# AN ATTRIBUTE ANALYSIS OF ARCHAEOLOGICAL BEADS

FROM

SHANGA, NORTHERN KENYA COAST

BY

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A Thesis submitted in Fulfilment

of the Requirements for the Degree

of Master of Arts in Archaeology

in the Department of History

at the University of Nairobi

## DECLARATION

This thesis is my original work and has not been submitted for examination in any other university.

Kufwafwa Mukhwana

This thesis has been submitted for examination with my approval as University supervisor

DR. HENRY W. MUTORO

To Kufwafwa and Munyite

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## ABSTRACT

This study is concerned with an attribute analysis of archaeological beads from Shanga site. From the written documents, it is evident that questions pertaining to bead analysis and interpretation have been inadequately studied by previous archaeologists, yet with the exception of pottery, beads constitute the commonest class of artifacts on the coastal settlement sites in Kenya. As one of the most valuable chronological indicators available, beads provide some of the best archaeological evidence for dating archaeological sites and commercial items.

In this analysis Shanga beads are studied in terms of raw materials, manufacturing techniques, shapes, sizes, decorative motifs and colours. An X-ray fluorescence analysis of the inorganic bead material samples is also made to throw some valuable insight about the nature of raw materials used in bead manufacture by past communities on Shanga settlement.

The findings show that a wide variety of raw-material were used in the manufacture of beads. It also showed that different colours, sizes, shapes and techniques were used in the manufacture of beads. All these apparently were based on the functions they served and the customers taste.

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## ABBREVIATIONS

| | |
|---|---|
| B.I.E.A. | British Institute in Eastern Africa |
| J.A.H. | Journal of African History |
| I.J.A.H. | International Journal of African History |

# CHAPTER ONE

## INTRODUCTION:BEAD MATERIALS AND USES OF BEADS

Beads are minute objects, made from organic and inorganic materials, which are pierced for stringing together before being worn by people as ceremonial or as aesthetic objects (Bozman 1967). The number of beads on a string varies according to the size of the body part to which they are worn. Most contemporary and archaeological beads are characterized by geometric patterns, decorations and perforations at the centre or at the extreme end of the beads.

In Africa, the earliest beads to be recovered from an archaeological site are from Lukenya Hills, Kenya. They were dated to 17,000 B.P.(Gramly 1976). Elsewhere in East Africa, beads made from different raw-materials have been excavated at a number of sites in the interior. For example at Njoro River cave, beads have been recovered and dated to 15,000 B.P. (Leakey 1945, Leakey and Leakey 1950). At Lamek (Ngamuriak), beads were found and dated to 2,000 B.P. (Merrick 1975).

From other archaeological sites in Africa beads have also been excavated. For instance, Ostrich egg-shell beads were recovered from the site of Haua Fteauh in Libya. They have been dated to 10,000 B.C. (Dubin 1987). Glass beads dating to 100 B.C. have also been found in the Sudan. From the sites of Djenne Jino in Mali and Luxor and Badari in Egypt, beads dating to 200 B.C. have been

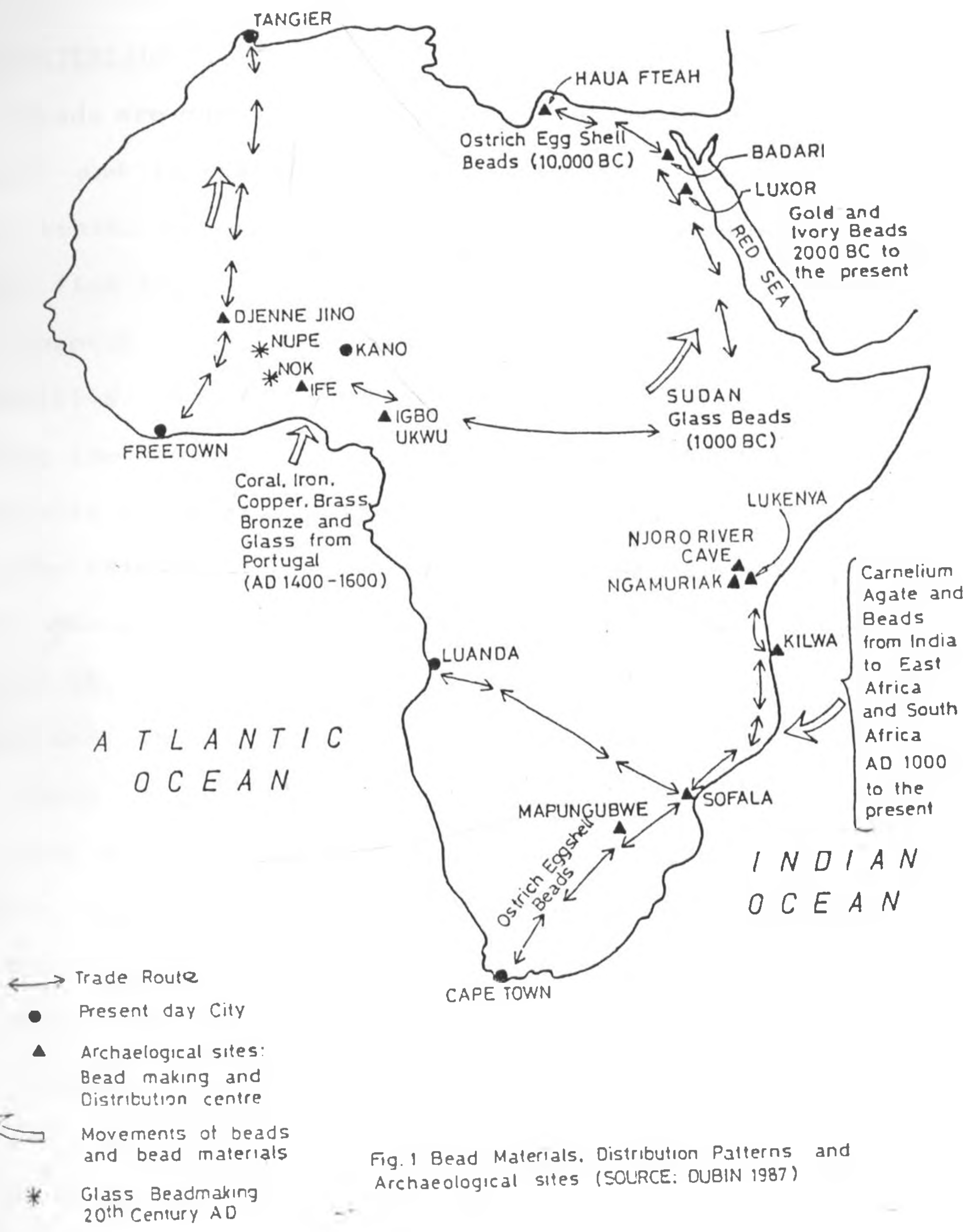


Fig. 1 Bead Materials, Distribution Patterns and Archaeological sites (SOURCE: DUBIN 1987)

excavated (Dubin 1987), (see fig. 1)

## BEAD MATERIALS

Beads are made from a variety of raw-materials. These include organic and inorganic materials. Organic materials consist of nuts, teeth, bones, tusks, seeds, tree resin (amber), bird egg-shell, fish bone and coral. Nut beads especially those of dhoum and coconut palm are highly prized in some West African communities. The flesh of the dhoum and coconut palm is removed, leaving the kernel. This kernel is then skilfully curved into beads with circular, feathered and leaf-shaped designs (Ginstone and Khan 1976). Also roaming elephants usually swallow the flesh of the dhoum palm nuts but due to the toughness of the kernel, they are undigested and hence dropped. When found these kernels are picked and used in the making of beads (Khan 1976).

Teeth from wild game have also been in use as a raw-material for bead manufacture. The hunters of Papua New Guinea, for example, drill teeth of animals they have killed and string them together as beads (Fitzpatrick 1963). Written sources indicate that ancient Egyptians curved hippo teeth into various bead shapes for wearing (Sease 1987). While the Lokele hunters who occupy the banks of the River Congo when hunting the leopards, put on leopards' teeth as beads to protect them from the fierce leopards that infest the dense equatorial forests. The leopard's skin is used as a regalia for the local chiefs in this society (Weeks 1985).

Beads were also made from Mollusc shells. A collection of these beads have been found at Gamble's Cave and North Horr sites, in the interior of kenya (Gow 1984). Evidence from coastal sites of Shanga, Kilwa and Manda in Kenya suggests that shells of Andara (a kind of mollusc) were cut into rough blocks and worn down into cylinder shaped pieces. These were later split along the lamini and then pierced centrally to form beads. In some cases, the shells were ground into disc shapes by using pieces of stone and pottery. This is supported by the criss-crossing marks left on their surfaces. Further evidence of use of mollusc shells in bead manufacture is supported by the presence of unpierced wasters at Kilwa and Shanga sites, which show that Andara were prepared by hand before being truncated into segments (Chittick 1974, 1977, Horton 1984).

Beads have also been made from ivory. Ivory as a raw material for making beads is valued because it is associated with the enormous strength of the elephants, from whose tusks ivory if derived. Elephants are totems in certain African communities have therefore been treasured for centuries because of their ivory. Secondly, ivory as a raw material for making beads has an advantage to archaeologists because it preserves well in the archaeological record.

Plant seeds have also been used as raw materials for making beads. Today as in the past, seeds from certain tree species are used for bead making among the Kamba and Pokomo. The Bagishu people, who inhabit the fringes of Mt. Elgon in Uganda also made beads from seeds of Scleria racemosa in pre-colonial times. These beads have been found to be similar to those excavated at Njoro River Cave (Leakey and Leakey 19950, Brown 1966). While seed beads do not preserve well in the archaeological record, some have been found in the marshy habitat sites of Central Africa (Katoto and Shaba) in excellent conditions. These included a squash and a been seed (Phillipson 1977).

People also make beads from bird egg shells. The most popular are the ostrich egg-shells. Evidence for these have been found at the Lake Turkana sites, particularly at Jarigole site (Momanyi 1988). ostrich egg-shells are still a popular raw material in bead-craft among the transhumant pastoralist groups of East Africa such as the Turkana, Samburu, Pokot and the Karamojong (Gow 1984, Galichet 1988).

Fish Vertebrae are also used in making beads. Beads made from this type of raw material have been found in large numbers along the coastal region of Kenya (Mutoro 1979, Horton 1984). In such cases beads were made by smooth the vertebral column by removing spines (Mutoro 1979).

Coral has also been used as a raw material for bead manufacture (Horton 1984). It has been suggested by Chittick (1974) and Sleen (1967) that some coral beads were introduced to Africa by the Portuguese in the early 16th century (Dubin 1987). However, very few of these beads have been excavated at coastal archaeological sites (Horton 1984). Other scholars, particularly Horton (1984), insist that coral bead technology was complex and the raw-material itself was hard and tough, hence would have mostly been preferred in construction rather than bead-manufacture. The fact remains that coral is still used in the manufacture of beads by the coastal peoples, namely the Bajuni, Pokomo, Boni and Sanye.

Inorganic Materials

Inorganic materials used in the manufacture of beads include semi-precious stones, terracotta, metal, glass and clay (Sleen 1967, Chittick 1974 Morrison 1984, Horton 1984, Leakey 1931, Leakey and Leakey 1950, Davison 1972, Gow 1984, Mutoro 1979, Merrick 1975 Dubin 1987, Sassoon 1966, Kirkman 1956).

Beads were also made from semi-precious stones. While few organised studies have been carried out on the manufacture of stone beads in East Africa, their abundance in this region suggests that stone was utilized in the production of beads. Most of the stone beads were made from semi-precious stone such as chalcedony, agate, crystal-quartz and carnelian (Leakey 19931, Leakey and Leakey 1950, Gow 1984, Arkell 1933, Chittick 1967, Horton 1984).

In addition to use of semi-precious stones as a raw-material for bead making, there is abundant evidence to suggest that the polity of Shanga, Kilwa and Manda also exploited terracotta in large quantities for the manufacture of beads (Chittick 1974, 1977 and Horton 1984). Recent excavations at Ungwana have similarly revealed use of baked clay in the manufacture of beads by these communities (Abungu 1987).

Another category of raw material used in the manufacture of beads has been excavated along the East African Coast. This is glass. A large quantity of glass beads excavated along the East African Coast have unique distinctions. They are characterised by traditional colours such as Indian red opaque, blue-green, green, yellow, black, orange and cobalt-blue (Davison 1972). Such type of beads have been called trade-wind glass beads by Sleen (1967) because they are thought to have come from Venice, Holland and Egypt through trade. They are dated to A.D 200 (Sleen 1967 and Dubin 1987).

Available archaeological evidence indicates that metal was also used in bead preparation. At Axum in Ethiopia, for example, beads made from copper and iron were found in a heavily corroded state (Morrison 1985). In Egypt, metal beads of iron, brass, bronze, copper and aluminum have similarly been recovered in various archaeological sites Sease (1987). Ethnographic studies on bead preparation among the Boran blacksmiths show that metals such as copper, iron and aluminium (from old utensils) are used for making beads (Kassam 1988). These metals are preferred in bead preparation because they are malleable and ductile. Thus, they soften when they are red hot, enabling the bead makers to fashion various shapes and sizes of beads (Sease 1987).

USES OF BEADS

A great variety of beads were used by the past communities for both ceremonial and ornamental purposes. The ceremonial function of beads is shown by their occurrence in burial places. This is particularly clear at Katoto site in Zambia, where female and child burials are associated with grave goods including conus shells (Conus prometheus) and disc beads (Harding 1961 ad Phillipson 1977). Another example where beads were used for ceremonial purposes by the past communities are the burial sites at Njoro River Cave, Gamble's cave and sites around Ngorongoro Crater. Beads found at these site were made from such raw materials as mollusc shells, semi-precious stones, bone, ostrich egg-shell and nuts. These beads were found distributed among the skeletal remains as grave items (Leakey 1931, 1945, Leakey and Leakey 1950, Sassoon 1968, Gow 1981). Another ceremonial use of beads, is shown by hunters of Papua New Guinea, who wear animal teeth and bone beads. This is done as a sign of victory over the animal killed by the hunter (Weeks 1985).

The ornamental aspect of beads is shown by their being sewn onto items like clothes, gourds, bags and skins. The Turkana, Karamojong, Maasai, Okiek, Samburu and some of the conservative Swahili Communities today, for instance, wear beads on their eye lashes, ears, noses, necks, legs and fingers for aesthetic purposes. The Swahili communities in fact, combine this aesthetic function with a religious one: being Muslims, they conceptualize beads in Islamic colours which show blue for water, red for danger and green for peace.

The functional role of beads is seen in the Swahili speaking peoples, the Mijikenda, the Maasai and the Rendille. Among the

Swahili, beads are used as either talisman or charm and for production and fertility. White and red beads are worn to protect the wearer against the evil forces (upepo) (Kassam 1988). The small red beads, with round edges (tunda) were used by the Swahili and Giriama women as girdles worn under the cloth and as amulets (Kirkman 1954). Large medium sized beads with hexagonal facets were strung with crystal and used as praying beads (sibha) by the Swahili and Arab women (Kirkman 1954).

Among the Mijikenda, beads were used in performing religious functions in the sacred place/shrine (moro). The kambi ( a group of old wise men) used white and blue beads decorated on the painted black staff with a red feather, to heal the sick. This occurred especially when exorcising evil spirits from the possessed. It is believed that the evil spirits get attracted to the white and blue beads, and in due course abandoned the sick individual (Mutoro 1990). Dark blue beads and black clothes were worn by the young initiates among the Maasai people as charms for protection against evil spirits. Blue beads were also placed at the entrance of the manyatta of the moran. This indicated the presence of God and his recognition of their social achievement. Among the Samburu people, young circumcised girls wear white beads of cowrie shells for protection against "evil eyes" of their enemies (Galichet 1988). The amuletic aspects of beads are not only restricted to East Africa but are also found in other parts of the world. For instance, in the Middle East this tradition of wearing beads as amulets is common among the desert Bedouins of Jordan, who wear a squared cylinder bead of green opaque glass called harzet marara which is thought to protect the wearer from gall-bladder disease (Mershen 1989).

Beads can also be used to indicate ethnicity of their wearers their membership in a clan, their sex and their age group. A good example are the Oromo, Rendille, the Gabbra, Boran and the Kikuyu communities. For instance, the yellow and red beads are a normal colour spectrum among the Oromo women. Yellow signifies fertility and good health (Schlee 1988). As an indicator of age and sex, females (baby girls) among the Rendille people of Northern Kenya wear a few white beads (Schlee 1988). Pink beads were cherished in the past by the Kikuyu women. They figured prominently as ear ornaments to represent the rich earth (Kassam 1988). Whereas among the Gabra, beads of various colours symbolize numbers and sex. For example, three beads stand for males and four beads for females. Thus, by enumerating the number of beads on a necklaces (ayaam) worn by the Gabbra women, one can easily determine the number of boys or girls a woman has delivered (Kassam 1988). Similarly, white porcelain beads called harzet halib (milk bead) when worn by women are thought to increase the flow of milk of breast-feeding mothers among the desert Bedouins of Jordan (Mershen 1989).

Like other nomadic peoples of East Africa, the Boran, Oromo, Maasai, Rendille, Okiek and Samburu have elaborate ways of identifying themselves with body decorations. One of them is by wearing beads. Among the Boran people, black beads (umu gurraatti) are sacred and thus worn by only the priestly (Quallum) clans or spiritual elders. This implies sanctity since black is a symbol of life. Another use of beads to show social status is seen among the Oromo people who conceive their celestial God Waaq as being black in colour. Their religious leaders adorn themselves with black and blue beads to signify infinity, purity and mystery (Kassam 1988). The Oloiboni (diviner or ritual leaders) among the Maasai wore red/white, dark blue/white beads around their necks for priestly functions (Galichet 1988). Among the Lugbara, an agricultural people of North-Western Uganda, there still exists ritual specialists in the person of hereditary rain-makers. Their traditional tasks include tasks include arbitration of warring clans, eradicating witchcraft and disciplining habit wrong doers. The power of these rain-makers is symbolised by the ownership of sacred objects such as rain stones, special traditional iron hoes and the wearing of obsidian bead necklaces when performing their duties. This reflects their social and economic position in the Lugbara society (Gabel 1967). Another function of beads can be seen among the Maasai, Samburu and the Rendille where they are used as status makers. They distinguish the married from the unmarried, the initiated from the uninitiated and the wealthy from the poor. The Maasai and Samburu communities sometimes associate beads, with God Enkai thus making them to be highly prized. For instance, black and dark blue colours are related to God, who lives in the sky which is blue in colour during the day and black at night. It is not surprising to see Samburu and Maasai powerful and wealthy elders, wear special necklaces of big blue beads called emurt narok that signify high status (Galichet 1988). Similarly old women, who no longer give birth, are respected at prayer when they are seen wearing dark blue and black beads.

Apart from white beads being used as charms to protect young children from diseases, they are also worn by circumcised boys among the Samburu for the purpose of indicating the difficult period of initiation (Galichet 1988). Similarly to differentiate between the initiated from the uninitiated among the Maasai, uncircumcised girls wear a skin belt decorated with blue beads of diamond shaped patterns (entulele) while young circumcised girls wear white glass beads and cowrie shells (Galichet 1988). Another ceremonial example where beads are extensively used is during the Okiek initiations. As the initiation ceremony approaches (excision for girls), the initiates wear three to four inch long straps beads (intoroongenik), wrapped uniformly around each wrist and forearm. The colour sequence of the beads goes up from the wrist in the scheme of green, red, white, blue and orange (Kratz 1988). Beads are also used to indicate marital status, particularly of women in societies such as the Rendille, Maasai and Samburu. Among the Rendille, for instance, a mature unmarried woman wears a headband decorated with white, yellow, red, blue and green glass beads. They also wear on their ears cylindrical white beads (somi) alternating with smaller red beads (imbaget). During and after marriage, they wear red large egg-shaped beads (bukhurcha) (Schlee 1988). Married women among the Samburu put on their ears two rings of beads strung on a wire to indicate their marital status. While among the Maasai such type of bead ornaments are worn by mothers of the moran (Galichet 1988). In the same community, women who have retained their original names after marriage wear skins decorated with blue and black beads (Galichet 1988).

In addition to being ceremonial and aesthetic objects, beads were also used as trade items. Glass beads, for instance, were articles of trade between overseas and the coastal people on the one hand and coastal people and the interior communities on the other (Leakey and Leakey 1950, Chittick 1974, Morrison 1984, Onyango-Abuje 1977, Gow 1984 and Dubin 1987. Glass beads were exchanged for leopard skins, ivory, gold, feathers and slaves (Dubin 1987, Chittick 1974 and Kirkman 1954). Cowrie shells and conus shell beads were held as having monetary value and thus used as a medium of exchange in local and long distance trade (Horton 1984, Onyango-Abuje 1977 and Chittick 1974). In the times of colonial period, African communities along the coast of Africa also used cowrie shell beads imported from the East Indies as a currency (Fitzpatrick 1963). North American Indian bead makers of Santo-Domingo and Pueblo in Mexico cut shells into small squares and bore holes through the centres by a hand-drill whirled by thongs. After stringing fragments, they wet-grind strands on stones to make them smooth and uniform. These beads are called heeshee and are sold to tourists.

The most striking archaeological discovery at Ntusi site, in Masaka District of Uganda, has been cowrie shells from the coast and glass beads from Italy, India and China. This evidence suggest that about 800 years ago, the Ntusi inhabitants were in frequent contact with the sea trade. They exchanged their iron implements (harvesting knives), salt and pottery with these glass beads

Using cowrie shell beads (and beads in general) as a form of exchange is not restricted to other parts of the world. In East Africa, the present day Turkana and Karamonjong communities still pay part of their dowry in the form beads made from different materials. A token of 1,500 beads, especially of cowrie shells and ostrich egg-shells form the basis of exchange in marriage transactions among these peoples.

SUMMARY AND CONCLUSION

This chapter has dealt at length with the definition of a bead, the raw-materials used for bead manufacture and uses of beads. In the foregoing discussion, it has been found that beads are made from both organic and inorganic materials. Beads are used for ceremonial purposes, as trade items, status markers and religious purposes, among the various communities which wear them.

# CHAPTER TWO

## INTRODUCTION:LITERATURE REVIEW AND THE PROBLEM

In this chapter, the literature review and statement of the problem are highlighted. Thus to analyse beads, one should take into consideration the amount of previous research carried out in different areas before one can identify the research problem to be studied.

## LITERATURE REVIEW

A perusal of previous studies on beads from archaeological sites on the coast of Kenya indicates that their nature and function is still poorly known. The reason for this is that the coastal region of East Africa experienced a relatively late fluorescence of archaeological research compared to the interior regions. Prior to 1950, the archaeology of the coastal region was relatively unknown.

But after 1950, a lot of research on archaeological sites on the Kenya coast as carried out. The major reason is that archaeological research during this period dealt with the recent history that was dominated by the quest to prove that civilizations among the indigenous societies of Kenya were arguably the work of foreign populations from the north, notably the non-indigenous societies (Kirkman 1954). Therefore, to explain to European and

colonialist satisfaction, the abundance of impressive stone monuments, tombs, ceramics,imported wares and mosque ruins found through much of the sites of Kenya, northern Tanzania and adjacent islands were considered the handiwork of the light skinned people; i.e. caucasoids, who were in frequent contact with the civilized mediterranean world (Kirkman 1954, Murdock 1959, Leakey and Leakey 1950 and Suttton 1974).
This problem led to a series of excavations carried out along the coastal sites of Eastern Africa to recover more archaeological evidence to support the notion that civilizations found in these regions were as a result of the coming of these caucasoids.

The earliest large-scale excavations at the Coast of Kenya were undertaken by James Kirkman in 1954. Kirkman carried out at a number of excavations at Gedi Ruins, Manda, Ungwana, Takwa, Mnarani, Kilepwa and the Portuguese Fortress at Fort Jesus in Mombasa. Archaeological evidence unearthed included Mosques, Copper Coins, a number of decorated houses, Chinese porcelain, iron-tools, Islamized glazed ware, bones, decorated tombs, glass bottles, local earthenware and large quantities of beads which were variably attributed to Arabs, Persians and the Portuguese (Kirkman 1954, 1956)

The earliest level at Gedi, Ungwana and Kilepwa are dated to 13th century. Mnarani was dated to 14th century, the pillar tombs at Malindi, Takwa and Kinuni dated to 17th century. Kirkman (1954,1956) analysed beads from Gedi in accordance with their shape, method of manufacture, colour and raw material. He concluded that beads from these sites were in the following forms: biconical, globular, barrel, square, melon and long cylinders. The raw-materials used in the manufacture of the beads were mostly natural materials such as shell, African elephant tooth, ostrich egg-shell, crystal, semi-precious stone and ceramic material. The carnelian and glass beads were thought to have been imported from Cambay in Gujarat and the Near East respectively (Kirkman 1954, 1956). The methods used in glass bead manufacture were wound and drawn shell and carnelian were either pierced or drilled for use as beads. The colour of the beads excavated at Takwa, Kilepwa Fort Jesus, Ungwana, Gedi Ruins and Manda were yellow, black, white, green and brown.

Chittick (1967, 1974) put more emphasis on the study of coastal settlements and believed that they were built by colonialists from the Persian Gulf. Archaeological evidence for Chittick's arguments comes from the excavation at the sites of Kilwa and Manda on the East African Coast. This included imported ceramic ware, metal objects, cowrie shells and beads. He argued that the sea-faring communities from Pepsin Gulf travelled to their settlements at the East African Coast to barter for their trade goods (cowrie shells and glass beads) in exchange of ivory, mangrove timbers, tamarind, tortoise shells and other resources (Chittick 1967 and 1974). Eighteen thousand beads were recovered from the excavations that were undertaken by Chittick at Kilwa in 1974.

Chittick undertook a quantitative spectrographic analysis of certain elements of the glass beads. This analysis involved identifying raw materials used in the manufacture of glass beads. Small pieces of various glass bead samples were ground until they were (0.03mm) thick. These thin sections were then mounted between glass slides. They were then examined under a spectroscope, whereby most minerals were transparent, distinguished different minerals which were observed, noted and measured. Thus, the quantitative spectrographic analysis of the glass bead samples enabled Chittick to classify these beads into five periods based on their mineral contents. The spectrographic analysis method of bead analysis such as size, shape, colour and techniques of manufacture in case of the glass beads.

Chittick (1974) concluded that glass beads from Kilwa displayed a high iron content and a low nickel content. He also observed that in period 1 and 11, ascribed to early 13th century, glass beads greatly outnumber beads made from other raw materials. According to the techniques of bead manufacture, wound beads exceeded the drawn beads in the proportion of 5:4.

Period 111 included beads ascribed to 14th and 5th centuries. The drawn glass beads were 9 times as common as wound. In Period IV, 7,500 glass beads were identified. This constituted 97.5% of the total number of beads assigned to the 17th century. Beads prepared from other raw-material like semi-precious stones, had an insignificant proportion of 2.5%.

Beads of 18th and early 19th centuries belonged to period V. This period was marked by three ring beads of cobalt blue and amber. These are believed to have been manufactured in Bavarian (Chittick 1974). In total, 1,016 beads were recovered of which 4,040 were glass beads made by the drawn method. The remaining six beads were wound. Of these, two were from shell, one from terracotta, one from limestone and two were from undetermined materials. Though a substantial quantity of beads were analysed by Chittick, beads made from other raw-material, or instance, semi-precious stones, terracotta and limestone were not subjected to spectrographic analysis. In fact his analysis were more slanted toward glass beads. Also, other relevant attributes such as colour, decorative motif and shape were similarly not addressed.

Morrison (1984) analysed a total of 1,150 beads from Manda, which was excavated by Chittick. She grouped the Manda beads into types of raw materials in their manufacture and colour. She observed that the Manda beads were made from the following: glass (563), carnelian (5), terracotta (5), stone bead (7), shell (523), coral (2) agate (4) limestone (2), aragonite (1) , fish (38) (see table 1)

| Raw Material | Number of Specimen | Approx.% |
|---|---|---|
| Glass | 563 | 48.9% |
| Shell | 523 | 45.4% |
| Fish Vertebrae | 38 | 3.3% |
| Coral | 2 | 0.17% |
| Aragonite | 1 | 0.08% |
| Limestone | 2 | 0.17% |
| Agate | 4 | 0.34% |
| Stone | 7 | 0.6% |
| Carnelian | 5 | 0.43% |
| Terracotta | 5 | 0.43% |
| Total | 1150 | 99.48% |

Table 1: Raw materials and number of bead specimens from Manda. (Source:Morrison 1984).

The major colours of the beads according to the Munsell colour chat were deep blue (5PB 3/8), green (5 GY 5/6) and ocean blue (10 B 6/7). The methods of manufacture of glass beads were drawn (74.1%), wound (23.4%) and of mould technique, which constituted a very small percentage 2.3%. On the basis of this analysis, Morrison (1984) concluded that the roughly fashioned, pierced and unpierced bead blanks testified to the process of local shell bead manufacture on the site of Manda. This was further supported by the presence of bead grinders, in whose grooves the edges of the beads are ground smooth. Morrison's studies were based on the physical examination of the beads in order to determine their source of raw materials.

The 1979 excavations at Takwa by Mutoro produced a total of 70 beads. These were classified according to their raw-material, method of manufacture, colour and percentage. According to raw-materials, fifty beads, accounting for 77% were made from glass. Ten beads, accounting for 13.1% were made from bone of fish vertebrae column. Their manufacturing process, involved the smoothing of fish vertebrae by removing their spines.

Finally, there were six shell beads which constituted 8.5%. They were made from small ocean snails. According to bead colours, the pinkish white 95 Y 6/8) accounted for 60.1%. Other colours of the beads were as follows: yellow (5 Y 8/12) 7.1% black 20%, red olive (2.5 YR 4/6) 7.1%, red 1.4%, and blue .8% (see Table 2). Mutoro's (1979) work on beads, indicates that, no detailed scientific analysis of beads particularly of glass, were done to determine their mineral content. Attributes such as shape, size and methods of bead preparation were not addressed.

In 1980, 1981 and 1986, mark Horton excavated the Shanga site. over 1,500 beads were also found. The principal method of analysis employed by Horton was by physical examination. This aimed at identifying their raw-material. He assigned the beads into the following groups of raw material: glass (779), copper (9), tooth (1), ivory (3) bone (10), shale (3), coral (2), onyx (1) haematite (1), agate (1), alabaster (7) and shell (51).

| Raw Material | Munsell Chart | colour | No. | % |
|---|---|---|---|---|
| Glass | 5 Y | Pinkish White | 27 | 38.5% |
| | 2.5 YR | Black | 14 | 20% |
| | 2.5 YR | Red Olive | 5 | 7.1% |
| | 5 YR | Yellowish | 5 | 7.1% |
| | - | Red | 1 | 1.4% |
| | - | Blue | 2 | 2.8% |
| | TOTAL: | GLASS BEADS | 54 | 77.1% |
| Fish Bone (vertebral column) | 5 YR | Pinkish White | 10 | 13.1% |
| ocean snails Shell | 5 YR | Pinkish White | 6 | 8.5% |
| | | TOTAL | 70 | 98.5% |

**Table 2: Raw material, colour and percentage of Takwa beads (Source: Mutoro 1979).**

This method of bead analysis cannot give the research adequate information on bead shapes, colour, function and raw material since neither a Munsell Colour Chart nor other scientific techniques of bead analysis were used to identify the various colours of beads and sources of raw materials.

Abungu (1987), analysed Ungwana beads on the basis of colour, shape and raw materials. Out of the 500 beads recovered and analysed, 270 were of glass, 57 were of burnt clay (terracotta), 91 of various semi-precious stones (carnelian, agate and alabaster), 20 were of shell and 11 of bone. The predominant shapes of beads were discs, cylinders and bicones. He did not attempt to utilize scientific analytic methods such as X-ray fluorescence to determine the exact raw material used in bead preparation.

Bead studies from the interior sites of Kenya, were largely concentrated on shapes and source of raw materials. Good examples are Leakey (1931) and (1945), Leakey and Leakey (1950) and Gow (1984). The Leakey studied over 4,800 bead samples from Njoro River Cave and sites in the Central Rift Valley. They classified the various types of beads b;y measuring the length and breadth of each bead. This was done to obtain the length-breadth ratio or index. In symmetrical specimens, a mean was taken when the indices were considered in conjunction with approximation, divided into six categories of shapes. There were barrels (12), spheroids (51), flattered spheroids (49), disks (37), flat disks (361), straight-sided disks (19) and sundries (6).

The following rocks were identified as raw-materials used in the making of beads. Their identification was based on such criteria as hardness, colour and specific gravity (Leakey 1931 and 1945). These included various forms of chalcedony, agate, green and white quartz, microcline feldspar, plagioclase, steatite, albeit and labradorite. These stone beads showed skilful workmanship. The fact that all these materials are known to occur naturally in Kenya also indicates that such beads could have been manufactured locally (Leakey and Leakey 1950). However, the method of analysis employed by the Leakeys in determining hardness, colour and specific gravity can only be useful if supplemented by other techniques of bead analysis, namely neutron activation, X-ray fluorescence and spectrographic analysis which the Leakeys were not available.

Gow (1984) studied a number of beads from Central Rift Valley sites. These were non-glass beads from such sites as Njoro River Cave, North Horr, Gamble's Cave II and Enkapune Ya Moto. A total of 4,000 stone beads, 11 bone beads, 17 mollusc shell beads, 261 ostrich egg-shell beads and 300 wood and nut beads were analysed. Gow's studies revealed that bead types could be patterned in geographical distribution which in turn related to the patterning of the prehistoric communities and their trade network.

No scientific techniques of analysis were, however, utilized to identify the raw-material contents of the stone beads.

Wandibba (1988) did a study on the prehistoric beads from various sites of Central Rift region of Kenya. These were Njoro River Cave and Wabukhe Hill in the Western region of Kenya. At Njoro River Cave, for instance, he analysed 810 beads. His analysis showed that out of 800 semi-precious stone beads, only 517 were of various shapes. In addition, there were 10 polished cylinder beads made from bone. He compared the Njoro River Cave bone beads with those found at other sites such as those in the Loita/Mara region and Lukenya Hill. Mollusc shell beads found at Wabukhe hill, North Horr I and Gambles Cave were just mentioned but not analysed. A similar treatment was given to ostrich egg-shell beads recovered in "plenty" at East Lake Turkana, Lukenya Hill, Gambles Cave and Njoro

River Cave. Wandibba's studies were restricted to "indigenous beads" i.e. those made from the locally available raw-material such as stone, bone and ostrich egg shell excluding glass beads (Wandibba 1988). Given such an analysis of the beads, other important aspects like techniques of manufacture, colour and nature of raw-materials and their possible sources were overlooked.

Another important bead study done was by Momanyi (1988). He analysed 400 ostrich egg-shell beads from Jarigole site, east of Lake Turkana. He grouped these beads into various shapes and method of manufacture. He observed that there were 150 polished cylinders and discs. They were made by drilling the roughouts. These drilled roughouts were then shaped by using a hammer stone or groove stone; then finally polished to remove the asymmetrical edges.

Another important research on beads was by Davison (1972). in her doctoral thesis, she provided a pioneering qualitative element analysis and physical examination of some 400 glass beads. These beads were from various sites in EAstern, Western and Southern Africa. These sites were Mapungubwe and Bambadyanalo in Southern Africa, Kilwa in Eastern Africa and Ife and Igbo Ukwu in West Africa. Her study included neutron activation analysis and X-ray fluorescence spectrometry. Her results showed that the 400 beads could be assigned two groups: beads made from soda lime glass and beads prepared from potash glass. For example, the Trade wind glass beads from Kilwa, Ife Class II, Igbo Ukwu Class II, Igbo Ukivu Class III, Igbo Ukwu Class I and Mapungubwe constituted a cohesive group of breads prepared from soda lime glasses. On the other hand, Ife Class I, Ife class III and Igbo Ukwu class IV were assigned to groups whose beads were manufactured from potash glass (see Fig 2). The archaeological significance observed by Davison (1972) study is that beads recovered from coastal sites could be distinguished from other beads by the presence of uranium and potash in largely comparative quantities. In general Davison's (1972) bead analysis was more oriented to glass beads rather than on-glass beads.

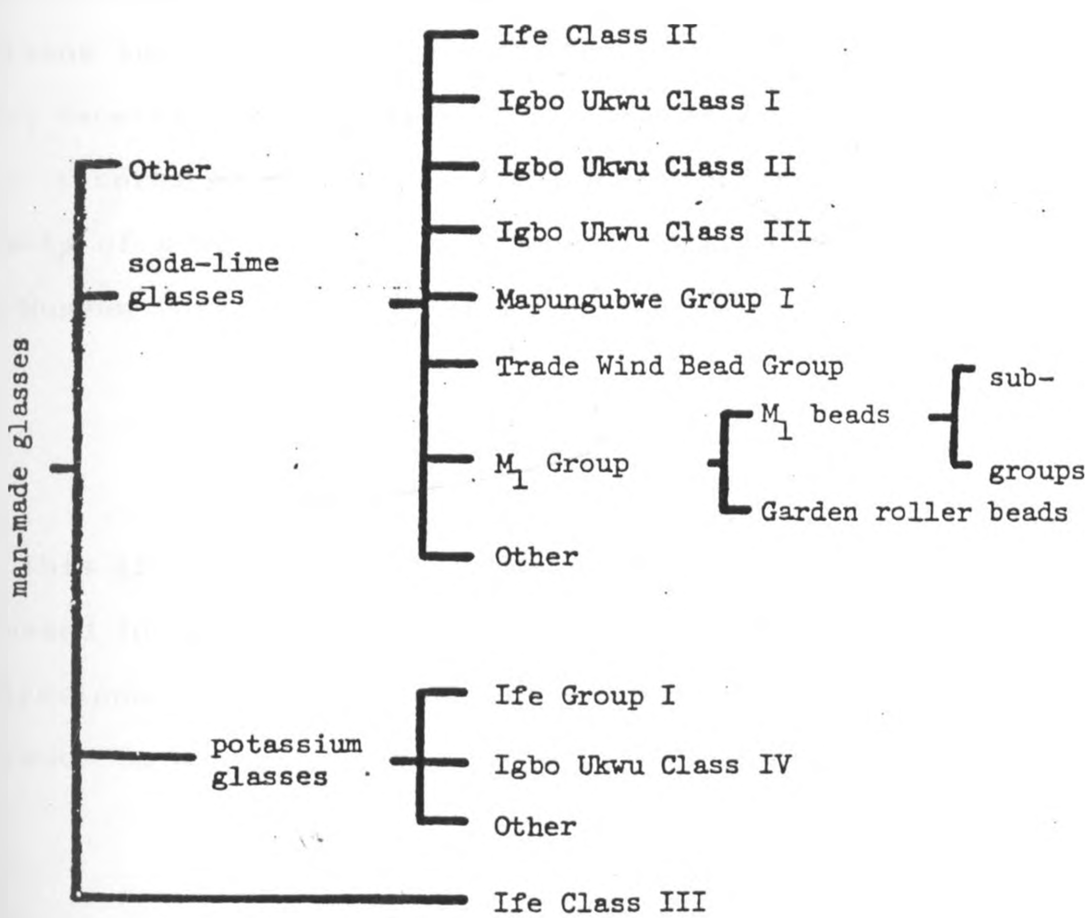


Figure 2 Chemical grouping of glasses analyzed. This diagram shows mutual exclusion and nesting of groups. It is not to any scale: degrees of homogeneity, dissimilarity, ranking, or other such features are not represented.

(Source Davison 1972: 5)

## THE PROBLEM

It can be observed from the literature review, that although considerable amount of archaeological research has been conducted in Kenya in general and the Coastal region in particular, very little is known about archaeological beads from these sites. The abundance of beads from Fort Jesus, Manda, Takwa, Gedi, Ungwana, Pate and Shanga ,makes it a very promising subject for scientific investigation. This study deals with an attribute analysis of these beads and by so doing attempts to provide some answers to questions such as the methods of beads preparation, colour,size, shape, decorative techniques. This analysis is supplemented by of X-ray fluorescence analysis which determines various mineral contents of selected bead specimens. Shanga beads stored in the Lamu Museum form the focus of this study.

## SUMMARY AND CONCLUSION

This literature review and statement of the problem have been discussed in this chapter. This has pin-pointed the weak areas of the previous studies done on archaeological beads, with particular reference to coastal sites of Kenya.

# CHAPTER THREE

## INTRODUCTION :THE STUDY AREA AND METHODOLOGY

This chapter deals at length with the study area, peoples, the nature of the data base, reasons for choosing the site as well as the methodology used in the collection and analysis of beads.

## THE STUDY AREA

Shanga site is located on a peninsula on the south western shore of the island of Pate in the Lamu Archipelago. The archipelago is located in Lamu District, Coast Province of Kenya. It stretches between Longitude 41° 40'E and Latitude 20° 08'S. The archipelago itself is a chain of islands which are separated from the mainland by a narrow channel. The channel is surrounded with a dense mangrove forest. Shanga is protected from the Indian Ocean currets by coral rears and large sand dunes (Horton 1980, 1984). It lies at the north eastern part of Kenya Coast. On the east, Lamu borders the Indian Ocean, to the southwest, it borders Tana River District. To the north, by Garissa District and Somali to the north-east. The District is divided into five divisions, Lamu, Mpeketoni, Faza, Kiunga and Witu.

## PEOPLES

The majority of the residents of Lamu archipelago are Bajuni. They inhabit most of the islands such as, manda, Pate and Faza. Other ethnic groups in the district include the Pokomo, Boni, Segeju, Sanye and Dahalo. These occupy most of the settlement areas of the mainland (Nurse and Spear 1985, Horton 1980, 1984, Brown 1988).

## CLIMATE AND VEGETATION

Rainfall is seasonal and rarely exceeds 850mm throughout the year, falling largely in April, May and in November. Rainfall is brought by the South East monsoon or Trade Winds (Horton 1980, Brown 1988, Allen 1972).

Generally, the Lamu Archipelago has varied temperature regimes, ranging from 20 to 29 degrees centigrade. The hottest months in Lamu District are May to July. The relative humidity of the District is 75%.

The Lamu Archipelago falls into three ecological zones: mangrove swamps, small forests and dry savannah which is engulfed by the sand dunes in the north (Horton 1984, 1986 Brown 1988). In the south, the region is covered by scattered acacia and numerous plantations of palm trees. The mangrove forests supply excellent building materials, firewood, handicraft and canoe/boat construction materials (Allen 1972, Salim 1973, Prins 1965, Horton 1984).

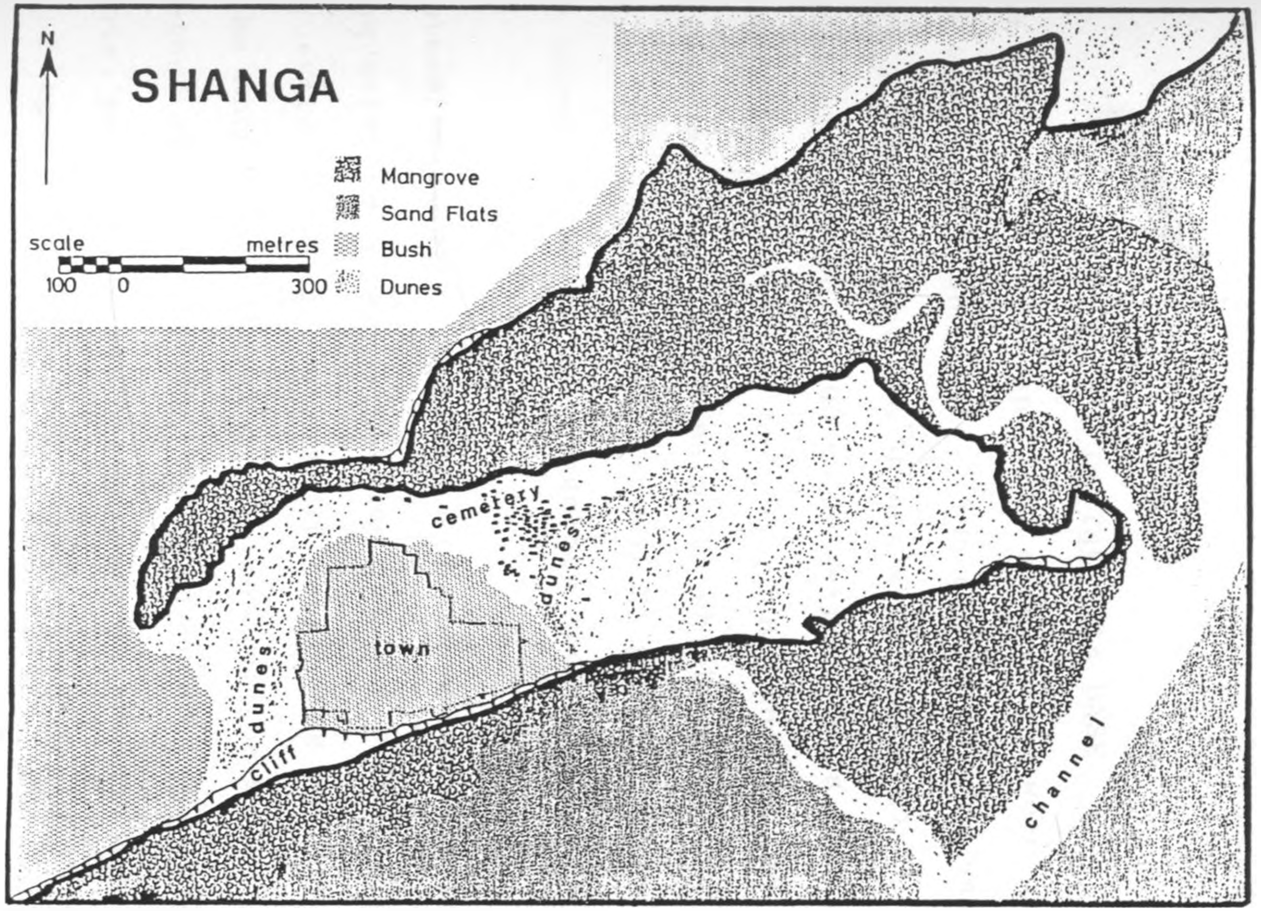


Figure 3 Shanga; location map of the archaeological remains with the towns relationship to the local environment. The mangroves have certainly grown up since the towns abandonment, and now surround the site. (Horton 1980:10)

## THE NATURE OF THE DATA BASE

The 1980, 1981, 1986 and 1987 excavations were undertaken by Dr. Mark Horton on Shanga site. The excavated area was located on the south western part of the Shanga site (see Fig. 4). It covered approximately a region of 200 x 300 metres. This area was selected for excavated because it had abundant and varied amounts of artefactual material and features which were visible on the surface. These are faunal remains, pottery shards, imported ceramic wares, beads metal fragments and ruined house walls and floors.

Intensive surface collection of the archaeological materials from the selected area was carried out. A total of 38 test pits were excavated with the purpose of retrieving maximum information about the long term cultural development of the site (Horton 1984). This method of data recovery, which included faunal remains, metal fragments, pottery shreds, ceramic wares, ancient coins, beads and ruins of mosques and houses, threw considerable light on the chronology and material culture of the site at Shanga before its abandonment in the 14th century A.D. (Horton 1984, 1986).

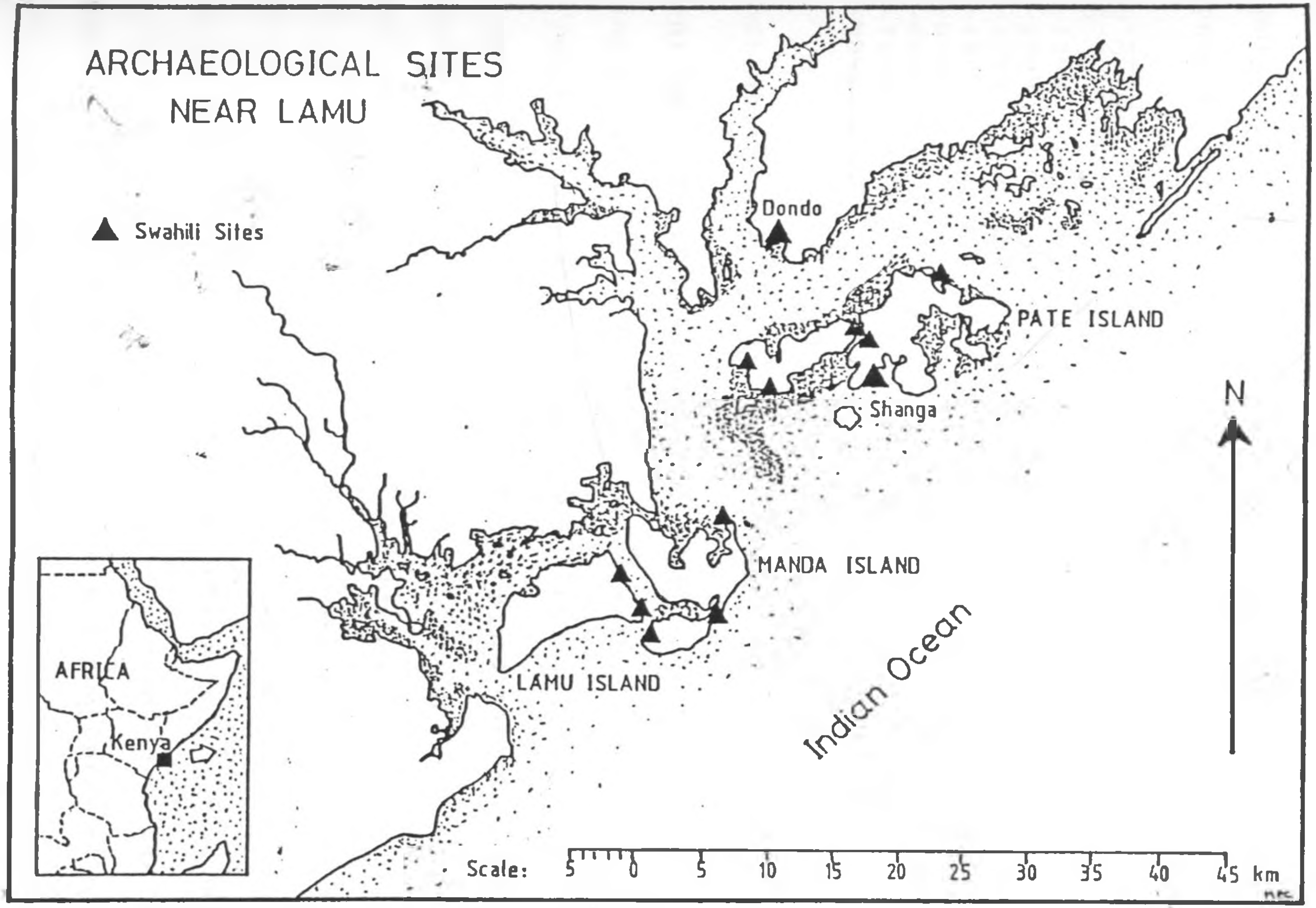


*Figure* 4 Lamu Archipelago; the distribution of known Swahili sites. Shanga is on the southern tip of Pate Island, and Dondo lies to the north on the mainland. (Horton 1980: 11)

From these excavation, a total 1,542 beads were found. Many of these beads were made from shells, glass, stone, terracotta, agate/carnelian, bone, tooth, ivory, copper, iron sea urchin spine and haematite. These bead were not only of various colours, but also of various sizes, shapes. Their numbers per stratigraphic levels are shown in Table 3 below:

| RANGE OF STRATIGRAPHIC LEVEL | NUMBER OF BEADS |
|---|---|
| 0-999 | 88 |
| 1000-1999 | 80 |
| 2000-2999 | 122 |
| 3000-3999 | 190 |
| 4000-4999 | 435 |
| 5000-5999 | - |
| 6000-6999 | 96 |
| 7000-7999 | 140 |
| 9000-9999 | 81 |
| TOTAL | 1,542 |

Table 3a Stratigraphic levels and the number of beads recovered

STRATIGRAPHY AND INTERPRETATION OF THE SITE

Phasing was done up to 4m deep. For example, Trench 6 had 1328 contexts,Trench 1 had 459 contexts and Trench 2 260 contexts. Contexts represent observations of archaeological materials as they were. Contexts are grouped in Phases of occupation an then interpreted according to linkage of adjacent deposits. Each phase represents about 25 years of occupation (about the life of a mud and thatch house) at the coast today. Phases are grouped into periods which comprise range of studied activities, for example, construction of buildings. The Shanga site occupation has been dated to 800 - 1425 AD using carbon 14 method and ceramic curves from local and imported pottery and coins (Horton 1984). The periods are summarised in the table below:

| Period | Date Range | Activities |
| --- | --- | --- |
| II | 800-950AD | Construction of mud and timber houses, also include dressed coral buildings. |
| III | 950-1075AD | Monumental constructions, for example, round structures are replaced by rectangular houses with lime floors and facings. |
| III/V | 975-1425AD | Construction of mortared houses using coral rags and lime replace timber and mud construction technique. |
| V | 1320-1350AD | Rebuilding the centre of the town. |

Table 3b : Archaeological periods with associated activities at Shanga.

Chronological Patterns of Craft Activity

a) Primary 800-1000AD :A high concentration of ornamental shells, beads, grinders and iron (illemite) metallurgy.

b) Secondary 950-1250AD: Rock crystals appear, Iron (haemetite), bone combs, spindle whorls (1000AD) and a decline in shell bead making.

c) Tertiary 1250-1425AD : Decline in all except non-ferrous metals. Few spindle whorls and little slag.

Bead craftsmen relied on imported raw materials from the interior through trade exchange. At Usambara mountains, for example, three bead grinders were found at Kwaranyesi which were identical to the earthenware types found at Shanga. This is a direct evidence of coastal trade in the form of beads. It also suggest that these beads were being re-exported overseas for exchange with raw-materials and other products. Therefore, the stratigraphy has shed light on the origins of the coastal society, establishment of island communication and development of Swahili culture at Shanga (Horton 1984).

## REASONS FOR CHOOSING SHANGA SITE

1. Lack of information on these beads. Although a lot of work has been done on beads, our knowledge particularly in terms of attributes like raw-materials, shapes, colours and sizes is still inadequate as already pointed out in the review. As such, the Shanga beads provide a strong ground for analysis.

2. Preservation conditions. Most of the archaeological finds excavated at Shanga site were in good preservation conditions. Secondly, this collection of beads were of different forms, sizes and colour. The raw-materials utilised in their manufacture also provided some of the basic attributes for analysis.

3. Availability of data: There is an abundance of both documentary and archaeological material that has been written and excavated at the coastal sites of Kenya. Thus, apart from pottery, beads are the second most common archaeological finds readily found at coastal sites.

METHODOLOGY

This section presents the methods used in data collection and analysis. It also highlights some of the problems encountered when analysing the beads. These problems were:

(a) Destruction of beads: Some of the beads were destroyed beyond recognition. The destruction of the beads affected certain attributes. The colour of some beads was very hard to ascertain because of either, heavy corrosion, hydrolysation processes or pagination. The beads which were affected by the above processes were of stone, coral bone and metal. In addition to this, a certain fraction of the bead samples was fragmentary in nature. Concerted efforts to reconstruction and conjoin these fragmented bead efforts were in certain situations fruitless.

(b) Sample: Resulting from problem (a) I ended up with a small sample size. Only 1,066 beads were finally sampled out for a physical examination and analysis. Of these only 5 beads were X-ray fluouresenced because of the high cost of this form of chemical analysis.
One bead sample cost Ksh: 500/-

LIBRARY OR ARCHIVAL RESEARCH

A great majority of the written works on coastal and interior sites touching on archaeological beads were read. This enabled me to understand the historical background to the study of beads in the following ways: first, it revealed the amount of work that has been done previously on the subject; second, it highlighted the weak areas in the existing literature and third, it enabled me to develop a problem.

MUSEUM BEAD COLLECTION:

The excavated archaeological beads from Shanga stored in the Lamu Museum totalled 1,542. Since there was a large number of beads not easily recognized in form of shape, colour and raw-material, some sampling was necessary to et a representative sample for analysis.

SAMPLING PROCEDURE:

Sampling in the process of taking one or few of a large population of things, or part of a whole, that can be looked at to see what the rest is like (Hornby 1989:199). Sampling was done to avoid conscious and unconscious bias on the beads in terms of their colour, methods of preparation shapes and raw-materials. A representative sample of 1,066 beads was chosen. This was a bead sample in which ideally all variations of attributes were present. The 1,066 beads were examined by looking at the following attributes:

(i) Colour was an asset and therefore utilized to identify and group the beads according to raw-materials. Certain bead specimens had some minerals which had a constant or uniform colour. A good example are the carnelian and copper beads. Carnelian beads were opaque red (7.5 R 4/11) while those beads made of copper were green (7 GY 5/6)

ii Feel: by subjecting the various bead specimen to tongue or cheek. This enabled the researcher to distinguish between beads manufactured from stone material and those prepared from glass material. Thus, stone beads were cold and glass beads were warm.

(iii) Sound: there was a clear cut difference between stone and glass beads when they were knocked against teeth. Glass beads produced hollow sounds while the stone beads has fine sharp sounds.

Other physical properties employed in the sampling of the Shanga beads were the level of attraction to the magnet and crystallization. A magnet was used to detect beads manufactured from metallic material. As a result, 14 beads, (13 of copper and 1 of iron) were easily attracted to the magnet, despite the heavy corrosion they had undergone. This criteria helped me to group beads into two classes; namely, beads which had mineral contents of magnetic metals and other beads which lacked magnetic properties (glass, bone, ivory, teeth, stone, coral and terracotta.

Some raw-material specimens and bead samples analysed tended to crystallize into definite, characteristically shaped crystals.

Most of these beads were stone beads, especially beads manufacture from quartz and carnelian materials. Therefore, such beads were easily sampled into specific raw-material group; i.e., stone: carnelian or quartz, since crystal faces appeared only on the surface (outside) of the beads.

Another method used n sampling of the beads, particularly those of glass was the degree of lustre. Lustre refers to the manner in which ordinary sunlight is reflected from the surface of a given object. The glass beads and raw-material were subjected to sunlight, and thus, they emitted vitreous lustre which was lacking in other beads made from various materials. Therefore, the lustre technique was a strong aid in the identification of beads made from glass and separated from the bead data collected.

Attempts were also made to extract as much information as possible reading the Shanga beads. For instance, a detailed level of "wholeness' census of the beads was taken. From this criteria of wholeness of the bead, a lot of information was generated in terms of untampered beads, broken fragment of beads and non-identifiable specimens. For the wholeness of the beads (untampered were easily identified and grouped as whole beads (860 in total). However, 250 beads exhibited various degree of destruction (fragmentation), weathering and pagination. This greatly affected their colour, shape, decoration, size and raw-materials. To assemble the fragmented bits of beads into meaningful shapes, the conjoining technique was employed. Thus, pieces of broken beads from the same bead were joined together so as to figure out the real bead. The conjoining technique produced 106 beads which were sampled into different shapes, sizes colours, decoration and raw-materials. Thus, also bead pieces bearing the same design, decoration and raw-material were conjoined to be exceedingly like to whole beads of the same design and raw-materials.

## ANALYTICAL PROCEDURES

The sample constituted 1,066 beads were examined, analysed and interpreted according to the theoretical frameworks set out by Beck (1928), Chittick (1967), Sleen (1967) and Guido (1978). These frameworks included a detailed visual screening (physical examination) of the 1,066 beads and their topological classification according to methods of manufacture, their shapes, sizes, dimensions, decorative motifs and raw-materials. To achieve the precise interval of measurements and sizes of the 1,066 beads, a pair of callipers were used.

Though the 1,066 beads were visually examined, a magnifying glass was occasionally employed in differentiating closely related bead colours, shapes, decorations and raw-materials. A Munsell-Nickerson colour chart was also utilized in indicating various colours of beads.

To determine the source of raw-materials of some of the beads, I employed the services of a geologies who greatly aided me in physically examining and identifying bead-materials, and in drawing comparisons between the Shanga beads with those from Kilwa, Gedi, Manda and Fort Jesus, while others are at the British Institute in

Eastern Africa laboratory.

X-RAY FLUORESCENCE ANALYSIS

This is the only method they which the five bead samples were analysed, to represent virtually other bead specimens. These were glass, alabaster, terracotta, carnelian and quartz. The bead samples were subjected to X-ray fluorescence analysis at the Centre of Nuclear Science, University of Nairobi.

In this technique, X-rays of variable known energy are directed at each sample. These X-rays stimulated the X-ray emission from the various elements contained in the sample. Then the emitted X-rays are detected and used to identify the elements present and calculate the amount of each (Bowman et al. 1970 and Davison 1972). However, the attained results are based on the use of standards of known composition.

This method of analysis was preferred to neutron activation and petrographic analysis because it is non-destructive. Apart from the damage caused to the artefact (bead in this particular case), both the neutron activation and petrographic analysis have the disadvantage of being very time-consuming and expensive due to the complications occurring on the bead samples when being analysed in the laboratory (Cox and Pollard 1977). Whereas the X-ray fluorescence method is accurate because it largely depends on the use of standards. One such important standard is known as 'standard' pottery' which was developed and calibrated to encompass the elements normally occurring in pottery at appropriate concentration (Perlman and Asaro 1969). This standard is appropriate for man-made glass and other bead materials (semi-precious stones and terracotta) since they contain many of the ingredients (elements) found in potter (Hall et al. 1975). Again, the X-ray fluorescence analysis and its results are easily interpreted. The detected elements are represented in peak form graph. Thus, the magnitude of the peak indicates the abundance of the elements in each specimen (Davison 1972 and Hall et al. 1964).

OPERATIONAL DEFINITION: BEAD TERMINOLOGY

A classification of Shanga beads included:

STEP ONE:

(a) Sizes (dimensions) of beads: this involved measuring the ration of the bead in relation to its diameter:

(i) Standard bead refers to beads whose length is equal to the diameter

(ii) Long bead refers to beads whose length is greater than its diameter.

(iii) Short bead means that the length is less than the diameter.

(iv) Disc bead refers to beads whose length is than one third (1/3) of the diameter.

(b) Interval measurements of beads in relation to the length of the diameter:

(i) Minute bead refers to the bead whose diameter is less than 2.5 mm:

(ii) Small beads are beads with the diameter of 2.5mm to 4.5mm:

(iii) Medium beads have a diameter of 4.5 to 8.0mm and

(iv) Large beads have a diameter greater than 8.0mm.

The methods used in the measurements of beads are shown o the next page.

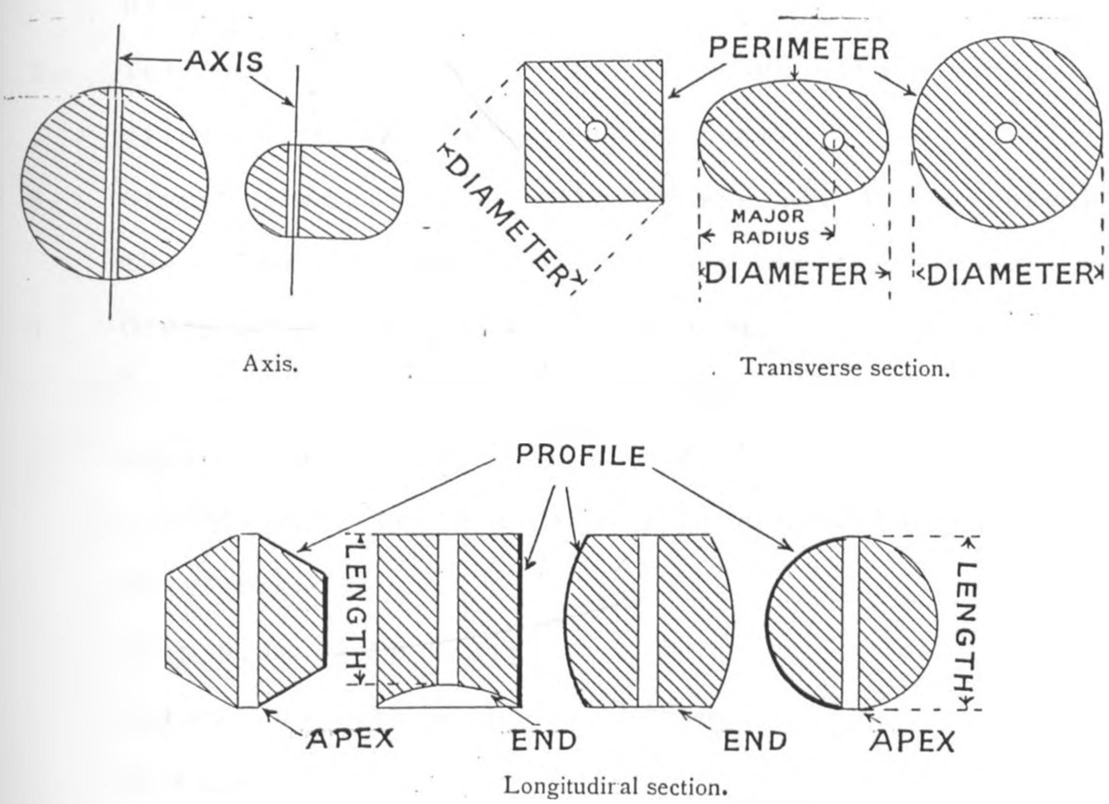


Fig. 5 Measurements of different shapes of beads. (Source: Sleen 1967:10)

STEP TWO: Colour of Beads:

Various colours of beads were indicated by their equivalent on the Munsell Nickerson colour scale:

1. Red Translucent (5 R 4/12). These are beads with a high silver patina.
2. Yellow (5 Y 8/12). These are beads with a wide variety of opaque shades occurring on them.
3. Grass Green (7.5 G 5/8). These are beads resembling the colour of green grass. They are translucent.
4. Ocean Blue (10 B 6/7). These are beads with a strong blue. They are either opaque or translucent.
5. Light Blue (2.5 PB 7/7). Are beads with opaque or translucent, their colour approaching bluest shade of blue/green.
6. Deep Blue (5 PB 3/8);
7. Colourless with milky weathering
8. Black
9. White
10. Green (5 GY 5/6)
11. Dark Green (5 G 5/8);
12. Dar, Grey (2.5_PB 5/7)
13. Pink Red (10 RP 7/8)

STEP THREE: Raw Materials

The Shanga beads were grouped in accordance with raw-materials as listed below:

1. Glass - is of great importance as the main article of raw-material and commerce with the interior apart perhaps from cloth (Horton (1984).
2. Terracotta - Burnt - baked clay.
3. Bone vertebrae - from both terrestrial and marine animals i.e. pieces of bird bones, marine bivalves, hollow spines of echinoids and sea urchin spine.
4. Tooth - carved from hippo teeth
5. Ivory - beads prepared from the elephant tusks
6. Metal - include both copper and iron
7. Semi-precious stones - these are Carnelian, Crystal, Malachite, Agate, Jasper, Quartz, Shale and Coral (all these are beach finds).

STEP FOUR: Shapes

Sets of nomenclature on shapes of beads analysed were:

(a) Cylinder: Beads show approximate to cylinder but depends on size i.e diameter. For instance, bead with length twice the diameter is a "tubular" (Fig.6).

(b) Barrel: Bead whose ends have been intentionally flattened (Fig. 7).

(c) Bicone: Bead of symmetrical shape in the form of two Cones with common base (fig.8)

(d) Spheroid: Bead with ends appearing flat in profile if the perforation is wide (Fig. 9).

(e) Disc: Bead with length less than a third of the diameter (Fig. 10).

(f) Ring: Shape of bead whereby the perforation is greater than half of the overall diameter (Fig.11).

(g) Oblate: This is a wounded bead whose length is lesser than 2/3 of its diameter (Fig. 12)

(h) Ellipsoid: Beads whose perimeter is ellipsoidal (Fig. 13.)

(i) Piriforms: Beads whose lower parts are greater than their upper parts.

(j) Longitudinally segmented: Beads that have segments which have been pierced (Fig. 15)

Fig.6 Cylinder

Fig.7 Barrel

Fig. 8 Bicone

Fig. 9 Spheroid

Fig.10 Disc

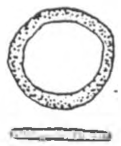

Fig.11 Ring

Fig.12 Oblate

Fig.13 Ellipsoid

Fig.14 Piriform

Fig. 15 Longitudinally segmented

STEP FIVE: Definitions of Methods of Manufacture:

The methods of manufacture most commonly encountered among the Shanga glass beads were wound, drawn, fold, facet cut and mould. These terms are defined below:

(i) Wound: A technique of preparing beads that involves the molten raw-material for the bead being wound around a rod. When cool, the thread of raw-material is butted or marvered together to form the bead (Chittick 1967, 1974).

(ii) Drawn: Long tubes of the bead raw-material are broken or snapped into short lengths. The beads formed have their sharp and rough edges rounded off. Drawn beads are also referred to as cane beads (Davison 1972).

(iii) Fold: A matrix of warm glass surrounded by thread of colours glass is pressed into a mould, with the resulting effect that the threads seem folded into the matrix itself (Chittick 1974).

(iv) Facet Cut: A ball of half melted glass is pressed by the bead maker into a form with rectangular, triangular or other shaped sections, perforated by a wire (or other object) and then tooled to give it the desired shaped (Guido 1978). This facet cut technique was also used in the manufacture of stone beads, especially those made from carnelian and crystal-quartz materials.

(v) Mould: Molten glass is poured into moulds of desired shape, and then pierced by metallic wire. This is more rapid technique and the removal of the bead is thus facilitated.

STEP SIX Decoration Motif

Decorated beads exhibit designs which have been applied by hand to the individual beads. The principle types of decorative motif applied when examining the Shanga beads are defined as follows:

(a) Wave: A wavy band of different colour applied to the circumference of the bead (Guido 1978).

(b) Bands: Straight trails applied around the circumference of the bad (Guido 1978).

(c) Chevrons: Design running at right angles to the perforation of the bead (Guido 1978).

(d) Stratified 'eye': Generally surrounded by a ring/or rings different in colour from the body colour of the Bead (Guido 1978).

(e) Mottles: Beads that are marked with patches of different colours without a regular pattern.

(f) Whirls: Beads whose decoration has two or more glasses of different colours that are melted and stirred together and moulded into beads. These gives the effect of lines of difference colours bending in an irregular manner.

(g) Scrabble: This decoration on a bead is formed by either winding or folding a thread of glass of different colours in an irregular manner over a bead matrix.

(h) Pricked Pattern: Beads whose perimeter has pricked holes. This type of decoration is common in terracotta beads.

(i) Etched: This method of decoration involves the scratching of the surface of beads with a hot metal point. Usually it has evidence of burnt marks, especially if on bone beads.

SUMMARY AND CONCLUSION

In this chapter, the study area and the data base have been discussed. It has highlighted how the type of archaeological finds influence the methodology of data collection and analysis. For instance, bead studies require a close examination of attributes such as shapes, colour, size and decorative motif determine their uses. The bead sample was subjected to scientific analysis in this case X-ray fluorescence analysis will detect the elemental concentration which will enable the research to identify the raw-materials used in the manufacture of the beads.

# CHAPTER FOUR

## INTRODUCTION: BEAD ATTRIBUTES OF SHANGA

This chapter deals with the different kinds of raw materials that were used in the manufacture of beads from Shanga. It also looks at the different methods which were used in manufacturing beads as well as the different shapes, sizes, decorative motifs and colours of beads that were made.

### Raw Materials:

An enormous variety of materials that were locally available were explored by the raw-materials detected and identified in the manufacture of beads. These are inorganic and organic materials.

### Inorganic Materials

These are:

(a) Glass A total of 765 glass beads of various shapes and colours were identified among the Shanga bead collection. This accounted for 72 per cent of the total bead samples from Shanga.

It should be noted that techniques of manufacturing beads varied with the raw-material used. For instance, five techniques of manufacturing glass beads were identified. These are wound, mould, fold, facet cut and drawn.

i) Wound technique: According to this technique a hollow ball of warm glass is drawn out in a cylindrical form. Then, beads are cut off at the desired length.

The beads are reheated to smooth off the rough ends. This gives them their irregular shape. This accounted for 18 per cent of the total bead collection studied.

ii) Mould technique: In this technique molten glass is poured into moulds of the desired shape, then pierced by a metallic wire. Since the contraction o metallic wire is more rapid than that of glass, the removal of the bead is facilitated. Glass beads made by this mould techniques constituted 20 per cent of the bead sample analysed.

iii) Fold technique: This implies that matrix of warm glass is surrounded by threads of coloured glass; then pressed into a mould. The resulting effect is that the threads seem fouled into the matrix itself, although it is in fact only superficial. Among the Shanga beads analysed the fold technique of bead manufacture accounted for 15 per cent.

v) Facet-cut technique: According to this method beads were produced by a ball of half melted glass pressed by the bead maker into a form with rectangular, triangular or other shaped section. It is then perforated by a wire or other Shanga sharp object, then tooled to give it the desired facets. Glass beads made from this methods were 5 per cent.

b) Terracotta: There were twenty two beads of terracotta material. Five beads were cylinders (with minimum length of 12mm and maximum length of 22mm). Of this, one is a hexagonally faceted cylinder (whose length is 20mm) from trench 8, level 7179.

Other terracotta beads are compassed of spheroids 92), bicones (13) and conical (2). However, most of the terracotta beads are bicones, usually large and sometimes truncated, (with an average diameter of 13 - 20mm). The smallest observed has 5mm and the largest was 22mm in diameter.

Though the terracotta beads resembled the spindle whorls, they were differentiated from the spindle whorls by the following characteristics:

(a) Archaeological evidence shows that spindle whorls wear out at the extreme ends, while terracotta beads analysed and identified did not have any wearing out at both their surfaces.

(b) A good number of terracotta beads were found to be irregularly shaped to have been utilised satisfactorily as spindle whorls for spinning purposes.

It is very possible that highly refined brick red clay was used to make the various terracotta beads. First, the clay was baked, pounded and then divided into pierced small lumps of the desired shapes; sizes and design forms. They were then heated in a man made oven to achieve hardness and the required colour. When ready they were strung.

c) Metal: Fourteen metal beads were found. Of these, one was iron and thirteen copper.

i) Iron: The iron bead, though rather heavily weathered and corroded, was nevertheless recognisable as a ring bead. This iron ring bead had a perforation which is greater than half the diameter.

ii) Copper: The total number of copper beads recovered was remarkably small. No analysis of tin or bronze was carried out. In all, thirteen beads, some very heavily corroded but recognisable as bicones (3), irregular spheroids (2), cylinders (4) disc (1) and longitudinally segmented (3). Most of the copper beads came from Trench 9, level 9480 of the Shanga site. The longitudinally segmented copper beads were made by introducing into a cylinder of a molten copper wire or sharp object (while warm) and then pinching it at intervals.

d) Stone: Most of the 131 stone beads are crystal-quartz, though carnelian, agate, jasper, onyx, white-moon stone, alabaster, coral, shale and white soapstone are also represented.

i) Carnelian: Some 34 beads were analysed. They included uniform sets of hexagonally faceted cylinders and bicones.

ii) Crystal-Quartz: The 53 bead specimen analysed were rather roughly shaped and fashioned. The most popular shapes were spheroids, hexagonally faceted cylinder, hexagonally faceted bicones and plain bicones, their size proportion varied from medium to large (d. 5mm - 12mm).

iii) Alabaster: Most of the 18 beads manufacture from alabaster were finely fashioned in the form of irregular spheroids, drawn and rectangular beads.

iv) Agate: 6 agate beads were analysed. The majority of them were ellipsoids.

v) Jasper: Six examples came from Shanga site. Most jasper bead specimens examined were of disc shape.

vi) Shale: Three examples were found. All these beads were discs.

vii) White Soapstone: Three examples were recorded and analysed. They included an opaque white unpierced cylinder shape waste and uniform sets of plain barrels with an average length of 8mm.

viii) Coral: Four specimens were recovered and analysed. The form examples included one cylinder length 8mm, and three discs, though having asymmetrical shape.

ix) Onyx: The sole bead in this material was a roughly shaped plain barrel (d 5mm) from level 3588, Trench 6. It has various colours of black white and light blue in it.

x) White moonstone: Two examples were recorded. They were discs.

ORGANIC RAW- MATERIALS:

The following organic raw-materials were identified as having been used in the manufacture of beads at Shanga.

a) **Bone** : A total of 24 beads made from bone material were identified. The bone beads are represented by 14 polished discs, ranging from medium to large (with diameter of 6 to 12mm). The bone cylinder beads have a length range of 6mm to 16mm.

Faunal analysis of the bone beads indicated that both the disc and cylinders were made from the polished sections. Most probably section of the long shaft of small bovid either goat, sheep or gazelle by utilizing the natural hollow for perforation. Other cylinder beads appear to have been manufactured from pieces of bird tibia, sine their ends have been polished smooth.

b) **Mollusc Shell**: There were 91 beads made form mollusc shells which came form various levels of Shanga site. Few are irregularly shaped and the perforations have been drilled slightly to one side latter then centrally.

At trench 6, level 3558, a number of mollusc beads were found together with mollusc shell raw-material and unfinished shell bead fragments. This area, thus appears to have been used for bead manufacture. The extremely symmetrical shell discs (66) measure an average of 4mm in diameter. These shell disc beads are slightly concave rather that flat. The thickness of the shell beads indicates that only larger mollusc were preferred in bead production.

Apart from the disc beads, 25 cylinders occurred at Shanga site. The smallest has a length of 6mm while the largest was 14mm in length. A few partially finished mollusc shell beads suggest that the manufacturing processes were similar for both bead types. This will be discussed in the section on the technique of bead preparation. The mollusc shell beads were made by cutting the shell structure into rough blocks. These rough blocks were then worn down into cylindrical beads and then pierced to form into various shapes. For instance, disc beads were prepared by cutting the cylindrical beads, then by using the stone and pottery for filing off the thick edges.

c) Ivory: A total of four ivory beads were recovered. These include cylinders (2) and rectangular (2), from trenches 3 and 9 respectively and a levels 325, 4064 and 4371. It was cut into long this blocks of the desired shapes, pierced by a metallic wire or burning sticks. The protruding degas were them smoothed by pottery (spindle whorls).

d) **Tooth:** Four tooth beads were recovered, all of them were cylinders with concave perimeters. They were longitudinally pierced and had an average length of 14mm. They were white/creamish in colour.

These were beads made from a hippo tooth. The tooth was cut into the desired shaped blocks. Theses shaped blocks were further designed into the required shapes i.e. cylinders, then longitudinally pierced by using a hat metallic wire. This was indicated by the burnt perforation observed on the beads.

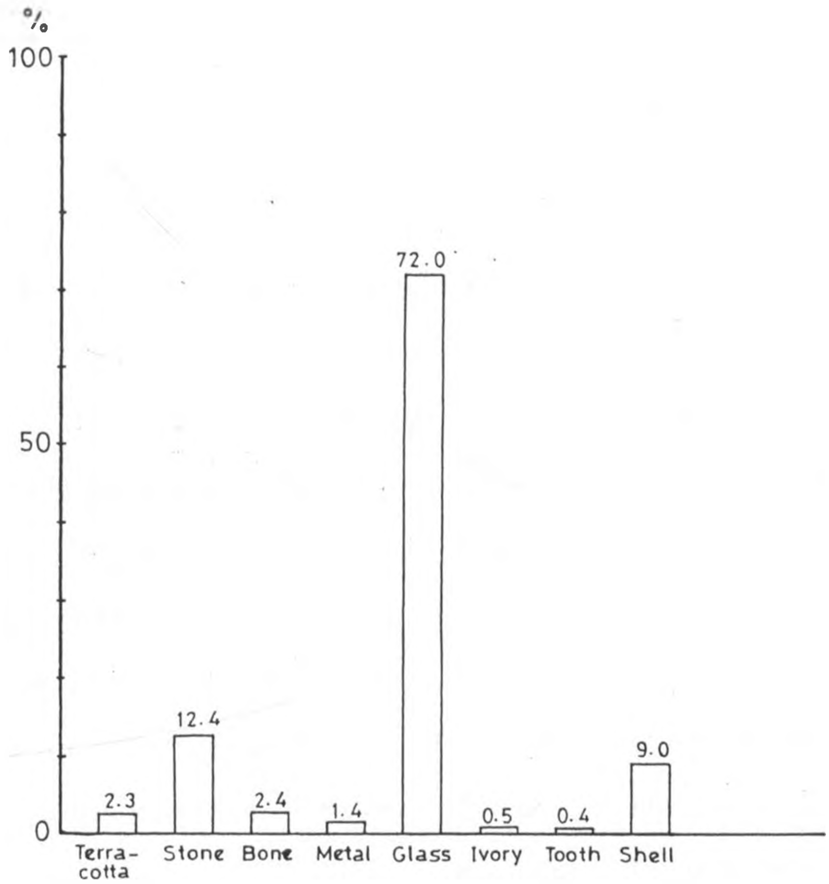


Fig. 16 Raw materials used in beads manufacture

SHAPES, SIZES AND COLOUR:

The classification of beads by Beck (1928) and the sizes and shapes by Chittick (1967, 1974) have been employed to describe the beads from Shanga site. It should be noted that the shapes, sizes and colour of beads varied with specific raw-materials, aesthetic and ceremonial purposes.

SHAPES

The following types of shapes were identified among the Shanga beads.

BARRELS: These are beads with fat ends that meet the curved profile at an angle. Barrel beads accounted for 5.6% of the total bead sample analysed. The following types of barrel beads were identified among the Shanga bead collection.

(a) **Plain Barrels:** These beads have rounded sides and flat extremities. Plain barrels constitute 3% of the bead collection studied. most of the beads have perforations which are both conical and wide, with an average diameter of 3mm. They are wound, ranging from small, medium to large (D2,6 and 9mm). The majority of the plain barrels are however, medium size. The plain barrels were found in the following frequencies and colours: 15 beads of yellow (5Y 8/12), 10 beads of dark green (5 G5/8), 6 colourless beads and 4 white beads.

(b) **Faceted Barrels:** These beads really resemble plain barrels, but have a characteristic of being faceted hexagonally, Faceted barrels represented 2.6% of the 1066 beads analysed. They are wound, ranging in diameter from 3-6mm, with large conical perforation. Their frequencies and colours are 15 beads of yellow (5 Y 8/12) and 10 beads of dark green (5 G 5/8).

CYLINDERS: These are beads whose shape is cylindrical. Their length is twice or more than their diameter. Cylinder beads accounted 9.3% of the bead collection. They were represented by 99 beads. The following types of cylinder beads were identified:

(i) **Plain Cylinders:** These moulded beads were by far the most numerous of the cylinders. There were 50 plain cylinder beads which accounted for 5% of the beads examined at Shanga. They varied in size from small to large (diameter 3 -10mm) and they occurred in a variety of colours. These were 10 light blue (2.5 PB 7/7) beads, 9 yellow (5 Y 8/12) beads, 5 white/creamish beads, 5 black beads, 6 dark green (5 G 5/8) beads and 15 medium light blue (10 B 6/7).

(ii) **Hexagonally Faceted Cylinders:** These are cylinder beads whose profile has been faceted into an hexagonal shape. Thus such type of beads are characterised by having six faceted sides. These beads were 20 in number, accounting for 2% of the total Shanga beads analysed. Most of the hexagonally faceted cylinders were large (length 17 -22mm). Their frequencies and colours were 12 translucent red (7.55 R 4/11) beads and 8 clear beads. two samples of beads analysed from this type were longitudinally pierced.

(iii) **Cylinder with pinched ends:** These are beads which are cylindrical in shape but their ends have "bused" into a corner or box form. A total of 10 beads of this type were analysed. This was 1% of the total bead data. Their number and colours were 4 yellow (5 Y 8/12) beads, 4 ocean blue (10 B6/7) beads and 2 white beads.

(iv) **Cylinder Truncated with one concave end:** This type of bead is characterised by being cut short in a concave manner at one of the ends. There was only one example of this type of bead from level 4252 which represented 0.2% of the bead data analysed. It was black in colour, and was longitudinally pierced.

(v) Square cylinders Such type of beads have a squared perimeter. They resemble a square shaped object.

LONGITUDINALLY SEGMENTED BEADS

These are beads that contain two or more beads that merge almost imperceptibly. Longitudinally segmented beads constituted 3% of the bead collection. Thus they were 3 beads in total, 2 of copper and 1 of glass. These types of beads were made by introducing into a cylinder of molten copper of glass a wire or sharp object (while warm) and then pinching it at intervals. The longitudinally segmented beads were represented in the following colours: 1 of yellow (5 Y 8/12) and black bead segments (1%) and 1 green (2.5 G 4/8) bead off our segments, which was 0.2% of the total beads analysed. The black and yellow beads were glass while the stainy green beads were of copper. They had (D. 4 -8mm) two, three and four segments respectively.

DRAWN BEADS

Drawn bread were characterised by their irregular appearance due to their technique of manufacture. Drawn beads were 191 in total which was 18% of the total bead sample analysed. The minute so small sizes (D> 2 - 4) far outnumber the medium (5-7mm) in the ratio 3:1. However, large specimens of drawn beads were rare, they were only 4 in number. Many colours were represented as follows: yellow beads (5 Y8/12¦) (5%0 dark green beads (5 G 5/8) (4%) green grass beads (7.5 G 5/8) (3%), bright yellow beads (5 Y 8/12) (3%) white beads (1%) colourless beads 1% and black beads 1%.

PIRIFORM

Piriform are beads that have the following distinct features: their lower parts are greater than their upper parts. Piriform accounted for 0.8% of the total bead data analysed. Most of the piriform from Shanga site are moulded and nearly of a spherical form. The perforations of the piriform were large. The piriform fall into the following colours and percentages: red translucent (5 R 4/12) 0.6% and black with decorated concentric lines in grey and yellow 0.2%

ELLIPSOIDS

Ellipsoid beads are characterised by the following features: The beads are rounded and the length is more than 4/5 of the diameter. The ellipsoids constituted 8.3% of the bead collection analysed. The following types of ellipsoids were identified:

(i) **Wound ellipsoids:** The ellipsoids of Shanga site beads form a homogenous group. Most examples are of medium size (D. 5 - 8mm). They are found in the following colours:

yellow beads (5 y 8/12) (2%), dark green beads (5 G 5/8) (1%), red translucent beads (5 R 4/12) (0.4%), green grass beads (7.5 G 5.8) 0.3% and black beads 0.2%

(ii) **Mould Ellipsoid:** Most of the moulded ellipsoids are of large size (D. 10mm) with the predominant colours being yellow (5 Y 8/12) 1.3% green grass (7.5 G 5/8) 0.6%, black 0.8%, green (2.5 G 4.8) 0.4% and opaque red (7.5 R 4/11) 0.3%

RING BEAD

Only one ring bead made iron was found and analysed. It represented 0.1% of the total bead sample studied. It was a wound bead, whose perforation is greater than half the diameter. The ring bead is heavily corroded, having a rusty colour.

OBLATES

The oblates are rounded beads, characterised mainly by their lengths being less that 2/3 of their diameters. There was a total of 22 oblates, with 8 drawn from glass, 11 of terracotta, 2 bone and 1 of quartz which accounted for 2.8% of the beads analysed. The dominant colours of the ablates were dark brown 0.8% and yellow (5 Y 8/12) white beads (0.6%) and milky weathering coloured beads (0.4%) were the least.

SPHEROIDS

Spheroids are beads with sub-spherical form, thus the diameter being greater then the length. The sides of the spheroids are convex and lack flat surfaces at their ends. In total, there were, 99 spheroid beads which represented 11% of beads analysed the are divided into the following groups:

Glass:

(a) Wound Spheroids: are chiefly of glass and their total number is 73 beads. The dominant colours are yellow (7.5 YR 8/8) (4%)

medium light blue (2.5 B 6.6) (1%) and black (0.5%). According to size, the wound spheroids fall into medium (d. 5 - 8mm) and large (d. 10 - 12mm).

(b) <u>Mould Spheroids</u> There are 21 beads of this shape and technique. Most of the moulded spheroids have very wide perforations. The strong yellow bead (7.5 Y 8/12) (3%) colour is numerous, as well as light blue (2.5 B 6/6) (1.5%) black (0.6%) and colourless beads (0.4%). These sizes range of most of the moulded spheroids have a pronounced curve but are distinguished by the visibility of irregular facets at one or both ends.

Other beads of spheroid shape are made of carnelian (3), terracotta (2) copper (2) agate (1) alabaster (1) and crystal (6).

<u>DECORATIVE TECHNIQUES AND MOTIF:</u>

The decorated beads exhibit designs that have been applied by hand to the individual beads specimens. Beads were decorated for artistic purposes. Decorated beads were highly prized. Twenty seven decorated specimens were analysed. The main decorative techniques and motif are shown in Table 4.

Table 4: Decorative Techniques and Motif found on the Shanga beads:

| Technique | Decorative Motif | R. Material | Shape | No. | % |
|---|---|---|---|---|---|
| Incised lines | Vertical Incisions on one cone | Terracotta | Bicone | 1 | 3.7%- |
| | Green Horizontal bands on white | Glass | Barrel | 1 | 3.7% |
| | White on Swirls | Glass | Piriforms | 1 | 3.7% |
| Incised lines with punctuations | Vertical lines with punctuations | Terracotta | Cone | 1 | 3.7% |
| | Scrabble: Two black bands at each end. | Glass | Cylinder | 1 | 3.7% |
| | Green with white horizontal band | Glass | Bicone | 1 | 3.7% |
| | Concentric Rings | Glass | Disc | 1 | 3.7% |
| | Mottled: Black and white spots | Glass | Spheroid | 1 | 3.7% |
| | Black with White/ Grey horizontal bands | Glass | Spheroid | 1 | 3.7% |
| | Brown: Impressed Criss-cross and network lines | Glass | Barrel 'melon' | 1 | 3.7%- |
| | Stratified 'eye'- shiny with bluish grey spots. | Glass | Spheroid | 1 | 3.7% |
| Incised lines | Black with grey and yellow horizontal lines | Glass | Piriforms | 1 | 3.7% |
| | Vertical lines | Glass | Barrel | 1 | 3.7% |
| | Wave white band on Green | Glass | Bicone | 1 | 3.7% |
| Incised lines | Vertical incised lines with convex profile having black horizontal band at each end | Glass | Bicone | 1 | 3.7% |
| | Chevron-vertical | Terracotta | Bicone | 1 | 3.7% |
| Impression | Gadrooned-ribbed sides | Glass | Bicone | 1 | 3.7% |
| | White band on black | Glass | Bicone | 1 | 3.7% |
| | Green with white whirls | Glass | Disc | 1 | 3.7% |
| | Brown with white band | Glass | Bicone | 1 | 3.7% |

| | | | | |
|---|---|---|---|---|
| Dark blue with white band | Glass | Oblate | 1 | 3.7% |

The main decorations on the 27 Shanga beads were:

(i) Incised lines

(ii) Incised lines with punctuation

(iii) Bands

(iv) Impression

(v) Concentric

(vi) Mottle

(vii) Stratified and

(viii) Swirls

(ix) Prick pattern

(x) Etched

The results show that the most popular decorative techniques applied to the bead collections were impressions and bands. The impression technique involved impressing the beads when warm into rib shaped patterns,then gadrooned. This technique accounts for 22.2% of the total number of decorated beads.

Another decorative technique that was common among the Shanga beads is that of coloured bands, mostly in a horizontal pattern on the circumference of the beads. This type of decorative motif accounted for 26%. A few examples of such beads are: Green horizontal band on white, white band on black,white band on brown and white band on green. This technique was applied to glass beads.

The technique of incised lines amounted to 11.1%, mostly vertical lines, some beads with punctuations. This technique was popular on the terracotta beads.

Other decorative motifs on beads which are rare on the beads from costal sites of East Africa but found in the bead collection of Shanga are swirls, stratified, mottled, wave and concentric rings which account for about (22.2%).

COLOUR

The main colours observed on the Shanga beads were as follows:

| COLOUR | NUMBER | PERCENTAGE |
|---|---|---|
| Yellow (5 YR 5/6) | 320 | 30 |
| Green (2.5 G 4/8) | 160 | 15 |
| White | 117 | 11 |
| Light Blue (2.5 PB 7/7) | 75 | 7 |
| Ocean Blue (10 B 6/7) | 43 | 4 |
| Green Grass (7.5 G 5/8) | 53 | 5 |
| Translucent Red (5 R 4/12) | 32 | 3 |
| Opaque Red (7.5 R 4/11) | 19 | 1.8 |
| Deep Blue (5 PB 3/8) | 21 | 2 |
| Dark Green (5 G 5/8) | 6 | 0.6 |
| Pink Red (10 RP 7/7) | 7 | 0.7 |
| Dark Grey (2.5 PB 5/7) | 10 | 0.9 |
| Black | 85 | 8 |
| Colourless/Clear | 117 | 11 |
| Totals | 1066 | 100 |
| | | |

Table 5: Colour,Number and Percentage of beads from Shanga.

Colourless clear beads could not be indicated on their equivalent on the Munsell-Nickerson colour chart.

Amongst the 1,066 beads analysed from Shanga site, 13 shades of colour are distinguished. Some of the colours are associated only with certain shapes,raw-materials and while others are fairly distributed throughout the bead collection.

The predominant colour is yellow (5 YR 8/12) which accounts for about (30%) of the beads and is equally distributed among the cylinders, barrels,drawn, oblates, spheroids, ellipsoids, bicones, annuals, and discs.

Green (2.5 G 4/8) which comes in second position with 15%, has the greatest number of discs, cones and longitudinally segmented beads. The majority of the green beads are made from copper and glass materials. White beads (11%) are mostly drawn and are made from glass, mollusc shells, bone, ivory, tooth and alabaster. However, a few beads manufactured from mollusc shells and alabaster have a milky weathering. Light blue beads (2.5 PB 7/7) constitute 7% and are prepared from glass. They are always drawn discs. Black beads which accounted for (8%) are of glass-material and terracotta. Black colour was associated with bicones, ellipsoid, spheroids and discs. The brown beads (5%) are most popular among the terracotta material. Their shapes include bicones, cones, oblates, cylinders and barrels. Most of the terracotta beads have vertical or horizontal incisions with parallel punctuations on their circumferences.

The colourless beads constitute (5%). They are made from glass and crystal-quartz. The predominant shapes of the colourless beads are the hexagonally faceted, bicones,spheroids, discs and cylinders. But a few tetragonally faceted beads do also occur. The less numerous colours are ocean blue (10 B 6/7) 4%, green grass (7.5 G 5/8) 5%, translucent red (5 R 4/12) 3%, opaque red (7.5 R 4/11) 1.8%, deep blue (5 PB 3/8) 2%, dark green (5 G 5/8) 0.6%, pink red (10 RP 7/7) 0.7% and dark grey (2.5 PB 5/7) (0.9%).

The translucent red and opaque red colours are most popular and typical of hexagonally faced bicones, and spheroids. The raw-materials are carnelian and glass. The majority of the tubular beads are of Pinkish Red colour.

X-RAY FLUORESCENCE ANALYSIS: RESULTS

The elemental concentrations ofthe five bead samples of terracotta, glass, carnelian, alabaster and crystal quartz were obtained by subjecting them to quantitative X-Ray Fluorescence analysis. Some chemical characteristics of the five bead samples are as follows.

**Glass:** The glass bead is generally characterised by a relatively high zirconium and low lead and potassium. It has medium concentration of iron, copper and calcium. (Fig. 17).

**Carnelian:** It shows a relatively high zirconium concentration and very low calcium, iron, copper, zinc, bromine and lead elemental proportions (Fig.18)

**Terracotta:** The terracotta bead sample was characterised by low concentration and constant ratios of potassium, manganese, zinc, bromine, lead, calcium and titanium. Iron is medium whereas zirconium concentration is high (Fig.20).

**Alabaster:** The Alabaster bead sample has the usual high zirconium concentration and a relatively elevated calcium content. The iron and strontium concentrations are medium. There are low concentration of zinc, bromine, copper, lead and manganese (Fig.21). These data re also shown in Table 6.

Table 6: The quantitative analysis results by X-Ray fluorescence analysis.

| ELEMENT | GLASS (D.blue) | CARNELIAN (opaque red) | TERRACOTTA (Brick/Brown) | CRYSTAL (Milky) | ALABASTER (White) |
|---|---|---|---|---|---|
| K | 0.53% | | 0.70% | | |
| CA | 0.62% | 0.07% | 1.12% | 0.07% | 27.13% |
| TI | | | 0.17% | 14.59ppm | |
| FE | 0.06% | 0.06% | 1.50% | 0.04% | 0.21% |
| CU | 0.24% | 7.97ppm | 22.03ppm | 4.42ppm | 66.80ppm |
| ZN | | 12.66ppm | 39.80ppm | 2.71ppm | 45.58ppm |
| AS | 0.02% | | | | |
| BR | | 2.42ppm | 8.60ppm | | 16.44ppm |
| RB | 21.66ppm | | 39.10ppm | | |
| SR | | | 0.02% | | 0.16% |
| ZR | 3.63ppm | 1.25ppm | 0.02% | 0.02% | 16.72ppm |
| PB | | 4.02ppm | | 2.69ppm | 93.73ppm |

Note: K=Potassium, CA=Calcium TI=Titanium
FE=Iron CU=Copper ZN=Zinc
AS=Arsenic BR=Bromine RB=Rubidium,
SR=Strontium ZR=Zirconium PB=Lead

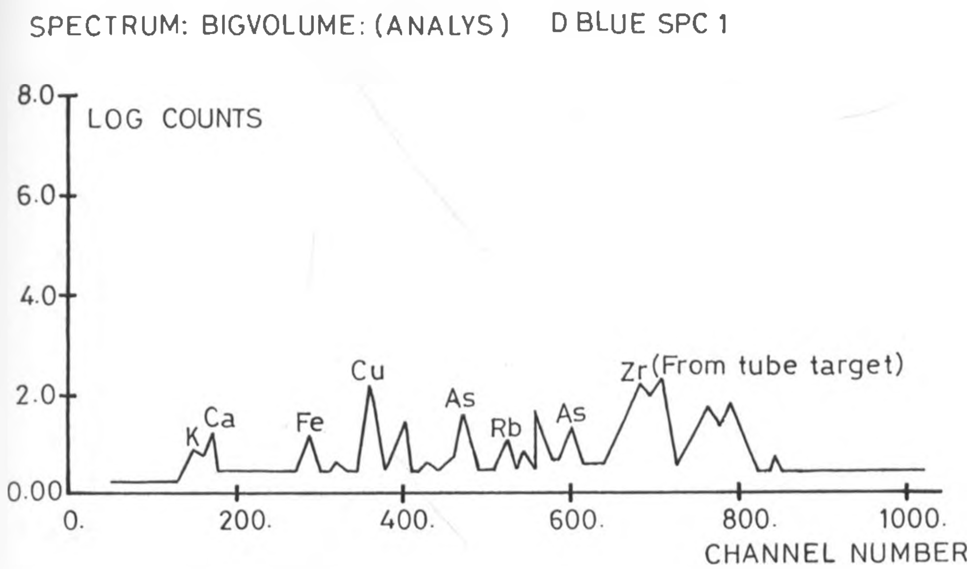


Fig. 17 Deep Blue glass bead sample

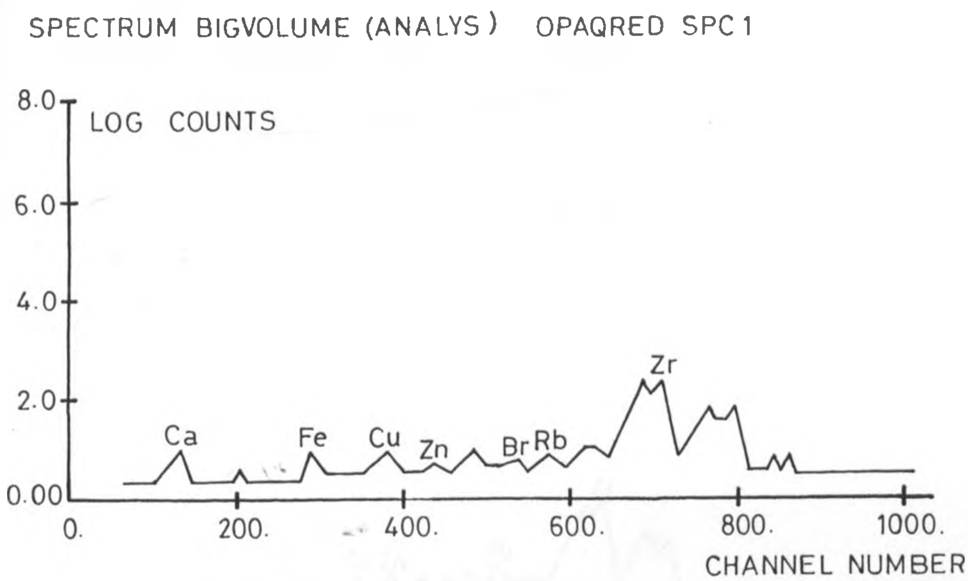


Fig. 18 Red Carnelian bead sample

pm= parts per million
% = percentage concentration of the element in the sample.

SPECTRUM: BIGVOLUME: (ANALYS) BROWN SPC

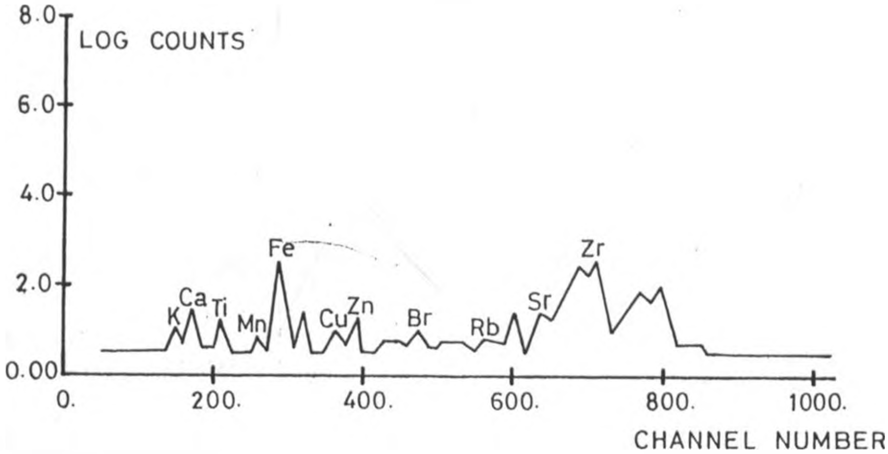


Fig. 19 Brick-Brown terracotta bead sample

SPECTRUM BIGVOLUME: (ANALYS) MILKY SPC 1

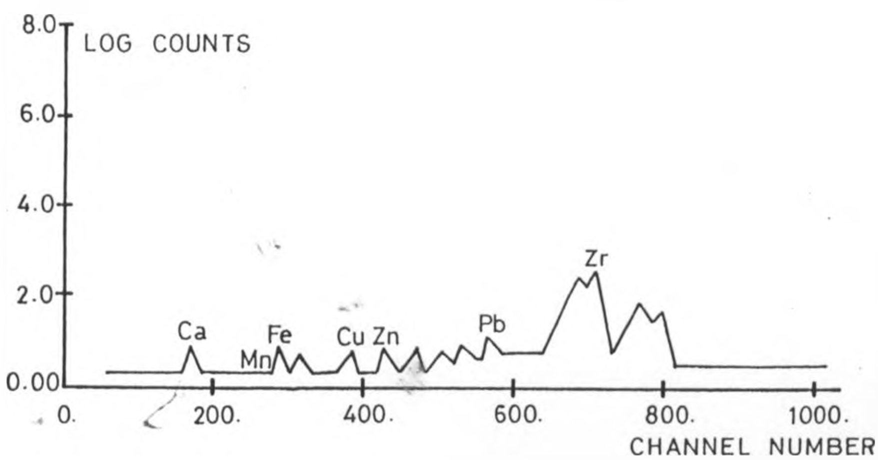


Fig. 20 Milky Weathering Crystal/Quartz bead sample

SPECTRUM: BIGVOLUME: (ANALYS ) WHITE SPC 1

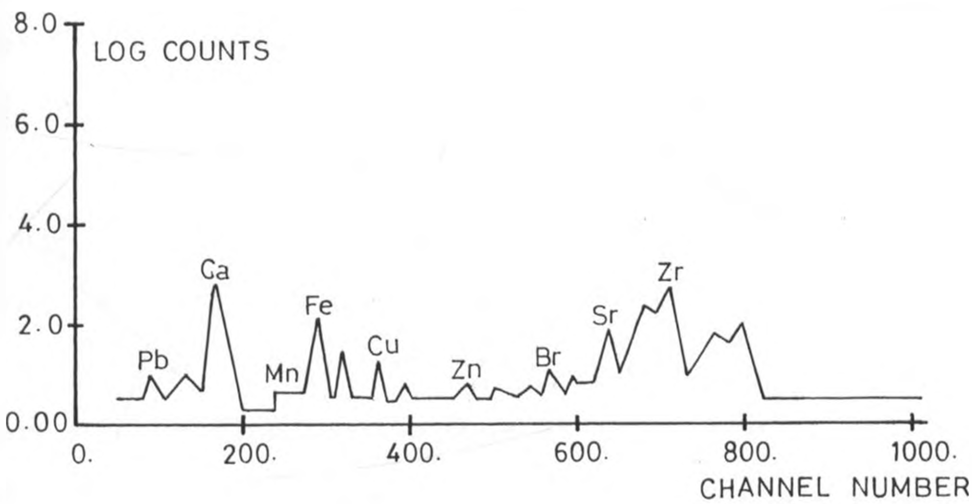


Fig. 21 White Alabaster bead sample

RESULTS

Results of X-Ray fluorescence analysis of a number of beads from Shanga site as recognised visually represented. The five bead samples were (1) glass bead, (hexagonally facetted bicone) of deep blue colour (5 PB 3/8); (2) Terracotta, (Plain bicone) of dark brown colour; (3) Carnelian (bicone) opaque red (7.5 R 4/4); (4) alabaster-white and (5) milky weathering colour of crystal quartz. Although the results of X-ray fluorescence are not comprehensive enough since only a few samples were analysed, but the results nevertheless can yield a lot of information concerning the other beads of the same material. (see Tables 4 & 5).

(a) In all the five bead samples analysed (Glass, Terracotta, Carnelian, Crystal-quartz and Alabaster): the concentration of zirconium is high and even.

(b) There are varying proportions of iron, copper and calcium concentrations.

(c) The glass bead had additives and opacifiers. Additives are used by the glass-maker for colouring and opacity.

Thus the range of colour created by suspended particles of metallic copper or cuprite ($Cu_2O$) are opaque Red, brick red and terracotta red (Davison 1972). The glass bead specimen analysed by XRF technique contained medium concentrations of copper and iron, suggesting that these additives were intentionally used in glass bead making.

## SUMMARY AND CONCLUSION

In Chapter four, it can be concluded that the techniques which figure prominently in the manufacture of the beads from Shanga site are wound, drawn, folded, moulded, and facet cut for the glass beads. While beads made from bone were prepared by utilizing the hollow perforation of the long bone shaft. Shell, ivory and tooth beads were prepared by cutting large blocks into the desired lengths and shapes, then pierced by hot metallic wire. Glass, semi-precious stones, metal, ivory, tooth, bone, shell, coral and terracotta provide the bulk of the raw-material used in bead preparation at Shanga. The shapes exhibited by the Shanga beads are as follows: Barrels, cylinder, bicones, tubular, longitudinally segmented; piriforms ellipsoids, spheroids, drawn, rings and oblates. The major colours found among the Shanga beads are yellow, green, light blue, ocean blue, green grass, dark grey,brown, white, colourless, black, translucent red and pink red. Last the X-Ray fluorescence analysis showed that the Shanga bead samples (five in number) contained high elemental concentrations of zirconium, moderate concentration copper, iron and calcium and very low proportions of arsenic, titanium, zinc, rubidium, strontium, lead, bromine, potassium and manganese elements.

### The Significance of XRF analysis

Though the bead sample analysed was small, the following comments can be made:

(i) Firing was used in the preparation of beads made from clay (terracotta)

(ii) Additives such as colorants and opacifiers were incorporated, particularly in the manufacture of glass beads.

# CHAPTER FIVE

## INTRODUCTION :DATA ANALYSIS AND CONCLUSIONS

The purpose of this chapter is to synthesize the information from the beads. In order to understand the details of this study,attributes such as raw-material, shapes, colour and decorations were employed in the interpretation of the 1,066 beads from Shanga.

## RAW MATERIAL

The 1,066 beads from Shanga were made of different materials. These were both organic and inorganic materials. From the wide spectrum of raw-materials used in the manufacture of beads at Shanga, two lines of evidence indicate that glass provided the bulk of the raw-material. Firstly there is large percentage distribution of the glass beads and secondly, glass occurs on the other coastal sites of East Africa. These sites are Fort Jesus, Gedi, Manda,Ungwana, Takwa and Kilwa. Glass beads accounted for 72% of the total of the various materials used in the preparation of beads at Shanga. This could be due to the fact that glass used in the manufacture of beads is more resistant to corrosion and thus keep a polished surface through time.

(ii) Glass as a raw-material, is noted for its various colours, transparency, hardness and rigidity at ordinary temperatures. Hence these properties made the people of Shanga prefer glass beads to other raw-materials. The presence of bead grinders unfinished blanks of broken pieces of glass (with holes drilled) and some with specific shapes indicate that bead making was taking place at Shanga.

The data analysed also show that semi-precious stones were utilized in the manufacture of beads at Shanga. These semi-precious stones supplied the raw-material for bead preparation which is only second to glass-material in order of preference. The beads made of semi-precious stones represented 12.3%,thus 131 beads. The various semi-precious stones exploited for bead manufacture were crystal-quartz, carnelian, alabaster, agate, coral shale, white moonstone, white soap stone, jasper and onyx.

Carnelian and crystal-quartz were the most popular types of raw-material used in the manufacture of stone beads. This could be due to their brilliant appearance and attractive colours, mostly of opaque-red and translucent red. Several pieces of unpierced and pierced crystal-quartz and carnelian found at Shanga attest to the evidence of the presence of stone bead factory. This is also supplemented by the abundant potential blocks of similar materials in rough form identified at the site. However, results show that semi-precious stone materials such as alabaster, coral shale, jasper, onyx, white moonstone, white soap stone and agate were rarely used. This is clearly indicated by their minimal percentages represented among the bead making raw-materials. Their infrequent usage in the manufacture of beads may be due to the poor qualities they had: these are hardness, dull colours (not attractive), easily patinated, less durable and easily crackable when being worked. Thus they commanded less demand in terms of customer's tastes.

Animal materials were also used in the manufacture of beads. These were bones, shells, ivory and tooth. Beads made from animal parts were 125 represented 12.3% of the total bead collection analysed. Of these, mollusc shells materials were the most prominent in bead manufacture and they accounted for 9%. This can be explained by the fact that mollusc shells have rigid and hard exterior coverings that contain calcious carbonate.

(iii) Various shapes and colours that range from white, black, steel-blue to pinkish were identified. Thus, bead makers of Shanga had to collect mollusc shells from the beaches of the saline waters adjacent Indian Ocean. The mollusc shells were then worked upon and modified to make decorative ornaments, among, them shell beads.

Another raw-material used in the making of beads at Shanga was metal. These were copper and iron metals. A total of 14 beads, 13 of copper and 1 or iron was analysed. This represented about 1.2% of the total bead sample examined; implying that beads manufactured from metal were not very popular at Shanga. Copper and iron materials are easily perishable when subjected to oxidizing conditions and may help explain why the Shanga bead makers rarely used metal in the production of beads. It is possible that they were used, but we cannot recover them in the archaeological record.

SHAPES

The type of raw-material used in the beads manufacture influenced their shape designs. For instance, disc beads were only made from particular raw-materials. These raw materials were identified as glass, mollusc shell and bone. While bicone and hexagonally faceted beads were common among the terracotta and carnelian raw-materials. Longitudinally segmented beads were only made of copper material. On the other hand, cylinders were popular with glass, bone, teeth and ivory materials. Other shapes such as ellipsoids, spheroids,piriforms, oblates and drawn shapes were prevalent among glass and stone materials.

The following types of bead shapes were observed among the Shanga beads; transversely pierced rectangular bead (ivory) Figure 22, barrel "melon" (glass) Figure 23, tubular "cane shape" (sea urchin spine) Figure 24, hexagonally faceted cylinder (glass) Figure 25, truncated bicone (glass) Figure 26, cone: pricked pattern (terracotta) Figure 27, stratified eye bead (glass) Figure 28, cylinder longitudinally pierced (glass) Figure 29, cylinder black bands at extreme edges (agate) Figure 30, flattened cylinder (crystal), Figure 31 and button shaped (glass) Figure 32.

Fig.22 Transversely pierced rectangular bead (Ivory)

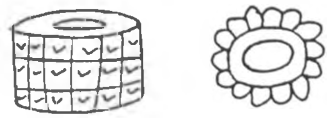

Fig.23 Barrel "Melon" (Glass)

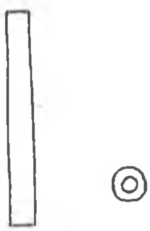

Fig.24 Tubular "cane shape" (Sea Urchin spine)

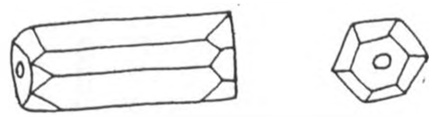

Fig.25 Hexagonally faceted Cylinder; Longitudinally pierced (Glass)

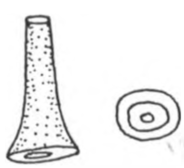

Fig.26 Truncated Bicone with one concave end (Glass)

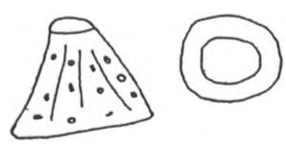

Fig.27 Cone: Pricked pattern (Terracotta

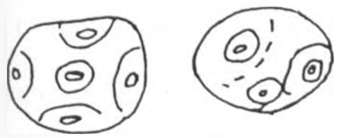

Fig.28 Stratified eye bead (Glass)

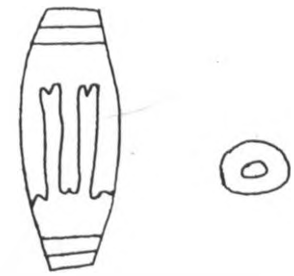

Fig.29 Cylinder longitudinally pierced
Scrabble Decoration (Glass)

Scale: 0 1 2 cm

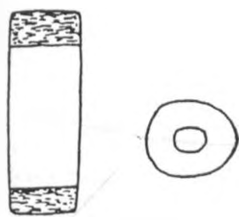

Fig.30 Cylinder: White Agate bead with black bands at extreme edges

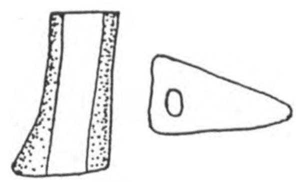

Fig.31 Flatenned Cylinder with bevelled edges

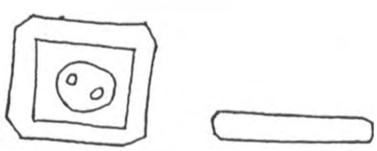

Fig.32 Button shaped (Glass)

COLOUR

Colour was another attribute studied. It was found that preferred colours were: yellow (31%), green (15.5%), white (11.5%) opaque red (9.7%) and translucent red (8.0%). Present day inhabitants of the region have symbolic meaning for these colours: Green is associated with peace and abundance, white with cleanliness and purity, light blue with water and the sky and translucent red is associated with danger, thus toward off bad omens. It is likely that the past inhabitants of Shanga had similar symbolic meanings for their beads as they were muslims as well.

Further information is provided by comparisons between the bead colours and the raw-material used in their manufacture. The comparison shows a gradual shift in terms of distribution of colours with specific raw-materials. This is recognizable as follows: Yellow and green beads were of glass material. White beads were prominent among the beads prepared of bone, mollusc shell, ivory and teeth. Opaque red and translucent red beads were made of carnelian stone. Hence, their colours and raw-material.

The X-Ray Fluorescence analysis of both glass and terracotta beads indicate that beadmakers at Shanga used additives, pacifiers and colorants for technical and aesthetic purposes. Hence, the coastal beads which have green colour, especially those made of glass material suggest that the green colour was caused by high concentrations of $Cu^{++}$ (Cupric Oxide) and $Fe^{+++}$ (Ferrous Oxide) and arsenic elements. These ingredients were added to glass during the manufacturing process. These additives were intentionally used for colourization, artistic and ornamental aspects. While calcium was added to the bead during the manufacturing process to provide chemical stability. Similarly, the blue colour of glass beads found along the coastal sites implies that an alkali, potassium may have been employed in the firing of these beads during their manufacture to achieve the desired colour and hardnesss.

The X-Ray Fluorescence analysis and the physical examination of terracotta beads from Shanga indicated that these beads were subjected to high temperatures in the course of their manufacture. Furthermore, the terracotta beads were characterised by some degree of fragility and cracking. Since terracotta beads have been excavated at various coastal sites, the Shanga bead study can be used to generalize some findings about coastal beads: that the bead makers subjected the ceramic clay used in the manufactures, possibly between 600 C and 1006 C. The firing of the terracotta beads was done to achieve hardness, minimize the level of porosity and to colour the beads into dark brown/dark grey colours. This was done to satisfy the customers' tastes and demands.

DECORATIONS

Among the total of 1,066 beads analysed from Shanga, only 28 beads exhibited decorataive motifs. A total of 9 decorative techniques were recognized. It should be noted that some decorations were peculiar with beads of specific raw-materials. Good examples are:

(i) Incised and prick patterning decorative techniques: that these were found to be exhibited only on bicone and cone beads manufactured of terracotta material.

(ii) Swirls, Wave, Mottle, Chevron and Stratified "eye" bead decorative techniques were common on glass beads. The wave decorative pattern was identified on bicone glass beads.

(iii) Etched decorations: This was identified with bone cylinder beads. Thus, the decorations observed on beads from Shanga were not only influenced by type of raw-material, but also by the shape and customers tastes.

TECHNIQUES OF MANUFACTURE

Among the coastal beads, techniques of manufacture varied with specific raw-materials. There is a standard trend in beads made of glass material. They are manufactured by the following methods: wound, mould, drawn, fold and facet cut techniques of bead manufacture.

Besides the techniques of manufacture of glass beads, other methods of making beads from raw-materials such as bone, teeth, shell and stone were quite distinct as they have already been spelt out in detail at the start of this chapter.

## SIGNIFICANCE OF THIS STUDY

This study is especially useful for sequence determination of chemical mineral constituents (elemental concentration). In one way, the X-Ray Fluorescence analysis of five bead samples from Shanga have contributed to an understanding of bead preparation technology. Of particular importance is that the beadmakers may have abandoned the traditional techniques of making beads and switched to a new technique, which was more advanced. This new technique of bead preparation required different temperatures, fuels, additives and furnace design to produce glass, metal and terracotta beads. Though archaeological evidence of a furnace is still lacking, there is evidence of pieces of iron slug excavated from the deep stratified deposits of Shanga.

The results of this study through X-Ray Fluorescence and physical analysis of the beads from Shanga have confirmed that their composition is related to the geographical and geological context of the area in which they were manufactured. This is with specific reference to terracotta, semi-precious stones, haematite, metal, bone, teeth, ivory and mollusc shell beads. These materials were locally available.

The bead analysis study has shown that it is inappropriate to utilize one attribute of beads to describe them fully. For purposes of interpretation of beads excavated at various coastal sites, a wealth of detailed analysis is required. This includes, raw-material, technique of manufacture, shapes, colour and decorative patterns of the beads. For instance, this study has revealed that shapes and colour were determined by the available local material and vice-versa.

## THE STRATIGRAPHIC ANALYSIS OF THE BEADS

The following observations were made on the significance of the stratigraphic analysis of the beads from Shanga.

a) Category One: Stratigraphic levels of 100-3000. Most of the beads found in these upper levels are made of glass: The manufacturing techniques are highly sophisticated. Beadmakers of Shape used to fashion the glass beads into various Shapes and colours. Copper beads are also found in these stratigraphic levels. Ivory, Shell, Bone, Tooth and Terracotta materials are found in relatively small numbers. Most of the glass and terracotta beads are decorated.

b) Category Two: Stratigraphic levels of 3000-6000 Beads are manufactured from semi-precious stones, glass, and terracotta. These beads are less advanced in terms of Shapes, manufacturing techniques and colours compared to category one.

c) Category Three Stratigraphic levels of 6000-9000. This category is characterized by the exploitation of marine and terrestial resouces. Hunting, Shell collecting gives rise to the making of bone, shell, ivory and tooth.beads. Other materials in category three though in small quantities, are rock crystals, glass, iron terracotta. This is attested by the occurence of rock-crystal wasters, rough out materials, iron slugs terracotta lumps in the lower stratigraphic levels of Shanga.

Comments: This stratigraphic analysis indicates that in category one, bead making techniques were advanced, specialised in specific raw-materials, colour and shapes. In category two, though bead manufacturing techniques were less advanced than category three, a wide range of materials were exploited for bead making. Bead making techniques used in category three are very crude. The bead materials are also fragile.

CORRELATION OF THE SHANGA BEADS WITH ARCHAEOLOGICAL PERIODS

a) Raw Materials Carnelian was the most common semi-precious stone used in the manufacture of beads. The shapes resemble other examples from the sites of East African coast (Kilwa, Manda, Fort Jesus and Gedi). There is adequate evidence to suggest that carnelian, agate and crystal quartz were exploited from the interior sites. This indicates a close trading pattern in semi-precious stones as raw-materials which were exports from East Africa were in great demand in Fatimid Egypt (Horton 1984).

Rock crystals occur at the lower levels of Shanga as finished beads, wasters, roughout materials and lump indicating that they were being worked locally. East Africa is well known as a source of semi-precious stones. The Kerio Valley and the Eastern Highlands could have supplied the coast. The archaeological period of these semi-precious stones is dated to 950-1050AD. Ivory, shell, bone and terracotta beads are also found during this period.

This period was characterized by hunting, shell collecting, bead griding, iron working and pottery. There is no evidence to suggest that the Shanga inhabitants relied upon marine resources for subsistence as fish bones occur in relatively small numbers. Ethno-historic observations indicate that these early inhabitants were pastoralist with a strong dislike of fish. They were probably vegeterians.

Architecture included mud and timber buildings. They battered their products with gulf region traders for glass beads, and with the interior region traders for Tana tradition 1 and 2 (Horton 1984).

A lot of glass beads from Trench 1 and 2 (dated to between 1050 - 1350AD) coincide with the presence of indian ceramics and coins indicating a close sea trading pattern. This archaeological period is characterized by increase in fish consumption, cattle/caprids and camel keeping. The town was divided into two: the western part which was occupied by mixed agriculturalist and the eastern part which was dominated by pastoralists. This is attested by the rapid increase in the volume of excavated bones with butchery marks suggesting that they subsisted mainly on a meat diet.

Rock crystals, pottery counters, and spindle whorls were a daily craft. The first permanent buildings occur on the western side of the town in this period. This include monumental buildings, for example mosques decorated with elaborate mihrab which signify the conversion of Shanga community to Islam. On the eastern side of the town mud, porite and coral are used in the construction of buildings whose floors were plastered or filled with loam and midden indicating foreign influence most probably Indian.

Non-ferrous metal working evidence for copper working at Shanga comes from fourteenth century levels in Trench 1 and 7 (1250-1400AD). This include a copper cutting waste, slag and copper scrap. This period is characterised by livestock keeping, hunting, consumption of marine resources and housing of coral rags and lime walls which are of Indian design.

b) Colour Colours not only possess sentimental perspective significance but also a true meaning based on the nature of the environment. For example, the green beads were attributed to vegetation, fertility, hope, lushness, livestock keeping, buildings and cultivation of crops (plan foods). Blue beads on the other hand were associated with celestial environment and loyalty while white beads indicated moral purity. Most of these beads were dated between 900 and 1400AD.

c) Shapes The most common bead shapes were drawn, spheroid, disks, cylinders, ellipsoids, piriforms, hexagonally faceted beads and oblates. These shapes occur in Trench 6,8,9 and 10 which belong to the archaeological periods III,IV and V (950-1250).

d) Techniques of manufacture The most prevalent techniques of manufacture are found on glass beads. These are mould, drawn, fold, wound facet cut. These were mostly found in the period 950-1400AD.

## RECOMMENDATION

One very important recommendation from this study is that it is imperative for detailed bead studies to be conducted over large areas to gain full knowledge of beads in terms of raw-materials used in their manufacture, techniques of manufacture, shapes, sizes, colour and decorative motifs. This may serve to identify distribution of factory sites and thus show a homogeneity in raw-materials.

Ethnological studies should be done on the traditional societies which still make beads along the coastal region of Kenya. These studies will provide a valuable complement to archaeological bead studies in term of techniques of manufacture, raw-material, shapes, sizes, colour, decorate motifs and uses of beads. Ethnographic bead studies could be used as an analogical tool for interpreting archaeological beads excavated at the coastal sites of Kenya.

The scientific analysis of beads, should include the use of various laboratory analyses. For instance, apart from using the X-Ray Fluorescence analysis,other scientific techniques of analysis such as neutron activation and spectrographic analyses should be employed when determining the mineral composition of specific bead materials. If all these analytic techniques are combined, then good to excellent precision may be achieved for coastal beads, specifically in the determination of chemical mineral constituents. This will be useful for locating sites and the level of techniques of manufacture.

## CONCLUSIONS

To conclude, the analysis of beads from Shanga has shown that to make the various types of beads, the beadmakers were influenced by attributes such as raw-material, techniques of manufacture, shapes, sizes, colour and decorate patterns. These attributes dictated the value, aesthetic and ornamental aspects of the beads.

## APPENDIX: DATA ANALYSED

| LEVEL | T | LEN | DIAM | SHAPE/DECORATION | M.T. | COLOUR(M.N.) | R.M. |
|---|---|---|---|---|---|---|---|
| 4254 | 9 | 4 | 8 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |
| 4254 | 9 | 1 | 7 | DISC | D | WHITE | GLASS |
| 4254 | 9 | 1 | 5 | DISC | D | WHITE | GLASS |
| 4254 | 9 | 3 | 11 | DISC | D | BROWN | GLASS |
| 4254 | 9 | 8 | 5 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 4254 | 9 | 2 | 6 | DISC | D | WHITE 5 | GLASS |
| 4254 | 9 | 8 | 9 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 4307 | 9 | 4 | 1 | TUBULAR | D | GREEN 5 GY 5/6 | GLASS |
| 4307 | 9 | 5 | 2 | CYLINDER | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4307 | 9 | 3 | 3 | SQUARE CYLINDER | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4085 | 9 | 8 | 7 | SPHEROID | W | D.GREEN 5 G 5/8 | GLASS |
| 4242 | 9 | 4 | 3 | SQUARE CYLINDER | D | BLUE | GLASS |
| 4242 | 9 | 8 | 5 | BICONE:MULTIFACETED | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4242 | 9 | 8 | 7 | ELLIPSOID | W | G.GREEN 7.5 G 5/8 | GLASS |

KEY: T - TRENCH, LEN - LENGTH, DIAM - DIAMETER, R.M. - RAW MATERIAL
M.T. - MANUFACTURING TECHNIQUE

| LEVEL | T | LEN | DIAM | SHAPE/DECORATION | M.T. | COLOUR(M.N.) | R.M. |
|---|---|---|---|---|---|---|---|
| 4242 | 9 | 3 | 3 | SQUARE CYLINDER | D | D.BLUE | GLASS |
| 4207 | 9 | 1 | 8 | CONE | W | GREEN 5 GY 5/6 | GLASS |
| 4232 | 9 | 7 | 9 | BICONE:PLAIN | W | YELLOW 5 Y 8/12 | GLASS |
| 4239 | 9 | 4 | 2 | CYLINDER | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4239 | 9 | 2 | 1 | DISC | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4234 | 9 | 4 | 3 | SQUARE CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 4252 | 9 | 4 | 5 | BICONE:PLAIN | W | GREEN 5 GY 5/6 | GLASS |
| 4252 | 9 | 3 | 3 | SQUARE CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 4252 | 9 | 5 | 4 | SQUARE CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 4252 | 9 | 8 | 7 | SPHEROID | W | BLACK | GLASS |
| 4239 | 9 | 2 | 8 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 4239 | 9 | 11 | 8 | SPHEROID | M | BLACK | GLASS |
| 4226 | 9 | 22 | 7 | PLAIN CYLINDER | D | D.BLUE | GLASS |
| 4085 | 9 | 4 | 3 | SQUARE CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 4280 | 9 | 3 | 8 | DISC | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4012 | 9 | 2 | 9 | DISC | D | YELLOW 5 Y 8/12 | GLASS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4016 | 9 | 3 | 2 | SQUARE CYLINDER | D | GREEN 5 GY 5/6 | GLASS |
| 4303 | 9 | 10 | 6 | SPHEROID | M | DEEP BLUE 5 PB 3/8 | GLASS |
| 4304 | 9 | 4 | 2 | CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 4304 | 9 | 9 | 5 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 574 | 9 | 9 | 3 | TUBULAR "CANE" | D | PINK RED | GLASS |
| 567 | 9 | 2 | 6 | DISC | D | WHITE | SHELL |
| 568 | 3 | 2 | 4 | DISC | D | WHITE | BONE |
| 568 | 3 | 5 | 2 | CYLINDER | M | CREAM | BONE |
| 568 | 3 | 1 | 3 | SPHEROID | M | COLOURLESS | CRYSTAL |
| 15 | 6 | 6 | 6 | PLAIN BARREL | D | BLACK | GLASS |
| 574 | 3 | 6 | 6 | PLAIN BARREL | D | L.GREEN 10 GY 6/9 | GLASS |
| 511 | 3 | 4 | 2 | CYLINDER | D | GREEN 5 GY 5/6 | GLASS |
| 1232 | 1 | 2 | 2 | PLAIN BARREL | D | YELLOW 5 Y 8/12 | GLASS |
| 1217 | 1 | 1 | 1 | DISC | D | WHITE | GLASS |
| 1089 | 1 | 2 | 3 | DISC | | CREAM | SHELL |
| 1102 | 1 | 3 | 3 | PLAIN BARREL | D | GREEN 5 GY 5/6 | GLASS |
| 1170 | 1 | 2 | 4 | DISC | D | YELLOW 5 Y 8/12 | GLASS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4064 | 9 | 1 | 3 | DISC | | M.GREEN 7.5 G 5/8 | GLASS |
| 4051 | 9 | 2 | 2 | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4063 | 9 | 5 | 6 | CONE | M | GREEN 5 GY 5/6 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | O.BLUE 10 B 6/7 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | GREEN 5 GY 5/6 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | O.BLUE 10 B 6/7 | GLASS |
| 4246 | 9 | 1 | 2 | DISC | M | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 5 | 4 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 1 | 3 | DISC | M | WHITE | GLASS |
| 4246 | 9 | 1 | 3 | DISC | M | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 3 | 2 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 7 | 4 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 10 | 5 | ELLIPSOIDS | W | BLUE | GLASS |
| 4248 | 9 | 1 | 11 | DISC | D | WHITE | GLASS |
| 4246 | 9 | 4 | 4 | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4247 | 9 | 4 | 5 | BICONE | W | G.GREEN 7.5 G 5/8 | GLASS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 119 | 3 | 2 | 6 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 1011 | 1 | 10 | 7 | SPHEROID | M | COLOURLESS | GLASS |
| 1154 | 1 | 7 | 5 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 1111 | 1 | 15 | 7 | BICONE:MULTIFACETED | F | COLOURLESS | CRYSTAL |
| 1107 | 1 | 4 | 6 | ANNULAR | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 1111 | 1 | 5 | 10 | CONE LENTICULAR | W | YELLOW 5 Y 8/12 | GLASS |
| 1109 | 1 | 11 | 5 | BICONE HEXAGONALLY FACETED | D | COLOURLESS | CRYSTAL |
| 20 | 2 | 24 | 6 | CYLINDER | | WHITE CREAM | HIPPO TOOTH |
| 1064 | 1 | 3 | 3 | PLAIN BARREL | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 1066 | 1 | 1 | 3 | PLAIN CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| | 1 | 3 | 3 | PLAIN BARREL | D | D.GREEN 5 G 5/8 | GLASS |
| 166 | 2 | 12 | 11 | PIRIFORM | | BROWN WITH WHITE HORIZONTAL BANDS | GLASS |
| 1205 | 9 | 3 | 2 | PLAIN CYLINDER | D | YELLOW 5 Y 8/12 | GLASS |
| 1216 | 9 | 1 | 5 | DISC | D | WHITE | SHELL |
| 1216 | 9 | 1 | 5 | DISC | D | WHITE | SHELL |
| 379 | 3 | 6 | 8 | MELON | M | BLACK | GLASS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4064 | 9 | 1 | 3 | DISC | | M.GREEN 7.5 G 5/8 | GLASS |
| 4051 | 9 | 2 | 2 | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4063 | 9 | 5 | 6 | CONE | M | GREEN 5 GY 5/6 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | O.BLUE 10 B 6/7 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | GREEN 5 GY 5/6 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | O.BLUE 10 B 6/7 | GLASS |
| 4246 | 9 | 1 | 2 | DISC | M | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 2 | 3 | ANNULAR | W | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 5 | 4 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4246 | 9 | 1 | 3 | DISC | M | WHITE | GLASS |
| 4246 | 9 | 1 | 3 | DISC | M | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 3 | 2 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 7 | 4 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 4248 | 9 | 10 | 5 | ELLIPSOIDS | W | BLUE | GLASS |
| 4248 | 9 | 1 | 11 | DISC | D | WHITE | GLASS |
| 4246 | 9 | 1 | [illegible] | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4247 | 9 | 1 | 5 | BICONE | W | G.GREEN 7.5 G 5/8 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4247 | 9 | 4 | 5 | BICONE | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4011 | 9 | 3 | 7 | DISC | W | GREEN 7.5 G 5/8 | GLASS |
| 4364 | 9 | 16 | 7 | CYLINDER | D | BROWN | GLASS |
| 4364 | 9 | 5 | 1 | TUBULAR | D | WHITE | GLASS |
| 4364 | 9 | 4 | 4 | PLAIN BARREL | W | O.BLUE 10 B 6/7 | GLASS |
| 4364 | 9 | 15 | 6 | BICONE | W | BROWN | GLASS |
| 4294 | 9 | 2 | 7 | DISC | D | BLACK | GLASS |
| 4294 | 9 | 4 | 3 | PLAIN BARREL | W | D.BLUE 10 B 6/7 | GLASS |
| 4294 | 9 | 3 | 2 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4294 | 9 | 3 | 2 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4026 | 9 | 5 | 5 | PLAIN BARREL | W | BLACK | GLASS |
| 4176 | 9 | 3 | 5 | CYLINDER | D | BLACK | GLASS |
| 4176 | 9 | 1 | 2 | DISC | D | BLACK | GLASS |
| 4176 | 9 | 10 | 4 | CYLINDER:TWO CONCAVE ENDS | W | BLUE 5 PB 3/8 | GLASS |
| 4185 | 9 | 3 | 2 | PLAIN BARREL | W | YELLOW 5 Y 8/12 | GLASS |
| 4123 | 9 | 12 | 9 | BICONE | W | O.BLUE 10 B 6/7 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4123 | 9 | 7 | 4 | ELLIPSOID | W | O.BLUE 10 B 6/7 | GLASS |
| 4123 | 9 | 3 | 4 | BICONE | W | WHITE | GLASS |
| 4123 | 9 | 1 | 4 | DISC | | WHITE | SHELL |
| 4123 | 9 | 6 | 4 | CYLINDER | D | O.RED 7.5 R 4/11 | GLASS |
| 4385 | 9 | 2 | 4 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 4385 | 9 | 5 | 4 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 4314 | 9 | 5 | 6 | PLAIN BARREL | W | BLACK | GLASS |
| 4314 | 9 | 4 | 4 | SPHEROID | W | O.BLUE 10 B 6/7 | GLASS |
| 4315 | 9 | 4 | 9 | BICONE | W | YELLOW 5 Y 8/12 | GLASS |
| 4315 | 9 | 4 | 9 | BICONE | W | YELLOW 5 Y 8/12 | GLASS |
| 4315 | 9 | 3 | 11 | DISC | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4378 | 9 | 8 | 5 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 4378 | 9 | 4 | 3 | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4378 | 9 | 2 | 2 | PLAIN BARREL | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 4378 | 9 | 3 | 2 | PLAIN BARREL | W | WHITE | GLASS |
| 4378 | 9 | 3 | 4 | ANNULAR | W | BLACK | GLASS |

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|---|---|---|---|---|---|---|---|
| 4378 | 9 | 4 | 3 | PLAIN BARREL | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 4313 | 9 | 3 | 9 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 4313 | 9 | 3 | 8 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 4313 | 9 | 2 | 4 | DISC | W | BLACK | GLASS |
| 4313 | 9 | 2 | 4 | ELLIPSOID | W | D.BROWN | GLASS |
| 4356 | 9 | 4 | 3 | PLAIN BARREL | W | O.BLUE 10 B 6/7 | GLASS |
| 4380 | 9 | 4 | 2 | CYLINDER | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4380 | 9 | 2 | 2 | PLAIN BARREL | D | YELLOW 5 Y 8/12 | GLASS |
| 4381 | 9 | 11 | 5 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |
| 4381 | 9 | 3 | 2 | PLAIN BARREL | W | GREEN 5 GY 5/6 | GLASS |
| 4381 | 9 | 4 | 5 | DRAWN BEAD | D | BLUE 5 PB 3/8 | GLASS |
| 4653 | 9 | 7 | 6 | COLOURED BARRED: GREEN HORIZONTAL BANDS ON WHITE | D | WHITE | GLASS |
| 4816 | 9 | 3 | 3 | DRAWN | D | YELLOW 8/12 | GLASS |
| 4816 | 9 | 5 | 5 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 4064 | 9 | 42 | 8 | CYLINDER | | WHITE | IVORY |
| 4077 | 9 | 3 | 4 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4815 | 9 | 3 | 5 | DRAWN | W | YELLOW 5 Y 8/12 | GLASS |
| 4815 | 9 | 4 | 7 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 4604 | 9 | 3 | 3 | DRAWN | D | G.GREEN 7.5 G 5/8 | GLASS |
| 4657 | 9 | 16 | 17 | BICONE:HEXAGONALLY FACETED | M | L.GREEN 10 GY 6/9 | GLASS |
| 4316 | 9 | 7 | 5 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 8 | 6 | ELLIPSOID | W | D.GREEN 5 G 5/8 | GLASS |
| 4810 | 9 | 2 | 6 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 4 | 19 | DISC | W | D.GREEN 5 G 5/8 | GLASS |
| 4810 | 9 | 4 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 2 | 6 | DISC | | MILKY WEATHERING | ALAB-ASTER |
| 4312 | 9 | 2 | 3 | DRAWN | D | D.GREEN 5 G 5/8 | GLASS |
| 4312 | 9 | 20 | 13 | BICONE: GREY BANDS ON DARK GREEN | W | D.GREEN 5 G 5/8 | GLASS |
| 4312 | 9 | 22 | 29 | BICONE: IMPRESSED VERTICAL INCISION ON ONE CONE | W | D.BROWN | TERRA- |
| 4654 | 9 | 3 | 2 | DRAWN | W | YELLOW 5 8/12 | GLASS |
| 4653 | 9 | 6 | 3 | BICONE | W | GREEN 7.5 G 5/8 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4653 | 9 | 7 | 6 | COLOURED BARREL: GREEN HORIZONTAL BANDS ON WHITE | D | WHITE | GLASS |
| 4816 | 9 | 3 | 3 | DRAWN | D | YELLOW Y 8/12 | GLASS |
| 4816 | 9 | 5 | 5 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 4064 | 9 | 12 | 8 | CYLINDER | | WHITE | IVORY |
| 4077 | 9 | 3 | 4 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 4815 | 9 | 3 | 5 | DRAWN | W | YELLOW 5 Y 8/12 | GLASS |
| 4815 | 9 | 4 | 7 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 4604 | 9 | 3 | 3 | DRAWN | D | G.GREEN 7.5 G 5/8 | GLASS |
| 4657 | 9 | 16 | 17 | BICONE:HEXAGONALLY FACETED | M | L.GREEN 10 GY 6/9 | GLASS |
| 1316 | 9 | 7 | 5 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 8 | 6 | ELLIPSOID | W | D.GREEN 5 G 5/8 | GLASS |
| 4810 | 9 | 2 | 6 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 4 | 19 | DISC | W | D.GREEN 5 G 5/8 | GLASS |
| 1810 | 9 | 4 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 4810 | 9 | 2 | 6 | DISC | | MILKY WEATHERING | ALABASTER |
| 4312 | 9 | 2 | 3 | DRAWN | D | D.GREEN 5 G 5/8 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4312 | 9 | 20 | 13 | BICONE:GREY BANDS ON DARK GREEN | W | D.GREEN 5 G 5/8 | GLASS |
| 4312 | 9 | 22 | 29 | BICONE: IMPRESSED VERTICAL INCISION ON ONE LINE | | D.BROWN | TERRACOTTA |
| 4654 | 9 | 3 | 2 | DRAWN | W | YELLOW 5 8/12 | GLASS |
| 4653 | 9 | 6 | 3 | BICONE | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4655 | 9 | 3 | 10 | BICONE | M | YELLOW 5 Y 8/12 | GLASS |
| 4654 | 9 | 10 | 6 | ELLIPSOID | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4272 | 9 | 2 | 5 | DISC | | MILKY WEATHERING | ALABASTER |
| 4793 | 9 | 6 | 4 | SPHEROID | W | BLACK | GLASS |
| 4298 | 9 | 8 | 9 | SPHEROID | W | D.BLUE 5 PB 3/8 | GLASS |
| 4298 | 9 | 3 | 2 | DRAWN | D | D.BLUE 5 PB 3/8 | GLASS |
| 4298 | 9 | 6 | 8 | PIRIFORM | M | WHITE | GLASS |
| 4290 | 9 | 9 | 7 | ELLIPSOID | W | R.TRANSLUCENT 5 R 4/12 | GLASS |
| 4290 | 9 | 6 | 9 | BICONE | W | YELLOW 5 Y 8/12 | GLASS |
| 4290 | 9 | 5 | 4 | ELLIPSOID | W | BLACK GLASS | |
| 4290 | 9 | 2 | 3 | DRAWN | D | BLUE 5 PB 3/8 | GLASS |
| 4290 | 9 | 3 | 2 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 4290 | 9 | 6 | 4 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4272 | 9 | 3 | 8 | DISC | W | GREEN 5 GY 5/6 | GLASS |
| 4272 | 9 | 4 | 12 | DISC | W | GREEN 5 GY 5/6 | GLASS |
| 4272 | 9 | 11 | 7 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |
| 4272 | 9 | 4 | 3 | DRAWN | D | BLUE 5 PB 3/8 | GLASS |
| 4272 | 9 | 4 | 3 | DRAWN | D | BLUE 5 PB 3/8 | GLASS |
| 4272 | 9 | 1 | 2 | DRAWN | D | BLUE 5 PB 3/8 | GLASS |
| 4263 | 9 | 4 | 3 | DRAWN | D | BLUE 5 PB 3/8 | ALABASTER |
| 4263 | 9 | 5 | 11 | CONE | W | YELLOW 5 Y 8/12 | GLASS |
| 4263 | 9 | 3 | 6 | DISC | D | GREEN 2.5 G 4/8 | GLASS |
| 4263 | 9 | 2 | 2 | DRAWN | D | BLUE 10 B 6/7 | GLASS |
| 4263 | 9 | 4 | 3 | DRAWN | D | BLUE 10 B 6/7 | GLASS |
| 4263 | 9 | 3 | 2 | DRAWN | D | BLUE 10 B 6/7 | GLASS |
| 4263 | 9 | 7 | 7 | SPHEROID | W | COLOURLESS | GLASS |
| 4252 | 9 | 5 | 8 | BICONE:IMPRESSED GADROONED | W | GREEN 5 GY 5/6 | GLASS |
| 4252 | 9 | 4 | 7 | BICONE:IMPRESSED GADROONED | D | GREEN 5 GY 5/6 | GLASS |
| 4252 | 9 | 2 | 6 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 4252 | 9 | 1 | 4 | DISC | D | GREEN 5 GY 5/6 | GLASS |

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|---|---|---|---|---|---|---|---|
| 1252 | 9 | 4 | 1 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 1252 | 9 | 4 | 4 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 1252 | 9 | 5 | 3 | CYLINDRICAL DISC | D | GREEN 5 GY 5/6 | GLASS |
| 1252 | 9 | 3 | 3 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 1252 | 9 | 10 | 6 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |
| 1252 | 9 | 6 | 7 | BICONE | W | R.TRANSLUCENT 5 R 4/12 | GLASS |
| 1252 | 9 | 2 | 12 | DISC | W | GREEN 5 GY 5/6 | GLASS |
| 1199 | 9 | 4 | 1 | DRAWN | | MILKY WEATHERING | ALABASTER |
| 1218 | 9 | 3 | 6 | DISC | D | BROWN | GLASS |
| 1248 | 9 | 8 | 5 | ELLIPSOID | W | GREEN 5 GY 5/6 | GLASS |
| 1248 | 9 | 9 | 9 | BICONE:WHITE BAND ON BLACK | W | BLACK | GLASS |
| 1248 | 9 | 10 | 5 | ELLIPSOID | W | OPAQUE RED 7.5 R 4/11 | GLASS |
| 1171 | 9 | 3 | 3 | DRAWN | D | M.L.BLUE 10 B 6/7 | GLASS |
| 1171 | 9 | 2 | 1 | DISC | D | M.L.BLUE 10 B 6/7 | GLASS |
| 1171 | 9 | 4 | 3 | DRAWN | D | M.L.BLUE 10 B 6/7 | GLASS |
| 1171 | 9 | 4 | 2 | CYLINDER | D | M.L.BLUE 10 B 6/7 | GLASS |

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|---|---|---|---|---|---|---|---|
| 280 | 9 | 2 | 3 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 009 | 9 | 3 | 2 | DRAWN | D | M.L.BLUE 10 B 6/7 | GLASS |
| 009 | 9 | 6 | 8 | SPHEROID | W | D.GREEN 5 G 5/8 | GLASS |
| 782 | 9 | 3 | 5 | DISC | W | B.YELLOW 5 Y 8/12 | GLASS |
| 782 | 9 | 1 | 3 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 782 | 9 | 5 | 6 | CONE | W | BLACK | GLASS |
| 092 | 9 | 6 | 1 | SPHEROID | W | G.GREEN 7.5 G 5/8 | GLASS |
| 071 | 9 | 6 | 8 | SPHEROID | W | O.RED 7.5 R 4/11 | GLASS |
| 095 | 9 | 5 | 6 | DRAWN | D | GREEN GY 5/6 | GLASS |
| 071 | 9 | 5 | 5 | BICONE (SILVERY WEATHERING | W | BLUE-GREY 2.5 | GLASS |
| 502 | 9 | 3 | 8 | DISC | W | G.GREEN 7.5 G 5/8 | GLASS |
| 485 | 9 | 3 | 12 | DISC | W | G.GREEN 7.5 G 5/8 | GLASS |
| 300 | 9 | 3 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 300 | 9 | 1 | 3 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 300 | 9 | 1 | 5 | SPHEROID | W | PINK RED RP 7/8 | GLASS |
| 511 | 9 | 3 | 7 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 511 | 9 | 3 | 8 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 598 | 9 | 5 | 3 | CYLINDER | D | GREEN 5 GY 5/6 | GLASS |

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|---|---|---|---|---|---|---|---|
| 4598 | 9 | 3 | 3 | DRAWN | D | WHITE | GLASS |
| 4517 | 9 | 3 | 8 | DISC | W | WHITE | GLASS |
| 4517 | 9 | 3 | 13 | DISC | W | BLACK | GLASS |
| 4517 | 9 | 9 | 5 | ELLIPSOID | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4517 | 9 | 1 | 6 | OBLATE | W | BLACK | GLASS |
| 4517 | 9 | 3 | 5 | DISC:GREEN WITH WHITE WHIRLS | F | GREEN 5 GY 5/6 | GLASS |
| 4517 | 9 | 4 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 4517 | 9 | 4 | 4 | DRAWN | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 4252 | 9 | 22 | 7 | CYLINDER:TRUNCATED WITH ONE CONCAVE END | W | BLACK | GLASS |
| 1188 | 1 | 3 | 2 | DRAWN | D | YELLOW Y 5 8/12 | GLASS |
| 1213 | 1 | 11 | 8 | PLAIN | | WHITE:PARTIALLY PIERCED | WHITE SOAPSTONE |
| 1066 | 1 | 20 | MID=13 MAD=17 | PIRIFORM | M | D.BROWN | HAEMETITE |
| 759 | 7 | 17 | 7 | CYLINDER:HEXAGONALLY FACETED | F.C | R.TRANSLUCENT 5 R4/12 | CARNELIAN |
| 5237 | 10 | 8 | 4 | CYLINDER | D | BLUE 10 B 6/7 | GLASS |
| 800 | 7 | 16 | 15 | SPHEROID | W | BLACK | GLASS |
| 801 | 7 | 13 | 11 | SPHEROID | | COLOURLESS | CRYSTAL |

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|---|---|---|---|---|---|---|---|
| 801 | 7 | 7 | 6 | SPHEROID | | COLOURLESS | CRYSTAL |
| 793 | 7 | 8 | 4 | DISC | | WHITE | SHELL |
| 721 | 7 | 5 | 4 | ELLIPSOID | W | I.RED 7.5 R 4/11 | GLASS |
| 1719 | 1 | 6 | 1 | ELLIPSOID | W | YELLOW Y 5 8/12 | GLASS |
| 2369 | 6 | 11 | 8 | ELLIPSOID | W | YELLOW 5 Y 8/12 | GLASS |
| 2247 | 6 | 5 | 1 | DRAWN | D | BLUE 10 B 6/7 | GLASS |
| 2406 | 6 | 14 | MID=6<br>MAD=22 | CONE:VERTICAL INCISED | | D.BROWN | TERRACOTTA |
| 4897 | 9 | 11 | 5 | CYLINDER | D | L.BROWN OVER BLUE | GLASS |
| 2313 | 6 | 11 | MID=9<br>MAD=19 | | | BRICK RED | TERRACOTTA |
| 724 | 3 | 3 | 2 | DRAWN | | WHITE | SHELL |
| 1283 | 1 | 5 | 5 | SPHEROID | W | BLACK:WHITE BAND | GLASS |
| 7824 | 8/10 | 10 | 5 | CYLINDER | | OPAQUE WHITE | CORAL |
| 9336 | 9 | 6 | 6 | CONE | M | GREENISH 5 GY 5/6 | COPPER |
| 7896 | 8/10 | 6 | 8 | CONE. | M | GREENISH GY 5/6 | COPPER |
| 1956 | 3 | 8 | 5 | CONE | M | GREENISH 5 GY 5/6 | COPPER |
| 1612 | 3 | 12 | 6 | CYLINDER | D | GREENISH 5 GY 5/6 | COPPER |
| 9480 | 9 | 11 | 2 | LONGITUDINALLY SEGMENTED | D | GREENISH 5 GY 5/6 | COPPER |

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| 7538 | 8/10 | 2 | 6 | DISC | | WHITE | SHELL |
| 1457 | 3 | 3 | 7 | DISC | | R.BROWN | JASPER |
| 9758 | 9 | 1 | 7 | DISC | D | YELLOW 5 8/12 (BROWNISH WEATHERING | GLASS |
| 9286 | 9 | 14 | 3 | BICONE:HEXAGONALLY FACETED | | R.TRANSLUCENT 5 R 4/12 | CARNELIAN |
| 9155 | 9 | 2 | 8 | DISC | | WHITE | SHELL |
| 9639 | 9 | 2 | 6 | DISC | | WHITE | SHELL |
| 1614 | 3 | 2 | 3 | DRAWN | D | YELLOW WITH A BROWNISH WEATHERING 5 Y 8/12 | GLASS |
| 9153 | 9 | 2 | 6 | DISC | | WHITE | |
| 7962 | 8/10 | 4 | 17 | SQUARE: TWO PER-ATED HOLES | D | COLOURLESS | GLASS |
| 7895 | 8/10 | 9 | 7 | SPHEROID | W | GREENISH | COPPER |
| 3501 | 6 | 12 | 1 | CYLINDER: LONGITU-DINALLY PIERCED WITH A SCRABBLE DECORATION AND TWO BLACK BANDS AT EACH END | | L. BROWN | GLASS |
| 3605 | 6 | 2 | 6 | DISC | | COLOURLESS | CRYSTAL |
| 3614 | 6 | 2 | 6 | DISC | | WHITE | SHELL |
| 3614 | 6 | 2 | 6 | DISC | | WHITE | SHELL |

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|---|---|---|---|---|---|---|---|
| 3614 | 6 | 14 | 1 | CYLINDER | | WHITE | SHELL |
| 9074 | 9 | 11 | MID=5 MAD=7 | CONE:HEXAGONALLY FACETED | M | B.GREY 2.5 PB7/7 | GLASS |
| 9100 | 9 | 5 | 4 | PLAIN BARREL | | D.BROWN | TERRACOTTA |
| 1821 | 3 | 2 | 9 | DISC | D | YELLOW Y 5 8/12 | GLASS |
| 1831 | 3 | 1 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 1754 | 3 | 3 | 5 | DISC | | WHITE | BONE |
| 1754 | 3 | 2 | 1 | DISC | | WHITE | BONE |
| 1758 | 3 | 4 | 8 | DISC | | WHITE | BONE |
| 1758 | 3 | 2 | 5 | DISC | | WHITE | BONE |
| 1763 | 3 | 8 | 7 | ROUND TABULAR | M | GREEN 5 GY 5/6 | GLASS |
| 1558 | 3 | 12 | 2 | TUBULAR | | WHITE/CREAM | SEA URCHIN SPINE |
| 1558 | 3 | 2 | 5 | DISC | | WHITE | MOONSTONE |
| 1853 | 3 | 9 | 8 | SPHEROID | W | GREENISH 5 GY 5/6 | COPPER |
| 7896 | 8/10 | 6 | 8 | CONE | M | GREENISH GY 5/6 | COPPER |

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|---|---|---|---|---|---|---|---|
| 4011 | 1 | 2 | 4 | ELLIPSOID | | WHITE | SHELL |
| 4246 | 1 | 6 | 4 | ELLIPSOIDICULAR | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4600 | 1 | 4 | 3 | CONE | M | YELLOW 5 Y 8/12 | GLASS |
| 4317 | 9 | 4 | 3 | PLAIN BARREL | | G.GREEN 7.5 G 5/8 | GLASS |
| 4060 | 9 | 7 | 7 | PLAIN BARREL | | G.GREEN 7.5 G 5/8 | GLASS |
| 4060 | 9 | 3 | 2 | CYLINDRICAL DISC | | YELLOW 5 Y 8/12 | GLASS |
| 4060 | 9 | 4 | 2 | CYLINDER | M | YELLOW 5 Y 8/12 | GLASS |
| 4067 | 9 | 4 | 3 | PLAIN CYLINDER | M | GREEN 5 GY 5/6 | GLASS |
| 4061 | 9 | 1 | 2 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 4061 | 9 | 7 | 6 | SPHEROID | W | BROWN | GLASS |
| 4061 | 9 | 6 | 5 | PLAIN BARREL | D | WHITE | GLASS |
| 4063 | 9 | 12 | 6 | POLYFACETED SPHEROID | | COLOURLESS | CRYSTAL |

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| 4243 | 1 | 3 | 5 | ANNULAR | D | D.BLUE 10 B 6/7 | GLASS |
| 4243 | 1 | 16 | 5 | TRUNCATED BICONE | M | BLACK | GLASS |
| 4361 | 1 | 3 | 8 | DISC | W | WHITE | GLASS |
| | 1 | 7 | 6 | PIRIFORM | | R.TRANSLUCENT S.R 4/12 | CARNELIAN |
| 4011 | 1 | 2 | 4 | ELLIPSOID | | WHITE | SHELL |
| 4246 | 1 | 6 | 4 | ELLIPSOIDICULAR | W | G.GREEN 7.5 G 5/8 | GLASS |
| 4600 | 1 | 4 | 3 | CONE | M | YELLOW 5 Y 8/12 | GLASS |
| 4317 | 9 | 4 | 3 | PLAIN BARREL | | G.GREEN 7.5 G 5/8 | GLASS |
| 4060 | 9 | 7 | 7 | PLAIN BARREL | | G.GREEN 7.5 G 5/8 | GLASS |
| 4060 | 9 | 3 | 2 | CYLINDRICAL DISC | | YELLOW 5 Y 8/12 | GLASS |
| 4060 | 9 | 4 | 2 | CYLINDER | M | YELLOW 5 Y 8/12 | GLASS |
| 4067 | 9 | 4 | 3 | PLAIN CYLINDER | M | GREEN 5 GY 5/6 | GLASS |
| 4061 | 9 | 1 | 2 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 4061 | 9 | 7 | 6 | SPHEROID | W | BROWN | GLASS |
| 4061 | 9 | 6 | 5 | PLAIN BARREL | D | WHITE | GLASS |
| 4063 | 9 | 12 | 6 | POLYFACETED SPHEROID | | COLOURLESS | CRYSTAL |

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|---|---|---|---|---|---|---|---|
| 1702 | 3 | 8 | 8 | SPHEROID | | L.BROWN | AGATE |
| 1702 | 3 | 2 | 12 | DISC | D | BLUE 5 PB 3/8 | GLASS |
| 502 | 6 | 2 | 3 | DRAWN | D | BLUE 5 PB 3/8 | GLASS |
| 502 | 6 | 2 | 5 | DISC | | WHITE/MILKY WEATHERING | ALABASTER |
| 502 | 6 | 4 | 1 | DRAWN | | R.BROWN | JASPER |
| 504 | 6 | 3 | 3 | DRAWN | | R.BROWN | JASPER |
| 704 | 3 | 12 | 6 | CYLINDER | | R.TRANSLUCENT 5 R 4/12 | CARNELIAN |
| 960 | 8/10 | 1 | 4 | DISC | | WHITE | SHELL |
| 501 | 6 | 2 | 3 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 501 | 6 | 2 | 4 | DISC | | BLACK 1 | ONYX |
| 501 | 6 | 3 | 5 | OBLATE | | BLACK | ONYX |
| 501 | 6 | 1 | 3 | DISC | | R.BROWN | JASPER |
| 558 | 6 | 13 | 8 | LONGITUD-DINALLY SEGMENTED (2 BEADS) | | BLACK | GLASS |
| 502 | 6 | 2 | 4 | DISC | D | BLUE 10 B 6/7 | GLASS |
| 502 | 6 | 3 | 10 | DISC | W | GREEN 5 GY 5/6 | GLASS |
| 502 | 6 | 1 | 2 | DRAWN | | RED 7.5 R 4/11 | CARNELIAN |
| 502 | 6 | 2 | 7 | DISC | | WHITE | SHELL |
| 502 | 6 | 2 | 6 | DISC | | WHITE | SHELL |
| 502 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 502 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 502 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 50 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 502 | 6 | 1 | 4 | DISC | | WHITE | BONE |
| 502 | 6 | 2 | 6 | DISC | | WHITE | BONE |
| 502 | 6 | 1 | 5 | DISC | | WHITE | BONE |
| 502 | 6 | 1 | 7 | DISC | D | BLUE | GLASS |

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|---|---|---|---|---|---|---|---|
| 1723 | 3 | 4 | 6 | OBLATE | W | BLACK | GLASS |
| 1723 | 3 | 4 | 5 | DRAWN | | R.TRANSLUCENT 5 R 4/12 | CARNELI |
| 7956 | 8/10 | 2 | 5 | DISC | | WHITE | SHELL |
| 9076 | 9 | 1 | 2 | DRAWN | D | YELLOW 5 Y 8/12 | GLASS |
| 9076 | 9 | 1 | 2 | DRAWN | | COLOURLESS | CRYSTAL |
| 9076 | 9 | 2 | 3 | DRAWN | | COLOURLESS | CRYSTAL |
| 9076 | 9 | 3 | 4 | DRAWN | D | RED TRANSLUCENT 5R 4/12 | GLASS |
| 9097 | 9 | 1 | 3 | DISC | | WHITE BROWNISH | SHELL |
| 9044 | 9 | 1 | 5 | DISC | | WHITE | SHELL |
| 9044 | 9 | 1 | 5 | DISC | | WHITE | SHELL |
| 7438 | 8/10 | 3 | 2 | DRAWN | D | BEIGE | GLASS |
| 7438 | 8/10 | 10 | 3 | CYLINDER | D | GREEN 5 GY 5/6 | GLASS |
| 7438 | 8/10 | 1 | 5 | DISC | | WHITE 5 GY 5/6 | SHELL |
| 7438 | 8/10 | 1 | 4 | DISC | D | WHITE | SHELL |
| 7438 | 8/10 | 3 | 3 | DRAWN | | CREAMISH 5 GY 5/6 | SHELL |
| 3605 | 6 | 1 | 3 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 3607 | 6 | 3 | 3 | DRAWN | D | GREEN 5 G 5/6 | GLASS |
| 3607 | 6 | 3 | 5 | OBLATE | W | YELLOW 5 Y 8/12 | GLASS |
| 1500 | 3 | 4 | 7 | ELLIPSOID | | WHITE | AGATE |
| 3604 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 1763 | 3 | 3 | 6 | DISC | | D.BROWN | JASPE |
| 3615 | 6 | 1 | 4 | DISC | | WHITE | SHELL |
| 3615 | 6 | 2 | 4 | DISC | | WHITE | SHELL |
| 3615 | 6 | 1 | 3 | DISC | | WHITE | SHELL |
| 7450 | 8/10 | 2 | 6 | DISC | | WHITE | SHELL |
| 7463 | 8/12 | 14 | 8 | BICONE:VERTICAL P.C. IMPRESSIONS | | BLACK | GLAS |
| 3643 | 6 | 16 | 6 | CYLINDER: CONVEX PROFILE AT EACH END | | WHITE | AGATE |
| 1515 | 3 | 3 | 7 | DISC | | WHITE | SHELL |
| 7601 | 8/10 | 2 | 7 | DISC | D | YELLOW 5 Y 8/12 | GLASS |
| 9178 | 9 | 2 | 5 | DISC | | WHITE | SHELL |
| 9178 | 9 | 2 | 4 | DISC | | WHITE | SHELL |
| 9178 | 9 | 2 | 4 | DISC | | WHITE | SHELL |

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|---|---|---|---|---|---|---|---|
| 9178 | 9 | 1 | 6 | RING: HEAVILY CORRODED | W | BROWN (RUSTY) | IRON |
| 7610 | 8/10 | 2 | 5 | DISC | | WHITE | SHELL |
| 7610 | 6 | 2 | 5 | DISC | | WHITE | SHELL |
| 3614 | 6 | 9 | 7 | RECTANGULAR FLATTENED | | WHITE | SHELL |
| 9280 | 9 | 1 | 5 | DISC | | WHITE | SHELL |
| 9280 | 9 | 4 | 8 | DISC | | CARNELIAN | BONE |
| 9137 | 9 | 7 | 8 | SPHEROID | | R.TRANSLUCENT 5 R 4/12 | CARNELIAN |
| 9291 | 9 | 10 | 6 | CYLINDER | | GREENISH R GY 5/6 | COPPER |
| 9334 | 9 | 6 | 7 | SPHEROID | W | BLUE | GLASS |
| 7905 | 8/10 | 4 | 7 | OBLATE | | CREAMISH | BONE |
| 7527 | 8/10 | 2 | 7 | DISC | | R. TRANSLUCENT 5 R 4/12 | CARNELIAN |
| 7906 | 6 | 2 | 7 | DISC | | WHITE | SHELL |
| 7906 | 8 | 2 | 7 | DISC | | WHITE | SHELL |
| 7906 | 8 | 3 | 6 | DISC | | WHITE | SHELL |
| 7906 | 8 | 3 | 6 | DISC | | WHITE | SHELL |
| 7906 | 8 | 3 | 6 | DISC | | WHITE | SHELL |
| 9424 | 9 | 1 | 7 | DISC | | CREAM | SHELL |
| 9424 | 9 | 1 | 6 | DISC | | WHITE | SHELL |
| 9424 | 9 | 1 | 5 | DISC | | WHITE | SHELL |
| 9424 | 9 | 1 | 6 | DISC | | CREAMISH | BONE |
| 9734 | | 2 | 6 | DISC | | WHITE | SHELL |
| 1612 | | 1 | 5 | DISC | | WHITE | SHELL |
| 9456 | 9 | 7 | MID=3 MID=5 | RECTANGULAR: PIERCED TRANSVERSELY | | SILVERY BRONZE YELLOW | GLASS |
| 7535 | 8 | 3 | 6 | DISC | | WHITE | BONE |
| 7535 | 8 | 3 | 6 | DISC | | WHITE | BONE |
| 740 | 3 | 6 | 5 | SPHEROID | | L.BROWN | TERACOTTA |
| 723 | 3 | 3 | 5 | ELLIPSOID | W | YELLOW 5 Y 5/12 | GLASS |
| 742 | 3 | 6 | 3 | CYLINDER | D | COLOURLESS | GLASS |
| 599 | 3 | 3 | 5 | OBLATE | W | COLOURLESS | GLASS |
| 784 | 3 | 5 | 4 | SPHEROID | W | COLOURLESS | GLASS |
| 784 | 3 | 5 | 3 | CYLINDER | D | GREY | GLASS |

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| 6315 | 10 | 8 | 7 | SPHEROID | W | YELLOW 5 Y 8/12 | GLASS |
| 6315 | 10 | 3 | 8 | DISC | W | YELLOW 5 Y 8/12 | GLASS |
| 6353 | 10 | 13 | 12 | SPHEROID | W | BLACK | GLASS |
| 6262 | 10 | 1 | 4 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 6262 | 10 | 2 | 3 | DRAWN | D | GREEN GY 5/6 | GLASS |
| 6269 | 10 | 4 | 3 | DRAWN | D | GREEN 5 GY 5/6 | GLASS |
| 6247 | 10 | 19 | 13 | ELLIPSOID | W | BLACK | GLASS |
| 6270 | 10 | 9 | 7 | ELLIPSOID | W | D.BLUE 10 B 6/7 | GLASS |
| 6293 | 10 | 21 | 7 | BICONE | W | BLACK | GLASS |
| 6241 | 10 | 13 | 11 | PIRIFORM:BLACK WITH GREY AND YELLOW BANDS | M | | |
| 6241 | 10 | 9 | 8 | SPHEROID | W | COLOURLESS | GLASS |
| 6241 | 10 | 9 | 8 | SPHEROID | W | COLOURLESS | GLASS |
| 6241 | 10 | 5 | 4 | SQUARE CYLINDER | D | O.BLUE 10 B 6/7 | GLASS |
| 6293 | 10 | 4 | 5 | ANNULAR | D | O.BLUE 10 B 6/7 | GLASS |
| 6405 | 10 | 3 | 11 | DISC | D | L.BLUE 2.5 PB 7/7 | GLASS |
| 6435 | 10 | 8 | 15 | BICONE | | D.GREY 2.5 PB 5/7 | TERACOTTA |
| 7185 | 8 | 6 | 4 | PLAIN CYLINDER | | D.L.BLUE 2.5 PB 7/7 | GLASS |
| 7214 | 8 | 14 | 22 | CONE | | D.GREY 2.5 PB 5/7 | TERACOTTA |
| 7230 | 8 | 8 | 6 | ELLIPSOID | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 7124 | 8 | 5 | 4 | SPHEROID | W | COLOURLESS | CRYSTAL |
| 76 | 2 | 2 | 7 | DISC | D | WHITE | SHELL |
| 85 | 2 | 2 | 5 | DISC | W | WHITE | GLASS |
| 85 | 2 | 6 | 7 | SPHEROID | W | GREEN, WITH BLACK BAND ON CIRCUMFERENCE | GLASS |
| 180 | 2 | 16 | 15 | SPHEROID:"STRATIFIED EYE": SHINY BRONZE WITH BLUISH GREY SPOTS | M | SHINY BRONZE WITH | GLASS |
| 143 | 2 | 7 | 6 | BICONE, IMPRESSED INCISIONS | M | COLOURLESS | GLASS |
| 80 | 2 | 6 | 5 | PLAIN BARREL | D | COLOURLESS | GLASS |
| 166 | 2 | 2 | 6 | DISC | | WHITE | SHELL |

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|---|---|---|---|---|---|---|---|
| 170 | 2 | 2 | 4 | DISC | | WHITE | SHELL |
| 116 | 2 | 2 | 4 | DISC | | WHITE | SHELL |
| 146 | 2 | 2 | 4 | DISC | | WHITE | SHELL |
| 7240 | 8 | 2 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 7121 | 8 | 9 | 6 | HEXAGONALLY FACETED BICONE | | R.TRANSLUCENT 5 R 4/12 | GLASS |
| 7093 | 8 | 12 | 11 | SPHEROID | M | YELLOW 7.5 8/12 | GLASS |
| 7121 | 8 | 5 | 4 | SPHEROID | | WHITE MILKY | |
| 7121 | 8 | 5 | 4 | SPHEROID | | WEATHERING | ALABASTER |
| 7105 | 8 | 12 | 11 | ELLIPSOID | M | BLUE | GLASS |
| 7228 | 8 | 8 | 1 | ELLIPSOID | M | D.GREEN 5 5/8 | GLASS |
| 6312 | 10 | 6 | 23 | DISC:CONCENTRIC | D | CREAM WHITE | SHELL |
| 6195 | 10 | 6 | 5 | HEXAGONAL BEAD WITH F.C. CHAMFERED CORNERS:TRIANGULAR ENDS/SIDES FACETED TO LOW PYRAMID HAVE A TRIANGULAR APPEA-RANCE WHEN VIEWED FROM ABOVE | | R.TRANSLUCENT | CARNELIAN |
| 6302 | 10 | 4 | 8 | DISC | W | GREEN 5 GY 5/6 | GLASS |
| 6337 | 10 | 3 | 7 | DISC | W | YELLOW 7.5 Y 8/12 | GLASS |
| 587 | 3 | 17 | 17 | CYLINDER SCRABBLED | P | BLACK:WHITE WINDING LINES | GLASS |
| 756 | 3 | 6 | 2 | CYLINDER | D | G.GRASS 7.5 G 5/8 | GLASS |
| 756 | 3 | 6 | 2 | CYLINDER | D | G.GRASS 7.5 G 5/8 | GLASS |
| 2375 | 6 | 3 | 5 | DISC | D | YELLOW 2.5 Y 8/12 | GLASS |
| 2371 | 6 | 8 | 6 | SPHEROID | W | BLACK | GLASS |
| 2233 | 6 | 2 | 9 | DISC | D | YELLOW 7.5 Y 8/12 | GLASS |
| 2449 | 6 | 7 | 4 | ELLIPSOID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 7215 | 8 | 21 | 11 | PLAIN BICONE | W | BLACK | GLASS |
| 7283 | 8 | 7 | 5 | ELLIPSOID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 7295 | 8 | 6 | 4 | SPHEROID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 6028 | 10 | 14 | 13 | SPHEROID | | MILKY WEATHERING | ALABASTER |
| 6332 | 10 | 2 | 5 | DISC | W | G.GREY 7.5 G 5/8 | GLASS |
| 6351 | 10 | 2 | 4 | DISC | W | YELLOW 7.5 Y 8/12 | |
| 6354 | 10 | 2 | 2 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |

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|---|---|---|---|---|---|---|---|
| 6166 | 10 | 2 | 1 | DISC | | WHITE | SHELL |
| 6434 | 10 | 2 | 8 | DISC | | WHITE | SHELL |
| 6166 | 10 | 1 | 3 | DISC | | WHITE | SHELL |
| 7000 | 8 | 2 | 1 | DISC | | WHITE | SHELL |
| 7238 | 8 | 2 | 4 | DISC | D | G.GRASS 7.5 G 5/8 | GLASS |
| 7238 | 8 | 2 | 4 | BARREL | W | D.GREEN | GLASS |
| 7238 | 8 | 2 | 4 | BARREL | W | D.GREEN | GLASS |
| 7000 | 8 | 3 | 4 | BARREL | W | OPAQUE RED 7.5 R 4/11 | GLASS |
| 6351 | 10 | 3 | 2 | BARREL | W | YELLOW 7.5 Y 8/12 | GLASS |
| 6228 | 10 | 7 | 4 | ELLIPSOID | M | YELLOW 7.5 Y 8/12 | GLASS |
| 6079 | 10 | 2 | 1 | DISC | D | G.GRASS 7.5 G 5/8 | GLASS |
| 6189 | 10 | 8 | 6 | SPHEROID | W | L.BLUE 10 B 6/7 | GLASS |
| 6431 | 10 | 8 | 5 | ELLIPSOID | M | BLACK | GLASS |
| 6426 | 10 | 4 | 3 | BARREL | W | YELLOW 7.5 Y 8/12 | GLASS |
| 322 | 3 | 4 | 6 | DISC | | R.TRANSLUCENT | CARNELIAN |
| 325 | 3 | 12 | 5 | RECTANGULAR PIERCED TRANSVERSELY | | CREAM | IVORY |
| 324 | 3 | 3 | 4 | BICONE:HEXAGONALLY P.C. FACETED | | COLOURLESS | GLASS |
| 326 | 3 | 3 | 4 | DISCOID | | WHITE | SHELL |
| 326 | 3 | 2 | 2 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 325 | 3 | 2 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 325 | 3 | 3 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 179 | 3 | 13 | 4 | BICONE:HEXAG-NALLY FACETED | F.C | COLOURLESS | CRYSTAL |
| 179 | 3 | 5 | 6 | SPHEROID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 179 | 3 | 2 | 4 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 7236 | 8 | 2 | 5 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 7236 | 8 | 5 | 4 | SPHEROID | | COLOURLESS | CRYSTAL |
| 7236 | 8 | 5 | 3 | P.CYLINDER | D | BLACK | GLASS |
| 7183 | 8 | 1 | 4 | DISC | D | BLACK | GLASS |
| 7208 | 8 | 3 | 8 | DISC | W | G.GRASS 7.5 G 5/8 | GLASS |
| 2028 | 6 | 1 | 2 | DISC | D | O.BLUE 10 B 6/7 | GLASS |
| 2369 | 6 | 4 | 2 | P.CYLINDER | D | GREEN 5 GY 5/6 | GLASS |
| 2219 | 6 | 4 | 3 | ELLIPSOID | W | YELLOW 7.5 Y 8/12 | GLASS |

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|---|---|---|---|---|---|---|---|
| 2219 | 6 | 2 | 2 | SPHEROID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 2219 | 6 | 3 | 2 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 2412 | 6 | 7 | 5 | BARREL | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 2412 | 6 | 7 | 5 | SPHEROID | F.C | T.RED 5 R. 4/12 | CARNELIAN |
| 2412 | 6 | 8 | 6 | ELLIPSOID | F.C. | T.RED 5 R 4/12 | CARNELIAN |
| 2412 | 6 | 6 | 4 | SPHEROID | W. | YELLOW 7.5 Y 8/12 | GLASS |
| 2412 | 6 | 16 | 4 | BICONE | W. | BLACK | GLASS |
| 2107 | 6 | 2 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 2407 | 6 | 2 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 7000 | 8 | 3 | 4 | BARREL | W | OPAQUE RED 7.5 R 4/11 | GLASS |
| 6354 | 10 | 3 | 2 | BARREL | W | YELLOW 7.5 Y 8/12 | GLASS |
| 6228 | 10 | 7 | 4 | ELLIPSOID | M | YELLOW 7.5 Y 8/12 | GLASS |
| 6079 | 10 | 2 | 4 | DISC | D | G.GRASS 7.5 G 5/8 | GLASS |
| 6189 | 10 | 8 | 6 | SPHEROID | W | L.BLUE 10 B 6/7 | GLASS |
| 6131 | 10 | 8 | 5 | ELLIPSOID | M | BLACK | GLASS |
| 6126 | 10 | 4 | 3 | BARREL | W | YELLOW 7.5 Y 8/12 | GLASS |
| 322 | 3 | 4 | 6 | DISC | R.TRANSLUCENT | | GLASS |
| 325 | 3 | 12 | 5 | RECTANGULAR PIERCED TRANSVERSELY | | CREAM | IVORY |
| 362 | 3 | 3 | 8 | BICONE:HEXAGO- NALLY/FACETED | | F.C. COLOURLESS | GLASS |
| 324 | 3 | 4 | 6 | DISCOID | | WHITE | SHELL |
| 326 | 3 | 2 | 2 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 228 | 10 | 7 | 4 | ELLIPSOID | M | YELLOW 7.5 Y 8/12 | GLASS |
| 6079 | 10 | 2 | 4 | DISC | D | G.GRASS 7.5 G 5/8 | GLASS |
| 6189 | 10 | 8 | 6 | SPHEROID | W | L.BLUE 10 B 6/7 | GLASS |
| 6431 | 10 | 8 | 5 | ELLIPSOID | M | BLACK | GLASS |
| 6426 | 10 | 4 | 3 | BARREL | W | YELLOW 7.5 Y 8/12 | GLASS |
| 322 | 3 | 4 | 6 | DISC | R. | TRANSLUCENT | GLASS |
| 322 | 3 | 4 | 6 | DISC | R. | TRANSLUCENT | GLASS |
| 179 | 3 | 2 | 4 | DISC | D | GREEN 5 GY 5/6 | GLASS |
| 736 | 8 | 2 | 5 | DISC | D | GREEN 5 GY 5/7 | GLASS |
| 7236 | 8 | 5 | 4 | SPHEROID | | COLOURLESS | CRYSTAL |
| 7236 | 8 | 5 | 3 | P.CYLINDER | D | BLACK | GLASS |
| 7183 | 8 | 1 | 4 | DISC | D | BLACK | GLASS |

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|---|---|---|---|---|---|---|---|
| 708 | 8 | 3 | 8 | DISC | W | G.GRASS 7.5 5/8 | GLASS |
| 2026 | 6 | 1 | 2 | DISC | D | O.BLUE 10 B 6/7 | GLASS |
| 2369 | 6 | 4 | 2 | P.CYLINDER | D | GREEN 5 GY 5/6 | GLASS |
| 2219 | 6 | 4 | 3 | ELLIPSOID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 2219 | 6 | 2 | 2 | SPHEROID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 2219 | 6 | 3 | 2 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |
| 2412 | 6 | 7 | 5 | BARREL | W | L.BLUE 2.5 PB 7/7 | GLASS |
| 2412 | 6 | 7 | 5 | SPHEROID | F.C. | T.RED 5 R 4/12 | CARNELIAN |
| 2412 | 6 | 8 | 6 | ELLIPSOID | F.C | T.RED 5 R 4/12 | CARNELIAN |
| 2412 | 6 | 6 | 4 | SPHEROID | W | YELLOW 7.5 Y 8/12 | GLASS |
| 2412 | 6 | 16 | 4 | BICONE | W | BLACK | GLASS |
| 2407 | 6 | 2 | 3 | DRAWN | D | YELLOW 7.5 Y 8/12 | GLASS |

## BIBLIOGRAPHY


Abungu G.A.

1987 The Historical Science on the Kenya Coast and development of the towns and related topics. Paper presented to the Workshop on "Urban Origins in East Eastern Africa Nairobi.

Allen, J. de V

1972 Lamu ,Publisher unknown, Nairobi

Allen, J de V

1973 Swahili Ornament: Art and Archaeology Research Papers 2:1-14

Allen, J. de V

1980 Swahili Culture and the Nature of East African Coast IJAH 15:2

Arkell, A. J.

1933 "Cambay and the bead trade" Antiquity, 10:292-305

Beck, H.C. 1928 Classification and Nomenclature of Beads Pendants. Archaeologia 27:1-76

Bailey, T. J. N.

1981 Statistical methods in Biology (second edition). Edward Arnold, London.

Bower, J. R. F., Nelson, C. M. Waibel, A. F. and Wandibba, S.

1977 'The Later Stone Age Pastoral "Neolithic" Comparative Study in Central Kenya' Azania.

Bowman H. R., Gianque and Perman I.

1970 Rapid X-ray fluorescence Analysis of Archaeological Materials In Rainer Berger (ed) Scientific methods in Medieval Archaeology.

Bozman, E. F.

1967 "Beads" Everyman's Encyclopaedia 2:95 J. M. Dent & Sons Ltd, London.

Brown, J.

1966 Excavation of a group of burial mounds at Ilkek near Gilgil, Kenya Azania 1:59-77

Brown, J.

1970 Some polished axes from East Africa Azania 4:160-69.

Brown, H.

1988 "Siyu: Town of the Craftsmen: A Swahili cultural centre in the eighteenth and nineteenth centuries" Azania 23:101-113.

Chittick, H. N.

1967 The description and dating of glass beads in Eastern Africa. Paper presented to the Conference on East Africa and the Orient Nairobi.

Chittick, H. N.

1974 KILWA: An Islamic Trading City on the East African Coast volume II:The Finds Memoir No.5 British Institute in Eastern Africa.

Chittick, H. N.

1977 East Africa and the Orient Culture Synthesis in Colonial Times. Africa Publishing House, New York.

Chittick, H. N.

1984 Manda: Excavations at an Island port on the Kenya Coast, Nairobi, British Institute in Eastern Africa Memoir No.9.

Cox, G. A and Pollard, A. M

1977 X-ray Fluorescence of ancient glass beads; the importance of sample preparations. Archaeometry 19, 45-54

Davison, C. C.

1972 Glass beads in African Archaeology: Results of Neutron-Activations Analysis, supplemented by Results of X-Ray Fluorescence Analysis Unpublished Ph.D Thesis, University of California, Berkeley.

Dubin, L. S.

1987 The History of Beads. Abrahams, London

Fitzpatrick, F.L.

1963 Our Animal Resources: Animals and Their Economic Importance Holt, Rinehart and Winston Inc. New York.

Gabel, C.

1967 Analysis of Prehistoric Economic Patterns. Holt, Rinehart and Winston Inc. New York.

Galichet, M. L.

1988 "Aesthetics and Colour among the Maasai and Samburu": Kenya Past and Present: Issue 20

Ginstone, T. and Khan, A.

1976 Uses of Coconut in West Africa. Oxford University Press.

Gow, J.

1984 A survey of prehistoric beads from the Rift Valley and adjacent areas of Kenya. Mila 7:17-35

Gramly, R. M.

1976 Upper Pleistocene archaeological Occurrences at site Gv Jm/22 Lukenya Hill, Kenya. Man (N.S.) 11:319-344.

Guido, M.

1978 The Glass Beads of the Prehistoric and Roman Periods in Britain and Ireland. Society of Antiquarians, London.

Hall, E. T., Banks, M. S. and Stern J. M.

1964 Uses of X-ray fluorescence Analysis in archaeology Archaeometry 7:84-89.

Hall, E. T. Schweitzer, F: and Teller, P. A.

1975 X-Ray Fluorescence analysis of Museum objects: A new Instrument Archaemetry 15:34-51.

Harding, T.

1961 Evolution and Culture. Ann Arbor, University of Michigan.

Hornby: A. S.

1989 Oxford Advanced Learners Dictionary (Fourth Edition). Oxford University Press.

Horton, M. C.

1980 Shanga: An Interim Report. Unpublished Report for the National Museums of Kenya, Nairobi.

Horton, M. C.

1983 Early Muslim Trading on the East African Coast: New Evidence from Shanga.Antiquaries Journal 5:24-45.

Horton, M. C.

1984 The early settlement of the northern Swahili Coast. Unpublished Ph.D Thesis, University of Cambridge.

Horton, M. C.

1986 Some Evidence of Early Islamic Culture at Shanga, Kenya Coast. Antiquaries Journal 6:1-10.

Kassam, A.

1988 Traditional Ornaments: Some general observations. Kenya Past and Present 20:11-16

Keevin, G.

1983 Archaeology: An Introduction. B. T. Batsford Ltd, London.

Kirkman, J. S.

1954 The Arab City of Gedi: Excavations at the great Mosque: Architecture and Finds Oxford University Press, London.

Kirkman, J. S.

1956 Ruined City of Gedi: The Culture of the Kenya Coast in Later Middle Ages: Some Conclusions from excavations 1948 - 1956. Unpublished research papers of the British Institute in Eastern Africa.

Kratz, C. A.

1988 Okiek ornaments of Traditional and Transformation. Kenya Past and Present 20:21-26.

Leakey, L. S. B.

1931 The Stone Age Cultures of Kenya Colony. Cambridge University Press, London.

Leakey, L. S. B.

1935 The Stone Age Cultures of Kenya Colony. Oxford University Press, London.

Leakey, L. S. B.

1945 Notes on the skull and skeleton Material from Hyrax Hill. In M. D. Leakey; Report on the excavations at Hyrax Hill, Nakuru Kenya:- 1937-1939. Transactions of the Royal Society of South Africa 30:271-409.

Leakey, M. D. and Leakey L. S. B.

1950 Excavations at Njoro River Cave Clarendon Press, Oxford.

Merrick, H. V.

1975 Change in Late Pleistocene Lithic Industries in Eastern Africa. Unpublished Ph.D Thesis University of California.

Mershen, B.

1989 Amulets and jewellery from Jordan: A study on the function and meaning of recent bead necklaces. TRIBUS 38:43-58.

Momanyi, D. M.

1988 A study on Ostrich-egg shell beads from Jarigole, Northern Kenya. Unpublished B.A. dissertation, University of Nairobi.

Morrison, H.

1984 Glass Beads Memoir 9, British Institute in Eastern Africa.

Morrison, H.

1985 The Beads Excavations at Aksum (ed) Munro-Hay Memoir 10:168-178 British Institute in Eastern Africa, Nairobi.

Murdock, G. P.

1959 Africa: its peoples and their culture history McGraw-Hill, New York.

Mutoro, H. W.

1979 A Contribution to the study of cultural and Economic dynamics of the historical settlements of East African Coast with particular reference to the ruins at Takwa North Kenya Coast. Unpublished M. A. Thesis, University of Nairobi.

Mutoro, H. W.

1990 The Mijikenda Kaya as a sacred site. Paper presented to the 2nd World Archaeological Congress, Barquisimeto, Venezuela September,1990.

Nurse, D. and Spear, T.

1985 The Swahili: reconstructing the history and language of an African Society 800-1500.University of Pennsylvania Press Philadelphia.

Onyango-Abuje, J. C.

1977 A contribution to the study of the Neolithic in East Africa with particular reference to Nakuru-Naivasha basins. Unpublished Ph.D Thesis, University of California, Berkeley.

Phillipson, D. W.

1977 The later Pre-History of Eastern and Southern Africa. Heinemann, Nairobi.

Prins, A. H. J.

1965 Sailing from Lamu: a study of Maritime culture in Islamic East Africa. Assen Van Gorcum.

Salim, A. I.

1973 The Swahili-speaking peoples of Kenya's Coast, 1895-1965. East African Publishing House.

Sassoon, H.

1966 New views on Engaruka Northern Tanzania Journal of African History VIII 2:210-217.

Schlee C.,

1988 Beads as Status Markers among the Rendille: Kenya Past and Present 20: 31 - 37.

Sease, J.

1987 Ancient ornaments in Egypt, Cairo.

Sleen, W. G. N. Van der

1956 Trade Wind beads. MAN ITEM 154

Sleen, W. G. N. Van der

1967 A Handbook on Beads. Publication of Journal Internationals de Verre, Liege, Belgium.

Sutton, J. E. G.

1974 The Aquatic Civilization of Middle Africa J.A.H 15:527-46

Van de Merwe

1989 Standardized Analysis of Glass Trade Beads from Mgungundhlovu and Ondini nineteenth century Zulu Capital Sites. South African Archaeological Bulletin. 44:98-105

Wandibba, S.

1988 Pre-historic Beads in Kenya. Kenya Past and Present 20:17-20.

Weeks, J. H.

1985 The Congo in Hutchinson, W. (ed) Customs of the World: A Popular Account of the Manners, Rites and Ceremonial of Men and Women all Countries. Volume II. Concept Publishing Company New Delhi pp 738-760.