Pattanam Beads: A Preliminary Typo-Technological Assessment

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Abstract: *Pattanam is a hamlet located in Paravur taluka of Ernakulam district in Kerala. Archaeological excavations carried out at Pattanam from 2007 to 2015 unearthed a large number of Indian and non-Indian artifacts belonging to different cultures and periods. Beads constituted one of the most common categories of artifacts. Glass beads were in maximum number followed by stone beads. Glass beads were of diverse colour and shapes. Drawn beads, wound beads, segmented beads, eye beads and collar beads comprise the glass bead assemblage. They revealed their manufacturing techniques as they were preserved in good condition. Stone beads were of Carnelian, Agate, Serpentine, Quartz, Quartz Crystal, Amethyst, Garnet and Onyx. There were a few beads in terracotta and gold. A typo-technological assessment of glass and stone beads is attempted in this paper based on their texture, shape and other associated features.*

Keywords: Pattanam, Excavations, Glass Beads, Stone Beads, Gold Beads, Typology, Manufacturing Techniques

Introduction: Pattanam Archaeological Site

Pattanam (N. Lat. 10° 09.434'; E. Long 76° 12.587') is a densely populated hamlet in Paravur taluka in Ernakulam district of Kerala in India. It is located in the Periyar river delta, about 25 km north of Kochi. The Paravur stream flows about one kilometer south of the site. It is a tributary of the river Periyar. The Munambam backwaters is about one kilometer from the western boundary and the Arabian sea is about four kilometer west of the site. The occurrence of crisscrossing Paleo channels, Mediterranean and West Asian artifacts obtained from excavations and proximity of the Arabian sea strongly indicate the maritime importance that Pattanam enjoyed in the past. Pattanam gained importance because of its envisaged closeness to the *Muziris,* the famous port of the past, identified as a center of trade between India and the Mediterranean and the West Asian countries.

Methodology

Archaeological excavations undertook for nine seasons at Pattanam unearthed a large number of Indian and non-Indian artefacts belonging to different cultures and periods

(Iron Age to Modern) (Cherian, 2007-15). About 60 trenches were excavated during the nine seasons. In general, the size of the trenches was 4 x 4m but it varied from 1.5m x 2m to 8 x 3m depending upon the locations, nature of deposits and specific purposes. The 'locus based' method was adopted for excavation.

Pattanam Beads

Among the artifacts unearthed, beads constituted the most common genre with maximum numbers. There were good quantities of glass beads, semi-precious stones and a few terracotta and gold beads. Establishing a precise chronology of Pattanam beads is difficult because of three reasons: (i). Extensive post depositional disturbance in the site due to successive habitational activities (ii). Percolation of small beads from upper to lower layers and (iii). Same and stable manufacturing techniques adopted for bead making in different periods and cultures. Out of 10,8990 beads (99379 full beads and 9611 broken beads) recovered from nine seasons of Pattanam excavations, a massive portion was from the loci of the Early Historic and the Medieval periods. Glass beads dominated the assemblage (98.75%). Stone beads constituted only 1.19%, terracotta 0.04% and gold 0.002% of the total bead assemblage.

Glass Beads

Different varieties of glass beads were recovered from the excavations (Figure 1). In general, they were in good condition, though a few were weathered. These beads assumed their distinct features by virtue of their colour, shape, manufacturing techniques and decorations.

Figure 1: Glass beads from Pattanam (Courtesy KCHR)

Colour: Glass bead assemblage consisted monochrome, bichrome and polychrome beads. Monochrome beads dominated the glass bead assemblage. Black (39%) was the dominant colour, followed by red (21%), green (20%), blue (15%), yellow (4%) and dull white (1%). Beads with different hues of single colour, especially red, blue and green, were present in the glass bead assemblage (Nayar, 2011) (Figure 2). The assemblage had a few bichrome and polychrome glass beads (Figure 3). The common bichrome varieties were black opaque bead with horizontal or vertical white bands and blue opaque beads with vertical white bands. The bands were straight or wavy. The polychrome beads had a combination of red, white and yellow coloured vertical or horizontal lines. For making the lines on banded beads, colours are added to the glass core before drawing it out into a tube or winding around the mandrel.

Figure 2: Glass beads of different colours from Pattanam (Courtesy KCHR)

Shape and Size: Glass beads occurred in almost all known shapes: bicone, truncated bicone, cylindrical barrel, sphere, square tube, melon, disc and microbeads (Figures 4, 5). The size ranged from 1 to 12 mm.

Glass Bead Making Technology: There were drawn beads, wound beads, molded beads, segmented beads, gold foiled beads and eye beads.

Drawn Beads: Most of the glass beads were drawn beads. They were small and monochrome having less than 6 mm in diameter and length. The drawn beads were

made by *lada* technique wherein a thin tube of glass is pulled or drawn from a furnace heated glass. They are cut in regular sizes and then, their edges are polished (see Francis, 2002 and Kanungo, 2016). Enormous quantities of finished monochrome beads obtained, the linear striations observed on the outer surface of the beads, features of glass wasters (Figure 6a, b and e), unfinished bead segments found with sharp cutting edges and fused beads (Figure 6c) indicated that it was the *lada* technique used for making these drawn beads. A few drawn beads recovered with sharp cutting edges showed that they did not undergo the normal smoothening by annealing (Figure 6d). The drawn beads recovered from the excavations were opaque in nature. They were in different hues of blue, green, yellow, red, black and grey.

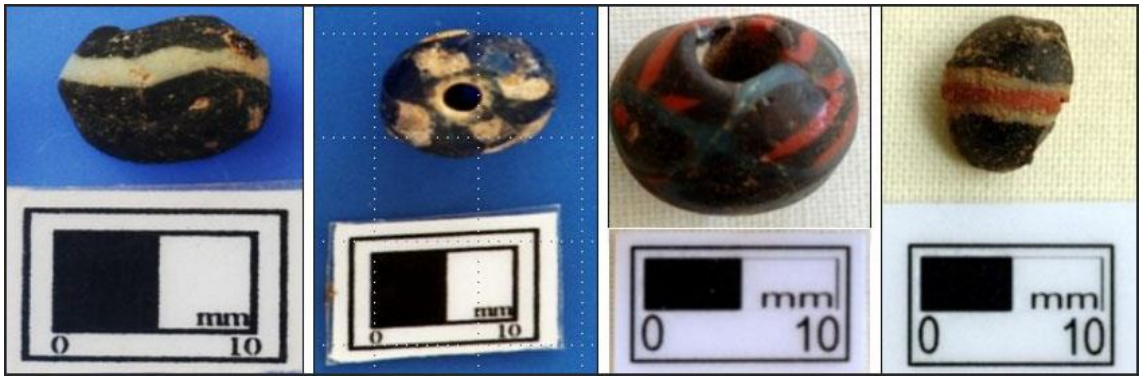

Figure 3: Bichrome and Polychrome glass beads (Courtesy KCHR)

Wound Beads: Wound beads are made by wrapping a lump of molten glass around a mandrel. These beads are distinguished by the fabrics of the glass that swirl around the perforation. There are a few wound glass beads in the glass bead assemblage of Pattanam. The winding lines were quite evident in these beads. Van der Sleen (1958) mentioned that air-bubbles in the glass might indicate whether a bead was made by winding or drawing. When these bubbles are elongated or lying parallel to the perforations, the beads are the drawn ones. When they are elongated perpendicularly to the perforation, they are termed the wound beads. Microscopic analysis of a few glass beads showed that they possessed trapped perpendicular air bubbles in them. This indicated their wound nature.

Segmented Beads: Two types of segmented beads were unearthed from Pattanam: (i). Monochrome segmented beads and (ii). Gold foiled segmented beads (Figure 7). Segmented beads are made by rolling a hot tube of glass along grooved stone rollers, constricting the tube to form bulges. After cooling, the individual or multiple segments are cut into beads. Monochrome segmented beads excavated from Pattanam were red and blue in colour. Quite a good number of single and segmented gold foiled beads have been recovered from the excavations. Gold foiled beads have three layered sandwich structures. They consist a flat base glass, a second layer with gold foil and a third more or less transparent glass layer covering the second. They are produced by twin glass tubes. A tube of glass is inserted into another tube with metal foil in between, which can be of gold, silver or lead. In some cases, there would not be any

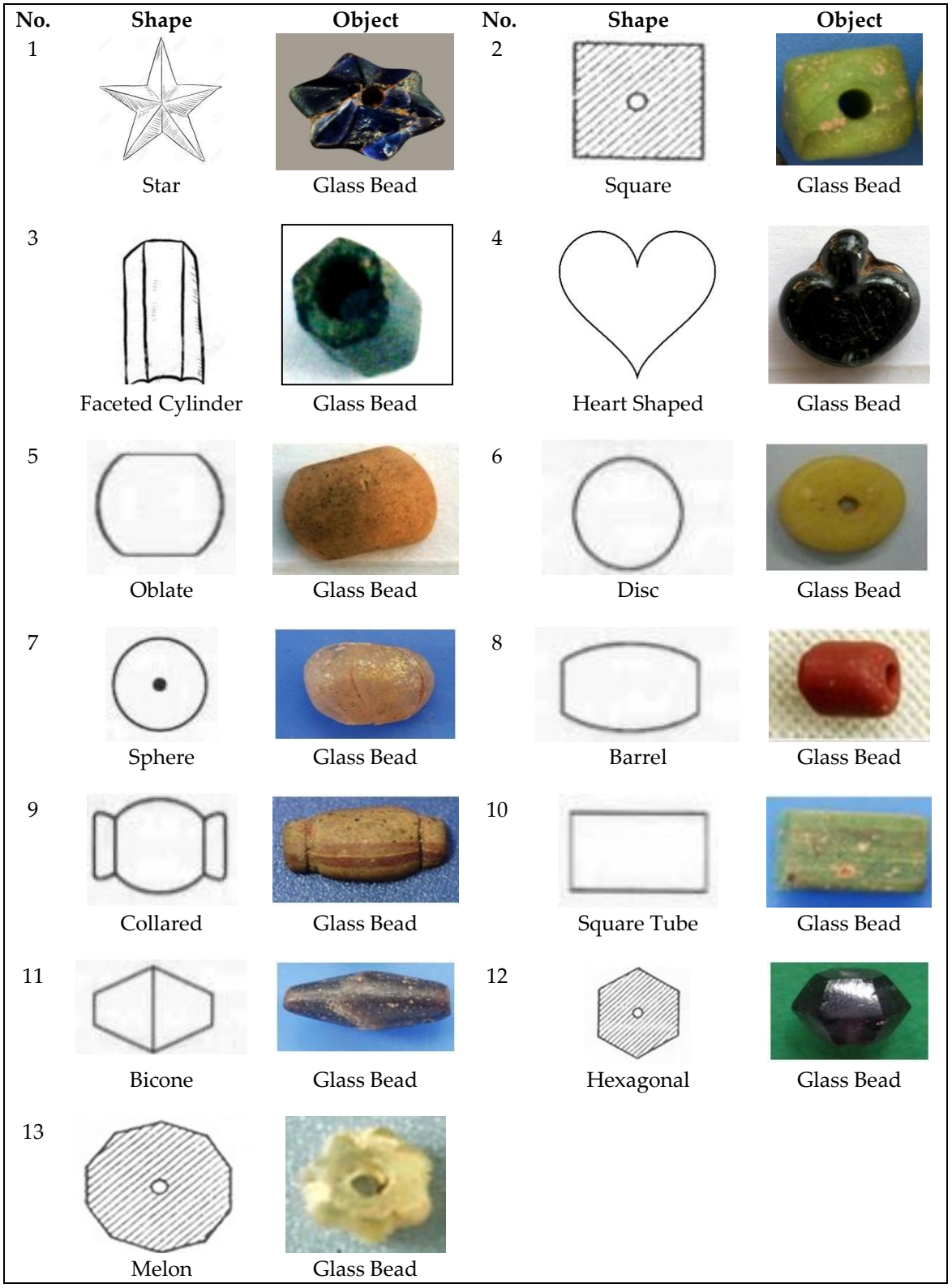

Figure 4: Shapes of glass beads (Size Range: 1mm – 12mm)

metal foil in between and then they are known as the 'false gold glass beads'. The top glass layers in metal foiled and false gold foiled beads are colourless. They may also be

yellow or amber in colour. This helps to project or imitate the image of a gold foil within. Only gold foils were found as the middle layer in Pattanam beads. Gold foiled beads are also known as gilt glass bead, gold in glass bead or gold glass beads.

Figure 5: Microbeads and disc beads (Courtesy KCHR)

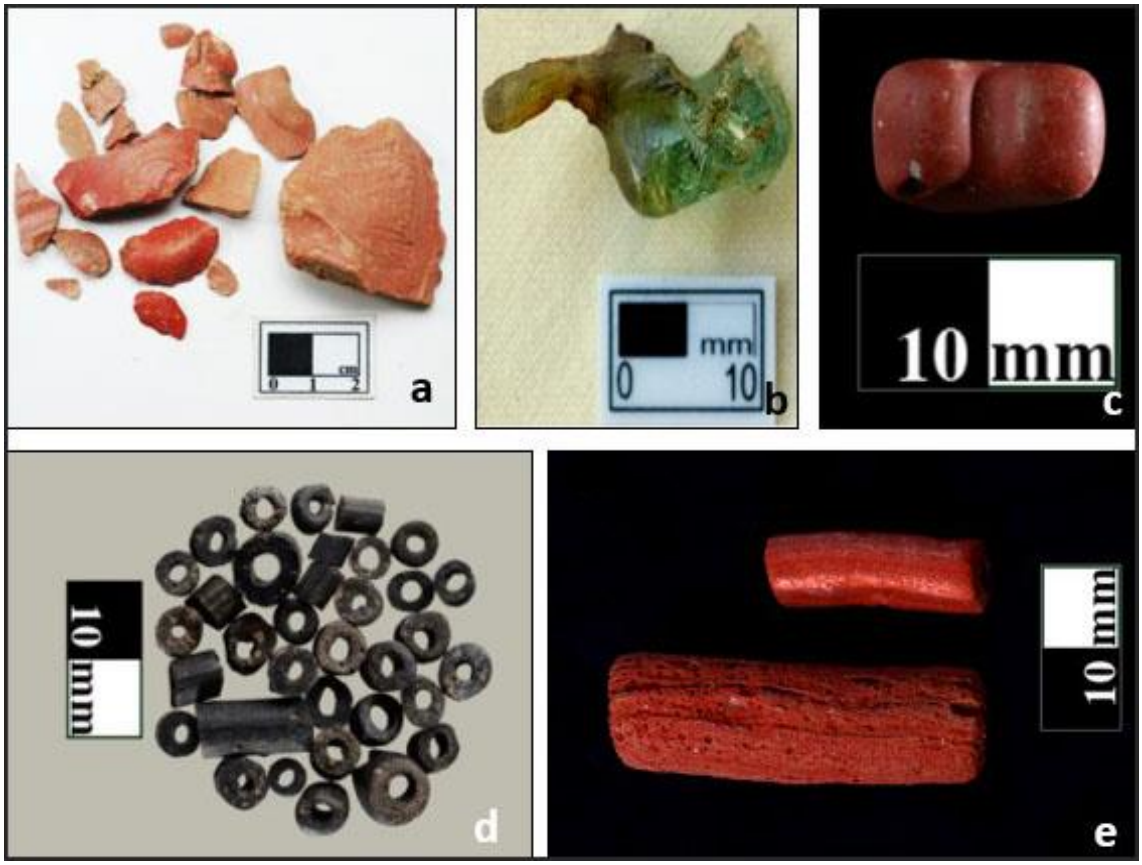

Figure 6: Glass bead wasters (Courtesy KCHR); a, b and e - Glass Wasters, c - Fused Beads, and d - Beads with Sharp Cutting Edges

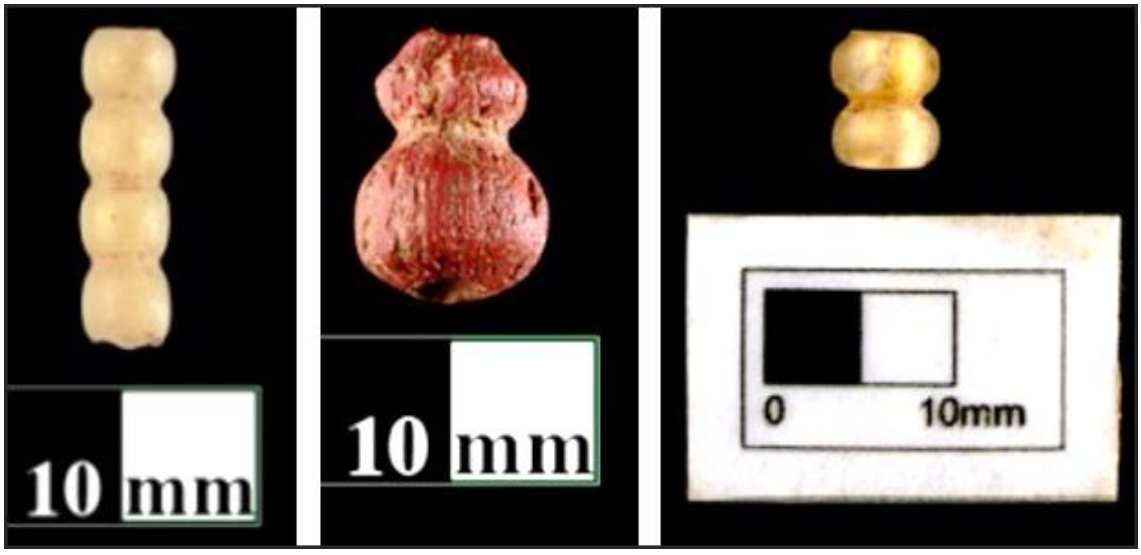

Figure 7: segmented and gold foiled glass beads (Courtesy KCHR)

The shape and pattern of bulged segments indicated two types of techniques employed for manufacturing segmented beads: (i). By rolling warm twin glass tubes over uniformly grooved stone rollers and (ii). By pinching the reheated twin tubes at uniform intervals along their length, creating segments. Uniform shape and space of the segments of some beads point out the first technique and the slightly longitudinal fibrous striations and elongated bulges of a few indicate the second technique.

Eye Beads: Beads decorated with spots or contrasting circular rings giving roughly the appearance of eyes are called eye beads. The spot and circular designs are made on glass and it is added to a basic glass bead to make the eye bead. They are considered as effective amulets to ward off evil eyes. Glass *eye beads* are generally blue because this colour is thought to be the most defensive one against any evil.

Eyes are made on the matrix of the glass beads by (i). Painting the eyes, (ii). Pressing single or composite coil of glass, (iii). Pressing separately made stratified eyes or (iv). Pressing slices of mosaic glass cane in to the matrix. The mosaic glass canes are made from multi layered glass rods. Rods are dipped in successive baths of liquid glass of alternate colours and hacked off into discs when cooled. Each disc is pushed into the soft matrix of the bead to form an eye with rings (see Eisen, 1916).

The excavation at Pattanam brought out one complete and one broken eye beads. The complete eye bead had eyes of twin yellow rings. The full round shaped eye bead had dark blue matrix decorated with yellow round eyes. Each eye was made by pressing yellow colored disc segments. The broken one possessed dark bluish green matrix and three eyes. The double layered eye had a blue inner spot and a white outer ring. This eye bead also was made using mosaic glass rod having alternately coloured layers.

Collar Beads: Collar beads are produced from preformed drawn glass tubes which are slightly reheated and incised with a paddle and then cut apart into individual beads

(Francis, 2002). The assemblage had a few collar beads. They had protuberant collars with shallow grooves at both ends.

Glass beads obtained from Pattanam were transparent, translucent or opaque (Figure 8). About 50% of the glass beads were opaque, 46% translucent and the remaining 4 % transparent.

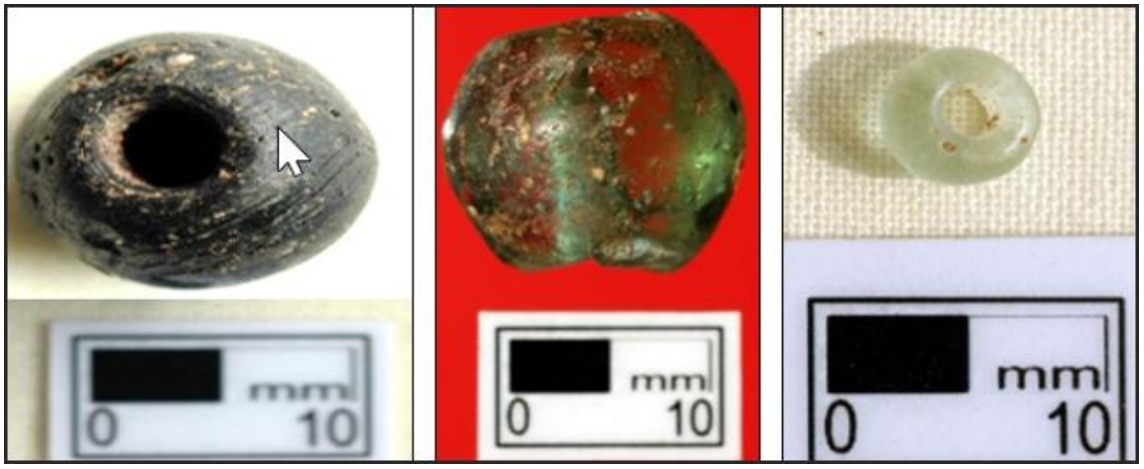

Figure 8: Opaque, transparent and translucent glass beads (Courtesy KCHR)

Stone Beads

The stone beads excavated from Pattanam were made of different materials like Carnelian, Agate, Serpentine, Quartz, Quartz Crystal, Amethyst, Garnet and Onyx. They were in triangular, square, rectangular, diamond, pentagonal, disc, sphere, barrel, collared, cylindrical, bicone, hexagonal and melon in shape (Figure 9). Almost all these beads were plain with smooth surfaces except a few Serpentine, Quartz and Carnelian beads which possessed different designs on them. The designs could be parallel, radiating, spiral or irregular lines or with 'x' or '+' shaped marks (Figure 10). Some Carnelian beads had white etched designs on them. The assemblage had some spacer beads of Serpentine also. Spacer beads obtained were of rectangular shape with multiple perforations in a line. These beads are used to separate individual beaded strings of a jewelry.

Stone Bead Making Technology

The raw materials (Figure 11a), debitage (Figure 11b), shatters, rough-outs (Figure 11c), bead blanks (Figure 11d) and finished beads (Figure 11e) obtained from Pattanam indicated that the technology of stone bead making in Pattanam was in the following way: Imported or indigenous raw materials were cut into pieces of required sizes. By removing the cortex and employing the controlled chipping, these pieces were made into desired shapes called rough-outs. These roughouts were then heated to enhance the colour. Heating also facilitated fine chipping and pecking. After fine pecking, the rough-outs were ground on grinding stones to make them smooth surfaced bead blanks. At the final stage, holes were drilled into the bead blanks. They were then

polished to the finished beads. In some cases, perforation by drilling was done after polishing the bead blank. The drilling might have been done by diamond tipped copper or bronze rod with abrasive.

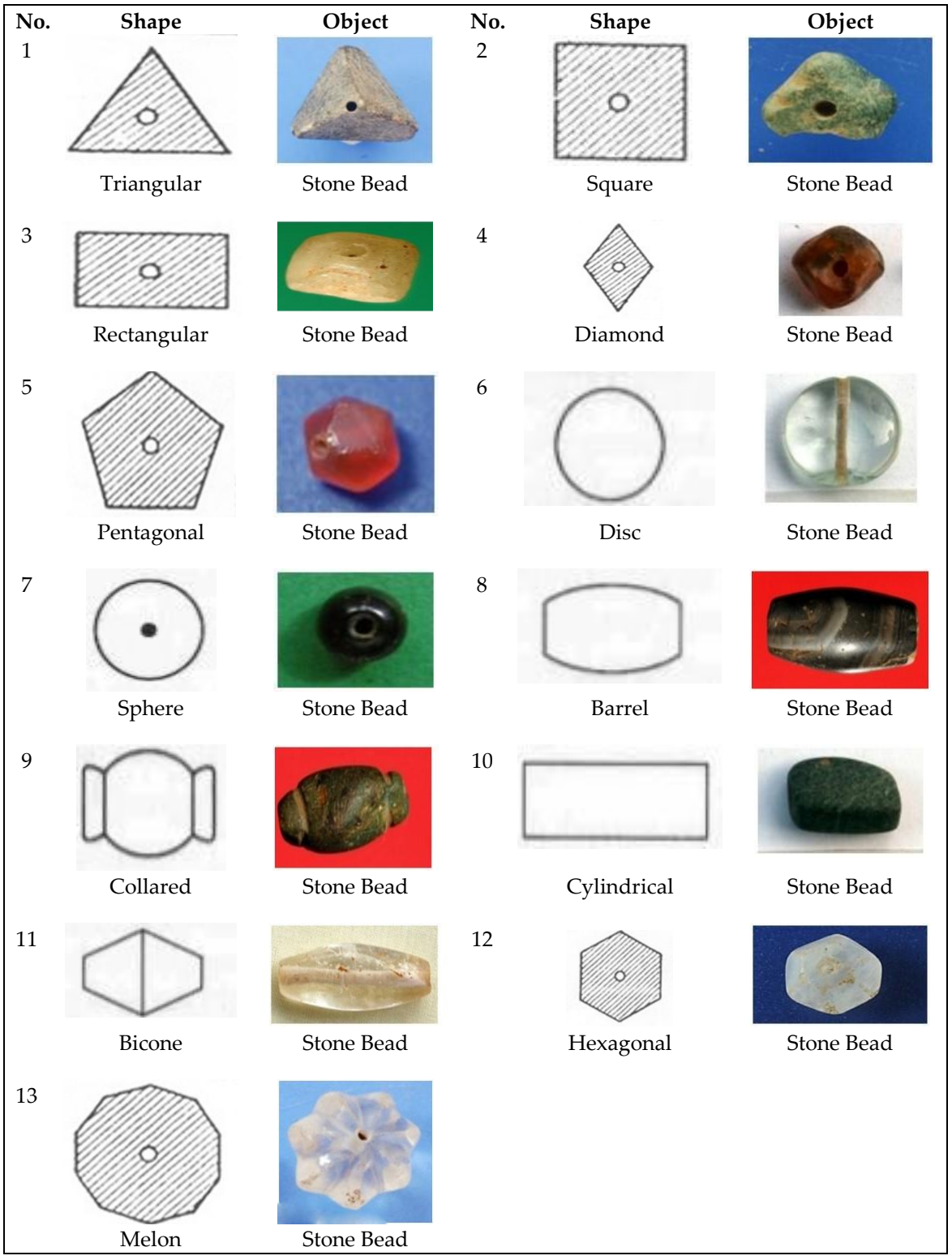

Figure 9: Shapes of stone beads from Pattanam (Courtesy KCHR)

Beads drilled from either side and from one side were noticed in the stone bead assemblage of Pattanam. There were a few beads with conical bores.

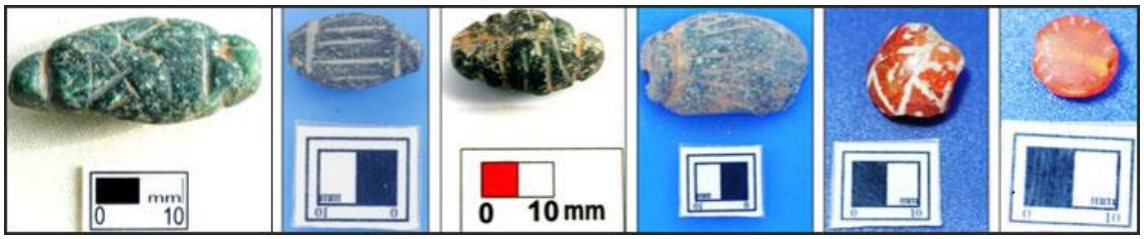

Figure 10: Stone beads with designs (Courtesy KCHR)

Figure 11: Indicators of Stone Bead Making; a. Raw materials; b. Debitage; c. Rough-outs; d. Bead Blanks; and e. Finished Beads (Courtesy KCHR)

Terracotta and Gold Beads

Pattanam excavations yielded a small quantity of terracotta beads. They were oblate, sub oblate, barrel, melon, short or long biconical or spherical in shape. Areca nut and cylindrical disc shaped ones were also present in the assemblage. These beads were of an average 15 mm long with varied diameter and thickness depending upon the shape (Cherian et al., 2016). Gold beads, oblate in shape, were negligible in number.

Discussion and Conclusion

Pattanam excavation brought out five phases of cultures starting from the Iron Age (*c.* 1000 BCE), the Iron Age/Early Historic transition (5th-3rd/2nd century BCE), the Early Historic (*c.* 3rd/2nd century BCE-4th/5th century BCE), the Early/Late Medieval (*c.* 5th century CE-15th century CE) to the Modern (*c.* 15th century CE-present) (Cherian et al., 2016). The Early Historic period appears to be the most active phase at Pattanam as it yielded maximum number of artifacts like sherds of Roman amphorae, Terra Sigillata,

Turquois glazed pottery, Torpedo, Roman glass fragments, gold ornament fragments, Iron nails and implements, cameos, intaglios and beads of stone, glass and terracotta. These artifacts indicated overland mercantile activity and trade network Pattanam had maintained with the Greco-Roman and the West Asian world. They also reflected a brisk domestic inland trade.

In India, the presence of beads in archaeological context can be traced back to the Upper Palaeolithic period. In Kerala, however, their presence has been observed only since the Iron Age period, possibly due to inadequate excavations. Glass and stone beads of Pattanam were found distributed from the Iron Age to the Modern, representing maximum in the Early Historic period. The Iron Age beads are mainly observed in funerary context in Kerala but they are observed in habitational and commercial context at Pattanam. Abundance of glass beads that dominated the Pattanam bead assemblage (99:1) shows the high demand that existed in the Early Historic period for them. This, in turn, indicates more production and easy accessibility of raw materials. However, the absence of proportionate waste points out that the center of production of these beads may properly not be the excavated sites. The quantity and range of glass materials that could be associated with the production are extremely limited. The most common items that could suggest local manufacture are the occasional tube ends, cut tube segments and fused beads. Their presence could be incidental by way of bulk transfers. In fact, Pattanam does not hold many usual evidences like the presence of pull of glass, rods of glass, dripples and drops of glass, lumps of raw glass and furnace to confirm any glass bead making industries. Precisely, the chances of having the facility of glass bead manufacturing at Pattanam remain questionable. The glass beads might have been brought from other places like Tamil Nadu region and used in local and regional exchange networks, besides exporting to outside world as finished bead or value added products.

The occurrence of stone beads in less number, it is reasonable to think, could be due to the lack of specialized hands, labour intensiveness involved or less availability of raw materials. Though Serpentine beads dominated the stone beads (52%) (Figure 12), their proportionate manufacturing waste materials could not be observed at Pattanam. Small amount of the debitage of Serpentine and negligible amount or no trace of the debitage of Agate, Quartz, Amethyst, Garnet and Onyx indicate the possibility of importing them. However, excavated materials provided enough evidences for various stages of the manufacturing of Carnelian and Quartz beads. They were in the form of raw materials, debitages, rough-outs, blanks and perforated beads. Though Quartz is available in the nearby Tamil Nadu region (for example, Arasapalayam and Erode), no source of Carnelian is identified at or near Pattanam. Carnelian could have been brought from Vidhyan, the known region for it. Another possibility is that the nodules of Carnelian washed from the Deccan trap might have reached the rivers of Kerala. The raw materials of Carnelian recovered from Pattanam look like small pebbles or chunks indicating a fluvial deposit. The craft people of Pattanam appear to have worked more in Carnelian than in Quartz as Carnelian debitage contained almost all

stages of bead manufacturing. Most of the unearthed stone beads, irrespective of the material, are either with bad shapes or with defected perforations. This possibly indicates the process of quality selection existed, wherein good beads were traded and the defective ones were discarded.

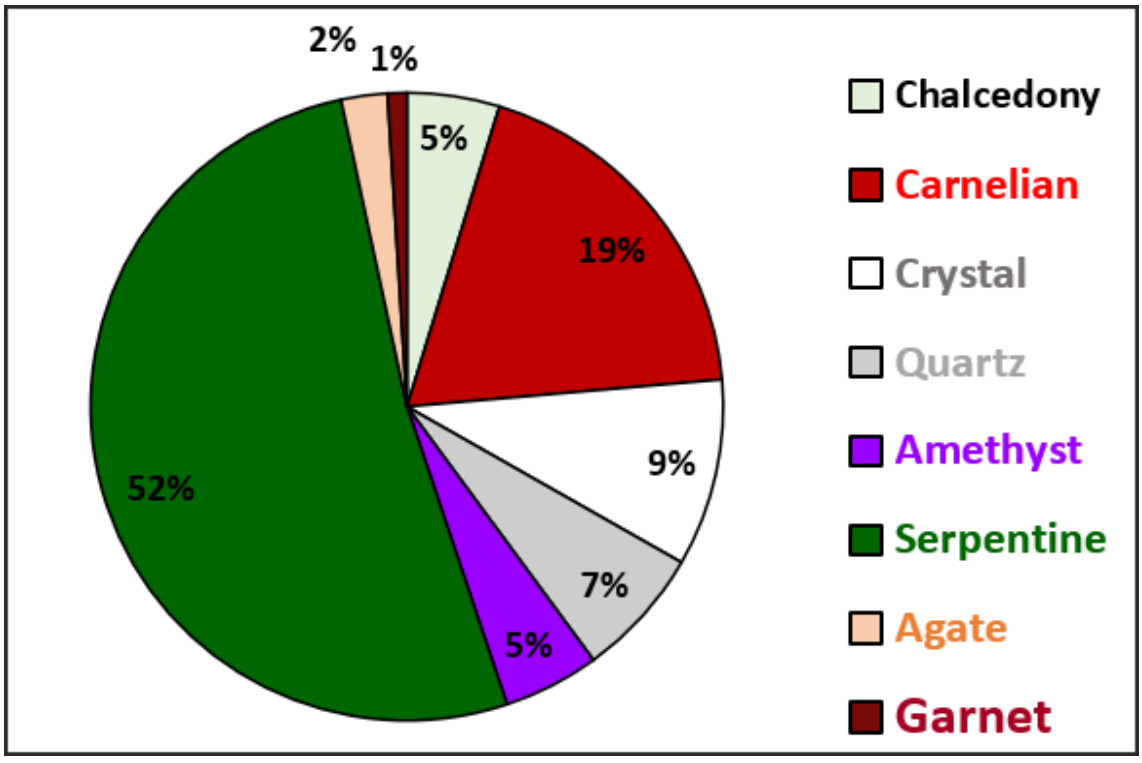

Figure 12: Graph- Stone beads from Pattanam

Quantities of raw materials, nodules of Chalcedony, Agate, Amethyst and Carnelian of varying sizes, shatters and debitages of all these stones, bead blanks and unfinished beads unearthed from nine excavations at Pattanam were comparatively less in volume. This suggests that the bead making was not practiced at Pattanam on a large scale, though the obtained volume of waste materials provides enough support to think that the manufacturing of beads happened in small quantities. The breakage and cut marks observed on nodules indicate how these nodules were broken into pieces as the initial step of bead making. The cut marks found on some big nodules indicate that they were swan longitudinally and then cleaved into sections or small units. As iron was known to the people of Pattanam (KCHR, Interim Reports of Pattanam Excavations 2007-15), iron saw might have been used with the aid of some abrasives to cut nodule to required sizes. It is logical to think that rough blanks were separated from the parent nodule and these blanks were worked upon so as to produce more even shaped bead rough-outs by coarse flaking. The sharp angles were then removed by finer flaking followed by meticulous minute flaking to produce round sections. Surface of bead rough-outs thus created were smoothened and bead blanks were fashioned by continuous grinding. Course sand stone pieces with grooves recovered indicate that beads were finally shaped by rubbing them back and forth on pieces of

coarse sandstones. After the beads are rounded, the rough ends are ground down flat, and before the final polishing, the boring process is initiated. Some beads show the marks of roughening made at their centers so as to avoid the drill slipping. The round aperture and bore concentric to the round aperture found on some beads give the indication that people practiced bow drilling for making perforations. A carnelian bead observed with multiple perforations could possibly be the hand work of an apprentice trainee or a nonprofessional bead worker. Though smooth surfaced bead blanks without perforations, beads with half way perforations and finished beads with perforations were unearthed from the site, no drills or parts of them were found among the artifacts.

Evidences of all stages of bead making can be observed in case of Carnelian at Pattanam. This emphasises the point that the people of Pattanam manufactured at least Carnelian beads in small quantities. Imitation of Agate, Serpentine, Amethyst and Garnet stone beads in glass excavated from the sites indicates higher value for and preference to stone beads. High quantity of glass and stone beads discovered from Pattanam shows that Pattanam was undoubtedly a center of maritime and inland trade in beads.

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