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The stone and shell beads of the shell-midden settlement of RH-5 (Muscat, Sultanate of Oman)

Alessandra Pisan, Paolo Biagi and Giorgio Gasparotto

Abstract: During the excavations carried out by the Italian Archaeological Mission at the shell-midden site RH-5, Muscat, 374 beads of different shapes and sizes, obtained from both stone and marine shell, were recovered. This paper discusses their chronology, typology, raw material, manufacturing technique and circulation along the southern coast of the Arabian sea during the fifth millennium BP. The authors point out the probable exogenous production of the RH-5 beads, given also the scarce number of these items from the large cemetery excavated at the same site. The existence of production centres, and the specialised role played by some of the coastal (shell-midden) sites of this period are also emphasised.

1. Introduction

The scope of this paper is to describe and discuss the stone and shell beads collected during the excavations carried out by the Italian Archaeological Mission at the multi-layered shell-midden site of RH-5 on the cape of Ra's al-Hamra, west of Muscat (Sultanate of Oman). The excavations brought to light a complex sequence, radiocarbon-dated between the middle of the sixth and the first half of the fifth millennium uncal BP (Durante and Tosi, 1977; Biagi et al., 1984; Biagi and Nisbet, 2006). They also yielded a great number of man-made structures among which are pits, postholes, fireplaces and C-shaped narrow canals, which have been interpreted as probable remains of (semi)-circular hut foundations (Cavulli, 2004). A very large cemetery, with individuals buried with different rituals in three different layers (Méry and Charpentier, 2009) was uncovered at the eastern part of the site (Salvatori, 2007).

The importance of archaeological beads has already been pointed out by several authors amongst whom is H.C. Beck (1941). His classification, more aesthetical than archaeological, was based on a few morphological characters among which are shape, piercing, colour, material and decoration (Beck, 1928). Although his method was criticised by several authors, mainly because it was unrelated to any geographical, chronological and contextual parameter (Van der Sleen, 1973), only very recently has the importance of archaeological beads been also noted from a cultural point of view (Bednarik, 2006). Even though beads undoubtedly relate closely to aesthetics, their use nevertheless is often linked to magic, religion, superstition, and different rituals among which are reproduction and gender (Sciama and Eicher, 2001); furthermore they represent an easily recognisable, speechless way of communication (De Waele and Haenrick, 2006). In effect, beads bring to light a number of features ranging from typology and technology to socio-economic organisation and trade (Kenoyer et al., 1991; Konstantinidi, 2002), and they reflect the ethno-cultural, social, political and religious sphere

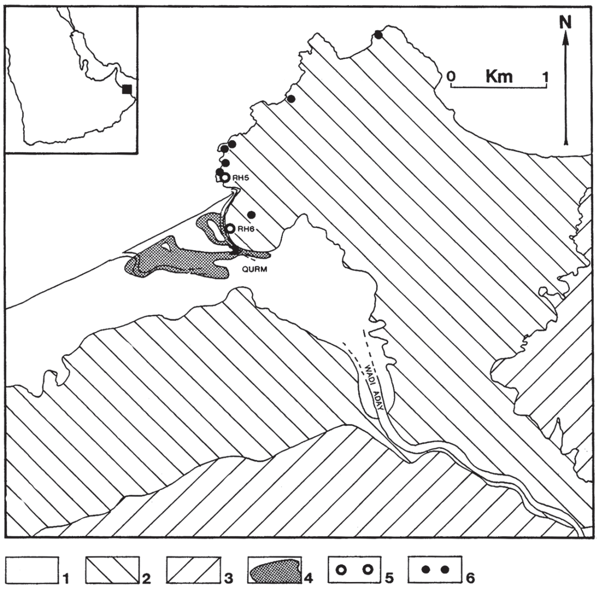

Fig. 1: Distribution map of the shell-midden sites on the cape of Ra's al-Hamra, west of Muscat (after Biagi, 1994: 21)

Fig. 2: An aerial view of Ra's al-Hamra cape on the top of which RH-5 is clearly visible (grey spot) (photograph by R. Salm).

of the culture to which they belong. This is why several studies point out that a systematic approach to bead analysis is the only way to achieve the highest possible amount of data from this category of objects (Vidale, 1992; 2000; Mastykova, 1998).

2. The shell-midden RH-5

RH-5 is one of the twelve shell-middens discovered on the cape of Ra's al-Hamra (Fig. 1), west of Muscat, during the surveys carried out since the 1970s; of these, only a few have been partly excavated (Durante and Tosi, 1977; Biagi and Salvatori, 1986; Santini, 1987; Biagi 1999; Biagi and Nisbet, 1999; Uerpmann and Uerpmann, 2003).

The site is located on a rubified, Tertiary terrace that stretches towards the sea at the southern end of the Batinah Beach, where begins the high calcareous terrace that extends as far as the cape of Ra's al-Hadd. Here Wadi Aday flows into the Arabian Sea, where the Qur'm mangrove swamp opens (Fig. 2). Apart from representing an area of ecological tension, which is ideal for settling, this territory is very rich in different varieties of workable stones that were exploited in different ways and for different purposes by the RH-5 inhabitants. Ophiolithic outcrops are known a few kilometres from the site, along the piedmont of the Jabal al-Akhdar, where also are located Cretaceous formations rich in steatites, serpentinites, chlorites, cloritoschists and other sedimentary rocks. Flint, quartzite, hyaline quartz and gabbro are also available within a radius of some 5 km from the site (TAVO, 2003).

RH-5 was discovered by R. Jäckly (Tosi, 1975), and later excavated by the Italian Archaeological Mission between 1980 and 1986; the excavations were resumed recently by the same mission and are still under way (Tosi, pers. comm. 2009). The site is some 90 m long and 45 wide, with a sequence of rather horizontal deposits some 1.5-2 m thick. The excavations revealed at least seven main phases of occupation (from layer 0 to 5), which have been further subdivided into sub-phases within layers 1 (a and b), 3 (a, ab, b, c and d), and 5 (a and b). The radiocarbon chronology shows that it was "almost continuously" settled, roughly between the middle of the sixth and

1	1b	1c	2	3	3a	3ab	3b	3c	3d	4	5	5a	5b
7 (24.13)	0	0	3 (14.28)	0	0	0	14 (30.43)	3 (17.64)	7 (13.46)	16 (41.30)	7 (36.84)	12 (21.81)	1 (33.33)
22 (75.86)	2 (100.00)	1 (100.00)	17 (85.71)	17 (100.00)	5 (100.00)	1 (100.00)	32 (69.56)	14 (82.35)	45 (86.53)	23 (58.69)	11 (63.15)	35 (78.18)	2 (66.66)
29	2	1	20	17	5	1	46	17	52	39	18	47	3

Table 1: Number and percentage of the white and dark beads. Their variability can be partly due to the different extension investigated per each settlement layer.

the third century of the fifth millennium uncal BP although, most probably, seasonally (Biagi, 1994; Biagi and Nisbet, 2006). A graveyard extending over some 160 m², from which 122 burials were excavated (Fig. 3), yielded more than 170 individuals, both in a primary (Fig. 4) and a secondary position; it was uncovered at the eastern part of the site (Coppa et al., 1985; Salvatori, 1996; 2007). According to the available 14C dates it was in use during the first three centuries of the fifth millennium uncal BP (Biagi and Nisbet, 2006: fig. 4; Salvatori, 2007: table 1).

3. The bead assemblage

It consists of 374 stone and shell specimens, recovered from all the archaeological horizons, in variable percentages (Table 1), more rarely from the settlement structures, among which are pits, postholes and fireplaces (Pisan, 2005-2006). Most beads were found isolated, just a few in connection, mainly from layer 3d. They have been analysed following Mastykova's (1998) method, which includes typological, technological and SEM-EDS analyses, for the precise identification of the raw materials utilised, and described according to Beck (1928) and Vidale (1989; 1995). Visible traces of their manufacture processes have also been identified.

3.1. Classification

According to their shape and length/width ratio, the beads have been subdivided into four main types: cylindrical (308: 82.35%), discoid (32: 8.55%), polygonal (9: 2.40%) and ovoid (3: 0.80%); a further group is represented by broken specimens (22: 5.88%) (Fig. 5). On the basis of their colour they can be subdivided into white and dark; this latter class includes pieces of various chromatic aspects and textures. According to their characteristics, observed by

Fig. 3: RH-5: the cemetery area during the 1984 excavations (photograph by P. Biagi).

Fig. 4: RH-5: Grave 49 (Salvatori, 2007: Fig. 72) from which a cylindrical, elongated stone bead was recovered close to the right foot (photograph by P. Biagi).

optical microscopy, they have been subdivided into the following classes:

a) Dark beads.

1a1) black or greenish black, fine, compact, grained rock (chloritite)[(1)],

1a2) grey or greenish grey, fine, compact, grained material with surface small quartz grains (ceramic?),

1b1) bluish, dark grey or greenish dark grey, fine, compact, grained rock (chlorite + calcium silicate),

1b2) very dark grey or greenish dark grey or greenish grey, medium grained rock (chloritite),

1b3) bluish dark grey, fine, compact, grained rock with reddish oxidations (chloritite),

1c1) greenish black, fine, compact, grained rock (chloritite),

1c2) greenish dark grey or very dark greenish or greenish black, medium grained, with quartz grains (chloritite),

1d) greyish brown, fine compact, carbonatic, grained material (shell?),

1e) very brown red, fine, compact, grained rock (serpentinite).

b) White beads.

2a) fibrous and powdering material (white, pinkish white, very light grey, and very light yellow) (shell?),

2b) compact rock (light greenish grey) (chloritite).

3.2. SEM-EDS analyses

Representative samples from each class

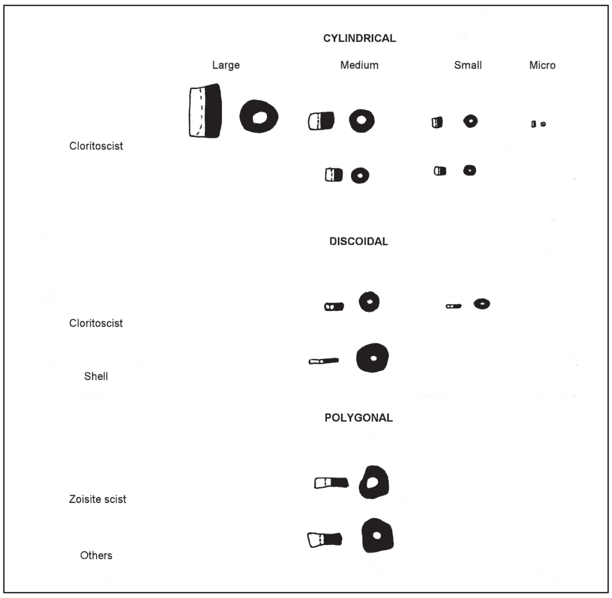

Fig. 5: RH-5: typology of the bead types (drawing by A. Pisan).

were analysed by SEM-EDS. Samples were prepared embedding fragments in epoxy resin and preparing polished thin section for optical microscopy and SEM-EDS. Major element compositions of minerals and back-scattered (BSE) electron images were acquired at the Dipartimento di Scienze della Terra e Geologico-Ambientali, Università di Bologna, using a Scanning Electron Microscope (SEM) Philips 515B fitted with an EDAX DX4 micro-analytical device. The study allowed classifying the samples in the following groups:

1) carbonates, of organic origin most probably shell or mother-of pearl, or even coral (1d and 2a). Samples display a characteristic structure (Fig. 6a) with fibrous crystals arranged side by side. Composition is probably aragonite ($CaCO_3$).

2) chloritites (1a1, 1b2, 1b3, 1c1, 1c2 and b2), about 70% of the samples: in thin section all samples display a more or less dark green colour and are fine-grained. Images of Fig. 6a to 6f depict the structure characterized by fine-grained chlorite with variable amounts of oxides (ilmenite, magnetite). Chlorites, following the classification of Zane and Weiss, 1998 (Fig. 7), are Mg-Fe chlorites.

3) prehnite-bearing chloritite, composed of chlorite and calcium silicates (1b1; Fig. 6g). This sample is composed mainly of Mg-Fe chlorite and a calcium silicate, prehnite ($Ca_2Al_2Si_3O_{10}(OH)_2$).

4) serpentinite with typical green-yellow colour. Main component is serpentine and possibly additional magnetite and olivine (1e).

5) A non–better defined material (1a2; Fig. 6h) containing clay mineral, illite and widespread silica (SiO_2).

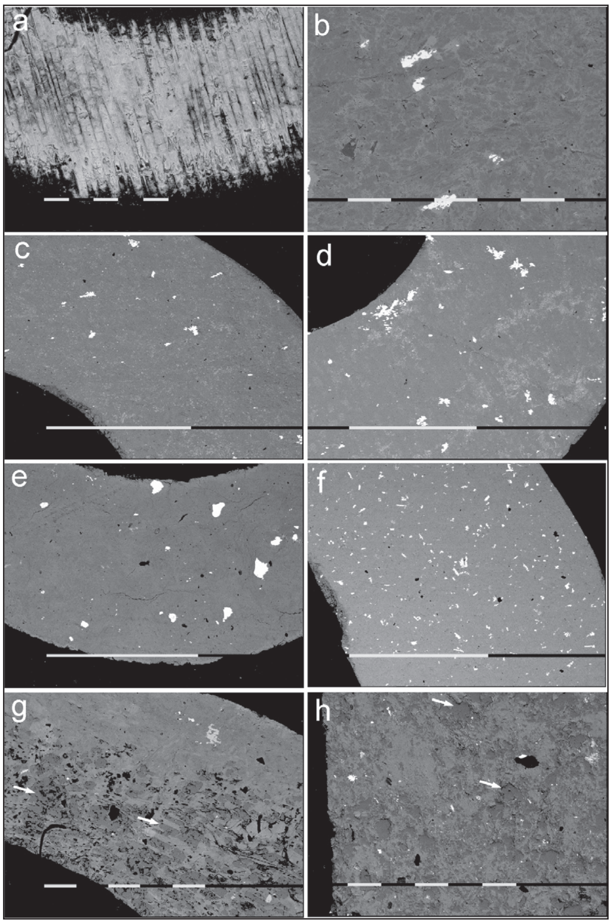

Fig. 6. RH-5: Scanning electron microscope backscattered electron images (magnification, black-white bar scale, 0.1 mm for images a, b, g, h; 1 mm for c, d, e, f). a) HWO/CD, layer 3d n.682, aragonite crystals arranged side by side. b) HWB/A, layer 3, chlorite plus minor ilmenite (light white); c) HWJ/AB 2, bead section with fine-grained chlorite and scarce ilmenite; d) HXG/BC, layer 3d n. 603, bead section with fine-grained chlorite and patches of ilmenite and Fe-oxides; e) Pit HWA-HWB 21 n. 463, fine-grained chlorite with large lmenite grains; f) HXF/AB, layer 3d, fine-grained chlorite with diffused prismatic ilmenite grains; g) HKX/AB, layer 5a, bead section with prehnite crystals (arrows) inside fine-grained chlorite; h) HWY/CD, layer 1"clay" matrix with diffused silicification (arrows).

The most abundant type of beads (group 2) are made up of chloritites. Chloritites are made almost completely of Mg-Fe chlorites, varying slightly in composition from sample to sample and also in the same sample, with minor Fe-Ti oxides (ilmenite) and scarce accessory minerals (Fe oxides, titanite). These low grade metamorphic rocks are diffused as veins inside hydrothermally altered ultrabasic to basic rocks which constitute the well known Semail nappe wich outcrops with continuity along the coast of northern Oman (Geology and Minerals, 1985; David, 2002). The prehnite in group 3 is a common hydrothermal to low grade metamorphic minerals while serpentine is widespread in ophiolites. The low to moderate hardness of chlorite and the texture of rocks made them suitable for bead manufacturing.

3.2.1 Discussion

Differences have been observed between white and dark beads. The white (very light grey and very light yellow specimens of class 2a) are mainly discoid, while the pinkish white ones are almost exclusively cylindrical. In contrast, the dark beads are mainly cylindrical, while the discoid types are rare; no evidence of any correlation between shape, colour and material has been noticed. According to their dimension few differences were observed. The diameter of the white, discoid types is wider than that of the brown discoid, while the white cylindrical specimens are longer than the brown, discoid specimens. In contrast, the size of the hole of the white pieces is narrower; amongst the dark beads the hole of the discoid specimens is wider than that of the cylindrical ones.

To sum up, most of the elements are cylindrical (85.4%) and dark (77.6%). Nevertheless 1) the percentage of the white and dark, cylindrical specimens is almost identical (83.4% darks, 79.8% whites); 2) the discoid shape prevails among the whites (6.2% darks, 18.7% whites); 3) the polygonal shape is characteristic of the dark specimens, more precisely of those of class 1b1); 4) the cylindrical types of the two

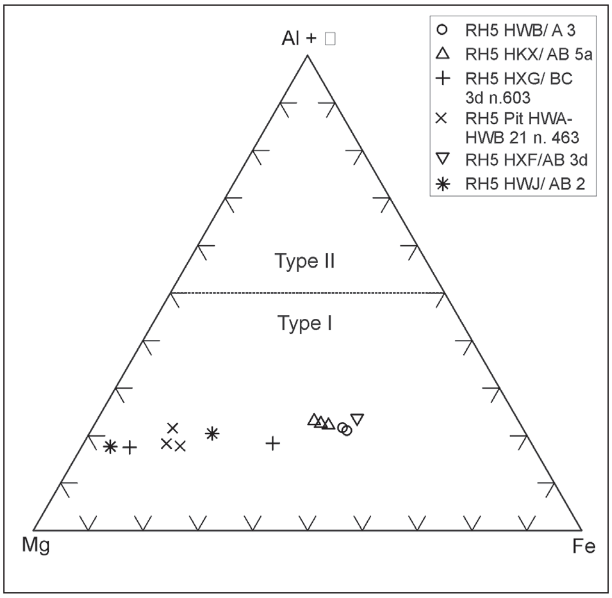

Fig. 7. RH-5: Chlorite classification diagram (Zane and Weiss, 1998) for studied samples.

main colour classes do not show any significant difference both in diameter (average size 4.5 mm darks, and 4.8 mm whites) and length (average size 2.5 mm darks, 2.3 mm whites); 5) the white discoidal are often wider than the darks (average diameter 9 mm darks, 12 mm whites; average length 1.3 mm darks, 2 mm whites); 6) the diameter of the polygonal elements ranges from 10 to 19 mm and their length from 4 to 6 mm; 7) the dimension of the whites is more variable than that of the darks (Fig. 4); 8) the number and percentage of the dark elements are always higher than that of the whites throughout the entire sequence, reaching a peak of 86.53% in layer 3d (see Table 1).

Both cylindrical and discoid elements are represented in the entire sequence, although their size varies according to the different occupation periods. It is interesting to point out the presence of very tiny elements from the central part of the series (layers 3d-3) (Fig. 8), and that the discoidal beads from the lowermost layers are shorter, while their size increases in the upper ones. Furthermore their dimension is almost standardised, in the central layers, and all the white specimens from layer 3b are cylindrical.

The dark beads are mainly obtained from chloritoschists of variable colour and texture. Zoisite schist, serpentinites, and unidentified illite rich specimens are known only from layer 5a. The white, cylindrical types are mainly variegated, while the discoid ones show a more standardised colour.

3.3. Technological analysis

The technological analysis of RH-5 beads

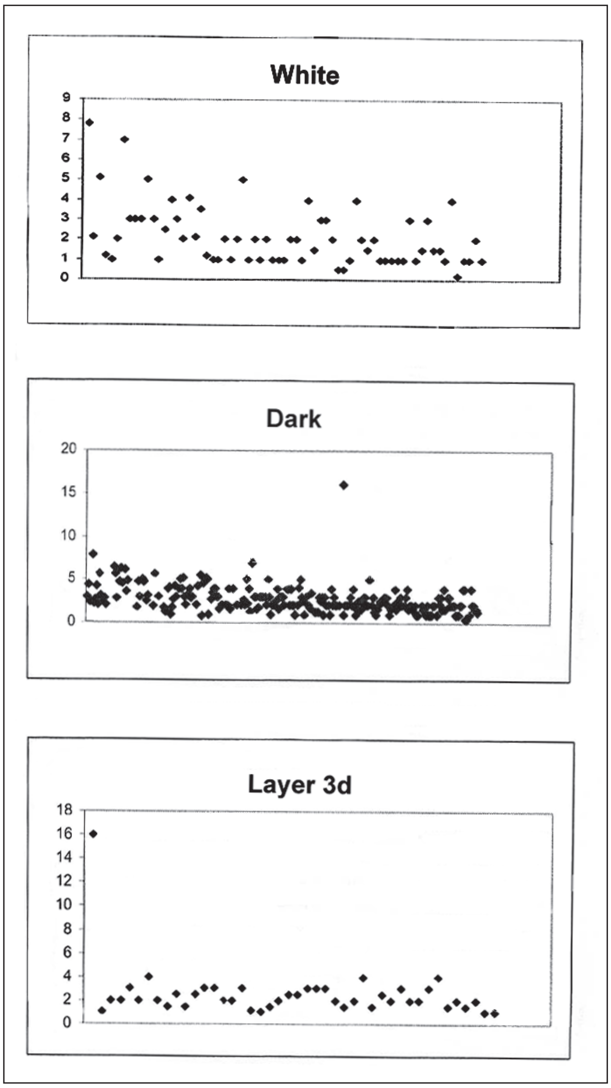

Fig. 8: RH-5: length/number diagrams of the dark, white, and layer 3d beads (drawing by A. Pisan).

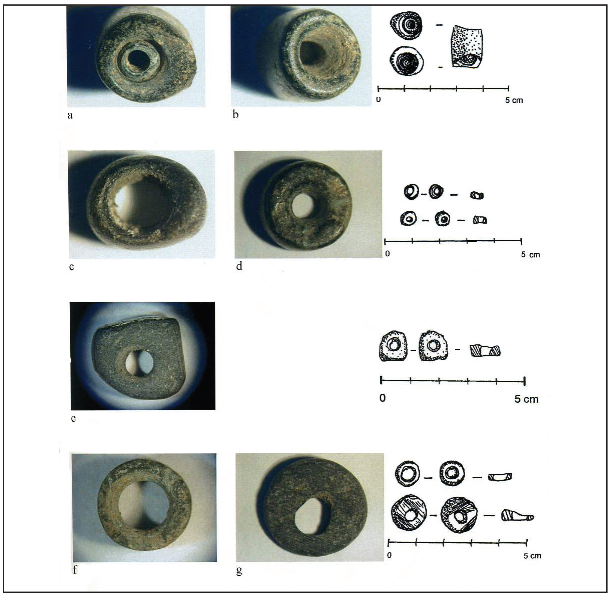

Fig. 9: RH-5: bead types according to their colour classes with the indication of their square or structure and layer of recovery: a) and b) 1a1 (HXP/CD, layer 3d), c) 1a2 (HWY/CD, layer 1), d) 1b1 (HXP/CD, layer 4), e) 1b2 (HXK/AB, layer 5a), f) 1b3 (Pit HWE/B, layer 0), g) 1b3 (KCE/CD, layer 1) (from Pisan, 2005-2006: fig. 5).

has been made by an optical microscope, in order to recognise any elements useful for the reconstruction of their operative chain, in the settlement site. It is well known that archaeological tools are indicators of workmanship activity. In effect some authors consider each artefact a microscopic archaeological context, with its specific characteristics, given that each tool shows physical and/or chemical components that derive from the technological processes, which mark its manufacture phases. As a consequence they can be considered important micro-indicators of craftsmanship activities (Vidale, 1992).

Concerning the RH-5 beads, manufacture traces have been identified on a few objects. They consist of 1) parallel, unidirectional striations, 2) multidirectional striations, 3) grooves, 4) cut (incision) marks, 5) one or more cut mark on their entire faces, and 6) abrasions in the centre of the faces, which recur only on unpierced specimens. These traces are not homogeneously distributed on their surfaces, given that they recur with different percentages and characteristics, according to the material employed for their production.

For instance the cloritoschists elements, which are all pierced, often show unidirectional and multidirectional striations. They are all of a rounded or slightly elliptical shape, with an irregular and/or rather asymmetrical hole. A unique case comes from layer 3d, square HXP/CD. A cylindrical specimen from this context, with an asymmetrical, bipolar perforation, shows an unfinished bead carved inside one face of the small cylinder in the same direction of the piercing (Fig. 9a and 9b). The unfinished, inner bead might have been obtained by a circular incision. A few blackish elements show a very well refined, bright surface, which might indicate polishing.

The zoisite schist beads, and one specimen obtained from unidentified material rich in illite, are all of polygonal shape and pierced. The hole is perfectly circular in the centre of the beads. They show grooves and unidirectional striations; only one has a cut mark along one edge. The assemblage yielded only three serpentinites, ovoid plaquettes. They are all well refined, with rounded edges, and polished surfaces. They show a shallow cup mark entirely covered with rough, unidirectional striations, in the centre of one face.

The beads from carbonatic material are more worn than those from stone, which made their analysis far more difficult. Nevertheless few of them show traces of parallel striations on their faces and edges, cut marks on one face, and one or more incisions on their surface(s), from the hole to the edge (Fig. 10).

4. Conclusion

Although the importance of communication and trade between the shores of the Gulf and the Arabian Sea during the Holocene has already been pointed out by several authors (Potts, 1990; Cleuziou, 2004; Biagi, 2008; Boivin and Fuller, 2009), it is nevertheless becoming more and more clear that the trading networks reached their apex during the Bronze Age, when the movements of goods extended well far beyond the coasts of the Arabian Peninsula (Kenoyer, 1998; Ray, 2003; Ratnagar, 2004).

Within this complex framework, it is important to point out the existence of fifth millennium uncal BP shell-middens along the coast of the Oman Peninsula, with complex and variable characteristics. Their study is supposed to contribute to the definition of the long-trade, seafaring activities that took place between the (coastal) sites, which started to be seasonally inhabited, since the period when the seashores reached the present-day level (Lambeck, 1996). It is on the basis of the above observations that we stress the importance of beads for a better understanding of this fundamental topic (De Waele and Haerink, 2006).

Apart from RH-5, a few other Omani aceramic shell-middens, have yielded bead assemblages, although little has so far been published about this topic (see for instance Panei et al., 2005). Among these sites is GAS-1 at Wadi Shab (Tosi and Usai, 2003; Usai and Cavallari, 2008), radiocarbon-dated, from soil, to the end of the sixth millennium BP (Biagi 2004). GAS-1 is of major importance because of the high number of stone and shell beads, rough-outs at different stages of manufacture, as well as flint perforators, which suggest the existence of workshops for the production of different types of beads.

Among the other sites are 1) RH6, the oldest shell-midden of the Qur'm/Ra's al-Hamra region, radiocarbon-dated to the second half of the seventh millennium uncal BP (Biagi, 1994; 1999), which yielded a few beads from the entire settlement sequence; 2) the shell-midden of Khor Milkh (Uerpmann and Uerpmann, 2003), which yielded chlorite/serpentinites, talc and calcite beads of different shapes, as well as rather long specimens, whose provenance could not be defined with certainty within the complexity of the orography of the Oman mountain chain (Schöler, 2003), although this site did not yield any evidence for bead manufacturing activities; 3) al-Haddad, where a workshop for the manufacture of Engina mendicaria marine shells has been identified (Charpentier et al., 1997). The site yielded also other types of cylindrical and discoid beads obtained from chloritoschists and soft rocks; 4) Suwayh (SWY-2), which gave chlorite beads of cylindrical and tubular shape, as well as gina mendicaria specimens (Charpentier et al., 1998); 5) the bay of Bandar Khayran where, from the surface of the small island BK-3, a long limestone bead, pierced at both ends, was collected in the 1980s from a context radiocarbon-dated, from marine shells, to the late sixth millennium uncal BP (Biagi, 1988: fig. 2); 6) Ra's al-Khabbah, a fifth millennium uncal BP shell-midden (Magnani et al., 2007) from which is reported the presence of many exogenous serpentinite beads and shell specimens, which had been locally produced (Cavulli, 2004; Cavulli and Scaruffi, in press); and 7) Wadi Wuttaya, whose excavation yielded both shell and dark stone beads (Uerpmann and Uerpmann, 2003).

If we extend our comparisons to the Emirates, we must emphasise the importance of the graveyard of al-Buhais 18, where some 19,000 beds of different types and sizes have been recovered (de Beauclair et al., 2006). It is on the basis of the data from this site that relationships with other areas of the region, from which centres of bead production are known (see for instance Piperno, 1973), have been suggested (de Beauclair, 2005-2008).

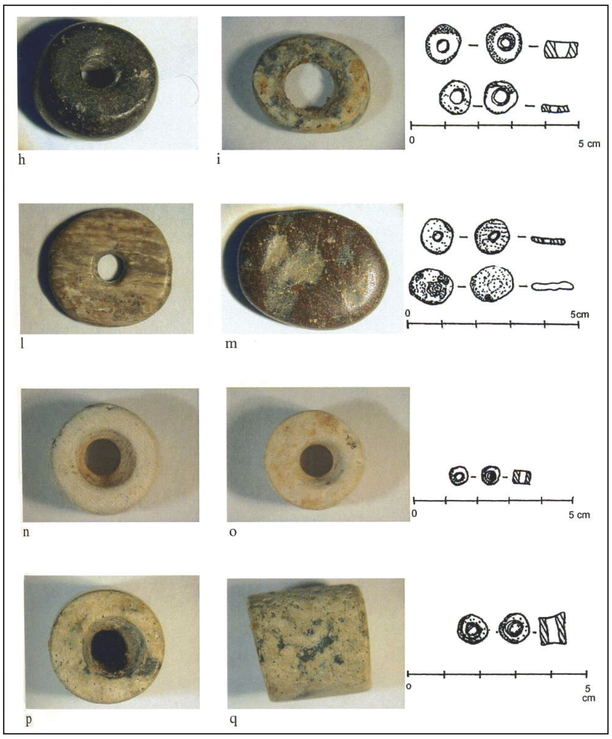

Fig. 10: RH-5: bead types according to their colour classes with the indication of their square or structure and layer of recovery: h) 1c1 (HXK/AB, layer 1), i) 1c2 (HWJ/AB, layer 2), l) 1d (HWO/CD, layer 3d), m) 1e (HXL/CD, layer 5a), n and o) 2a (HXG/BC, layer 3d), p and q) 2b) (Pit HWE/B, layer 0) (from Pisan, 2005-2006: fig. 6).

Reverting to RH-5, we have to point out that beads are mainly attested from the settlement site. They are very scarcely represented at the cemetery area, where S. Salvatori (2007: 52) suggests that some 280-300 individuals had been buried, in three different layers, with variable rituals (Méry and Charpentier, 2009: 21). Beads recur within the grave goods of only 15 burials in the form of both bracelets and necklaces.

The impression is that beads were not produced at RH-5 given the absence of their waste products, which are so common at sites from which workshops are known (see for instance Vidale, 1987; 1992; 2000), and chipped stone tools utilised for their manufacture, among which are drills and perforators (Vidale, 1995). In contrast, these characteristics occur at Wadi Shab, GAS-1, a unique site, which cannot be described as a shell-midden (Biagi, 2004). It is now clear that the study of beads, and their manufacture centres, would greatly contribute to a more comprehensive picture of the production activities of the fifth millennium uncal BP fisher-gatherers who inhabited the coasts of Oman, their complex movements and international seafaring activities (Cleuziou, 2004).

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ملخص: عثرت البعثة الآثارية الايطالية أثناء حفرياتها في موقع المخلفات الغذائية RH-5 في مسقط على ٣٧٤ خرزة من الأصداف البحرية والحجرية ذات أحجام وأشكال مختلفة. وتناقش هذه الورقة تسلسلها الزمني، وأصنافها، ومادتها الأولية الطبيعية، وتقنية تصنيعها، وانتشار تداولها على طول الساحل الجنوبي لبحر العرب إبان الألفية الخامسة قبل الزمن الحالي. ويشير الباحثون إلى احتمال تصنيعها خارج الموقع بدليل قلة العدد الذي اكتشف في مقبرة واسعة جرى حفرها في الوقت نفسه. كما تم التركيز في هذه الحقبة الزمنية على مراكز التصنيع والدور الخاص الذي لعبته مواقع مخلفات الاستيطان الغذائية الساحلية.

Notes:

(1) Colours of the Munsell Color Charts.

References

Beck, H.C. 1928. “Classification and Nomenclature of Beads and Pendants”, **Archaeologia**, LXXVII: 44-77.

Beck, H.C. 1941. “Beads from Niniveh”, **Antiquity**, 5: 427-437.

Bednarik, R.G. 1993. “Palaeolithic Art in India”, **Man and Environment**, 18 (2): 33-40.

Bednarik,R.G.2006.“Beads,SymbolismandSelf-awareness”, **Cognition and symbolism in human evolution**. Semiotix Course. Lecture n.4, Toronto.

Biagi, P. 1988. “Surveys along the Oman Coast: Preliminary Report on the 1985-1988 Campaign”, **East and West**, 38 (1-4): 195-219.

Biagi, P. 1994. “A radiocarbon chronology for the aceramic shell-middens of coastal Oman”, **Arabian Archaeology and Epigraphy**, 5 (1): 17-31.

Biagi, P. 1999. “Excavations at the shell-midden site of RH6 1986-1988 (Muscat, Sultanate of Oman)”, **Al-Rāfidān**, XX: 57-84.

Biagi, P. 2004. “Surveys along the Oman Coast: A Review of the Prehistoric Sites Discovered between Dibab and Qalhāt”, **Adumatu**, 10: 29-50.

Biagi, P. 2008. “The shell-middens of the Arabian Sea and

Gulf: maritime connections in the seventh millennium BP?". In Al-Ansary, A.R., Al-Muaikel, K.I. and Alsharekh, A.M. (eds.) **The City in the Arab World in Light of Archaeological Discoveries: Evolution and Development**. Abdul Rahman Al-Sudairy Foundation, Riyadh: 7-16.

Biagi, P. and Nisbet, R. 1999. "The shell-midden sites of RH-5 and RH-6 (Muscat, Sultanate of Oman) in their environmental setting", **Archaeologia Polona**, 37: 31-47.

Biagi, P. and Nisbet, R. 2006. "The prehistoric fisher-gatherers of the western coast of the Arabian Sea: a case of seasonal sedentarisation?", **World Archaeology**, 38 (2): 220-238.

Biagi, P. and Salvatori, S. 1986. "Gli scavi nell'insediamento preistorico e nella necropoli di Ra's al-Hamra 5 (Muscat - Oman), 1980-1985", **Rivista di Archeologia**, X: 5-14.

Biagi, P., Torke, W., Tosi, M. and Uerpmann, H-P. 1984. "Qurum: a case study of coastal archaeology in Northern Oman", **World Archaeology**, 16 (1): 43-61.

Boivin, N. and Fuller, D. 2009. "Shell Middens, Ships and Seeds: Exploring Coastal Subsistence, Maritime Trade and Dispersal of Domesticates in and Around the Ancient Arabian Peninsula", **Journal of World Prehistory**, 22: 113-180.

Cavulli, F. 2004. "L'insediamento di KHB-1 (Ra's al-Khabbah, Sultanato dell'Oman): lo scavo, i resti strutturali e i confronti etnografici", **Ocnus: Quaderni della Scuola di Specializzazione in Archeologia**, 12: 37-48.

Cavulli, F. and Scaruffi, S. in press. "The Middle Holocene Settlement of KHB-1 (Ra's al-Khabbah, Sultanate of Oman): an overview". In Giraud J. and Gernez G. (eds.) **Aux Marges de l'archéologie: ouvrage à la mémoire de Serge Cleuziou**. Collection Travaux de la Maison René-Ginouvés, De Boccard, Paris.

Charpentier, V., Blin, O. and Tosi, M. 1998. "Un village de pêcheurs néolithiques de la péninsule d'Oman : Suwayh 2 (SWY-2), première campagne de fouille", **Proceedings of the Society for Arabian Studies**, 28 : 21.37.

Charpentier, V., Cremaschi, M. and Demnard, F. 1997. "Une campagne archéologique sur un site côtier du Ja'lan : Al-Haddad (BJD-1) et sa culture matérielle (Sultanate d'Oman)", **Proceedings of the Society for Arabian Studies**, 27 : 99-111.

Cleuziou, S. 2004. "Purquoi si tard? Nous avons pris un autre chemin. L'Arabie des chasseurs-cuillerurs de l'Holocéne au Début de l'Age du Bronze". In Guilaine J. (ed.) **Au marges des grands foyers du Néolithique. Périphéries débitrices ou créatrices?** Errance, Paris : 123-148.

Coppa, A., Macchiarelli, R., Salvatori, S. and Santini, G. 1985. "The prehistoric graveyard of Ra's al-Hamra 5 (RH-5). A short preliminary report on the 1981-1983 excavations", **The Journal of Oman Studies**, 8 (1): 97-102.

David, H. 2002. "Soft Stone Mining Evidence in the Oman Peninsula and its Relation to Mesopotamia". In Cleuziou, S., Tosi, M. and Zarins, J. (eds.) **Essays of the Late Prehistory of the Arabian Peninsula**. Serie Orientale Roma, XCIII: 317-335. IsIAO, Rome.

De Beauclair, R. 2005-2008. "La parure funéraire de la nécropole néolithique d'al-Buhais 18 (Émirates Arabes Unites), **Préhistoire Anthropologie Méditerranéennes**, 14 : 39-52.

De Beauclair, R., Jasim, S.A. and Uerpmann H.-P. 2006. "New results on the Neolithic jewellery from al-Buhais 18, UAE", **Proceedings of the Society for Arabian Studies**, 36: 175-187.

De Waele, A. and Haenrick, E. 2006. "Etched (carnelian) beads from northeast and southeast Arabia", **Arabian Archaeology and Epigraphy**, 17: 31-40.

Durante, S. and Tosi, M. 1977. "The aceramic shell middens of Ra's al-Hamra: a preliminary note", **The Journal of Oman Studies**, 3: 137-162.

Geology and Minerals, 1985. **Geology and Minerals of the Sultanate of Oman**. Sultanate of Oman, Ministry of Petroleum and Minerals, Muscat.

Kenoyer, J.M. 1998. **Ancient Cities of the Indus Valley Civilization**. Oxford University Press, Oxford, New York, Delhi.

Kenoyer, J.M., Vidale, M. and Bahn, K.K. 1991. "Contemporary stone beadmaking in Khambat, India: patters of craft specialization and organization of production as reflected in the archaeological record", **World Archaeology**, 23 (1): 44-63.

Konstantinidi, E.M. 2002. "Jewellery Revealed in the Burial Contexts of the Greek Bronze Age", **BAR International Series**, 912. Archaeopress, Oxford.

Lambeck, K. 1996. "Shoreline reconstructions for the Persian Gulf since the last glacial maximum", **Earth and Platenary Science Letters**, 142: 43-57.

Magnani, G., Bartolomei, P., Cavulli, F., Esposito, M., Marino, E.C., Neri, M., Rizzo, A., Scaruffi, S. and Tosi, M. 2007. "U-series and radiocarbon dates on mollusc shells from the uppermost layer of the archaeological site of KHB-1, Ra's al Khabbah, Oman", **Journal of Archaeological Science**, 34: 749-755.

Mastykova, A. 1998. "Glass beads as an archaeological source". In Milliken S. and Vidale M. (eds.) "Craft Specialization: Operational Sequence and Beyond", **BAR International Series**, 720: 139-143. Archaeopress, Oxford.

Méry, S. and Charpentier, V. 2009. "Rites funéraires du Néolithique et de l'âge du Bronze ancien en Arabie Orientale". In Guilaine, J. (ed.) **Sépoltures et Sociétés Du Néolithique à l'Histoire**. Errance, Paris: 11-40.

Panei, L., Rinaldi, G. and Tosi, M. 2005. "Investigations on ancient beads from the Sultanate of Oman (Ra'ss al-Hadd - Southern Oman)" **ArcheoSciences, Revue d'Archéometrie**, 29: 151-155.

Piperno, M. 1973. "Micro-drilling at Shahr-I Sokhta: the making and use of the lithic drill heads". In Hammond, N. (ed.) **South Asian Archaeology**. Duckworth, London: 119-129.

Pisan, A. 2005-2006. **Le perline di Ra's al-Hamra 5 (Sultanato d'Oman)**. Thesis presented for a Dott. Degree, Ca' Foscari University, Venice, Faculty of Letters and Philosophy (unpublished).

Potts, D. 1990. **The Arabian Gulf in Antiquity. Volume 1. From the Prehistory to the Fall of the Achaemenid Empire**. Clarendon Press, Oxford.

Ratnagar, S. 2004. **Trading Encounters. From the Euphrates to the Indus in the Bronze Age**. Oxford University Press, New Delhi.

Ray, H.P. 2003. **The Archaeology of Seafaring in Ancient South Asia**. Cambridge University Press, Cambridge.

Salvatori, S. 1996. "Death and Ritual in a Population of Coastal Food Foragers n Oman". In Afanas'ev, G., Cleuziou, S., Lukacs, J.R. and Tosi, M. (eds.) **The Prehistory of Asia and Oceania**. XII International Congress of Prehistoric and Protostoric Sciences, Colloquia. A.B.A.C.O., Forlì: 205-222.

Salvatori, S. 2007. "The Prehistoric Graveyard of Ra's Al Hamrā 5, Muscat, Sultanate of Oman". **The Journal of Oman Studies**, 14: 5-202.

Santini, G. 1987. "Site RH10 at Qurum and the preliminary analysis of its cemetery", **Proceedings of the Society for Arabian Studies**, 17: 179-198.

Sciama, L.D. and Eicher, J.B. 2001. **Beads and bead makers: gender, material culture and meaning**. Oxford International Publishers, Oxford.

Schöler, S. 2003. "Mineralogical and Petrological Examination of Some Objects Found at Khor Milkh, Sultanate of Oman". In Uerpmann, H-P. and Uerpmann, M. (eds.) **Stone Age Sites and Their Natural Environment. The Capital Area of Northern Oman Part III**. Beihefte zum Tübinger Atlas der Vorderen Orients. Reihe A (Naturwissenschaften) Nr. 31/3: 143-162. Ludwig Reichter, Wiesbaden.

TAVO, 2003. **Tübingen Atlas Vorderen Orients**, Universität Tübingen, Tübingen.

Tosi, M. 1975. "Notes on the distribution and exploitation of natural resources in ancient Oman", **The Journal of Oman Studies**, 1: 187-206.

Tosi, M. and Usai, D. 2003. "Preliminary report on the excavations at Wadi Shab, Area 1, Sultanate of Oman", **Arabian Archaeology and Epigraphy**, 14: 8-23.

Uerpmann, H-P. and Uerpmann, M. 2003. **Stone Age Sites and Their Natural Environment. The Capital Area of Northern Oman Part III**. Beihefte zum Tübinger Atlas der Vorderen Orients. Reihe A (Naturwissenschaften) Nr. 31/3. Ludwig Reichter, Wiesbaden.

Usai, D. and Cavallari, A. 2008. The lithic industry of Wadi Shab, a Middle Holocene site on the coast of Oman", **Arabian Archaeology and Epigraphy**, 19:121-133.

Van der Sleen, V.G.N. 1973. **A Handbook on Beads**. George Shumway Publications, New York.

Vidale, M. 1987. "Some Aspects of Lapidary Craft at Mohenjodaro in the Light of the Surface Record of the Moneer South East Area", **Interim Reports**, 2: 113-149. Aachen, Rome.

Vidale, M. 1989. "Early Harappan Steatite, Faience and Paste Beads in a Necklace from Mehrgarh-Nausharo (Pakistan)", **East and West**, 39 (1-4): 291-300.

Vidale, M. 1992. **La produzione artigianale protostorica**. Laboratorio del Piovego, Padova.

Vidale, M. 1995. "Early Beadmakers of the Indus Tradition. The Manufacturing Sequence of Talc Beads at Mehrgarh in the 5th Millennium BC", **East and West**, 45 (1-4): 45-81.

Vidale, M. 2000. **The Archaeology of the Indus Crafts. Indus Craftspeople and the Way we Study them**. Reports and memoirs, Series Minor, IV. IsIAO, Rome.

Zane, A. and Weiss, Z. 1998. "A procedure for classifying rock-forming chlorites based on microprobe data", **Rendicondi dell'Accademia Nazionale dei Lincei**, Classe di Fisica, 9: 51-56. Rome.