, 1939) while irregular shapes were achieved with the combined use of the lost wax process at Ingombe Ilede (Frey, 1969).

2.3: THE ANTHROPOLOGY OF METAL WORKING

2.3.1: WHAT SOCIO-CULTURAL BELIEFS ARE ASSOCIATED WITH METAL WORKING?

A number of scholars with an interest in ethno-archaeology, ethnology, ethno-history, archaeology, metallurgy, and history over the past century have scrutinised the "*chaîne opératoire*" of iron and copper production not only from a chemical and physical point of view but also from a non-technical perspective; the ritualism and symbolism that accompanied the process (McCosh, 1979; Childs & Killick, 1993; Herbert, 1993; Childs & Dewey, 1996; de Barros, 1997; Miller, 1997, Mapunda, 2013). In terms of the gendered and seasonal nature of iron and copper production, most observations concerning the activity of iron work in southern Africa stress that the entire metal working profession was controlled by men, especially the smelting process which was in charge of a professional master iron worker, generally an elderly man with senior assistants (Thompson, 1949; Shaw, 1974).

While copper smelting was controlled by men, Bisson (2000) argues that women could control the mining operations. A great deal of variation has been found amongst groups in the region regarding the participation of women in smelting. In some cases, they were not allowed near the smelting camp because it was feared that their fertility, if unconstrained, might result in failed smelts (McCosh, 1979; Childs & Killick, 1993; Herbert, 1993, De Barros, 1997, Huffman 2007; Mapunda, 2013). However, there are some Karanga women who helped their husbands with the pumping of bellows (Hatton, 1967). While metal working in most African communities was practiced in the dry winter months at the end of the harvest season. There were a few iron working enterprises such as those of the Njanja and the Zulu, that grew so large that they became year round activities (Mackenzie, 1975; Maggs, 1992).

As a transformative process, metal smelting was associated with beliefs in and dependence on magic, rituals and the integration of taboos which for the smelters and their communities, were essential for a positive transformation of raw earths and rocks into bloom (Herbert, 1993). The strong belief of the smelters and their societies, in the intervention of ancestors and diviners was also considered vital to the success of the smelt. Smelters used medicines to neutralize the power of the malevolent forces (Thompson, 1949; Van der Merwe & Avery, 1987). Such medicines were often planted in holes strategically dug at the bottom of furnaces (Van der Merwe & Scully, 1971; Childs & Killick, 1993).

One of the most powerful metaphors in African metallurgy is the symbolic association between smelting and human copulation and reproduction (Childs and Killick, 1993, Miller, 2001; Mapunda, 2013). Smelting furnaces were symbolically viewed as female bodies that were impregnated during smelting to produce a child – iron. Not surprisingly furnaces for smelting, in a number of African societies such as the Shona, and the Barongo, were built and decorated with female sexual features such as breasts, stomach scarification marks, splayed legs and a lower hollow, the ‘womb’, to receive the bloom which represented the neonate. These female features can be seen on the photograph below in Figure 2.5 (Bent, 1892; Posselt, 1926; Herbert, 1984, 1993; Robinson, 1961; Bernard, 1962; Ndoro, 1991; Childs & Dewey, 1996, Mapunda, 2013). This association, required that smelters had to withdraw from sexual relations with their wives, in order to be fully affiliated with the furnace, the temporary wife for the duration of the smelt to ensure a successful smelting operation (Herbert, 1993).

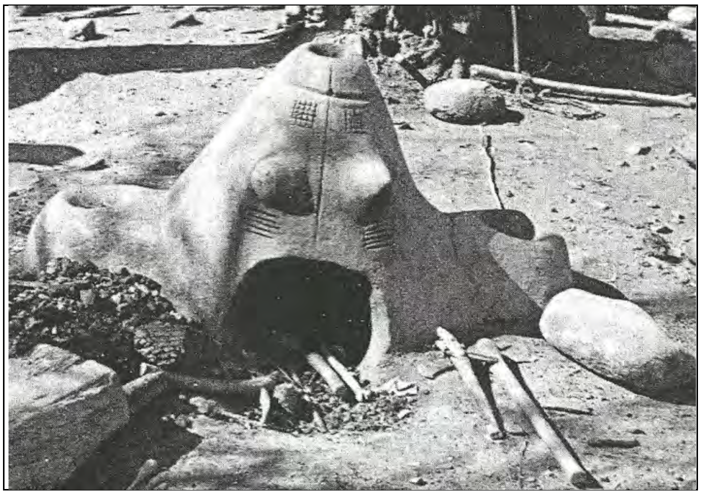


Figure 2.5 A furnace in Chibi Nature Reserve, Zimbabwe, decorated with female sexual features (Robinson, K. 1961, Plate 2).

Once the smelting operation was complete some rituals and taboos were relaxed (Herbert, 1993). When formed, the iron bloom was withdrawn and when cool it was subjected to smithing as discussed above but in a less ritualised condition.

Several scholars have argued that the presence of rituals and metaphors of reproduction often necessitated the location of smelting activities in secluded areas. This is archaeologically demonstrated by the discoveries of furnaces away from residential areas. (Herbert, 1993; de Barros, 1997, 2000; Maggs, 1992, Huffman, 2007) to retain sexual wholesomeness for the sake of producing pure smelt (Raum, 1973; Anderson, 2009). Smelters also believed that isolation was essential to preserve knowledge and power over the craft and ultimately their own wealth (Childs, 1991a). However the archaeological and anthropological records are full of variations as there are some cases where smelting was done in areas adjacent to settlements (Schmidt, 1997) with the participation of women (Hatton, 1967; Mackenzie, 1975). This illustration (Figure 2.6) is an adaption of Angas's (1849) of "Zulu blacksmiths at work" (Plate XXIII). The image shows that heating, forging and smithing took place detached from the immediate family activities in KwaZulu-Natal.

Figure 2.6 Forging and smithing taking place in a metalworker's workshop in KwaZulu-Natal. (Wood, J.G. 1873: 97)

2.4: WHAT IS THE ROLE OF SMELTERS AND SMITHS IN SOCIETIES?

During the Iron Age, the social position of iron smelters and smiths varied depending on context. In most of southern Africa, they commanded as much respect from citizens as chiefs and kings (Herbert, 1993; de Barros, 2000). Their knowledge of heat-generated metal technologies placed them on a superior social level above the rank and file in their communities, although some exceptions have been found in Saharan Africa amongst the metal smiths of Darfur, including those amongst the Tuareg, Masai and Somali (Herbert, 1984: 33: 1993, Haaland, 1985: 57). Iron smelting was sometimes an all-male occupation but in cases necessitating improvisation women, could participate in the process.

The smelters position in society was enhanced by considerable economic power. The affluence of a smith at Ingombe Ilede was exposed in several graves of chiefs, smiths or traders in the form of considerable material wealth consisting of local and exotic items and tool kits (Fagan et al., 1969). The production of hoes, spears and axes, all necessary for heavy duty, attracted payment which was settled with produce, wives or slaves (de Barros, 1997). In some African societies, this power was observed to be equal to that of the chief and kings, as the master smelter was involved in the initiation rites of the incumbent as he was prepared for office. The master smith demonstrated his social and political position with the chief's or king's court by providing expressive artefacts for this event, whether in the form of body ornaments or short hand-held artefacts of uncommon designs (Childs, 1991a; Childs & Herbert, 2005).

The social position of smiths in southern Africa was often as high as that of the smelters. As with smelting, the spatial location of forges varied from context to context. It has been reported that forgers were placed within and outside residential areas. A few illustrations of smelters and smiths at work have been included in visitors/author's publications (Burchell, 1953: 308; Casalis, 1965: 131; Wood, 1873; 97; Holden, 1866; 222, Mackenzie, 1975: 204)

In some cultural groups the smith was expected to perform a number of rituals associated with the creation of a new forge. This could involve the selection and installation of a new anvil and the making of new hammers. One case was observed of a new anvil in KwaZulu/Natal being initiated with ox-gall, or the juice of aloe leaves (Stuart & Malcolm, 1959). A significant celebration was reported by Read (1902) in which he observed the inauguration of an apprentice into the role of a smith in Ondonga, Botswana, with the blessing from an elderly smith over a new hammer being the focus of the event (Hambly, 1934; Cline, 1937). In some societies, sexual relations with wives were required as part of the incorporation of the anvil and hammer into the new smithy, the rationale being that the tools of a smith were welcomed as a second bride into the family (de Barros, 1997).

2.5: CONCLUSION

In this chapter, the focus has been on the procedural methods employed by African metal smelters over the past 2000 years to obtain workable billets or ingots of iron, copper and tin, the latter alloyed with copper to produce bronze, for the manufacture of tools and body ornamentation. The first millennium AD is characterised by the use of iron and copper for small implements (Miller, 1996: 82, 84) and ornamentation, without apparent distinction in value between the two metals (Herbert, 1996: 642). This trend continued into and throughout the second millennium when iron was used for a wide range of larger tools: hoes, axes, spears and knives and to a lesser degree for ornamentation, copper retained its prominent role for decoration and for the enhancement of ceremonial artefacts. From ca. 900 AD gold was mined, melted and employed with a two-fold purpose, for body and artefact enhancement, and for economic enrichment of the rulers of the Great Zimbabwe state. The first half of the second millennium saw the employment of gold concurrently with the development of bronze for ornamentation, ceremonial artefacts and their embellishment.

To achieve workable billets or ingots from iron, copper and tin, a relatively simple technology of achieving a bloom was employed where high grade ores were reduced in clay built shaft furnaces, although the bowl type furnace was more frequently used in southern Africa. The use of hardwoods such as the *Acacia* and *Burkea* species (Maggs, 1992;

Hatton, 1967) provided charcoal which produced high temperatures, which were regulated with the aid of forced air through the bellows and tuyères for a speedier action in force-draught bowl-shaped or low-shaft furnaces, alternatively, without these tools for a slower process which depended on natural-draught achieved by way of tall combustion chambers.

The knowledge and experience of senior master iron smelters was paramount in achieving successful smelts in this almost exclusively heredity all-male profession. The use of symbolism in the practice of taboos and rituals by the chief smelter and his assistants was seen as desirable in maintaining ultimate control of this essential industry whether this symbolism it was practiced on a small or substantial scale. Within the surrounding uninitiated community iron smelting was viewed as a transforming process allied to human procreation. The smelting process was recognised as a merging of male and female symbolic components within the heated furnace, in some societies the furnace was enhanced with female sexual features, believed by them to produce a bloom, or the 'birth of a neonate'. Although less investigative research has taken place on the role of the metal smith, his position was found to be that of an intermediary between the smelter and the consumer. While the commoners' need was for iron agricultural tools and weapons, the elite required ornaments and ceremonial artefacts for socio-political enhancement. Ornaments and ceremonial artefacts were made of semi-precious metals: gold, copper and bronze, while iron still continued to fulfil a minor role.

Ornaments of wire, beads, bangles, bracelets and ear-rings, amongst other rarely seen decorations, such as chains and pendants, formed part of the material culture of many cultural groups in southern Africa. The above inventory is not found in all archaeological sites in southern Africa. In some sites they appear in quantities strongly suggesting they were made on site, while other locations indicate that decoration was acquired by the elite for personal use. For some societies ornaments became a currency, while these and ceremonial artefacts were made for trade regionally, intra-regionally within southern Africa.

3. CHAPTER THREE: ISSUES IN THE STUDY OF OBJECTS

3.1: INTRODUCTION

In the last three decades or so, archaeologists have increasingly endeavoured to glean different nests of information from archaeological and ethnographic objects (see for example Miller 1987; Gosden, 1995; Caple, 2006). This process usually combines techniques from various disciplines, from history, archaeology, material science, earth and engineering sciences to social anthropology (Martinón-Torres & Rehren, 2008).

All these efforts have placed objects at the centre of investigating and understanding past and contemporary societies. As part of material culture, objects contain invaluable information about the societies that made and used them (Kingery, 1996). In order to satisfy both mundane and specialised needs, humanity, past and present has made utilitarian, ceremonial, luxurious and ornamental objects. Clearly, such objects have been used in different contexts, during different times and by different peoples. Thus, when studied from different perspectives, these objects yield essential information on the diachronic and synchronic development of society (Caple, 2006). However, objects are not simple passive mirrors of the societies that produced them: they have within themselves a great deal of agency (Gosden, 1995). Furthermore, objects contain within themselves information on how they were made and used, information which speaks to the producing and consuming societies.

In order to take advantage of this power of objects to yield a range of valuable information, various techniques and approaches have been developed by a range of disciplines to gain amongst other kind of information social, cultural and economic information from material culture (Lechtman, 1977; Bachman, 1982; Schiffer, 1985; Lemonnier, 1993; Rehren, 2003; Caple, 2006). Since the late 1970s, researchers have recognised that objects consist of material properties and embedded socio-cultural information. This phenomenon has been referred to as technological style (Lechtman, 1977) or materiality (Jones, 2004).

A consideration of the style of objects that are exposed in archaeological records should be considered from two points of view. This entails the technological styles that constitute the manufacture of the object and the object itself which are considered as expressions of form and function (Lechtman, 1977; Sackett, 1977). The carefully recorded metallic forms that are found in stratigraphic excavations provide a sequence in which technological and stylistic nuances are linked to form and function (Lechtman, 1977: 7). From the point of view of this thesis, the technologies of metal manufacture is observed to be similar over many centuries, from Early to Later Iron Age without noticeable variations especially in the production and processing of iron and copper. Comparable metallic technologies were used for gold and bronze objects for a shorter period of time in the Later Iron Age. The technologies of style discussed by Lechtman (1977: 3) relate to the study of 'technological style' as an occurrence as well as the manner in which individual styles of technology share aspects of the cultures in which they occur. In analysing technological activities human behaviors are revealed. The conducts isolated by Lechtman (1977:6) are modes of operation involving attitudes towards materials: its availability and quality, organisation of labour and the ritual observations which is appreciated, learned and transmitted within cultural groups and spread through invisible networks over time (Sackett, 1977: 371). Information of this nature is seen in the similarities of workshop evidence, mainly in the form of cylindrical and barrel shaped beads, from excavated sites such as Mabveni, Zimbabwe (2nd to 6th century) (Robinson, 1961), Nqoma, (8th to 11th century) and Bosutswe, Botswana (13th to 17th century) (Miller, 1996; Denbow and Miller, 2007).

Sackett (1977: 369) argues that archaeologists use the term 'style' frequently and in diverse ways, without being fully conscious of its implication. As a word it is not easy to explain, alternatively it is easier to define (Sackett (1977: 372). Foremost 'style' and cultural history are interlinked, and as a word carries several different meanings which has accumulated over time in fields of research. The scholar suggests that there are two principles in which to assess style, it concerns a characteristic routine of doing something, and the period of specific time and place in which these routines took place (Sackett (1977: 370), the latter research sharing affinity with that of Lechtman (1997: 6). In a general sense when 'style' is projected into the field of archaeology it is considered the perfect accompaniment of function while both carry identical influence. It is stated that a study of style and function together exhaust the potential of variabilities (Sackett (1977: 370). In the realm of metallic ornaments and non-utilitarian objects the emphasis is placed more heavily on social and ideational spheres rather than technology and economics. Sackett feels that all objects have an active voice which signifies 'function' while its passive voice suggests 'style'. When 'function' and 'style' are linked together they are appreciated for their analytical value of objects which in many cultures is noted in a particular historic context (Sackett, 1977: 370). Nonetheless, in southern Africa the similarity of objects and their shapes over extensive spaces of time and space indicate that the interaction of cultural groups was strong and the forms created satisfied many populations. This current study uses these approaches as a framework for understanding and interpreting technological and cultural information from decorative metal work used in Iron Age southern Africa, from the early first millennium AD to the late 19th century.

3.2: OBJECTS AS PRODUCTS OF MANUFACTURE

It is probably axiomatic to argue in general terms that most objects are products of manufacture. Manufacture implies a physical ‘hands-on’ activity with an experienced craftsman being intimately involved with the fabrication of objects. The manufactory often involves dexterous manipulation of the materials once other foundational processes in the sequence of operation or production (*chaîne opératoire*) have been fulfilled. For example since the advent of copper pyrotechnology in the Old World, in northern Europe, the manufacture of copper objects followed the prior reduction of copper rich ores. According to Miller (1987: 112), it is therefore not surprising that, behind each and every object there is a great deal of intentionality which precipitates its creation. The process of manufacture from early times involved a number of sequential stages from the selection of raw materials to the hammering of the final product. The manufacture required an understanding of the properties of the materials that were worked, which speaks to the skills of the manufacturers. Therefore a study of objects from different cultural contexts and periods shows the different ways in which materials were manipulated over time. For example, the manufacture of copper objects in ancient Egypt passed through several changes that saw improvements in blowing crucibles and furnaces to the development of complex methods of casting (Scheel, 1989). Similarly the metallurgists of Igbo Ukwu in Nigeria developed very sophisticated methods of casting bronze and copper objects towards the end of the first millennium (Shaw, 1970). Unlike the detailed recording of these processes in Ancient Egypt and Nigeria, lost wax casting in southern Africa during the Iron Age has not been documented (Miller 2001). In as much as studying manufacturing techniques has shed light on the properties of the metals, the skills of the artisans and so on, it also illuminates the division of labour and embedded socio-cultural beliefs and metaphors. Technological and cultural information helps in understanding the intended use of the objects. For example Childs & Dewey (1996) studied utilitarian and ceremonial objects from Zimbabwe and the Democratic Republic of Congo and observed differences in the qualities of the metal used in making the two sets of objects. Ceremonial objects tend to be very thin and immaculately made but they have absolutely no utilitarian value.

3.3: OBJECTS AND FUNCTION

One of the most frequently asked questions in archaeology concerns the function of objects recovered from archaeological sites. Miller (1987: 115) considers that understanding the function of objects is no easy task. Often the function of objects is closely related to context and that classification is usually gained from the experience of observers. Also central to the discussion is the question of the intentionality of the object or its users: was this object made to fulfil this specific function?

More importantly function requirements seem to impose constraints on the shape and form of an object. In cases of handmade objects, there is a loose relationship between forms as fitness for function (Miller, 1987: 116). The iron hoe used in the agricultural regions of southern Africa is a case in point. It was used for tilling the land and weeding the fields and its form closely fitted its function (Maggs, 1984). The metal head was made from welding iron fragments together to create the blade and tang and attached to a wooden shaft. Hoes, however, had both a practical and symbolic function. For example, in many Bantu communities, the hoe was used in negotiating relations such as the payment of bride wealth. In fact hoes also symbolised women and their work (Childs, 2000). Therefore, although form and function are correlated, there is a lot of associated information beyond form and function.

The context of the recovery of objects is also important in illuminating their function. For example, Fagan (1970) remarks on the exposure of an expressive, rather than functional, hoe, found in pristine condition in a grave at Ingombe Ilede, and notes the contrast between this hoe and those exposed in archaeological horizons nearby. These were heavily worn away by frequent employment in the fields. The ceremonial hoe indicates the ideal (or symbolism) of function rather than actual use and efficiency. As an artefact it was recognised as a utilitarian tool valuable to all Bantu farmers working towards their own sustenance. Miller (1987) adds that, for contemporary researches, tools extend the possibility of humanity as productive agents. It is the object's symbolic relationship to the social group which is crucial, rather than its ability to perform transformation in nature linked with utility.

Another aspect of the found object is its ability is to isolate itself from the closeness of a relationship embodied in the concept of utility. This is evident in the way that it is used for the opposite function, to isolate the individual from the proactive activity. An illustration of this is the consideration of the multi-metalled body ornaments exposed on the hill-top sites found in the Zimbabwe culture (1100-1900) where beads, neck-laces, arm, ankle and leg bracelets adorned the aristocrats and signified an elite class separated from manual labour through positions of prestige and power through political and religious associations (Caton- Thompson, 1931; Fouché, 1937; Robinson, 1959; Garlake, 1983; Fagan et al, 1969, 1970). These decorative and fragile objects were emblems of this class alone which was constructed to ensure separation from the commoner and their associated activities. In this context, civilization is best described, not as greater efficiency in food production and manufacture, but as the preservation of the distance between the two activities (Miller, 1987: 118).

3.4: OBJECTS, THE SELF AND SOCIETY

Earlier studies concerning objects and the human in society, in southern Africa are characterised by a romanticism accompanying objects made prior to industrialisation. There was a fascination for the hand-made object for personal use. During the past century investigations into the significance of self were questioned by Mauss (1872-1950) (quoted in Miller 1987: 118) who felt that the attention to self-became evident once larger investments were made by individuals in acquiring greater proportions of material culture, including property rights within the scope of capitalism. An emerging form of capitalism was noted in the reference to bride-wealth. In some societies, it is mentioned that the prospective husband worked within the family to serve time to acquire the bride (Van Warmelo, 1940; Mackenzie, 1975). The tradition altered when manufactured goods or objects became an acceptable form of transaction for the bride – the terms and transaction of *lobola* being a significant tradition within southern Africa, amongst the Zulus in the 19th century, where not only objects but cattle, too, became a form of transaction (Raum, 1973).

Pre-colonial societies in southern Africa had little in common with contemporary society where the self is more autonomous. Within Africa, kin-groups of the past played a greater role than the individual in managing the affairs of society. Miller (1987: 119) mentions the phenomenon of certain ordinary objects becoming associated with certain individuals, and that they were considered as extensions of themselves. A further commentator added that clothing and ornaments belonging to an individual may be considered so integral to them that handling them is a violation of the owner. An element of this activity was observed amongst the precolonial societies in southern Africa by a range of scholars. In these societies chiefs and the elite were buried with their life-long accumulated material wealth (Caton-Thompson, 1931; Fouché, 1937; Fagan et al. 1969; Garlake, 1969; Huffman, 1970; Walker, 1991; Meyer, 1998; Desai, 2001).

In this context of objects and wealth being the extension of self, three skeletons were found in archaeological contexts on Mapungubwe Hill during the early 20th century, where each was buried with their personal wealth of gold beads, wire-wound ornaments and three iconic objects (Fouché, 1937; Meyer, 1998; Desai, 2001; Miller et al., 2001). These forms of non-inheritable wealth were surpassed by those described by treasure hunters digging within the ruins of Great Zimbabwe. Hall & Neal's (1972, Caton-Thompson, 1931; Garlake, 1973) reports describe a wider range of gold ornamental forms including small and large beads, solid and flexible bracelets and many fragments of gold foil which had decorated wooden forms. At Ingombe Ilede the wealth of three skeletons associated with metal smithing / chiefs/ traders was exposed under professional conditions highlighting their riches found in context. The ornamentation recovered comprised objects of fine worked iron, copper, bronze and gold set against a few foreign derived, understood to originate in Asia (Brown, 1995), metal wire-drawing tools (Chapman, 1961; Fagan, 1970). It seems as if the individuals owned these objects in life, illustrative a personal way of life and the objects were buried with them as non-inheritable treasure. Such property can be seen as synonymous with the person and may represent the person in his absence (Shaw, 1938).

Childs & Dewey (1997) engaged in extensive research into the significance of objects, in terms of ancestral links which may have been the basis of an individual's social identity at the time. In some cases the loss of the object would itself constitute a danger to the legitimacy and viability of the personage and the group that he leads. Dewey (1994: 365) reports that the ritual uses of axes amongst the Shona have rarely been described although they are termed 'ceremonial or dancing axes'. Some of these were entirely of spiritual value, made several generations ago and still maintaining their aura of protectionism. The Shona regarded the ancestor's influence as a positive one. Although the loss of the object would not constitute a danger to the legitimacy of the personage, Dewey (1994) adds that axes were more highly prized, or at least survived in great numbers than any other type of object. Most Shona considered old axes to be more superior, although it was acceptable to have a new one made (Shaw & Van Warmelo, 1974; Dewey, 1994).

An analysis of object exchange, throughout the past two millennia, prompted anthropologic discussion concerning self, object and society. Almost all societies have had elements of exchange of objects in which persons participate whether in the form of barter or market exchanges. This object exchange phenomenon has been found to have taken place during the Early Iron Age indicating inter-village traffic in raw materials and objects which depended on social organisation over much of the sub-continent (Gray & Birmingham, 1970). Food gathering and production coincided with the introduction of metallurgy into the region. With food production trade became important and led to a more complex economy and material culture was met with objects from oriental sources (Fagan, 1970). It is under these conditions of a free market that there is evidence for a flexible exchange of objects, detached from their background, to be conducted by merchants.

3.5: OBJECTS AND SPACE

In relation to the objects in space Miller (1987: 121) sees close relationships between the concepts, the materiality of objects and the materiality of space. That special order has been investigated by various authors who have considered the use of social space within the confines of enclosed space defined by architecture. However, the focus of these studies has been a contemporary and Western understanding of space. Other studies suggest that some societies used spatial planning to represent a sacred order which was an ideal form, and that in a social context this represented attempts to demonstrate certain principles, while often creating firmly controlled populations. Evidence of these firmly controlled populations were noted in the Middle and Later Iron Age in southern Africa at site specific locations within the Zimbabwe culture (Fouché, 1937; Robinson, 1959; Fagan, 1968-69; Garlake, 1973, 1983 Huffman 1996).

According to this interpretation the sites of Mapungubwe, Great Zimbabwe, Khami and Danangombe were elevated and isolated for the political and religious elite, who supported their superior social position with an outward display of expressive decoration and objects (Caton-Thompson, 1931; Fouché, 1937; Robinson, 1959; Fagan, 1968-69; Garlake, 1973, 1983; Huffman, 1996). Ornamentation exposed at these sites was manufactured from iron, gold, copper and bronze and can be perceived as signs of exoticism, as the actual metal work was not a major feature taking place at these sites (Herbert, 1996). The manufacturing activities were performed elsewhere and the objects brought to the site as tributes or prestige gifts by those who had access to such resources and supported the role of the incumbent chiefs and administrators (Earle, 1991).

Almost all everyday objects possess some kind of biography or witnessing properties through which their significance may fundamentally change (Caple, 2006: 13). For example, Miller (1987: 126) in his description of pottery making in India, noted the various transformations from the sacred object to a utilitarian one, indicating the introduction of new forms resulting in the discarding of the former object's sacred status. It is at this point of transformation that objects or fragments became evident in archaeological records, and the process of working backwards was established in delineating the meaning of the original object (Jones, 2002).

A similar sequence of events marked the wire-wound bracelet in the southern African context in the Early to Later Iron Age. While it was a complete object created for neck, arm and leg decoration it was accepted for its decorative and symbolic values, but once it became fragmented, it was no longer appreciated by the wearer. Thus while the abandoned parts found in archaeological contexts became invested with information for theorists and archaeologists alike. It was at this point that the value of the metals was negated by members of society as recycling the metal was not considered (Summers, 1969; Calabrese, 2000; Miller 2001; Denbow & Miller, 2006). In contrast to Miller's (1987:

127) theory the African wire-wound bracelet remained a fashion statement and counters the notion of it ever being an indifferent object (Hechter-Schultz, 1963, Shaw and Van Warmelo, 1974, Shaw, 1974, Davison, 1984). Objects in space are linked to concepts such as estrangement and validity which is delineated within general theory of objectification of properties of relationships rather than of either peoples or things, the place of time, in establishing the implications of context became significant (Miller, 1987: 127).

3.6: OBJECTS AND STYLE

To date the analysis of objects by many scholars has been focused on the external contextual dimensions in unresolved forms without taking their internal organisation into account. In this research, the term 'style' is often used to cover a range of artefactual components which relate such objects to their social environment.

The concept of style comprises elements of material forms which relate to each other in orderly sequence linked with the manner in which they are utilised in establishing cultural patterns and act as systems meaning. When assessing ornaments and ceremonial objects they can be seen to gain their effect from the lack of abstraction and to benefit from the various connecting functions that they perform, linked to the messages they broadcast. One of the methods in which objects may be interconnected with others is through what is known as type-tokens. Miller (1987: 127) suggests that this takes place within industrial environments – where the objects made have strong similarities with others produced in the same manner and in similar situations throughout the wider environment. This notion can be found to apply to hand-made wire-wound bracelets made in pre-colonial times in southern Africa. These created objects were made by African craftsmen in rural and urban locations from the Early

Iron Age to the present and continually repeat the same manufacturing details (Hechter Schultz, 1963, Shaw & Van Warmelo, 1974, Davison, 1984). The conclusion that objects are type-tokens is drawn from the great numbers of discarded fragments exposed in archaeological records dating from the 7th century to the present (Miller, 1996). Early records show the prevalence of iron used in the making of objects in the Early Iron Age, while later at Mapungubwe, this was linked with gold and copper as noted in literary records (Fouché, 1937; Oddy, 1984; Meyer, 1998; Calabrese, 2000; Miller, 2001; Miller et al, 2001) and in KwaZulu-Natal towards the end of the Later Iron Age (Webb & Wright, 1979; Kennedy, 1991; Roodt, 1993). An evident style factor was the use of flexible vegetable matter for the internal cores, which was replaced later with the use of animal tail hairs in some southern African cultural groups in the 18th and 19th centuries AD (Burchell, 1953; Stayt, 1931; Cline, 1937; Herbert, 1984). The communicative message of these objects lies in the large volumes which the wealthy could amass (Caton-Thompson, 1931; Mason 1962; Fagan et al., 1969, Garlake, 1969, Huffman, 1970) in comparison with the few worn by the less affluent societies, or by members of a social class as exposed in archaeological contexts (Robins & Whitty, 1966; Garlake, 1970)

At another level of investigation, objects may be organised into a given space within which they contrast with all other objects outside that space. In this new context Miller (1987) defines style principles as the use of certain limited functions upon which the variability of a domain is expressed. Certain aspects of the object would have been used to create social distinctions, but in these cases other properties would be uniform within the range. It is this process which helps to distinguish that an object is from a particular place (Miller, 1987: 121). Three, if not four, iconic objects, unlike each other, partly made of wood (now disintegrated) and gold foil, include a ‘mace’, the rhinoceros, the crown/bowl and fragments of foil decorating a divining dish were exposed at Mapungubwe in 1933 (Fouché, 1937; Steyn, 1998; Mayer, 1989, 2000; Tiley, 2004; Duffey, 2012). The golden objects demonstrate their association with design as well as their physical limitations in terms of being purely decorative and created as ceremonial rather than utilitarian objects.

Miller (1987: 122) considers that on another level objects in different spheres may be organised according to a similar underlying logic. In such analysis the changes of the cultural forms almost become independent of their social form, as individual societies themselves are understood as simple variants of a deeper social order. Amongst the objects that are present in a different sphere is the expressive iron axe of the Shona, an instrument fulfilling several roles within the style format that comprise a blade, a decorated tang hafted to a decorated wire bound shaft (Herbert, 1984; Childs, 1991a; Dewey, 1994; Childs & Dewey, 1997). The object realises its potential by being on one level a utilitarian tool for agricultural needs and warfare, and on another it could be converted from a utilitarian object to the ceremonial sphere, or specifically created as a hand-held object for political and religious functions (Childs, 1991a). For some of these objects further distinction was maintained by the veneration that kin-groups held for these objects used by the ancestors, made in the distant past and preserved for the present and future generations (Dewey, 1994). The Northern Nguni valued the *nhlendla*, a crescent shaped iron head set at right angles to a decorated or plain shaft. Within its setting it was carried by the Zulu king at ceremonial events (Maggs, 1993). These artefacts express ideas and ideals which confirm the legitimacy of form following function. The style patterns mentioned above were peculiar to some of the cultural groups living within southern Africa (Widstrand, 1958).

3.7: TECHNICAL PROPERTIES

Caple (2006; 96) sees all products as being ultimately created from materials. The choice of the materials general takes place in two stages. The materials are either found to be inappropriate for the object or seem to contain its best assets for its fabrication (Caple, 2006: 96).

The desirable physical properties for metal made objects were and are hardness, strength, malleability and colour. During the Iron Age hardness and strength were the features required for suitable implements for farming (hoes), weapons for war and hunting (spears, axes and arrowheads), and for ceremonial artefacts (decorative spears and axes). Ornaments (beads, bracelets and ear-rings) relied on the physical attributes of malleability and colour, the latter fulfilling ideological and symbolical requirements for those in superior social and political positions in the Zimbabwe, and other cultures (Herbert, 1984; Garlake, 1973; Denbow & Miller, 2006).

When the maker of an object is considering its function, the object invariably needs more than one property; as a result objects need a balance that best enables them to perform their desired function (Caple, 2006). In the pre-colonial southern African context, the discarded fragments of wire wound bracelets indicate a variety of vegetable fibre used as internal cores for supporting decorative arm and leg ornaments while ceremonial iron axes required wooden handles in order to be functional (Cline, 1937; Herbert, 1984). In most cases the natural materials have disintegrated with samples from archaeological records displaying sufficient residues to facilitate identification and dating (Woodbourne et al., 2009).

During the Later Iron Age some metals required the use of additional technologies as noted in the use of alloying copper with other ores; the most familiar to the African craftsmen during this period was the mixture of smaller quantities of tin with copper to produce bronze within crucibles. The composition of copper was altered to produce a stronger metal, albeit used for its decorative qualities only (Herbert, 1984, 1996). Caple (2006: 97) attests that in the presence of copper alloys it is important to identify the material correctly. In the case of African alloyed bronze it cannot be assumed that all objects are of the same composition as some metallurgists have indicated variations have been exposed in terms of the variable quantities of tin found in bronze (Miller et al, 1995; Miller, 1994, 2002, 2003; Hall et al., 2006).

3.8: CULTURAL INFLUENCES

In pre-colonial times materials for manufacturing objects were chosen for several reasons: their technical suitability, their economic feasibility or for their cultural association (Caple, 2006: 101). The material considerations are related to their visual appearance observed in body ornaments in terms of the choice of the appropriateness of one material or one over another. In southern African cultural societies, iron and copper were constantly used for their colour; their indiscernible language and their symbolic qualities all of which have been noted in ornamentation and ceremonial artefacts (Herbert, 1984; Childs, 1991 a/c; Childs & Dewey, 1996).

In the employment of materials by makers of objects, colour symbolism was an important determinant in manufacturing body decoration using a number of metals. This symbolic system consisted of white for iron, and red for copper linked with shades of bronze's yellows. It has been noted that the yellow of bronze (Denbow and Miller 2007: 296) bore resemblances to gold (Denbow & Miller, 2007). The decoration of iron bangles, bracelets and neck-rings with gold was noted within archaeological records from sites within the wider extent of the Zimbabwe culture, indicating that choices were considered for these status accentuating ornaments. These particular forms were linked with chieftainship within this cultural group (Hall & Neal, 1972; Walker, 1991; Miller et al., 2001).

Records of the use of traditional practices by African societies leads to the suggestion that the technical choices in the manufacturing process were largely culturally regulated (Caple, 2006). In traditional African work-shop environments metal smiths manufactured their products in community environments to satisfy their customer's needs (Stayt, 1931; Cooke, 1966; Hatton, 1967; Maggs, 1992). Hodder (1982) suggested that in this regard the work- shop and the scale of production, varied between cultural groups depending on the demands made from them.

Iron and copper are the two primary metals found to have been exploited in sub-Saharan Africa and possess several physical differences, in terms of colour, malleability and luminosity – the red of copper is appreciated for its softness and was rarely used for utilitarian purposes, although small tools have been excavated in archaeological sites (Childs & Herbert 2005). Copper's importance lies in its use for currency in trade, as ornamentation and for ritual activities. Iron also fulfilled these roles, but was used essentially for utilitarian artefacts. The combination of iron and copper in the making of a single object stressed that choices were deliberate. Metals were used to make statements, and the messages were recognisable to people within that culture. Ethnography, oral reports and material culture have helped to reconstruct this language and symbolism in recent years (Childs & Herbert, 2005).

The cultural language of colour has been explained by Herbert (1984) who attests that iron and copper have been found so frequently together that it must be assumed that their complementary relationship is a long and established one. In considering colours Herbert (1984) attests that it is not possible to interpret a single metal in terms of a single colour without seeing it in its total context contrasted with other colours or other materials (Herbert, 1984). This perception is verified in archaeological records from the Early to Later Iron Age in southern Africa, where so many reports stress the deliberate placing of iron against copper that this juxtaposition cannot be considered fortuitous (MacIver, 1906; Garlake, 1973; Inskeep & Maggs, 1975; Steyn et al., 1998; Miller, 1996, 2001, 2002; Denbow & Miller, 2007). Colours and their symbolism may have what appear to be contradictory significances but in fact turn out to be carrying out alternative meanings. Thus it is necessary to observe the context in which the objects appear to in order to make valid interpretations (Herbert, 1984; Caple, 2006).

3.9: ECONOMIC CONSTRAINTS

Metal technology played an important role in the economy of the African Iron Age. Both iron and copper objects have been found throughout the Early to Later Iron Age excavated in many archaeological sites. In the manufacturing of objects a range of economic and supply factors influenced the type and nature of the material used (Caple, 2006: 102). Evidence exists of economic limitations on materials as a result of scarcity, leading to unlimited energy spent by metal smiths and traders in acquiring the materials or the manufacture of desired products. In the absence of metals for ornamentation natural materials, such as snail shells, ostrich egg shell beads, grasses and leather were used for this purpose or if available glass beads.

Limitations on manufactured objects were caused by reduced natural availability of resources such as desirable ores. One of the economic limitations in southern Africa was set by the distances that high-grade iron ores needed to be transported for to use in the smelting process. Some ethnographic literature mentions women and children carrying baskets or sacks of ore, at times with the aid of oxen, to the furnaces (Read, 1903; Hatton, 1967; Mackenzie, 1975). Other authors have mentioned the distances walked. Van der Merwe & Scully (1971) described iron ore having been carried 20 km from Lolwe Kop to Square, metal ores were not mined in the Lobedu area, and ore had to be carried on foot from “somewhere in the north-east” to the Lobedu smelting sites (Davison, 1984: 171). Cooke (1966) reported that in southern Zimbabwe women collected iron from the surrounding hills in baskets. The amount was not mentioned but once smelted it was sufficient to make three or four hoes (Hatton, 1867). Fewer limitations existed in terms of the availability of iron ore, which occurs in generous quantities throughout Africa, and metal-smiths exploited a wide diversity of ore types. These ranged from low-grade laterite to iron-rich weathered rock to scarcer high-grade magnetite a dense iron-oxide material (Miller 1997, 2002).

The availability, quality and quantity of hardwood trees used for charcoal was an essential component for smelting and smithing. Many scholars discuss the process of these two activities but few mention the species of hardwood trees peculiar to the regions under investigation. However, a few authors have supplied names of trees, sometimes with Latin names and link some with African names for the same trees, or just with African names alone (Wise, 1958; Franklin, 1945; Cooke, 1996; Haddon, 1967; Shaw and Van Warmelo, 1974; Mackenzie, 1975; Maggs, 1992; Roodt, 1993). Within KwaZulu-Natal *Olea europea africana*, *Combretum* species, *Acacia* species (*A. caffra*) and Tambotiehout are mentioned by Maggs (1992) and Roodt (1993, Bryant, 1949). Shaw and Van Warmelo (1974) specify that the hardwoods found in the Eastern Cape were used for charcoal such as *umlokithi*, *isiqualaba*, or *isiqwane*. In the southern Zimbabwe, Cooke (1966) and Hatton (1967) stated that the *Burkea africana (umNondo)*, *Peltophorium africanum* (*Meseshla*) and *Terminalis* (*iMangwe* or *Mususu)* were the hardwood trees utilised for charcoal in this region. Mackenzie (1975) and Franklin (1945) add that the African trees in central Zimbabwe used for charcoal making, were the *myange*, *mushava*, and *mukarate*. The method for making charcoal was similar throughout; that of burning wood for a period of time and then quenching it with water or soil, and when cool, gathering it and reserving it for smelting and smithing activities (Wise, 1937; Rickard, 1966; Maggs, 1992; Roodt, 1993). However, a lack or sparse availability wood suitable for making charcoal hampered metal production (Maggs, 1976; Haaland, 1985; Goucher and Herbert; 1996, Chirikure et al., 2007).

Copper mineralization is restricted to only a few areas in the African continent, one area being southern Africa. Locations within this region include some of the richest copper deposits in the world (Herbert, 1984, Bisson, 2000). In southern Africa the discovery of unfamiliar ores such as cassiterite alloyed with copper led to the combination that produced bronze (Garlake, 1973). At first bronze manufacture was thought to be localised to Zimbabwe where it was used exclusively for ornamentation and ceremonial objects (Caton-Thompson, 1931) but further discoveries show that this is not the case and bronze ornaments have been excavated at several sites in South Africa at Klipriviersberg, Gauteng (Friede, 1980), Goergap, and Marothodi, North West Province (Miller et al., 1995; Hall et al., 2006) and Bosutswe in Botswana (Denbow & Miller, 2007).

Local populations endeavoured to exploit local resources as these were both cheaper and easier to obtain and their required technologies were well-known to the craftsmen

(Caple, 2006). The Northern Nguni cultural groups were familiar with locally smelted iron for manufacturing utilitarian objects, while imported Indian and European brass provided a metal to be used exclusively for ornamentation (Bryant, 1949; Smith, 1970; Roodt, 1993, 1996). There could also be limited technical expertise to discover, or exploit introduced materials. Brass making technology presented practical challenges to pre-colonial metal workers in many regions zinc being an extremely volatile metal which evaporates during the heating process (Maggs & Miller, 1995; Thondhlana & Martinón-Torres, 2009). The repeated annealing of brass reduces the malleability of the metal and this resulted in fractured objects, especially seen in the Zulu *izingxotha* (Connor & Pelrine, 1983, see Figure 4.10). The cultural groups deprived of iron ore such as the Xhosa and others living along the south-eastern coast of South Africa satisfied their needs in pre-colonial times by obtaining small supplies of metal through trading with cultural groups to the north and east. Those living near the coast augmented their iron requirements from the numerous ships wrecked there (Shaw & Van Warmelo, 1974; Vernon, 2013).

The manufacture of objects could be hindered by the lack of the ready availability of desired materials at those foundries where knowledgeable craftsmen were situated (Caple, 2006: 103). It appears that African smelters specifically chose to be closer to the fuel supply and the centres of demand and distribution (Van der Merwe & Scully, 1971: 182). In considering specific cases there is a wide variation in the location and concentration of iron working sites. Maggs (1992: 74) mentions that the smiths working at Hluhluwe, KwaZulu-Natal were situated in a well wooded area, with iron ore available locally. This situation would be fairly rare considering the distance miners and ore gatherers walked to deliver basic materials to smelting furnaces (Cooke, 1966; Hatton, 1967; Van der Merwe & Scully, 1971; Mackenzie, 1975; Davison, 1984; Huffman, 2007).

3.10: RECYCLED MATERIALS

Caple (2006: 109) defines recycled materials as those materials that can be gathered and reused. From studying scholar’s reports one can see that iron was considered sufficiently valuable to recycle in some African cultural societies (Miller, 1996, 2002; Childs, 1991c; Dewey, 1994; Childs & Dewey, 1966). Recycled objects are a source for any material that is economic to collect (Caple, 2006). For African craftsmen iron was seen as a high-value material as extracting it from raw ore was at the time a lengthy, irregular and labour intensive operation. The variations in the availability of materials and their value led to different levels of recycling in different periods and places (Caple, 2006: 108). Miller (1996) reports that the accumulation of fragments of iron led to the diffusion of dissimilar alloys which were indicated by the recycling of metal fragments which were too small for re-use. Childs (1991c) asserted that transformed objects were fabricated from an accumulation of small segments, and hammered, folded, annealed, and welded as the metal underwent progressive modifications. Miller (2002) further maintains that the recycled iron metal pieces were joined by a process of hot welding which often embedded surface scale, internal voids and fragments of dissimilar metals which have been revealed in metallographic analysis.

Recycled iron from worn-out objects was examined by Childs (1991c) who describes the activities of the Luba craftsmen. A *chaîne opératoire* was observed where “hoes were transformed to axes, axes to knives, knives to razors, razor to scalpels (quoted from Womersley, 1984: 21). Iron was thus obviously too valuable to discard. This can also be seen in the retrieved hoards of utilitarian and ornamental objects found in KwaZulu-Natal where several collections imply that objects were buried for safe keeping to be retrieved at a later stage (Maggs, 1991). When an object became impaired, it was converted into another useful object (Childs, 1991c; Miller, 1995, 2002). In post-colonial times imported industrial iron and steel waste found favour with African metal-smiths as it was from this material that they fulfilled commissions mainly for ritual spears, knives and axes (Shaw, 1974, Shaw & Van Warmelo, 1974; Maggs, 1992; Dewey, 1994; Childs & Dewey, 1996, Childs & Herbert, 2005).

3.11: NEW MATERIALS

Economic circumstances do not remain constant. As time passes perceptions of the value of new materials change. Caple (2006: 110), sees technological development as taking place with the exposure of new or alternate materials. Iron and copper were essential to Early Iron Age technology and iron remained central for tool making throughout the Late Iron Age (Miller 2002). With the excavation of gold, and the smelting and manufacture of bronze and brass, new social-cultural dimensions in the Middle and Later Iron Age developed over and above the metals’ working technologies that had been practiced for centuries. The technologies acquired for manufacture in iron and copper smelting and smithing were transferred to gold, and bronze with mixed results for brass (Miller, 2002, Thondhlana & Martinón-Torres, 2009).

Renfrew (1986) suggests that new materials appear well before they are exploited by local communities. In the case of Zimbabwe the value of gold was appreciated by foreigners before the local elite cultural groups grasped the value of this new material. With the appearance of gold the local leaders took advantage of the metal for trade and individual wealth which enhanced social status with a variety of ornamental forms. At Mapungubwe, in the 13th century AD, (Fouché, 1937; Calabrese, 2000; Woodbourne et al., 2009) this was identified amongst royalty buried with their wealth of gold beads, bracelets and expressive objects. The trend continued at Great Zimbabwe (Caton-Thompson, 1931; Hall & Neal, 1972; Garlake, 1973), at Ingombe Ilede (Fagan et al., 1969) and Thulamela (Steyn et al 1998; Miller et al., 2001). Renfrew (1986) adds that at a later stage 'new' materials became familiar and were incorporated into tool making. The value of bronze remained relevant to the expressive sphere in Zimbabwe, the metal being used for decoration and ceremonial spears (Caton Thompson, 1931; Summers, 1971; Garlake, 1973; Huffman, 1996, 2007). In south eastern Africa large quantities of imported brass were exploited by the Zulu kings exclusively for ceremonial decorative objects only (Roodt, 1993, 1996).

Caple (2006: 111) elaborates on Spratt's (1982) contribution to "The analysis of innovation process" suggesting that apparent stages existed for the appreciation, introduction and development of materials; in this case the exploitation of metals.

In the early stages when the metal was rare – in the case of iron and copper – it was used for ornamentation in the Early Iron Age as noted in the archaeological records of southern African localities such as Mabveni (Robinson, 1961), Broederstroom (Friede, 1977; Miller, 2002), Divuyu and Nqoma (Miller, 1996), and Kwagandaganda (Miller & Whitelaw, 1994). A negligible amount of iron was set aside for the fabrication of implements which at that time were undersized (Miller, 1996).

During the middle stage the decorative qualities of metals – such as gold and bronze – were exploited by the wealthy for prestigious and social stratification purposes (Caple, 2006: 111). In southern Africa this took place with greater frequency in the Middle and Later Iron Age. Working with gold was confined to the Zimbabwe culture, initially exploited by the Swahili and the Arabs, with the African elite aware of its potential for status defining properties and lucrative Middle Eastern trade from the 12th century. Bronze alloyed for its colour, was exploited for decorative purposes alone in the wider context of Zimbabwe and in South Africa (Garlake, 1969; Friede, 1980; Herbert, 1996; Miller, 2001; Hall et al., 2006; Denbow & Miller, 2007).

Finally, in the later stage while the previous materials are still employed for tools and ornamentation a new material in southern Africa became accessible. This was brass which became available through international trade and was exploited by the Zulu as a decorative metal for the display of wealth and elitism. Brass making technology presented practical challenges to pre-colonial metal workers. Its earliest exposure in the 17th century as noted in Eastern Zimbabwe was shown to be utilised for bead manufacture (Thondhlana & Martinón-Torres, 2009). In the hands of the iron workers of Zululand in the 19th century the technology of melting and smithing of brass exhibited unfamiliar properties which became exposed in the manufacture of larger objects for ornamentation such as the large metal cuffs; *izingxotha*. In the early 20th century the skills developed in smelting disappeared with colonialism, where scrap metals from unknown sources were used to manufacture required ceremonial objects and ornaments (Shaw & Van Warmelo, 1974; Shaw, 1974; Davison, 1984; Maggs, 1992).

3.12: CONCLUSIONS

There are many theoretical contributions to the examination of the centrality of objects from material cultures made by hand from a variety of materials, whether for utilitarian or ceremonial use by various population groups. The writings of Caple (2006) and Miller (1987) have been amongst the most influential in providing us with a variety of aspects and ways for appreciating objects retrieved from the past in archaeological contexts and enabling us to make illuminating comparisons with those that appear in the present. In the last two decades a variety of disciplines have combined to tease out information for understanding the full complexity of mankind's historical material culture and to evaluate the succession of activities engaged by metal workers from the raw state of materials to finished objects, each one valued for its utility during its life-span, and ultimately discarded when worn out or damaged. A careful study of the *chaîne opératoire* has exposed details of technologies hidden in the past and now exposed with the aid of current scientific techniques demonstrating procedural details not apparent to the naked eye especially in the field of metallurgy. An exposure of these scientific particulars, including socio-cultural information, assists in evaluating the lifeways of craftsmen and their immediate communities, not only of those to hand, but those in the wider environment from the commoners to the aristocrats of these societies who utilised the products of craftsmen throughout the Iron Age.

While museum collections of objects of past populations provide inventories of material cultures, whether from similar or dissimilar contexts, they lack complementary evidences of workshop or living conditions surrounding these cultural groups. The value of retrieved whole or fragmented objects increases when sourced from archaeologically stratified contexts which render clues from the past; their presence requires deciphering in order to reconstruct the past, not only in terms of the craftsmen's abilities, but of the functions of the objects in the immediate environment of people between occupational areas and the grave (Martinón- Torres, 2009). The metal worked object, whether for utilitarian or ceremonial needs was portable and satisfied the needs of many cultural groups in the form of currency, as gifts and for trade. As exchangeable objects their presence confirmed their acceptance either as ornaments, as expressive objects or utilitarian tools. While in the case of ornamentation one unit rarely sufficed, it was often encountered in quantities. This is noted in the manufacture of metal beads and wire-wound bracelets, which were created from more than one metal and have appeared amongst numerous cultural groups throughout southern Africa.

This study concerns decorative metals and stresses that each object merits an in-depth exploration of its materials and technologies in the contexts of their appearance in space and time. The study is intended to demonstrate that the power of the object grows exponentially with the quality of the questions asked and the quality of answers received for our understanding its social and cultural background and its contribution the future of human kind. Should responses to questions posed cover the materialities, physical interactions with locale, social relations and symbolism in human life, then one could claim that a useful procedure has been developed and achieved for use in future investigations.

4. CHAPTER FOUR: THE VALUE OF NINETEENTH CENTURY ETHNO-HISTORY IN STUDYING DECORATIVE METALWORK IN SOUTHERN AFRICA

4.1: INTRODUCTION

Ethno-history uses historical and ethnographic data as its foundation in establishing the social and economic conditions of past communities, especially those without written records and limited oral records (Trigger, n.d.; David & Kramer, 2001). The use of historical methods and materials goes beyond the standard use of documents and manuscripts. Historians, anthropologists, archaeologists and ethnographers have recognised the value of additional source materials such as maps, photographs, documentary art, folklore, oral traditions, site explorations, archaeological materials, museum collections, enduring customs and place names as playing their part in discovering and explaining the life-styles and craft processes, and the use to which objects were put, amongst other activities of vanished communities. The current use of historical and ethnographical information for relatively fine graded sequences of events offers support in exploring the relationship between the archaeological record and communal and processual changes especially in metal work (Rogers & Wilson, 1995). Although a significant number of travellers' reports exists for southern Africa (Figure 4.1), researchers have tended to selectively use those aspects which satisfied their fancy and curiosity or romanticised the 'primitive'. For example, rituals and restrictions associated with iron smelting were often recorded while there was scant information on smithing and the use of objects. This chapter seeks for the first time to develop a comprehensive and in-depth understanding of decorative metalwork presented in a range of ethno-historical and archival sources. In the process, it delineates the typology of objects used during the Later Iron Age in southern Africa, and maps their distribution in relation to various cultural groups. This process permits an exploration of the synchronic similarities and differences within and between groups occupying the region in the late 19th century.

4.2: THE VALUE OF ETHNO-HISTORY

The essential requirements from the discipline identified as ethno-history were developed in the mid-20th century in order to aid the indigenous populations of North America to claim their land rights (Harkin, 2010). For this purpose, written documents and oral evidence was sought to establish a foundation on which to settle the legal positions of these groups (Harkin, 2010). The pursuit of ethno-history as a discipline has been globally accepted as an equal partner to anthropology and archaeology in the later part of the past century (Harkin, 2010). Ethnohistory shares equally with the others in their endeavours of explore human behaviours and the manners in which it may have altered in the past and relate them to the present in terms of helping us to understand human and social behaviour (Leach, 1989; Harkin, 2010). In the past, early ethnographers were primarily interested in the contrast between European culture and non-European cultures – a phenomena which anthropologists have described as the process of othering. Supposedly, early ethnographic studies focused on cultural differences that were assumed to be stable over long periods of time, with manners and customs of cultural groups being repeated endlessly (Leach, 1989).

However, with increasing encounters between Westerners and southern Africans leading up to full-scale colonisation in the 19th century, western visitors, such as missionaries, travellers, hunters and amongst others, geologists have recorded in detail several aspects of the communities which they encountered. In some cases, they also recorded the oral traditions of the various people. In northern Zimbabwe, Portuguese explorers recorded various versions of Mutapa dynastic histories (Beach, 1980). In the 19th century, the missionary Moffat (1842) recorded in detail his oral communication with a Hurutse copper smith. In the 20th century, the value to researches in assembling oral records became more critical when observing fading metallurgical activities (Franklin, 1945; Hatton, 1967; Van der Merwe & Scully, 1971; Küsel, 1974; Van der Merwe & Avery, 1987). The field of ethnohistory in southern Africa, like elsewhere, is based on extracting information from books, pamphlets, tracts, journals and diaries written by missionaries, visitors, prospectors, traders and settlers documented what they witnessed in a country that was being explored by Europeans from the early 1500s. In as much as this database is useful, there are a number of limitations that must always be kept in mind. For example, within the area of decorative metalwork, most visitors to the region lacked a scientific education or the knowledge to interpret what they observed in unexpected encounters with African smelters, smiths and with the processes these craftsmen followed in the manufacture of basic tools and ornamentation. Further, very few commentators visiting indigenous cultures remained sufficiently long to study the craft practised by local craftsmen and women in depth, or to integrate with communities as a whole, or to notice changing customs and manners (Leach, 1989). The consequence is that these observations in fact create a picture of static technological practices that bore similarities to one another throughout southern Africa. Furthermore, these observations struggle with a baggage of essentialism and Eurocentricism. However, when carefully sifted, these sources do contain useful data. For example Delegorgue (1842) made useful observations that archaeologists and metallurgists have been able to employ to reconstruct details which have provided substantial information in terms of assessing the value of indigenous metal working practices (Maggs, 1992).

Table 4.1 shows the nine cultural groups discussed in the chapter and the visitors or ethnologists who sojourned amongst them and who added relevant knowledge to the forms of ornaments, utilitarian tools made, and the tool-kits observed and used by indigenous African smelters and smiths in their working locations. The table below represents a culmination of a dedicated archival research and appraisal of the contribution early European visitors, ethnologists and scholars. Although not all visitors and 20th century ethnologists sojourned amongst cultural groups for long enough to observe relevant details, sufficient details were recorded over southern Africa to present an informative picture of what was worn and used over a wide area within southern Africa in the 19th century.

Table 4.1 The production inventory and tool-kits of the cultural groups investigated in southern Africa supported by ethnographical literature.

	Production								**Tool-kit**					
Authors/ Culteral Group	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Ovambo Galton, 1876								X						
Read 1902									X	X	X			X
Hambly, 1934			X				X	X	X	X	X	X		X
Shaw, 1938								X						
Mpukushu														
Andersson, 1861	X	X	X			X								
Van Tonder, 1966	X		X			X		X	X	X	X			
Larson, 1975	X		X		X	X	X	X	X	X	X			
Tswana/Sotho														
Lichtenstein, 1928	X		X			X								
Campbell, 1822	X	X	X		X	X	X	X	X	X	X			X
Burchell, 1953	X		X		X	X	X	X						
Moffat, 1842			X		X	X	X	X	X	X	X	X	X	X
Methuen, 1846						X	X		X	X	X			
Mackenzie, 1871						X	X							
Holub, 1872			X		X									
South Sotho														
Backhouse, 1844			X		X									
Casalis, 1855			X	X		X		X	X	X	X			
Ellenberger 1912	X	X	X	X	X	X								
Ashton, 1938	X	X	X	X										
Kalanga/ Matabele														
Wood, 1895			X			X				X	X	X		
Carnegie, 1938			X			X				X	X	X		
Cooke, 1959, 1966		X								X	X	X		X
Hatton, 1967						X	X	X	X	X	X			
Shona														
Bent, 1892			X				X	X		X	X			
Knight-Bruce, 1895			X			X	X							

	Production								Tool-kit					
Franklin, 1945						X			X	X	X			
Ellert, 1984						X	X	X						
	A	B	C	D	E	F	G	H	I	J	K	L	M	N

Key:

PRODUCTION: A: Beads; B: Bangles; C: Bracelets; D: Neck-rings; E: Ear-rings; F: Spear-heads; G: Axes; H. Knife

TOOL-KIT: I: Bellows, J: Anvil; K: Hammers; L: Chisels; M: Draw plate; N: Tongs

Table 4.1 continued

	Production								Tool-kit					
Authors/ Culteral Group	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Venda, Lemba, Tsonga														
Junod, 1927	X	X	X			X	X	X						
Stayt, 1931	X		X		X	X	X	X	X	X	X	X	X	X
Van Warmelo, 1940			X				X		X				X	X
Shaw 1974									X	X	X			
Van Schalkwyk, 1982										X	X		X	X
Davison, 1984	X	X	X	X		X	X		X	X	X		X	X
Northern Nguni														
Gardener, 1835	X		X	X	X				X					
Fynn 1825	X	X	X	X		X	X		X	X	X	X		
Mason, 1855										X	X			
Flemming 1856						X			X	X	X	X		
Shooter, 1857	X	X	X			X	X							
Grout, 1861		X												
Maggs, 1992		X				X	X	X	X	X	X			
Roodt, 1996	X	X	X						X	X	X			X
Southern Nguni														
McLaren, 1918		X	X			X	X	X	X	X	X	X		X
Shaw and Van Warmelo 1974	X	X	X			X	X		X	X	X	X		X
	A	B	C	D	E	F	G	H	I	J	K	L	M	N

Key:

PRODUCTION: A: Beads; B: Bangles; C: Bracelets; D: Neck-rings; E: Ear-rings; F: Spear-heads; G: Axes; H. Knife

TOOL-KIT: I: Bellows, J: Anvil; K: Hammers; L: Chisels; M: Draw plate; N: Tongs

This table presents not only useful information but highlights some of the research limitations identified earlier. For example, different observers focused on different aspects, such as the objects which they encountered or parts of the metallurgical processes which they witnessed. Thus, their reports and observations were always destined to be incomplete. It is, for example unlikely that the Ovambo people (Galton, 1876) would have only knives as pieces of decorative metalwork. However, when other sources are considered, it becomes clear that the repertoire of objects made and used by the Ovambo was much wider. As such, when considered holistically, it is clear that the nature of the decorative work used was to some extent similar amongst various groups, but further work is necessary to explore situational specificities.

4.3: LIMITATIONS OF THE ETHNO-HISTORICAL DATABASE

European written accounts were often biased according to their beliefs, world-views and the historical skills of the observer. This consideration is important bearing in mind that early descriptions were made by opinionated and influential individuals including well-known explorers, administrators and Christian missionaries. They tended to focus on the exotic rituals, including the blood sacrifices of animals that often accompanied the iron smelting operation. Thus their writing reflects the smelting process as being secondary to ritual behaviour (McCosh, 1979; Van der Merwe & Avery, 1987; Schmidt, 1997). Schmidt (1997) considers that African oral accounts should also be critically evaluated. Trigger (n.d.) points out that oral documentation is produced by participants of different cultural backgrounds and could be erroneously or deficiently reported. If the individual giving an account was not involved in the actual process of smelting iron then the evidence can be regarded as doubtful and consequently of little value (Motenda, quoted in Van Warmelo, 1940). In addition the process of smithing differs radically from that of smelting (Miller 2002). The two domains of iron production are linked in a sequence of events and share symbolic meaning, in spite of this there is no connection between the two activities (Schmidt 1997). Youthful memories from those of a later generation to specialist metal-workers themselves can rarely deliver valuable or reliable evidence about exploitative and productive practices (Van der Merwe & Scully, 1971; Schmidt, 1997). These authors appeal for caution in accepting verbal accounts from past smelters who are of a great age adding that memories about carefully planned sequences, each of which was executed with distinctive ideology and technological justification, have become indistinct and fuzzy, although details remain (Schmidt, 1997). However, information offered by elderly smelters and smiths has some value in relation to location, specific mining sources and general patterns of procedure.

A sceptical attitude, is necessary when one is studying illustrations executed in the 19th century in relation to smelting and smithing. Dritsas (2010) points out that care should be exercised when viewing travellers' narratives with accompanying hand-drawn images. Modifications were made to images at the time when they were prepared for publication. Engravers could alter drawings made in the field to 'suit' the popular imagination and thus alter and falsify their representation (Klopper, 1994; Dritsas, 2010). Dritsas (2010) adds that publishers, often profit-seeking enterprises preferred to give audiences what they expected. The publisher's financial considerations supported their civilising mission ideologies and partially explain the inability of the European authors to depict Africans as independent, dominating and capable individuals (Thornton, 1983; Dritsas, 2010). These effects also serve to explain why so little is known about indigenous African views on nature in the narratives of travellers' in Africa (Dritsas, 2010).

Webb's (1992) research into photography in KwaZulu-Natal in the 1880s indicates that a number of hidden meanings were expressed in photography of which the viewer should be aware (Rippe, 2012). In her article "*Fact and fiction: Nineteenth century photographs of the Zulu*" a darker side of image making is presented which Rippe (2012) confirms. It is attested that only recently have scholars with an interest in non-European cultures viewed photographs to illustrate their texts rather than as subjects worthy of study itself (Webb, 1992). Photographs taken at that time (1880s) were simply to prove an object's presence or to confirm its use. Little information was presented, about the direct manipulation of images, arrangements of objects, and the photograph's attribution and archival sources. At present historic photography undertaken in the service of anthropology, ethnography, religion and commerce among non-European peoples under colonial rule are being analysed for content and are being used to explore the biases of the photographer towards his subjects (Webb, 1992). Essentially the images need to be deconstructed in order to show how racist misconceptions, gender and social biases, stylistic genres and colonial agendas affect the historical lenses through which the photographic subjects are viewed (Webb, 1992).

4.4: THE ETHNO-HISTORICAL LITERARY CONTRIBUTION TO FURNACE BUILDING, AND SMELTING ACTIVITIES

The ethno-historical accounts of iron smelting fall largely into two groups those of an oral nature taken from indigenous aging metal workers and those descriptions by foreign observers (Franklin, 1945; Hatton, 1967; Küsel, 1974; David et al, 1989; Goucher & Herbert, 1996; Schmidt, 1997). The ethnographical literature, mostly dating from the mid-19th century, was extended by visiting Europeans. It provided information; on their chance encounters with indigenous African metal-smiths conducting iron smelts (Methuen, 1846; Mackenzie, 1871; Carnegie, 1894). Some, for example, Casalis

(1965:133) described such encounters by mentioning a circular fire place, with its heaped up quantity of embers and a little ore. The use of bellows and tuyères or pipes of clay radiating from the centre of the depression were described. The final action described was the retrieval of the coagulated metal, and its refinement with the aid of heat (Casalis, 1965: 133). Methuen (1846), Mackenzie (1871) and Carnegie (1894), like Casalis, while being perceptive in observing the character of the activity failed to observe details which would be of assistance to present day archaeologists and material scientists (Thornton, 1983; Sutton, 1985; Schmidt, 1997).

Observations that would be of assistance, to current researchers over and above descriptions of the style and shape of the furnace are their construction and the materials used for this. Of further valuable descriptions would be the amounts and quality of the iron charge, the species of trees used in the making of charcoal, and the quantities used for each particular event, as each would differ in relation to the amount of ore available. The quantities of each component had to be carefully gauged by the metal smelter as it had to be balanced with the duration and length of heat provided by one or more pairs of bellows. The resultant bloom was treated differently by different cultural groups involved in such an activity.

The furnaces described by a number of Europeans are diverse in construction, and size with each one delivering the expected bloom by the metal smelters. Three broad categories of furnace design have been found with a number of variations. The bowl type chiefly consisted of a semi-circular depression in the earth and was lined with heat accommodating stones. Some of the bowl shaped forms were surrounded by shallow walls in order to achieve higher volumes and better draught when compared to the regular bowl type (Küsel, 1974; Chirikure et al., 2009). The second category described is the low shaft furnace which stood roughly one meter high, while the base diameter varied (Kense, 1985). The longer shaft acted as a combustion chamber while the thick walls of the furnace acted as insulation against heat loss during the smelting procedure. Furnaces in the third group were identified by their tall shafts which measured as much as 1.5 to 4 m high from base to upper edge. These furnaces were operated by natural draught, as opposed to the shorter furnaces, which operated by force draught-using bellows (Van der Merwe, 1980; Kense, 1985, Van der Merwe & Avery, 1987; Pole, 1985; David et al, 1989; Killick, 1991, Schmidt, 1997; Chirikure et al., 2009).

Figure 4.1 The locations of some of the cultural groups who practised smelting and smithing in southern Africa mentioned in the text.

Amongst the ethnographical accounts, there are some furnaces that have been observed in action, indicating that the bowl, had been concealed by iron ore and charcoal surrounded by slabs of termite hill (Van Tonder, 1966). The description of this furnace suggests a long oval shape, with tuyères and bellows being inserted at opposite sides of the construction (Huffman, 2007). Larson (1975) reported that these metal workers would build a fire of hardwood or charcoal over a depression. The iron was melted down and it “ran off through two long slabs moulded by a potter, or collected under the fire” (Larson, 1975: 109). While providing some interesting details, this account is technically deficient because it is widely acknowledge that molten iron was not produced in the bloomery process (Miller & Killick, 2004).

While sojourning amongst the Sotho/Tswana, Campbell (1822) mentioned his attempt to observe a copper smelt or forging processes but was thwarted while he achieved his aim in watching an iron smelt and the manufacture of utilitarian objects. He described the furnace as being built of clay, and estimated it to be as hard as stone (Campbell, 1882: 228). The structure he describes was a dome shaped shaft furnace with an opening at the top to receive the ore and charcoal, and an excavation underneath for holding the fire. Campbell (1822) adds there were cavities “behind and fore for admitting the fuel, and also the wind from the bellows”. Küsel (1974: 248) describes a similar furnace type to the *Buispoort Type* mentioning that the furnaces were oval in shape, with two openings for tuyères, one at each end of the oval, with the opening at the top, serving as a chimney, and allowing the charge to be poured through it.

When visiting the Ndebele in the mid-19th century AD, Carnegie (1894) described a smelt which took place in a clay pot whose measurements were not given. He mentions that the vessel was filled to capacity with ‘coke’ and ‘ironstone” (Carnegie, 1894: 57). A ceramic lid was placed on top of the pot, and the cracks were filled with clay mixed with cow-dung. The whole unit was placed on three stones around and beneath which were placed heated ‘sticks’; heat was maintained with the aid of bellows until the smelt took place (Carnegie, 1894). The author confirmed that the resultant bloom was placed on an anvil and hammered into shape for further use. Again, this observation is technically deficient because there is no historical record of iron smelting using coke as fuel in pre-industrial southern Africa. Küsel (1974: 248) describes a similar furnace known as the *Melvillekoppies Type* which resembles a wide mouthed globular pot; it is nearly 1 m in maximum external diameter, and slightly more than 60 cm in depth. The structure has cavities for two tuyères; it is not mentioned where they are placed. From reports it appears that clay pots were used for smelting in northern Nigeria. Some of these early descriptions are suspect because clay pots could refer to the “comparatively squat shafts” (Pole, 1985: 151) and one needs to accurately understand the technical process to distinguish fact from fantasy.

Hatton (1965) and Cooke (1959) describe two bowl type low shaft furnaces they encountered in the Matopo Hills of southern Zimbabwe made by different cultural groups. The two furnace differ in that one made allowances for a small medicine pit, attributed to the Kalanga (Cooke, 1966), while the other associated with the Shona (Cooke, 1959), and was decorated with bosses on the front of the structure representing female features (Bent, 1892, Posselt, 1926, Mackenzie, 1975). Cooke (1959) supplied measurements for this furnace adding that it was round at the base and described it as gourd shaped. It was 1 m high and the opening measured 30 cm at the top of the neck. Women’s features of breasts and tattoo marks were noted by the missionary William Burton in the 1920s amongst the Luba metalworkers in central Africa according to Childs & Dewey (1996: 152, 153) indicating that furnaces showing these features were considered quite rare in Africa “and yet occur in an unexplained diagonal swath from Zimbabwe in the south-east up through southern Zaire and across into northern Angola”.

Amongst the Venda and Lemba cultural groups furnaces have been located in the Limpopo Province in the Venda Hills and at Phalaborwa during the past century (Schwellnus, 1938; Hanisch, 1974; Küsel, 1974; More, 1974; Van der Merwe & Scully, 1971, Miller, Killick & Van der Merwe, 2001). Küsel (1974: 248) describes two types of iron smelting furnaces used in this region. The *Venda Type* describes a cylindrical shaped furnace with three parallel oblong ports for the tuyères. These run from the floor of the furnace to about 10 cm below the upper edge of the furnace. The ports for the tuyères are roughly at an angle of 120° from each other. Between the openings for the tuyères are three supporting walls on the outside of the furnace (Küsel, 1974: 248). This type of furnace is constructed with a medicine pit at its base. The approximate measurements for this type of furnace are about 90 cm in diameter and height (Van der Merwe & Scully, 1991; Miller, Killick & Van der Merwe, 2001). The *Loole Type* of furnace is associated with Phalaborwa. It is bowl-shaped low, shafted, with one tuyère opening. The walls gradually contract towards the top where an opening is created for receiving the charge. This structure, too, is distinguished by a medicine pit at the base (Schwellnus, 1938; Küsel, 1974; Van der Merwe & Scully, 1991, Miller, Killick & Van der Merwe, 2001). This low shafted furnace is closely associated with copper smelting.

The furnaces constructed in smelting camps used in KwaZulu-Natal during this period were different in shape and design. Küsel (1974) reported that the *Natal Type* furnaces are generally found in groups of two or three. Their measurements are 50 cm long, 25 cm wide and 30 cm deep. These furnaces are built without ports for tuyères, which he feels were probably inserted against the inside of the structure with its one opening pointing towards the bottom of the furnace (Küsel, 1974: 248). These furnaces have been described as oval shaped and outlined with a low superstructure of clay around small pits dug in the ground while at Mabhija a cluster of 20 furnaces were uncovered by Maggs (1989; 1992). Delegorgue (1842) an early visitor to Natal, witnessed an iron smelting incident in which he claimed that metal was produced from the local ore which was described as sufficiently rich and plentiful (Maggs, 1992). The oval shape is confirmed by the measurements; 1.8 m long, by 90 cm wide and 90 cm deep, although Delegorgue's (1842) descriptions differs from Küsel's (1974) in noting that the cavities for tuyères are accommodated at the extremities of the furnace and passed underground, two tubes of sundried clay could be seen converging into one 30 cm from the walls of the pit, creating the effect of forcing the compressed air towards the centre of the fireplace (Maggs, 1992: 69). Delegorgue (1842) observed the production of iron was to be intense, as there were three parallel pits contained within the smelting camp that he visited (Maggs, 1992). A decade later Shooter (1857) commented on an iron smelt in Natal by noting that charcoal was assembled close to a hole dug in the ground which would serve as a furnace. He described the tuyères as comprising a short tube of coarse pottery buried, with one end introduced into the furnace, while the other extremity is inserted into a horn and the nozzle of the bellows, in this way the blast is directed under the fire (Shooter, 1857). Over the decade the details of smelting had not altered, while together, the sum of details of iron smelting in Natal supplied by the two commentators is both substantial and useful to researchers.

In central east Zimbabwe, the Njanja metal industries was sustained throughout the 19th and early 20th century AD and was renowned for the thorough application of organisational methods and exploitation of resources to create an organization known all over southern Zimbabwe (Mackenzie, 1975). Early visitors such as Knight-Bruce (1895) and Shimmin (1891) commented favourably on the extensive metal-working enterprises that they encountered (Mackenzie, 1975). Distinctive features of their metal industries that gave the Njanja the edge over other iron metal-workers in the region were taller furnaces, many in continual operation without disruption, the exploitation of superior iron ores, and the use of a large workforce of men and women, including the acknowledgement of those taboos and rituals which were meaningful to the inhabitants of the region (Mackenzie, 1975: Ndoro, 1991). The Njanja's superior technology benefited from the use of enlarged furnaces which were more carefully constructed and tapered more towards the apex than those of other cultural groups in the country (Mackenzie, 1975). The taller furnaces generated a more effective reduction process which was considered an improvement of what had taken place with shorter furnaces (Mackenzie, 1975). The Njanja furnaces were serviced with two sets of bellows, whereas other cultural groups nearby were familiar with and used one set, this too, gave the Njanja an economic edge over their competitors (Mackenzie, 1975). The furnaces were made from clay placed around an earth core, estimated to be one meter high. The dry earth core was removed once the construction was complete. The charge hole at the top was about 20 to 25 cm wide, while at the base there were four ports on one side of the furnace to take the tuyères of two sets of bellows, and on the opposite side an outlet was created to extract the bloom (Mackenzie, 1975).

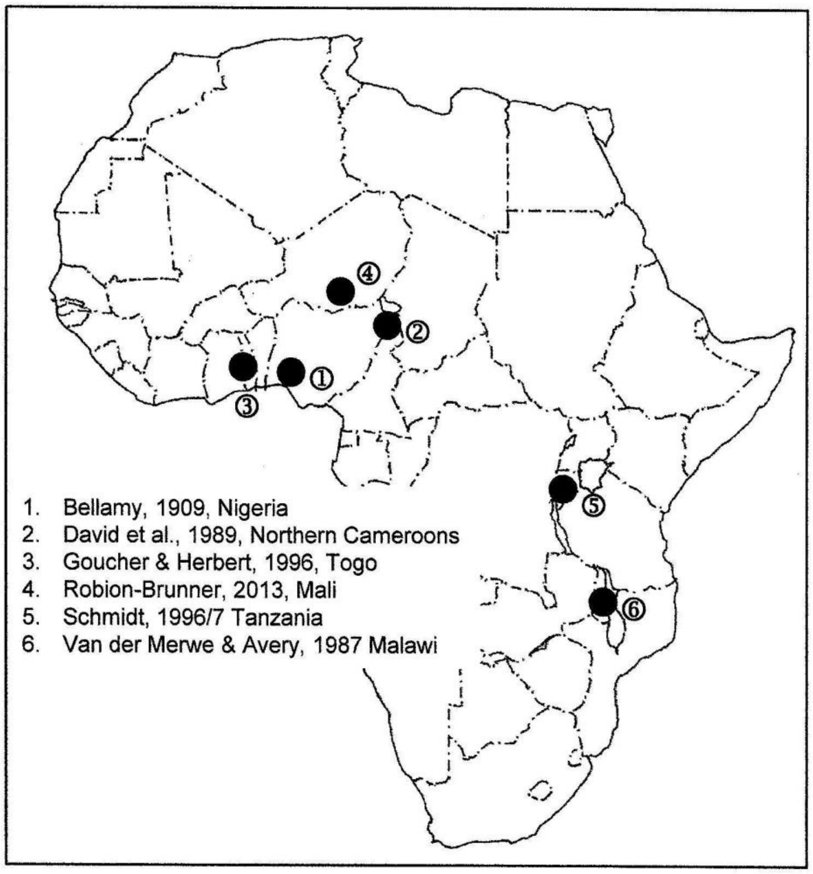


Figure 4.2 Map of smelting sites investigated north of the Zambezi River and south of the Sahara.

In some parts of Zimbabwe and to the north of the Zambezi River taller furnaces have been described by a range of researchers in which the draught was either induced or natural draught employed to produce iron bloom consisting of iron and steel (Stanley, 1938; Robinson, 1961; Prendergast, 1974; 1975; Van der Merwe & Avery, 1987; Ndoro, 1994).

Even taller and more robust furnaces with differing smelting technologies were reported by early visitors to the interior of Africa who noted the activities of many indigenous African metal workers north of the Zambezi, such as Zambia and Malawi stretching as far as the southern borders of the Saharan Desert (Prendergast, 1975; Van der Merwe & Avery, 1987). Childs & Herbert (2005: 284) called attention to "a peculiarly African innovation is the tall shaft furnace that relies on natural draught". This shaft drags air through a number of holes arranged around the base of the furnace thus removing the need for groups of bellow operators (Childs & Herbert, 2005). Recent investigations in Burkina Faso and Cameroon indicate that further advancement have taken place with even taller constructions that of 7 m high, – that once set in operation, required no labour at all during the prolonged smelting period (Childs & Herbert, 2005). The down draught furnace described by David in the 20th century (David et al, 1989: 183) in the Cameroon was fed air through one long tuyère activated by one bellow operator. The advantages from these furnaces were larger quantities of bloom incorporating carbon steel (Childs & Herbert, 2005; 285).

While travelling in Central Africa the explorer Livingstone (1865), supplied information on a tall furnace in operation in which he noticed that no flux was used and that good quality metal was produced (Van der Merwe & Avery, 1987). In the Bassar region of Togo, a German officer, Doering reporting in 1895, mentioned that the intense iron-working activities bore comparisons to those in the Ruhr Valley in Germany, and observed that the working furnaces in Togo could be counted in their hundreds (Goucher & Herbert, 1996). A similar observation was made by Bellamy (1904) commenting on the Oyo community, in Yoruba country, Nigeria, where several booths were erected to shelter furnaces while the metal smiths were involved with smelting.

Bellamy (1904) provided a comprehensive description of the building of a furnace which he called a cupola; a narrow dome shaped structure. While amongst the Oyo, he mentioned the manner, in which the ore was collected, and the methods used by women and children to treat and cleanse it. The relevant details of furnace construction are included in Bellamy's (1904) description, providing material scientists and archaeologists adequate data for analysis in comparison with many ethnographical descriptions that omitted relevant and valuable information (Methuen, 1846; Carnegie, 1894; Read, 1909; Hambly, 1934; Van Tonder, 1996).

The furnace Bellamy (1904) describes was made of clay. The diameter of the structure was 2.10 to 2.25 m; the height from floor level to the apex of the dome was ca. 1.23 m. On the eastern side an entrance was made into the furnace, the sill of which was about 30 cm below the floor, and an irregular-shaped depression scooped out. This was estimated to be 120 cm long and 110 cm wide. The door way into the furnaces occupies about a fourth part of the circumference of the structure, while around the remaining three-fourths were seven rough ports measuring 30 cm each way, alternating with six openings through the walls of the furnace. Each of them was 45 cm high and nine tapered to 15 cm in width. The openings slope towards the base of the furnace (Bellamy, 1904).

Viewed from the exterior the furnace was egg-shaped. The apex of the furnace was rounded up on the outside slightly and measured about 1.05 m to 1.13 m across; a circular chimney hole was created in the centre of the dome measuring 23.0 cm in diameter. Below the curve of the dome a rope of creepers bound the structure to prevent it from cracking and splitting (Bellamy, 1909). The interior height of the furnace was about 1.55 m, while the interior diameter was about 75.0 cm. In order to prepare for a successful smelt three pairs of ceramic pipes were placed in positions in the cavities prepared for them packed about with charcoal, and sealed with clay. The closing of the openings and confining the inward flow of air to the pipes resulted in a more vigorous heat flow (Bellamy, 1904).

The report prepared by David (David et al, 1989: 183) on the Mafa metallurgical practicing community near Mokolo in the Mandara highlands of north Cameroon, indicated that down draught furnaces were constructed producing cast iron in addition to steel and low-carbon iron. In producing this material the single tuyère was described as a critical component in an indirect iron-smelting process is described in which cast iron was produced and subsequently decarburised to steel in a forge.

David et al., (1989: 186) states that the metal workers of the Mandara highlands and wider environments of Nigeria were known for a rare feature: “air is blown into the smelting furnace from the top through a long vertical tuyère”. Killick (1991) reported that the tuyère was ca. 144 cm long, and weighted 21 kg see Figure 4.3. The line drawing in Figure 4.3 shows a cross section from front to back in the hill side or platform, and indicates the component parts especially the long tuyère in place. Above the structure there is a seat for the bellows operator, and a shield on the left to protect him from the heat. The long narrow cavity shows the single tuyère in place, and the charge hole on the extreme right indicates the amount of charge necessary to produce a suitable quantity of bloom.

The shaft was about 30 cm across, 30 cm deep and 1.62 m tall, and was built up in sections consisting of dry stone walling, a segment of courses of stone alternating with clay, and the top section with coils of clay. In assembling the shaft interior numerous clay coatings were applied, some of which included crushed plants which were believed to have magical powers. In preparing for the smelt the shaft opening was sealed with a thin clay wall that was supported by thin sticks. During the sealing process charcoal was packed around the tuyère, while during the smelt charcoal and iron were poured into the shaft through the chimney above (David et al., 1989: 188).

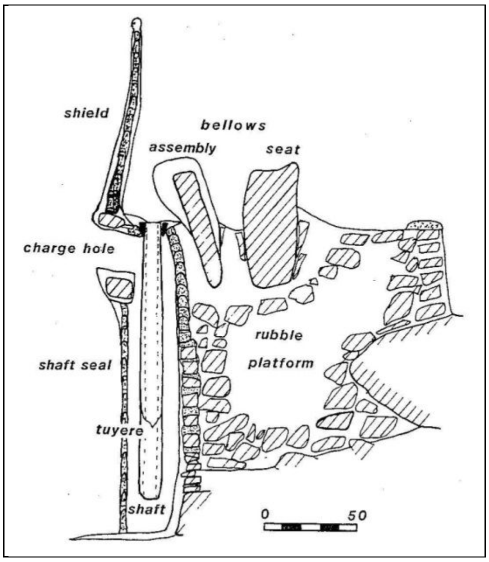


Figure 4.3 The line drawing shows a cross-section of the furnace in Mafa showing details of construction to achieve a down draught for smelting purposes (Killick, 1991: 53, citing Nicholas David, 1989).

Killick (1991) noted that in 1986, the charge emptied into the furnace was a ratio of fuel to ore at 4.5: 1, and that the metal produced was approximately 40% cast iron and 60% small fragments of bloom. The resultant bloom from this furnace was then crushed and placed into shallow open crucibles in an oxidising zone for the forge tuyère for 20 minutes (Killick, 1991). This process converted the cast iron to steel, since the final achievement was forged into a hoe head (Killick, 1991: 52).

Amongst the Banjeli of Bassar, Togo, Goucher & Herbert (1996) observed a smelt which was arranged so that they could monitor the efficacy of a tall shafted furnace which had its origins in the 12th century AD. The researchers witnessed the building of the future furnace which was erected away from the residential areas. They recorded that a shallow circular trench was dug which became the base and defined the perimeter of the new structure in which medicines were combined (Goucher & Herbert, 1996). The furnace was constructed with grass mixed into the clay and formed into briquettes which were placed alongside each other. The complete structure formed a cylindrical shape which narrowed towards the top and measured between 2.5 and 3 m high. The furnaces of Banjeli relied on natural draught. The air entered through cavities arranged evenly at the base, including a few in the walled-up orifice (Goucher & Herbert, 1996: 46). While the smelt progressed hot gases inside the furnace increased, drawing a constant supply of cooler air from outside (Goucher & Herbert, 1996). These authors do not describe this type of furnace as fuel efficient, its advantage lay in the extent to which the process needed less manpower as one smelter could adjust the flow of air according to the progress of the smelt (Goucher & Herbert, 1996).

Tall furnaces producing iron and steel in a similar manner have been reported from the Dogon area of Mali (Robion-Brunner et al., 2013). Six communities involved with metallurgical traditions, linked with furnace morphology were investigated by these researches for their similarities and differences in achieving iron bloom for local use or trade. It was noticed that the morphology of the furnaces was variable with cylindrical, tapered and dome-shafts being described, leading to the conclusion that there were and are cultural choices which reflected the identity of the producers (Robion-Brunner et al., 2013). The report indicated that all the metallurgical traditions of this region were reflected by low- temperature, and natural draught bloomery. The construction of the furnaces of the six communities exhibited different traditions which confirmed a high degree of architectural diversity. The furnaces built in the 20th century AD built amongst the Fiko, of the Bandiagara Plateau, showed a horse shoe shaped shaft, with a superstructure constructed with sandy slag, reused tuyères and clay. The internal volume reached between 3 and 4 m (Robin- Brunner et al., 2013: 260). The indigenous metal workers of this area of Mali showed ingenuity in the building of the bloomery structures. A common feature throughout was a pit, which was mostly circular, including a door to extract the slag and raw iron. The differences in the furnace construction were measured in degree, as all furnaces had an opening, while some exhibited peepholes. The report emphasises that iron bloomery was produced in large quantities while more relevant information, was the amount of waste produced in the smelting process (Robin-Brunner et al., 2013).

The archaeo-metallurgists Schmidt (1996, 1997), Childs (1996/7), and Schmidt & Avery (1987), have concentrated on assessing the value of preheated air funneled into furnaces by the Haya of Tanzania, investigated in the later part of the 20th century AD, in their achievement of nodules of high grade steel amongst iron in the slag. The processes of smelting amongst the early generation of this cultural group showed little in common with the initial smelting techniques practised by the West African cultural groups of Niger and Nigeria or known from the Zaire Basin (Kense, 1985). By consulting and working with elderly master metal workers from the Kagera Region of Tanzania, Schmidt (1997) reconstructed a fresh furnace in the last decade of the 20th century AD, in order to test the theory of preheated air used by earlier metal workers in raising the temperatures during a smelting procedure. The focus of the study was to establish whether the preheating of the air blast had been a prominent feature of Early Iron Age smelting in Africa (Schmidt, 1997).

Towards the end of the last century investigations were conducted in Malawi by archaeo-metallurgists in order to examine the two phase smelting process using two differently structured furnaces for producing iron bloom (Van der Merwe & Avery, 1987). The investigations were based amongst two cultural groups of Malawians situated in central (Phoka) and northern (Chulu). Master smelters from each group were called upon to reconstruct the kind of furnaces their ancestors operated to acquire bloom for manufacturing tools (Van der Merwe & Avery, 1987). The primary tall furnace, *ng'anjo*, see Figure 4.4, was operated by natural draught and produced incomplete melted spongy slag with smaller pieces of iron nodules in it. The product, once cooled, was resmelted in a smaller secondary furnace which used forced draught aided with bellows and produced a solid portion of iron which contained some slag amongst the iron bloom (Van der Merwe & Avery, 1987). The authors (Van der Merwe & Avery, 1987) noted that the furnaces of the two groups differed in details of shape, size and operating characteristics, indicating that the draught and the potential temperatures of the smelting process remain the same.

The illustration in Figure 4.4 shows a tall natural draught furnace ca. 2.3 m in height being charged through the top funnel by a group of smelters. The diameter of the construction was 1.5 m. The furnace, shows a two chambered structure of which the upper compartment was twice the size of the lower one with the internal construction assist in the support of the weight of the charge in the chimney. It was calculated by Killick (1991) that the above furnace consumed roughly 1445 kg of fuel, and 75 kg of laterite, for a smelt that lasted 114 hours. He mentions that furnaces in Malawi could be as high as 3.0 to 3.5 m and took about five days to produce a bloom of about 20-30 kg (Killick, 1991: 50). In conclusion (Killick, 1991) it was estimated that the natural draught furnaces consumed more fuel than a forced draught furnace and that there was no clear advantage of natural over forced draught smelting.

Figure 4.4 The illustration shows the *Ng'anjo,* or induced draught furnace at Kasungo, Malawi, 1983 (Killick, 1991: 50).

For the second phase of the smelting process a smaller furnace was constructed. The shapes of the furnaces of the respective cultural groups differed one was cylindrical (*chiramba* built by the Chulu, where four bellows were used) and the other was beehive in shape (*kathengu* built by the Phoka, where two bellows were used). Both furnaces were between 0.57 m high, the former had four tuyère ports, while the other was oval in shape and 0.4 m in width and height and had two tuyère ports. The Phoka metal smiths demonstrated a final procedure in a *kathengu* furnace in the course of which they crushed sintered sponge taking choice pieces to re-smelt in order to produce usable lumps of iron (Van der Merwe & Avery, 1987).

4.5: ETHNO-HISTORICAL REPORTS ON FORGING AND SMITHING IN THE 19TH CENTURY

There are many 19th century ethno-graphical reports on smithing from visitors to the region who observed the manufacture of utilitarian and non-utilitarian objects (Campbell, 1822; Burchell, 1953; Moffat, 1845; Hambly, 1934; Larson, 1975). The technology used for making small items at a smithing site, such as domestic tools and ornaments is juxtaposed against that used for larger objects such as knives, axes and spears for daily use as compared with those made for ceremonial occasions (Campbell, 1822; Burchell, 1953; Baines, 1845; Moffat, 1845; Galton, 1851; Knight-Bruce, 1895; Junod, 1927; Stayt, 1931, Shaw, 1938, Shaw & Van Warmelo, 1974; Larson, 1975; Maggs, 1986, 1992; Childs, 1991a/c). The production of certain objects, required by a community in large quantities such as iron weapons for conflict, led to specialisation in the manufacture of these objects. Metal smiths who worked with copper and brass, especially those associated with the kings amongst the Zulu, and including other cultural groups such as the Xhosa were considered to be of a superior class to those who worked with iron (Shaw & Van Warmelo, 1974; Childs, 1991a; Maggs, 1992; Roodt, 1993)

The smith's tools in the 19th century AD consisted of bellows, hammers of stone and iron, a stone anvil, cutting and punching tools; awls and chisels, and crucibles of sandstone or ceramic material, while some works-shops had iron tongs and perhaps a file. This has been summarised in Table 4.1 which shows that most cultural groups possessed a rudimentary collection of tools while some groups enjoyed a wider range of tools (Moffat, 1842; McLaren, 1918; Stayt, 1934; Hambly, 1934; Cooke, 1959; 1966; Shaw & Van Warmelo, 1974; Davison, 1984; Miller, 2002). Amongst a few cultural groups in southern Africa the draw plate was used, notably among the Venda, Lemba and Sotho/Tswana, where Moffat (1842) was encouraged to make one for a copper smith in Kurrichane (Casalis, 1965; Maggs, 1976; Shaw, 1974; Van Schalkwyk, 1982; Davison, 1984; Friede & Steel, 1975).

Ethno-graphic reports of the actual smith's processes were provided by Casalis (1965), Hambly (1934), Franklin (1945), Maggs (1992) and Shaw & Van Warmelo (1975). The descriptions of forge or smithing places amongst a variety of cultural groups bear strong similarity to one another throughout southern Africa. Figure 4.5 portrays a metal smith at work with his junior assistant pumping the bag-bellows. The paucity of tools is noted in the illustration. Some ethnologists have observed that booths were built for protection against the sun (Read, 1902, Bellamy, 1909, Hambly, 1934; Ellert, 1984).

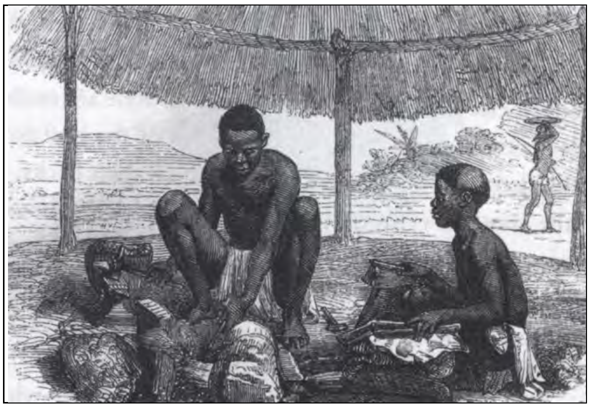


Figure 4.5 Smithing taking place at a small scale metal smith's workshop aided by the metal smith's assistant operating leather bellows near Lake Shirwa, southern Malawi. (Livingstone's African Journal, Livingstone, D. & C. 1963:103)

Amongst the Ovimbundu of Angola, Hambly (1934) noted that the forge was placed within a shelter under which a pit 26 cm deep was created and filled with charcoal. Around this cavity were three stone seats for workers, two operate bowl-bellows, and, while a detailed report on the metal-smiths activities are omitted, there is a detailed inventory of the tools that the metal smith was making, including the ceremonial hammer (Hambly, 1934) which was particular to this region. Hambley's (1934) report is corroborated by Read (1902), who mentions the symbolism attached to this object and the ceremonial event that accompanied the graduation of an apprentice to the status of professional metal worker (Ellenberger, 1912). Casalis's (1965) report on a South Sotho metal smith at work is more detailed. The smithing site consists of a hearth placed between two low protective walls. The apprentice manipulates two long bag-bellows which end in a horn tube, to maintain the heat in the fireplace. An inventory of manufactured objects follows without a description of the details of the smithing activity except for a reference to the decoration of some objects with chasing. Casalis (1965: 132) adds that the Southern Sotho work in copper, and are expert at fine drawing wire although the group's uses for it are not described.

Shaw & Van Warmelo (1974) describe how the 20th century Xhosa forge was created from an anthill or from a small mound of clay, measuring about 60 cm high, which had been cut straight down one side. From the outer side a tunnel was created to reach the fireplace. The nozzles of the active bellows were linked to the hearth to maintain the temperature (Shaw & Van Warmelo, 1974). In the same area a different type of forge was described by Döhne (1837) as a little round hill 60 cm by 45 cm, was concave and equipped with two holes. A feature of Xhosa smelting lore, according to Döhne (reporting in 1837) was that the metal workers would cover pieces of iron with clay prior to replacing them in the hearth, to "prevent it from burning" especially when welding was considered (Shaw & Van Warmelo, 1974: 125).

Whilst residing in KwaZulu-Natal, Dedekind (1929) visited Hloma Mathonsi, a renowned metal smith, and wrote an account of his experience at the metal smith's forge (Maggs, 1992). The tools used by this metal smith bear similarity to those utilised elsewhere in southern Africa, goat skin bellows, horns to providing a conduit into the ceramic tuyères to feed the hearth, charcoal made of hardwoods, a rock anvil, a homemade iron hammer and a hollow rock containing water to temper the objects (Maggs, 1992). In this context the activity of forging commenced with the hot iron retrieved from the fire and beaten on the anvil. The activity was repeated until the desired shape was achieved, and finally the object was sharpened and polished with suitable stones (Maggs, 1992). While travelling in the KwaZulu-Natal country side Mason (1855) described an unusual encounter with indigenous smiths surrounding a hearth and anvil where there was a lack of bellows. He noticed that a group of twelve metal workers each held a moderate sized (1.5 kg mass) pebble (or stone) to use as a hammer. "The whole party then commenced blowing on the fire with their mouths, six at a time, alternatively, until they had brought the iron to a bright glowing heat" (Mason, 1855 : 164). Thereafter the hot iron was placed at the other end of the anvil, where a metal worker secured it and the rest kept up an incessant hammering until the iron grew cold and the process was repeated (Mason, 1855).

The melting, forging, and smithing of imported brass in Natal in the early 19th century is described by both by Gardener (1836) and Fynn, an English traveller and trader (quoted in Stuart & Malcolm, 1950). Gardener described the event taking place around a hearth created in a hollow in the soil and fed by two bag-bellows pumping air into the embers through eland's horns. A crucible containing brass was placed within the fire and held there until molten. It was then poured into moulds for bars for creating throat rings and bangles. Smaller moulds were used for knobs and studs (Gardener, 1836: 105; Shooter, 1857). Fynn (Stuart & Malcolm, 1959: 273) reports that brass smiths used sandstone crucibles which held sufficient heat to melt brass. Some moulds for beads were made with cow-dung placed in a circle on an aloe leaf, in the centre of this mould a splinter of wood was placed to form a hole by which the beads were strung. The melted brass is then poured in, leaving them in a rough shapes, after which they were beaten with a hammer and brought to the desired form (Stuart & Malcolm, 1950: 273). The neck-rings are formed by casting them into cow-dung channels on the anvil stone which is of a gritty nature or in sandstone moulds (Parkington & Cronin, 1979). The brass objects are treated by filing them with abrasive stones and polishing them with cow-dung (Stuart & Malcolm, 1950: 273) (Figure 6.18, 6.19) for examples of neck-rings cast in (what could be) cow-dung, and the other identified by rough filing).

Smithing of copper amongst the Venda / Lemba and Tonga is described by Junod (1908) and Stayt (1931). In north-eastern, South Africa in the 20th century the Venda / Lemba were known to use iron draw-plates (*magogo*) and sturdy tongs (*ngwenya*) to produce fine wire from copper (Junod, 1909; Stayt, 1931; Shaw, 1974; Van Schalkwyk, 1982; Steel, 1974; Davison, 1984). Stayt (1931) attests that in the melting copper, lead obtained in the early days from the Portuguese, was added to the copper, to alter the colour and assist in the drawing process. Later in time, Stayt (1931) adds, that solder was used for the same purpose. Junod describes the sequence of the copper rod "*ritsondjolo*" being sold to the Lemba who converted it into fine wire to make bracelets (*busenga*) with which they traded to support themselves (Junod, 1908:279). For a brief description of *musuku* and *lerale* and their distribution in the region see Table 4.2, and 4.3. Stayt (1931: 65) reports that in the manufacture of beads an attempt at uniform size was achieved by using a device; described as a small iron staple with two lines engraved across the face, it was used for cutting copper wire into uniform short lengths for making large copper studs on bracelets. This is one record in the ethnographic accounts describing attempts at standardisation in the bead making industry another record is of the endeavour at producing standard gauges of wire for wire-wound bracelets by using the draw-plate and tongs.

4.6: ETHNO-HISTORICAL CONTRIBUTIONS TO THE OBJECTS MADE IN THE 19th AND 20th CENTURY

The ethno-historical literature describing metal objects made by indigenous metal smiths from various cultural groups in southern Africa is more comprehensive than that describing their manufacture by smelting and smithing processes (Campbell, 1822; Gardener, 1835; Ellenberger, 1912; Junod, 1927; Stayt, 1931; Hambly, 1934; Burchell, 1953; Van Tonder, 1966; Shaw and Van Warmelo, 1974; Larson, 1975; Davison, 1984). The objects made from iron, copper and its alloy brass, as was described in the previous chapter, can be divided into two groups, utilitarian and non-utilitarian objects. The utilitarian objects embrace hoes, knives, spears, and axes, made for daily use including for hunting and combat. While non-utilitarian objects incorporate ornaments of a wide range in type and size, for both men and women, and ceremonial objects, knives, spears, axes, and hammers to be used in a variety of circumstances (Campbell, 1822; Ellenberger, 1912; McLaren, 1918; Stayt, 1931; Hambly, 1934; Burchell, 1953; Van Tonder, 1966; Hatton, 1967; Larson, 1975; Dewey, 1994).

4.7.1: THE MANUFACTURE OF CELEBRATORY OBJECTS FOR COMMEMORATIVE EVENTS

Several ethnographers in the course of the past one and a half centuries have referred to the use and the fabrication of ceremonial or expressive objects in terms of their symbolic value amongst selected cultural groups (Read, 1902; Hambly, 1934; Shaw, 1938, Childs, 1991a/b, Childs & Dewey, 1996). According to these ethnographers some ceremonial objects, such as the knife and axe were venerated amongst the Shona cultural groups (Dewey, 1986, 1997, Childs & Dewey, 1996). Other cultural groups such as the Ovambo, Ovimbundu and Ondulu revered other objects such as specifically manufactured copper knives in northern Namibia and hammers in southern Angola (Shaw, 1938; Read, 1902; Ellenberger, 1912; Hambly, 1937) and including ceremonial spears amongst the Mpukushu of Okavangoland (Van Tonder, 1966). A spear known as *mufumbu* was used only during special ceremonies by the chief when the ritual occasion demanded the display of greatness. It was used in performances when the chief danced at a special event known as the *rufumbue* signifying the importance of the cultural group and the chief's fighting spirit (Van Tonder, 1966: 258).

There is reference to the fabrication of a heavy iron hammer known as *osoma* made amongst the Ondulu for celebrating the graduation of an apprentice into a fully-fledged metal smith. The sledge-hammer; the *onjundo* was accepted by the group as the object which “feeds the people”, the analogy being that it makes the hoes which is the vital tool in agriculture (Hambly, 1934: 160). This hammer is revered in a similar manner to that of revering a chief. Hambly (1934) confirms the symbolic and intrinsic value of an *onjundo*, as being the most sacred of tools, measuring 12.5 cm and having the value equivalent to an ox. The author confirms that among the Ovimbundu small axes, used in ceremonial dances had well-made blades decorated with punched designs in the form of decorated patterns. Shaw (1938) described a short ceremonial copper knife made amongst the Ovambo for the chief including some made for presentation purposes. Figure 4.7 portrays the short copper knife placed within a wide semi-circular copper sheath decorated with twisted rectangular wire. The full length from the top of the haft to the base of the sheath is about 19 cm, while the length of the blade and handle is ca. 14.0 cm. The base of the sheath is 26.5 cm wide. The ethnographic literature mentions that the chief employed these objects as “a sort of king’s signet” (Shaw, 1938: 254, Zirngibl, 1983).

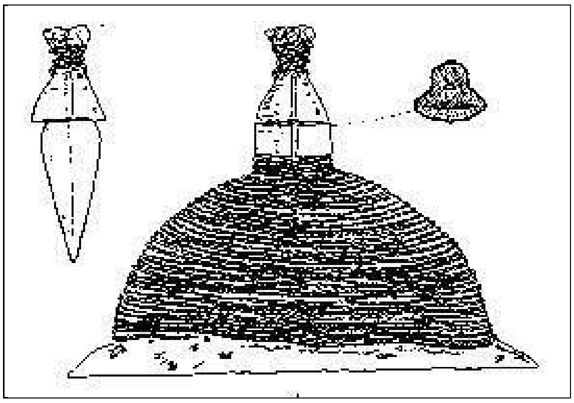


Figure 4.6 The illustration shows the short copper knife in its wide copper wire decorated sheath, known as the “king’s signet”. The significance of the knife is that the holder was a representative of the king and whatever request were made the holder could expect full cooperation amongst the various cultural groups amongst the Ovambo. Its full length is 19.0 cm. (Shaw, 1938: Plate LXXVI: 1)

According to Dewey (1986, 1997) ceremonial knives were being produced at the time of his research in Zimbabwe, if not to replace those representing ancestors, then to create one for immediately deceased family members. Dewey (1986, 1994, 1997) mentioned that a new style of ceremonial knife has evolved within the last half of the 20th century which resembles the Russian AK-47 rifles the guerrillas used during the war. The blade has the typical double edge and ogee midrib and the copper wire ornamentation is added to the sheath which marks it as a ritual item (Dewey & Mvenge, 1997: 205).

Amongst the Nguni groups of south-eastern Africa the Northern Nguni utilised special axes for their ceremonial value and these were carried by men of status at selected events. The *nhlendla* is a form of battle-axe which has its tang inserted into the end of the staff, and not at right angles to it as noted in other axes (Maggs, 1993). The significance of the steel blade itself is that it is bow shaped and shares similarities with the cattle horns and thus to cattle which carried symbolic and spiritual importance, and is equally the mainstay for the cultural group's economy (Maggs, 1993). Maggs (1993) confirms that amongst the Zulu cultural group this object has symbolic values and by rights should be carried only by the Zulu king at ceremonial events.

A number of researches discuss the value of the *musuku*, described as a 'top-hat' and the lerale described as a 'golf-club', being produced at Messina and Phalaborwa in the Limpopo Province respectively, while as yet none of these objects have been found in archaeological context of any kind (Dicke, 1926; Thompson, 1945, 1954; Steel, 1974; Herbert, 1984; Friede, 1980; Mason, 1986; Killick, 1991a; Miller & Van der Merwe; 1994; Miller, 1995; Miller, Killick & Van der Merwe, 2001) (Tables 4.2 and 4.3). The presence and symbolic and economic significance of *musuku* are mentioned by several authors with negligible reference to weight and size.

Table 4.2 The distribution of copper *musuku* found in north eastern South Africa sourced from literary records.

Author, date	Height, cm	Width, cm	Breadth cm	No of studs	Other information
Dicke, 1929	No details				Illustrations
Stayt, 1931	10.0	9.0	8.5	7, 8, 9, 8.	4 rows of studs, 2.0 cm long
Van Warmelo, 1940	No details				Illustrations
Thompson, 1945	Analysis of 5 specimens			13 15 28 38 40	Weight kg 1,41 1.59 3.14 4.68 4.50
Steel, 1974	Illustration; no information on sizes				
Herbert, 1984	Repeats Stayt's and Thompsons' information				
Miller, Killick, & Van der Merwe, 1994	No details				
Miller, 1995	No details				
Bisson, 2000	No details				
Childs & Herbert, 2005	No details				
Swan, 2007	No details				

Table 4.3 The distribution of copper *marale* found in north eastern South Africa sourced from literary records.

Author, date	Metal	Length cm.	Width (circum-ference) mm	Mass, g	Locality
Haddon, 1908	Copper	49.0	13.0	900	Phalaborwa
Hemsworth, 1908	No details				
Junod, 1928	Copper	46.0	11.0		Phalaborwa
Lindblom, 1928	Copper Copper	49.9 49.0	11.0 – 13.0 13.0	900	Leydsdorp Limpopo Province

Author, date	Metal	Length cm.	Width (circum-ference) mm	Mass, g	Locality
Trevor, 1930	Copper	No details		Ca. 600	100 specimens
Thompson, 1947	Copper Copper	45.0 45.0	50.0 48.0	800 620	Makudzi River Phalaborwa
Hanisch, 1974	Copper	50.0			Phalaborwa
More, 1974	Copper	Ca. 45.0			
Friede, 1980	Copper Copper	46.5 46.0	12.8 to 13.0 13.8 to 15.0	852 1093	Zoutpansberg Pilgrim' Rest
Ackerman, 1983	Copper	51.0			Phalaborwa, 7 specimens
Herbert, 1984	Copper				Repeats Haddon's details
Killick, 1991	Tin	45.0	55.0	510	Messina area
Van der Merwe, & Scully, 1991	Copper				No details
Miller, & Van der Merwe, 1994					No details
Miller, 1995	Copper				No details
Bisson, 2000	Copper				Repeats Lindblom's details
Miller, Killick, & Van der Merwe, 2001	Copper	45.0			Phalaborwa district, 5 specimens

4.7.2: THE MANUFACTURE OF KNIVES FOR GENERAL USE

Ethno-graphical accounts of a number of visitors to southern Africa comment on the variety of knives made by specialist metal smiths for the communities they lived amongst (Wikar, 1779; Campbell, 1822; Burchell, 1953; Moffat, 1844; McLaren, 1918; Junod, 1927; Stayt, 1931; Shaw, 1938; Hambly, 1934; Casalis, 1965; Van Tonder, 1966; Hatton, 1967; Larson,1975; Davison, 1984; Ellert, 1984; Dewey, 1986, 1994) (see Appendix 3, 3a). Distinctive knives with their sheaths were the most significant objects made by the Ovambo (Shaw 1938). These items were restricted to a comparatively small area in the north-western regions of Namibia and Botswana (Shaw, 1938). The knife blades were manufactured from iron while the sheaths and / or scabbards for utilitarian use were of wood and metal (Galton, 1851; Shaw, 1938). An account of the long dagger knife describes a long two edged blade, which could measure between 20 to 75 cm set into a sheath with a narrow aperture on one side stretching from top to base and revealing the blade within (Shaw, 1938). The scabbard itself was distinctive as the wooden object was carved to allow a form representing cow- horns at the lower end. In southern Angola, the utilitarian knife described by Hambly (1934) bears unusual characteristics which define the locality in which it was made. These knives vary in length from 48 to 73 cm with a breadth across the scabbard of 5.0 to 7.0 cm. The general cross-section of the scabbard is a well-balanced ellipse. These scabbards, too, show a cavity carved in such a manner to display the tapering blade (Shaw, 1938). The two edged blade is tanged, which extends the whole length of the handle and is slightly visible, or bent over and beaten down at the apex.

Although a number of ethnologists mention that knives are amongst the objects produced by cultural groups (see Appendix 3) not all describe their manufacture in detail. Junod,

(1927) describes the knives made by the Venda as resembling a sword, while Stayt (1931) suggests that their shape is that of a small spear head and are about 15 cm long, with a tang just long enough for a handle grip, and bent over to form a ring. A cord through the ring enabled the wearer to display the object around his neck (Stayt, 1931). The decoration of the sheath is described by Junod (1927), like others elsewhere, as being made from two pieces of wood and fastened together with braided iron wire. Similar information on the structure of the knife is provided by Wikar (1779), Campbell (1822, Burchell (1953), Moffat (1844) and Casalis (1965) amongst the cultural groups in central southern Africa, while McLaren (1918) confirms related information for the Xhosa. The knives from central southern African were generally double-bladed they were triangular in shape and tapered to a point. The blades were fixed into a short wooden handles and decorated with carved ivory. The sheaths were made with two slips of wood, sometimes decorated with ivory (Campbell, 1844; Moffat, 1842; Burchell, 1953; Casalis, 1965).

The Shona cultural group made distinctive knives which were commented upon by visitors to the region such as Blennerhassett & Sleeman (1893: 302) who noted that the wire works on these knives was "well-done". Ellert (1984) presents a description of knives, swords and daggers manufactured by the Shona. The iron blade (*bakatwa*) was beaten out from a central ridge so that one cutting edge was slightly higher than the opposite edge, and was generally 43.0 to 100.0 cm long. The blade was set into a wooden handle (Ellert, 1984). A smaller and similar version of this knife was the sheath knife (*banga*) with a single edged blade and secured in a double sided wooden scabbard virtually identical to the large *bakatwa* without the wooden carving, (Ellert, 1984)

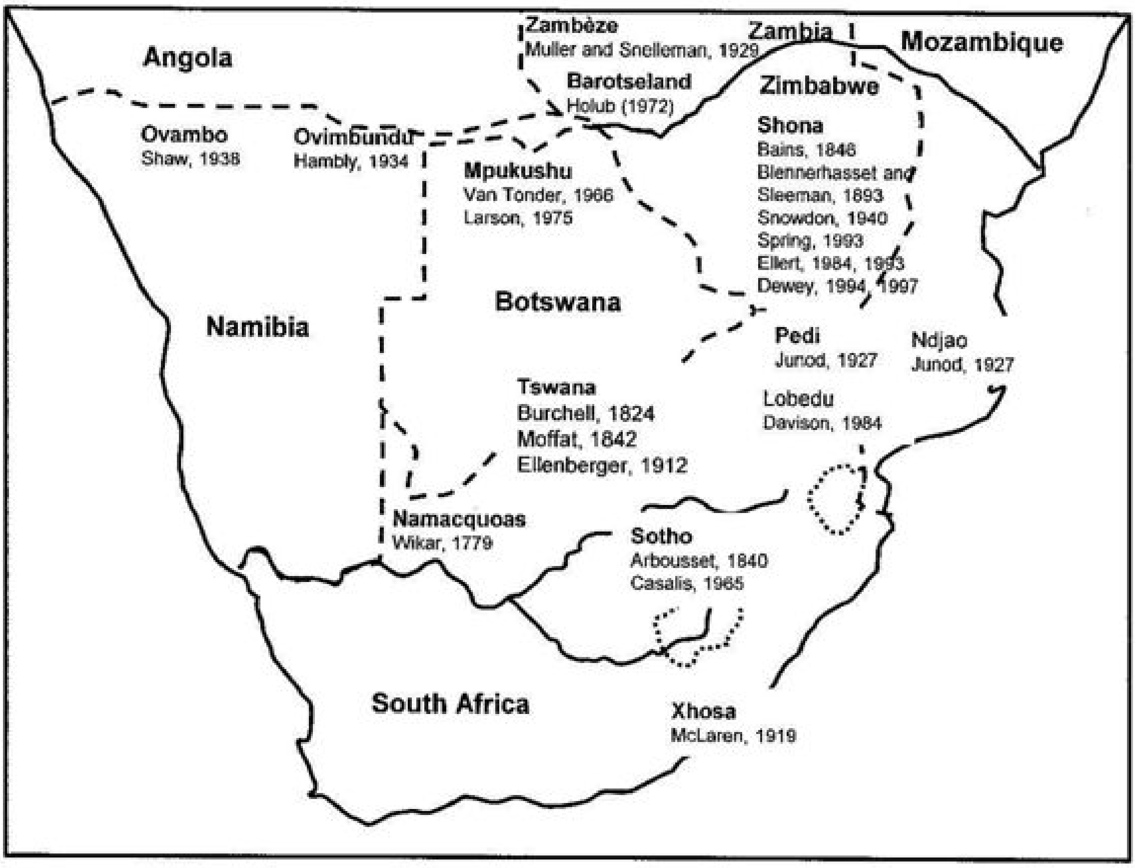


Figure 4.7 A map showing the distribution of knives made by various cultural groups in southern Africa. Information gathered from literary data.

Table 4.4 Information on knives from a variety of cultural groups who made them for utilitarian and ceremonial use sourced from literature (Period19th century).

Author, date	Cultural group	Blade width cm	Blade length cm	Sheath length cm	Materials / decoration
Wikar, 1779	Tswana	No measurements			No information
Campbell, 1822	Tswana				No information
Burchell, 1824	Tswana	No measurements			No information
Methuen, 1846	Tswana				No information
Lichtenstein, 1928	Botswana	No information			Wooden sheaths
Moffat, 1842	Tswana		15.0		Wire work on sheath
Blennerhasset & Sleeman, 1893	Shona	No measurements			Wire decoration on handle
Read, 1902	Ovambo				
Ellenberger, 1912	S. Sotho				
McLaren, 1918	Xhosa	No measurements			Carried in a sheath
Muller & Snelleman, 1926 (a)	Zambezi	3.3	48.0	14.0	Handle: brass wire binding
	Zambezi	3.0	38.0	14.5	Handle: brass wire binding
	Zambezi	3.0	38.0	13.0	Handle: brass wire binding
	Zambezi	2.5	28.0	14.0	Handle: brass wire binding
	Zambezi	2.5	38.0	16.0	Handle: brass wire binding
	Zambezi	1.5	37.5	15.0	Handle: brass wire binding
	Zambezi	2.1	33.5	15.0	Handle: brass wire binding
	Zambezi	2.0	28.3	15.7	Handle: brass wire binding
	Zambezi	2.5	41.5	26.0	Handle: brass wire binding
	Zambezi	2.8	14.5	15.0	Brass wire binding
	Zambezi	4.0	29.5	33.0	Brass wire binding
	Zambezi	3.8	22.0	23.5	Brass wire binding
	Zambezi	3.0	16.5	17.5	Brass wire binding
	Zambezi	2.4	11.5	12.5	Brass wire binding
	Zambezi	1.5	6.0	6.8	Brass wire binding
	Zambezi	1.0	5.4	5.8	Brass wire binding

Author, date	Cultural group	Blade width cm	Blade length cm	Sheath length cm	Materials / decoration
	Zambezi	3.0	22/23.5	16.5	Double sheath, brass wire binding
Miller and Snelleman, 1926	Zambezi	1.8	56.5	59.5	Entirely bound with brass wire
Junod, 1927	Venda				'Kind of sword'
Hahn, 1928 Vedder, 1928	Ovambo Berg Damarar, Namibia	No measurements			
Stayt, 1931	Venda		15.0		Tang bent to form a ring for carrying purposes
Hambly, 1937	Ovambo			48.0 to 73 .0	Scabbard width: 5.0 to 7.0 cm
Shaw, 1938	Ovambo (short knife) Long knives		14.0 20.0 to75.0	19.0	Width of sheath: 26.5 cm Copper twisted rectangular wire Wooden scabbard
Hemans, 1945	Ndebele	No measurements			Decorated wooden sheath
Casalis, 1965	S. Sotho				Wooden sheaths
Van Tonder, 1966	Mpukushu				
Hatton, 1967	Shona / Ndebele	No information			
Larson, 1975	Mpukushu				
Snowden, 1940	Shona(a) Shona (b) Shona (c) Shona (d)	4.0 4.0 1.2 3.0	31.0 36.0 46.0 30.5	45.0 47.0 50.0 45.0	Wire and carving Wire and carving Wire with carving Wire and carving
Van Tonder, 1966	Mpukushu				No details
Mackenzie, 1975	Shona				No details
Davison, 1984	Lobedu		15.0	No sheath	
Ellert, 1984	Shona (bakatwa) Shona	3.0	3.0	18.0 43.0 to 100.0	
Dewey, 1986, 1997 (b)	Shona (*chisvo*) Shona (*bakatwa*) Shona (bakatwa) Shona Shona (AK-47)	 3.5 3,4		16.0 16.0 14.5 28.3 92.0	Bands of wire binding Binding wire throughout Bands of brass wire Binding of brass wire Copper wire binding
Spring, 1993	Shona (bakatwa) Shona (bakatwa)			71.0	Brass wire binding Brass wire binding, plus geometric carving

The Table 4.4: shows that the appearance of knives made of iron were more prevalent in the areas noted for the high summer rainfall or savannah region. Public and private collections have published information gathered from ethnologists showing that the majority of knives were made by the Shona and cultural groups to the north of the Limpopo River. Their measurements illustrate that there is uniformity in the widths of blades which range 1.0 to 5.0 cm. The blade lengths ranged from 5.4 to 56.6 cm. The sheaths, were made from wood and were decorated with wire; brass wire which was more frequently noted than copper. The length of sheaths varied from 5.8 to 100.0 cm. Some were reported to be decorated with carving.

4.7.3: THE MANUFACTURE OF SPEARS FOR GENERAL USE

The ethnographical information on spears is as extensive as it is for knives, which were made for hunting and combat throughout sub-Saharan Africa (Campbell, 1822; Burchell, 1953; Fynn, 1825 (Stuart & Malcolm, 1959); Gardener, 1835; Moffat, 1844; Methuen, 1846; Baines 1846; Flemming, 1856; Shooter, 1857; Andersson, 1861; Knight-Bruce, 1895; Wood, 1895; Carnegie, 1896; Ellenberger 1912; McLaren, 1918; Lichtenstein, 1928; Junod, 1927; Stayt, 1931; Franklin, 1945; Casalis, 1965; Van Tonder, 1966; Hatton, 1967; Shaw & Van Warmelo, 1974; Larson, 1975; Mackenzie, 1975; Davison, 1984; Dewey, 1994, Childs & Dewey, 1996) (see Appendix 4). Gluckman (1946) reports that iron spears were made for combat and hunting, amongst the Lozi, confirmed by Holub (1976), who describes a wide variety used for this purpose.

In 1805, the doctor and naturalist, Lichtenstein (1928) arrived amongst the Tswana cultural group. During his travels he noted the variety of utilitarian tools which formed part of the material culture of the inhabitants in the region. He reported that the spears were 150.0 to 180.0 cm in length, and the measurement of the two-edged blades between 15.0 cm and 45.0 cm long and 2.5 to 5.0 cm broad (Lichtenstein, 1928). While sojourning amongst the Tswana, Mackenzie (1871) towards the end of the 19th century AD, noted that the spears made by this cultural group had short wooden handles, and when broken, should the need arise, were used as knives or daggers (Mackenzie, 1871). The shafts were made of wood and the blade attached with sinew.

In northern-eastern South Africa Junod (1927) and Stayt (1931) commented on the spears manufactured and used amongst the Venda, Lemba and Tsonga. Junod (1927) describes these iron spear-heads ending in a spike that is attached to a stick with iron or brass wire while the blade head is double-edged ending in a sharp point. There is a smaller spear- head, which he described as the size of an arrow head secured to a stick with strips of bark or palm leaves (Junod, 1927). According to Stayt (1931) the spears (*pfumo*) made by the Venda are of two types. One is slightly broader than the other, both displaying a mid-rib running down the centre (Stayt, 1931). The common variety displays a blade 23.0 cm by 1.0 cm and the broader blade is 25.0 cm by 8.0 cm. Each blade has a 16.0 cm tang of which half is hidden in a wooden shaft approximately 150 cm long. The blade is secured with copper and iron wire-work and a tight fitting sheath of hide (Stayt, 1931).

The major output of iron amongst the Northern Nguni was reported by observers in the 19th and the early decades 20th century as being in the form of hoes and spears. According to Holden (1866) the spear was the only offensive weapon used by these people. He noted that there were different kinds of spears. One of them had a blade 25.5 to 35.5 cm long which was bevelled off on both sides to the sharpness of a knife and tapered towards the point (Maggs, 1991). Another form is the trua, the blade being longer than the former ca. 25.5 to 38.0 cm and from 5.0 to 8.0 cm wide, and more robust, containing probably two to three times the quantity of iron (Holden, 1963). The spears in Dedekind’s (1928) possession were made out of scrap iron (Maggs, 1982) and were completed with the use of stones for filing and polishing.

Amongst the Xhosa, McLaren (1918) reports that the objects mostly manufactured were spears of which there were several types, mostly used in combat. The long bladed spear the *in-tshuntshe* was 36 cm long and about 2.5 cm in breath, and another was *isi-gixi,* with a blade 26.0 cm long. Several others were made for different purposes such as hunting, circumcision and ceremonial events (McLaren, 1918). Shaw & Van Warmelo (1974) confirm that the Xhosa made spears, with whatever iron that they could come by as it was a scarce material in the Eastern Cape and therefore there were few objects made from it.

Table 4.5 Information on spears from a variety of cultural groups who made them for utilitarian use and ceremony sourced from literature (Period 19th century).

Author, date	Cultural group, local name of weapon (Museum no)	Length of blade, cm	Width of blade, cm	Shaft length	Materials and decoration / Other
Wikar, 1779 (1935)	Northern Cape	No measurements			
Champion, 1835 (1967)	Zulu	No measurements			
Lichtenstein, 1805 (1928)	Tswana	15.0 to 45.0	2.5 to 5.0	150.0 to 180.0	
Campbell, 1822	Tswana	No information			
Burchell, 1824	Tswana	No information			Various types
Alexander, 1836 (1967)	Damara, Namibia	No information			
Arbousset, 1840 (1991)	Lesotho	No measurements			
Moffat, 1842	Tswana	No measurements			Short spears
Methuen, 1846	Tswana				Short wooden shafts
Shooter, 1857	Zulu	No measurements			
Andersson, 1861	Namibia	No measurements			Received from traders
Holden, 1866	N. Nguni N. Nguni (trua)	25.5 to 35.0 25.5 to 38.0	5.0 to 8.0		
Baines, 1869 (1946)	Shona	No measurements			Wooden shaft bound with iron
Mackenzie, 1871	Tswana	No measurements			Short wooden handles
Holub, 1872 (1976)	Botswana	No measurements			Made for hunting and warfare Length 15.0-18.0
Wood, 1893 (1974)	Ndebele	No measurement			
Carnegie, 1894	Ndebele	No measurements			
Blennerhassett & Sleeman, 1895	Shona	No measurements			Spears made entirely of iron
Knight-Bruce, 1895	Shona				
Ellenberger, 1912	Sotho				No information
Lichtenstein, 1805 (1928)	Botswana	45.0	5.0	165.0	No information
Gibson, 1911	Zulu				No information
McLaren, J. 1918	Xhosa (intshuntshe) Xhosa (isi-gixi) Xhosa (i-ncula)	36.0 26.0 13.0 tang: 18.0 -20.5	2.5		Binding not mentioned Binding not mentioned Binding not mentioned
Junod, H. 1927	Tsonga, (likhalo) Tsonga, (tindjombi)	35.5 18.0		88.0 89.0	Binding wire 111.5 cm wide Iron stem 18 cm, binding palm leaves

Author, date	Cultural group, local name of weapon (Museum no)	Length of blade, cm	Width of blade, cm	Shaft length	Materials and decoration / Other
Vedder, 1928	Berg Damara, Namibia	No measurements			
Stayt, H. 1931	Venda (pfumo) (pfumo)	26.0 23.0	8.0 1.0	 150.0	Copper, iron or hide Tang: 16.0 cm
Hambly, 1934	Ovimbundu, Angola	No measurements			
Van Warmelo, 1940	Tsonga	No measurements			
Franklin, 1945		No measurements			
Bryant, A. 1949	Zulu, (iklwa) Zulu (isijula) Zulu (uNtlewane) Zulu (inhlendla) Zulu (inhlendla)	45.0 18.5 30.0 23.0	4.5 4.0 4.0 10 1.5	 127.0	Binding: no information Binding: no information Banding: not mentioned Binding not mentioned Copper or iron or hide binding
Bryant, A. 1949	Zulu, (iklwa) Zulu (isijula) Zulu (uNtlewane) Zulu (inhlendla) Zulu (inhlendla)	45.0 18.5 30.0 23.0	4.5 4.0 4.0 10 1.5	 127.0	Binding: no information Binding: no information Banding: not mentioned Binding not mentioned Copper or iron or hide binding
Hemans, 1945	Ndebele	No measurements			Blade and shaft of iron
Gluckman, 1946	Lozi (Zambia)	No measurements			
Hughes & Summers, 1955 (National Museum, Bulawayo)	(Mus. #2362) Kalanga (Mus. #2363) (Mus. #2364) Kalanga (Mus. #2365) Ngwato (Mus. #2367) Ngwato (Mus. #2368) Kalanga (Mus. #2370) Kalanga (Mus. #2371) Ngwato (Mus. #2372) Kalanga (Mus. #2373) Ngwato (Mus. #2374) Ngwato (Mus. #2375) Ngwato (Mus. #2376) Ila (Mus. #2379) Ila (Mus. #2381) Ila (Mus. #2382)	24.0 28.0 44.5 27.0 29.0 17.0 29.0 29.0 19.0 26.0 26.0 14.0 28.0 16.0 16.0 16.0	7.0 3.0 2.5 3.0 2.5 3.0 3.0 3.6 3.0 3.5 3.0 3.0 3.0 3.0 3.0 2.5	116.0 117.0 96.0 112.0 105.0 94.0 92.0 82.0 94.0 107.0 106.0 102.0 112.0 100.0 93.0 130.0	Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Binding: Thong Iron ribbon Oxtail Oxtail
Casalis, 1965	S. Sotho	No measurements			
Van Tonder, 1966	Mpukushu				
Hatton, 1967	Shona / Ndebele	No measurements			
Mönnig, 1967	Pedi	No measurements			
Shaw, 1974	Xhosa, Zulu	No measurements			
Shaw & Van Warmelo, 1974	Xhosa	No measurements			
Larson, 1975	Mpukushu	No measurements			
Mackenzie, 1975	Shona	No measurements			
Davison, 1984	Lobedu	No measurements			
Ellert, 1984	Shona Ndebele	No measurements			Two types: for war and hunting
Spring, 1993	Zulu (isijula) Zulu (iklwa) Sotho Ndebele Shona	 No measurements No measurements No measurements No measurements		131.0	
Dewey, 1994,	Shona				
Childs & Dewey,	Shona	No information			

Author, date	Cultural group, local name of weapon (Museum no)	Length of blade, cm	Width of blade, cm	Shaft length	Materials and decoration / Other
1996					
Wood, M. 1996 (a)	Zulu (isijula)	44.6	4.5	138.0	Wood, iron, grass
	Zulu (isijula)	34.2	2.8	141.6	Wood, iron, grass
	Zulu (isijula)	28.5	3.1	142.0	Wood, iron, grass
	Zulu, (isijula)	28.5	3.1	141.5	Wood, iron, grass
	Zulu (isijula)	48.7	3.5	131.4	Wood, iron grass
	Zulu, (isijula)	33.0	3.3	119.0	Wood, iron grass
	Zulu, (iklwa)	39.5	5.0	128.2	Wood, iron, brass wire
	Zulu, (iklwa)	45.6	5.5	123.5	Wood, iron, brass wire
	Zulu, (iklwa)	42.0	4.3	146.0	Wood, iron wire
	Zulu (umkhonto)	21.2	7.0	116.8	Wood, iron, grass
	Zulu (umkhonto)	22.8	5.1	132.1	Wood, iron, grass
	Zulu (umkhonto)	23.3	4.0	130.5	Wood, iron sinew

The Table 4.5 shows that the appearance of spears follows a similar distribution pattern as to manufactured knives. Spears for combat are more frequently discussed in relation to the cultural groups within south eastern Africa. The Zulu and Ndebele spears indicate that the widths of blades ranged from 1.0 to 10.0 cm while their lengths vary from 13.00 to 48.7 cm. The lengths of the wooden shafts range from 88.0 to 165.0 cm.

4.7.4: THE MANUFACTURE OF AXES FOR GENERAL USE

The axe is referred to frequently by the visitors to southern Africa as well as ethnographers and historians who note that this object was designed for combat and utilitarian use. The object answers to a number of names such as: hatchet, battle axe and war-axe (Moffat, 1844 Baines, 1846; Mackenzie, 1871; Ellenberger, 1912; McLaren, 1918; Casalis, 1965) (see Appendix 2). All the axes were made from iron, while those set aside for ceremonial use were sometimes decorated with incisions on the blade. The format for the axe blades was generally triangular and showed a variety of dissimilarities amongst the cultural groups that favoured them (Widstrand, 1958) (see Figure 4.9). Not all the visitors or ethnographers to the region commented on the details of their manufacture a large number included them in the inventory of tools made on site (Campbell, 1822; Burchell, 1953; Backhouse, 1844; Moffat, 1844; Mackenzie, 1871; Hambly, 1935, Hatton, 1967; McLaren, 1918, Junod, 1927, Stayt, 1931, Casalis, 1965; Shaw, 1974; Shaw & Van Warmelo, 1975; Davison, 1984; Maggs, 1993).

The shape of the blade is described by Shaw (1974) as crescentric, which was included amongst the weapons carried by the Sotho, Venda and the Tsonga. She mentions axes having been reported as being used by the Nguni but that they were not an integral part of their fighting equipment (Shaw, 1974; 133), although Holden (1866) and Maggs (1991) reported that they were used for ceremonial events. Descriptions of the axe heads are added by Junod (1927) and Stayt (1931) who comment on the similarity of the weapons employed by the cultural groups in the Limpopo Province in the early decades for the 20th century. According to Stayt (1931) the axe manufactured and used by these groups is a flat triangular shaped object which measures from 23.0 to 30.0 cm long and 4.0 to 8.0 cm wide at the base and tapers to a spike. Junod's (1927) information indicates that these axes were more restricted in use, to cutting wood and combat. The blade was of two shapes, one similar to Stayt's (1931) description being narrow and elongated, and the other broader and rounder. These axe heads were firmly secured in wooden handles (Junod, 1927).

While visiting Zimbabwe, Bent (1892: 62) mentioned the importance of the axe as a symbol of chiefdom. While in the presence of 'Umgabe' he noted an axe held by the chief, which Bent called an 'iron sceptre'. Two visiting English nurses, visiting eastern Zimbabwe in the 1890s, observed, while in the presence of chief "M'Tassa" an assistant carrying "a beautiful axe, made of polished wood curiously inlaid with brass" (Blennerhassett & Sleeman, 1893; 302). Further descriptions of the different axe blades found in Zimbabwe, such as the *humbwa* or *gano* and *tsomho* are described by Ellert (1984) and Dewey (1994, 1997). The *tsomho* has a slender handle and the axe blade itself is proportionally smaller than the larger *gano*. A feature of this axe is the extension of the blade through the head or 'toe' of the handle where it narrows and curves (Ellert, 1984: 37). This particular axe was appreciated amongst the Korekore cultural group as a dancing-axe and displayed by women and was popular at religious events (Ellert, 1984; 37). The *humbwa – gano* is the more substantial of the two objects and was used for hunting elephants and combat. There are two forms of this battle-axe, one is a large semi-circular bladed weapon which is attached to a handle which was at times decorated (Ellert, 1984). Of this type, there are some axes which were more substantial than others depending on the anticipated purpose (Ellert, 1984; 38).The other form of this axe appeared to be more symbolic or decorative. The general measurement for this object is 50.0 cm in length and the blade some 8.0 to 20.0 cm from point to point (Ellert, 1984).

To the north of Botswana, Holub (1976), during the period of his travels in the region (1872-79) observed that axes were among the objects made for utilitarian purposes and combat. He noted that axe-heads were made of different shapes by different cultural groups, he also observed that they were better manufactured amongst the Hurutse than were those made by cultural groups to the south (Holub, 1976) in relation to form, lightness and choice of materials, and that the handles were cut from strong wood with ornamental patterns burnt on them. The author noted that these axes were more substantially made than those he examined amongst the "Bechuanas, Kaffirs, Makalakas and Ndebele" (Holub, 1976: 340). Shaw & Van Warmelo (1974) briefly described the axe made by the metal deprived Southern Nguni. The base of the triangle is the sharpened cutting edge, while the point or tang is inserted through a hole in the shaft-head.

According to Makalima (1945) (Shaw & Van Warmelo, 1974) axes were also considered weapons of war amongst the Thembu, and that they were no longer manufactured after the mid-19th century, after that date iron objects were traded into the area from the Cape.

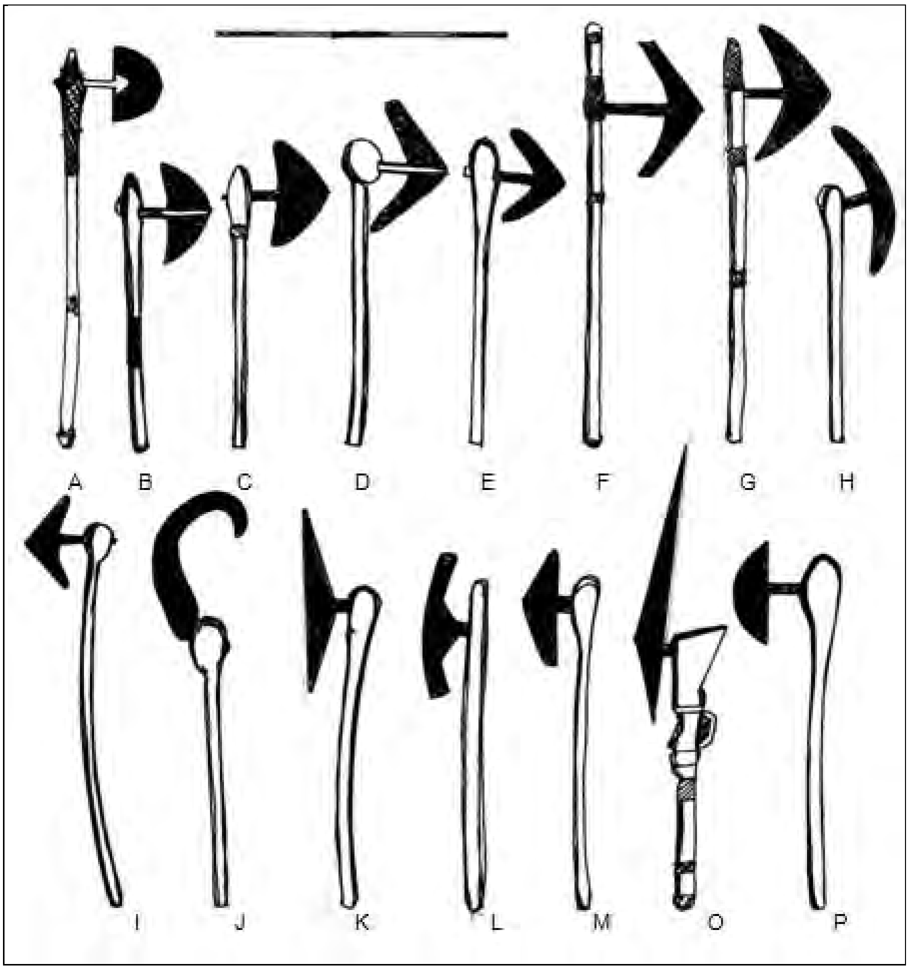
Table 4.6 Distribution of ceremonial, ritual and utilitarian axes sourced from literature. (For further information see Appendix 2).

Author, date	Period	Ethnic group	Metal	Length of blade; cm	Width of blade: cm	Decorated blade /shaft
Campbell, 1822	19th century	Tswana	Iron			No details
Burchell, 1824 (1953)	19th century	Tswana	Iron	No information		No details
Moffat, 1842	19th century	Tswana				'War-axe'
Backhouse, 1844	19th century	S. Sotho				
Methuen, 1846	19th century	Tswana	Iron			No details
Casalis, 1855 (1965)	19th century	Sotho	Iron			No details
Shooter, 1857	19th century	Zulu	Iron			No details
Baines, 1869 (1946)	19th century	Ndebele	Iron			No details
Holub, 1872 (1976)	19th century	Tswana	Iron	No information		Carved decoration on shafts
Andersson, 1861 (1968)	19th century	Damara, Namibia	Iron			No information
Mackenzie, 1871	19th century	Tswana	Iron			No information
Bent, 1892	19th century	Shona	Iron			No details
Carnegie, 1894	19th century	Ndebele	Iron			No details
Ellenberger, 1912	19th century	Lesotho	Iron			No information
McLaren, 1918	19th century	(Xhosa) Eastern Cape	Iron	16.0	5.0	No information
Muller & Snelleman, 1929	19th century	Zambeze Zambeze	Iron Iron	24.5 24.5	18.0 14.0	Blade incised Shaft partly bound with wire Wooden shaft bound with wire
Junod, 1927	19th century	Venda, Tsonga	Iron			
Hahn, 1928 Vedder, 1928	19th century	Berg Damara Ovambo	No information No information			
Stayt, 1931	19th century	Venda Venda	No information No information			Narrow blade Crescent shape
Hambly, 1935	19th century	Ovimbundu				
Ashton, 1939	19th century	Sotho	No information			
Van Warmelo, 1940	19th century	Tsonga	No information			
Gluckman, 1946	20th century	Lozi (Zambia)	No information			
Hemans, 1949	20th century	Ndebele	No information			Wooden shaft brass and copper wire binding
Hughes, & Summers, 1955	19th century	Ndebele	Iron			No information
Hatton, 1967	19th to 20th centuries	Shona	Iron	No information		
Mönnig, 1967	19th to 20th centuries	Pedi		No information		
Shaw, 1974	19th to 20th centuries	Sotho, Venda, Tsonga		No information		
Shaw & Van Warmelo, 1974	19th century	Xhosa				Described as 'flat triangle'
Mackenzie, 1975	19th & 20th centuries	Shona				'Small axes'
Ellert, 1984	19th century	Zimbabwe	Iron (*demo*)	15.0-20.0		No information
Havran, 1991 Havran, 1991 (a)	19th century	Tsonga Central east Africa	Iron Iron	15.1 11.7	3.1 2.7	Length 59.4 cm Shaft: wood Length: 71.6, wood, copper wire

Author, date	Period	Ethnic group	Metal	Length of blade; cm	Width of blade: cm	Decorated blade /shaft
		Central east Africa Shona	Iron Iron	30.7 16.8	2.8 2.2	Length: 45.6 cm, shaft: wood Length: 43.2 cm, shaft: wood
Spring, 1993	19th century	Sotho / Tswana	Iron			Length: 71.0 cm
Dewey, 1994	19th century	Ndebele/Shona	Iron			No details

Author, date	Period	Ethnic group	Metal	Length of blade; cm	Width of blade: cm	Decorated blade /shaft
Wood, 1996 (d)	19th century	Zulu (isizenze) Zulu (isizenze) Zulu (isizenze) Zulu (isizenze)	Iron Iron Iron Zulu	13.5 10.9 18.1 18.0	15.0 12.5 21.5 25.9	Shaft length (wood) 79.0 cm Shaft length (wood) 86.5 cm Shaft length (wood) 71.5 cm Shaft length (wood) 6.5 cm
Dewey, 1997 (c)	19th century	Shona Venda Shona (*tsomho*) Ndebele Shona Tonga (*bukano*) Tonga (bukano)	Iron (tang decorated) Iron Iron Iron Iron (double axe, decorated tangs) Iron blade Iron	75.0 78.5 48.0 83.0 81.0 63.0 57.0	17.8 15.2 34.0 33.0 28.5 27.5	No decoration Wooden shaft wire decoration Wooden shaft entirely bound with wire Wooden shaft entirely bound with copper wire No binding on wooden shaft Wooden shaft No information
Petridis 2011 (d)	19th century	Tonga / Shangaan Ndebele	Iron Iron	84.4 40.1		Wooden shaft entirely bound with copper wire. Wooden shaft entirely bound with copper wire.

Table 4.6 indicates that utilitarian axes made of iron are found amongst many cultural groups and are used for a number of purposes, while infrequently some of them become venerated as part of an ancestor's belongings, and are set aside for ceremonial use (Witstrand, 1958: 113). Not all reports indicated measurements of blades, while ethnologists commented upon the decoration found on their shafts. The length of the blade varied between 11.7 and 84.4 cm, while the widths ranged from 2.2 and 34.0 cm. Comments on the decoration on their shafts indicate that brass and copper wire was used.



Scale: 0 to 50 cm

Key:

A – H Scale for battle-axes blades only from KwaZulu-Natal (not for shafts lengths) (After Maggs, 1992, 183)

I: Tlokoa L. 71.0 cm; J: Sotho*; N: Tsonga, L 71.0 cm (After Spring, 1993: 132, 137)

K: Kwena*; L: Sotho*; M: Karanga* (After Widstrand, 1958: 64) O: Shona* (After Dewey, 1994: 365)

* No shaft measurements

Figure 4.8 The illustration shows a range of axe-blade shapes made for combat, utilitarian and ceremonial purposes by cultural groups in southern Africa; sourced from literature.

4.7.5: THE MANUFACTURE OF ORNAMENTATION

Ornaments were observed by ethnographers, artists, and attentive travellers who visited southern Africa from the late 18th century. Some areas in the Eastern Cape received concentrated attention similar to that experienced in Natal, and the Sotho/Tswana in Botswana, Lesotho and South Africa, and amongst the Venda / Lemba / Tsonga of south-eastern South Africa. Table 4.1 shows that some cultural groups were not subjected to the same attention by observers in terms of ornamentation, which could be the result of poor observation on the part of the few ethnologists who visited the area, or of the lack of metal made objects to report. This lack could have existed amongst the Ovambo of Namibia, and the Kalanga / Ndebele and Shona of Zimbabwe.

4.7.5.1: THE MANUFACTURE OF ORNAMENTATION: BEADS

The smallest ornamental objects made by metal craftsmen were iron, copper and brass beads. The measurements of these range between 2.0 mm and 9.0 mm in width and 0.5 mm and 14.0 mm in depth (See Table 4.7, 5.5, 5.8, 5.9) (see Appendix. 5). A limitation in the gathering of information on beads means that it is not always clear whether glass or metal beads are being discussed in the various sources (Backhouse, 1844). While a wide range of ethnologists and visitors have commented on ornamental objects worn by the inhabitants they have had no clear guide as to the obvious use and consequently it is not surprising that a number of descriptions from separate sources exist for the same object. Metal beads have been variously called rings (Burchell, 1953; Lichtenstein, 1928; Shaw & Van Warmelo 1974), links (Larson, 1975), small tongues of metal (Junod, 1927) and studs, either for decorating leather aprons or to be used as spacers on copper bracelets (Gardener, 1835; Stayt, 1931). Many authors have mentioned observing beads in material cultures while omitting further descriptions on their manufacture (Andersson, 1861).

Beads of iron and copper were used amongst the Mpukushu (see Chapter 6) (Andersson, 1861; Van Tonder, 1966; Larson, 1975). The Tswana enjoyed displaying a variety of copper beads (Lichtenstein, 1928); while some made by Bushmen (see Chapter 6) are archived in the Iziko Museum.

Campbell (1822) mentions that he saw iron beads amongst the Tswana while Burchell (1953) after describing the local attraction to glass beads, adds that iron and copper are worn in profusion but were less esteemed amongst the Sotho/Tswana. Burchell (1953) in ca. 1812 classified a bead a ‘ring’ which was manufactured to be placed at intervals on wire-wound bracelets. A greater number of ‘rings’ would make a bracelet more costly and of greater value, while the most expensive would be a bracelet made entirely of ‘rings’ (Burchell, 1953: 400). The manufacture of the ‘ring’ comprised short lengths of copper bent into a circular form and the ends deftly hammered (Burchell, 1953: 400). The author attested to their popularity by stating that the bracelets are so favoured that they were seen in profusion on wrists and just under the knee of men and women (Burchell, 1953).

Backhouse (1844) while in the Eastern Cape noted that a woman had brass ornaments attached to her petticoat, which suggests some interaction with the Northern Nguni who stitched ‘knobs’ and ‘studs’ to their garments (Gardener, 1835). Casalis (1965: 151-152) called some beads ‘balls of iron and copper’ for the want of the word beads which were incorporated into necklaces and girdles. Shaw and Van Warmelo (1974) noted that some of the ‘rings’ were made of iron amongst the southern Nguni, but were more often made of brass. They were made by flattening a piece of metal into a plate of the desired thickness, and then cutting from this strips of the desired length and width which were then bent around a mandrel of the desired size and attached to girdles (Shaw & Van Warmelo, 1974).

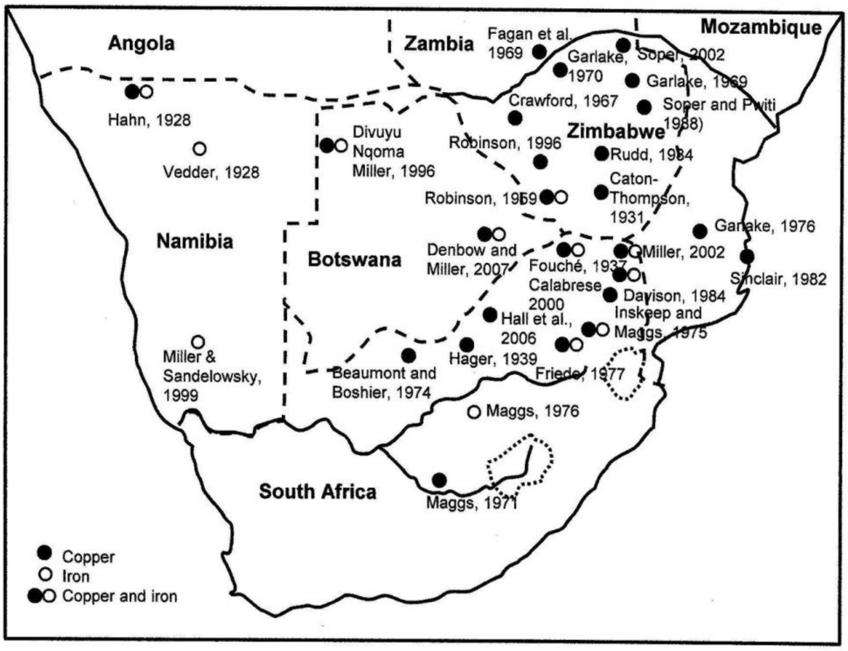


Figure 4.9 Distribution of iron and copper beads in southern Africa, information assembled from literary records.

The description of the manufacture of copper beads submitted by Davison (1984) is similar. She states that ornaments of hand-forged metal were rare in the 1930s and are now considered heirlooms. The kherogaana beads of the ‘wrap-around’ type that is, made from a strip of hand-worked copper, cut and bent into a circle are amongst the oldest Lobedu objects in the Iziko Museum collection (Davison, 1984: 176).

The large brass beads made by brass-smiths in KwaZulu-Natal were mentioned by a few of the early visitors to the area and by subsequent ethnographers and were known as *indondo*. According to Fynn (Stuart & Malcolm, 1959) owning them added to the owner and wearer’s prestige in the community (Gardener, 1855; Fynn, 1825 (Stuart & Malcolm, 1959); Shooter, 1857; Kennedy, 1991; Roodt, 1993). Large and small brass beads were used to decorate the *ingcayi* (*izingcayi*) a pliable tanned duiker hide frontal garment, also known as a petticoat, decorated with brass beads of various sizes (Gardener, 1936;

Shooter, 1857; Tyler, 1891; Kennedy, 1991, Roodt, 1996). They were worn by brides for the year following her wedding, and longer regardless of whether she was pregnant or not (Wood, 1966). Roodt (1996: 96) mentions a variety of smaller beads than the *indondo* used by the Zulu women: they were the pentagonal *izimulwane* and about 10.0 mm in diameter, the *ubuhlalu* a small bead ca. 5.0 mm in diameter, and the *iqhosha* made specifically to decorate skin garments.

Table 4.7 Distribution of beads as noted by ethnologists and anthropologists in the 18th–20th centuries, sourced from relevant literature.

Author	Place	Metal	Period	Other information
Wikar, 1779	Northern Cape	Copper	Late-18th century	
Burchell, 1824	North West Province	Copper	Mid-19th century	
Gardener, 1835	KwaZulu/Natal	Brass	Mid-19th century	Called knobs and studs
Angas, 1849	KwaZulu/Natal	Brass	Mid-19th century	Indondo
Shooter, 1857	KwaZulu/Natal	Brass	Mid-19th century	Knobs and studs
Casalis, 1855	Lesotho	Iron and copper	Mid-19th century	
Flynn, 1861) Stuart, & Malcolm, 1950	KwaZulu/Natal	Brass	Mid-19th century	Indondo
Stayt, 1931	Limpopo Province	Copper	Mid-20th century	
Laidler, 1934	Lesotho	Copper	Mid-20th century	Sewn onto garments
Martin, 1940	Zimbabwe	Brass	Mid-20th century	Cylindrical and biconical
Hager, 1940	North West Province	Copper Gold	Mid-20th century	Cylindrical
Bryant, 1949	KwaZulu/Natal	Brass	19th century	Imfibinga/ indondo
Krige, 1950	KwaZulu/Natal	Brass	19th century	Indondo
Von Sicard, 1955	Zimbabwe: Cipise	Copper / bronze (15) Iron (18)		Some are biconical
Larson, 1975	Botswana	Iron / copper	Mid-20th century	No description
Webb, & Wright, 1976, 1982	KwaZulu/Natal	Brass	19th century	Iqhosha, indondo,
Van Schalkwyk, 1982	Ndzundza	Copper	Mid-20th century	No information
Davison, 1984	Limpopo Province	Copper	Mid-20th century	Cylindrical, barrel
Kennedy, 1991	KwaZulu/Natal	Brass	19th century	Indondo,
Roodt, 1993, 1996	KwaZulu/Natal	Brass	19th century	Indondo, imulwane, iqhosha

Table 4.7 shows that information gathered by ethnologists, anthropologists, missionaries and archaeologists observed the presence of metal beads throughout southern Africa. All four metals; iron, copper, bronze and brass were used for this form of decoration, which could be strung around the neck (Hall & Neil, 1972:94; Garlake, 1969: 45), around the waist attached to girdles (Lichtenstein, 1928: 339; Shaw and Van Warmelo, 1974: 126), sewn to women's leather garments (Backhouse, 1844: 152; Mason, 1986: 24; Morris, 1981; 41), or used as spacers on wire-wound bracelets (Burchell 1953:400). The most common forms were cylindrical and barrel shapes. Infrequently biconical beads are noted in Zimbabwean collection (see Appendix 10). There is additional emphasis on those made in KwaZulu-Natal as they were large and cast in brass. Some of them were known for their great bulk in mass and size, while others were recorded as 'knobs and studs'.

The mention of gold artefacts in the 19th century by ethnologists in southern Africa is fragmentary. Anhaeusser (2012: 2) reported that in the 19th century gold mining in Zimbabwe was largely forgotten and abandoned by the time the first Europeans arrived. Gold beads were noticed by Bain (1949: 9) in northern Botswana. They were strung around the neck of chief Sebego and were described as “beads of virgin gold”. There is no further information.

4.7.5.2: THE MANUFACTURE OF ORNAMENTATION: SOLID BANGLES

Information on the manufacture of solid / inflexible bangles of iron, copper and brass and the cultural groups who used them were recorded during the 19th and early 20th century by visitors to southern Africa, and more recently by current ethnographers (Campbell, 1822; Fynn 1825 (Stuart & Malcolm, 1959); Shooter 1857; Grout, 1861; Andersson, 1861; Holub, 1876; Ellenberger, 1912; McLaren, 1918; Junod, 1927; Ashton, 1938, Shaw & Van Warmelo, 1974; Davison, 1984; Maggs, 1992; Roodt, 1994) (see Appendix 6: bangles, bracelets and arm bands). As with a number of ornamental objects, inflexible, solid bangles have been often confused with flexible bracelets, and, instead of being known as bangles have also been called rings, arm rings, armlets, and leg rings (see Glossary for further information) (Sparrman, 1772, (Forbes, 1975). While sojourning in the north from 1972-79, Holub (1976) noted anklets of iron, copper and brass. Anklets of brass were worn by queens and the wives of the men of rank in multiple numbers from two to eight, while the poor wore anklets of iron and not so many of them (Holub, 1976: 348).

Bangles of iron are mentioned infrequently by ethnographers; Shaw and Van Warmelo (1974) attest that in the 20th century AD iron was manufactured into ornaments for the chief and the well-to-do amongst the Xhosa. A single iron bangle might be worn, and one of its kind is placed in the Iziko Museum’s collection such as the iron bracelet noted in Figure 6.2. Maggs (1992) writes that Mkhize (1942: 82) observed that iron bangles and eating forks made of iron were created for the king in Zululand.

Amongst the Tsonga (Junod, 1927) the Lobedu (Davison, 1984) and the Sotho/Tswana (Campbell, 1822) bangles worn were made of copper and brass. Junod calls the heavy copper rings *musindana* which are oval in shape with an opening to slip them over the wrist. A similar, lighter example is described by Davison (1984), and was known as *mefhiri* and was made of brass, although she adds that in earlier times these were made from copper. Copper arm and leg rings were observed by Campbell (1822) while sojourning amongst the Tswana.

The Sotho of Lesotho also favoured arm and leg rings. Ashton (1938: 308) describes large and heavy bangles and anklets made of brass and copper worn in great numbers from ankle to the knee and from the wrist to the elbow. The copper and brass was acknowledged as being imported by the Tsonga and other tribes in touch with the Arabs in Delagoa Bay (Ashton, 1938: 308).

A group of two copper and 15 iron bangles were found at the archaeological site, Hut #16 at 001 Makgwareng, Lindley District, in the Free State. The collection of 15 bangles came from the interior of a corbelled hut. It is felt that they were stored amongst the upper structure of the hut, while the copper bangles came from the *lelapa* in the same environment. The bangles were of various sized and thicknesses (Maggs, 1976; Chirikure, Hall & Maggs, 2008).

In KwaZulu-Natal in the 19th century AD, Fynn (1959), Shooter (1857) and Grout (1861) described the heavy bold brass ornaments they observed being worn by those members of the elite of society attached to the court. Fynn (1959: 49) writing in 1825 describes the chiefs and principal people wearing heavy brass bangles, *izingxotha*, from the wrist to the elbow (Baleni Ka Silwana, Gxubu ka Luduzo in Webb & Wright, 1976). Shooter (1857: 7) confirms that rings for fingers, arms and ankles were made of brass and copper and manufactured by the metal craftsmen in the region. Grout (1861: 107) mentions that 'glittering rings were worn by men, women and children' and that some of them were broad and heavy and very cumbersome to wear. They were considered as insignia of the highest honour. Roodt (1996) provides a comprehensive account of the number of solid arm and leg rings made by the brass smiths working within the king's residences at this time. The largest and the heaviest, the *izingxotha* were shaped like gauntlets and were worn on the right wrist. Its main characteristic was its raised and notched and ribbed surface. Chubb's (1936) discovery of a slab of cast brass in Nongoma, measures 318.0 by 166.0 mm and grooved on one side. It indicates that this was a prior step in the final production of the *izingxotha*. Figure 4.10 indicates that by heating and bending the metal repeatedly, the metal, in this case displays cracks from metal fatigue.

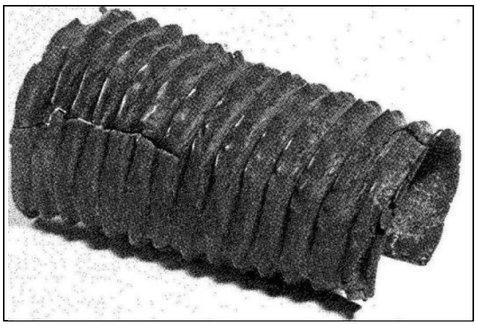


Figure 4.10 A grooved and ribbed *izingxotha* showing the characteristics of metal fatigue from KwaZulu-Natal (Conner & Pelrine, 1983: 25).

These ornaments were awarded by the king to persons of note within the kingdom (Roodt: 1996: 96). Bangles of a narrower width were created from brass for ornamenting the upper (*isinda*) and lower arm (*isonga*). The *isinda* varied from 75.0 mm to 90.0 mm in width and was noted for its semi-circular section. The *isonga* was similar to the former but slightly smaller and normally flattened in shape to fit the wrist and forearm (Roodt, 1996: 96). Leg rings were also a part of the material culture for the well-to-do. Research into leg rings, according to Roodt (1996: 96), shows from past illustrations that they were probably similar in shape to and appearance to arm rings.

Table 4.8 Distribution of solid bangles and armbands from the 18th to 19th centuries sourced from literary data.

Author, date	Locality	Metal	Dimensions mm	Other Information
Campbell, 1822	North West Province	Copper	No information	Arm and leg rings
Champion,1835	KwaZulu/Natal	Brass	No information	Heavy bangles
Gardener, 1836	KwaZulu/Natal	Brass	No information	Armlets
Flynn, 1950	KwaZulu/Natal	Brass		
Shooter, 1857	KwaZulu/Natal	Brass	No information	Armlets
Backhouse, 1844	Lesotho	Brass	No information	Arm rings
Grout, 1861	KwaZulu/Natal	Brass	No information	Heavy armlets
Gibson, 1911	KwaZulu/Natal	Brass	No information	Armlets
Ellenberger, 1912	Lesotho	Brass	No information	Arm rings
Chubb, 1936	KwaZulu/Natal	Brass	Width: 166.0 Length: 318.0 Thickness: 12.0	Izingxotha
Schwellnus, 1937	Limpopo Province	Copper	Diameter: 75.0 Thickness: 7.5	Bangle
Bryant, 1949	KwaZulu/Natal	Brass	No information	Izingxotha, Isonga
Krige, 1950	KwaZulu/Natal	Brass		Izingxotha, no information
Cooke, 1959	Motopo Hills, Zimbabwe	Iron		Bangle, no information
Conner, & Pelrine, 1983	KwaZulu/Natal	Brass Brass	Length: 150.0 Length: 175.0	Izingxotha, Mass: ca.1.5 kg Izingxotha
Davison, 1984	Limpopo Province	Copper / bronze / brass		Bangle
Webb & Wright, 1976, 1986	KwaZulu/Natal	Brass		Arm rings
Kennedy 1991	KwaZulu/Natal	Brass (3) Brass (4)	100.0 rings Length: 180.0	Amasongo Izingxotha
Roodt 1993	KwaZulu/Natal	Brass	No information	Izingxotha
Wood, 1966 (a)	KwaZulu/Natal	Brass (M43) Brass (M44) Brass (M45) Brass (M53)	Length: 189.0 293.0 cir. Length: 170.0 286.0 cir. Length: 175.0 286.0 cir Diameter 85.0, thinness: 26.0	Izingxotha Izingxotha Izingxotha Brass armlet: Isinda
Hall et al, 2006)	Marothodi, North West Province	Bronze	No information	Bangle fragment

Table 4.8 above indicates that the majority of the heavy arm bands and bangles reported by ethnologists, archaeologists and missionaries were made in KwaZulu-Natal of brass from the early to mid-19th century. Those that were made in KwaZulu-Natal were heavy cast forms (Chubb, 1936) and then worked into the required shape and decoration by skilled metal smiths (see Figure 4.10). The published dimensions show that each one

was made individually as diameters and lengths for each object differed. The information shows that iron, copper and bronze was used for these objects where brass was an unfamiliar metal in areas beyond KwaZulu-Natal.

There is little information on the presence of gold artefacts mentioned by ethnologists in the early 19th century. Cline (1937: 19) reports that a chief in Swaziland was observed wearing a “metal armlet” and that it was so heavy that the European visitor who noticed the ornament considered it to be gold. A similar fragment of information was reported by Johannes Kumalo in the James Stuart Archive (Webb & Wright, 1976: 257). It states that “Mxaba says that Ngwane (Bunu), the king of Swaziland… used to wear a heavy bangle with studs…This bangle …was made of gold and is known as *inzila*”

4.7.5.3: THE MANUFACTURE OF ORNAMENTATION: WIRE-WOUND FLEXIBLE BRACELETS

Flexible wire-wound bracelets suffer like several other ornamental forms from a range of names given to them by visitors to the continent in the 19th century. These individuals, who arrived with their own itineraries and agendas from missionary, scientific, and artistic endeavours, to trading and prospecting, sometimes added notes about the inhabitants and their body and garment decorations in their travel notes (Sparrman, 1975; Thunberg, 1986; Backhouse, 1844; Andersson, 1861; Ellenberger, 1912, Le Valliant, 1973; Daniell, 1976). The result is that an assortment of names has been given to a single item, and sometimes it not easy to distinguish between solid and flexible decorations (Holub, 1976). The alternative names given to flexible wire-wound bracelets for arms and legs include rings, bangles and arm and leg bands, and only with careful analysis can they be distinguished apart (see Glossary for further information) (Campbell, 1822; Backhouse, 1844; Van Warmelo, 1940; Shaw 1974, Larson, 1975; Mackenzie, 1975). However, the word ‘bracelet’ are used by some early ethnographers such as Knight-Bruce (1895), Junod (1927), Krige (1950), Casalis (1965) and Shaw (1974). During this time a local name in KwaZulu-Natal for these objects was *ubusenge* (Krige, 1950, Baleni ka Silwana in Webb & Wright, 1976; Kennedy, 1991; Roodt, 1996), while Junod amongst the Tsonga (1927: 84) noted that they were known as *busenga*, the latter differing in description from the general manufacture of wire-wound bracelets (see Chapter 6) in that, instead of being wound over a core of the familiar roots or animal tail hairs, these were wound over hide. It is to be wondered if these objects were more robust than those made from cores of weaker material.

What is apparent from ethnographical literature is that, during the 19th century, bracelets were a common form of decoration for arms and legs throughout southern Africa, and if not made by craftsmen amongst cultural groups, they were traded in metal deprived areas with several authors attesting to this. (Lichtenstein, 1928; Thunberg, 1986, Sparrman, 1975, Wikar, 1935, Ashton, 1938, Shaw & Van Warmelo, 1974). Several authors have described their manufacture; Lichtenstein noted the unusual 'elasticity' of the objects made of brass wire. He observed that the wire to be flat after been beaten with a hammer, was about 30 cm long, and that each wire-wound object was composed of more than one length to achieve a finished object. The core of the bracelet was not described. Burchell (1953: 400) added a detail, describing the core for such rings is the kokūn, giraffe or other animals affording thick and long tail hairs. The popularity of copper and iron wire-wound bracelets was confirmed by Stayt (1931: 58) who claimed that a proficient craftsman amongst the Venda can make from 60 to 100 bracelets a day, and that "every man makes bracelets and anklets for his wives", the extent of his affection being assessed by the number he makes for her. Interestingly, Stayt (1931) added that bracelets were the "medium through which the Venda women gratified her craving for a change of fashion and that, sometimes it was "decreed that 100 iron bracelets shall be worn next to the ankle and 200 of brass or copper up the leg; at other times the numbers may be reversed" (Stayt, 1931: 25). The author reports that men were known to wear bracelets on their legs but not in the same profusion. In this case two to four were worn just below the knee (Stayt, 1931).

The continual demand for wire-wound bracelets throughout southern Africa during this period has been stressed by Shaw & Van Warmelo (1974), Davison (1984), and Hechter-Schultz (1963). Shaw & Van Warmelo (1974) noted that these metal ornaments were commonly made by women as well as by men and not only of brass and copper but also of aluminium (Davison, 1984). Shaw & Van Warmelo (1974: 127) confirm their manufacture by describing how they were usually made by rolling the wire between a horn and a flat piece of wood around a core of wire (See Chapter 6) or tail hair which has been looped and fixed to the desired size.

4.7.5.4: THE MANUFACTURE OF ORNAMENTATION: NECK-RINGS

Information on the wearing and the manufacture of neck-rings is scarce in the ethnological literature in southern African, while there are several specimens from mainly south-eastern Africa are found within the Iziko Museum's collection (see Chapter 6 and Appendix 8). Campbell (1822) does not follow his report that neck-rings of copper were worn in the region with any description of them. According to Davison (1984) brass and copper neck- rings were part of the material culture of the Lobedu, although there is no mention of details of their manufacture. More information on neck-rings is derived from reports by visitors and ethnographers from Lesotho where neck-rings appear to have been a prevalent form of ornament (Ellenberger, 1912; Ashton, 1938; Casalis, 1965). Ellenberger (1912) registers the presence of brass neck-rings on the necks of the

Basotho elite, while Casalis (1965) confirms that they are massive and made of copper. Ashton (1938) noted that the neck-ring is called a *letjekoana* and formed part of the production of objects by the copper and brass smiths in the area.

In KwaZulu-Natal the brass neck-ring according to Roodt (1996) was known as an *umnaka* and various numbers of these could be worn together. Some of James Stuart's informers mention the importance of the neck-ring in elite Zulu societies (Baleni ka Silwana, Mandhlakazi ka Ngini, and Dinya ka Zokozwayo, Webb & Wright, 1976, 1979: 176) and the inconvenience that poorly manufactured objects could cause to wearers. In cross-section some rings were v-shaped while some were made from thick circular-cross sectioned rods. The usual diameter was 80.0 mm in diameter and the rod between 15.0 to 20.0 mm in thickness (Roodt, 1996: 96). Fynn confirms that four brass neck-rings / collars were worn, fitting closely to the neck (Stuart & Malcolm 1959: 73).

Table 4.9 Distribution of solid neck-rings from the 18th to 19th centuries sourced from literary data.

Author, date	Locality	Metal	Dimensions mm	Other Information
Campbell, 1822	North West Province	Copper	No information	Neck-rings
Champion, 1835	KwaZulu/Natal	Brass	No information	Collars
Gardener, 1836	KwaZulu/Natal	Brass	No information	Throat-rings
Flynn, 1850, (1950)	KwaZulu/Natal	Brass	No information	Collars
Backhouse, 1844	Lesotho	Brass	No information	Neck-rings
Shooter, 1857	KwaZulu/Natal	Brass	No information	Throat-rings
Gibson, 1911	KwaZulu/Natal	Brass	No information	Neck-rings
Ellenberger, 1912	Lesotho	Brass	No information	Neck-rings
Bryant, 1949	KwaZulu/Natal	Brass	No information	(Umnaka)
Davison, 1984	Limpopo Province	Copper / bronze / brass	Estimate: 120.0	Neck-ring
Webb and Wright, 1976, 1986	KwaZulu/Natal	Brass		Neck-rings
Kennedy, 1991	KwaZulu/Natal	Brass	Dia.: 205.0	(Ubedu)
Roodt, 1994	KwaZulu/Natal	Brass	Dia.: 80.0	(Umnaka)
Wood, 1996 (a)	KwaZulu/Natal	Copper Brass Brass Brass Brass	Dia.: 155.0 Dia.: 165.0 Dia.: 150.0 Dia.: 114.0 Dia.: 145.0	(Ubedu) (Umnaka) (Ubedu) (Umnaka) (Umnaka)

Table 4.9 above shows that the majority of solid neck-rings were noted by ethnologists, archaeologists and missionaries in KwaZulu-Natal and made from brass from the early to mid-19th century. The heavy forms were using the casting technique. Thereafter they were worked into the desired shape with hammering and abrasion by skilled metal smiths. The published dimensions indicate that each one was made individually as diameters for each object differed. The above information shows that copper and bronze was used for these objects in northern and western South Africa.

4.7.5.5: THE MANUFACTURE OF ORNAMENTATION: EAR-RINGS

The distribution of ear-rings made of iron, copper and brass appears to be restricted to the Highveld of the Free State, Lesotho, the south-western area of former Transvaal and the extreme borders of the Kalahari (see Appendix 9). Maggs (1976) suggested that these ear- ring were distinctive to the Sotho/Tswana and their neighbours, the Khoisan Unusually, in the north of the former Transvaal, Stayt (1931: 65) mentions that ear-rings were made of copper wire amongst Venda / Lemba, which were only worn by the Lemba women "and never by the Venda". There is no description of their physical appearance.

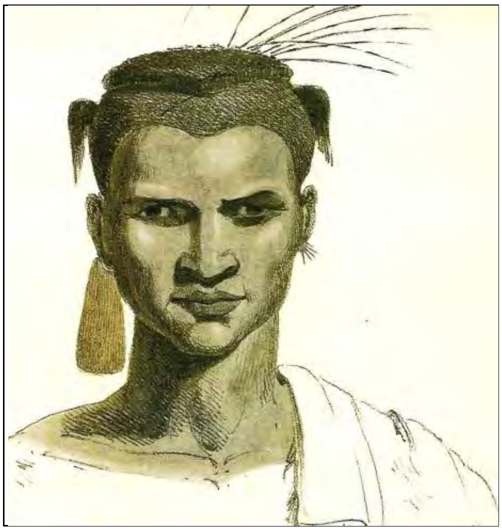


Figure 4.11 A water colour of an elite member amongst the Sotho/Tswana displaying the large copper pendant ear-plate (Daniell, 1802, Plate 92 Vol. II) (Bradlow, 1976).

Amongst the Sotho/Tswana Campbell (1822) mentions that ear-rings were made of copper, and that he had acquaintance with one individual who wore about thirty ear-rings hanging in his ears. These ear-rings were reputed to be made of a metal which much "resembled gold", which he had heard came from countries to the north of Kurreechane (Campbell, 1822: 270). Figure 4. 11 portrays a heavy pendant ear-plate attached to one ear only and worn only by the elite men in the society. It is interesting to note that this large object has not disfigured the ear-lobe. Burchell, (1953) writing in ca. 1812, described two types of ear ornamentation, a heavier pendant one known as the lekáaka, made of copper plate and worn by men of high rank only such as seen in Figure 4.11 above (Ellenberger, 1912; Herbert, 1984). The lighter ear-ring known as the ear-drop or manjéna was made of copper wire and was more prevalent (see Figure 4.14).

Burchell (1953) described it as a small pendant consisting of a thin wire neatly wound around another of larger dimensions and terminated by a small knob formed by a piece of copper hammered around the end. The upper part was formed into a loop by which it was secured to the ear (Burchell, 1953: 398). The author added that he met an individual with as many as six in one ear, corroborating similar information from (Campbell, 1822). While among the Hurutse, in the 1870s, Holub (1976) noted ear-rings made from iron, copper and brass, which he reports was an imported material. He confirmed that “the little ear-rings, whether of iron, brass or copper, hardly differ from those of the Tswana” (Holub, 1976: 349).

In the mountain kingdom of Lesotho during this period, the inhabitants appreciated body ornamentation, as Ashton (1938: 308) has documented that the Sotho made and wore ear- rings of copper and brass. Backhouse (1844: 363) described some ear-rings as “spiral springs that had been draw beyond their strength” and were so long as to reach almost to the shoulder”.

The 18th century scientist, Sparrman (Forbes, 1975: 116), while in the Eastern Cape from

1772-1776 mentions the ‘Cafres and the Hottentots’ wearing ear-rings of two different shapes made of copper mixed with silver. Thunberg (Forbes, 1986) who sojourned from 1772-1775 in the same region reported that “We were shown ear-rings of two different shapes made from copper mixed with silver” which the people had received from the nations to the north (Forbes, 1986:101).

Far to the north, in the region along the Kunene / Zambezi River, Larson (1975), mentions the Mpukushu making ear-rings of iron wire, although their forms or the metal used was not described. Four specimens made of iron archived in the Iziko Museum resemble those described by Burchell (1953) (see Chapter 6, see Figure 4.12).

Much further to the south, along the Gariep River, Wikar 1779 (Mossop, 1935) described the local population enjoyed wearing copper ear-rings, which he noted were quite pliable, and that they barter from visiting metal craftsmen for cattle and goats . Lichtenstein (1928) writing in the 19th century, also noted that the local inhabitants traded copper ear-rings from roving trader-craftsmen. Judging from the number of ethnographic reports on these ornaments of iron, copper and brass they were continually favoured with willing buyers ready to acquire these objects from traders.

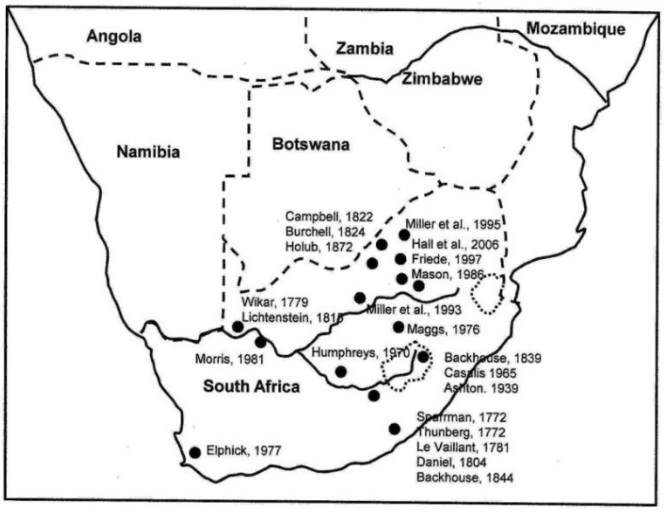


Figure 4.12 Distribution of ear-rings sourced from literature amongst the Sotho/Tswana and Khoisan.

Table 4.10 Distribution of ear-rings as noted by ethnologists and anthropologists in the 18th - 20th centuries, sourced from literature.

Author	Locality	Metal	Date	Other information
Sparrman, 1778	Eastern Cape	Copper/silver	Late 18th century	
Thunberg, 1772	Eastern Cape	Copper/silver	Late 18th century	
Wikar, 1779	Northern Cape	Copper	Late 18th century	
Le Vaillant, 1781	Eastern Cape	Copper	Early 19th century	
Daniell, 1804	Eastern Cape	Copper, brass	Early 19th century	Hoops, and large heavy ear-plates
Campbell, 1822	Eastern, Northern Cape	Copper	Early 19th century	
Burchell, 1824 (1953)	North West Province	Copper	Mid-19th century	
Arbousset. 1840	Lesotho	Copper	Mid-19th century	Large heavy ear plate Ear-rings with shanks
Backhouse. 1844	Lesotho	Copper	Mid-19th century	Copper wire
Casalis, 1855	Lesotho	Copper	Mid-19th century	Stretched spiral springs
Ellenberger 1912	Lesotho		Mid-19th century	
Holub, 1872 (1976)	Lesotho	Brass	Mid-19th century	Large heavy ear plate
Stayt, 1931	North West Province	Iron, copper, brass	Mid-19th century	
Ashton, 1939	Limpopo Province	Copper	Early 20th century	Examples not discussed
Fourie, 1928	Sotho Namibia	Copper/ Brass Iron?	Early 20th century Early 20th century	Illustration

Table 4.10 The above table shows that information gathered by ethnologists, natural scientists, missionaries and artists visiting South Africa noted that the ear-rings were worn in a variety of styles principally by the South Sotho/Tswana and Khoisan cultural groups of central South Africa between the 19th and early 20th century AD. The styles included ear- plates, large hoops, and ear-hoops with shanks of varying lengths mainly made in copper. Other metals used indicated that iron, bronze and brass were also favoured in restricted measure, as metals had to be traded into this metal deprived zone of southern Africa.

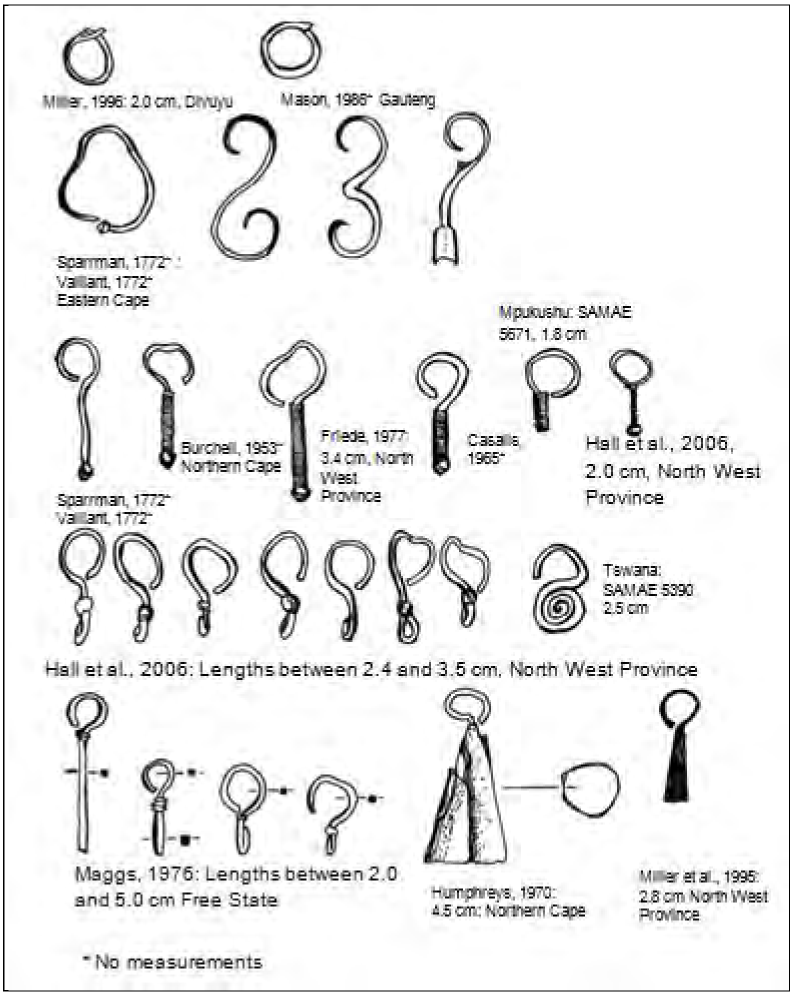


Figure 4.13 A chart showing the different types of ear-rings retrieved from archaeological sites and literary sources

4.8: CONCLUSIONS

A detailed study of decorative metalwork contained in ethno-historical accounts has revealed the major object types used by the various cultural groups in southern Africa during the 19th century. However, information from various sources is limited, and only a multi-source study can generate more information. The process of manufacturing decorative metalwork started with smelting in the case of iron, copper, and tin. The metal from the furnaces was subsequently worked in forges to produce a wide array of tools and ornaments. Interestingly, within variations, the basic infrastructure for forging included a smithy or hearth, anvils, hammers, bellows and tongs. In the forge, the smiths used the techniques of hot and cold working. This chapter has described, as amongst the Shona, a billet of metal was placed into a fire until red hot. It was then repeatedly hammered into shape. Once cold, it was placed in the fire again until the desired shape of an iron spear was achieved. Some of the objects such as folded beads were also hammered, but some copper and copper alloy beads were also cast. Amongst the Zulu the large brass and heavy cast *indondo* were also cast. The techniques for wire-wound bracelets for leg and arm decoration remained consistent, altered only with the addition of fine drawn copper wire, or commercially acquired iron, aluminium, copper and brass wire, while solid bangle forms in KwaZulu-Natal demonstrated the metal smith's skill in manufacturing larger and heavier objects with the greater quantity of alloy that was available to this cultural group. Wire drawing was an important technique which produced different grades of wire which was wound around vegetal material to produce bracelets.

By the end of the 19th century in the context of burgeoning industrialisation in Europe and its colonies, European colonisers contributed to the termination of the indigenous African metal working industries as imported metal wear replaced what was locally made, and scrap iron and steel were finally adopted by metal craftsmen for use in the making of locally required ornamental objects. This enquiry establishes that there is a wealth of knowledge to be gained from early European visitors and ethnographers about the activities of the metal smith within a variety of cultural groups, supported by oral confirmation in African south of the Sahara. These mid to late 19th century sources play a significant role in building the picture of metal smelting and smithing in the region during this period. What do we know about decorative metalwork in the deep past? This is the focus of the next chapter which is dedicated to decorative metalwork in the Iron Age (200-1840) of Southern Africa.

5. CHAPTER FIVE: FROM THE ARCHAEOLOGICAL RECORD: DECORATIVE AND EXPRESSIVE METAL OBJECTS

5.1: INTRODUCTION

The previous chapter focused on the typology of decorative metalwork used in 19th century southern Africa. In order to delineate continuity and change in the use of decorative metalwork between the recent and deep past, I carried out an archival study to explore the decorative metalwork archaeologically retrieved in the Iron Age of the region. While archaeologists have, in the interests of convenience divided the span of time conventionally referred to as the Iron Age into three periods: Early, Middle and Late Iron Ages (Mason, 1975; Maggs, 1984; Huffman, 2007), these divisions are marked by permeable borders, knowing that lags and advances in development were experienced by many cultural groups living within the savannah regions of the continent where metallurgy was developed and practised (Maggs, 1984). For this chapter Huffman's divisions will be followed (and are considered in reverse order): Late Iron Age (1300-1840) Middle Iron Age (1000-1300), and Early Iron Age (200-1000). This reverse order represents a variation of the direct historical approach (Huffman, 2007) and is aimed at understanding the similarities and differences in the typology of decorative metalwork in the regions where various cultural groups are historically associated with existing archaeological sites.

A significant amount of archaeological work was carried out over the past near 100 years at Iron Age sites dating to the last 1500 years. This work has exposed the various contexts in which decorative metalwork was used during this period. Archaeological sites dating to the 17th to 19th century such as Marothodi near Rustenburg and other chronologically overlapping Tswana towns of the Bankenveld have indicated that iron, copper and bronze were used to make ornaments as beads, ear-rings, and pendants (Hall et al., 2006). In addition, iron was used to fabricate knives and axes, some of which may have been used for ceremonial purposes. During the same period, distinctive cast ingots known as *lerale* (copper or tin) and *musuku* (copper) were used in various parts of what is now Limpopo Province. Excavations at the major and long lived sites such as Mapungubwe, Great Zimbabwe and Khami have yielded a great deal of ornamental objects such as beads, pendants, and amongst others, bangles made of iron, copper, gold, bronze, brass and rare instances, tin (Caton-Thompson, 1931, Fouché, 1937; Robinson, 1959; Childs, 1991; Childs & Dewey, 1996). Often some of the objects were made of two or three metals or alloys. For this group of expressive, or ceremonial, objects decorative spears and axe heads, bronze and iron were utilised in their manufacture and gold, copper and bronze in their decoration (Bent, 1892; Caton-Thompson, 1931; Garlake, 1973; 1983). When compared with the second millennium sites, those dating to the first millennium yielded comparatively fewer objects whose range and uses was limited. However, the available evidence indicates that only copper and iron were used to make Early Iron Age decorative metalwork such as beads and bangles. As such, there is a clear developmental trajectory from the early second millennium onwards in the course of which new metals and objects were added indicating a great deal of interaction with other cultural groups living and trading in other areas such as the Indian Ocean seaboard (Killick, 2009). It has been argued that gold, bronze, and brass were all derivative in origin but that they were worked using techniques already used for working copper and iron in the Early Iron Age speaks of innovation and improvisation. The nature of the object types and techniques of manufacture invested during the entire Iron Age suggests that metal smiths knew about the behaviour and properties of various metals and alloys. For example, the malleability of gold dictated that it was hammered into a sheet which was used as a wrapping for wooden and iron objects for insignia of state (Bent, 1892: 180; Mudenge, 1988: 181; Maggs, 1992; Miller, 2001; Pikirayi, 2001: 115; Chirikure, 2007). Overall, a consideration of the objects used from the 19th century, all the way back to the early first millennium, demonstrates a great deal of continuity and change in the way in which objects were made and used. This when coupled with the various contexts of recovery is a window through which various layers of technological, sociological and anthropological information can be accessed. An archival study of published archaeological reports is an important data mining exercise because decorative metal work mostly appears in frugal instalments, such that the distribution of various objects through space and time is hardly known. This particular kind of research provides the motivation for this chapter.

5.2: THE LATER IRON AGE

Based on Mason's (1986) theory, it is now believed that the Later Iron Age in southern Africa covered the period between 1300 and 1840 AD (see also Huffman, 2007: 393). This long period witnessed a great deal of local and regional mobility as well as intensified links with the Indian Ocean world. The arrival of the Portuguese after 1500 also introduced new dynamics into the economy, politics and technology to the region. Although a significant amount of archaeological work was carried out at various sites dating to this Later Iron Age period to date the material has not been consolidated. The map (Figure 5.1) indicates the position of some of the archaeological sites that yielded evidence of metal working industries and the associated decorative metalwork discussed in this chapter.

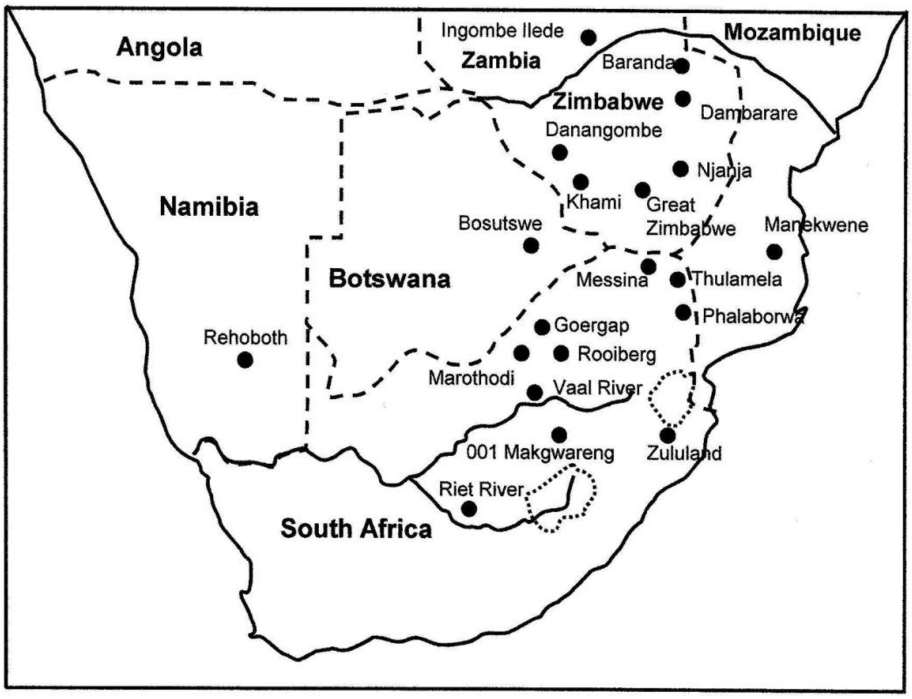


Figure 5.1 Position of Later Iron Age archaeological sites mentioned in the text.

In an attempt to delineate regional patterns, motivated by different regional histories, the discussion in this chapter focuses initially on the Zimbabwe plateau and adjacent areas, and later on the areas to the south of the Limpopo River. Although it is clear that modern political boundaries did not apply in the past, this division is an attempt to see if landscapes associated with ancestral Shona people (Zimbabwe plateau) and Tswana and Nguni groups (south of the Limpopo) are also linked with differences in the nature and types of decorative metalwork used (Maggs, 1984; Pwiti, 1999; Huffman, 2000; Pikirayi, 2001: 31)

5.2.1: DECORATIVE METALWORK FROM LATER IRON AGE SITES ON THE ZIMBABWE PLATEAU AND ADJACENT LOWLANDS.

For six or seven centuries before 1900, the Zimbabwe plateau and adjacent lowlands were dominated by the Shona and their neighbours (Beach, 1984). These groups not only interacted within themselves, but also with the outside world, initially with the Swahili and later with the Portuguese (Garlake, 1973: 193; Pikirayi, 2001: 19; Mitchell, 2002: 328; Huffman, 2007: 395). The association of this very large area with the Zimbabwe culture, the tradition of building elite residences inside dry-stone walls or on dry-stonewall terraces within this area and time period has dictated that most of the archaeological work done to date comes with only a few exceptions from the sites believed to have been former capitals (Garlake, 1973, 1978; Steyn et al., 1998; Miller et al., 2001). These capitals were administrative and commercial centres characterised by clear class distinctions (Earle, 1991, Huffman, 2007). Due to the fact that they vary in size, within the plateau region, centres such as Khami (1450-1650) displayed similar features such as building style and ornamentation to those of Danangombe (1650-1820). There are also numerous smaller zimbabwes such as Castle Kopje, Harleigh Farm, Tsindi Ruins at Lekkerwater and Musimbira Ruins; Bikita district, where archaeologists uncovered evidence of ornamentation and expressive non-utilitarian objects from burials (Robinson, 1959; Robins & Whitty, 1966; Munroe & Spies, 1975; Rudd, 1983; Walker, 1991). Further archaeological sites such as Chedzurgwe, Muyove and Nyarinde River in the north-west copper producing area of Hurungwe district and the Ruin sites of Nhunguza and Ruanga to the north-east of Harare, exhibit sparse but similar cultural material associated with elite societies (Garlake, 1970, 1973).

Danangombe was the capital of the Changamire state which flourished between 1650 and 1820. Excavations at the site exposed copper decorative ornaments such as bracelets, beads as well as bangles. One burial exposed in an enclosure believed to have been occupied by an important person revealed a significant amount of copper bracelets on the ankle of the skeleton (Chirikure, 2015). Another important capital that yielded decorative metalwork is Danangombe's predecessor, Khami (Pikirayi, 2001: 200). Khami, a present day World Heritage site, is well known for its distinctive architectural features; some of them inherited from the local Leopard's Kopje traditions (Munroe & Spies, 1975; Garlake, 1976; Rudd, 1984, Walker, 1991, Steyn et al, 1998; Pikirayi, 2001: 201). In 1947, a hidden chamber revealed a cache of royal regalia comprising iron axes, one of which had a distinctive wooden handle decorated with copper sheets, iron spears, two copper cross ingots, small ivory carvings and diviners ivory dice (Robinson, 1959). Robinson (1959) mentions that copper and iron beads were very common. Most copper and copper alloy objects from Robinson's (1959) excavation had biconical forms and were made by hammering sections of copper/bronze rods into rings which were further hammered to produce a carinated profile without welding the ends. In addition to copper based ornaments, numerous gold beads were found but no description of manufacturing techniques is provided. Beside these ornamental objects, ceremonial iron axes were also found, and these were decorated with copper and bronze wire. These weapons were of ritual significance and could be preserved over a long period. Robinson (1959) mention that amongst the metal working tools excavated at Khami was a wire drawing plate indicating that the wire-wound bracelets found at this site were made at this site.

The smaller *zimbabwes* in outlying areas exhibited some of the noticeable features of the Zimbabwe culture in their use of stone walls, built to surround sacred or inhabited areas. The majority of these structures were generally erected in secluded areas amongst the boulders on hills. Most were large enough to contain some daga dwellings for the elite and their families, while other ruins such as Tsindi was transformed from a dwelling area into a religious shrine in the Later Iron Age (Garlake, 1970, 1973; Rudd, 1984). The significance of the sites discussed resides in the appearance of metalwork and related activities which was more apparent at some occupational sites than at others (Garlake, 1970, 1973, 1976; Rudd, 1984; Walker, 1991; Steyn et al., 1998; Miller et al., 2002).

Within central Zimbabwe a series of archaeological excavations took place in the 20th century, in controlled conditions on hill-top ruin locations, some exposing burials associated with minor rulers living in stone walled *zimbabwes*. Four sites were chosen, three of which on the basis of their noteworthy burials containing skeletons adorned with gold beads, wire-wound bracelets of gold, copper, and iron, and indicating that, if the objects were not created within the locality they were acquired as personal possessions endorsing the rank and status of the buried. These sites include Harleigh Farm (14th-16th century), Musimbira (1480), Tsindi Hill at Lekkerwater (900-1600), and Castle Kopje (1200-1400) (Robins & Whitty, 1966; Munro & Spies, 1975, Rudd, 1984; Walker, 1991).

Two archaeological sites situated in the granite kopje and sandvelt country were investigated within the ruins of Harleigh Farm. The archaeological location became known as No. 1 Ruin, and represented an example of an outlying settlement demonstrating features of the Zimbabwe culture (Robins & Whitty, 1966). The ruins contained a burial which lacked grave goods, while the material culture was negligible, the items that were found came from a midden below floor B where pottery fragments, bone and beads were found (Robins and Whitty, 1966). If metal work was practised at this site, it was thought not to have taken place within or near the settlement. The authors attest that iron might have been a scarce commodity as only a few objects were found in various stratified levels. The inventory of ornamentation displayed a greater variety: a corroded bracelet fragment of wire- wound iron over a fibre core (21/3). Items made of copper consisted of seven fragments of copper wire, three found binding a fibre core (T/1, T/2, 10/1, 21/7 (2) 23/2). A number of copper and brass beads were retrieved, the copper beads being created from thin strips of metal bent round and butt-jointed, while the thick brass beads had a biconical section and the joints were welded. Part of a copper ring (10/2) was also found. There are no supporting measurements for these objects. Like several sites exhibiting the Zimbabwe culture, a sparse collection of iron and copper metalwork was recovered from this site from a number of pits and stratified horizons.

The archaeological ruin site at Musimbira revealed a material collection of pottery typical of Zimbabwe III/IV (quoted both in Robinson, 1961, and Munro & Spies, 1975) the metal work of gold and copper wire was also typical of the metal work from this site. The evidence of the latter was found surrounding a juvenile skeleton, decorated with copper and gold body ornaments. The measurements for the gold wire artefact from strata 3347 (C4) showed a circumference of 12 to 14 cm and the object appears to be a bracelet. The gold ribbon wire is flat (5 mm wide and 3 mm thick) and wound into a spiral; the necklace from the burial is about 38 cm long and approximately 17 to 18 coils per centimetre (Munro & Spies, 1975). No further information is available on the metal crafting activities at this site other that the daga building on the site were created for the chief and built in the locality for political purposes (Munro & Spies, 1975).

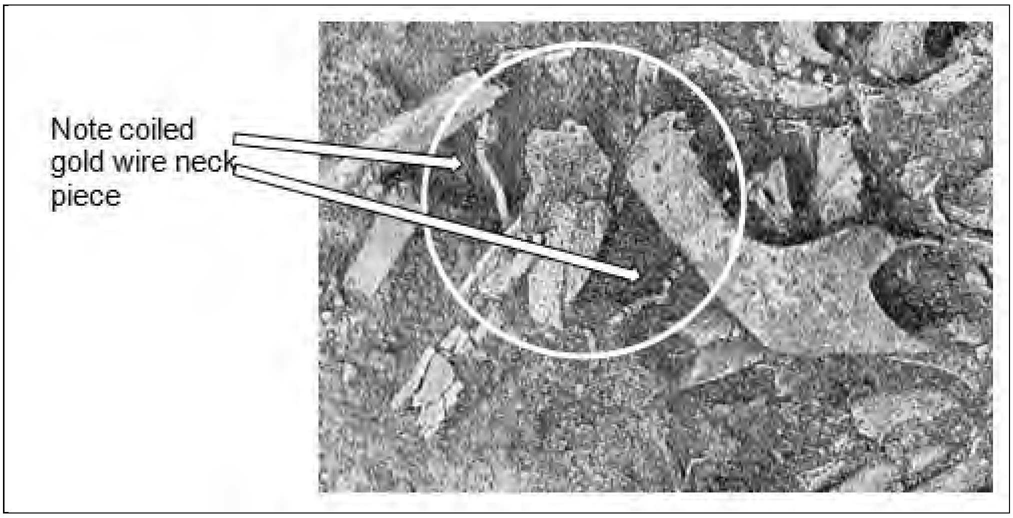


Figure 5.2 A photograph showing the gold neck-piece beneath the bones of a juvenile, at Musimbira, Zimbabwe (Munro and Spies, 1975:9).

The archaeological evidence from the stone walled ruin on Tsindi Hill at Lekkerwater supports a continued occupation over several centuries (Rudd, 1984). The earliest evidence from this site was dated to about 900 where the use of stones for walling differed from that of later centuries (Rudd, 1984). The second phase was dated to 1450 where Q walling identified the site as falling within Zimbabwe Culture. During the third phase of its continuous occupation, about 1600, it appears that the site became a religious centre and was destroyed at the beginning of the 19th century (Rudd, 1984). The material associated with metal work was found in phase II, with residues of iron slag, hammers, grinding stones, and an anvil, suggesting activities of smelting and smithing. A quantity of rusty iron weapons found suggests a specialisation in the manufacture of these wares; there were 18 arrow heads, some with added details of barbs and distinctive tangs, which came from surface layers (1) to (3) (Rudd, 1984). Nine thin rusted blades were found in the same surface, some of them which had distinctive tangs, and others ended with coils; a spear and two iron shafts complete the collection or arms. There is scant reference to decorative metalwork, although the find included two iron bangles, one anklet (no measurements), and six copper beads. There is one gold ‘ring’ (1.5 x 3.5 mm) found in Hut K in IIC (i)

(Rudd, 1984). The six copper beads were of three different sizes (2.0 x 4.0 mm; 3.0 x 8.0 mm; 4.0 x 8.0 mm), and came from the surface, one copper ‘ring’ (1.0 x 1.0 mm) from the stone midden, while two copper beads had their ends overlapping (9.5 x 5.0 mm) and came from different huts, IIB (3) and III A.E. midden respectively (Rudd, 1984). An analysis of the metal working activities endorses a community whose interests in metalworking was confined to specialisation in weaponry.

The stone walled hill-top site of Castle Kopje in the vicinity of Wedza, indicated the features of a *zimbabwe* constructed amongst massive boulders, with pole and daga huts built within the architectural structure. This site has a noteworthy burial in an elaborate funerary hut, which is suggested to have been that of a high ranking woman, based on her small body size, and her being buried with her personal belongings consisting only of gold, iron and copper body ornamentation (Walker, 1991; Mitchell, 2002: 325). The excavation was considered uncommon as it was excavated under professional conditions with the recovery of the gold ornaments in their original context, considering that in the past many graves within Zimbabwe had been destroyed by treasure hunters (Hall & Neal, 1972; Walker, 1991). The burial was broadly dated to about 13th to 15th centuries (Walker, 1991) while in stratification terms the grave was situated in Unit 5, while Unit 6 lay on bedrock.

The inventory of the gold artefacts indicated a variety of gold cast beads, and gold wire-wound bracelets, amongst many iron and copper bracelets made in the same manner. Figure 5.2 shows the collection of decorative metal surrounding the skeleton showing bangles and bracelets. The initial collection consists of 170 small cast gold beads strung in lengths of 30 to 40 mm and might suggest groups of 12 ringlets of up to 15 beads in length, which in turn are thought to have been suspended from the hair or stitched to a garment (Walker, 1991). The small beads are regular in shape and measure on average 3.0 mm in diameter, 2.0 mm in length, the bore being 2.0 mm and weigh 0.05 g. Two large lenticular solid cast gold beads were found and weighed 2.5 g each, their lengths on average being 5.5 mm, while their diameters were 7.5 and 8.0 mm, and the bore was about 1.5 mm. There were three gold wire-wound bracelets created from rectangular sectioned wire while the ends of each bracelet had been neatly joined by welding (Walker, 1991). They measured 1.4 x 1.3 mm; 1.2 x 1.4 mm; 1.1 x 1.1 mm in width and thickness respectively. The diameters of the coils were 4.9 mm, 3.3 mm, and 4.8 mm while the bangles’ circumferences were 278 mm, 229 mm, 273 mm, they weighed 21.9 g, 10.1 g and 24.1 g respectively. The iron bracelets were made in the same manner and were in a poor state of preservation; one example showed that a strip of gold foil had been wrapped around a section. The copper bracelets were similarly manufactured and their condition was in a better state of preservation and could thus show the friable vegetable core *in situ*. When considering the cluster of the four professionally excavated sites in central Zimbabwe, Castle Kopje seems to be the only site where all the crafted metal work was brought to the site, as compared to the others which registered a certain amount of metal working taking place in the settlement.

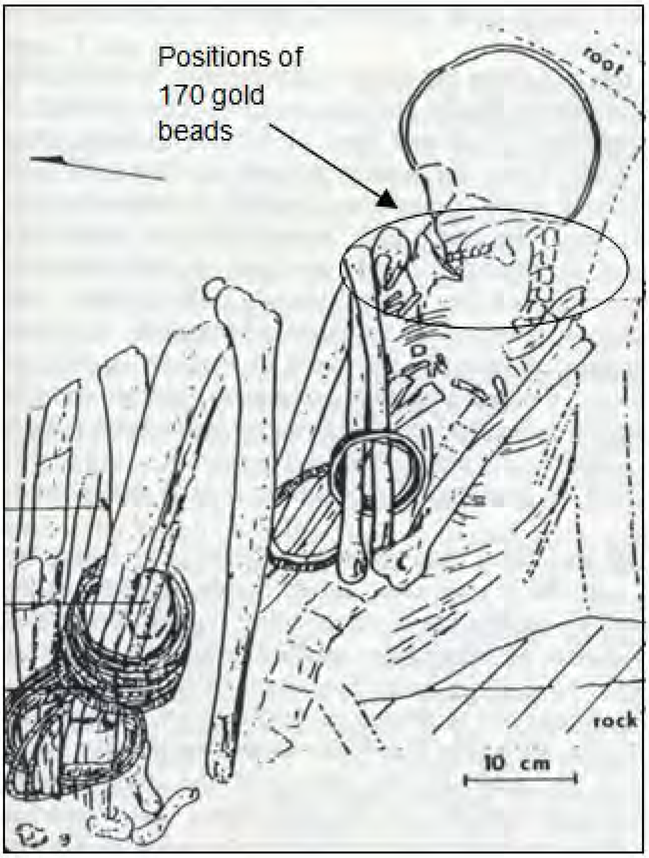


Figure 5.3 A diagram showing the arrangement of gold beads, bangles and bracelets surrounding the skeleton at Castle Kopje. (Walker, 1991: 143)

Between the eastern border of Zimbabwe and the coastal lowlands towards the ocean lies the ruined *zimbabwe* of Manekweni, built from limestone and situated in southern Mozambique (Garlake, 1976, 1978). The importance of this site is that it exhibited many features of the Zimbabwe Culture, including the daga walled dwellings of the ruler and his followers within stone walls, validating his elevated status and position in the community. Pottery and ceramics, those locally made and those imported from Chinese, Persian and Iberian sources, including a quantity of glass beads and shell beads were features of the material cultural collection (Garlake, 1976). The dating of this site from radiocarbon tests indicates that the locality was occupied from the12th to 17th centuries (Garlake, 1976).

The importance of this site is noted based on the range of metal work produced which relied entirely on imported metal; iron, gold and copper as there are no available ores in this coastal region. The fact that iron smithing took place is supported by evidence of slag and two pieces of tuyères. The iron objects produced include a barbed iron arrowhead, the head being (23 mm long) and a tapering tang measuring 142 mm (Garlake, 1976). A similar arrowhead with a coiled end, and the fragment of a tang was also found. The collection of manufactured ornaments from copper was more extensive. There were 24 copper beads, mainly from later deposits; most were made of thin butt-jointed strips of copper, and about 4.0 mm to 6.0 mm in diameter and 2.0 mm to 3.0 mm wide, the largest being 12.0 mm in diameter and 7.0 mm wide. There were three cast truncated biconical beads the same size as the strip beads (Garlake, 1976). Fragments of square sectioned copper wire were also found, (0.2-0.5 mm in diameter) at all levels. Fourteen of these were more than 2.0 cm long, while the longest was 12 cm. Like the copper wire iron wire was made and used for creating wire-wound bracelets and anklets. The copper wire wound into bundles, of which seven were found, attests to their use as a form of currency (Garlake, 1976). Their measurements were 3.5 cm across and of 3 to 10 turns. The copper ring was also retrieved measuring 8.0 mm in diameter made from two intertwining strands of wire, and which might have decorated a wooden shaft (Garlake, 1976).

An archaeologically excavated skeleton within the stone structure, confirmed the ruler's status, and had been buried with grave goods of pottery, copper and gold beads. The artefacts found at this site were those of a prosperous later Iron Age community within the southern Africa interior. At this site the metal craft-workers smithed with iron and copper to produce weapons, and manufactured ornaments from the metals they acquired through trade from locations where ores were available.

Thulamela is a hill-top stone walled site built in the Zoutpansberg Mountain range that lies to the south of the Limpopo River. It forms the southern-eastern limit of the Zimbabwe culture (Steyn et al. 1998). Within this *zimbabwe* of wide and high walling there was evidence of centuries old occupation under the leadership of elite rulers (Steyn et al., 1998). From archaeological evidence the site has been dated to 13th to 17th century (Steyn et al., 1998). The significance of this site is that it was investigated under controlled conditions exposing relevant details confirming the melting and/or the reworking of gold on site. This evidence was noted in ceramic shards showing glassy slag containing droplets of gold (Küsel 1972; Miller et al, 2001; Desai, 2001). The assemblage of gold objects consisted of beads, nodules, wire fragments of wire-wound bracelets, amongst fragments of fine plate and nails. Two elite status bearing individuals in the Zimbabwe culture had been buried within the stone structures. The male, thought to be one of the earliest leaders of this stone wall site, dated to 13th century, was buried with his personal goods consisting of several pieces of gold and copper plate pierced with small nails, a double gong a feature supporting kingship in Zimbabwe and the Congo (Fagan et al., 1969; Steyn et al., 1998), clay pots, lions teeth, a hyena mandible, three gold beads, the latter from different stratified levels. The material cultural evidence surrounding the woman showed to have held a prestigious position in the community towards the end of the site's occupation (Steyn et al., 1998). Her personal possessions consisted of wire-wound gold bracelets, a triple wire wound bangle found on her right wrist, (see Figure 5.4), showing three twisted thick gold wires decorated in areas with fine wound gold wire decoration, gold beads, an iron necklace decorated with gold staples, and a quantity gold beads. The absence of glass beads and weapons was a feature of this site which the authors found unusual (Steyn et al., 1998). It is thought that the influence of the Portuguese, and civil war in Zimbabwe, prejudiced the future of this settlement in the 17th century (Steyn et al., 1998: 84).

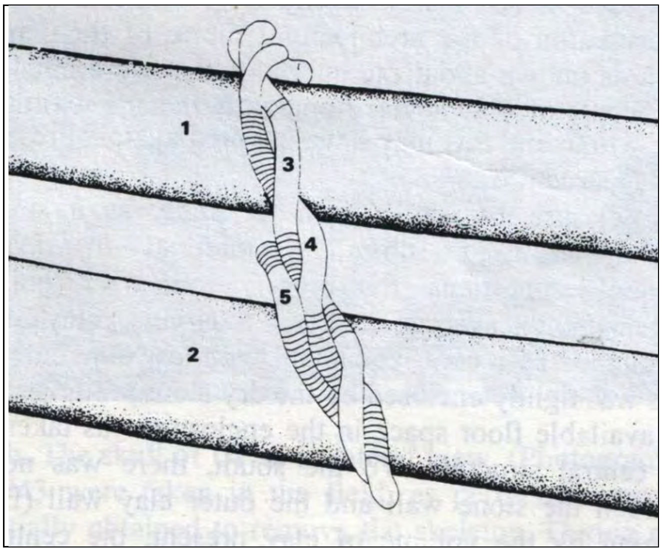


Figure 5.4 The drawing shows the (3, 4, 5) triple gold wire intertwined bangle around the (1 & 2) ulnar and radius exposed at Thulamela, north-eastern South Africa. (Steyn et al., 1998:77).

Great Zimbabwe yielded evidence of major metalwork processes in gold, iron, copper and bronze but most of the evidence was destroyed by treasure hunters in the 19th century (Bent, 1892; McIver, 1902; Hall & Neal; 1972, Caton-Thompson, 1931; Fagan, 1969). Those finds recorded by professional archaeologists have confirmed substantial evidence of gold work in the form of fragments, beads, bracelets and gold foil used for decorating wooden, and some metal artefacts, such as ceremonial spears and axes (Bent, 1892; Hall & Neal, 1972; Mudenge, 1988; Childs & Dewey, 1996). Although many excavations have taken place, most of the gold finds are from unstratified levels and are therefore undateable (Oddy, 1984). The author argues that they undoubtedly belong to the same tradition as that identified at Mapungubwe (Oddy, 1984). A further valuable discovery at Great Zimbabwe constituted evidence or gold working supported by a gold crucible with adhering gold globules trapped in the surface with gold residues which are the products of melting operations (Hall & Neal, 1972; Caton-Thompson, 1931; Garlake, 1972; Oddy, 1984; Küsel, 1992).

The beads produced throughout the Iron Age have been generally described as "simple folded cylinders" (Crawford, 1967: 378). They were achieved by bending strips of metal, or lengths of wire or rod into wire circular forms (Caton-Thompson, 1931; Fouché, 1937; Hager, 1940; Robins & Whitty, 1966; Miller, 1996; Desai, 2001; Soper, 2002; Denbow & Miller, 2007). Several techniques were applied in the manufacture of gold beads. Garlake (1973: 115) confirms that gold beads were occasionally cast but usually formed by bending together narrow strips of metal with their ends butted, or more often clamped over wire-wound bracelets. The shapes of cast beads found were cylindrical, spherical, cuboidal, barrel or biconical (Jones 1938; Robinson, 1959; Garlake, 1973; Walker, 1991). The cylindrical beads may have been cut from cast tubes, their dimensions being less than 0.2 mm in diameter (Jones, 1938; Garlake, 1972; Oddy, 1984). Thin rods were bent round to make simple bangles while wire-wound bracelets were created from strip ribbons and also from drawn gold wire, their manufacture confirmed by the presence of a wire drawing plate and tongs found at Great Zimbabwe (Bent, 1892; Caton-Thompson, 1931; Hall & Neal, 1972; Garlake, 1973; Oddy, 1984, 1991).

Objects made of iron outweighed the metal collections made at Great Zimbabwe; much of these collections consisted of domestic tools, such as hoes, axes, chisels, arrowheads and knives (Herbert, 1996). Iron also played an important role in the non-utilitarian or expressive sphere as noted in the prominent role that iron played in body ornaments especially those made for chiefs (Crawford, 1963; Childs, 1991a; Childs & Dewey, 1996). Iron smelting and smithing took place at Great Zimbabwe throughout the main occupation (1300-1450) (Garlake, 1973). Specimens of slag were found in the basal midden on the Hill, in the soil below Maund Ruin and in a midden underlying the elliptical building. Residues of iron working activities were retrieved from the floor of the cave below the Eastern Enclosure on the Hill (Garlake, 1973; Herbert, 1996).

Objects made of iron include arrowheads, noted for their long tapering rectangular tangs, spearheads with similar tangs, smaller triangular foliate heads and knife blades with short tangs coiled at the end, indicating they were hafted through short handles. Some worn out hoes with thick short tangs and small axe heads, form part of some collections (Garlake, 1973)

A distinct feature of this period was the smithing of 'ogee' type stepped mid-ribs noted on hoes and some spearheads (Garlake, 1973: 114). The ceremonial spear heads of iron, copper and bronze are described, with the bronze examples of ceremonial objects from Khami carrying more detailed descriptions (Robinson, 1959). The measurements of these objects from the National Museum in Bulawayo include lengths and descriptions of blades, and maximum widths of blades. Descriptions of tangs and length and the total length of the object have been placed into a table (Table 5.1) for easier comprehension.

Key A: Museum No. 4310

B: Museum No. 4312

C: Museum No. 1150

D: Museum No. 4313

E: Museum No. 4311

Figure 5.5 A collection of blade shapes and decorated shafts of ceremonial implements found at Khami (after Garlake, 1983; No page numbers (5 specimens on the right) (Museum codes from Robinson, 1959) and on the left from Great Zimbabwe (Caton-Thompson, 1931: 196).

Table 5.1 Dimensions of ceremonial spears from Great Zimbabwe and Khami Ruins (1300-1445 AD).

Author, date	Locality	Metal (Museum no)	Length cm	Max width cm	Tang shape	Length cm	Total length cm	Other information
Caton-Thompson, 1931	Great Zimbabwe	Bronze	No measurements					W. Temple Acropolis
		Bronze	No Measurements					W. Temple Acropolis
	Bulawayo Museum	Bronze	No measurements					W. Temple Acropolis
	Danangombe		No measurements					Position unknown
Robinson, K. (1959)	Zimbabwe Bulawayo Museum	Bronze (#4310)	32.5	6.5	Round	13.5	56.0	Blade leaf-shape. Tang worked in a series of rings. Wire binding still in place.
		Bronze (#4312)	11.5	2.5	Round	16.0	25.5	Blade leaf-shape. Tang worked in a series of rings wider apart than above.
		Bronze (#4311)	25.0	5.8	Round	6.0	ca.31.0	Blade: broad leaf-shape
		Bronze (#1150)	11.5	3.0	Rect-angular section	13.0	13.0	Blade: tapering leaf-shape. Tang: four sided and roughened by chisel marks and bent.
		Bronze (#4313)	17.0	4.1	Octagonal	16.5	33.5	Blade: tapering leaf-shape, tang: decorated with three double bands.
		Bronze (#4314)	11.5	2.6	Rect-angular section	15.0	26.5	Blade: narrow leaf-shape
		Bronze (#4315)	No measurements					Specimen twisted and bent, tip missing. Fragmented.
		Iron (#4291)	8.0	14.0	Socket	14.0		Blade: triangular, central (broken) mid rib Remainders of iron spears
		Iron (#4292-4309) Iron	Barbed spear-head	7.0	4.0			Central mid-rib, hafted onto wooden shaft. Copper wire binding.

From Table 5.1 above it can be noted that most of the bronze blades are dissimilar in their length measurements, which range from 7.0 cm to 32.5 cm, while 2 bear similarities: both are 11.5 cm, long, and are described as leaf-shaped with details observed as narrow, broad or tapered. The widths of the blades show comparable features with 2 of them having similar widths; 2.5 cm and 2.6 cm. The tangs of both blades are similar, both being round rather than rectangular and octagonal. The lengths of the tangs indicate a wide divergence, from 6.0 cm to 16.5 cm while the overall lengths of the spears differ most, from 13.0 cm to 56.0 cm. It is in the decoration of the tangs that their greater distinction lies. Specimens No. 4310 and No. 4312 indicate the craft-worker's skill in creating a series of raised rings placed close together, while the second show rings that are placed further apart (Robinson, 1959) (See Table 5.1). It is reported that decorative wire binding was still in place on No. 4310 and No. 1150.

In her analysis of ceremonial spears and axes from Great Zimbabwe and Khami, Childs (1991a) examined nine specimens for their manufactured details. One section of the study concentrated upon expressive objects only. In her assessment these objects were poorly welded and made from thin sheets of ferrite or low carbon steel which would easily have bent with use (Childs, 1991a). Some of the axe blades she inspected showed a large gap in the centre where two metal layers were marginally pressure welded together and were further damaged by corrosion. The alternative theory, she posited was that axes made for daily use were manufactured from a uniform low or medium carbon steel, and were carefully welded, indicating that the craftsman was aware of the functions that the axes would serve and the attrition to which they would be subjected to (Childs, 1991). Data from the literature have been examined, based on the information available on axes (see Table 5.2) and the range of blade lengths can be noted to be from 25.00 cm to 49.0 cm, while the maximum width of the blades ranges from 6.0 cm to 23.5 cm. From the scant information available the differences in lengths and widths for ceremonial implements in comparison to utilitarian tools does not seem apparent or significant.

The conspicuous features of ceremonial spears and axes were the distinguishing etchings on the blades and the wire complex bindings on the shafts (Table 5.2). The distinction of expressive axes is that they mostly have crescent shaped blades (Childs, 1991a). Their exclusive use was in the realm of ritual and ceremony for diviners, healers and spirit mediums, and esteemed as symbols of power and prestige for rulers (Childs & Dewey, 1996).

Table 5.2 Distribution of wire with dimensions from sites in Zimbabwe in the Later Iron Age (1840-1300 AD) sourced from literature.

Author, Date	Period	Locality	Metal (-) no of specimens	Diameter and width mm	Other information
Caton-Thompson, 1931	14^{th} to 15^{th} centuries	Great Zimbabwe	Copper / bronze	1.8, 0.43	Thinness: 0.25 mm
		Mauch Ruins	Copper / bronze	0.76 to 0.51	Hammered wire, Thinness: 0.24 mm
		Mauch Ruins	Copper / bronze (4)	3.5, 0.3 to 0.37	Oval-sectioned, curvature on metal noticeable

Author, Date	Period	Locality	Metal (-) no of specimens	Diameter and width mm	Other information
			Copper / bronze	1.14, 0.41 to 1.14	
Garlake, 1966	17th century	Mutoko site	Copper / bronze coil Copper coils	0.2 2.0 to 2.5	Length: 23 cm, Level 6, fragments: Level 5 Length: 9 cm, Level 5 Length: 1 cm, Level 1 18-23 turns to the cm
Garlake, 1969	17th century	Dambarare	Copper / bronze Iron	2.0 to 0.5 1.5	Square and rectangular section Coil: 5 mm diam. Circular cross-section
Soper, 2002	17th century	Baranda	Copper / brass	1.5 to 2.0	Triangular section

Table 5.3 Distribution of beads with dimensions from sites in Zimbabwe in the Later Iron Age (1840-1300), sourced from literature.

Author, Date	Period	Locality	Metal: (-) no of specimens	Diameter and width mm	Other information
Zimbabwe					
Caton-Thompson, 1931	15th to 19th centuries	Matendere	Copper beads (5)	5.0-9.0, inner diameter 2.0 to 3.0 mm	Central bore 3.4 mm
Robinson, 1959	17th to 19th centuries	Khami	Iron Copper Gold		
Garlake, P. 1966	17th century	Motoko	Copper (2) Copper Copper Copper Copper Copper Copper	2.00, 1.00 4.0, 1.0 5.0, 3.0 6.0, 3.0 5.0, 6.0 5.0, 3.0 5.0, 2.0	Strip wrap-around beads Ditch level 6 Strip wrap-around beads. Ditch level 5 1.5 thick, cast bead, Midden level 2 Rough biconical; Midden level 1 1.0 mm thick bead, Midden level 1 1.0 mm thick, Midden level 1
Garlake, 1969	17th century	Dambarare	Copper / bronze Copper / bronze Copper / bronze	2.0-4.0, 1.0-2.0 3.5, 2.0 6.3	Strip wrap-around beads Biconical cast beads Cast, spherical
Garlake, 1973	17th to 19th century	Ruanga Ruins	Iron Gold	3.0, 3.0 2.5, 2.0	Cylindrical Cylindrical
Rudd, 1983	16th to 19th centuries	Tsindi Hill Lekkerwater	Gold Copper (4) Copper	1.5, 3.5 2.0, 4.0 3.0,8.0 4.0, 8.0 1.0, 1.0 9.5, 5.0	'Ring' 'Rings'
Soper, 2002	17th century	Baranda	Copper / bronze	4.0-6.0	Biconical

During the later centuries of the Late Iron Age adjustments in power, trade and economic patterns took place which caused the decline of the Great Zimbabwe city state (1550) and the rise of the Torwa (1450-1650), Changamire-Rosvi (1690-1830), and Mutapa (1450-1900), as well as cultural entities situated to the north, east and south west of Zimbabwe (Pikirayi, 2001: 28, 2013; Mitchell, 2002: 335). From the commencement of the rise of Great Zimbabwe smaller *zimbabwes*, under the leadership of minor chiefs, were constructed on hilltop summits with substantial walls and housing arrangements for families and followers, and in many instances showed similar metallurgical material cultures with some variations depending on the ores available in proximity to settlements. Not all sites were residential sites; some such as Tsindi and Castle Kopje were religious shrines (Rudd 1984; Walker, 1991). At this time there was greater participation by the Portuguese merchants in the various cultural groups' economic and political affairs recorded in oral testimonies and documentation by commentators and archivists (Axelson, 1951; Roodt, 1993, 1996; Childs & Herbert, 2005; Finneran, 2002; Pikirayi, 2013).

To the north-west of Mashonaland there are three Iron Age ruin sites; Chedzurgwe, Muyove and Nyarinde River in the Urungwe District which were investigated by Garlake (1970); these sites fall within a large copper ore bearing region. The archaeological finds from these three sites demonstrated the degree to which the metal smiths put this product to use for copper ingots, ornamentation, and tools for domestic use (Garlake, 1970). Chedzurgwe was a small isolated hill on the northern border of Rydings Farm. From excavated material the site was dated to about 1440-1600. Iron and copper artefacts were evident, with the latter being more apparent than iron objects (Garlake, 1970).

The evidence of copper work was noted in saved wire fragments for bangle and bracelet making, and two cast ingots (Garlake, 1970). The fragments of wire had two different sections, square wire was used for a number of bangles, its dimensions being 5.0 mm wide and 'paper' thin wound over a bast fibre to form a coil 2.0 mm to 3.0 mm in diameter with 20 turns a centimetre. A square section copper rod 55 mm long and 2.0 mm wide was part of the assemblage. The copper finds included a small bundle and two short lengths of a finer wire 0.3 mm in diameter retrieved from the midden; suggesting that this could be drawn wire (Garlake, 1970). The copper ingots came from a surface find and weighed 3106.5 and 3528 g and measured 30 cm and 33 cm respectively. The ingots were cast in open moulds and were not worked after casting and might have formed units of currency to be used in the prestigious economic and social sphere (Garlake, 1970; Bisson, 1975, 2000; Swan, 2007).

The sparse evidence of iron work is apparent in a short tanged, arrow head with a raised midrib, which was recovered from a midden. An iron razor, an unfinished blank of a spear head, and a large axe with a long triangular blade with a square sectioned tang was recovered from the surface of the site. The material culture of the site included fragments of ivory bangles, a negligible number of glass beads, and ceramic whorls or disks which are interpreted as aids to spinning (Garlake, 1970). The collection of copper, iron and ivory work support the evidence of a skilled community living at this settlement.

The community of Muyove lived on another summit of a steep hill. From archaeological evidence it was apparent that the occupation was prolonged and intensive (Garlake, 1970). The material culture of this site indicated that pottery production was more evident than metal work. The author noted that the small tuyères 4.0 cm in external diameter and 1.0 cm thick walls found at this site indicated that smelting took place (Garlake, 1970). A pellet of unworked copper and a copper bead 6.0 mm in diameter and 1.0 mm in depth was formed from square sectioned wire, while iron made objects retrieved from the site were scant; one large razor with a short round sectioned tang (Garlake, 1970).

A further hill site near the Nyarinde River was the third ruined site in this environment to be investigated, with evidence supporting occupation on the summit. The collection of ceramic shards and figurines showed affiliation with the community at Chedzurgwe (Garlake, 1970). The iron working activities were noted in the smelting residues of slag and tuyères found in the vicinity of a furnace on the south-west side of the hill (Garlake, 1970). The utilitarian tools made from iron included a razor, a thin bladed lanceolate spearhead, with a central mid-rib on one face and a central tang and a small triangular arrowhead.

The copper component of this site consisted of lumps of smelted copper and two fragments of wire bracelets, identical to those found at Chedzurgwe. The three hill-top stone structured sites, represented the residence of minor chiefs and their followers; the small surface collections indicate sophisticated craftsmanship in metal and ivory work from Chedzurgwe. The presence of many ceramic whorls for spinning cotton suggests that other crafts were practised, and as there was a dearth of glass beads it was suggested that people living in this area did not have contact with the international trading routes (Garlake, 1970).

The archaeologically investigated site of Ingombe Ilede in Zambia ca. 1450-1600 indicated that the wealth accumulated by the elite, (a non-Shona group), came from activities such as chieftain-ship, trading and craftsmanship by which they accumulated their wealth in the forms of multiple wire-wound bracelets made from iron, gold, copper and bronze for arm and leg adornment (Chaplin, 1961; Fagan et al., 1969). Accompanying this assemblage were gold cast beads showing dissimilar manufacturing process than the cast beads found at Macardon, Zimbabwe (14th and 15th centuries) (Jones, 1939) or the strip folded beads observed at Great Zimbabwe (Garlake, 1973). Frey (1969) proposes that the Ingombe Ilede gold beads of irregular lengths were cut from cast tubes. The material culture found *in situ* included expressive iron hoes and an axe, ocean derived sea shells, glass beads, cloth and local ceramics (Fagan et al., 1969; Huffman, 1971). The artefacts (see Figure

5.6) supported metal crafting activities include copper ingots and wire, and a tool-kit of iron hammers, iron draw plates, and iron tongs (Fagan et al., 1969).

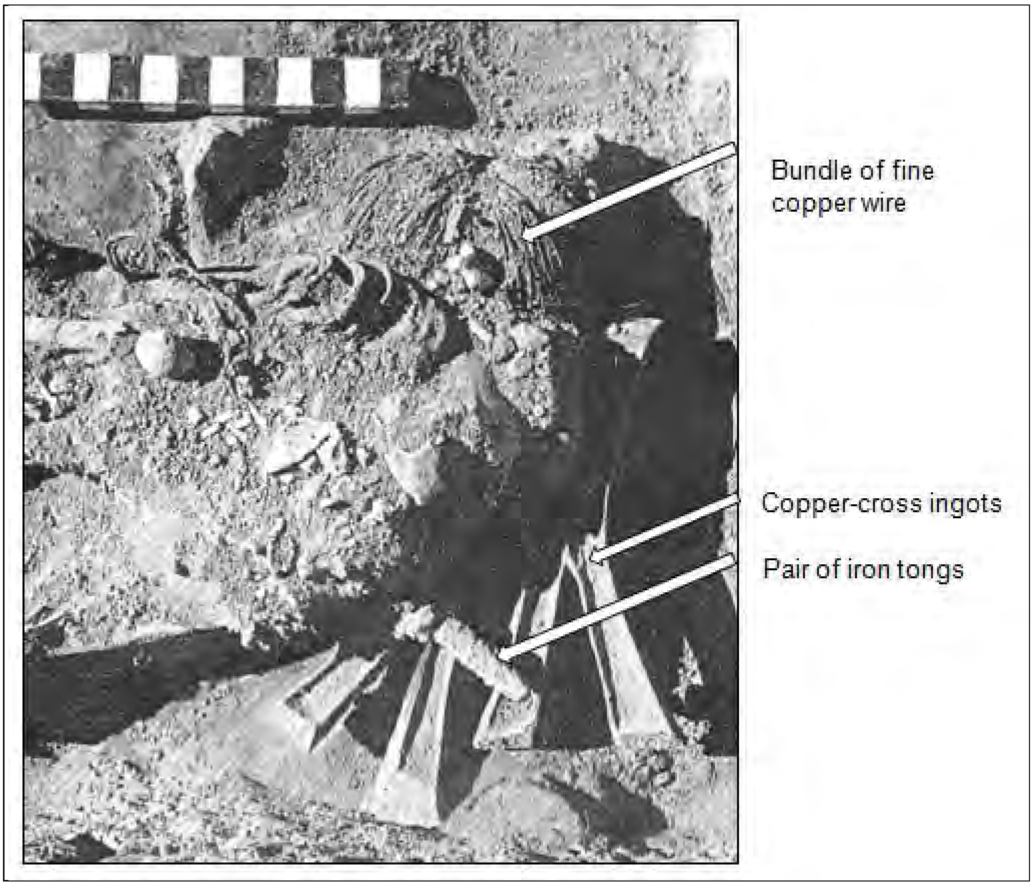


Figure 5.6 The photograph shows copper crosses, fine bangle wire and a pair of tongs shown at the neck of burial II/1 at Ingombe Ilede, Zambia (Fagan et al., 1969, Plate 5(a) no page numbers).

The Figure 5.6 shows the bundle of copper wire, two copper crosses, above which is placed a corroded pair of iron tongs. Significantly two bobbins of fine copper wire with a diameter of 0.5 mm circular sectioned pulled wire were accompanied by square-sectioned wire (2.0-3.0 mm) and were placed besides the wealthiest skeletons (Chaplin, 1961; Fagan et al., 1969). Measurement for the gold and copper beads have not been provided (Chaplin, 1961; Fagan et al., 1969).

Archaeological investigations at Ingombe Ilede indicated that iron working was barely practised while copper slag was not found in the excavations. Three lumps of smelted copper were found accompanying Burial II/3, indicating the intention of future metal working activities (Fagan et al., 1969). The immediate area surrounding this site lacks copper outcrops and it is understood that the metal was transported into the area in the form of ingots (Fagan et al. 1969). The significance of this site is the recovery of iron draw plates and tongs. (See Figure, 5.7) where two significant instruments were found that would affect the course of copper wire cross-section in the future. This provided options in the choice of drawn wire over hammered wire for wire-wound bracelets (Bisson, 1975, 2000). The iron instrument shows a curved flat bar penetrated by a number of holes of varying narrow bores through which copper wire was pulled with the aid of tongs to produce fine wire. The spread of fine circular- sectioned wire averaging 0.3 to 0.5 mm in diameter is inadequately recorded in archaeological excavations within the Later Iron Age.

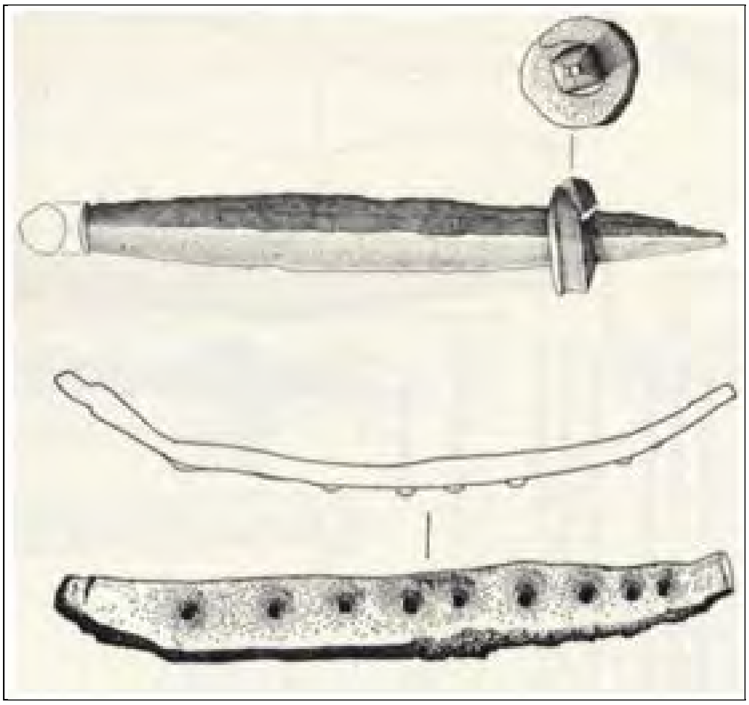


Figure 5.7 Illustrations of a draw plate and tongs recovered from Ingombe Ilede Zambia (Fagan et al. 1969: 97, 99).

5.3.3: THE RETRIEVAL OF DECORATIVE METAL WORK FROM THE PORTUGUESE BASED SITES IN THE LATER IRON AGE

With the arrival of the Portuguese in the 16th century came administrators, archivists and merchants who became known for their ability to record details of their infiltration into the country west of the Indian Ocean ports in search of gold and exotic merchandise (Pikirayi, 1993, 2001: 223). The extent of their contact with, and recording of, the cultural groups of the Mutapa state situated in the north-eastern sector of Zimbabwe is shown by the number of sites that archaeologists have been able to explore (Pikirayi, 1993, 2001).

Garlake's (1966: 157) excavations at Mutoko, close to Luanze, in the vicinity of Tete, indicated that this was a Portuguese trading settlement established to have direct contact with the local gold miners (Axelson, 1951; Pikirayi, 1993, 2001: 227). The material culture of this location is noted in the extensive selection of imported and local ceramic products. Imported Indian opaque glass beads were collected from stratified levels within an excavated ditch and midden attached at the site. A few copper beads were recovered from the lower ditch levels and the upper levels of the midden (Garlake, 1966). Another Portuguese trading settlement was created at Dambarare. It was considered a major site supported by a church for missionary activities (Garlake, 1969; Finneran, 2002). Archaeological records show that this settlement was terminated in 1693, and all of the resident population murdered, including some missionaries. This evidence is supported by the religious material cultural objects buried with them (Axelson, 1951; Garlake, 1969). The site gained attention when a number of elite grave sites and skeletons, those of three Negroid women and one male were found to be interred with profuse copper/brass wire-wound ornamentation, some of it decorated with glass beads. Several authors confirm that the preservation of copper ornamentation took place with the aid of cloth shrouds (Garlake, 1969; Huffman, 1971; Finneran, 2002). The metallic material culture associated with the four skeletons comprised copper or bronze bangles, bracelets, and anklets or necklaces (Garlake, 1969). The fragments of wire indicated that square and rectangular sectioned wire was used for wire- wound bracelets, while thicker wire with a semicircular section was employed for a similar purpose (Garlake, 1969). The copper or bronze beads were made to clip over a fibre core - they were all butt jointed - while some beads showed a variation: the smooth side of the ribbon was placed against the core which produced a barrel-shaped bead (Garlake, 1969). A further form of copper/bronze bead was retrieved; these were cast biconical beads (3.5 mm diameter x 2 mm wide), and one spherical cast copper bead was found (6.5 mm in diameter) (Garlake, 1969). A fragment of a wire-wound iron bracelet was exposed with a circular section (1.5 mm diameter). The ultimate significance of these burials was the mass of metal work on the arms and legs of the three women who wore between them 450 g to 2.5 kg of copper work. The volume of ornamentation presented an expression indicating copper wire-wound bracelets were considered a form of wealth storage in that community including being a form of currency in prestigious spheres (Herbert, 1984; Bisson, 1975, 2000).

In contrast to the details of wire measurements furnished by Garlake at Mutoko and Dambarare, Pikirayi (1993) fails to include the copper wire measurements found at Baranda (1500-1700 AD). He mentions that the use of twisted copper wire suggested a local production of copper beads, which were made by bending pieces of wire over a metal core (Soper, 2002), and thin plain copper wire was sometimes wound on a wooden core to produce bracelets (Pikirayi, 1993). The dimensions of cross-sections of the few fragments of wire archaeologically retrieved are not available, or is information as to whether the wire was pulled or hammered.

5.3.4: EVIDENCE OF DECORATIVE METAL WORK FROM ARCHAEOLOGICALLY INVESTIGATED SITES IN SOUTH AFRICA IN THE LATER IRON AGE

Within certain areas of South Africa there has been archaeological endeavour in assessing the metallurgical activities amongst metal deprived cultural groups (Humphreys, 1970; Maggs, 1976; Miller et al., 1993; Miller et al., 1996; Hall et al., 2006; Chirikure, 2007). There was a substantial measure of agro-pastoral activity in the grasslands of the Free State, North West Province and the Northern Cape in the Later Iron Age (Humphreys, 1970; Maggs, 1976; Chirikure, 2007). Cultural groups in these areas overcame the lack of mineral resources in copper and iron by trading smelted products (Maggs, 1976). This region is known for its lack of trees which would have provided fuel for concentrated metal working interests. Scant information is available on the smithing of smaller objects that were excavated in some archaeological investigated sites in this area, such as 001 Makgwareng, Koffiefontein, De Hoop; Kimberley district, Klipriviersberg, and Marothodi (Humphreys, 1970; Maggs, 1976; Friede, 1980; Miller et al., 1993; Miller et al., 1995; Hall et al. 2006). Many assemblages have been excavated in archaeological stratified contexts while some forms of ornamentation have been described from museum archives (Morris, 1981; Humphreys, 1970). The archaeological site at 001 Makgwareng was considered to be a wealthy site on the evidence of the quantity of ornamentation discovered. The metal collection comprised larger smithed objects such as iron hoes, spears, axes, knife blades, arrow heads and bars, the decorative cultural material including iron bangles and beads, (Table 5.4 and 5.5) while rare examples of copper ornamentation including bangles and earrings were excavated at the same site (Maggs, 1976; Chirikure et al., 2007). The tables (5.4 and 5.5) show that solid iron bangles were distinctive in having round and rectangular sections, their thickness ranging between 3.5 to 8.0 mm. Features of craftsmanship were noted in one example which has an extremity finished off by rolling the metal over and hammering it down to produce a nodule, while others have ends that are crudely cut or broken off and slightly flattened (Maggs, 1976: 122). Fourteen cylindrical iron beads were excavated with measurements of 5.0 to 9.0 mm in diameter, and manufactured from wire bent to form a ring with ends butted. Copper ornamentation in the form of solid copper bangles had an average thickness of 3.0 mm to 5.0 mm, while the wire for the manufacture for finger rings was 1.5-2.5 mm in diameter (Maggs, 1976). A comparison of wire dimensions shows the size of a wire or rod to lie between the thickest, of 14.2 mm to the fine wire at 1.5 mm. The diameters of the beads all fall between 9.0 to 5.0 mm from the two sites 001 Makgwareng and Goergap, North West Province.

Table 5.4 Distribution of wire with dimensions from sites in South Africa in the Later Iron Age (1840-1300), sourced from literature.

Author, Date	Period	Locality	Metal (-) no of specimens	Diameter and width mm	Other information
Le Roux, 1966	17th to 19th century	South Africa (Vaal River Barrage	Copper Iron	3.0 No measurement	Bangle: 42 mm diameter Neck-ring oxidised
Maggs, 1976	16th to 19th century	001 Makgwareng Tihela: OND 3 OXF	Iron Copper Iron Copper Copper Copper Copper/iron	1.5 3.5 to 5.0 3.0 to 5.0 1.5 to 2.5 1.5 4.0 0.8 to 1.6	Ear-rings Solid bangles, round sectioned Solid bangles Finger rings Ear-ring loops Fragment of wire Finger ring
Chirikure et al., 2007	16th to 19th century	Tihela: OXF 1	Iron	4.0	
Friede, 1980	18th to 19th century	Klipriviersberg	Bronze Copper	6.4 12.3 to 14.2	Finger ring Rod: neck ring
Humphreys, 1970	18th to 19th century	Koffiefontein	No information	10.0 to 10.0	Bangle; 71 mm in diameter
Humphreys, 1980	18th to 19th century	St. Clair, Douglas area	Copper (6) Copper (3) Copper Copper (3)	5.0 2.5 2.0 2.0	Lengths: 42.0, 42.0, 10.0, 10.0, 10.5, 15.0 Lengths: 48.0, 39.0, 21.0 Length: 22.0 Rings: diameter: 3.0, 22.0, 23.0
Miller et al., 1993	17th to 19th centuries	De Hoop, Kimberley	Copper Copper	1.5 2.0	Ear-ring hook (slightly corroded) Ear-hook, length ca. 15.0 mm
Miller et al., 1995	17th to 19th centuries	North West Province	Copper alloy Bronze	1.7 61.0	Ear-hook Bracelet
Hall et al., 2006	18th to 19th centuries	Marothodi	Copper (9)	No measurements	Ear-rings

Table 5.5 Dimensions of beads from sites in South Africa from the Later Iron Age (1840-1300) sourced from literature.

Author, Date	Period	Locality	Metal (-) no of specimens	Diameter and width mm	Other information
Maggs, 1976	16th to 19th centuries	001 Makgwareng Tihela: OND 3	Iron (4) Iron	5.0-9.0 6.0	Cylindrical Cylindrical
Miller, et al., 1995	18th to 19th centuries	Goergap, North West Province	Iron Iron Iron Iron Copper Bronze	7.6, 4.0 8.5, 4.5 8.0, 4.5 8.0, 3.9 5.4, 1.8 6.6, 5.6	Cylindrical, mass: 0.49 g. Layer 2 Cylindrical, mass: 0.66 g. Layer 2 Cylindrical, mass: 0.56 g. Layer 2 Cylindrical, mass: 0.73 g. Layer 3 Barrel-shaped, mass: 0.69 g Layer 1
Miller, et al., 2001	Later Iron Age	Phalaborwa, Limpopo Province	Iron Bronze Brass Bronze Bronze Bronze Bronze Bronze Bronze Bronze Bronze		Mass: 1.34 g Mass: 0.66 g Mass: 0.55 g Mass: 0.43 g Mass: 0.42 g Mass: 0.41 g Mass: 0.50 g Mass: 0.40 g Mass: 0.49 g Mass: 0.51 g Mass: 0.50 g

The ear-rings were manufactured from copper wire of 1.5 mm and were bent into a loop; 1.0 cm in width. One of three distinctive ear-rings was retrieved from a burial site (Number 1). This object exhibits an unusual shank which thickens into three flanges, resembling collars. This particular ear-ring indicates that it was hammered up from the material of the shank and not applied separately. Below the collars the shank broadens to 3.0 mm and has a square section with rounded edges. The lower extremity is cut off at right angles (Maggs, 1976: 122). The populations living at sites OND 3 and OXF 1 were considered to have been poor, as the quantities of ornamentation retrieved from these sites are minimal (Maggs, 1976; Chirikure, 2007). Two items were found at a site named Tihela: (OND 3), one was a fragment of copper wire measuring 4.0 mm in diameter, and the other an iron bead measuring 6.0 mm in diameter. At site OXF 1 a finger ring of copper/iron wire was collected bearing a measurement of 0.8 mm to 1.6 mm (Maggs, 1976).

Two distinctive ear-rings (Table 5.7) were archaeologically retrieved from the farm De Hoop in the Kimberley district, one of the two being found *in situ* beside a Khoisan juvenile skeleton, and the other on the surface in a corroded state (Miller et al. 1993). Both ear-rings comprised a copper wire hook; 1.5 mm diameter, with a hollow cone of iron sheet attached to the shank. The overall measurement is 20.0 mm, the diameter at the base 10.0 mm and it has a mass 0.649 g (Miller et al, 1993). The second ear-ring had lost its cone, the copper wire being 2.0 mm in diameter, and the short shank terminating in a small hook; its length was 15.0 mm and its weight 0.247 g (Miller et al., 1993). A pair of ear-rings from an assemblage of body ornamental forms held at the McGregor Museum, Kimberly district was described by Humphreys (1970). These exhibit similar features to those found at De Hoop farm and described by Miller et al. (1993). The ear-rings came from a farm; St. Clair in the Douglas area (Humphreys 1970). These copper ear-rings were considered by archaeologists sufficiently distinctive to be called "extinguishers", so named because of their similar appearance to candle snuffers. Although both ear-rings of the pair were described as corroded they show sufficient details to indicate that they each consist of a cone-shaped form attached to wire which forms the ear- hook; their full length is 45.0 mm and the diameter at the base: 22.0 mm (see Illustration 4.14) (Humphreys, 1982). They are considerably larger than those found at De Hoop. A third pair of similarly shaped ear-rings made of bronze from the farm Goergap, in the Waterberg district was retrieved; a suggested date for these objects 540±50 BP to 380±50 BP (Miller et al., 1993). These details have been recorded in (Table 5.5) showing that the shapes bear some similarity while the details in measurements differ.

Included in the assemblage were two beads, one copper and the other bronze and four iron beads. The significance of these copper alloyed artefacts, and the few others found in the environment is that although smelting of copper and tin together did take place, it was not practised in a systematic manner, and the history of tin and bronze in southern Africa is inadequately recorded, with irregular exposure of copper alloyed forms appearing in archaeological sites (Miller et al., 1995, Mitchell, 2002). Figure 5.6 shows the ear-ring made from bronze wire with a substantial cowl attached to the top end of the shank, while the Table 5.6 indicates a comparison of different measurements and that each region showed its preference for the materials used.

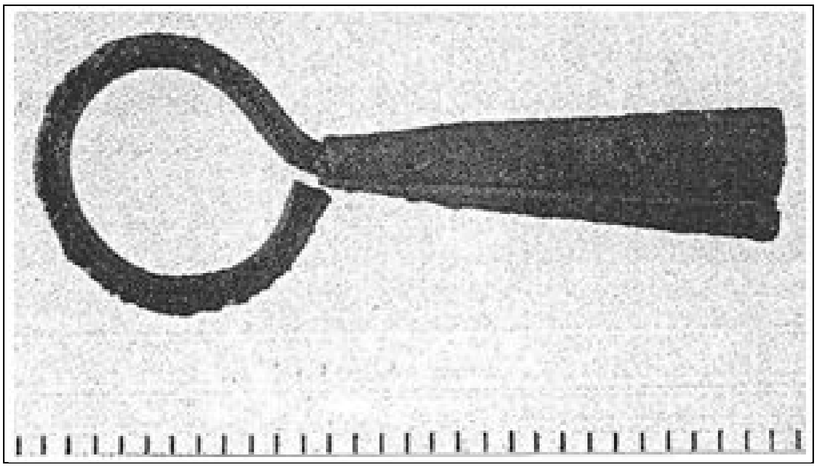


Figure 5.8 A complete bronze composite ear-ring from Goergap, North West Province. (Miller et al. 1993, 54) (Measurement in mm).

Table 5.6 Dimensions of wire and plate on three distinctive ear-rings, ear-hooks with suspended metal cones from North West Province and Free State.

Author, date place	Metal	Diameter mm	Length mm	Mass: g	Other information
Humphreys, 1970, Koffie- fontein, Riet River, Free State	Copper	22.0	45.0		
Miller et al., 1993 De Hoop, Kimberley, Free State	Copper/Iron	10.0	20.0	0.69	Wire hook, 1.5 mm diameter
Miller, et al., 1955, Goergap, North West Province	Bronze	5.0	28.8	1.30	Wire hook 1.7 mm diameter, bent into a circle 11 mm diameter Cone length: 17.9 mm, made from 1 mm thick plate

Table 5.7 Distribution of wire with dimensions from sites in Zimbabwe, South Africa and Botswana in the Middle Iron Age (1000-1300), sourced from literature

Author, date	Period	Locality	Metal	Diameter and width mm	Other information
Zimbabwe					

Author, date	Period	Locality	Metal	Diameter and width mm	Other information
Crawford, 1967	Ca. 1280	M'bagazewa	Copper / iron	No measurements	Solid bangles and wire-wound bracelets
Mapungubwe					
Oddy, 1984	1200-1280	Mapungubwe	Gold	0.5 to 0.7	Measurements of coils
Calabrese, 2000	900-1300	Mapungubwe	Copper / iron		No measurements
Botswana					
Denbow, & Miller, 2007	1200 to 1300	Bosutswe	Gold	0.5	22.0 mm long

The range of simple form copper ear-rings from 001 Makgwareng of lengths of wire forming a loop for ear attachment and 'drop' shanks bears similarity to those found at Marothodi which were created from copper and bronze wire (Hall et al. 2006). The wire measurements for the former range is suggested to be about 1.5 mm in thickness (Maggs, 1976), while the wire measurements for the assemblage from Marothodi was not detailed (Hall et al., 2006). Figure 5.7 shows the collection of ear-rings from Marothodi which bear a similarity in shape to those described by Burchell (1953: 398) and Maggs (1976: 121).

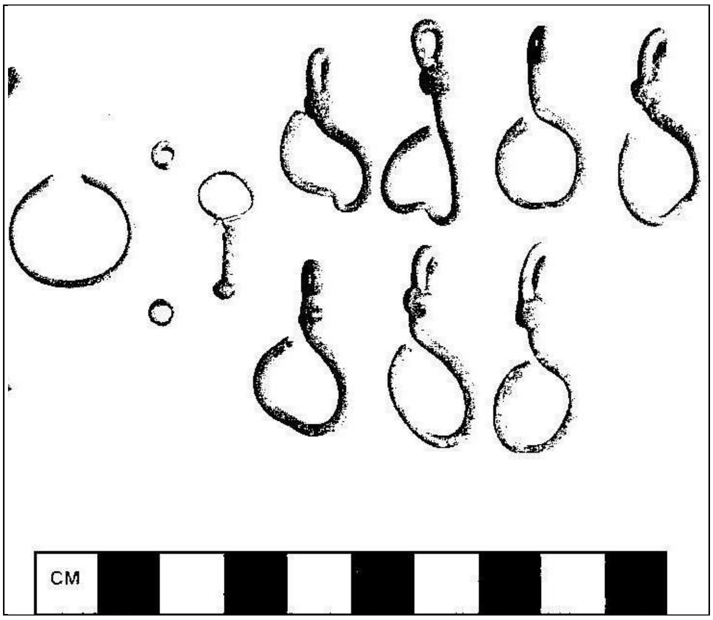


Figure 5.9 The illustration shows a selection of copper body ornaments excavated at Marothodi, North West Province South Africa (Hall et al., 2006: 23).

A more substantial form of copper ornamentation was found at Klipriviersberg, Gauteng, using geophysical instruments in the hope of finding buried metal objects in a complex of walled ruins (Friede, 1980). From this site a solid, and well preserved, oval copper neck-ring was exposed. The visible features are a thin dark layer of oxide and a few irregularities which were the result of porous surface structure (Friede, 1980). The dimensions are: outer breadth 173 mm, inner breadth 144.0 mm, the thickness 12.3 mm to 14.2 mm, the mass: 487 g. A bronze finger ring made of fine wire came from a nearby site; Meyersdal, and measures 19.0 mm, with a thickness of 2.0-2.5 mm, and was described as one of the few objects made from bronze found in the Waterberg region (Humphreys, 1980, Mitchell, 2002: 327). From the above synthesis of historical and archaeological material, although there is nothing conclusive to indicate local smithing, the distribution of ornamentation in central South Africa in the Iron Ages can be said to be fairly widespread throughout the region, and not restricted to one group alone, a feature noted by early travellers in the area (Humphreys, 1982).

The archaeological investigation on the hill-top site of Bosutswe in eastern Botswana indicates a time range of occupation between the 7th to the 17th/18th centuries (Denbow & Miller, 2006). The final 10 cm strata at the site have been dated to a period 1400-1650. Evidences of metal working activities were retrieved with a collection of fragments of iron strip wound bracelets, as noted in Figure 5.10 showing short to longer pieces, with some showing the remains of the fibre core. (Denbow & Miller, 2007: 282). Included in the assemblage was a few fragments of bronze and 14 copper beads which came from a range of stratified levels. The beads demonstrated the familiar cylindrical profile indicating that the strips were cut from plate with the aid of a sharp chisel, and in their production the bevel was placed on the inside of the bead. From analytical evidence the metal was cold worked and cyclical annealing took place. The significant evidence from this site at this time period suggests that copper alloying took place at a considerable distance from the Waterberg region where the tin ores were mined (Mitchell, 2002; Denbow & Miller, 2006).

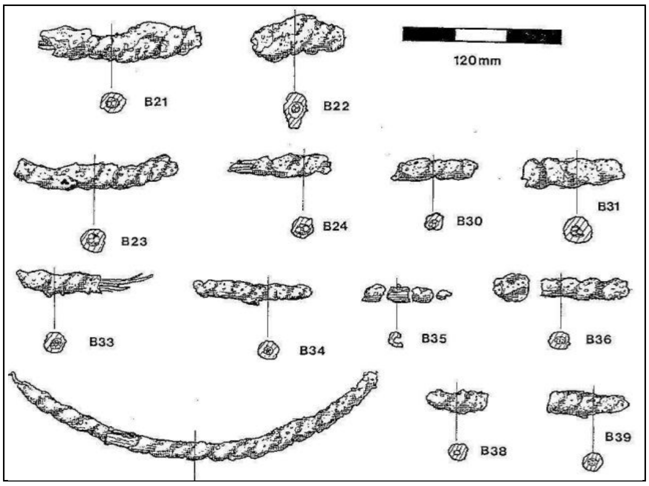


Figure 5.10 Fragments of iron wire-wound bracelets from Bosutswe, Botswana (Denbow & Miller, 2006: 282).

5.4: THE MIDDLE IRON AGE: 1300-1000

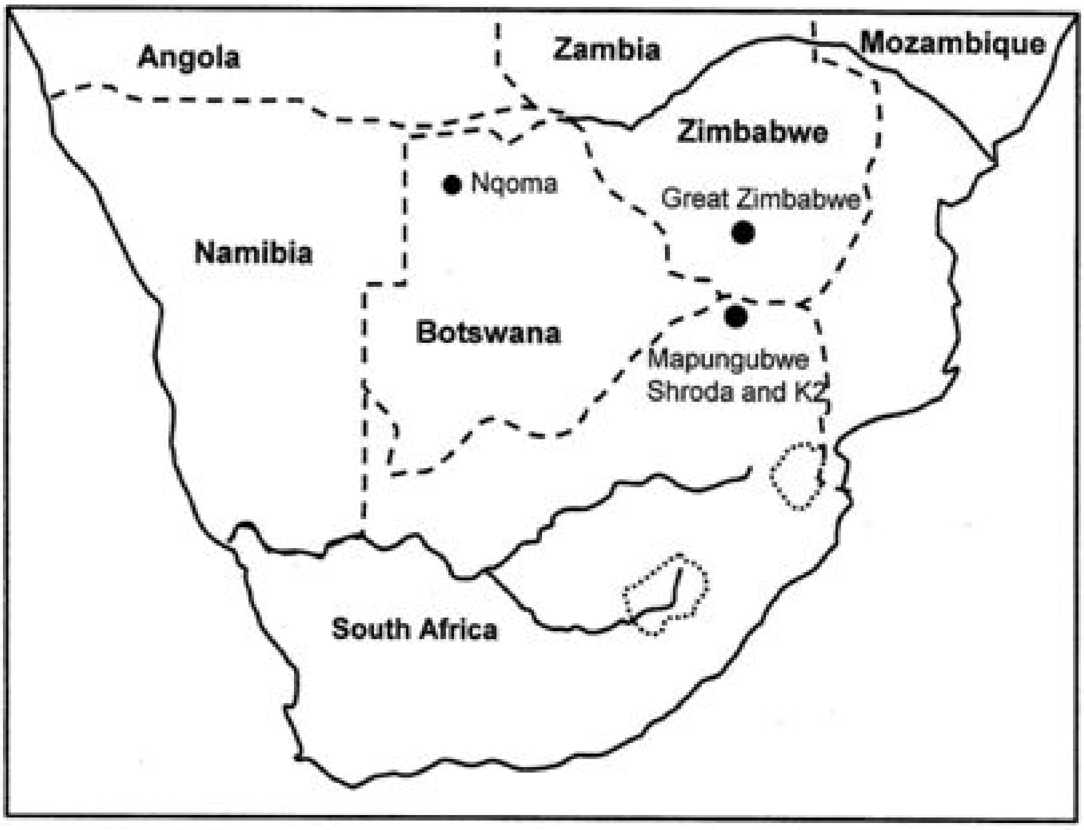


Figure 5.11 Distribution of archaeological sites investigated for the Middle Iron Age 1300-1000

The Middle Iron Age is a period used mainly to describe the communities occupying the Greefswald region, of the Shashi-Limpopo Basin, between ca. 1000 and 1300 (Huffman, 2007). Huffman's (2007: 361) dates incorporate the settlements of Nqoma in western Botswana, Shroda, K2, Mapungubwe Hill and its Southern Terrace, on the Shashi-Limpopo River, Northern Province (Calabrese, 2000).

The two well examined sites; Shroda (900-1025) and K2 (1030-1220) were noted for the positions both population groups reached in the development of socio-political ideologies in the period appreciated as the Middle Iron Age (Calabrese, 2000; Meyer, 2000). At this time kin-based groups were emerging into class based societies, a development which reached its culmination in the active separation of nobles from the commoners (Pikirayi, 2001: 96; Calabrese, 2000; Huffman, 2000: 71; Phillipson, 2005: 298). The metal working skills of indigenous African craftsmen at Shroda indicated by accumulations of broken tuyères and furnace bottom slags. Early investigators at K2 retrieved copper smelting waste connected with tuyères and pieces of slag (Calabrese, 2000). Calabrese's evidence of ornamentation was retrieved from K2 in the form of wire-wound bracelets fragments made only of iron and copper, ornamentation which indicated the socially superior positions of the residents who occupied this site (Calabrese, 2000: 107).

During this periods archaeologists noted the spatial expression of a new order in which elite leaders physically moved apart from the commoners to live in elevated areas, on hill-tops, within substantially built houses, surrounded by walled enclosures and to concentrate on accumulating greater wealth to support their positions of prestige, power and rank (Oddy, 1984; Maggs, 1986; Huffman, 2000). One of the ways they accomplished this was through exploitation of metal worked objects manufactured in iron, copper, bronze and gold for attracting foreign merchandise with ivory, animal skins and gold in exchange or glass beads, cloth and Asiatic ceramics, acquired through trading networks which extended within southern Africa and beyond to the Indian Ocean ports (Maggs, 1986; Pwiti, 1991; Pikirayi, 2001: 21; Mitchell, 2002: 327).

The stratification of the occupational precinct on Mapungubwe Hill and the Southern Terrace has been divided into four phases (Mayer, 1998; Miller, 2001). Within the lowest level of the earliest phase (Phase One) a few shards were identified as Early Iron Age pottery, while in the Second Phase metal work was exposed in Level 11 of Mapungubwe Hill (Miller, 2001). At the top of this level, below Phase Three, a fragment of a gold wire-wound bracelet was retrieved providing an indication of what was likely be exposed in Phase Three, the date of which is suggested to be ca. 1220-1250 AD (Miller, 2001). Throughout Phase Three period, discoveries suggested that the occupants possessed gold body ornamentation from the outset, while it is not certain if the gold burials are associated with this phase or Phase Four which is dated 1250-1290 (Miller, 2001). Initially the archaeological site of Mapungubwe underwent poorly executed excavations by untrained technicians which lead to a loss of valuable information (Steyn, 2007).

During this period the elite of Mapungubwe Hill displayed their political power and status with the use of iron for utilitarian and non-utilitarian artefacts, with gold, copper and bronze being used exclusively for ornamental objects and ritual implements (Herbert, 1996). Although gold and bronze have been considered by archaeologists as relative latecomers to the range of metals available for non-utilitarian objects as noted, the greater exposure of iron wire-wound bracelets (1032 specimens as opposed to 531 specimens of copper) indicates that iron was still a metal of choice for this artefact for the occupants of Mapungubwe Hill (Herbert, 1996; Calabrese, 2000). Iron was considered the favoured metal for manufacturing tools for agriculture, hunting and combat and expressive objects for ritual and ceremony (Herbert, 1996; Childs, 1991a). Other than the exposure of fragments of iron wire-wound bracelets, the retrieval of beads, (11 copper and 10 iron beads) and fragments of wire and foil was negligible

(Calabrese, 2000). Fouché (1937) mentioned that few copper beads were saved for examination, while Miller (2001) confirmed that 15 copper beads and one iron bead formed part of his study collection. The presence of gold and quantities of glass beads in the community appears to have reduced the desire for copper and iron beads amongst the elite, which is apparent in the assemblages of objects from Mapungubwe (Miller, 2002). (See Tables 5.7 and 5.8)

The production and excavation of metal work played an important role in the Iron Age as can be seen from the range of ornamental forms manufactured from gold. Some scholars argue that gold craftsmanship did not take place on Mapungubwe Hill but somewhere to the north of the Shashi-Limpopo Valley (Jones, 1938; Oddy, 1983, 1984; Grigorova et al, 1998; Miller et al, 2001). Fragments of gold wire of varying widths and lengths, a range of gold beads, some of whose forms had not been observed, wire-wound bracelets, and gold foil for enveloping wooden forms, with their accompanying tacks, were found amongst the graves at Mapungubwe (Fouché, 1937; Oddy, 1984; Desai, 2001; Miller, 2001, Miller et al., 2001). (See Tables 5.7 and 5.8).

Table 5.8 Distribution of beads with dimensions from sites in Zimbabwe and South Africa in the Middle Iron Age (1300-900), sourced from literature.

Author, date	**Period**	**Locality**	**Metal**	**Diameter and width**	**Other information**
Zimbabwe					
Crawford, 1967	Ca. 1280	M'bagazewa	Copper	No measurements	Simple folded cylinders
South Africa					
Fouché, 1937	1200-1280	Mapungubwe	Gold (H1) Gold (H2) Gold (H3) Gold (H4) Gold (H5) Gold (H6) Gold (H7) Gold (K1) Gold (K2) Gold (K4) Gold (K3-K15) Gold (M2) Gold (N1) Gold (N2) Gold (N3)	1.45, 3.26 1.63, 2.59 2.30, 3.87 2.05, 4.05 2.23, 3.67 2.30, 4.05 1.63, 3.26 2.29, 2.05 0.91, 2.59 0.91, 1.63 0.91-1.63, 1.45-2.59 1.63, 2.30 0.8, 2.30 0.8, 1.83	Mass: 0.101g Mass: 0.137 g Mass: 0.352 g Mass: 0.323 g Mass: 0.229 g Mass: 0.247 g Mass: 0.102 g Mass: 0.026 g Mass: 0.075 g Mass average: 0.574 g Mass: 0.554 g Mass: 0.079 g Mass: 0.081 g Mass: 0.033
Oddy, 1984	1200-1280	Mapungubwe	Gold Gold (cast)	2.1 x 1.2 to 3.9 x 1.6 1.5 x 0.7 to 4.3 x 2.0	Hammered facets visible
Meyer, 1998	1200-1280	Mapungubwe	Gold Gold Gold Gold	6.41 x 2.27 to 8.3 3,32 4.6-8.6 dia. 2.0 x 3,2 to 2,35 x 3.55 1.5 x 3.4 to 1.5 to 3.7	Foil rolled cylindrical shape Cast beads Thickness: 3.5 to 6.5 Notched beads Wire and thin rods bent until ends meet
Calabrese, 2000	Ca. 900-1300	Mapungubwe and environment	Iron / Copper		No information

Author, date	Period	Locality	Metal	Diameter and width	Other information
Botswana					
Denbow & Miller, 2006		Bosutswe	Gold	0.5	Length 22.0 mm

Notes on Tables 5.7 and 5.8: Fine wire of iron, gold copper and bronze was produced in the Middle Iron Age. The thickest measurement recorded is 1.14 mm to 0.5 mm, while the diameters of beads made of the same materials measured 8.5 mm to 0.5 mm.

5.5: THE EARLY IRON AGE: 1000-200

Figure 5.12 The distribution of Early Iron Age sites referred to in the text 1000-200

In distinguishing the Middle Iron Age from the Early Iron Age a number of differences (Miller, 2001) were observed notably in pottery motifs and shapes, the form of dwellings, and the size of villages which earlier in the first millennium were larger (Maggs, 1984). There was generally metal smiths assisting a group of villages, while at a later stage cattle herding became a noticeable feature within some populations which formerly relied on more goats and sheep. For a number of groups emerging trade interaction beyond the immediate periphery of local environments became evident from their embracing regional and later international trade networks (Miller, 1996).

In southern Zimbabwe the Iron Age kraal-site at Mabveni, in the Chibi District, was excavated in the mid-20th century (Robinson, 1961). Mabveni is located on the summit of a hill, and was exposed as a single occupation village site producing Ziwa traditional pottery (Robinson, 1961). The ceramic evidence of stamped ware suggested an occupational date between 100 and 300 AD, while further investigation placed it towards the end of the first millennium. This appears to be a more likely period when considering the provisional dates associated with the exposure of the three glass beads (Robinson, 1961; Miller & Van der Merwe, 1994; Miller, 1995; Woods, 2011). The material culture exhibited by the occupants included, structures made of daga and pole (Maggs, 1984), clay figurines, three glass beads, ostrich egg shell beads, marine shells, worked bone and bone fragments, iron and copper beads, iron objects, and slag from iron smelting (Robinson, 1961). Evidence of iron metal work is noted in the exposure of slags suggesting that smelting and/or smithing took place as confirmed by the presence of fragments of tuyères. The collection of eight heavily corroded iron beads exhibited an average size of 3.00 mm by 6.00 mm while a few fragments of iron tools were assembled. Ten patinated copper beads were found; nine were described as collars and measured 1.0 by 4.0 to 5.0 by 6.0 mm, while one was described as a spiral and exhibited the same measurements. The beads were made of chisel cut copper strips of varying widths hammered over a mandrel with their ends butted and the seam left visible; one bead bore a resemblance to biconical forms (Robinson, 1961). There is no reference to other forms of copper work. A significant feature of the site was the presence of marine shells and glass beads suggesting contact with trading routes associated with the Indian Ocean ports during this period (Robinson, 1961). The manufacturing procedures noted in the iron and copper beads suggest a continuity derived from elsewhere and appreciated for their resemblance to metal beads retrieved from archaeologically investigated sites over 1 500 years.

The site of Chibuene on the east coast of Mozambique was uncovered by archaeologists in 1977 and is located about 5 kilometres south of Vilanculos. The settlement carries a suggested date of late 8th or early 9th century AD similar to the development of African locations to the north on the Swahili coast. The location was defined by its considerable accumulation of occupational material and midden deposits situated above calcareous beach rock (Sinclair, 1982,). The significance of the site lies in its two major periods of occupation, the upper levels of which included an extensive shell midden deposit (Sinclair, 1982). A rich material culture of the occupants was discovered from the Early Iron Age deposits. The scant metallurgical material includes two fragments of slag and twenty-one lumps of ferruginous material confirming that smithing might have taken place at this site.

The iron finds included two hook-like fragments, one nail and one spike, while the copper objects included one small piece of copper sheet, one spike, one fragment of a wire-wound bracelet and two copper beads (Sinclair, 1982). The measurements of the beads are not included in the text. The material culture of the community was extensive confirming their access to imported wares from the Indian Ocean rim (Mitchell, 2002: 327). The greater part of the collection consisted of glass beads, shell beads and Middle Eastern ceramics.

The importance of the mid-first millennium Iron Age site at Lydenburg, in South Africa, situated on the edge of the Highveld towards the east coast lies in the craftsmanship exhibited in ceramics, bone and ivory work and metallurgy: the latter excavated in the form of iron and copper beads (Inskeep and Maggs, 1975). A more specific date of 7th century with a break and a further sequence from the 9th to 11th centuries has been established from objects found in unstratified locations (Whitelaw, 1996). The extended archaeological site was identified by dwellings of irregular-circular shape situated in the lower valley regions of the Sterkspruit in Mpumalanga. Inskeep and Maggs (1975) indicate that the significant archaeological finds of bone, ivory and metal work had no relationship with the dwelling structures.

At this site a collection of seven iron beads showed signs of severe to mild corrosion as seen in the illustration (Figure 5.13) where the copper beads have kept their form while the iron beads have a rough appearance.

Copper beads Iron beads

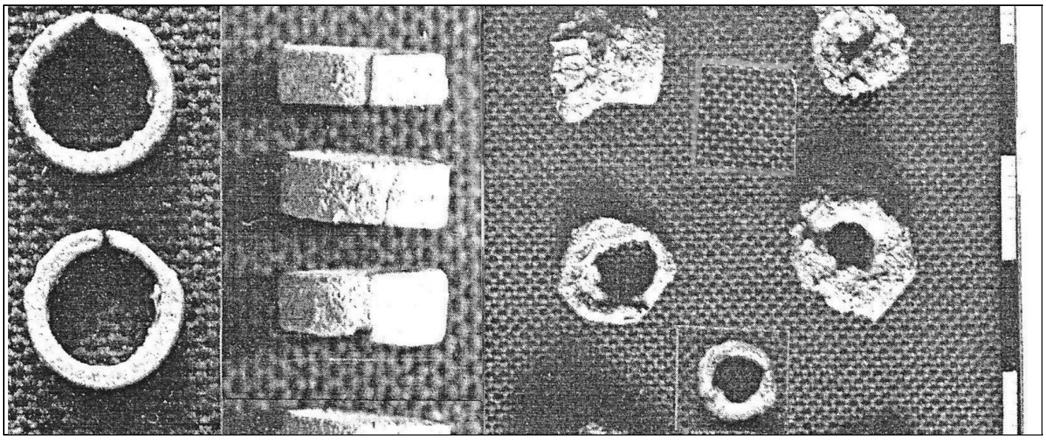


Figure 5.13 5th to 7th century copper beads and iron beads from Lydenburg (Inskeep & Maggs 1975: 134).

The iron beads were created from a strip of metal 3 mm wide, ca. 1.0 mm thick and bent round to form a ring of 7.0 mm in diameter. The corroded iron beads exhibited the same manufacturing features with some being a faction larger; their measurements were 10.0

or 11.0 mm in diameter and were bonded to copper beads ca. 9.0 mm in diameter (Inskeep & Maggs, 1975).

A collection of six copper beads, two bonded end to end with the iron bead bonded at one end, was discovered and their overall preservation was better than that of the iron beads. Each bead was made from a strip of copper 3.0 mm wide, and 0.75 mm thick bent round to form a ring of 8.0 mm, their shaping was remarkably consistent (Inskeep & Maggs, 1975). Inskeep & Maggs, (1975) argued that the copper beads may have been acquired from as far as Graskop, Pilgrim Rest, Steelpoort, Groblersdal or Phalaborwa which were all ancient metal-producing centres. The beads could represent a short-distance trading connection, phenomenon which is reflected in many archaeological sites in South Africa (Inskeep & Maggs, 1975).

While no other objects of iron were excavated in the area the manufacture of iron cutting tools was suggested by the presence of the cut marks on the bone, bone lozenges and ivory objects. There is no report of smelting or smithing of iron or residues of this technology, although the presence of the few iron beads suggests that this activity could have taken place in this locality. The skills of the local potters were noted in the large ceramic mask-like heads found in this area (Inskeep & Maggs, 1975).

The mid-first millennium site of Broederstroom, in Gauteng, is acknowledged as one of the oldest metal working sites where craftsmen demonstrated their skills in South Africa (Friede & Steel, 1975; Friede, 1977; Mason, 1981; Maggs, 1984; Maylam, 1989, Miller, 1995; Miller 2002). The significance of this Early Iron Age site (24/73) lies in the exposure of a spacious metal working location on the banks of the Hartebeespoort Dam dated from ca. 350-560. The development of this “village culture” appears to have commenced about 350 with the accumulation of mounds indicating early occupation showing charcoal remains and continued through to about 450 AD with hut and furnace formations and ending about 600 (Friede, 1977; Mason, 1981).

The archaeological evidence indicated that the occupational site was large, consisting of about 49 clay huts and was sustained by an active iron smelting industry with fragmentary evidence showing between six and ten furnaces noted in different parts of the settlement (Mason, 1981). Although a complete furnace was not found a large fragment of a bowl-like structure was traced amongst broken tuyères, and iron slag deposited over an area of 150 square m (Mason, 1981). An analysis of the slag revealed six different kinds of ore, the most frequently being was limonitic goethite ore and ochrous limonite; neither ore indicated the necessity for mining at any depth (Mason, 1981, Hammel et al., 2000). From various parts of the site 56 rusted items were found, two of which were iron beads and were considered to be similar to those associated with Middle and Later Iron Age manufacture (Mason, 1981).

While Mason (1981) specifies that there was no evidence of copper ores on the site, Friede (1977) indicated earlier that small copper outcrops of malachite had been found in the hills to the south of Broederstroom, and that it was unlikely that large scale copper smelting took place here as the yield in the area was scant, even though Friede (1977) considered that there was sufficient to provide a few “trinkets and ornaments” (Friede, 1977: 231). There was no evidence of smelting crucibles found, and archaeologists queried whether this activity took place elsewhere and whether ingots were traded into Broederstroom (Friede, 1977). The ornaments of copper found within stratified levels yielded a copper chain consisting of eleven links from a hut (24/73D) and a number of copper beads and rings were found in an ash heap (24/73U) and in the collapsed ash heap (24/73X) (Friede, 1977; Mason, 1981). The links for the chain were manufactured from copper rod or wire hammered into narrow ribbons and then bending cut-off sections into oval links (Friede, 1977). The width of the copper ribbon was 3.0 mm and the length of each link about 14 mm, its mass was 10.8 g. From a metallurgical analysis it could not be assessed whether the chain was manufactured locally or was an imported trade article (Figure 5.14). This Figure 5.14 shows a photograph of a chain with 9 links. The links are elongated ovals with gaps left at the extremities. On careful examination the metal shows a flat surface on the interior of the link and a bevelled outer surface which appears at variance to the straight walled cylindrical beads found at Lydenburg which are roughly the same age (Friede, 1977). No information regarding diameters, widths or mass or manufacturing details of the copper and iron beads was not provided in the texts; although it is understood that they would be similar to collections found within Early Iron Age sites in southern Africa.

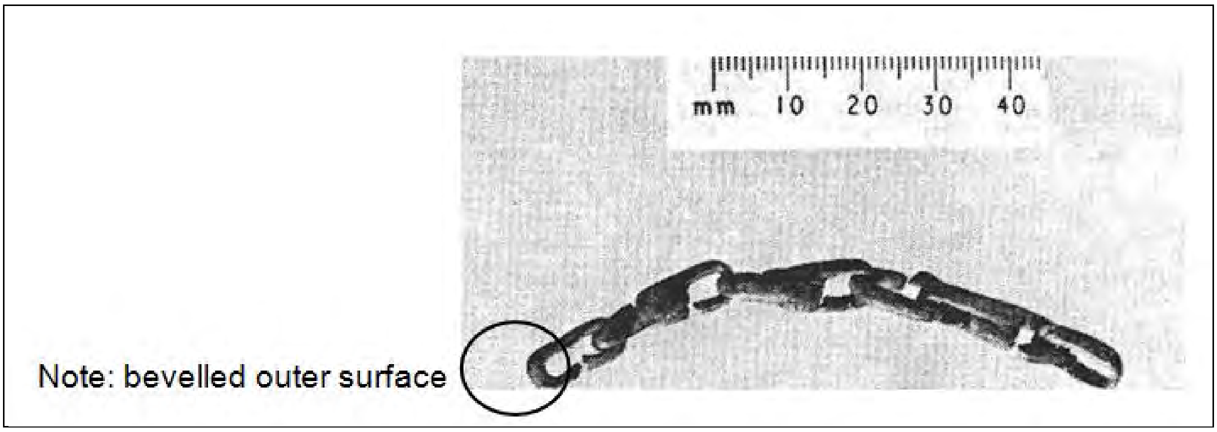


Figure 5.14 An assembled chain of copper links from Broederstroom, South Africa (Friede, 1977: 231).

One of the many occupational sites excavated in KwaZulu-Natal was the ten hectare settlement of Kwagandaganda situated within a bend of the Mngeni River where cultivation took place, in an environment surrounded by savannah bushveld (Maggs, 1984; Miller & Whitelaw, 1994). An analysis of ceramic styles from a wide region in KwaZulu-Natal showed the period of occupation to be about 300 years between the 7th and 11th centuries (Miller & Whitelaw, 1994). This span of time has been divided into three phases; Msuluzi (7^{th} century), Ndondondwane (8^{th} century) and Ntshekane (9^{th} century). The occupational site of Kwagandaganda falls into the first two divisions (Miller & Whitelaw, 1994).

The metallurgical material from this settlement included objects made of iron and copper, with a few beads made of each metal as part of the assemblage. This scant collection of metal ornamentation constitutes a portion of a material culture consisting of pottery, faunal material, and ivory objects, the latter confirmed from ivory shavings. From metallic residues exposed on the site smelting and smithing of iron is thought to have taken place within the community, as was understood from the recovered nodules in the Kwagandaganda sample (Miller & Whitelaw, 1994). There was no evidence of pile welding in this collection of iron objects (Miller & Whitelaw, 1994). The severely corroded iron beads were made by cutting annealed plate' into ribbons with a chisel; two iron beads had been cut and bent into shape when cold and their ends butt jointed (Miller & Whitelaw, 1994: 82).

The copper beads showed mild corrosion and were non-magnetic (Miller & Whitelaw, 1994: 82). The strips had been bent round when cold into cylindrically shaped beads and the ends had been hammered together without welding. The presence of the copper beads in KwaZulu-Natal is an anomaly as there are a scant number of sites which could have produced ore for the manufacture of these objects. It has been suggested that regional and inter-regional trading networks from copper working regions to the north could be responsible for their presence at Kwagandaganda and elsewhere in the copper ore deprived regions in Early Iron Age sites in South Africa (Inskeep & Maggs, 1975; Maggs, 1984; Miller & Whitelaw, 1994).

The lowest archaeologically investigated levels at Bosutswe (600-1200 AD) in eastern Botswana are dated to a century later than the archaeological site of Nqoma (500-1100) situated in the west of the country. The earliest Iron Age stratigraphical levels of the occupational settlement at Bosutswe are described as the Taukome and Toutswe Traditions which occurred during the period ca. 600 to 1200 when circumstances forced a hiatus in occupation (Kiyaga-Mulindwa, 1993; Reid & Segobye, 2000; Denbow & Miller, 2007). The significance of this site was that it was situated in favourable cattle producing country, linked to cultivation of suitable crops with a population living under a nascent state system with wealth based on the control of cattle (Kiyaga-Mulindwa, 1993). The lowest 2 m of the site with the base at bedrock showed a minimal involvement in metal work by the inhabitants, and this resulted in a scant collection of ornamentation (Denbow & Miller, 2007).

Information on dwelling areas, animal kraals and midden deposits were retrieved from the lower stratigraphical levels of the Central Precinct (Denbow & Miller, 2007). While working in the Toutswe levels of the Central Precinct, archaeologists found two copper beads and in the Eastern Precinct in the same Toutswe level a bronze bead and Lose Traditional ceramic fragments were exposed. It is suggested that the ceramics were misplaced which casts doubts on whether the bead should be labelled as Toutswe material or placed within the Middle Lose period of a later date (Denbow & Miller, 2007).

Specimens of iron work were recovered from the Taukome and Toutswe levels in the Central Precinct (Denbow & Miller, 2007). From within the Taukome acid levels iron rod and three severely corroded blade-like plates, which could be classified as parts of hoes, were recovered (Denbow & Miller, 2007). Material gathered from the Toutswe levels were two iron rods and a collection of decorative ornamentation which, too, were also corroded. Throughout the Taukome and Toutswe Tradition periods the metallurgical technology found at this site was typified by comparative metal working technologies indicating continuity from earlier sites to west and east in southern Africa.

Evidence of the Early Iron Age community living on an elevated hill site at Divuyu indicated that agro-pastoral indigenous African metal workers were living in the far western regions of Botswana (Miller, 1996). This hill-top site is situated in the Tsodilo Hills west of the Okavango River system and is dated to 550-760 (Denbow & Wilmsen, 1986; Miller, 1996). It is suggested that the Divuyu people were almost certainly Western Bantu speakers who had arrived from northern regions bringing their skills in metalwork and agro-pastoral activities with them (Denbow, 1990). The archaeological information from this locality indicates that a fully-formed Iron Age community lived in Ngamiland, where Iron Age craftsmen practised metalwork with evidence seen in the production of small iron tools and body ornaments manufactured from iron and copper (Denbow, 1999).

The motifs found on the ceramic shards at this site indicate that design influences were derived from elsewhere; this is reflected, as well, on the tanged arrow points and the pendants found on site (Denbow, 1990). Farming practices at this time consisted of cultivation and the herding of sheep and goats in contrast to major cattle herds which dominated later localities in later centuries. Apart from the collection of metal ornamental forms and worked ivory, their material culture confirms that occupants lived in pole and daga huts, and their collections of marine shells provide evidence of exchange links with coastal areas (Denbow & Wilmsen, 1986; Denbow, 1999).

The Divuyu metal work collection consisted mostly of ornamentation and was made up of variety of iron and copper objects which included beads, bangles, wire-wound bracelets, chains, links and pendants. The scant collection of tools consisted of an arrowhead with a tang; its measurement was 15 cm long and the tang 4.0 mm in diameter. The heaviest tool was a chisel; its shaft had a rectangular section shaft and ended with a sharp cutting edge used for cutting metal ribbons (Miller 1996). The sparse tool collection could suggested that worn out iron artefacts were recycled.

It is in the production of ornaments and decorative forms that the skills of the craftsmen were noted. Many of the ornamental forms were made from hammered square sectioned and round section rod or wire. There was a scant collection of small iron beads found at Divuyu which amounted to six examples and measured less than 5.0 mm in diameter (Miller, 1996). An iron bangle was made from a twisted square shaped rod, while the rest of the arm and leg ornamentation was made from rectangular sectioned hammered wire or ribbons to be wound on a fibre core to produce flexible wire-wound bracelets. A few chains made of links were made from these ribbons or strips; they measured 3.0 mm to 4.0 mm wide and 0.5 to 1.0 mm thick. They were described as robust and were made from iron and copper, the latter being made of square sectioned wire, while corrosion was evident in their split points (Childs, 1991c, Miller 1996). There were 40 iron ribbon clips in the collection. These were made either from flattened square wire, or by cutting thin sheet into strips with the aid of a chisel.

What could be described as an ear-ring was made from iron and copper wire and found on site (Miller, 1996). This was described as hook-like artefact made from copper and bore similarity to those made of iron. It was made from round section wire and tapered to blunt points of unequal length. Part of the assemblage consisted of twelve iron rings which were believed to be finger rings, made from thick round wire with ends butt jointed (Miller 1996).

Table 5.9 Distribution of beads with dimensions from sites in Zimbabwe and South Africa in the Early Iron Age (1000-200), sourced from literature.

Author, date	Period	Locality	Metal (-) No of specimens	Diameter mm	Width mm	Other information
Zimbabwe						

Author, date	Period	Locality	Metal (-) No of specimens	Diameter mm	Width mm	Other information
Robinson, 1961	200-800 inconclusive	Zimbabwe (Mabveni)	Copper (9) Copper (1) Iron (8)	5.0-6.0 5.0-6.0 3.0-6.0	1.0-4.0 1.0-4.0	'Collars' patinated Spiral, patinated In all levels of midden
Mozambique						
Sinclair, 1982	8th to 9th centuries	Chibuene	Copper			No measurements
Botswana						
Miller, 1996	6th to 8th centuries	Divuyu	Iron	>5.0		No measurements
Miller, 1996	8th to 11th centuries	Nqoma	Iron / Copper (992)			No measurements
Denbow, & Miller, 2007	7th to 11th centuries	Bosutswe	Iron			No details or measurements
South Africa						
Friede, 1980	4th to 6th centuries	Broederstroom	Iron (2) Copper (11 links)		14.0, 3.0	No measurements Mass: 10.8 g
Inskeep, & Maggs, 1975	5th to 6th centuries	Lydenburg	Iron Copper	7.0 8.0	3.0 3.0	Some beads fused with copper ones Some beads fused with iron ones
Maggs, 1984	Ca. 730-760	Ndondondwane	Iron Copper	5.0 4.0	13.0 2.0	Rolled cylinder
Miller & Whitelaw, 1995	7th to 9th centuries	Kwagandaganda	Iron (Spec. # 1) Iron (Spec. # 15) Copper (Spec. # 8) Copper (Spec. # 9) Copper (Spec. # 10)	10.5-10.5 11.2-12.5 7.8 6.4-7.0 6.1-6.4	0.87 6.0 5.3 2.7 2.3	Mass: 0.87 Mass: 0.22 g Mass: 0.53 g, thinness: 1.5mm Mass: 0.27 g, Strip thinness: 1.3 mm Mass: 1.13 g, strip width: 1.2 mm

Table 5.9 shows that the beads from all the sites were made from copper and iron and that their diameters fall in the range of 3.0 to 10.8 mm, and they were no more than 13.0 mm wide and 10.8 g in mass.

5.6: CONCLUSIONS

In this chapter, a long term perspective on decorative metalwork from the Early Iron Age to the 19th century was presented, indicating that over the past 1500 years, objects for ornamentation were basically the same, although new materials and types emerged over time. For example, while decorative metalwork was only made using copper and iron in the Early Iron Age, bronze and gold were introduced in the Middle Iron Age and in the Later Iron Age, brass was widely worked. Throughout the first millennium iron and copper processed from oxide ores resulted in the manufacture of ornamentation and small domestic tools. At the beginning of the second millennium a number of improvements in metal technology were detected. Thereafter a greater number of ores were treated, with smelted copper being cast into bars and cross-shaped forms for further processes used in the form of ornamentation, for trade and in the use of currency in the prestigious sphere. Bronze, an alloy of tin and copper and gold were exploited for their decorative qualities, the latter metal as cast prills were made into punched and other beads and used for the foundation for foil, which was used to overlay carved wooden forms and ultimately secured with small tacks of the same metal.

The tool-kit for the indigenous African craftsmen remained essentially the same throughout the time span of metal production. Archaeological excavations have exposed fragments of furnaces and hearths which required one or more sets of bellows, together with crucibles, a large stone anvil and various stone hammers. Tools made of iron comprised chisels, blades or knives, punches for piercing the gold prills, and, in some workshops, tongs for handling hot metals were found. From the middle of the last millennium the iron draw-plate was recovered, in a few larger northern centres, facilitating the manufacture of fine circular sectioned wire. Although some fragments of this wire were retrieved from archaeological contexts the hammered rectangular or square sectioned wire used for beads and wire- wound bracelets was more apparent in Zimbabwe.

The formation of the simple “wrap around” bead made from a range of metals followed a similar pattern throughout a 1500 year period. The metal was either hammered into flattened thin rods, or cut from a sheet with blades to form thin ribbons, these were cut into required lengths and either folded over a rod with ends-butt-jointed, or clipped as further decoration over cores of wire-wound bracelets. Longer lengths of cut rectangular sectioned ribbons of wire were wound over cores of fibres for flexible wire-wound bracelets. The quantities of fragments found in archaeological sites from the latter part of the first century attest to their approval by men and women for decorating necks, arms and legs throughout the following centuries.

This chapter has shown what appears to be very interesting regional differences in the typology of decorative metalwork. For example, the ear-rings which are so dominant in areas such as the Free State region of South Africa, and are historically associated with the Sotho-Tswana groups are completely absent on the Zimbabwe plateau and adjacent lowlands whereas beads, bangles and bracelets made of iron and copper are found in greater profusion in the savannah lands in ore rich areas while less prolifically in metal deprived zones of southern Africa.

6. CHAPTER SIX: A VISUAL STUDY OF DECORATIVE METALWORK AS A WAY OF UNDERSTANDING MANUFACTURING TECHNIQUES

6.1: INTRODUCTION

The contribution of metallurgy to the manufacture of ornaments from a restricted, but slowly evolving technology benefitted the economic and social status of both commoners and the elite in these cultural groups, including both the craft and social status of the African metal smith during the Iron Age in southern Africa. Contributions from the literature, chiefly from historians, ethnologists and archaeologists have recognized that the topic of decorative metalwork occupies an important space in Iron Age studies. However, in order to achieve this, it is important to reconstruct the techniques of manufacture employed throughout the past 1500 years. Admittedly, a number of researchers such as Miller (1996, 2001, 2002), amongst others have reconstructed the fabrication techniques using material science approaches. However, such work has focused on objects which in most cases have been incomplete and / or heavily corroded. A central question however is, what manufacturing evidence do finished objects possess, and can such evidence be reconciled with that generated using metallographic studies of archaeological objects? The main purpose of this chapter; in the first instance is to visually document, the techniques of fabrication invested in making 19th century decorative metalwork in the collection of the Iziko South African Museum, Cape Town. In the second instance, the chapter presents a comparison of these techniques with those documented archaeologically.

The Iziko South African Museum in Cape Town hosts decorative objects collected in the 19th and early 20th centuries. A sample of these belonging to cultural groups studied in Chapter 4 was studied visually to document techniques of manufacturing such as hammer marks. In the end, the techniques were compared to those documented through material science analysis thus adding further insights into continuity and change in metal fabrication technologies from the first to the second millennium.

6.2: THE ASSEMBLAGE

An assemblage of ornamental objects made from a variety of metals; iron, copper, and brass were chosen from the Iziko Museum’s collections for examination. The samples comprise beads, bangles, bracelets, neck-rings and ear-rings. Some of the objects were estimated by their appearance to be older than others; this was indicated by the rough edges, hammer marks or the lack of them, or the use of files, or the amount of abrasive action evident. Others presented details of recent manufacture, accentuated by the use of contemporary tools and of commercial evenly drawn wire obviously available from local trading stores. In visually analysing these objects I bore in mind several enquiries. Have the shapes of objects, their processes of manufacture, and the materials used changed throughout the past centuries, and what, if any, innovations have been introduced and noted within the same time period? Although the objects in the Iziko collections are displayed out of context, in relation to time and place of manufacture, sufficient ethnological and archaeological literary information is available to support the assumption that the beads, bangles, wire-bound bracelets, solid neck-rings and wire made ear-rings manufactured during the 20th century have not altered in manufacture in relation to those made by African metal-smiths throughout the Iron Age.

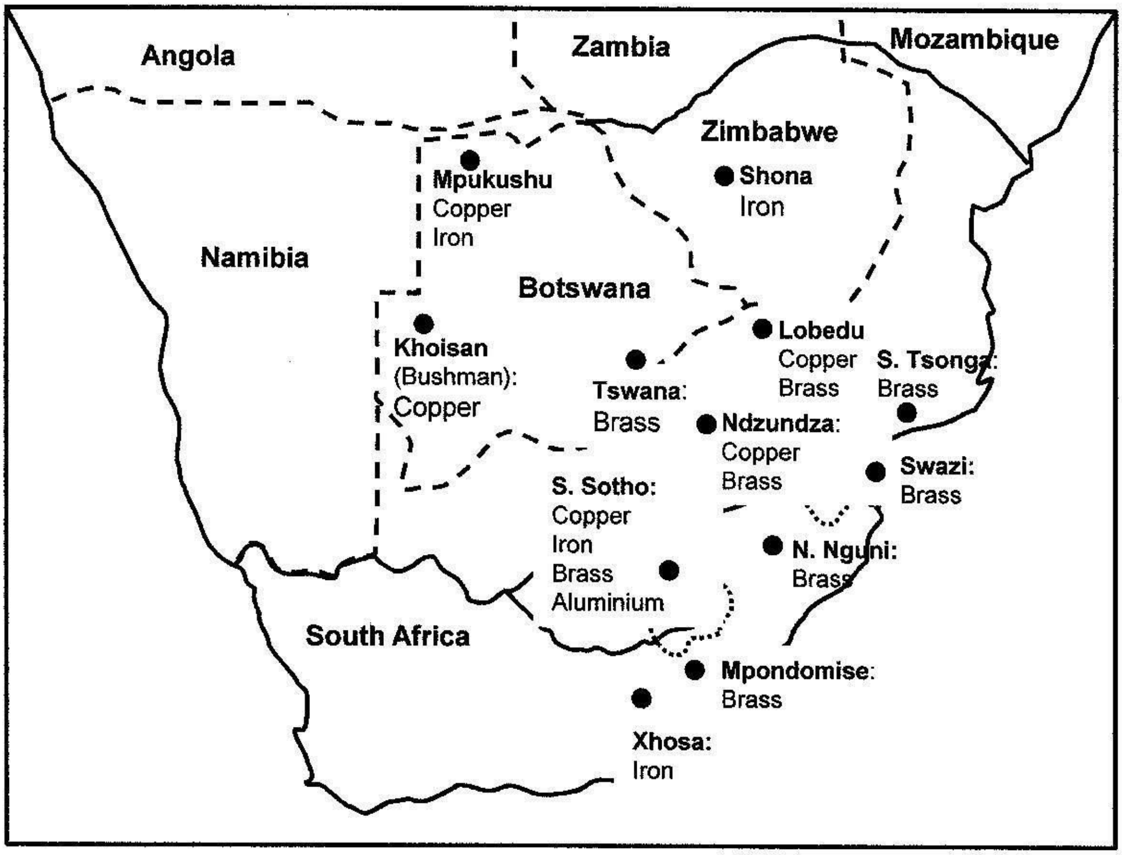


Figure 6.1 Map showing the position of selected cultural groups and the metals used in the manufacture of ornaments.

Table 6.1 Survey of body ornamental forms chosen for analysis from the Iziko South African Museum

BEADS							
Number SAMAE	Ethnic group	Date	Material	Object's Dia.mm	Width mm	Thickness mm	Manufacturing details
9913	Lobedu	1970*	Copper	5.5		2.5	Semi-circular ribbon, barrel-shaped
9910	Lobedu	19th C	Copper	5.2	2.7	1.2	Rectangular section ribbon, cylindrical shape
9911	Lobedu	19th C	Copper	6.5	3.2	1.5	Triangular sectioned wire, uneven manufacture

11837	Lobedu	No date	Brass	7.2	2.5	4.5	Triangular sectioned wire, uneven manufacture
10009	Mpukushu	1971*	Copper	7.9	2.5	4.9	Irregular manufacture
9326	Bushman	No date	Copper	6.5	2.0	3.5	Rectangular sectioned ribbon, cylindrical shape
9147	Bushman	No date	Copper	6.7	2.0	3.9	Rectangular sectioned ribbon, cylindrical shape
BANGLE							
3325	Xhosa	1892	Iron	6.5	5.8	5.2	Rod: circular section, uneven
6712	Shona	1871-86	Iron	7.2	5.5	2.5	Wire, square section
8167a/b	S. Sotho	19/20th C	Brass				Rectangular section ribbon
7839	S. Tsonga	1958	Brass	10.1	15.0	14.9	Circular rod
BRACELETS							
457	S. Sotho	1904	Copper/Iron	5.7	1.1(coil)	0.5	Coiled circular sectioned wire
9575b	Mpondomise	1969*	Brass	8.7		0.3	Triangular pulled wire
UCT 38/39	Lobedu	No date	Copper/Brass	6.8		0.5	Coiled circular section, wire
NECK-RINGS							
454	S. Sotho	1904	Brass	16.5	13.0	12.9	Flattened bar: triangular section
3788	Swazi	No date	Brass	15.4	21.0	19.0	Bar: uneven throughout
3794	N. Nguni	1958*	Brass	18.5	19.0	23.0	Bar: circular section
7838	S. Tsonga	No date	Brass	15.4	19.0	19.0	Bar: circular section
10152	Ndzundza	1972*	Brass	10.8	6.9	5.0	Uneven manufacture
10151	Ndzundza	1972*	Copper	10.9	6.0	4.5	Rectangular sectioned narrow rod
EAR-RINGS							
5309	Tswana	No date	Brass	1.5	1.2	2.1	Circular/square wire hammered flat
5671	Mpukushu	1936*	Iron	1.5	0.9	0.9	Circular uneven wire
BROOCH							
567	Basotho	1904	Copper/iron Brass/aluminium	5.7		0.5	Pulled circular wires
*Date of collection							

SAM-AE = South African Museum – Anthropology & Ethnology

I compiled the above assemblage with several contextual and manufacturing characteristics of the objects in mind. A factor to bear in mind is that collectors gathered objects that were available or presented to them when in the field by members of cultural groups. A further feature to consider is whether conscious personal choices were made by collectors of these items, whether professional archaeologists or private collectors in terms of what should be pertinent to an ethnological collection to present to museums for their archives, or retained for their own collections (Davison, 1984) The materials used in the above collection indicate that a restricted amount of copper, and iron and a minimal quantity of aluminium, were used in comparison to the quantity of brass employed by different cultural groups during the period under study, especially those in trading contact with the east coast ports of southern Africa. The techniques used by southern African metal-smiths manifested in the collection reflect those that were practiced from the Early to the Later Iron Age and that smelting and smithing processes remained unaltered throughout this period. The African smiths treated materials that appeared in the second millennium such as gold and bronze, in the same uniform manner as iron and copper, while the casting of items in copper and brass in south east Africa generally remained uneven and progressed gradually with the use of contemporary tools, such as the metal file. The selection of cultural groups for the study does not indicate all those that inhabited southern Africa, but is limited to those that are adequately represented with ornamentation in the Iziko Museum's collection.

6.3: LIMITATIONS

The objects selected for macro analysis are subjected to several limitations. From the initiation of recorded data at the Iziko Museum towards the end of the 19th century AD a full description of each object was either presented to the curator or not. Thus relevant information for each item in terms of answering the research questions in this study is rarely comprehensive, in most cases, sparse. The dates for actual manufacture of the selected objects are rarely recorded in the Iziko collection; while a few objects have been supported by collection dates in the latter decades of the 19th century, most objects with these have been produced in the course of the early to mid- 20th century (these collection dates are marked with * in Table 6.1). The original location of many items is not fully known; some details provide the collector's name and a town in southern Africa. The assemblage for the study reflects those cultural groups amply represented with a range of ornamental forms. Items made of bronze found in Zimbabwe and South Africa have not been represented in the collection as the metal is not itemized in the Iziko collections, although objects made of this alloy are intermittently referred to in archival literature (Friede, 1980; Miller et al., 1993; Hall et al., 2006; Denbow & Miller, 2007).

6.4: VISUAL STUDY METHODOLOGY

The visual analyses focused on a number of diagnostic criteria that appear on the objects after manufacture. A combination of ethno-historical and archaeological information provided above, when supplemented with metallographic analyses performed by among others, Miller (1996) revealed that often manufacturing processes left hammer marks, striations, cavities, signs of wear and tear, and seam treatments (Thondhlana & Martinón-Torres, 2009) on the finished objects. Although objects were often polished, these marks remain. Hammered and drawn wire can also be distinguished visually. Similarly cast objects also stand out because of their lack of hammer marks, and are of a more or less standardised shape as determined by the mould. Industrial wire generally has greater symmetry in cross-section and lacks striation marks. Using these diagnostic indicators, the techniques used to make various objects were recorded for this study.

6.4.1: ORNAMENTS MADE OF IRON AND WITH IRON

Iron played a diminishing role in recent centuries in the manufacture of ornamentation, which contrasted with the greater exposure and use of copper and brass taking place between the 17th and 20th centuries. This feature is noted in the study in the reduced amount of iron in comparison with copper and brass used for ornament in this study. In the Iziko collection of ornaments there were two classes of objects made entirely of iron comprising bangles made from an oxidized hammer beaten rod (SAMAE 3352) dated to 1892 from the Transkei, a thin wire bangle made by the Shona, Zimbabwe; dated 1871-86 (SAMAE 6712) the other being four ear-rings made of commercially available drawn wire made by the Mpukushu cultural group in Northern Botswana in the (SAMAE 5671). These items were collected in 1936 by F. Froehlich from the Okavango River region. Two composite examples of ornament made with a combination of materials, iron, copper, brass and aluminium are a brooch from Lesotho

(SAMAE 567) dated to 1904 made by the ‘Basotho’, and a composite bracelet (SAMAE 457) with the core made of spiralled copper wire with a covering of spiralled and stretched wire-wound copper secured with iron brackets. (Table 6.1)

A detailed evaluation of the iron bangle (SAMAE 3352), made by a Xhosa metal-smith, ca. 1892, indicates that it was made from a hammered iron rod. It is 6.5 cm in overall diameter the rod is 5.8 mm diameter and 5.2 mm thickness and weighs 9.5 g (Figure 6.2). The photograph shows that it is not the conventional oval shape as the ends do not meet. Figure 6.2 shows the hammer marks are visible surrounding the object, including an area of elongation of metal towards the narrowing extremities of the bangle. In this area the rod has been reduced to 4.4 mm. The object shows a certain amount of filing, which has been almost obliterated by attrition. The metal would have been heated to red or white hot in order to achieve maximum malleability. In its manufacture, the bangle would have been subjected to hot and cold forging processes. This required adequate heat, bellows, an anvil, and hammers of stones and metal in order to achieve this shape.

Figure 6.2 The photograph shows an uneven iron bangle made by a Xhosa metal-smith.

A narrow circular iron bangle (SAMAE 6712) with chisel decorated marks from Zimbabwe is dated to 1871-86. Figure 6.3 shows a fine iron rod which has been employed by a Shona metal smith to create a circular bangle 7.2 cm by 7.3 cm in diameter. The rod is 3.0 mm in diameter and 3.0 mm thick. The metal is discoloured and in some parts corroded. The inner surface is smooth and has been rendered D-shaped from a square cross-section by the outer edges being slightly flattened with a narrow stamped herringbone design along the upper and lower edges giving the surface a ribbed appearance. A sharp blade has been used for this purpose.

Figure 6.3 A narrow decorated iron bangle from Zimbabwe including detail (SAMAE 6712).

A collection of four ear-rings Figure 6.4 made from iron wire by the Mpukushu of Botswana, living in the Okavango River region, was acquired by the Iziko Museum in 1936 from Rev. F. Froehlich. The four ear-rings average 1.8 cm long, while the ear-loop is circular to oval in shape and is ca. 1.0 cm diameter. The wire is bent in such a manner as to touch the lower loop. The wire is 0.9 mm in diameter. A minimal amount of discolouration is present on what appears to be commercial wire. Two of the ear-rings suggest that they might have been worn; this is established by the unevenness of the upper curve of the ear loops, while the others appear to be unworn. The ear-rings consist of a loop, for attachment to the ear lobe, while the shank is decorated with a tight binding of similar wire. The core of the shank and the binding wire end abruptly with irregular edges suggesting that a chisel was used as a cutting device. Two of the ear-rings display 6 coils on the shank while the remaining two display 7 coils. Ear-rings loosely similar to these have been described by Burchell (1953), Friede (1975), and Hall et al., (2006).

Figure 6.4 Four iron wire ear-rings (SAMAE 5671) made by the Mpukushu, Northern Botswana.

A composite brooch (SAMAE 562) illustrated in Figure 6.5 made from iron, copper, brass and aluminium was acquired from the "Basotho" dated to 1904 by Rev F. Christol. The diameter of the brooch is 5.7 cm, while its full depth is 1.7 cm. The basic foundation consists of two circular domed structures that are 1.5 cm deep, the upper structure being 1.5 cm wide. On the reverse is an iron pin, now partially discoloured, its width being 2mm, and length is 5.2 cm and attached to the frame work. On the opposite side a hook of the same wire is placed to accommodate the pin, which also holds the structure together. The twenty-three loops of the top structure show that the inner loops are pinched compactly together, while the opposite ends are left in a splayed state. The lower structure is a replica of the upper one; except that it is enlarged with the inclusion of a few more loops. Twenty six loops are needed to achieve this wider structure made in the same manner as the one above it. Fine commercially acquired strands of wire of copper, brass, and aluminium are woven in and out of the struts to achieve bands of solid and alternating colour, while the lower structure enjoys similar patterning with brass and aluminium. Each of the outer loops of the two structures has been bound with copper wire wound around the framework. This is an unusual item as generally clasps for holding garments together do not appear to be part of the African farming communities' material culture. In this case it appears that the metal smith was influenced by brooches he noted being worn among European visitors or immigrants or large safety pins imported from Europe (Tyrrel' 1968:97). A postscript added by Ashton (1938:308) stated that "At one time a modern type of blacksmithing learnt from European blacksmiths, flourished in Basutoland. A number of Sotho after serving their apprenticeship with a European-smith or at one of the technical schools established their own blacksmith shops" where they facilitated local repairs for the community.

Midway through the 18th century colourful blankets from England were introduced to the South Sotho in Lesotho and became a valued item of clothing (Karstel, 1995). To ensure the blanket's security around the shoulders a large safety pin or brooch (*lemao* or *sepêlêlê*) (Kriel, 1958) was employed. These have been illustrated in drawings and photography (Tyrrel, 1968:97, Morris & Levitas, 1984. Illustration 44).

Figure 6.5 A European inspired brooch (SAMAE 562) made from iron, copper, brass and aluminium wire of varying thickness from Lesotho.

In summary, the main techniques used to manufacture the objects made with iron in the Iziko Museum are hammering, wire drawing, polishing, incisions with the use of a chisel, and in the case of the brooch the use of pliers. It appears that imported metal was manipulated using techniques similar to those employed on local metal.

6.4.2: ORNAMENTS MADE OF COPPER AND WITH COPPER

In this chosen assemblage are copper manufactured objects which were valued amongst the material culture of the Mpukushu, Bushmen, Lobedu, Ndzundza and S. Sotho cultural groups of southern Africa. The ornaments selected to represent these cultural groups are beads, bracelets and a neck-ring. The beads and bracelets are representative of decorative objects that have been recovered in archaeological sites, most in fragmentary form over the past five hundred years (Van Tonder, 1966; Shaw, 1974; Maggs, 1976; Davison, 1984; Hall et al., 2006; Denbow & Miller, 2007). The Krige collection presented to the Iziko Museum in 1990 comprises a range of copper beads from the Lobedu (SAMAE 9910, 9911, 9913) each group showing a diversity of manufacturing features. Amongst the copper bead collections are some from the Mpukushu (SAMAE 10009) and Bushman (SAMAE 9147, 9326) of Botswana, all of which are fastened to flexible bracelets made of a selection of natural materials. A group of copper flexible, fine, wire-wound bracelets wound over an animal hair core is accompanied by others made from fine brass wire (UCT 38/69). A flexible bracelet has been included in the collection, demonstrating a combination of metals, those of fine copper spiralled wire and a use of narrow iron plates (SAMAE 457), and narrow rod copper neck-ring from the Ndzundza (SAMAE 10151), Limpopo Province.

Two sets of copper beads (SAMAE 9910, 9911) Figures 6.6/7 from Duiwelskloof, Limpopo Province, demonstrate the techniques of bead making that have been recorded from early archaeological sites such as Broederstroom (Friede, 1977) and Kwagandaganda (Miller & Whitelaw, 1994) without having been altered to the present time (Shaw, 1974; Davison, 1984). A note in the Iziko records states that these are “old copper and native made beads”. Items in the first group (SAMAE 9910) are recorded as being the same age; they are two cylindrically shaped copper beads with carefully butt jointed seams. The measurements for the two beads are 5.2 mm in diameter for both, while their widths differ, 2.0 mm and 2.7 mm, and their thickness is 1.1 mm and 1.2 mm respectively. The upper and lower surfaces have been worn flat. Both beads have been cut from rectangular shaped wire, while the wider bead shows striation marks. Both beads are well polished eliminating obvious manufacturing tool marks.

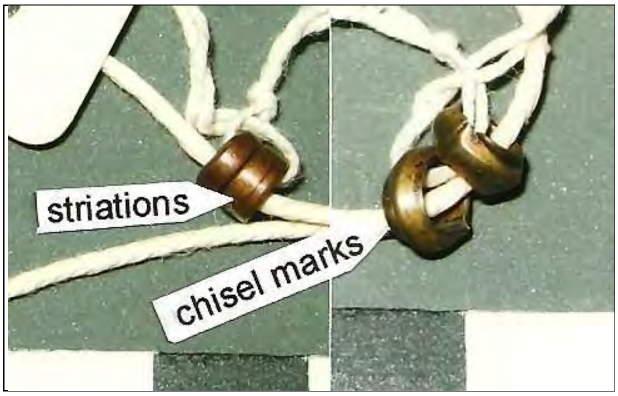


Figure 6.6 (left) (SAMAE 9910) a set of two copper cylindrical beads

Figure 6.7 (right) (SAMAE 9911) a set of two barrel shaped beads, showing manufacturing marks

The second group of two beads (SAMAE 9911) demonstrates the use of chisels in the uneven manufacture of the two beads. The measurements of these two beads are 6.5 and 6.9 mm in diameter, 3.2 and 3.3 mm in width while the thickness of the wire is 1.5 mm in both cases. Hammer marks on the surface have been eliminated through wear and tear, as both beads are highly polished. The angled chisel cuts from left and right have produced a blunt triangular or barrel-shaped cross-section. The beads have been bent into shape with the vertical surface on the inside of the object. The thin stretched metal around the top and bottom edges shows blade or chisel cut surfaces. The severing of the barrel-shaped wire into units has also splayed the metal which has resulted in the flat butt joints of the beads appearing wider than the actual bead.

The third group of copper beads from the Lobedu region (SAMAE 9913) Figure 6.8 is also part of the Krige collection. A large number of discoloured beads is strung on a cord. The diameters of the beads are uneven with an average of 5.5 mm and a thickness of 2.5 mm. The joints display a gap between their extremities in the final manufacture. The overall impression is that there is a lack of uniformity in the use of shallow D-shaped sectioned rods, which are cut into irregular lengths and bent into barrel shaped forms. They are worn smooth with no striations, or hammer marks visible.

Figure 6.8 Copper beads made from D-shaped cross-section rod demonstrate polished surfaces and chisel cut butt-joins

The copper beads from central Botswana Figure 6.9 show considerable difference in appearance from those from the Limpopo Province. There are two sets of cylindrically-shaped beads which are spaced around a fibrous core bound with sinew (SAMAE 9326 and SAMAE 9147). SAMAE 9326 was acquired by F.W. Taylor from the Naron Bushmen in the Ghansi area, in 1966. There are 16 beads which have been cut from strips of copper and bent into shape. The diameter of the beads is ca. 6.5 mm, the thickness 3.5 mm and the width of the metal ribbon ca. 2.0 mm. The diameter of the bracelet is 6.2 cm. The cylindrical shaped beads are carefully butt-jointed, with hammer marks superficially seen on the external surface of some of the beads. The outer sharp edges of the beads have been eliminated through wear and tear which has produced a smooth overall surface.

A group of copper beads labelled SAMAE 9147 was acquired from L. van Onselen in 1965 without the locality of origin being noted. There are 30 copper beads placed on a core of animal hairs and sinew. The measurements of these beads are 6.5 mm diameter with a thickness of 3.9 mm, and the width of the metal ribbon is ca. 2.0 mm. Figure 6.9 shows cylindrical beads which have been cut from rectangular strips of copper and bent into shape. Tool marks, such as those from hammering are more visible on these beads than on those discussed above. The butt-joints are not invisible as are those seen on SAMAE 9326, while these show an imperceptible curvature inwards and a roughness around the edges. Tool marks in the form of small depressions are noted on some of the beads. Wear and tear has contributed to the polished appearance of the beads.

Figure 6.9 Cylindrical copper beads of Bushman manufacture from the central Kalahari Desert.

The copper beads made by the Mpukushu, of Northern Botswana (SAMAE 10009) Figure 6.10 show a rougher approach to bead making than those worn by the Bushmen. The beads were obtained from the Okavango River region, acquired from Dr. Fisch in 1971. The measurements for the bracelet are 9.5 cm by 10.2 cm. The measurements for the beads are on average 7.9 mm in diameter, the thickness 4.9 mm and the width of the metal 2.5 mm.

Figure 6.10 A bracelet made of uneven copper beads from Northern Botswana showing manufacturing irregularities.

Although these beads appear polished the irregular manufacturing processes are apparent. The unevenly made beads are strung around a flexible core made from giraffe tail hairs and bound by sinew. A variety of tool marks or metal defects are noted on these beads such as grooves in the centre of some beads, perhaps as a result of bending or overlapping in the metal ribbons in the act of making rods for the object. There are fine hammer marks noted on the beads throughout, and the butt joints are rough and uneven. The shapes of the beads vary between cylindrical and barrel shapes.

Thirty three flexible wire-wound bracelets of fine copper and brass wire are tied into a bundle bearing the catalogue number UCT 38/69, - 38 implying the year of collection (see Figure 6.11 :). The average measurements of the copper bracelets are 7.2 cm in diameter while the brass bracelets are slightly smaller measuring 6.8 cm in diameter. The diameter of the wire employed for these objects is 0.5 mm. The circular wire employed is regular throughout suggesting that the wire was commercially acquired. Some of these bracelets are in better condition than others as patination has taken place over part or all of many of the objects. The Iziko Museum records states that the inner core used was animal tail hairs and the artefacts were collected from the Lobedu. The bracelets are well made with no unusual manufacturing characteristics visible.

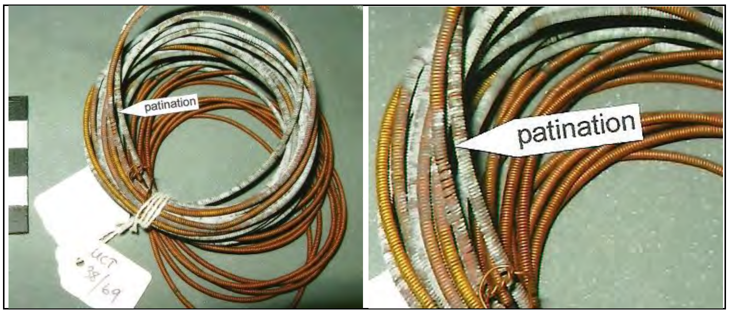


Figure 6.11 Thirty-three flexible bracelets of copper and brass, most of which are patinated including a detail showing fabrication methods.

A copper and iron bracelet (SAMAE 457) (see Figure 6.12) was made by a S. Sotho metal smith in approximately 1904. The upper and lower sections are made with a core of coiled copper wire and are bound by even, slightly stretched, spiralled, copper commercial wire which is 1.1 mm thick. The diameter of the object is 5.7 cm. It is made in two sections placed one above the other and held firmly together with a bracket of discoloured hammered iron plates over both extremities. The iron brace is 8 mm wide and 1.1 mm thick and overlaps securely on the inner surface of the object. A ‘hook and eye’ device is made of iron for holding the ornament together; the latter features are wrapped in fine copper wire. The Iziko Museum acquired the object from Rev. F. Christol.

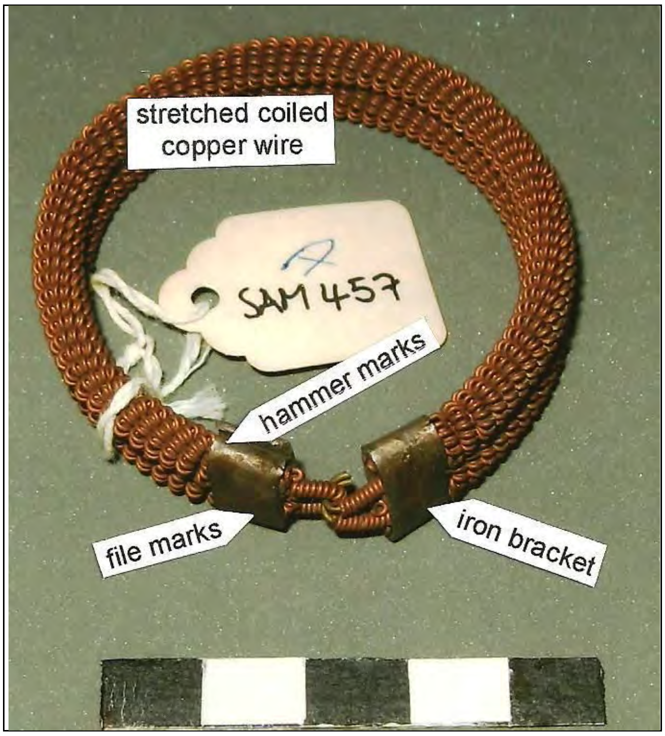


Figure 6.12 A double stranded copper flexible bracelet held together by iron brackets made by a South Sotho metal-smith.

A light and narrow neck-ring made of copper by a metal-smith (SAMAE 10152) has been chosen to represent the larger forms of body ornament made from this metal (Figure 6.20 (a) :) shows both copper and brass neck-rings). The copper neck-ring measures 10.9 by 10.45 cm in diameter, while the dimensions of the rod are 6.00 mm in diameter, and the thickness is 4.5 mm. It weighs 39 g. The curved rod displays a slight convex inner and outer surface and a smooth upper and lower surface. The cross-section is rectangular which is noted at the outer extremities which almost meet. There are no smithing marks on the ring; which might imply that the ring or rod was acquired from a trading outlet, or alternatively subjected to attrition by many neck-rings being worn at the same time. The possibility cannot be excluded that this object may have been manufactured from a locally cast *marale* by the metal smiths of Phalaborwa (Friede, 1980, Mason, 1986). This neck-ring demonstrates similarities with a brass neck-ring from the same cultural group and described below.

In summary, the techniques of manufacture visible on the studied objects include the shaping of rods with either flat or curved outer surfaces to form beads not only from the Limpopo region but also from Botswana. The latter show rougher fabrication marks identified by the use of hammers, while some beads from Botswana show grooves appearing on the surface of the beads, while those from Lobedu show striation marks. The copper wire-wound bracelets indicate that commercial fine drawn wire was used for manufacture of both examples and that metal smiths were following the techniques utilised from the first millennium onwards.

6.4.3: ORNAMENTS MADE OF BRASS AND WITH BRASS

Brass made ornamentation forms a major component of my assemblage. It reflects the widespread availability of this metal to the cultural groups residing close to the Indian Ocean port of Delagoa Bay. There are 10 examples displaying the variety of ornaments made as well as the range of techniques employed by the metal smiths within the various regions. Nine of the samples chosen show the qualities of workmanship from the particularly rough cast neck-ring from Umfolosi in northern KwaZulu-Natal (SAMAE 3794) to the refined neck-ring made in Limpopo Province (SAMAE 10152).

The map Figure 6.1 indicates that many cultural groups within southern Africa utilised this metal for decoration, some are light, as the ear-ring from Marico SAMAE 5309 shows, in contrast to the many heavy objects that were fashioned into neck-rings. The cultural groups and objects chosen are the South Tsonga with a bangle SAMAE 7839, (see Table 6.1) the Lobedu with flexible bracelets UCT 38/69 (the copper component is discussed above) and beads SAMAE 11837, a Ndundza neck-ring SAMAE 10152, a Swazi neck-ring SAMAE 3788, a N. Nguni neck-ring SAMAE 3794, a S. Sotho neck-ring SAMAE 454, a Mpondomise bracelets SAMAE 9575, and a Tswana ear-ring SAMAE 5309. The brass beads SAMAE 11837 strung on a leather thong, Figure 6.13 from Lobedu show uneven manufacture, some having a D-shape cross-section, mutating to those which could be termed biconical. An average measurement for the large beads is 7.2 mm diameter and 4.9 mm thickness. These beads show a blunt ridge around the mid-circumference identifying them apart from those that are barrel shaped. They show hammer marks which were introduced in manufacture, while the ridge caused by chisel use is noted in the depression on either side of the extremities of each join. The upper and lower edges of the beads have been worn away eliminating fabrication marks. The beads are discoloured throughout, while a visual appraisal suggests that an assortment of rods was used in their manufacture. This can be noted on the narrow bead amongst many others that are of wider in dimension.

Figure 6.13 Lobedu brass beads strung on leather thonging indicating manufacturing details.

A decorated brass bangle (SAMAE 8167b) Figure 6.14 from Zastron was made by a S. Sotho metal smith in the Free State, near the Lesotho border. The narrow rectangular cross - section measures 2.0 mm in diameter and 0.5 mm thick, and the extremities meet flush in a disconnected butt join. The diameter of the bangle is 5.8 cm. Production marks of hammering and rough filing are noted on the inner surface. It is not possible to tell if this was achieved with a file or rough stone. The outer surface decoration consists of a range of punch marks and controlled areas of bass relief produced with diagonal, horizontal and vertical impressions achieved with a narrow and thicker edged chisels. The upper and lower edges have not been damaged by the activity on the inner and outer surface; they are comparatively even throughout.

Figure 6.14 A brass bangle showing manufacture and decoration on the outer surface including details of chisel marks. The two images on the right show closer details of decoration.

Two sets of bracelets have been chosen to represent the wire-wound technique which is identified as flexible bracelets appearing from the mid-Early Iron Age. The brass and copper bracelets (UCT 38/69) (Figure 6.11 above) made by a Lobedu metal smith differs in so far as those made centuries earlier were from hammered ribbon or from wire bound over vegetable fibres. These many bracelets have been made from commercially available wire in the area while their manufacture still maintains the use of animal hairs a feature which became apparent in the later centuries of the Iron Age (Stayt, 1931; Shaw, 1974; Davison, 1984; Herbert, 1984).

The South Tsonga solid brass arm decoration (SAMAE 7839) Figure 6.15 presents a well-made solid and heavy object which according to Iziko's records came from 'Maputoland, Portuguese East Africa', and was collected in 1958. The measurements for this oval arm decoration are 10.1 cm by 9.65 cm for the diameter while the circular bar is 15 mm and the thickness 14.9 mm. The weight of the arm-ring is 322 g. The metal is discoloured and show refined hammer marks. The general surface is smooth. The extremities indicate this could well have been a bar of brass heated and forged into shape; the visible concavities have been roughly filled with a substance on one side. Filing marks around the edges have eliminated the sharp edges.

Figure 6.15 A photograph of heavy brass (SAMAE 7839) arm decoration from the South Tsonga, Mozambique.

The inflexible bracelets made by the Mpondomise, from Tsolo in the Transkei (SAMAE 9575 a/b) Figure 6.16 are similar in exterior to those produced in the past and described by Shaw & Van Warmelo (1974) but they differ in as much as the cores for these objects consists of several strands of fine copper wire, bound with brass triangular cross-sectioned commercial wire. The introduction of alternative manufacturing processes is noted in the creation of this piece of ornamentation, which indicates the use of consciously made choices in the manufacturing of frequently observed similar objects. In this case, a departure is noted from the use of animal tail hairs being generally used for a core in many regions amongst the African craftsmen who loosely duplicated objects made in the past. In this example a flexible wire-wound bracelet has mutated into a rigid object and fits the description of a bangle (Garlake, 1973; Steyn et al., 1998, Denbow & Miller, 2007). The measurements for the two bracelets are 8.75 cm and 9.0 cm respectively. Their larger measurements suggest that they could be accepted as leg-rings. The dimensions of the copper wire used for the inner core is 0.3 mm while the commercially acquired triangular cross-sectioned wire is 3.0 mm by 1.1 mm. There is faint discolouration on the two specimens, which otherwise appear unworn.

Figure 6.16 a/b Bracelets made of fine wire copper core and commercially acquired triangular manufactured brass wire made by a Mpondomise metal-smith.

Neck-rings from south eastern Africa are seen in several different designs made of brass and copper. The heaviest objects within this region are from the KwaZulu-Natal and Lesotho region, while lighter ones are noted from the Limpopo Province (Roodt, 1996, Ashton, 1939, Davison, 1984). Bryant (1949: 159) suggests that the background to the heavier neck-rings originates from the early 18th century AD when heavy brass and copper rings (*umDaka*) of various sizes about 10.0 cm in diameter and about 2.5 cm thick were introduced by the Portuguese and British and used amongst the Zulus, at that time, as currency amongst the elite. It is noted that the imported material was introduced as large rings which were easier to carry and safeguard (Bryant, 1949). In 1719, Robert Dury, a British slave hunter / merchant arrived with a number of “large brass rings, or collars” and received “seventy-four boys and girls” to be taken to colonise the New World (Bryant, 1949). The notion that humans could be exchanged for “rings and collars” resulted in that these would change hands with animals and objects in the payment of *lobola* (Bryant, 1949, Mabola: Webb and Wright, Vol II, 1979;

Ndukwana: Webb and Wright, Vol. IV, 1986). In Shaka’s time (ca. 1800-1828), the imported rough brass and copper rings were remodelled by Zulu brass and copper smiths into light and heavy ornaments for the elite of the Zulu society (Gardener, 1836, Stuart & Malcolm, 1959; Kennedy, 1991). Baleni ka Silwana (Webb & Wright, Vol I, 1976: 24) clarifies the confusion between *umDaka* and *umnaka* by stating that *umDaka*, was the imported material in its rough form, and was the metal of which *izingxotha* were made, while *umnaka* was the completed article for wearing around the neck.

The records at Iziko Museum defines this object as a neck-ring SAMAE 3794, Figure 6.17. It is 19 cm in diameter; is roughly circular in cross-section and the bar measures 1.9 mm in diameter and 23.0 mm in thickness. The weight of the neck-ring is 1 266 kg. The metallographic test indicated copper 85%, zinc 10%, tin 4%, and lead 1 %. The test was performed in 1922 by the Government Analyst, Mr. [N. or L. – could be Nico or Leo] Sinclair, of the Government Chemical Laboratory in Cape Town who sent the results to Dr. Peringuey, Director of the South African Museum, 8th March 1922. The Laboratory number for the ring was 491. This information can be found in South African Museum Correspondence File 19181929, and 124-204: 135 (G. Klinghardt. Iziko Museum, March 30, 2015).

The neck-ring was cast prior to the mid-19th century, by a N. Nguni brass smith from the Umfolosi region of KwaZulu-Natal and shows considerable imperfections and discoloration in manufacture. To achieve the cast, a large quantity of brass would have been melted in a crucible over a hot fire, with the aid of bellows and sufficient charcoal for fuel. The surface of the neck-ring is unevenly pockmarked throughout which indicates that it could have been cast in sand / rough earth, sandstone or dung mould (Bryant, 1949; Stuart & Malcolm, 1959; Parkington & Cronin, 1979; Maggs & Miller, 1995). It also shows heavy hammering on the inner and outer surfaces as well as faint file marks or abrasions on the ring. The right extremity shows coarseness in fabrication including a depression in which some filling has taken place while the other shows an abrupt severing indicating the use of a saw. The Iziko Museum acquired the object from Rev A. Knottenbelt in 1958.

Figure 6.17 A Northern Nguni neck-ring manufactured with available rough casting methods.

A brass neck-ring from Swaziland (SAMAE 3788) Figure 6.18 appears to be of a different composition to the one examined from KwaZulu-Natal. The dimensions of this neck-ring are 15.4 cm in diameter while the rod's width is 2.0 cm and its thickness 1.9 cm, and the mass is 942 g. This object was not measured metallographically as was the N. Nguni neck-ring. A cross-section through the object would show a double pyramid with the upper and lower highpoints reduced. The object was cast with both extremities showing irregularities and fractured areas with concavities that have been partially filled. The overall surface indicates that the casting technique was superior that of the Northern Nguni neck-ring. Although there are shallow pits and indentations, ridges and convex areas, hammering and the use of a metal file or stone has been vigorously applied to produce a smoother surface throughout.

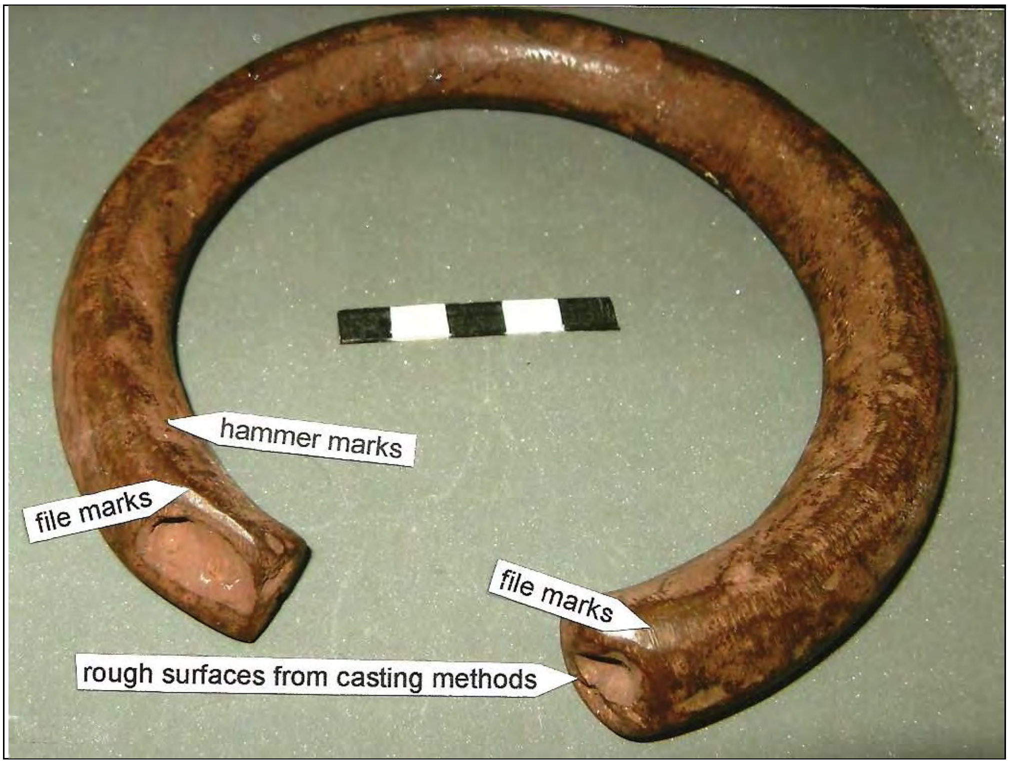


Figure 6.18 A Swazi neck-ring indicating cast and manufacturing details

A more refined solid brass cast neck-ring was procured from the South Sotho (SAMAE 454).

Figure 6.19 and described in the Iziko records as a 'rounded brass ring, with a diameter of 16.5 by 15 cm', and dated 1904. The cross-section of this object is bullet-shaped with the thickest area at the neck-edge while the metal is hammered thinner towards the outer edges. The measurements in the centre are 16.3 mm in diameter the width 13.0 mm and the thickness 12.9 mm. There are no metallographic records for this collar / neck ring. The metal is slightly discoloured and mottled in areas, although it has retained its golden colour. The surface shows shallow pits and indentations of manufacture, and areas of irregular porosity on the inner surface are visible. It has been filed and polished sufficiently to eliminate the rough surfaces. The extremities are narrowed reduced with hammer action and show a different profile from the centre of the object. The extremities are more circular than wedged shaped. They have been sawn off and the sharp edges removed; their measurements are 12.0 mm and 16.0 mm in diameter respectively and the weight is 490 g.

Figure 6.19 A South Sotho cast brass neck-ring showing imperfections in manufacture

A thinner and more polished brass neck-ring was made by a metal smith in (SAMAE 10151) Figure 6.20 (b). Apart from it being described as a neck-ring there little information about the object in the Iziko records. The diameter of the neck ring is 10.8 cm by 10.7 cm. The measurements of the convex cross-sectioned rectangular rod are 6.9 mm in diameter and the thickness 5.0 mm, and the total weight is 49 g.

Figure 6.20 a / b: A copper (a) and brass (b) (SAMAE 10151) (lower) neck-ring made by Ndzundza in Limpopo Province.

The uneven profiles of the extremities, one almost circular, and the other rectangular suggests that the neck-ring was produced from a circular brass rod and that the upper and lower surface have been subjected to vigorous filing or attrition. Hammer and/or filing marks are not visible on these polished planes. The outer edge of the neck-ring is decorated with incised indentations, which include cross hatching and herring bone on either side of what appears to be letters spelling KEMH. The object was collected near Weltervreden, Groblersdal district, Limpopo Province in 1972.

The ear-ring (SAMAE 5309) Figure 6.21 made of brass is one of the few objects of its genre in the Iziko collection as the majority of ear-rings in the collection are made from glass beads and natural materials. The length is 2.2 cm and it is 1.5 cm wide. The wire measurements are 1.5 mm in diameter and 2.1 mm thick. The records concerning this object are scant, the only indication is that it came from the Groot Marico district. It could have been made by a Tswana metal smith. The metal is discoloured and shows areas of corrosion. This object would have been subjected to hot and cold working conditions to achieve its present shape. The ear-ring appears to be made from roughly square cross-sectioned wire bent into an ‘S’ formation, with an oval loop at one extremity, while a further portion is wound into a tight spiral of several turns with a small gap remaining in the centre. From the top of the ear loop robust hammering has taken place flattening the metal throughout, thereby expanding the metal and creating a more substantial object.

Uneven wire manufacture is noted on the square wire portion of the ear-loop which indicates that the metal was exposed to hot and cold forging processes prior to being wound into shape.

Figure 6.21 A brass ear-ring (SAMAE 5390) of square cross-sectioned wire from Groot Marico showing fabrication details.

The assemblage chosen from the Iziko Museum indicates that the typology of beads, solid bangles and flexible wire-wound bracelets followed examples that have been noted in ethno-historical literature and archaeological contexts from the Early Iron Age to the 19th century, while wire-wound bracelets of copper, brass and aluminium are objects that are still made for the tourist market (Hechter-Schultz, 1966; Shaw & Van Warmelo, 1974)

In summary the manufacturing techniques visible on the brass objects are the use of commercially drawn wire for flexible bracelets, and the use of narrow and thicker rods which has been subjected to heat to create shapes such as the bangle and ear-ring. The casting of heavy ornamentation became a feature of the late 18th century and early 19th century which did not have antecedents in southern Africa. The melting of brass amongst the south east African cultural groups led to cast neck- and arm rings which show crude to refined finishing techniques including those of hammering, filing and the polishing of surfaces, some of which can be attributed to attrition.

6.5: ARCHAEOLOGICAL RECONSTRUCTIONS OF TECHNIQUES OF ANUFACTURE USED FOR DECORATIVE METAL WORK

6.5.1: INTRODUCTION

The reluctance of Iziko curators to make objects available for invasive sampling precipitated the development of an alternative approach to this study. It was important to study published metallographic works on decorative objects made of various metals and alloys in the region (Stanley, 1929; Miller, 1996, 2001, 2002; Childs, 1991 a/c, Miller et al., 1993, 1995; Desai, 2001; Denbow & Miller, 2007). Knowledge of metallographic techniques is essential for understanding the processes and techniques used in the manufacture of archaeological objects. Metals are made up of crystals with distinctive shapes, structure, alignment and size (Thondhlana & Martinón-Torres, 2009). The factors controlling the microstructure of metals include, amongst others their composition and manufacturing progressions (Caple, 2006; Martinón-Torres, 2009). If samples of metal are polished and studied metallographically the processes of manufacture can be delineated (Thondhlana & Martinón-Torres, 2009). In studying the microstructure of indigenous iron objects made in South Africa, Stanley (1929) Figure 6.22, 23, 24 noted that the metal was heterogeneous and consistent with that produced during the bloomery process. The microstructures had phases characteristic of steel and other characteristics typical of soft iron. In between, there are the slag stringers whose elongations indicate that the metal was forged and not cast into shape.

The figure below shows different grades of steel metallographically reconstructed.

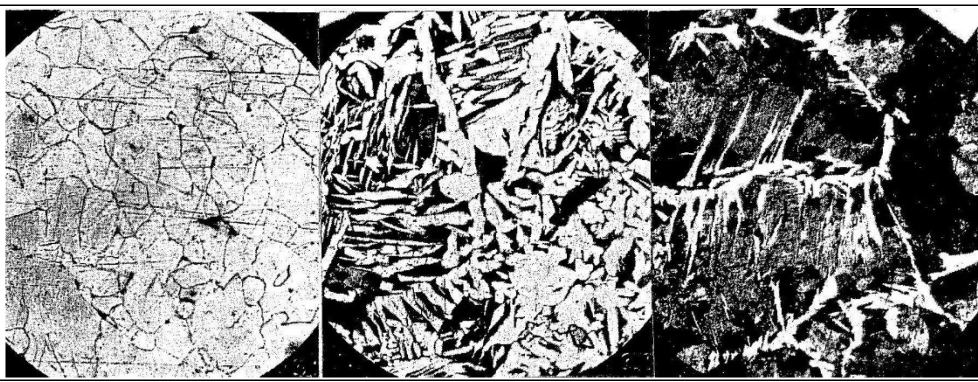


Figure 6.22, Figure 6.23, Figure 6.24 showing different grades steel, while the last one shows slag stringers inside the objects (Stanley, 1929: Plate 3 facing page 132) (Magnification 100x).

Although usually metallographic studies provide details relating to metal composition which visual analyses cannot provide hence the two are complementary.

6.5.2: ARCHAEOMETALLURGICAL RECONSTRUCTIONS OF FABRICATION TECHNIQUES USED TO MANUFACTURE DECORATIVE METALWORK IN SOUTHERN AFRICA

A literature survey indicates that numerous metallographic studies have been conducted to understand the fabrication of decorative iron objects in the Iron Age of southern Africa. For example, Miller (1996) studied iron artefacts from Divuyu metallographically (mid 6th to 8th centuries AD) and Nqoma (7th to late 11th centuries AD). Miller's (1996) work reveals that the study of small ornamental forms made of iron such as beads, bangles, wire-wound bracelets, clips and staples comprised microstructures consistent with carbon steels which had been fabricated through cycles of hot and cold working. Hot-working, typically needing temperatures of between 700° C and 1000° C, allows the metal to be malleable, often elongating the slag inclusions or trapping surface oxides in welds (Miller, 1996). Some of the following examples show heating, bending, folding and banding within the metal structure to have been achieved while the metal was still malleable. This evidence was documented in the microstructures of decorative metalwork from Nqoma and Divuyu in Botswana (Miller, 1996). Working at lower temperatures or cold-working near ambient air temperatures may leave traces in the form of grain deformations, fractured glassy intrusions or strain lines (Miller, 1996). Deeper investigation into the magnification of metal structure was performed on an iron bangle (D11) from Divuyu dated to the Early Iron Age. Figure 6.25 shows a polished section of an iron bangle which includes a multiphase inclusion in fine pearlite (medium grey) and ferrite (light) in the metallic composition (Miller, 1996).

Figure 6.25 A polished section of an iron bangle from Divuyu, Botswana (Miller, 1996: 110) (Magnification 562x).

An iron ring from Divuyu (D 63) Figure 6.26 was examined to show the manufacturing process of the object which appears as an irregular oval section with a seam stretching partially through its centre. Within the perimeter the etched section shows the trapped surface oxides in the fold, and grains of sand trapped in the perimeter (Miller 1996: 110).

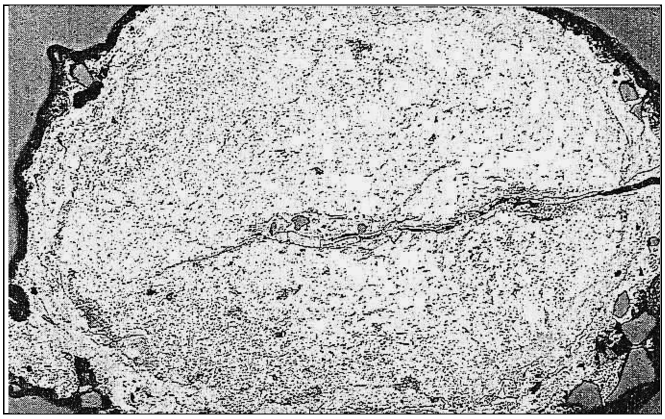


Figure 6.26 A micrograph shows an etched transverse section through an iron ring from Divuyu (D 63) (Miller, 1996: 107) (Magnification, 18x).

Staples and clips of iron and copper appeared in great numbers at Divuyu and Nqoma, (Botswana) in the Early Iron Age. Most were made of iron from the characteristic cut metal ribbons. Some of them were fused laterally together at both sides having been bent around some form of material now decayed. Figure 6.27 shows how distorted the metal became at the end of an iron clip from being cut with a chisel in cold state, with grains of sand adhering to the tip of metal (Miller, 1996).

Figure 6.27 A micrograph shows the distorted cut end of an iron clip (N 926) from Nqoma (Miller, 1996: 105) (Magnification 56x).

These various features of the *chaîne opératoire* in iron can be seen in the specimens that have been isolated for illustrative purposes. Figure 6.28 below shows a micrograph of a polished transverse section through a bent iron plate (M 106) from Mapungubwe, dated to the Middle Iron Age, illustrating the outline of the original metal preserved in the corrosion product with only a small bright fragment of the remaining metal (Miller, 2001: 29)

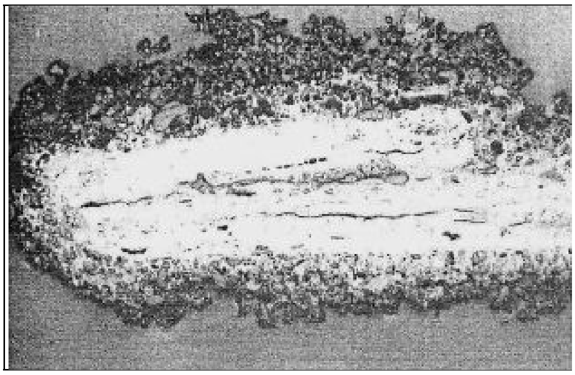


Figure 6.28 A micrograph showing a fold in an iron plate from Mapungubwe (Miller, 2001: 29) (Magnification 10x).

A series of iron beads was inspected from Goergap in North West Province and has been dated to the Later Iron Age (WAT 4, 5, 6, 7). Figure 6.29 shows the extent of the corrosion that has taken place. Their manufacture shows that a narrow strip of iron bent to form a circle or ring; some of the rings have their ends butted. Figure 6.30 shows the results of poor welding seen in one of them (Miller et al, 1995: 54)

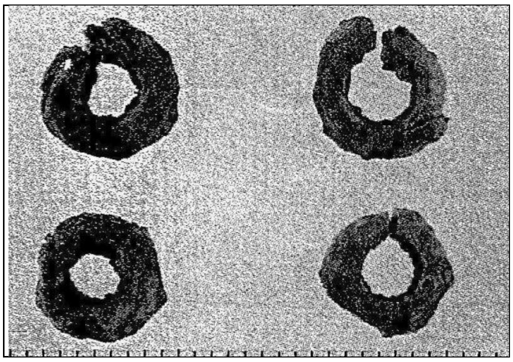


Figure 6.29 Photograph showing four corroded cylindrical iron beads from Goergap, (Miller et al, 1995: 54). Scale in mm.

Amongst the iron beads that have been investigated to evaluate their fabrication from Goergap was one (WAT 4) which shows distinctive banding or layering, as seen in the illustration below in which the welding was described as poor. Figure 6.30 shows the variation between two strips showing different carbon content (Miller et al., 1995)

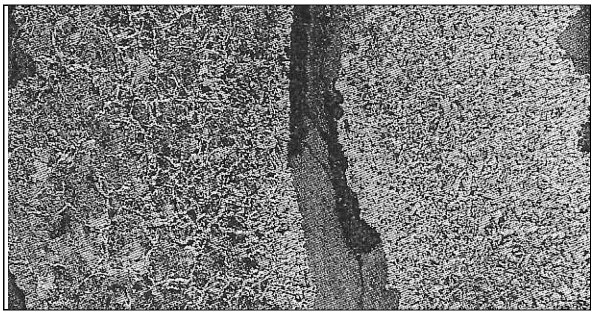


Figure 6.30 The photograph shows an example of poor welding between two strips of iron with different carbon content (Miller et al, 1995: 54) (Magnification 45x).

The results of poor welding on an iron bead are seen in the micrograph (below) where oxidation has burst the layers apart. This is seen in Figure 6.31 which shows a polished section through bead WAT 4, illustrating the laminated or layered structure (Miller et al, 1995: 54).

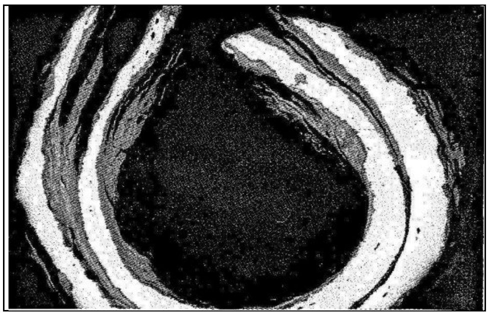


Figure 6.31 A micrograph showing a polished section through an iron bead (WAT 4) indicating its laminated structure (Miller et al., 1995: 54) (Magnification 7.2x).

6.5.3: ARCHAEOMETALLURGICAL RECONSTRUCTIONS OF TECHNIQUES USED TO FABRICATE DECORATIVE COPPER, BRONZE AND BRASS WORK

From numerous archaeological site exhibiting iron and copper objects especially when ornamental forms are found together, copper specimens are generally better preserved and show less corrosion than iron ones. When apparent, the corrosive features are noted as this surface copper oxide and pitting (Miller, 1996). Worked copper generally consists of recrystallized copper grains with annealing twins indicating that heavy prior cold-work was followed by annealing temperatures generally above 300° C (Miller, 1996). A feature seen frequently in ornamental pieces such as beads and ribbon wire is the grain compression.

Examples of copper ornamentation in the form of beads, bangles and wire-wound bracelets have been explored for their internal cell structures under hot and cold conditions. Childs (1991c) investigating amongst the Luba of central Africa excavated samples of copper being worked similarly to iron in respect of layering fragments of copper. The suggested date of manufacture was indicated as 13th – 14th century at the beginning of the Later Iron Age, when ornamental forms were made by pressure welding together thin strands of copper which after centuries of burial are now splitting apart (Childs, 1991c: 39). Figure 6.32 shows how the technique of layering copper exposed inadequacies as through time the stands have parted. It was concluded that the technical skills of the metal smiths of the time were inadequate for the process (Childs, 1991c: 39).

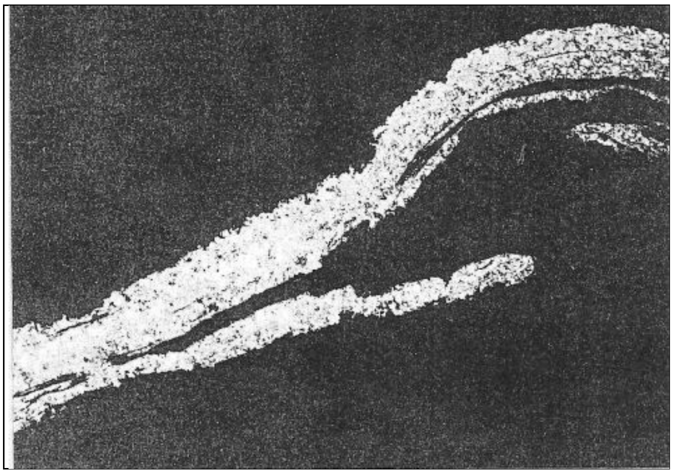


Figure 6.32 A micrograph showing layered copper strands detaching from the main form from corrosion (Childs, 1991c: 39).

The following example of copper investigation on ornamental forms, Figure 6.33 shows a substantial rod being formed as a bangle, while deeper examinations indicates that the metal smith pressure welded a thin copper strip to a thicker rod and then hammered around the circumference (Childs, 1991c : 39). The explanation indicates that pressure welding is difficult due to the speed with which the metal surfaces oxidize in the air and form a veneer which impedes the diffusion and bonding of the metal (citing Tylecote, 1969).

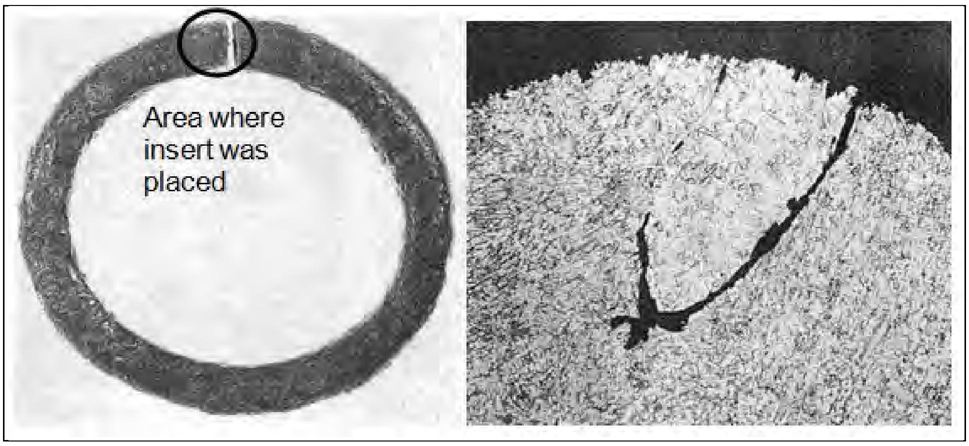


Figure 6.33 A photograph (left) showing the thick copper rod formed into a bangle and a micrograph (right) showing the inserted strand of copper hammered into its periphery (Childs, 1991: 39) (Magnification 12.5x)

Copper and iron were used for ornamental forms in the Middle Iron Age site of Mapungubwe (Meyer, 1998; Calabrese, 2000, Miller 2002). The copper decorative objects show that they were manufactured using similar techniques to those noted in the past and often left in a recrystallized annealed condition. Figure 6.34 shows a section of worked copper from a ring 19.0 mm in diameter and indicates that cold working took place, in which the original casting network of cuprite/copper eutectic had been drawn out longitudinally and given a slight torsional twist due to flattening of the sides (Miller, 2001: 92).

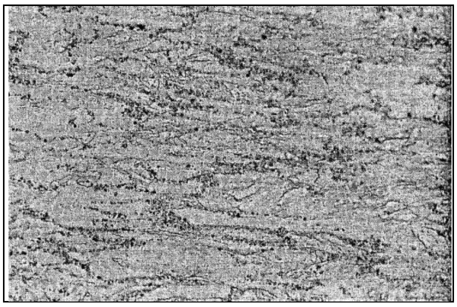


Figure 6.34 The micrograph shows how a network of cuprite/copper eutectic had been drawn out longitudinally (Miller, 2001: 92). (Magnification 240x).

The intensive archaeological studies at the Greefswald site produced numerous fragments of iron and copper wire-wound bracelets for arms and ankles (Calabrese, 2000; Miller, 2001). Miller (2001) found most of the copper wire for wire-wound bracelets to contained angular, recrystallized copper grains showing straight-sided annealing twins. Figure 6.35 is a micrograph of a polished longitudinal section through a copper wire-wound bracelet (M 1093) exhibiting thickened wire elements flattened on the outside, wrapped around a composite fibre and iron core (Miller, 2001). The copper wire used for this object indicates that a certain amount of cold working had taken place.

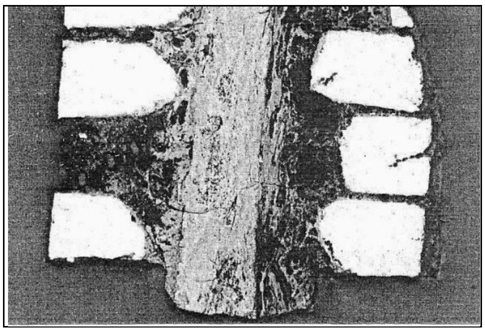


Figure 6.35 The micrograph shows a polished longitudinal section through a copper wire-wound bracelet (Miller, 2001: 92) (Magnification 7.5x).

A further micro image of a fragment of a copper wire-wound bracelet, Figure 6.36 shows the alternative shape of cut ribbon forming the object. Apart from the trapezoidal shapes (M 4001) placed closely against each other the corrosion rinds are packed around residual cores of metal indicating corrosion (Miller, 2001). Many of the copper wire-wound bracelets from this site were found to have well preserved fibre cores, due to the antibiotic properties of copper (Miller, 2001: 90).

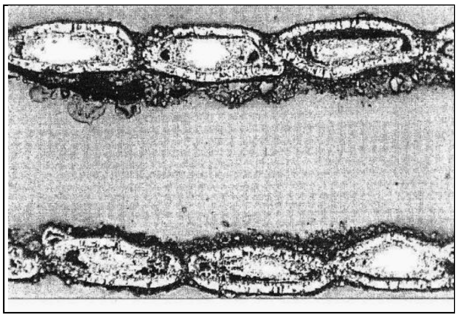


Figure 6.36 A micrograph of a polished longitudinal section through a copper wire-wound bracelet (M 400-1) showing corrosion rinds around residual cores of metal (Miller, 2001: 92) (Magnification 10x).

Many beads of copper and its alloys were retrieved from the site of Bosutswe in the Later Iron Age period, showing varying degrees of corrosion (Denbow & Miller, 2007). Their fabrication indicated that all beads consisted of single phase equiaxed copper grains with annealing twins, while their grain sizes varied from small to large. At times nearly a full range of grain sizes could be noted in a single object, indicating that different degrees of cold work had taken place before being annealed (Denbow & Miller, 2007: 287). Figure 6.37 shows a micrograph of the copper bead (B 133) with a cold worked join with some preferential corrosion attack in the cold worked areas. The image indicates that the beads were all cut from the “inside” of a hot-worked strip with a chisel and wrapped to keep the v-shape cut on the inside to form a neat join (Denbow & Miller, 2007: 287)

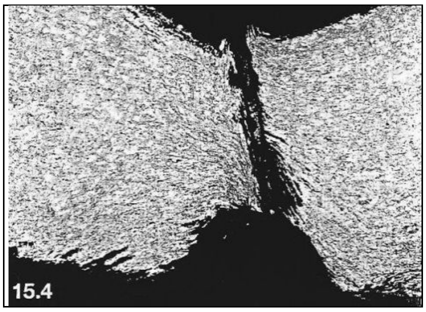


Figure 6.37 A micrograph showing a longitudinal section of an annealed copper bead from Bosutswe (Denbow & Miller, 2007: 286) (Magnification 11x).

A slightly lower magnification of a copper bead from the same locality as the former indicates the full bead showing the strip of metal with tapered wedge-shaped ends cut with the aid of a sharp object. Figure 6.38: indicates more clearly that a hammered sheet was cut into strips for beads which were made by cutting short lengths of copper ribbon and bending them around with the cut bevels on the inside to create a relatively smooth join (Miller 2002). The several collections of copper beads from Iziko Museum revealed similarities to the form and manufacture to those discussed above (SAMAE 9910, 9911, 9913, 9147, 9326, 11837).

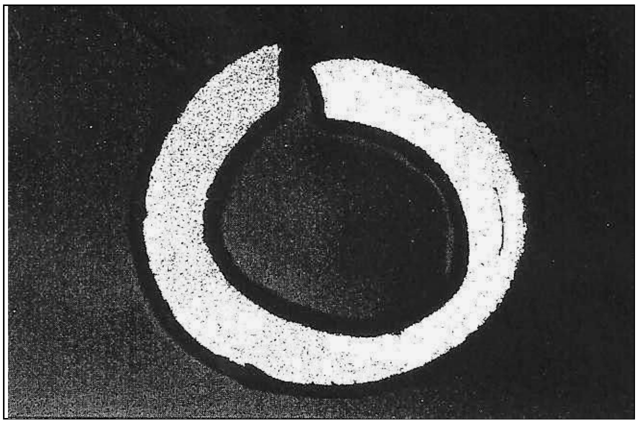


Figure 6.38 The micrograph shows an etched section through a wrapped copper bead (B 159) from Bosutswe (Miller, 2002: 1124) (Magnification 10x).

Until recently the production of bronze; an alloy of copper and tin has been sparsely documented and a few objects have been metallographically studied (Friede, 1975, Miller, 1992; Miller et al., 1995; Hall et al., 2006; Bandama, 2013). The fabrication technology used for working bronze was similar to that for working with copper, and in many body ornamental objects bronze has been used in multi-metalled composite wire-wound bracelets (Miller, 2002). The earliest appearance of bronze in an archaeological Middle Iron Age site is recorded at Mapungubwe in the form of a substantial curved bar shaped like a bucket handle and a few fragments of wire-wound bracelets (Miller, 2002: 1102). The specimens were all 6% tin in copper and when polished reached a golden colour, similar to the appearance of gold and most likely, the social context of this cultural group, enjoyed a similarly elevated position as gold for status enhancement (Miller, 2002: 1124). From the Middle to Later Iron Aged site of Bosutswe bronze detritus and beads were recovered and metallographically analysed (Miller, 2001, 2003; Denbow & Miller, 2007). Figure 6. 41 shows an etched section through a bronze nodule (B 3) from Bosutswe, consisting of 8% tin in copper. The copper grains are rounded, with irregular intergranular island of the tin-rich delta eutectoid, indicating slow cooling taking place in a molten droplet. The black areas are voids (Miller, 2002; 1124)

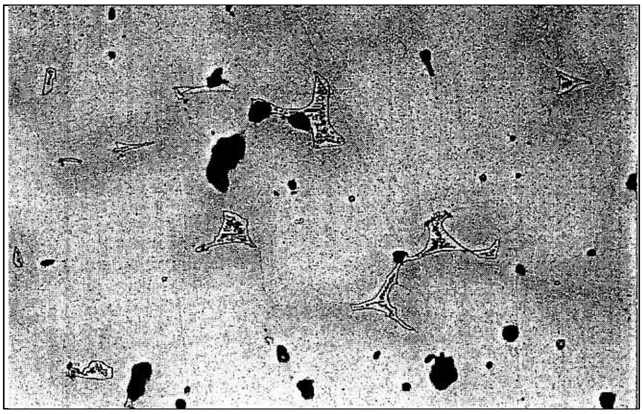


Figure 6.39 The micrograph shows an etched section through a bronze nodule (B 3) from Bosutswe (Miller, 2002: 1124) (Magnification 257x).

The technology for making bronze beads was similar to that employed for iron, copper and gold. The bronze objects from Bosutswe indicated varying degrees of corrosion. Some alloyed beads showed that a full range of grain sizes could be found in a single object, indicating that different degrees of cold-work had occurred before the final anneal (Denbow & Miller, 2006: 287). All the beads had copper oxide or copper sulphide inclusions, most often both. These were found in concentric bands which appeared to be from hammering the spherical smelted prills into flat strips before cutting lengths for beads (Denbow & Miller, 2007). Most beads had indications of cold-work in the form of slip bands and grain deformation near their joints, see Figure 6. 40: indicating that annealing (probably during hot working) was a deliberate part of the fabrication process (Denbow & Miller, 2007). The bead illustrated below shows an etched longitudinal section of 7% tin bronze (B 92) and an open join with preferential corrosion attack in cold worked areas (Denbow & Miller, 2007).

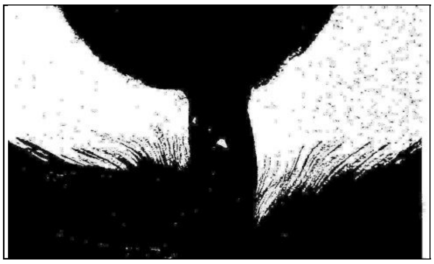


Figure 6.40 The micrograph shows etched longitudinal section of a bronze bead showing open join with preferential corrosion attack in cold-worked areas (Denbow & Miller, 2007: 286) (Magnification 7.2x).

The example of a Middle Iron Age wire-wound bronze bracelet from Mapungubwe, seen below; Figure 6. 43 had a composition of 6% tin in copper (Miller, 2002). It was reported that there were no other detectable elements present. The alloy had homogeneous microstructures with angular, recrystallized, single-phase copper grains with annealing twins. The structure resulted from hot working and annealing to form a sheet, from which strips were cut from one side only. Figure 6. 41 shows that the strips were wound around a fibrous core (Miller, 2002). The micrograph shows a section of a polished longitudinal section showing typical trapezoidal cross-sections of the strip, wound with the pinched edges on the inside. The core is well preserved. The manufacture of the bronze wire-wound bracelets did not differ from the copper examples examined throughout the Iron Age (Miller, 2002: 92)

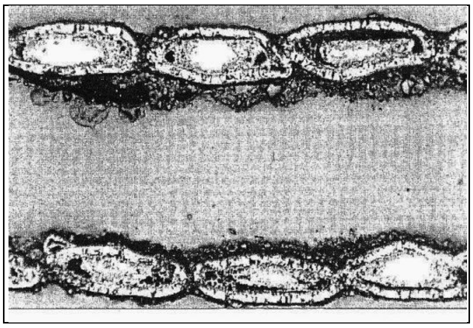


Figure 6.41 A micrograph of a polished longitudinal section through a bronze wire-wound bracelet (M 1175) showing trapezoidal cross-section of the strips wound with the pinched edges on the inside (Miller, 2001: 91) (Magnification 15x).

Brass is not an indigenous African product, although it was remelted by metal workers and made into a number of ornamental forms, sparse attention has been paid to this alloy (Maggs & Miller, 1995, Denbow & Miller 2007, Thondhlana & Martinón-Torres, 2009). An assessment of a brass mesh strip from the surface levels (B 432) at Bosutswe is dated to the Later Iron Age. A metallographic study indicated that the fragment of mesh wire consisted of 35 % zinc weight (Denbow & Miller 2007). Figure 6. 42 shows a micrograph of brass showing recrystallized and heavy worked grain structures (Scott, 1991). The sample examined by Denbow & Miller (2007) showed fine, uniform, single-phase wire with equiaxed recrystallizing grains and annealing twins. The wire had been hot-worked, drawn, and then annealed before being woven into a complex regular mesh. The example was considered to be a foreign import, as there is no record of indigenous zinc mining in southern Africa (Miller 2002).

Figure 6.42 A micrograph of a cross-section of brass showing recrystallized and heavy worked grain structures (Scott, 1991: 97).

6.5.4: ARCHAEOMETALLURGICAL RECONSTRUCTIONS OF TECHNIQUES USING MIXED METALS FOR DECORATIVE METALWORK.

The use of mixed metals used for further enhancement of ornamental forms has been recorded from Early Iron Age archaeological sites. Some of the earliest mentioned examples are those from Lydenburg and Divuyu and were iron and copper beads with links were placed between each one in random sequences (Inskeep & Maggs, 1975; Miller, 1996). Further examples have been retrieved from archaeological horizons where mixed metals forming wire-wound bracelets were found as sites such as Divuyu, Bosutswe, Great Zimbabwe, and Thulamela. Infrequent evidence of shows that iron bangles and wire-wound bracelets were enhanced with gold foil or gold beads and mentioned in association with chief's burials (Hall & Neal, 1972; Walker, 1991; Miller et al., 2000), The significance of placing multi-coloured metals was discussed by Herbert (1984: 294; 1993) who mentioned that in spite of corrosion iron and copper have been found so frequently together that it must be anticipated that their complementary relationship is a long- established one. Figure 6.43 shows a combination of copper and iron strips in a compound wire-wound bracelet (D 136) displaying rectangular sections of the light outer copper strip and the corroded light grey inner iron strip (Miller, 1996).

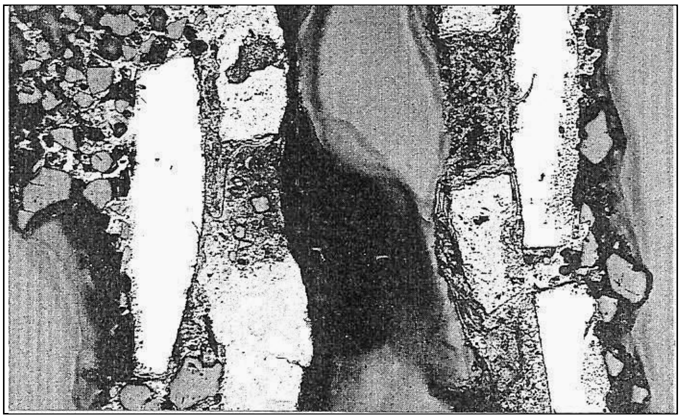


Figure 6.43 The illustration shows the polished longitudinal section of a compound wire-wound bracelet (D 136) from the Early Iron Age site Divuyu, Botswana, (Miller, 1996:103) (Magnification 14x).

The following three examples of compound wire-wound bracelets come from the Later Iron Age sites of Bosutswe, Great Zimbabwe, and Thulamela respectively (Miller, 2002). Figure 6. 44 shows a micrograph of a polished longitudinal section through a compound wire-wound bracelet portion (B 61) from Bosutswe. Bronze strips have been wound around a fine iron wire to form a thicker foundation (top right and center middle - medium grey in the illustration) (Miller, 2002: 1125). Lengths of this wire were subsequently wound around a fibre core together with a thicker bronze wire (top left and bottom right – silver grey) to form a thick wire-wound bracelet with multi-coloured wire components (Miller, 2002).

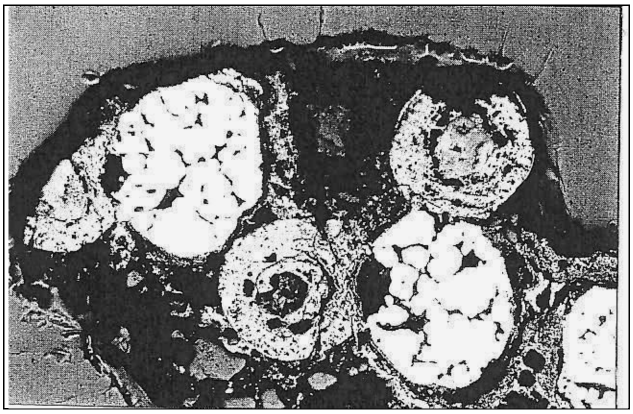


Figure 6.44 The micrograph shows a polished longitudinal section through a compound wire-wound bracelet fragment from Bosutswe comprising two thicknesses of bronze wire and twice times a single thickness of iron wire (Miller, 2002: 1125) (Magnification 26x).

The second example of a compound wire-wound bracelet portion was recovered from Great Zimbabwe (Miller 2002). Figure 6.45 illustrates a polished longitudinal section through a compound wire wound fragment (Z 216). It shows a thick iron wire, now corroded and visible as grey dumb-bell shapes – noted in the centre of the image – wound around a fibre core intertwined with a pair of thinner low bronze wires. Thicker and higher bronze beads were clamped around the whole bracelet. Opposite sides of a single bead are visible in the section (Miller, 2002: 1125)

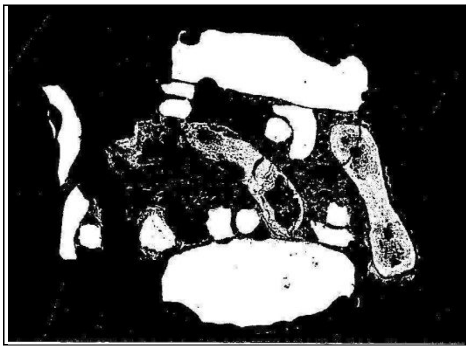


Figure 6.45 A micrograph showing a polished section through a multimetal wire-wound fragment (Z 216) from Great Zimbabwe. The metals represented are iron and bronze (Miller, 2002:1125) (Magnification 8x).

The third example of a multi-coloured wire-wound bracelet was located at Thulamela, Limpopo Province from a Later Iron Age site (Miller 2002). This object bears similarities with the example from Divuyu in that it is manufactured from iron and copper. Figure 6.46 shows a polished portion of a longitudinal section through a compound fragment. The central dark core was originally filled in with fibres around which iron and copper wires were wound (Miller, 2002: 1125). The relatively uncorroded copper is light in colour, while the corroded iron forms constitute the intermediate, more disrupted circular areas (Miller, 2002). The circular copper forms at the top of the image are more complete than the D-shaped forms at the base of the picture which represent wear and tear of the object (Miller, 2002).

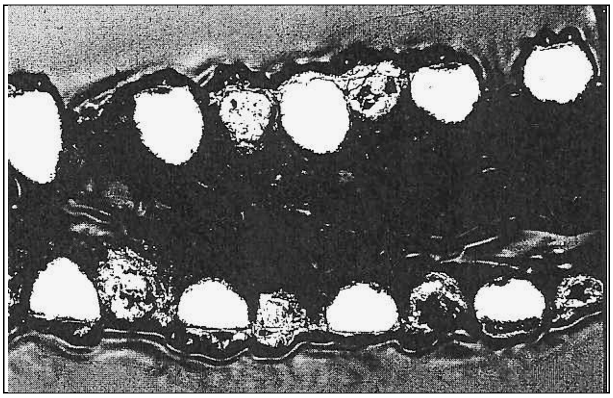


Figure 6.46 The micrograph shows a portion of a polished longitudinal section through a compound wire-wound iron and copper bracelet fragment from Thulamela (TM 106) (Miller, 2002: 1125) (Magnification 10x).

6.6.5: ARCHAEOMETALLURGICAL RECONSTRUCTIONS OF TECHNIQUES USED TO MANUFACTURE GOLD FOR DECORATIVE METALWORK.

Evidence of indigenous African craftsmanship in gold objects has been found at Mapungubwe, Bosutswe, Great Zimbabwe, and Thulamela (Fouché, 1937; Hall & Neal, 1972; Oddy, 1984; Steyn et al, 1998; Desai, 2001; Miller et al, 2001; Miller, 2002), as well as few smaller archaeological sites in Zimbabwe such as Khami (Hall & Neal, 1972; Robinson, 1959) and Castle Kopje (Walker, 1991). Most of the gold work in southern Africa took place on the cusp of the Middle Iron Age and the Later Iron Age. The techniques used by metal smiths in gold fabrication were very similar to those employed in iron and copper working (Miller 2002). Once hammered from gold nodules, the sheets of foil were cut into ribbons with chisels for wire-wound bracelets and beads. Figure 6. 47 shows the narrow wire ribbons coiled around a core to make a series of wire-wound bracelets. As Oddy (1984: 74) explains; 'wire' from Mapungubwe describes two forms: some of it approximately round in cross- section and some of it consisting of strips of metal with a trapezoidal cross-section which has been cut from the edge of a gold sheet (Desai, 2001). Microscopic examination of many fragments has shown that the original gold sheet was approximately 0.2 to 0.3 mm thick, and has been cut using a sharp blade and a straight edge (Oddy, 1984).

Figure 6.47 The detailed micrograph shows the coiled gold wire ribbon wound around a core forming wire-wound bracelets (Oddy, 1984: 74) (Magnification not included).

The following micrograph, Figure 6.48 shows a transverse section through trapezoidal shaped sections that were used in the fabrication of wrapped beads and wire-wound bracelets. This sample from Mapungubwe (UCT 1) shows angular, recrystallized annealed grains. The strip was cut from a hammered sheet, leaving cutting burrs at the base of each wedge shaped section. The strips were wound around fibre cores to form flexible bracelets. The cut faces were placed on the inside and the burrs were burnished together to form a smooth outer surface, while the inner surface (upper right) was left rough (Miller, 2002).

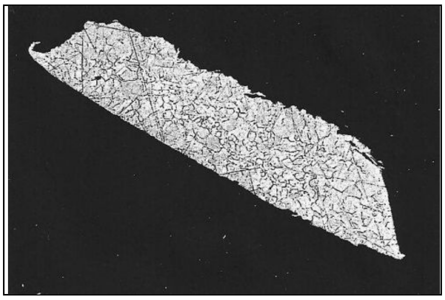


Figure 6.48 A micrograph showing a gold cut trapezoidal shape with burrs at the end of the long edge and the rough inner surface designed to be placed against the fibre core. The burrs were burnished together to form a smooth outer surface (Miller 2002: 1126) (Magnification 51x).

Some of the gold beads retrieved from Mapungubwe and from Mundi Ruins in Zimbabwe, showed indentations around the perimeter of gold beads (Hall & Neal, 1972; Desai, 2001; Miller 2002). Desai (2001) suggests that all punched beads were sub-spherical items with single holes while some had five grooves indented into the perimeter. These grooves had been indented after punching the central hole and while the bead was cold. Figure 6.49 shows a somewhat different bead, one that was cut from a strip and wrapped with indentations placed around the outer edge. The micrograph shows an etched section through a grooved gold bead (UCT G) from Mapungubwe indicate the voids in the poorly consolidated material. The grain deformations are due to cold work caused in creating the grooves (Miller, 2002).

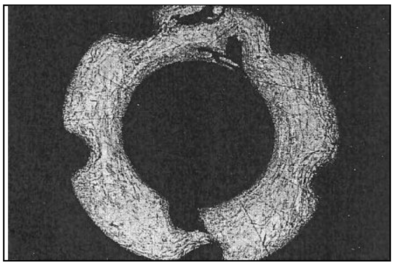


Figure 6.49 A micrograph showing a wrapped gold bead with indentations placed around the perimeter (Miller, 2002: 1126) (Magnification 26x).

The following micrograph Figure 6.50 appears in Desai’s (2001) unpublished Masters of Science thesis “Technological, social and economic aspects of gold production” showing that in this fragment of gold sheet the grains are recrystallized and angular. Annealing twins are present, and the top layer shows more evidence of deformation than the lower. The deformation of the top surface is probably produced from scratch burnishing (Desai, 2001).

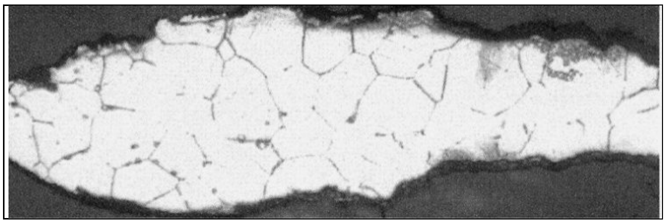


Figure 6.50 A micrograph through gold fragment, showing the angularity of the recrystallized grains. Note the deformation of the top and lower surface (Desai 2001: 112) (Magnification 84 x).

6.6: CONCLUSION

In order to fully appreciate the range and significance of the archaeological literature that has accumulated over the past 200 years I chose and studied macroscopically a number of examples of ornaments from the Iziko Museum's collection. The chosen assemblage represents the metals iron, copper and brass from which ornaments were traditionally made, by indigenous African craftsmen within the last decades of the 19th century and almost throughout the 20th century to the present.

The first part of the chapter recorded and described in detail the chosen ornamental objects, the metal/s from which they were made, their visible characteristics accumulated in the fabrication process, their measurements, and the names of collectors, places and dates of collection when available. The collection included beads, solid bangles, flexible bracelets, neck-rings, and ear-rings. I discussed how different cultural groups in southern Africa have been found to favour one or many forms of ornamentation which were substantiated by their material culture which aided social, political and economic ranking in large and small indigenous African communities.

The second part of the chapter considered the contribution made by material scientists who have metallographically analysed pieces of slag from various ores, together with ornamental forms and small tools to evaluate the processes that these objects underwent in the *chaîne opératoire* sequences in the production of the objects being analysed. Archaeo-metallurgical studies have revealed the processes exposed in waste and intentional metal products to recreate the methods employed in understanding the technical skills of indigenous African craftsmen. This process also achieves a record of the human choices, decisions and influences involved in the production of metals and their uses as well as the socio-cultural and environmental contexts in which they took place.

The metals that have been analysed are iron, gold, and copper and its alloys, and the forms include beads, bangles, wire-wound bracelets, ear-rings and neck-rings. The archaeological sites from which the specimens have been derived are Divuyu, Nqoma and Bosutswe in Botswana, Mapungubwe and Thulamela in Limpopo Province, Goergap from North West Province, and Great Zimbabwe, Zimbabwe. The chosen sites cover the period from the mid Early Iron Age, to the Later Iron Age. The ornamental forms analysed indicate that metal working techniques remained similar over a period of 1500 years, and that the technology used in iron metal work was transferred to copper, gold, bronze and brass.

7. CHAPTER SEVEN: DISCUSSION AND CONCLUSION

7.1: INTRODUCTION

Generations of archaeologists have indicated that, within the savannah regions of southern Africa, pre-colonial metallurgy was one of the most important industrial activities practised in Bantu Africa (Caton-Thompson, 1931; Garlake, 1973; Miller & Van der Merwe, 1994; Miller & Killick, 2014). However, a review of the literature on early metallurgy reveals that a significant amount of information was generated on the socio-economic and political impacts of metallurgy (de Barros, 1986, 2013) as well as on the associated technical (Miller & Killick, 2004) and the anthropological factors (Herbert, 1993). Indeed, amongst others (e.g. Stanley, 1929, Miller, 2002) archaeologists and archaeo-metallurgists have revealed the techniques of metal fabrication invested in making both utilitarian and decorative objects at selected elite sites in southern Africa. Although these influential works have established a solid foundation for our understanding of metallurgy in pre-colonial southern African communities, very little research has been invested in developing a long term understanding of decorative metalwork within a framework provided by ethnohistory and archaeology. In fact, although archival research is not popular amongst many archaeologists it has the potential to generate new and valuable information essential for understanding the evolution of past communities (Merriman & Swain, 1999; Tite, 2002). Often, the allure of discovery associated with field based archaeology resides in the fact that data is simply generated and archived without ever being analysed, thus limiting this kind of study to narrow antiquarianism.

In order to both resist and expand this research paradigm, my study explored diachronic and synchronic insights into continuity and change in decorative metalwork created and used in the southern African Iron Age from 200 AD to 1900 AD. During this long period, the production of metals initially focused only on copper and iron in the first millennium AD. The indications from archaeological archives are that iron and copper metallurgy escalated as the first millennium AD progressed, initially from small ornamental forms and undersized domestic objects (Miller, 1996: 82, 84) regarded as luxuries, to large objects manufactured for heavy-duty forest clearance, cultivation, hunting, warfare, and to select objects designated for exclusive ceremonial use, often by certain social classes in these societies (Miller & Van der Merwe, 1994; Phillipson, 2005; Miller & Killick, 2015). In the early second millennium AD, two copper alloys, bronze and brass were introduced, together with tin and gold (Killick, 2009). Iron was considered equally significant, and together with gold, copper and its alloys was used in the production of body ornaments from minute sized beads to large scale neck-rings and arm- cuffs, for decorating men and women amongst the elite of many hierarchical societies over many centuries (Herbert, 1984; Oddy, 1984; Kennedy, 1991; Miller, 2002).

The picture emerging from this research is that consumption of metals and alloys varied in scale between elites and commoners. For example, the elites of Mapungubwe were interred with thousands of gold beads, which are yet to be found by archaeologists in Iron Age sites of contemporary commoner burials (Fouché, 1937; Meyer, 1998). Using a pedestal of artefact studies/material culture theory presented earlier in the thesis, as a basis for this study, this discussion fuses together observations from ethnohistory, archaeology and visual and metallographic studies to develop a long term perspective on decorative metalwork in southern Africa. Particular emphasis is placed on the different and related kinds of information relating to the producers and users of metalwork together with associated social, political and anthropological issues. Furthermore, studies have found metal work to have been part of the trade and exchange pulse of various communities during the period allowing us to infer mechanisms of metal distribution in our region and beyond (Fagan, 1970; Smith, 1970; Mackenzie, 1975; Pwiti, 1991).

Limitations to the scale of the research have been set by the nature of the study itself. The range of examples discussed in the literature is restricted through lack of investigations in under researched localities, the state of preservation of objects ranges between good for those made from non-ferrous metals and alloys, to poor for iron. As a caution, it should be borne in mind that, in a study such as this, the pattern of what we know is shaped and conditioned by what is in the archive. Within southern Africa the sample sizes of ornaments and expressive objects exposed are rarely overwhelming, as seen in the volume of the collections from localities such as Divuyu, Nqoma, Mapungubwe, Great Zimbabwe, Khami, Ingombe Ilede, Bosutswe and 001 Makgwareng. Fortunately for this research it appears that during the period under study that some people were buried with most of their decorative metalwork and that little material was dumped in middens or left in homesteads. The unrepresentative nature of existing material is also reflected in museum collections where in the past, collectors were motivated by objects that interested them and left out or discarded those that did not. Regardless of these limitations, decorative metalwork offers a window into the life of those who produced and used it. As Caple (2006) argued, such objects are reluctant witnesses to the past. What emerges clearly from this study is that decorative metalwork offers a window, not only into the lives of metal workers and their societies, but also into the technology and associated lifeways of Iron Age communities in southern Africa.

7.2: CONTINUITY AND CHANGE IN THE TYPOLOGY, MANUFACTURE AND USE OF DECORATIVE METALWORK

A comprehensive review of pre-industrial metallurgy in Africa carried out by Miller & Van der Merwe (1994) demonstrated that the technology of primary metal production (smelting) in sub-Saharan Africa exhibited continuity in the persistence of the bloomery process for iron, copper and tin reduction. However, within this continuity, several innovations were developed particularly in the adaption of furnace types to suit various ores and topographies (Killick & Gordon, 1993). For example, the Phoka of Malawi developed a two stage process that allowed them to smelt very low grade iron ores (c. 35 wt. % iron oxide), initially in natural draught furnaces to produce a sintered matrix which was further worked in a bellows driven furnace (Killick, 1990). These ores cannot be processed in a modern blast furnace. In the Mandara region of Cameroon, the Mafa smelted magnetite sands in a down draught furnace to produce a mix of cast iron and soft iron (David et al., 1989). These innovations were not only made in the technology of smelting. The Njanja of Zimbabwe reorganised their production through the operation of multiple furnaces and introducing a shift system of labour (Mackenzie, 1975; Chirikure, 2006). Similarly, the Zulu smelters reduced iron in small bowl furnaces and through a reorganisation of production could supply iron required for an army of almost 50 000 (Maggs, 1992). While all these innovations and improvisations were taking place, the technology remained fundamentally the bloomery process (Miller & Killick, 2004).

The continuity and change in primary metal production in southern Africa was also characteristic of the fabrication and the use of the metal from furnaces. When asking the question as to what the typology was of objects used in the Iron Age of southern Africa (see Table 7.1), recourse to ethno-historical and archaeological evidence helps to address provide some kind of answers to this question. The evidence presented in this thesis suggests that, from the early first millennium AD when iron metallurgy was introduced, until the 1900s, the typology of iron objects was relatively stable in different areas of southern Africa. The earliest objects ever recovered by archaeologists are the beads from Broederstroom and Mabveni (evidence controversial). During this time, there is a scarcity of utilitarian items. The range of objects increases the closer we get to the second millennium. The evidence from Nqoma and Divuyu shows that iron was still used to manufacture decorative metalwork but that larger utilitarian objects were also being manufactured. By the early second millennium AD, iron was still being used for making beads, bangles and bracelets alongside ceremonial and utilitarian objects. This continued well into the 19th century (see Table 7.1)

Table 7.1 Major iron decorative and ceremonial objects from selected sites dating to the Iron Age.

Locality	Province/ Country	Object	Period (century)	Source
Mabveni	Zimbabwe	Beads	2nd to 3rd to 6th	Robinson, 1961
Broederstroom	Gauteng, S.A.	Beads, chain, pendant	5th	Friede, 1977; Miller, 2002
Lydenburg	Limpopo Province, S.A.	Beads	7th, 9th to 11th	Inskeep & Maggs, 1975, Whitelaw, 1966
Divuyu	Botswana	Beads, ear-rings, bangles, pendants	6th to 7th	Miller, 1996
Kwagandaganda	KwaZulu-Natal, S.A.	Beads	7th to 9th	Miller & Whitelaw, 1994.
Nqoma	Botswana	Beads, bangles, bracelets, pendants	8th to 11th	Miller, 1996
Phalaborwa	Limpopo Province, S.A.	Beads, wire, bracelets	7th to 9th	Miller, Killick & Van der Merwe, 2001
Makodu	Botswana	Beads, chain	7th to 10th	Kiyaga-Mulindwa, 1992.
Ndondondwane	KwaZulu-Natal, S.A.	Bead	8th	Maggs, 1984.
Leopard's Kopje	Zimbabwe	Beads, bangle	9th to 10th	Robertson, 1996.
K2, Shroda, Mapungubwe	Limpopo Province, S.A.	Wire, beads, bangles, bracelets, pendants, sheet	9th to 1300	Fouché, 1939, Calabrese, 2000, Miller, 2002, Desai, 2001.
Lekkerwater	Zimbabwe	Bangle	1000-1600	Rudd, 1983.
Monk's Kop	Zimbabwe	Bangles, bracelets	1280	Crawford, 1967.
Waterberg	North West Province, S.A.	Beads, bangle, bracelets, ear-ring	12th to 19th	Miller et al., 1995.
Thulamela	Limpopo Province, S.A.	Beads, bangles, bracelets	13th to 17th	Steyn et al., 1998, Miller, 2002.
Great Zimbabwe	Zimbabwe	Bracelets	1300-1450	Caton-Thompson, 1931.
Bosutswe	Botswana	Beads, bangles, bracelets	1300-1450	Miller, 2002, Denbow & Miller, 2007.
Khami	Zimbabwe	Beads	1400-1600	Robertson, 1959.
Macardon	Zimbabwe	Beads	1400-1500	Jones, 1938.
Tihela	Free State, S.A.	Beads	17th to 18th	Chirikure, Halls & Maggs, 2008.
Makgwareng 001	Free State, S.A.	Beads	17th to 18th	Maggs, 1976, Chirikure, Hall & Maggs, 2008.
Baranda	Zimbabwe	Wire	16th to 17th	Soper & Pwiti, 1988, Pikirayi, 1993.
Dambarare	Zimbabwe	Bracelet	17th	Garlake, 1969.
Vaal River Barrage	Gauteng, S.A.	Neck-ring	16th to 19th	Le Roux, 1966.

As far as copper metallurgy is concerned, the evidence from the literature and that gathered for the thesis indicates that like iron, the earliest copper objects are also beads, and bracelets. After 1000 AD, more objects were added to the list of copper objects which increased the range. The objects include ear-rings and by the late 19th century distinctive copper ingots used for ceremonial and other purposes were widely used in some regions. In fact, copper ingots were traded widely in southern Africa linking areas such as Great Zimbabwe, with regions as far afield as Central Africa (Bisson, 2000; Swan, 2004, 2007).

When bronze and brass were introduced, they were also used to make the same objects as those for copper. However, amongst the Zulu in the 19th century, brass was used to make status objects known as *izingxotha*. Gold was also used to make decorative objects similar to those of copper and its alloys, but was restricted to the elites. It seems that all of these metals were used to create colour contrasts which served aesthetic and religious purposes (Herbert, 1984). Tables 7.2 to 7.5 present some of the major decorative metalwork manufactured from copper, and its alloys, bronze, and brass and from gold. The tables demonstrate continuity and change in the types of objects and manufactured through space and time.

Table 7.2 Major copper decorative and ceremonial objects from selected sites dating to the Iron Age.

Locality	Province/Country	Object	Period (century)	Source
Mabveni	Zimbabwe	Beads	2nd to 3rd to 6th	Robinson, 1961.
Broederstroom	Gauteng, S.A.	Beads, chain	5th	Friede, 1977, Miller, 2002.
Lydenburg	Limpopo Province, S.A.	Beads	7th, 9th to 11th	Inskeep & Maggs, 1975, Whitelaw, 1996.
Divuyu	Botswana	Beads, bracelet, chain	6th to 7th	Miller, 1996
Kwagandaganda	KwaZulu-Natal, S.A.	Beads	7th to 9th	Miller and Whitelaw, 1994.
Nqoma	Botswana	Beads, bracelets	8th to 11th	Miller, 1996
Bosutswe	Botswana	Beads, bracelets	7th to 1200	Denbow and Miller, 2007
Palaborwa	Limpopo Province, S.A.	Wire, beads, bracelets	7th , 10th to 19th	Miller, Killick & Van der Merwe, 2001, Vander Merwe and Scully, 1971.
Ndondondwane	KwaZulu-Natal	Bead	8th	Maggs, 1984.
Makodu	Botswana	Wire, beads	7th to 10th	Kiyaga-Mulindwa, 1992
Chibuene	Mozambique	Beads, bracelets, chain	8th to 9th	Sinclair, 1982.
Leopard's Kopje	Zimbabwe	'Rings'	10th to 11th	Robinson, 1996.
K2, Shroda, Mapungubwe	Limpopo Province, S.A.	Wire, beads, bangles, bracelets, ceremonial objects	10th to 13th	Fouché, 1939, Calabrese, 2000, Miller, 2001, Desai, 2001.
Lekkerwater	Zimbabwe	Wire, beads, bangles, bracelets	10th to 12th	Rudd, 1983.
Postmasburg	Northern Cape Province, S.A.	Beads	12th to 13th	Beaumont & Boshier, 1974.
Waterberg	North West Province, S.A.	Beads, ear-rings	12th to 19th	Miller et al, 1995.
Thulamela	Limpopo Province, S.A.	Beads, bangle, bracelet, sheet	13th to 17th	Steyn et al., 1998, Miller, 2002.
Great Zimbabwe	Zimbabwe	Beads, bangles, bracelets, chains	14th to 16th	Caton-Thompson, 1931, Garlake, 1973.
Matendere	Zimbabwe	Beads	14th to 16th	Caton-Thompson, 1931.
Cornucopia	Zimbabwe	Beads, bangles	14th to 16th	Prendergast, 1979.
Khami	Zimbabwe	Beads	14th to 15th	Robinson, 1959.
Castle Kopje	Zimbabwe	Bracelets	13th to 15th	Walker, 1991.
Nhunguza	Zimbabwe	Wire, bracelets	14th to 17th	Garlake, 1973.
Ruanga Ruins	Zimbabwe	Beads, bracelets	14th to 17th	Garlake, 1973.
Ingombe Ilede	Zambia	Wire, beads, bracelets	1450-1600	Chaplin, 1961, Fagan et al., 1969.
Musimbira	Zimbabwe	Wire, bracelets	1480-15th	Munro & Spies, 1975
Manekweni	Mozambique	Wire, beads, bracelets	14th to 18th	Garlake, 1976, 1978.
Harleigh Farm	Zimbabwe	Wire, bracelets	13th to 15th	Robins & Whitty, 1966.
Urungwe	Zimbabwe	Rod, beads, bangle	1440-1600	Garlake, 1970.
Chedzurgwe	Zimbabwe	Rods, beads	1440-1600	Garlake, 1970.
Muyove	Zimbabwe	Beads, bracelets	1440-1600	Garlake, 1970.
Nyarinde	Zimbabwe	Bracelets	1440-1600	Garlake, 1970.
Tihela	Free State, S.A.	Wire	17th to 18th	Maggs, 1976.
Koffiefontein	Free State, S.A.	Ear-rings	16th to 17th	Humphreys, 1970.
Riet River	Free State, S.A.	Pendant	18th to 19th	Humphreys & Maggs, 1970.
Makgwareng 001	Free State, S.A.	Beads, bangles, ear-rings	16th to 17th	Maggs, 1976, Chirikure, Hall & Maggs, 2008.
Baranda	Zimbabwe	Wire, beads, bracelets	16th to 17th	Soper, Pwiti, 1988, Pikirayi, 1993.
Hartley/ Mutoka	Zimbabwe	Wire, beads, bracelets	17th	Garlake, 1966.
Musina	Limpopo Province, S.A.	Wire, beads, bangles, bracelets	17th to 20th	Stayt, 1931.

Locality	Province/Country	Object	Period (century)	Source
Lobedu	Limpopo Province, S.A.	Beads, bracelets, neck-rings	17^{th} to 19^{th}	Davison, 1984.
Marothodi	North West Province, S.A.	Wire, beads, bangles, ear-rings	18^{th} to 19^{th}	Hall et al., 2006.
Vaal River Barrage	Gauteng, S.A.	Bangle	16^{th} to 19^{th}	Le Roux, 1966.
Klipriviersberg	Gauteng, S.A.	Neck-ring, ear-ring	17^{th}	Friede, 1980.

Table 7.3 Major bronze decorative and ceremonial objects from selected sites dating to the Iron Age.

Locality	Province/Country	Object	Period (century)	Source
Palaborwa	Limpopo Province, S.A,	Beads	7^{th} to 10^{th} to 19^{th}	Van de Merwe & Scully, 1971; Miller, Killick & Van der Merwe, 2001
K2, Shroda, Mapungubwe	Limpopo Province, S.A.	Bracelets	9^{th} to 14^{th}	Miller, 2001, 2002.
Bosutswe	Botswana	Beads, bracelets	13^{th} to 14^{th}	Denbow & Miller 2007.
Magozastad	North West Province, S.A.	Bracelet	12^{th} to 17^{th}	Miller et al., 1995.
Thulamela	Limpopo Province, S.A.	Sheet, tacks	13^{th} to 17^{th}	Steyn et al., 1998; Miller, 2002
Great Zimbabwe	Zimbabwe	Bangles, bracelets, ceremonial tools	14^{th} to 16^{th}	Caton-Thompson, 1931; Garlake, 1972; Miller, 2002
Matendere	Zimbabwe	Beads	14^{th} to 16^{th}	Caton-Thompson, 1931.
Khami	Zimbabwe	Beads	15^{th} to 17^{th}	Robinson, 1959; Walker, 1991.
Dambarare	Zimbabwe	Wire, beads	17^{th}	Garlake, 1969.
Klipriviersberg	Gauteng, S.A.	Ring	17^{th}	Friede, 1980.

Table 7.4 Major brass decorative and ceremonial objects from selected sites dating to the Iron Age.

Locality	Province/Country	Object	Period (century)	Source
Eastern Zimbabwe	Zimbabwe	Beads	17^{th} to 19^{th}	Thondhlana & Martinón-Torres, 2009.
Nongoma	KwaZulu-Natal	Cast in brass for izingxotha	19^{th}	Chubb, 1939.
Phalaborwa	Limpopo Province, S.A.	Bead	17^{th} to 19^{th}	Miller, Killick & Van der Merwe, 2002.
Mgungundlovu	KwaZulu-Natal, S.A.	Wire, beads, bangles and neck-rings	18^{th} to 19^{th}	Roodt, 1993.

For further information on the distribution of body ornaments made of brass see Table 4.8.

Table 7.5 Major gold decorative and ceremonial objects from selected sites dating to the Iron Age.

Locality	Province/Country	Object	Period	Sources
K2, Shroda, Mapungubwe	Limpopo Province, S.A.	Rod, wire, beads, bangles, bracelets, sheet and tacks	9^{th} to 14^{th}	Fouché, 1937; Calabrese, 2000; Miller. 2001, 2002; Desai, 2001.
Tsindi Ruins	Zimbabwe	Ring	11^{th} to 17^{th}	Rudd, 1983.
Thulamela	Limpopo River, S.A.	Beads, bangles, bracelets, clips, sheet and tacks	13^{th} to 17^{th}	Steyn et al., 1998; Miller, 2002, Desai, 2001.
Bosutswe	Botswana	Bracelet (fragment)	14^{th} to 16^{th}	Denbow & Miller, 2007.
Cornucopia	Zimbabwe	Bead	14^{th} to 16^{th}	Barnes-Pope, 1938; Prendergast, 1979.
Khami	Zimbabwe	Beads	14^{th} to 16^{th}	Robinson, 1959.
Macardon	Zimbabwe	Beads, chain, loops	14^{th} to 15^{th}	Jones, 1939.
Castle Kopje	Zimbabwe	Beads, bracelets	13^{th} to 15^{th}	Walker, 1991.
Harleigh Farm	Zimbabwe	Prills	13^{th} to 15^{th}	Robins & Whitty, 1996.
Nhunguza Ruins	Zimbabwe	Beads, bracelets	14^{th} to 17^{th}	Garlake, 1973.
Ruanga Ruins	Zimbabwe	Beads, ear-ring, prills	14^{th} to 17^{th}	Garlake, 1973.
Ingombe Ilede	Zambia	Wire, sheet	15^{th} to 16^{th}	Chaplin, 1961, Fagan et al., 1969.
Musimbira	Zimbabwe	Wire, bracelet	14^{th} to 16^{th}	Munro & Spies, 1975.
Manekweni	Zimbabwe	Beads	14^{th} to 16^{th}	Garlake, 1976, 1978.

Locality	Province/Country	Object	Period	Sources
Hartley, Mutoka	Zimbabwe	Prills	17^{th}	Garlake, 1976.

Information in Tables 7.1 to 7.5 demonstrates the remarkable stability, and its continuity in the types of objects used in the Iron Age. The tables show a number of innovative associations with adapting newly introduced alloys and metals to existing tastes and preferences. What is, however, interesting is that across the southern African region, as indicated by the limited evidence, there are similarities in decorative metalwork used in regions north and south of the Limpopo. Metal beads seem to be of an identical form as are bracelets. From the evidence, and the patterns or trends shown in the tables, it is possible to infer a change in the importance of iron decorative metalwork which may have been more important when metal was scarce in the first millennium, and then becoming more common in the second millennium. Elite burials at Mapungubwe and Danangombe were respectively associated with more gold and copper with very little iron apparent. Interestingly, iron was used to make ceremonial objects which were more important in negotiating power and social relations. The iron gongs from Great Zimbabwe can be seen as a good example of ceremonial iron objects, the general belief amongst scholars is that they were imported from central Africa. Another interesting, but less observable similarity, is that often objects made of different metals and alloys were used or worn together, to create appealing colour contrasts – with iron representing black and copper being seen as red. According to Herbert (1984), these colour combinations had a great deal of symbolic and spiritual significance as they were associated with ancestors, and thus lay at the heart of the community belief systems.

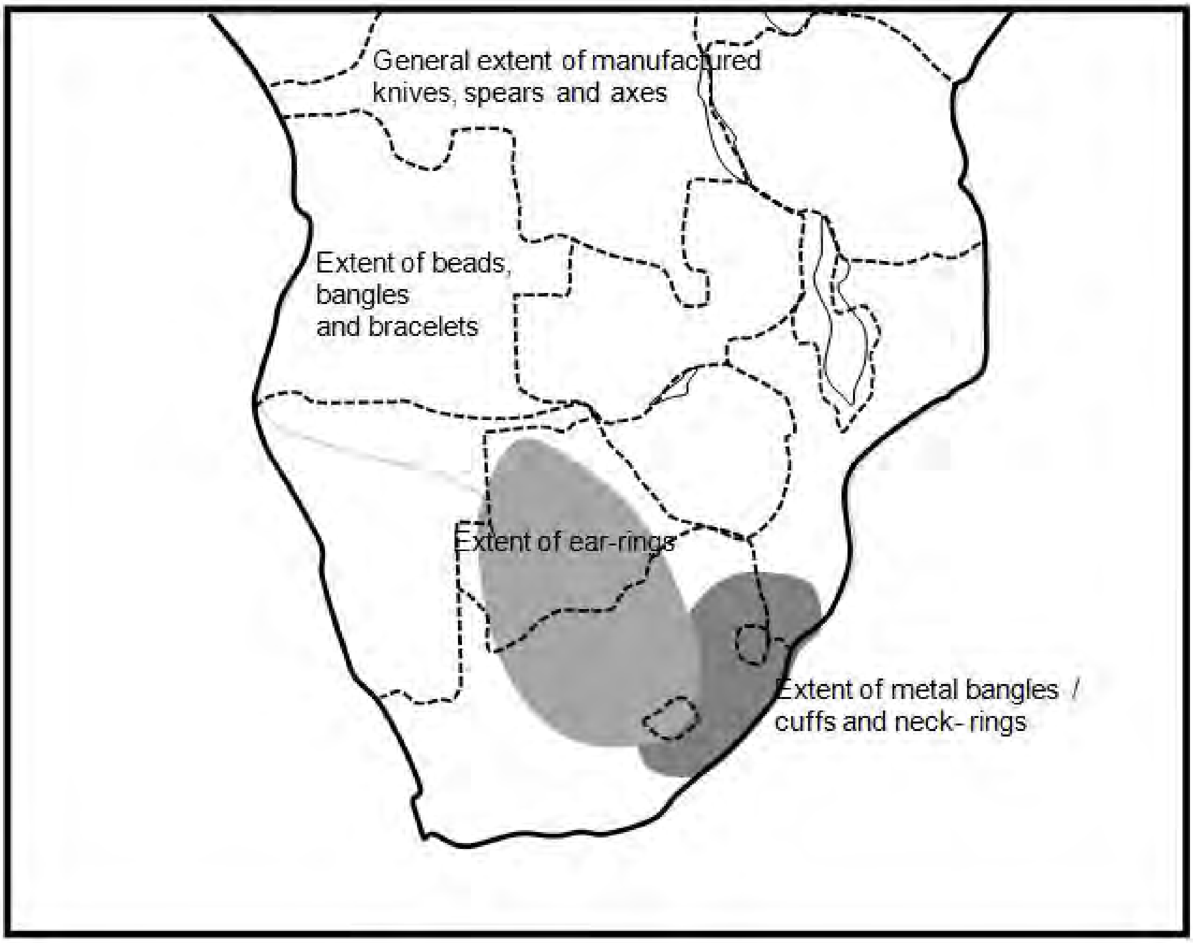


Figure 7.1 The map shows patterns of distribution of decorative metal work.

The production of knives, spears and axes follows the summer rainfall, or savannah regions, the area which was favourable for hunting and agro-pastoralism in northern and eastern southern Africa. The production of metal beads, bangles and bracelets follows a similar pattern, being most noticeable amongst the Shona, and Mpukushu. Ear-rings are found amongst the populations who live in metal deprived areas of South Africa, namely the Sotho / Tswana and Khoisan. The heaviest examples of body ornament; metal cuffs and neck-rings are to be found in the south eastern region of South Africa where imported brass was more readily available to the Northern Nguni, Southern Sotho, Tsonga, while rare copper and iron examples are found amongst Lobedu and Tswana.

As far as differences are concerned, it is clear from the 16th century AD onwards that, ear- rings established themselves as a major item of decorative metalwork amongst Tswana speakers (Maggs, 1976) mostly distributed south of the Limpopo. These ear-rings, found at places such as 001 Makgwareng site in the Free State Province which was extant in the 17th and 18th centuries AD (Maggs 1976), were also recovered in the 19th century contexts at Marothodi in Rustenberg-Pilanesburg area (Anderson, 2009). These ear-rings have so far not been recorded as having existed in the Shona speaking world; neither have they been recovered in the Nguni speaking world, except for Sparrman who recorded seeing them in the Eastern Cape. Another interesting point is that the Zulu brass *izingxotha* worn on the arms to denote status are similar to items made in ivory in some other groups. However, their fabrication in brass appears to be culturally specific to the Ngunis (Zulu). These objects have not been recorded, as far as the archival search carried out for the purpose of this thesis could establish, amongst the Tswana, and the Shona groups. This is regardless of the fact that, these groups could also with work brass. The *musuku* and *lerale*, both of which may have served a ceremonial function were also culturally specific: they were largely restricted to Venda, Tsonga, and their northern Sotho neighbours. They have not been recovered amongst the Nguni or neighbouring Shona peoples although it is possible that they may have been exchanged but converted to metal. This hypothesis can only be tested through detailed geochemical analyses of objects from those areas surrounding *musuku* and *lerale* production and distribution centres. Whilst on copper, the cross shaped ingots seem to be a phenomenon of areas north of the Limpopo and Zambezi River (Swan, 2007). This distribution shows that the typology of objects is sometimes culturally specific and can be used to identify groups in the archaeological and anthropological records. That material culture is a proxy for identity in southern Africa has also been supported by ceramic typologists such as Huffman (2007). Interestingly, Huffman (2007) argued that different groups decorated their ceramics and other material culture objects in culturally distinctive ways. However, similarities in other object forms speak to possible cultural relationships and interactions between various groups as these communities did not exist in isolation.

Given the continuity and change in the typology of decorative metalwork and how some objects are specific to groups such as Shona, Sotho-Tswana and Nguni, it is important to consider the techniques of fabrication employed in Iron Age southern Africa. Comprehensive studies of Iron Age metal fabrication techniques by among others Miller (1996, 2001, 2002) have revealed that continuity and change can be detected in this area too. Throughout the Iron Age, iron objects were hammered through cycles of hot and cold working. In some cases, hammered sheets of iron were cut by chisel to create strips which were folded to produce folded beads. In the second millennium AD, iron was also drawn and wound around vegetal cores to produce bracelets. Different pieces of iron were forged and welded to produce bigger items. As far as copper, bronze, brass, gold and tin metallurgy was concerned, Iron Age peoples also employed the techniques of hot and cold working to produce various items. These non-ferrous metals and alloys were also drawn or hammered into wire, producing a wide range of objects. As intimated above, these techniques are also similar to those used to with iron. However, it is unequivocally accepted that Iron Age metallurgists exploited non-ferrous metals and alloy properties such as malleability and ductility to cast them in order to produce predetermined object forms (Miller, 2010). As such, copper and its alloys, as well as gold and tin, were all cast. The techniques of casting were similar across these metals and alloys involving the pouring of molten metal or alloy from the crucible into pre-formed moulds. While these fabrication techniques were similar, the objects which were produced often differed from cultural group to cultural group as demonstrated above.

7.3: DECORATIVE METALWORK AND STATUS IN SOUTHERN AFRICAN IRON AGE COMMUNITIES

As material culture, objects speak not just of themselves but also about their uses at individual and community levels. A look at the nearly 2000 year old history of indigenous decorative metalwork shows that this category of material culture played an important role in denoting social, political and economic status at various levels. Available evidence for the early to mid-first millennium AD period indicates that Iron Age villages had no clearly discernable hierarchy (Pwiti, 1996). Furthermore, the distribution of material culture suggests an almost equal access to it by their inhabitants. However, by the end of the first millennium, some village sizes started to increase in their spatial extent, with evidence of clearly defined social differentiation, particularly after the region was integrated with the Indian Ocean trading system (Killick, 2009). During this time glass beads and cowrie shells, items which were conventionally viewed as status indicators made their appearance, showing that the concerned societies were gravitating more towards increased socio-political complexity (Pwiti, 1991, 1996). Indeed, in regions such as the Shashi-Limpopo, places such as Shroda became regional centres of political power as illustrated by the presence of centralized control of ritual and presence of glass beads (Huffman, 2007). Quite interestingly, decorative metalwork has not been extensively considered as a status indicator, with more weight being placed on commodities such as ivory that was an important part in long distance trade. However, given the significance of decorative metalwork as status indicators at various points in the southern African past, it is likely that it was a status indicator at Shroda and other chronologically overlapping places.

During the early centuries of the second millennium AD, it was clear that metals were important status indicators. At Mapungubwe, one of southern Africa's early states, burials rich in gold and glass beads were uncovered. According to Killick (2009), the adoption of gold in southern Africa was the result of the elite appropriation of alien values in terms of social status and wealth. Thus the Mapungubwe gold burials are believed to have been those of high status individuals. Although no commoner burials have been recovered from Mapungubwe itself, comparative evidence from Mapungubwe period sites from elsewhere suggests that commoners were not buried with gold objects. As such, decorative metalwork such as gold beads became important status indicators. This continued until the 19th century with elite sites such as Great Zimbabwe, Khami, Danangombe and the Mundi Ruins all possessing spectacular gold decorative work (Fouché, 1937, Hall & Neal, 1972; Robinson, 1959, Pikirayi, 2001). Archaeological reports from the historic Mutapa courts are sparse both in reportage and evidence but a journal entry from a Portuguese missionary, Fra Gomes described a gold necklace of "big chains worked in gold which are worn by people in the zimbaoe of the Monomatapa, and which represents his ancestors" (Mudenge, 1988: 173). What is also interesting is that elites acquired and displayed decorative metalwork of copper and iron as well as that of gold, as revealed by findings from places such as Great Zimbabwe, Khami, and many others. At Danangombe, a political centre associated with the Rozvi Changamire state, archaeologists have uncovered a burial of a high status individual within a stone walled area. This individual was buried with an extravagantly high amount of copper decorative metalwork comprising bracelets. The greater volume of wire-wound bracelets on the arms and legs of individuals indicated the elevated positions they occupied in their communities to the extent that physical movement was hindered, a feature which also became a mark of high status (Livingstone in Schapera, 1963; Garlake, 1969; Herbert, 1984). In the historical period, Van Tonder (1966: 270) confirms that wealthy married women amongst the Mpukushu, of northern Botswana, wore copper (wire-wound bracelets) rings just below their knees as prestige symbols, and that these also served as articles of barter in times of need. The traveller, Andersson (1968: 185) noted in northern Botswana that tall, well-built, wealthy men were decorated profusely with iron and bead ornamentation, while the women wore several (brass) buttons in their hair and around their necks, and had copper rings on their arms and ankles. However, Burchell (1953: 400) reports a variation on this custom drawing attention to the contrast, he observed between the rich and the poor within smaller communities by indicating that the elite adorned themselves with glass beads while the poorer residents wore iron and copper beads. It has been extensively recorded that copper ear-rings were, and continued to be important status indicators in the Tswana communities of the 19th and early 20th centuries South Africa (Maggs, 1976).

Brass was an important status alloy in the historical Zulu state. As discussed earlier, the brass armbands *izingxotha* were only worn by the elites. At UMgungundlovu, Dingane's capital, which he and his followers occupied between 1828 and 1839, brass was worked only in the *isigodhlo* or the royal area. Indeed, contemporary observers such as Flynn argued that brass workers enjoyed high status within the Zulu kingdom. The Zulu king, sustained by his political and ideological ambitions, utilized this brass in the form of large and heavy ornaments mainly worn by men in the society of the time especially by those who were his advisors, notable combatants in the king's regiments and receivers of awards including some women attached to the court, the ornaments emphasising their high status in society of all these categories of people. Indeed, substantial brass ornaments were created for decorating arms and necks, while lighter ones were made for wrists and legs (Roodt, 1993, 1996). Amongst the Venda and Lemba communities, *musuku* and *marale* copper ingots were important status objects which were also often used as symbolic insignia for political power.

The distribution of different metals and the degree of ease with which they could be worked using available technologies determined which metals and which alloys were valued by what community or communities. In gold rich areas of the Zimbabwe plateau and adjacent areas, gold once introduced, became a raw material for status decorative metalwork (Summers, 1969; Ellert, 1993; Swan, 1994). It appears on the basis of contemporary evidence, that, although commoners produced it, gold was not enjoyed by them (Mudenge, 1988). The description of some significant ornamental objects in the form of gold bangles and large gold beads confirms that these objects were employed and displayed for status and rank generating rituals and activities in the presence of appropriate audiences. The gold craft master's skill is apparent in descriptions from Mundi Ruins in central Zimbabwe regarding a heavy gold-wire bangle, amongst others, with a mass of 169.8 g (Hall & Neal, 1972: 93).

Some large gold beads in Hall & Neal's (1972) collection were described as being sufficiently hefty to be "burdensome and awkward to carry" (Hall & Neal, 1972: 94) the largest had a mass of 69.0 g (2ozs. 5 dwts), and was engraved with a chevron pattern around its circumference. Similar gold objects were recovered from Danangombe and Umnukwana; where large gold beads with a mass of 71.0 g and 34.0 g respectively were found (Hall & Neal, 1972: 145, 147). The typological range of the beads varied from spherical, cylindrical, barrel shapes and biconical forms, the latter described as bearing "facets like diamonds" (Hall & Neal, 1972: 94; Jones, 1938; Garlake, 1973). Some beads were cast and others were of the wrap-around variety (Desai, 2001). However, besides ceremonial objects such as the golden rhino and sceptre from Mapungubwe, which are believed to have played a ceremonial role as insignia of office, gold beads were similar to some bronze, brass and copper beads. Thin bronze sheets similar to the thin gold sheets from Mapungubwe were recovered from Great Zimbabwe. Therefore, context of recovery is important in linking objects to status. Most decorative metalwork from commoner sites on the Zimbabwe plateau is similar to that from elite areas, but those recovered from high status areas of sites such as Great Zimbabwe may have been status indicators. Interestingly, even, the copper bracelets and bronze beads from the commoner area of the Great Zimbabwe itself closely resemble those of the elite areas. Thus although one could say at one level, decorative metalwork worn by the elite was similar to that worn by the commoner but on another level it was different.

Natural availability also limited the use of various metals as status indicators. For example, to date there is no record that gold was exploited by the Sotho-Tswana communities south of the Limpopo or by the Nguni groups. What is however surprising is that gold working on the adjacent Zimbabwe plateaus did not stimulate a regional exchange involving gold, and this raises questions? It is clear that communities in southern Africa were involved in a regional trade network involving metal. For example, Bisson (2000) argues that copper may have been exchanged between central Africa and the Zimbabwe plateau. Furthermore, archaeologists believe that tin from Rooiberg in the southern Waterberg was widely circulated to places as far as Great Zimbabwe, Khami, and later to Delagoa Bay. And yet, gold was never part of this regional trade. It has been suggested that this could be an indicator of the system of material values at that time: gold was never accepted as having special value by many communities other than those in the producer regions who got hooked on to alien values (Chirikure, 2015).

The link between decorative metalwork and status has already been described. Logically, the next issue to consider is whether this status was also linked to power. Howman (1956: 16) defined power as the ability to oblige others to do or not do something. Thus access, control, and consumption of resources can all be said to be elements of power. While it is clear that during the Iron Age gold objects from southern African elite centres were symbols of power, to date these objects are so lacking from commoner sites. De Maret (1985) has shown that in central Africa, iron and copper objects were used, not just as status symbols but also as emblems of power, While the Rozvi-Changamire state levied tribute in the form of hoes, of greatest value to the chief were cattle, gold and ornaments, together with foreign trade goods (Mackenzie, 1975). The role of the chiefs was to be visible at all times in full regalia; these regalia were linked with festivals associated with agriculture. The production and decoration process was a metaphor for the cycle of the elite who underwent numerous rites of passage, or “refinements”, and accumulated prestige goods. For each ceremony that an individual underwent the wrapping of the body with old and new gleaming ornamentation was a perquisite to the personage being presented to the audience (Herbert, 1985; de Maret, 1985; Bisson, 2000). The carrying of an equal proportion of old and new ceremonial and ritual objects, with added metallic refinements further enhanced the bearer and his status / power. In various cultural groups a range of tools; including axes, spears, hoes, and knives could be manufactured for these events, with different tools being conspicuous for different occasions (Hambly, 1945; Van Tonder, 1966; Maggs, 1993; Childs & Dewey, 1996; Bisson, 2000).

On the whole, metals objects worked pre-colonially and spanning the full range were used for making ritual tools for investiture and ceremony. Examples of these creations are the mace, the diminutive rhinoceros, and bowl crafted from gold foil found in the graves at Mapungubwe (Fouché, 1937; Meyer, 1998, 2000; Duffey, 2012). A variety of spears made from iron and bronze, some with fringed or others with plain blades, and rarely, some with blades wrapped in gold were found at Great Zimbabwe (Bent, 1892; Caton-Thompson, 1931; Robinson, 1959). A group of less elaborate iron blades of various lengths, with distinctively created staffs were found at Khami Ruins preserved in wrapped cloth. The cultural value of the ceremonial implement made of iron known as the *nhlendle* is only discussed in relation to KwaZulu-Natal (Maggs, 1993). This ceremonial object identified by its narrow arc shaped iron blade set at right angles into a wooden shaft was designed for status enhancement, especially amongst the kings and elite males of the region in the 19th century AD. It was made primarily to be displayed at ceremonial events by older men of high status.

Although enjoyed by both men and women, metal was only worked by men in various southern African communities. In fact, it is well established in the literature that women were excluded from iron and copper smelting areas except amongst the Tswana of Marothodi, North West Province. Generally, it is assumed that women contributed to auxiliary services such as mining, and gathering and transport ores, and most importantly in the delivery of food to the team of iron metal workers working beyond settlement boundaries (Mackenzie, 1975; Childs & Dewey, 1976). However, often and depending on their context women could assist their husbands with pumping bellows (Hatton, 1967).

7.4: TRADE, EXCHANGE, INTERACTION AND ORGANISATION OF PRODUCTION IN RELATION TO DECORATIVE METALWORK

Decorative metal work is an outcome of metal production and fabrication. Once finished, decorative metalwork was distributed and used and worn by various Iron Age communities in ways that inform us about networks of contact and interaction within and between chronologically overlapping societies. Archaeologists have suggested that from the late centuries of the first millennium AD onwards there was trade and exchange in ores and finished metals, particularly those of iron and copper which connected different localities. When new metals and alloys were introduced to the region, this trend continued well into the historical period, an example of this being the trade and exchange activities amongst the Njanja (Mackenzie, 1975) and Tswana communities (Anderson, 2009). In this context, iron and copper respectively are credited with sustaining wide networks of contact. Most of the historically documented metal trade involved exchange and distribution of ingots, which were subsequently worked into various objects by the receiving communities. South of the Limpopo, the unusual *musuku* and *marale* ingots were widely distributed in what is modern day Venda, Phalaborwa and surrounding areas. These ingots were highly valued and could be used in ceremonial contexts as well as in the negotiation of social relations such as bride wealth transactions (Stayt, 1931). Indeed, archaeological observations supplemented by archival and geochemical research have shown that Rooiberg, situated in northwest Limpopo Province is the only unequivocal pre-industrial tin production site in southern Africa during the period (Hall, 1981; Killick, 1991; Heimann et al., 2010; Bandama, 2013). Rooiberg tin was circulated throughout much of southern Africa, primarily in the form of bars of various sizes (Friede & Steel, 1975; Killick, 1991). A *lerale* ingot made with tin which geochemically matches the Rooiberg ore body was also recovered around Polokwane, about 150 kilometres from Rooiberg (Killick, 1991). What is interesting is the fact that a bar of tin was recovered by Huffman during a salvage excavation at Great Zimbabwe in the 1970s. Geochemical analysis performed on the ingot revealed that it was made using Rooiberg tin thus suggesting extensive networks of trade and exchange throughout the area (Grant 1999; Molofsky et al, 2014). Indeed, in much of central Africa, there was substantial and lengthy network involving the trade and exchange of copper cross-shaped ingots (Bisson, 2000; Swan, 2004). Trade in cross-shaped ingots linked communities in the Lubumbashi (formerly Katanga) region of the Democratic Republic of Congo with those in Zambia and Zimbabwe. The large scale nature of some of the trade in metal ingots prompted some researches to argue that ingots were used as currency by various communities. Although the currency was not used in the sense that modern day currency is used, the most important observation is that ingots were primary forms in which value was stored and exchanged (Miller, 2010).

It was not just locally produced metal and alloy ingots which were circulated in southern Africa. Imported brass bars were brought by the Portuguese and other European traders and exchanged for various items with the Zulu kingdom. Similarly, the brass worked in northern Zimbabwe also came from the Indian Ocean coast. What is however interesting is that imported metals and alloys were worked using indigenous techniques, which were long established in the working of iron and copper (Thondhlana & Martinón-Torres, 2009). During this period, southern Africa also exported gold, iron, copper, and tin to the Indian Ocean area. In particular, the gold trade centred on the Zimbabwe plateau, sustained trade and interacted with the Indian Ocean World for more than 1000 years. Initially, sustained by the Swahili, the trade saw the involvement of the Portuguese until colonization of the area by various European powers. It is possible that bronze from the Indian Ocean, particularly in the late first and early second millennium was traded (Killick, 2009).

Besides ingots, historical evidence suggests the presence of entrenched networks involving finished items of decorative metalwork. In particular, wire-wound bracelets made of fine- drawn copper wire over cores of varying materials were used as currency more recently amongst the Tonga and the cultural groups in the present Limpopo Province (Junod, 1927; Stayt, 1931; Cline, 1937). In northern Limpopo Province, wire-wound bracelets amongst other commodities were offered as tribute to the Venda Chief by the Lemba so that they could continue to work the copper deposits. The use of bracelets in this area as currency is supported by Stayt (1937: 67), who recorded that “one hundred of the bangles were valued at ten pounds sterling, or the price of a cow and in that way used to pay *lobola* or marriage price of a cow”.

Researches such as Mackenzie (1975) have observed that in the 19th century, iron hoes became a form of currency manifested by evidence of master metal smiths conducting industrial sized enterprises in the region. In Zimbabwe the Njanja’s wealth came from the manufacture and dispersal of hoes over a wide area. The recognition of hoes as currency can be appreciated as it creates a market oriented trade over a wide area, within which iron tools, in particular the hoe, became currency, one against which the value of many other items were measured, it became vital in *lobola* transactions and the payment of tribute (Mackenzie, 1975). The author reports that the Njanja traders preferred to receive cows as payment for their hoes. The going rate was from ten to twenty hoes for a cow, and perhaps less for an ox. Smaller stock was also acceptable the rate being two to three hoes for a small goat and three to five for a larger one (Mackenzie, 1975). Similar information from Phalaborwa is confirmed by earlier research conducted by Schwellnus (1936: 911), who noted that hoes were “used for money in olden times”. In this locality they were chiefly used for buying wives, this is supported by a lament from an old resident from Makushane Location who stated

“Now the white man sells them for much cheaper than before, they do not have the same value anymore” (Schwellnus, 1936: 911).

There are areas in South Africa which are deprived of metal ores for metallic industries. During the period under study this was remedied by the introduction through trade networks of metal supplies to local smiths either in the form of finished objects of copper and iron, or in ingot form throughout the Highveld and Free State. Smith (1970) reports that there were some cultural groups, the Tsonga, Ronga, Thembu and Kosse, from

Mozambique and South Africa who assumed the role of travelling specialist merchants by interacting with the Portuguese in Delagoa Bay, and from the highlands of the Limpopo Province and dispersed brass, copper, glass beads, cloth, and local iron to inland cultural groups. Some cultural groups intermittently traded with the Southern Sotho of Lesotho (Ashton, 1939), the SothoTswana of the Free State (Smith, 1970; Maggs, 1976; Chirikure et al., 2007) and northern Mozambique. To the west of South Africa, at the beginning of the 18th century, Wikar (1779) writing at the end of the 18th century about western South Africa, mentions traders “from the north” consisting of large groups of people carrying metallic requirements of spears, adzes, and knives, ornaments of copper beads, wire-wound bracelets, and ear-rings to outlying hunter-gather communities and agro-pastoral populations (Campbell, 1822, Lichtenstein, 1928; Shaw & Van Warmelo, 1974). Ethnographic reports of trade in the 17th century AD indicate that the Portuguese were in the throes of developing stronger trading links in southeast Africa by developing a presence in Delagoa Bay, and at times having to share this facility with the British, Dutch and Austrians. Each one of these nations was competing for the bulk of the ivory trade and in return delivering copper, glass beads, cloth and wire-wound bracelets all of which carried the report “that they were doing great business” and which assisted the elite in displaying their status and rank in this region (Junod, 1927; Smith, 1970).

Information from the Gwembe Valley, Zambia, (15th century AD), particularly that from the archaeological site of Ingombe Ilede, indicates the great antiquity of trade in finished metal objects in this region (Summers, 1969; Bisson, 2000). In the Early Iron Age trading with metals is archaeologically evident through inference, in a limited number of investigated settlements especially in south-eastern Africa, where sparse collections of copper beads have been uncovered, amongst small collections of iron objects. In regions that lack naturally occurring ore, such as parts of modern day KwaZulu-Natal and Mpumalanga Provinces, the recovery of finished copper objects suggests the presence of trade and exchange relationships with producer regions. However, whether this trade took place directly through producers to consumers or through a network of intermediaries is difficult to tell. The copper objects from the archaeological sites of Lydenburg and Kwagandaganda, sites that lack copper ores indicates trade in either metal or finished objects. What is interesting is that objects in copper rich areas and copper deficient areas were fashioned using similar techniques. For example, folded beads were made from strips scored from narrow rectangular sheet, cut to length and wrapped round a tubular form with the ends carefully connected (Miller, 2002; Thondhlana & Martinón-Torres, 2009). At Divuyu, in north-western Botswana, archaeologists have inferred the presence of metals trade involving iron and copper which may have been sourced from Barotseland an area located a considerable distance to the north. Over 1 500 years of metal production in southern Africa including the dispersal of metal objects was important as the agent of social change in the course of population movements occurring through periods of peace and disruption.

Given the continuity and change in the typology and fabrication techniques invested in making southern African Iron Age decorative metalwork and the wide distribution of identical objects in areas without copper ores, such as the Free State region of South Africa, it is important to consider whether or not there was standardization in the production of various objects. From a morphometric point of view, the measured internal and external diameters for wire-wound bracelets used by various communities in the late 19th century AD (see Table 4.4, chapter 4) strongly show a lack of standardization in the modern sense of the word. Cline (1937: 113) reported that the Yeke of Zambia utilized the measurements of the distance between the heel and the ankle as the standard length for the creation of a wire- wound bracelet. It has been noted amongst the Venda, *musuku* ingots had varying numbers of studs at the top which correlated with value (See Tables 4.2, 4.3). The most expensive *musukus* had more than thirty studs and weighed more than those with fewer studs. Apart from the sameness in shape and form, there was no standardization in the weight and size. As such, it seems that the most important measure of standardization related to similarity in shapes not in the actual dimensions of individual objects that differed from smith to smith and person to person. If one can assume that the approach used by the Yeke smiths was standard practice, then it would follow that objects were tailored to suit individuals, making it unlikely that we find standardized objects similar to those mass produced in our industries today. However, that different shapes of objects, such as those of ear-rings, were culturally specific, is an indication of standardisation or imitation within groups. Given that objects were used to express identity, they were made in similar shapes which served as some rudimentary form of standardization. Therefore, in this sense, most decorative work was culturally standardised.

There are some questions that are however difficult to answer in any comprehensive way, given the limited nature of the archive. For example, was the production of decorative metalwork small or large scale? Indications from archaeology and history are that areas such as Musina and Phalaborwa are specialist oriented landscapes (Moffett, personal communication). They would produce ingots and in some cases finished objects which were widely distributed. Indeed, the Njanja of Zimbabwe also widely distributed iron hoes. However, we know that even those cultural communities who received ingots often made their objects to resemble those made by smiths as long as they were of the same cultural group. This make it difficult to separate imitation from objects produced for a larger market and this is an area which requires further research. Itinerancy is one theme that emerges in considerations of trade and exchange in metal. Mackenzie (1975) argued that Njanja metallurgists would travel to different areas and smelt there. The objects which they made were similar to those which they made in their home area, a fact which should caution researches that similarity in object types over large distances is an outcome of several and often conflicting possibilities.

Ethnologists and economic historians suggest that in the 18th and 19th centuries AD the regions to the north: Zimbabwe, and Mozambique trade amongst local communities remained at subsistence level and was conducted between two consumers. This was a simple pattern of exchange through which commoners and peasants away from urban centres conducted their affairs at local level. Mudenge (1988) notes that in conducting external trade, larger polities, in later centuries, used professional traders, a modus operandi supported by the Portuguese, who collected merchandise at designated locations and rewarded their employees accordingly. The author also reports that there were a few independent professional middlemen who were astute in buying and selling products and who could easily earn as much as 300 to 400 per cent on their transactions. Their endeavour was to carry metals in ingot form, of copper, gold, and sometimes iron from the interior towards the coast (Mudenge, 1988). This method of merchandise dispersal was in contrast to that of the Njanja, amongst whom craftsmen doubled up as traders in the dispersal of large and small items from, including hoes, spears, and “lesser lines” (Mackenzie, 1975). Not all iron craftsmen enjoyed the freedom of the Njanja in Zimbabwe, the Karanga, in the south- west were beholden to the Ndebele king, in delivering the required quantities of spears and hoes in the aggressive pursuit of regional expansion on the part of the Ndebele (Sutherland-Harris, 1970; Chirikure, 2007). The need for roving craftsmen distributing their own stock was eliminated by the Zulu state where quantities of spears and hoes were required by various *Inkosi* to fulfil both the army’s requirements and the population’s agricultural needs (Maggs, 1982).

The role of metals in the growth of trading provided further momentum to the development and expansion of indigenous states in southern Africa (Mudenge, 1988). The social functions of metal and metal craftsmen’s products added to the social complexity experienced by small and large communities and requires consideration, particularly as metallurgy had different effects at various times in a variety of localities, some areas of which have been more exhaustively investigated than others. Dissimilar metals became important at different times in different localities of southern Africa and this confirms the skills of the indigenous metal workers and their versatility as entrepreneurs who seized the commercial opportunities available to them (Vogel, 2000).

This is noted in the strong emphasis that was placed on the organizational requirements in the dispersal of merchandise in the later centuries of the Later Iron Age (Fagan, 1970; Smith, 1970; Sutherland-Harris, 1970; Mackenzie, 1975; Mudenge, 1988). The contribution of metallurgy to knowledge of early state formation requires more research and we leave this to future researchers.

7.5: CONCLUSION AND OUTLOOK FOR FUTURE RESEARCH

In conclusion, Iron Age metal working activities which included the mining of ores and the production of objects had a significant impact on the cultural, economic, social and political aspects of the lives of communities living in different time periods of the Iron Age. Evidence found in many locations within the savannah regions comprised mostly of scant and a few extensive assemblages. This evidence has generally appeared in sites dating from the late centuries of the first millennium to the mid-centuries of the second millennium. The majority of these have sites exposed a metal laden material culture from graves, which have revealed an extensive corpus of objects showing iron and copper complemented with bronze and gold, and the ensemble expressing an individual's wealth and power. The arrival of brass bars and ingots in southern Africa, imported as ready-made products, from colonial industrialised centres was treated with similar melting and smithing techniques as to those for iron and copper, and manipulated to provide distinctive body ornaments for wealth and status enhancing effects amongst the elite of a number of cultural groups in south-east Africa.

This literature based study has relied on past and current literature from archaeologists, anthropologists, ethnologists, historians and metal scientists in assessing the features and distinctions noted in the production processes of indigenous metal workers, within a variety of cultural groups in relation to objects produced. Relevant to all metallic collections of beads, bangles, wire-wound bracelets, neck-rings and ear-rings made within the Later Iron Age and compared with similar materials from the first millennium is the tool-kit used by metal smiths which barely altered throughout the 1500 years of craftsmanship. The essential requirements did not alter, a furnace of regional design, smelting tools consisting of bellows and clay crafted tuyères, and ancillary materials of ores and charcoal. Once the iron bloom was achieved, hammers of different sizes, a flat surfaced anvil of strong stone, and a hearth was utilized to refine the bloom. Crucibles of pottery were employed for melting gold, copper, bronze and brass. The tool-kit expanded marginally with the fabrication of iron made tools, such as chisels and blades with sharp edges for cutting metal, and for punching it, iron drawplates and accompanying tongs for producing thread-like wire for wire-wound bracelets, and gads used in the mining industry. This tool-kit in terms of delivering the carefully crafted beads of copper was no different from that noted from Lydenburg, South Africa (7th, 9th to 11th century) to those discussed from later sites, such as Nyanga, eastern Zimbabwe (17th to 19th centuries).

The appearance and form of metal beads recovered in archaeological horizons in metal producing regions was dependent on whether ores were readily available for smelting and smithing or whether they were imported through trade into ore deprived regions. The variety of shapes of beads and range of manufacture processes changed imperceptibly in the final centuries of the Late Iron Age when a wider variety was noted. The most common form of manufacture was a narrow strip cut with the aid of a chisel or knife, from a sheet of metal, which could be of iron, gold, copper, bronze or brass, and wrapped around a core in order to produce an evenly round form with the bevel cut surface on the inner surface, to produce what is known as a cylinder. More prevalent in the Later Iron Age were copper / bronze beads showing a further selection of shapes, described as barrel and biconical, where the outer surface of the bead was rounded, or angled. From iron, craftsmen produced bangles and wire-wound bracelets; however cylindrical beads were infrequently recorded from sites that developed after the mid-second millennium. The low-melting point for gold meant that it was the most versatile metal for creating cast beads, which were produced in spheres, cylinders, tubes and biconical forms.

Of particular interest in this study has been the role of women and their contribution to the metal industry in southern Africa. Linked to this is a study of the role of metal in a woman's life during the period under study. In the latter centuries of the Iron Age, a young man had to labour for many years to offset his *lobola* with a number of iron hoes while the woman spent her active life using these implements to produce food for her husband and family. Depending on her social position a woman might be found acceptable as a bride, adorned with decorative metal ornamentation, mainly in the form of wire-wound bracelets, if not, and she was socially outside the wealthy status group, there were natural materials to be used for ornamentation.

While this work has shown that there is a great deal of information about decorative metalwork to be gleaned from archives, it has been restricted by the limitations of the archive which is dictated to a large extent by what exists. As such, available historical and archaeological information is restricted to specific localities and cultural groups. Thus although I consider my research to have yielded valuable information and extended knowledge in this area, as well as having developed a useful procedure for use in further investigations I can claim limited success in the endeavour to gain insight into the manufacturing patterns, social formations that have been found to have existed during the Iron Age in southern Africa.

I would argue that new spaces exist in future research for locating and investigating objects for their power to yield a range of valuable information, about the people who made them and used them. I see this future research as extending its scope through the use of sources and scholars from a range of disciplines, including not only archaeology, but also history, anthropology, ethnology, and the sciences, particularly the geological and metallurgical sciences. I also see this research as being extended to previously unexplored geographies. The ultimate aim of this would be to bring additional insights into the social and cultural contexts of Iron Age metal smiths and the complex thought patterns and symbolic behaviour of their societies, and how this can contribute to our understanding for the future of humankind.

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APPENDICES

Appendix 1 Glossary of terms (after Miller, D.1996)

Bangle	Solid, inflexible of round, square, rectangular or twisted wire for arm and leg decoration
Bead	Small circular form, diameter generally under 10.0 mm
Bracelet	Flexible, (wire-wound over a core of vegetable, animal core) object, using round and rectangular wire for arm, wrist and leg decoration
Chain	Connected flexible series of metal round or oval links
Clip	Open form of bent ribbon
Conical tube	Tapering conical tube
Ear ring	Thin wire loop, diameter, roughly 15.0 mm
Pendant	Spatulate shape with a twisted shaft to form the eye
Plate	Flat form of metal produced for further use
Ring	Round and flat wire, or rod (neck-ring, ankle-ring) bent into a closed form
Staple	Round or flat wire with sharp bent points
Strip	Flat fragment of ribbon
Wire	Round, oval, square D-shape or rectangular in cross-section.

The illustrated Dictionary of Jewellery (Newman, 2005) suggests that “Bangle” is a nonflexible arm ornament (circular or oval) that slips over the hand or hinged and closed by a clasp. They are worn on the wrist or on the lower or upper arm (sometimes several together).

“Bracelet”. An ornament worn on the wrist, or forearm as a flexible band or series of links in contrast to a bangle which is rigid. Such ornaments have been worn by men from earliest times and in primitive as well as civilised societies.

Appendix 2: Ceremonial, ritual and utilitarian axes from the Iziko Museum, Cape Town

Museum No	Ethnic group	Decorative: blade	Decorated shaft
SAMAE 7248	Shona	Added vertical short spear on tang	3 bands of twined wire
SAMAE 6718	Shona	Cross-hatching on tang	Incised squares on grip
SAMAE 6719	Shona	No decoration	Incisions on head
SAMAE 1722	Shona	Raised band before blade widens	2 bands twined brass wire
SAMAE 1723	Shona	No decoration	3 bands twined brass wire
SAMAE 1813	Shona	Cross-hatching on tang	2 bands twisted brass wire, 1 Missing
SAMAE 2750	Shona	Cross-hatching on tang	No decoration
SAMAE 2751	Shona	Incised scallops & stars on both surfaces	1 band twined brass wire near grip
SAMAE 2977	Shona	Cross-hatching on both surfaces	2 bands of twined wire copper & brass
SAMAE 2115	Shona	Cross-hatching on rounded tang	No decoration notched on side edges & centre blade
SAMAE 2379	Shona	No decoration	Incised herring-bone design on grip
SAMAE 2380	Shona	Cross-hatching on tang	6 bands twined brass wire
SAMAE 4460a	Shona	Tang decorated	Iron shaft and metal binding
SAMAE 4460b	Shona	Tang decorated	No decoration
SAMAE 4996	Shona	No decoration	2 bands twined brass and zinc wire
M9	Shona ?	Cross-hatching on tang	No decoration
SAMAE 12620	Tonga	No decoration	twined wire on shaft
SAMAE 7075	Tonga	Swallow tail blade	Iron rings on shaft
SAMAE 12612	Venda	Bayonet blade	Decoratively carved designs
UCT 61/E55	Venda	Semi-circular blade	Wire work on shaft
SAMAE 9453	Natal Nguni	Half oval head lenticular blade	Head: twined brass and nickel wire
SAMAE 13347	Natal Nguni	No decoration	Decorative wire twining
SAMAE 14291	Swazi	Swallow tail blade	Flanged; wire binding
SAMAE 2116a	Matabele	Cross-hatching on tang both faces	No decoration
SAMAE 2116c	Matabele	Cross-hatching on tang both faces	No decoration
SAMAE 2116e	Matabele	Serrated edges on tang	No decoration
SAMAE 2116f	Matabele	6 incised chevrons, serrated back blade	No decoration
SAMAE 2116g	Matabele	Cross-hatching on blade	No decoration
SAMAE 7407	Thembu	No decoration	Decorated shaft
SAMAE 6690	Hlubi	Spiral thick blade	No decoration

Appendix 3:Ceremonial, ritual and utilitarian knives from the Iziko Museum, Cape Town

Museum No	Ethnic Group	Decorated handle	Decorated sheath
SAMAE 1730	Manyika	No decoration	Brass wire binding
SAMAE 1890	Manyika	No decoration	Brass wire binding
SAMAE 2749	Manyika	No decoration	Brass wire binding
SAMAE 10806	Shona	No decoration	Wire decoration
SAMAE 6713	Shona	No decoration	Decorated sheath
SAMAE 9468	Himba	Flared: fine copped wire used	No decoration
SAMAE 4846	Ambo	No decoration	Wire bound with diagonal pattern
SAMAE 5059	S. Ambo	No decoration	Large skirt-like sheath, wire bound
SAMAE 2102	S. Ambo	Wire binding	Wire binding
SAMAE 3310a	S. Ambo	Wire binding	Wire binding
SAMAE 3310b	S. Ambo	No decoration	Wire binding plus string and sinew
SAMAE 5368	S. Ambo	Rough wire binding	Rough wire binding

Information from other museums: Johannesburg Art Gallery A, Havran 1991

Cat. number		Blade width,	length	Sheath length	Materials
Cat 633	S. Sotho	4.6	2.8	29.2	Knife and sheath, wood, rhino-horn, fibre, hide Cat 634
	Tswana	2.4	0.9	17.9	Wood, bone, iron, hide, decoration not mentioned
Cat 635	Tswana	3.4	10.8	33.9	Wood, bone, iron, hide, hair, decoration not mentioned
Cat 637	Tswana	1.6	3.6	27.0	Horn, wood, iron, hide, sinew, decoration not mentioned
Cat 636	Tswana	2.3	4.2	34.7	Wood, horn, iron, hide, sinew, decoration not mentioned
Cat 638	Shona	1.6	2.2	17.6	Wood, iron, brass wire, decorated
Cat 653	Shona	3.1	3.4	28.6	Wood, iron, brass wire, decorated
Cat 644	Shona	3.4	4.6	36.5	Wood, iron, brass wire, decorated
Cat 652	Shona	3.7	5.5	48.2	Wood, iron, brass wire, decorated
Cat 639	Shona	2.1	2.4	16.9	Wood, iron, brass wire, decorated
Cat 640	Shona	1.7	1.9	17.9	Wood, iron, brass wire, decorated
Cat 641	Shona	2.9	3.5	39.3	Wood, iron, brass wire, decorated
Cat 642	Shona	3.7	3.9	32.7	Wood, iron, brass and copper wire, bone decorated
Cat 643	Shona	3.6	3.8	28.0	Wood, iron, brass wire, decorated
Cat 644	Shona	3.4	4.6	36.5	Wood, iron, brass wire, decorated
Cat 645	Shona	5.0	5.3	48.6	Wood, iron, brass wire, decorated
Cat 646	Shona	4.4	6.0	48.2	Wood, iron, brass wire, decorated
Cat 647	Unknown 3.2	3.3	34.9	Wood, iron, brass wire, decorated	
Cat 648	C-east Africa	6.3	8.5	78.7	Wood, brass wire, decorated
Cat 651	Unknown 4.6	7.3	46.7	Wood, iron, metal	
Cat 652	Unknown 3.7	5.5	48.2	Wood, iron, brass wire, decorated	
Cat 653	Unknown 3.1	3.4	28.6	Wood, iron, brass wire, decorated	

Appendix 4: Ceremonial, ritual and utilitarian spears from the Iziko Museum, Cape Town

Museum No.	Ethnic Group	Blade's local name	Blade: length	width	shaft	Decorative binding on shaft
SAMAE 12862	Shona	-				Binding metal strip
SAMEA 12623	Shangaan	-				Wire binding and skin sleeve
SAMAE 12625	Shangaan	-				Swells to rounded butt, wire binding
SAMAE 12626	Shangaan	-				Swells to rounded but wire binding on skin sleeve
SAMAE 6939	S. Nguni	-			Barbed and long tang. Iron wire binding over sinew at head	
UCT 32/32	S. Nguni	-				Ogee section, tang décor; -
SAMAE 14771	San	-				Metal rings, copper wire

M. Wood, 1996, Zulu Treasures, KwaZulu Cultural Museum and the Local history museums (measurement in cm)

CC = The Campbell Collections, University of Natal, KCM = KwaZulu Cultural Museum, LHM = Local History Museums

LMH 95/1398/1	isijula	44.6	4.5	138.0	Wood, iron, grass
LMH 95/1398/9	isijula	34.0	2.8	141.6	Wood, iron, grass
LMH 95/1398/4	isijula	28.5	3.1	142.0	Wood, iron, grass
LMH 95/1398/8	isijula	28.5	3.1	141.5	Wood, iron, grass
LMH 95/1398/5	isijula	48.7	3.5	131.4	Wood, iron, grass
LMH 95/1389/3	isijula	33.0	3.3	119.0	Wood, iron, grass
CC MM 205	iklwa	39.5	5.0	128.2	Wood, iron, brass wire
KCM C 3146	iklwa	45.6	5.5	123.5	Wood, iron, brass wire
CC MM 185	iklwa	42.0	4.3	146.0	Wood, iron, wire
LMH 95/194	umkhonto	21.2	7.0	116.8	Wood, iron, grass
LMH 95/143	umkhonto	22.8	5.1	132.1	Wood, iron, grass
CC MM 186	umkhonto	23.3	4.0	130.5	Wood, iron, sinew
KCM C 2173	umkhonto	30.5	6.1	139.0	Wood, iron, hide
LHM 95/1551/2	umkhonto	32.2	3.2	122.5	Wood, iron, sinew
LMH 95/1393/2	umkhonto	33.7	3.2	133.1	Wood, iron, grass, hide
LMH 96/1473	umkhonto	32.7	4.0	138.0	Wood, iron, plastic coated copper wire LMH 96/1436
	umkhonto	27.0	4.0	144.0	Wood, iron, plastic coated copper wire LMH 94/186
	umkhonto	26.8	3.5	155.0	Wood, iron, copper wire
LMH 95/1397/3	umkhonto	28.6	3.2	135.4	Wood, iron, copper
LMH 95/1397/2	umkhonto	37.5	3.0	123.0	Wood, iron, grass
CCMM 184	inhlendla	12.5	8.0	126.5	Wood, iron, hide
KCM C 914	inhlendla	38.2	4.5	143.6	Wood, iron, grass
CC MM 187	inhlendla	45.5	6.2	138.5	Wood, iron, grass
LHM 94/369/1	inhlendla	49.2	19.8	121.6	Wood, metal
LMH 95/1418	inhlendla	9.0	32.0	154.8	Wood, iron, hide
LHM 95/1417	inhlendla	34.0	45.2	-	-

Appendix 5: Table of metal beads in the Iziko Museum, Cape Town

Museum No	**Ethnic Group**	**Item**
SAMAE 5160	Herero	String of beads
SAMAE 14300	Himba	Metal beads on leather thong, galvanised iron (worn by men)
SAMAE 9478	Ambo	Sting of copper and iron beads
SAMAE 994	Basotho	Beaded necklace (query glass beads)
SAMAE 8080	Basotho	Brass neck ring; dia. 17 cm, thickness 2.5 cm
SAMAE 9910	Lobedu	2 copper beads, cylindrical; length 0.2 cm
SAMAE 9912	Lobedu	5 brass beads, query native manufacture; length 0.5 cm, height 0.2 cm
SAMAE 9913	Lobedu	Old locally made brass beads; length of string 34 cm, bead width 0.6 cm
SAMAE 11837	Lobedu	Brass beads strung on to leather
SAMAE 13919	Lobedu	Two copper ‘wrap around’ beads
SAMAE 1390	Lobedu	Wrapped copper beads – Sotho copper
SAMAE 3791	Natal Nguni	Brass beads (indondo) graduated, irregular shape, flattened at both ends, bulbous sides, Copper 77%, zinc 16%, tin 4 %, lead 3 %. Width 2-2.5 cm Depth 2.3-3.0 cm
SAMAE 7906	Shona	Gold beads (15)
SAMAE 7912	Shona	Gold beads (42) and 7 links

Appendix 6: Table of metal bangles, bracelets and arm bands in the Iziko Museum, Cape Town

Museum No	Ethnic group	Item
SAMAE 1823b	Shona	Copper arm band
SAMAE 6712	Shona	5 armbands
SAMAE 5074	Herero	Brass wire arm band
SAMAE 14557	Himba	Copper wire spiral
SAMAE 7838	S. Tsonga	Brass ring; dia. 15 cm dia. of brass 2cm (neck ? check details)
SAMAE 7839	S. Tsonga	Brass; dia. 10 x 9 cm, dia. of brass, 1.5 cm
SAMAE 457a	S. Sotho	2 sections of wound copper wire, metal binding link; clasp: ‘hook and eye’
SAMAE 457b	S. Sotho	3 sections wound tin wire joined by tin, clasp: ‘hook and eye’
SAMAE 4924	S. Sotho	Closely strung copper beads; arm band; diam. 6 cm, thickness of copper 0.5 cm
SAMAE 6957	S. Sotho	Thick copper bracelet, raised ridge on outer edge; dia. 6.5 cm; width 2.3 cm
SAMAE 8167a	S. Sotho	Metal with incised designs; dia. 6 cm, thickness 0.5 cm
SAMAE 8167b	S. Sotho	Metal with incised designs; dia. 5.8 cm, thickness 0.5 cm
SAMAE 8167c	S. Sotho	Metal with incised designs; dia. 5.8 cm, thickness 0.5 cm
SAMAE 8167d	S. Sotho	Metal with incised designs; dia. 6.5 cm, thickness 0.5 cm
SAMAE 9904	Lobedu	32: brass wire wound, dia. av. 7.8 cm, thickness 0.1 cm
SAMAE 9905	Lobedu	13: copper wire wound bracelets; dia. 6.5 cm thickness 0.1 cm
SAMAE 9909	Lobedu	13 bangles native worked iron, some with flattened wire, dia. 6.8 cm, thickness 0.5 cm
UCT 38/69	Lobedu	Wire bound tail hairs
UCT 37/74	Lobedu	2 bangles of Sotho copper
SAMAE 8125	Zoutspansberg	3: wound brass wire bracelets; dia. 9.5; 8.5; 6.5 cm, thickness average 0.2 cm
SAMAE 4110	Ambo	4: old metal; oxidation
SAMAE 12744	Ambo	3 incised narrow metal bands, solid short pieces at ends; dia. 7 cm, thickness 1.5 cm
SAMAE 10009	Mpukushu	4: copper bound over giraffe hair, including 1 brass bead.
SAMAE 2885	Natal Nguni	10: copper / brass wire plus few brass beads: largest 6.8 cm, smallest 5.8 cm
SAMAE 2886	Natal Nguni	Thick copper / brass wire plus beads; size 10.7 – 7.5 cm, beads 0.5 – 0.4 cm
SAMAE 2890	Natal Nguni	Thick brass wire coiled with cylindrical brass, plus clasp; dia. 7.5 cm width 1 cm
SAMAE 5010	Natal Nguni	Ingxota, brass gauntlet, cylindrical shape, back opening, one end flared, raised pattern, 17 horizontal bands, oval cross section, length 14.1 – 6.7 cm, dia. 8.5 cm, thickness: 0.2 cm
SAMAE 5175	Natal Nguni	Ingxota, brass gauntlet, cylindrical shape, back opening, one end flared, raised pattern of moon shapes, 7 horizontal bands, oval cross section, dia. 15.6 – 7 .0 cm, diameter at thickest part 9 cm, thinness of metal 0.3 cm
SAMAE 8310a	Natal Nguni	Brass wire bracelet with 7 copper beads at intervals, dia. 7.3 cm, bead depth 0.4 cm
SAMAE 8310b	Natal Nguni	Coiled brass wire coils intertwined, dia. 6.5 cm, coil depth 0.5 cm
SAMAE 8310c	Natal Nguni	Brass wire arm band, dia. 6 cm, wire dia. 0.4 cm
SAMAE 9939	Natal Nguni	Tin coiled around tin wire core, dia. 8.7, wire dia. 0.5
SAMAE 3788	Swazi	Brass rings; dia. 15 cm, ring width 2 cm
SAMAE 1468	Weltevrede	24: brass 21, copper 3, ‘zila’ Silver sticking tape most popular
SAMAE 9575	S. Nguni	2: triangular section wire wound over wire core; dia. 9 cm half thickness 0.2 cm
SAMAE 14078	S. Nguni	Wound wire covered with small blue / white / black glass beads
SAMAE 249	S. Nguni	3: wire weaving/ twining
SAMAE 9565	S. Nguni	Brass beads over a core, 4 copper beads at intervals; Length 20 cm, thickness 3 cm
SAMAE 13650	S. Nguni	Wound brass wire covered with brass and copper beads
SAMAE 8575	Hlubi	Bracelet of brass beads. Dia. 9.5 cm, dia. of beads 0.3 - 0.5 cm
SAMAE 6141	Xhosa	2: wide brass wire with thick brass wire; dia. 7.5 cm, thickness of wire 0.5 cm
SAMAE 6144	Xhosa	Beads of wire
SAMAE 11393	dXhosa	9: 3 wound brass wire over a core, 6 copper and brass beads
SAMAE 2889	Xhosa	Ring of metal – solid
SAMAE 2891	Xhosa	Thickish copper wire; dia. 7.2 cm, thickness 0.4 cm
SAMAE 2891	Xhosa	Wound brass wire; dia. 7.5 cm, thickness 0.2 cm
SAMAE 2894	Xhosa	4: wound copper wire; dia. 7.5 – 6.5 cm
SAMAE 3325	Xhosa	Iron bangle
UCT 39/4	Xhosa	8: 5 of 2 ply iron wire, 3 large, 2 small, # 6 wound copper wire around thinner copper wire core, # 7; thin copper wire core, aluminium beads pressed around core at 0.2 cm intervals, # 8; wound thin copper wire with 4 copper beads
SAMAE 6134	Xhosa	8 wound bracelets; dia. 11 cm, thickness 0.3 cm
SAMAE 6135	Xhosa	Brass wound wire interspersed with brass beads; dia. 9.8 cm, bead dia. 0.4 cm, thick thickness 0.2 cm

Museum No	Ethnic group	Item
SAMAE6166	Xhosa	Thick brass arm bands with moulded pattern; dia. 6 cm, dia. of brass 2.4 cm
SAMAE 6624	Xhosa	Brass wire wound around leather; dia. 7.5 cm, dia. of brass 2.4 cm
SAMAE 10032	Xhosa	40?, brass, store bought thick wire, bent into shape around the arm
SAMAE 7934	Shona	Bangle of wire
SAMAE 8628	Shona	Piece of copper bangle
SAMAE 8629	Shona	Piece of copper bangle
SAMAE8630	Shona	Copper bangle
SAMAE 4825	Shona	Wire ornamentation
SAMAE 1672	Bushman	2 of brass wire (? made by Bushman)
SAMAE 1689	Bushman	Bangle of iron
SAMAE 4256a	Bushman	Bracelet string of copper, brass and iron beads
SAMAE 9326	Bushman	Bangle
SAMAE 9147	Bushman	Bracelet of copper beads threaded onto leather

Appendix 7: Table of metal ankle and leg rings in the Iziko Museum, Cape Town

Museum No	Ethnic Group	Item
SAMAE 7151	Herero	Anklet or wrist: bracelet of iron beads (women)
SAMAE 9477	Ambo	4 copper anklets – copper from Angola
SAMAE 8168	S. Sotho	5: wound brass wire; 1 brass bead. Dia. 12.5, thickness of wire 0.3 cm
SAMAE 9906	Lobedu	Wound copper wire twisted into two for a child, interspersed with 5 pairs of copper beads; dia. 12 cm, thickness 0.2 cm
UCT 39/69	Lobedu	30: wire wound around tail hairs UCT 38/75 Lobedu 29: leg bangles
SAMAE 9902	Lobedu	34 (24): Rusted wound brass wire; dia. 9 cm, thickness 0.2 cm
SAMAE 9903	Lobedu	4: wound brass wire, 2 large 2 small dia. 10.5 - 9.5 cm, thickness 0.2 cm
SAMAE 9996	Lobedu	2: brass wire around nylon string (modern)
SAMAE 10244	Lobedu	140: made formerly of brass wire now aluminium store bought
SAMAE 11787	Venda	Brass wire wound around cow tail hairs
SAMAE 12591	Venda	3: thin cylinders with glass beads
SAMAE 9658	Ovamboland	Copper anklet solid and heavy, worn by women
SAMAE 2895	Natal Nguni	10: brass wire with groups of brass beads ± 5 at intervals; dia. 10.5 – 9 cm; dia. of beads 0.4 cm
SAMAE 12008	Natal Nguni	4: wire
SAMAE 12009	Natal Nguni	Copper and brass (ubusenge)
SAMAE 12014	Natal Nguni	Old metal and glass beads
SAMAE 9585	S. Nguni	3: copper wire coil, no core within, with brass wire spiralled above
SAMAE 13079	S. Nguni	Wound metal ring
SAMAE 7352	Xhosa	Copper or brass wire with brass beads at intervals; dia. 10 cm, dia. bead 0.4 cm
SAMAE 2839	Xhosa	7: (2) wound thick copper wire, (5) wound thin copper wire. dia. 11 cm thickness 0.3 – 0.2 cm

Appendix 8: Table of metal collars and necklaces in the Iziko Museum, Cape Town

Museum No	Ethnic group	Item
SAMAE 13589	Himba	Coils of copper wire bound with twine
SAMAE 14303	Himba	Bead ornamentation for men
SAMAE 14546	Himba	Hide, metal, shells and plastic (modern)
SAMAE 14547	Himba	Hide, metal, plant fibre (back)
UCT 32/18	E. Tswana	5 brass necklets
UCT 32/18	E. Tswana	Copper ring
SAMAE 76	Pedi	(Collar) Flattened brass necklet: dia. 19 x 18 cm
SAMAE 454	S. Sotho	(Collar) Rounded brass ring: dia. 16.5 x 15 cm
SAMAE 597	Basotho	(Collar) Flattened brass necklet: dia. 16 x 15 cm thickness 2.5 cm
SAMAE 8080	S. Sotho	Collar of brass: dia. 17 cm thickness 2.5 cm
SAMAE 14541	Natal Nguni	Collar; brass broad and flat: outer edge 310mm, inner edge 12mm
SAMAE 9907	Lobedu	Solid iron, round cross-section: dia. 14 cm thickness 0.7 cm
SAMAE 9908	Lobedu	Solid iron ring: round cross-section: dia. 14.5 cm thickness 0.6 cm
SAMAE 12587	Venda	Small metal beads folded over cloth
SAMAE 12743	Ambo	Small metal beads strung on plyed sinew
SAMAE 3794	Natal Nguni	UmNaka: brass ring: Copper 85%, zinc 10%, tin 4 %, lead 1%
SAMAE 5425	Natal Nguni	UmNaka: brass ring; dia. 15 cm, thickness 0.2 cm
SAMAE 6185	Natal Nguni	Brass neck ring: dia. 16.5 cm, thickness 2 cm
SAMAE 10150	Ndzundza	Copper neck ring
SAMAE 10150	Ndzundza	Brass neck ring
SAMAE10152	Ndzundza	3 copper and 7 brass rings (married woman)
SAMAE 77	S. Nguni	Copper wire, leather, and decorated purse
SAMAE 13316	S. Nguni	7: 3 joined by small ring;3 brass bound; 3 beaded with glass beads
SAMAE 5360	Xhosa groups	Modern; brass leopard’s claws amongst blue beads, claws: 6 groups 4 in each group, length of claw 35 mm
SAMAE 3788	Swazi	Brass: diameter: 15.4 cm, thickness: 2.0 cm, width, 2.1 cm mass: 942 g, uneven circular

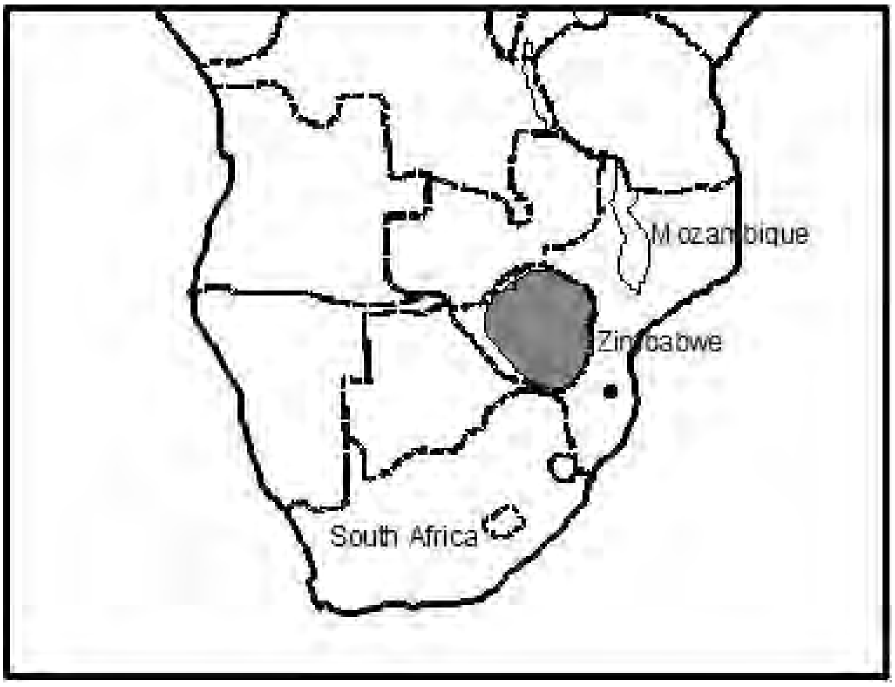
Appendix 9: Table of metal ear-rings in the Iziko Museum, Cape Town

Museum No	Ethnic Group	Item
SAMAE 5671	Mpukushu	6 ear rings no description metal?
SAMAE 1010	S. Nguni	5 ear rings
SAMAE 8555	S. Nguni	Small silver metal ear rings for pierced ear
SAMAE 13052	S. Nguni	Pair of ear-rings metal beads (modern)
SAMAE 5309	Tswana	Brass, 1 ear-ring; 1.5 cm length with coiled shank, 1.5 mm diameter: wire, 1.2 mm wire width, thickness of wire 2.1 mm
SAMAE 6673	Mpondo	Pair of ear-rings
SAMAE 7512	Mpondo	Pair of ear-rings
SAMAE 2868	Natal	3 ear-rings
SAMAE 6639	S. Nguni	Pair ear rings metal beads, rings (modern)
SAMAE 5481	Bushman	Copper ear-ring
SAMAE 11679	Xhosa	Ear ornament 2 beaded brass

Appendix 10: Distribution of metal biconical beads in northern southern Africa

Author, date	**Period**	**Locality**	**Metal (-) No of specimens**	**Dimensions mm**	**Other information**
Hall, & Neal, 1904 (1972)	1300-1450	Great Zimbabwe	Gold		Hammered facets
Caton-Thompson, 1931	1300-1450	Great Zimbabwe	Gold Copper		
Martin, 1940	19th century	Manyika	Brass / bronze	3.0 x 2,5	
Von Sicard , 1955	19th century	Cipise area Zimbabwe	Copper / bronze (2)	1.00	Vary in size
Robinson, 1959	15th-19th century	Khami	Copper / bronze / gold		
Robins, & Whitty, 1966	14th to 16th centuries	Harleigh Farm	Brass		Thick biconical section and were welded
Garlake, P. (1969)	17th century	Dambarare	Copper / bronze	3.5 x 2.0	Many strung on bracelets
Garlake, P. (1973)	41th to 15th centuries	Great Zimbabwe	Gold	No information	
Garlake, 1976	14th to 17th centuries	Mozambique: Manekwene (3)	Copper	2.0 to 3.0	
Soper, & Summers, 2002	1485-1632	Muozi, East Zimbabwe Nyangui Ziwa	Copper (12) Copper (8) Copper (2)	av.: 4.77 x 4.18 av.: 8.14 x 6.79 5.4 to 5.7 x 7.3 to 5.5	
Thondhlana, & Martinón-Torres, 2009	13th to 15th centuries 14th to 17th centuries 17th to 19th centuries	Zimbabwe: Harare Tradition (Arlington Estate) Zimbabwe Tradition: Great Zimbabwe Mahonje Tradition: Chenguruve Hill east and west, Muchekayawa Hill	Copper/ bronze Copper Copper Brass Brass	No information No information No information No information No information	

Appendix 10a: Distribution of metal biconical in northern southern Africa



The table and map above show the distribution of metal biconical beads in southern Africa an item that appeared infrequently in archaeological sites throughout the second millennium. The map indicates a concentration of the objects on the eastern border of Zimbabwe, the area that had most contact with the Portuguese traders between the 17th and 19th centuries. These beads were mostly made of brass. Copper biconical beads were gathered from archaeological sites from the 13th century, and those noted from the 14th century were made from gold and bronze at sites such as Great Zimbabwe and Khami Ruins (Caton-Thompson, 1931; Robinson, 1959). Hall and Neal (1972: 94) mentioned that the gold beads had "facets like cut diamonds" and were clearly distinguished from other shapes. Few authors have noted the quantities of biconical beads found. Information from Soper and Summers (2002: 262) states that they were called "*gengejaia*" by labourers in the Nyanga region of Zimbabwe, "and that they came up from the Portuguese territory, a likely explanation for the most un-Bantu name". It was also suggested they would seem to be dated to the 16th to 18th centuries.