

CERTAIN ISSUES OF CARNELIAN BEADS AND PENDANTS  
FROM THE SAMTAVRO CEMETERY

სამთავროს სამაროვნის სარდონის მძივებისა და  
საკიდების შესწავლის საკითხისათვის

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**Abstract.** The present paper is an introduction of the research on the carnelian beads and pendants discovered in the Samtavro Cemetery – on one of the most important sites from the eastern part of Georgia, where from the Early Bronze Age (middle of the third millennium BC) the 3000 years history of the community buried here is continuously represented and it is the main reason why this monument was selected for study the typological and chronological classification of carnelian beads. Here we can trace the development of carnelian beads and pendants over a fairly large chronological framework: in 311 various types of burial complexes dated back to the 17<sup>th</sup> c. BC – 8<sup>th</sup> c. AD 14,655 units of beads and pendants were attested. According to the mineralogical studies, it was determined that most of the raw material used for carnelian artefacts are identical to the agate-chalcedony deposits in Georgia; as for classification, we grouped the beads and pendants into five main chronological groups and determined the general features characteristic of each period.

**Key words.** Cemetery; Carnelian; Bead; Pendant;

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**აბსტრაქტი.** წინამდებარე ნაშრომი წარმოადგენს საქართველოს აღმოსავლეთ ნაწილში მდებარე უმნიშვნელოვანეს ძეგლზე, სამთავროს სამაროვანზე აღმოჩენილი სარდიონის მძივების კვლევის შედეგებს. სამაროვანზე დაკრძალული საზოგადოების 3000-წლიანი ისტორია ადრე ბრინჯაოს ხანიდან (ძვ. წ. III ათასწლეულის შუახანები) განუწყვეტლივ არის წარმოდგენილი და ეს არის მთავარი მიზეზი იმისა, რომ ეს ძეგლი შეირჩა სარდიონის მძივების ტიპოლოგიური და ქრონოლოგიური კლასიფიკაციის შესადგენად. აქ ჩვენ შეგვიძლია თვალი გავადევნოთ სარდიონის მძივების ევოლუციას საკმაოდ დიდ ქრონოლოგიურ მონაკვეთში - ძვ.წ. XVII – ახ.წ. VIII საუკუნეებით დათარიღებულ 311 სხვადასხვა ტიპის სამარხში საერთო ჯამში 14655 სარდიონის მძივი დადასტურდა. მინერალოგიური კვლევების შედეგად დადგინდა, რომ სარდიონის არტეფაქტებისთვის გამოყენებული ნედლეულის უმეტესობა საქართველოში არსებული აქატ-ქალცედონის საბადოების იდენტურია; რაც შეეხება კლასიფიკაციას, ჩვენ დავაჯგუფეთ მძივები ექვს ძირითად ქრონოლოგიურ ჯგუფად და დავადგინეთ თითოეული პერიოდისთვის დამახასიათებელი ზოგადი ნიშნები.

**საკვანძო სიტყვები.** სამაროვანი; სარდიონი; მძივი; საკიდი;

**Introduction.** As far back as prehistoric times man had a constant aspiration to express his spiritual world and personal identity through aesthetics. Beads have been interpreted as one of the oldest and main markers of social, spiritual and artistic values in the international scientific community. Their thorough research determines the level of development and social ties of different societies.

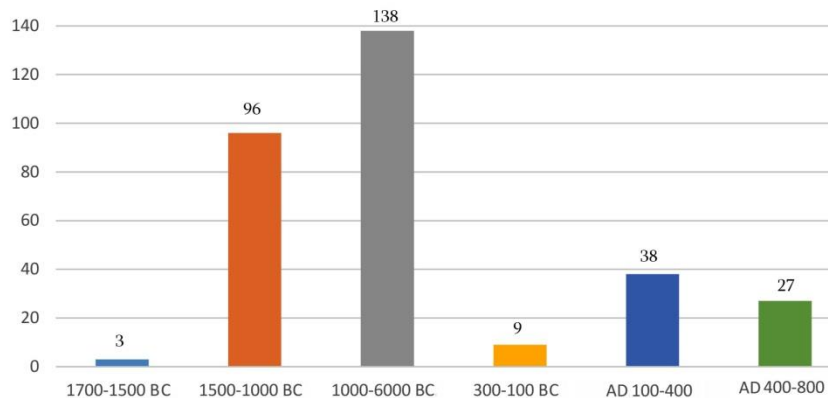
In Georgia widespread use of beads and jewelry is associated namely to the Early Farming Culture (8<sup>th</sup>-6<sup>th</sup> millennia BC). At this time, the high level of artistic taste is evidenced not only by the ornamental motifs of ceramics and sculptures, but also by a wide variety of jewelry. Due to the fact that Georgia is rich in various mineral resources, especially the mineral of the Agate-Chalcedony group, the prehistoric community residing here was soon attracted by the diverse and picturesque pebbles abundantly available along the rivers banks. Later, the purposeful exploitation of mineral deposits was started, which is confirmed by the special abundance of carnelian material on various monuments of Georgia and the discovery of unprocessed mineral brought to the archaeological sites from local deposits. In Georgia carnelian adornments dated back to the 3<sup>rd</sup> millennium BC onwards are abundantly discovered on the sites; well-crafted beads and pendants of different shapes are created, and often they are imitated and used in combination with goldsmith patterns, indicating on their specific meaning and value. The oldest jewelry made of carnelian on the territory of Georgia, a teardrop-shaped bead-pendant, was found in the Kotias Kldis Mghvime (8<sup>th</sup> millennium BC, GNM-10-2004: 769). Also ancient are the roughly processed bead-pendants of carnelian and chalcedony found on Arukhlo and Khramis Didi Gora (5<sup>th</sup> millennium BC) (Hansen, Mirtskhulava, 2013). From this period pendants and necklaces made of beads are one of the most widely used types of old jewelry in the history of mankind (Lordkipanidze, 2012).

Samtavro is the largest ancient cemetery known in the Caucasus. Covering an area approximately of 20 hectares; is situated on the northern fringe of Mtskheta (41°51' N and 44°43' E) on the right bank of the River Aragvi (Figure 1). The cemetery was intensely used during the Late Bronze-Early Iron Ages (Abramishvili 2003: 10-26). The site was again heavily utilized during the late Roman period (Sagona et al., 2015: 315).



**Figure 1.** Map of Georgia./the area of the carnelian deposit; ○ Samtavro cemetery

Among the different burial complexes of the site (Figure 2) carnelian jewelry is presented with special abundance and variety. According to current data the bead-jewelry is confirmed in 311 different types of tombs dating from the 17<sup>th</sup> c BC – to 8<sup>th</sup> c. AD. The main part of carnelian was discovered on the late Bronze-Early Iron Age cemeteries. Carnelian beads and pendants were discovered in 96 out of 300 graves dated to the Late Bronze Age and 138 out of 300 graves dated to the Iron Age. However, it must be noted that about 8% of carnelian beads discovered on the Samtavro cemetery are out of contexts and we did not take them into consideration by means of statistics and chronological classification. They include many well-made and exotic examples, which though must be dated through comparative dating.



**Figure 2.** Number of burials in different chronological groups

### Methods:

Carnelian, a member of the chalcedonic quartz family is one of the most popular and widespread semi-precious stones since ancient times. It's most attractive visual, dark red colour variation is determined by the level of iron oxides in it, while the yellowish-red colour is due to iron hydroxide. There are significant differences in the quality of carnelian. High-quality carnelian are considered to be homogenous reddish, yellowish, or orange, mostly translucent and dazzling stone; while low-quality carnelian is characterized by abundant inserts, non-uniform colours, cracked and eroded texture.

As it seems, improving the appearance of low quality carnelian was practiced by the society since they began to appreciate this very type. The desired red or darker colour of colourless or pale reddish-yellow carnelian can be obtained artificially by heating the mineral (Kenoyer, 2003: 14-19). Ethnographic parallels, especially from India, reveal that heating or baking of stone also was used to facilitate their chipping (Roux, 1995: 39-44).

For then society carnelian was available in the eastern desert of Egypt, Iran, India, north and south Caucasus, Italy, Crimea and various parts of the Europe in the forms of water-worn pebbles (Andrews, 1990: 41; Keel, 1995: 144-145; Aston et al., 2000: 26-27; Spaer, 2012: 507; Golani, 2013).

Today, on the territory of Georgia more than 40 sites are known for the mineralisation of agate and chalcedony. Industrial facilities are concentrated in four main regions, which administratively belong to: Akhaltsikhe, Adigeni, Kaspi, Marneuli and Terjola municipalities (Figure 1). In addition,

small outcrops are found in almost the entire territory of Georgia, where raw materials and their outcrops related to Jurassic, Cretaceous and Paleogene volcanic formations have been identified (Poporadze, Zukhbaia 1998: 247-251). In the framework of mineralogical studies, 60 samples of carnelian beads from different chronological groups were observed in the laboratory of the Department of Geology of the Georgian Technical University by means of optical microscope (Amscop PZ600T), X-ray fluorescence (EDXR 3600B) and X-ray phase analysers (DRON3) and compared with geological data from the region of Akhaltsikhe, Adigeni, Kaspi, Marneuli and Terjola. It became evident that the main source of raw material for the beads of the Agate-Chalcedony group from the Samtavro Cemetery most likely is the local *Chockrakian* sediments, which are concentrated within a radius of about 50 km from the Samtavro Cemetery (Figure 1). As a result of geological works in these sediments researches have attested abundant material knurled with quartz-agate-chalcedony mineral varieties including: quartz, black flint, agate, carnelian, red jasper and chalcedony. The raw materials used to make beads are mostly heterogeneous, they differ in colour, transparency and texture due to colour variability, polymorphic varieties, or different chemical compositions. The heterogeneity of raw materials mainly depends on the geological conditions of their origin. The heterogeneity of the raw materials in the *Chockrakian* sediments is mainly due to the different colours. The raw materials of the Bajosian porphyry series, agate of Panache and Shurdo, along with colour, are also characterized by different polymorphic varieties. The process of mineral formation covers different stages - generation (Poporadze, Zukhbaia, 1998: 247-251). The following elements are found in the composition of beads together with the main elements (Si, O): K, P, S, Ca, Al, Cu, Ti, Ni, Zn, Zr, Pb, Cr. Beads with different colours are similar in composition of impurity of chemical elements - K, P, Cu, Ti, Ni, Zn, Zr, Pb, Cr, and different in content of elements - S, Ca, Al, Zr. X-ray analysis fixed phases of carnelian and opaque tridymite and cristobalite in some beads.

### Discussion and Results:

Carnelian was one of the most widely used minerals on Samtavro cemetery for making beads and pendants, especially in the Late Bronze-Early Iron Ages. They are mainly represented as components of necklaces or bracelets, but often they are found in tombs individually (Figure 3).

Of interest is the largest number of beads found in one burial (burial N111 of 8<sup>th</sup>-6<sup>th</sup> centuries BC) with 796 units of beads and pendants (Figure 3). It represents a female burial, where shell, blue and white faience beads were discovered together with the great quantity of pottery and personal ornaments. According to the gender during the Bronze Age beads and pendants were mainly discovered in female's burials. In this regard, it's important to note that among the Iron Age burials there is a tendency to find a light orange-pinkish carnelian in the burials of women, or with female skeletons. We can see the same picture in early civilizations of Egypt, Mesopotamia etc. For example, in Mesopotamia there is textual evidence where carnelian was associated with women, whereas the blue stone lapis lazuli was associated with men (Winter, 1999: 52). In this regard of interest is the note of Pliny the elder: "*the male stone shines with a more attractive brilliancy than the female, which is of a thicker substance, and more opaque.*"(Pliny. 37 chap.1.1.)



**Figure 3.** Carnelian beads and pendants from the burial N111

Among the Samtavro beads and pendants we find quite wide varieties of this mineral, significantly different in shape and manufacturing technique: drilling, grinding, polishing etc. Since all beads are handmade, they are less uniform in size and shape.

Most of the products are characterized by relatively low quality: they are badly or non-polished with asymmetrical forms, mostly made of brown-reddish or orange-pinkish carnelian with abundant inserts and non-homogeneous texture. The same is true for most of the jewelry found in other regions of the Caucasus (north Caucasus, Armenia, Azerbaijan). High quality, homogenous and relatively transparent carnelian materials are obtained in relatively small quantities in the Caucasus region (Brunet, 2009: 57-68). Together with these specimens, we find about 10% of high quality carnelian with distinctive symmetrical geometric shapes and good surface treatment.

Although the main features of bead-making and their shape have generally remained unchanged for centuries or even millennia, changes in material, shape and manufacturing technology still can be traced according within the epochs.

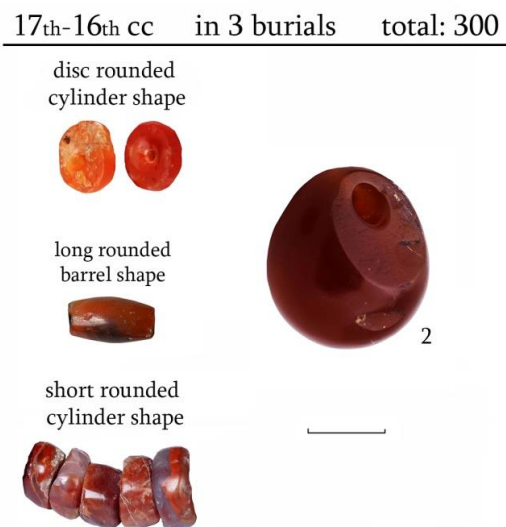
### The Middle Bronze Age

Considering that the Samtavro cemetery has been functioning since the end of the Middle Bronze Age, the burials of this period are only small parts of the total number of burials (Kalandadze, 1980: 33-38). Carnelian beads have been found in three different Kurgan-type tombs, among them one cenotaph and most of them have more archaic features - they are characteristic of Neolithic and Early Bronze Age sites of Caucasus region. According to shapes we find: circular discoid, circular short barrel/circular short cylinder, long rounded Barrel shaped beads (Figure 4<sub>2</sub>) and one rounded drop-shaped pendant made of sard (Figure 4<sub>4</sub>, Table 1).

The most numerous of them were found in the grave N10 – it represents a bead-necklace comprised of 296 units of mainly short and in few cases standard asymmetric cylinder/barrel shaped beads made of heterogeneous red-brownish carnelian with whitish inserts and different sizes – the biggest: L: 8, D: 12mm; the smallest: L: 3, D: 6mm; drill hole: 0.75-1.5mm. They are roughly sculpted, with polished walls, and untreated ends. They have a slightly cone perforation processed from one

end with tubular copper drill and fine abrasive material (Figure 5). It was discovered in the chest area of the female skeletons. Such kinds of beads are characteristic of middle and late Bronze Age sites of south and north Caucasus. Great quantity of them was discovered on the sites of Armenia and Azerbaijan. After the 9<sup>th</sup> c. BC this type of beads occurs comparably rear and as it seems by evident trace of wear, the discovered ones were made much earlier.

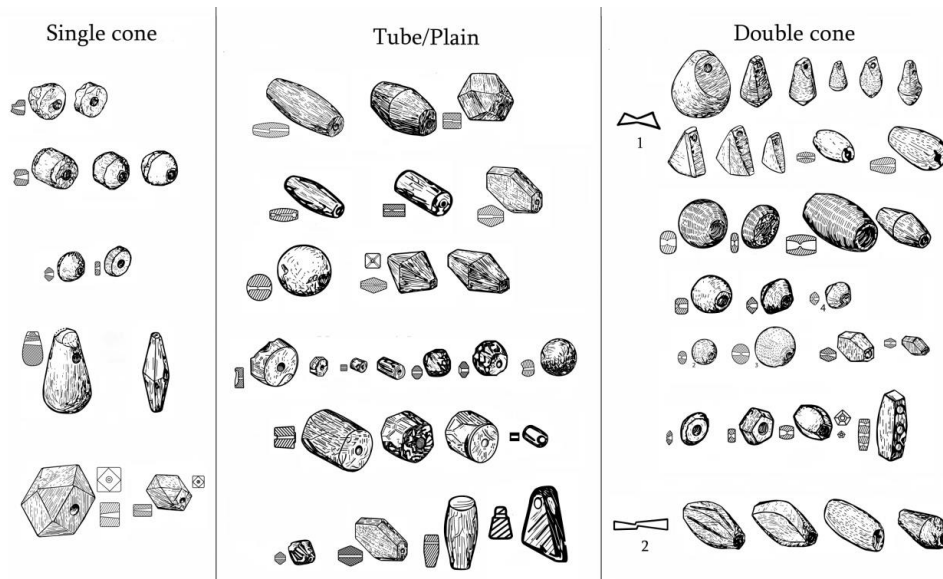
From this chronological group of special interest are two specimens discovered on the cenotaph-type burial N243. They represent roughly processed disc-shaped cylinder beads made of orange mineral with wide, single-cone holes (Figure 4i). Supposedly, perforation technique was pecking done by flint drill. Such kind of drilling technique is known from the Neolithic age, circa 6000 BCE in Mesopotamia (Chevalier et al., 1982: 55-65), and slightly later from Arabia, Egypt, and the Indus Valley regions (Kenoyer, 2003: 14-19). Such beads from Samtavro have an evident trace of wear which suggests that, they have been worn for thousands of years and used by many different people before their final burial. The same is true for a pendant discovered together with these beads (Figure 4j) - it represents a large, circular drop-shaped pendant, almost spherical with cut edges on the both sides in the vicinity of holes. It is made of dark brown variety of carnelian - so-called sard and has well-polished surface with evident trace of regularly spaced multiple short lines (Figure 5) and double-cone shaped wide drilled hole supposedly made by copper drill with fine abrasive. The grave inventory consisted of bronze weapons, pottery and beads made of jet, rock crystal, carnelian and gold (Kalandadze, 1982: 33). According to the inventory a pendant should have been dedicated to some very important or noble male. It finds exact analogies among the material of one of the biggest and richest burials of the Early Bronze Age – Ananauri Kurgan N3, dated to the 24<sup>th</sup> c. BC. (According to C14) (Makharadze et al., 2016). In this kurgan such pendants were discovered together with similar shaped pendants made of good quality amber and represented a part of the necklace composed of interchanging tubular and spherical beads and previously



**Figure 4.** Carnelian beads of the 17<sup>th</sup> -16<sup>th</sup> cc BC

mentioned pendants (Makharadze et al., 2016: 316, pl.22). In this chronological group we also have one example of long rounded Barrel shaped bead made of deep-red/orange carnelian with a fairly uniform colour with a spot of darker material that may be the result of carbon or other organic stain

in one of the cracks in the stone (Figure 4<sub>2</sub>). The bead has a well-polished surface and almost cylindrical drill hole made of copper drill with abrasive (Figure 5). Such kinds of beads at Samtavro cemetery are found in a quite large number in the chronological groups of the Late Bronze – Early Iron Ages and in the following periods. They are widespread varieties characteristic of the Early Bronze Age sites of Indus (Mohenjo Daro, Harappa, Chanhudaro) (Kenoyer, 1998: 97-98; 160-61), Mesopotamia (Ur Kish, Mari) (Moorey, 1994: 97-98), Turkey (Hattusa- Boğazköy) (Ludvik et al., 2014: 1-18) and Armenia (Metsamor) (Jakubiak, Bigoraj, 2020).



**Figure 5.** The types of drilling. Lemlein 1951: Table I-VII (graphic by the author)

### The Late Bronze Age

In the next chronological group, the number and variety of carnelian items increase drastically. During this period we still meet previously mentioned short cylinder/barrel shaped roughly processed beads made of low quality red-brownish opaque carnelian with non-uniform fibrous texture and asymmetric forms, but alongside with them patterns made of different raw material - more orange-pinkish samples begin to appear. Beads of this type are represented with 6011 units in this chronological group (Figure. 6; Table 1).

Another very characteristic shape which appears in this period is short pentagonal oblate or circular shaped beads made of deep-red or orange slightly translucent and homogenous carnelian (Figure 6). Their sizes range between 3X5-5X7 mm. they have wide, double-cone holes made of tubular metal drill with abrasive. The surfaces of the beads are generally well-polished. Such kinds of beads are characteristic of north Transcaucasus, north Ossetia, Digoria, and south Caucasus sites of the Late Bronze-Early Iron Ages. At the Samtavro cemetery we find up to 3000 units of such beads.

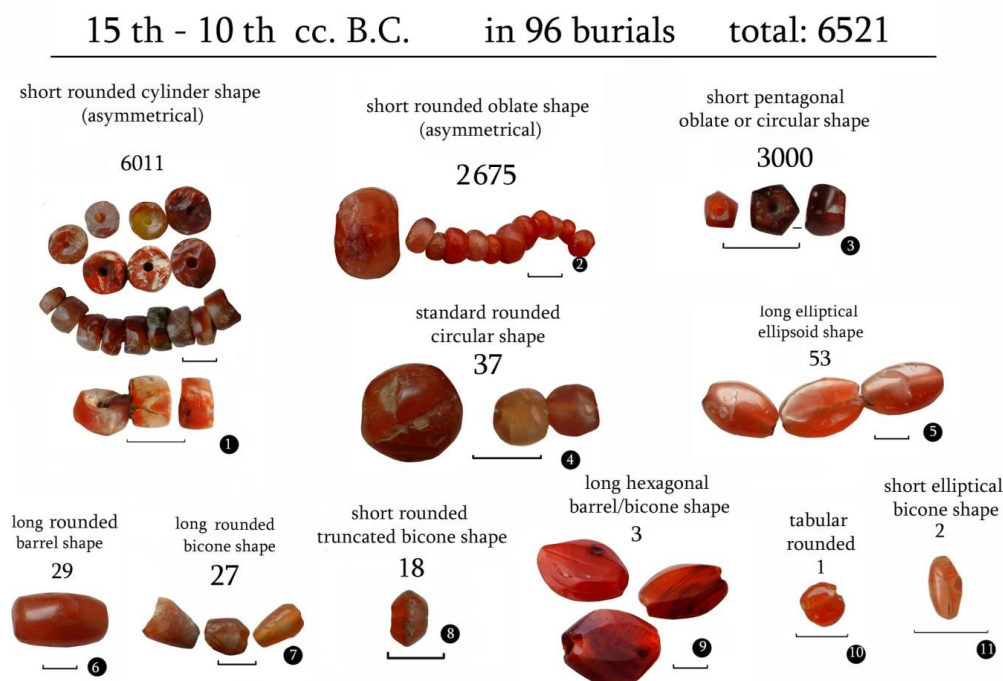
Another very common type of this period is short round oblate shaped beads (Figure 6), many of which are asymmetrical or squat, with a general tendency towards a globular shape generally made of orange, semi-translucent carnelian. They have wide biconical perforation made of metal drill with fine abrasive (Figure 5). This type is characteristic of the Late Bronze Age sites of south and north



Caucasus, Aegean region etc. Such types of beads on the Samtavro cemetery were represented with up to 2675 units.

The standard rounded circular-shaped beads made of the same sort of carnelian are another characteristic feature of this chronological group (Figure 6). They are roughly processed with badly polished surfaces, but in contrast to the previously mentioned samples in many cases their holes are not wide and have a slightly bicone shape (Figure 5). 37 units of such beads have been attested on the Samtavro Cemetery.

Among elongated beads we have: rounded, barrel-shaped beads – 29 samples, rounded bicone-shaped beads – 27 samples, elliptical ellipsoid-shaped beads – 53 samples and hexagonal barrel/bicone-shaped ones – three samples (Figure 6).























**Figure 6.** Carnelian beads of the 15<sup>th</sup> -tenth cc BC

These are the principle types of beads widely discovered in rich burrows of the Trialeti Culture in combination with beads made of gold and other precious material. Such types of beads did not lose their popularity in the following ages as well. Each of these elongated types has a different drilling technique but generally they are drilled from both ends. Ellipsoid and barrel-shaped beads have cylindrical drilled holes; the bead was perforated by drilling from both ends using a metal drill with abrasive. They have wide double-cone shaped perforation, which in some cases is not perfectly to the center and on equal depth from both ends (Figure 5). By the end of this chronological group new forms, largely characteristic of the graves of the next period – The Early Iron Age begin to appear; these are short truncated bicone-shaped, mainly small beads made of red or orange almost homogenous and semi-translucent carnelian (18 units) (Figure 6). This type is perforated in the same way as small pentagonal and rounded oblate-shaped beads. Relatively rare specimens are short oval bicone-shaped – so called boat shaped (Figure 6) beads which are very characteristic of the Iron Age sites of west and east Georgia, Armenia etc., and one example of tubular rounded bead (Figure 6). They are made of orange or pinkish comparably high quality carnelian. Among pendants are rounded

and oblate biconical, so-called teardrop-shaped and rectangular and oblate triangular-shaped pendants made of good quality - uniform and translucent red, pinkish and orange carnelian with different tones. Most of them are well polished and have symmetrical geometric forms. In few cases we find roughly processed ones. Almost all pendants have wide biconical perforation (Figure 5); Among pendants there is one piece of more exotic shape hexagonal semi rounded-shaped with two straight cylindrical holes (Figure 8; Table 2).

**The Iron Age**

During the Late Bronze-Early Iron Age carnelian beads were mostly demanded, elite and fashionable type of adornment as is reflected among the materials of the Samtavro cemetery and other sites of Caucasus.

Cut-Shape	Cylinder	Circular	Bicone	Circular Oblate	Ellipsoid	Rectangular	Barrel
 Rounded							
 Elliptical							
 Rectangular							
 Square							
 Pentagonal							
 Hexagonal							

**Table 1.** Types of carnelian beads from the Samtavro cemetery.

The most widespread type of previous period- short/regular cilinder/barrel-shaped brownish-reddish carnelian beads (Figure 6) decrease sharply and another types and species become dominant. These are: short pentagonal oblate or circular shaped small beads – 2770 units, short rounded truncated, bicone shaped, small beads -1410 units and standard rounded circular shaped beads of different size – 1830 units (Figure 7, Table 1). Bicone and pentagonal small beads are made of almost same row material – red or orange mostly translucent and homogenous carnelian, perforated in the same way, which suggests that it was produced in the same workshop with the same traditions.

The spreading area of such kinds of beads is also same - south and north Caucasus. Another type, round circular beads range widely in sizes and types of material, as well as in types of

perforation - depending on their sizes they have bicone cone and cylindrical holes (Figure 5). The dominant types of previous chronological group – short rounded barrel/cylinder and rounded oblate-shaped beads (Figure 6) are represented in less quantity – the first is represented with 250 units and the second with 227 units (Figure 7). The material and making technology is the same as in previous period. The types that continue to exist here from previous chronological groups are: long rounded barrel-shaped 32 units, short oval bicone-shaped nine units, long elliptical ellipsoid-shaped four units and tabular rounded five units of beads (Figure 7). Their making technique is the same as in previous group.

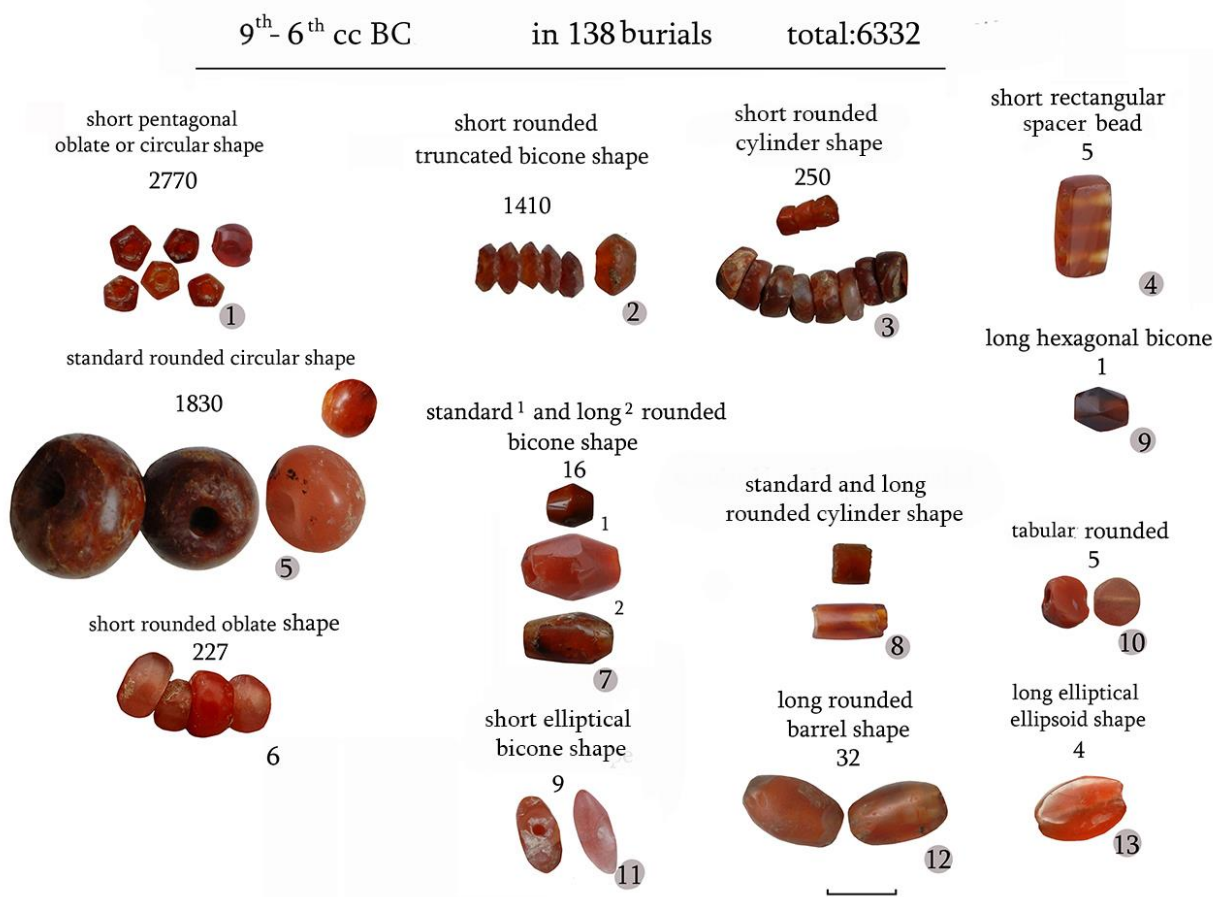


Figure 7. Carnelian beads of the 9<sup>th</sup>-6<sup>th</sup> cc BC.

The novelty for the period are several types of beads: well processed high quality short rectangular spacer bead with three holes (Figure 7), made of deep red translucent carnelian and double cone perforation (Figure 5); Standard and long rounded cylinder-shaped beads with thin walls and wide double-cone perforation made of orange homogenous carnelian; long hexagonal bicone-shaped well and symmetrically processed bead made of brownish semi-translucent carnelian, so-called sard (Figure 7).

There is news among pendants as well. If in the previous chronological group the pendants were made only of high quality carnelian and had good geometric shapes, now we find relatively rough patterns together with those of previous period, which suggests that the pendants imitating elite patterns were made for a relatively low layer of the society and had a symbolic charge rather than an aesthetic one (Figure 8; Table 2). From this period onwards we find strictly cylindrical, very thin holes which according to mineralogists must have been cut using diamonds (Iemlein, 1951).



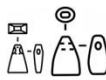






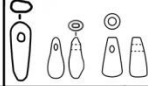

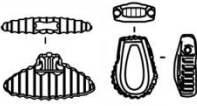
### After the Sixth Century BC

From the 6<sup>th</sup> century BC onwards, carnelian beads gradually lost their relevance. They were replaced by beads made of artificial material, on which the craftsman could more easily get the desired shape, colour combination and transparency. The use of carnelian from this period is mainly confirmed in the glyptic material. Carnelian was widely used during Roman times to make engraved gems for signet or seal rings. A similar picture is typical not only for the tombs of the Samtavro cemetery, but also for other monuments in Georgia and abroad.

The next chronological group, 3<sup>rd</sup>-1<sup>st</sup> cc BC is the period when prosperous and well organised Iberian Kingdom of Kartli was established. Carnelian beads of this period were discovered only in nine burials and their total quantity reaches 17 units. Among them are the following shapes: short rounded oblate and cylinder, short rounded truncated bicone, standard rounded circular and long rounded barrel

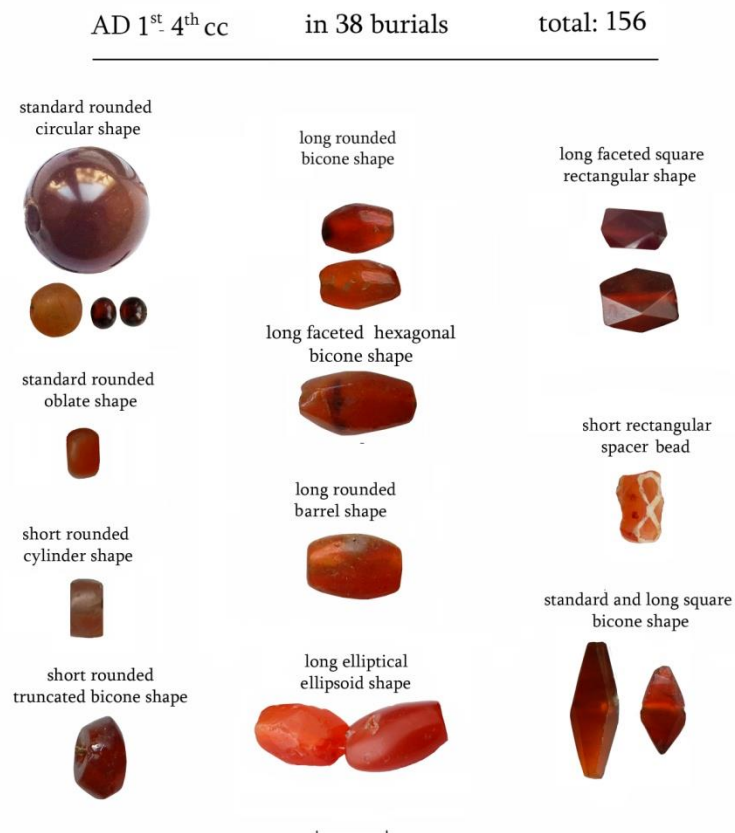


**Figure 8.** Carnelian pendants from the Samtavro cemetery

	Tear-Drop	Bicone	Triangular	Barrel	Asymmetrical	Special Type
Middle Bronze Age						
Late Bronze Age						
Iron Age						
Roman Age						
Early Christian Age						

**Table 2.** Carnelian pendants from the Samtavro cemetery

and bicone-shaped beads. According to the shape, making technology and the trace of wear they are most likely earlier examples from the previous chronological groups. As it seems, carnelian bead production did not exist/ was not so popular during this period. Roman Period, 1<sup>st</sup>-4<sup>th</sup> cc AD is the time when the Samtavro cemetery was heavily utilized. It represented the larger of two cemeteries of the capital of Iberia (Sagona et al., 2010: 315). In this period there are new forms of high quality carnelian: short square bicone-shaped beads made of high quality deep red carnelian (Figure 9) and long faceted square rectangular bead (Figure 9; Table 1). They were mostly found in the combination with gold beads of the same shape. It was used specifically to create the polychrome effect of gold items. Such beads are abundant in contemporary Roman goldsmithing as an integral component of the gold necklace (Richter, 1924: 34-38).



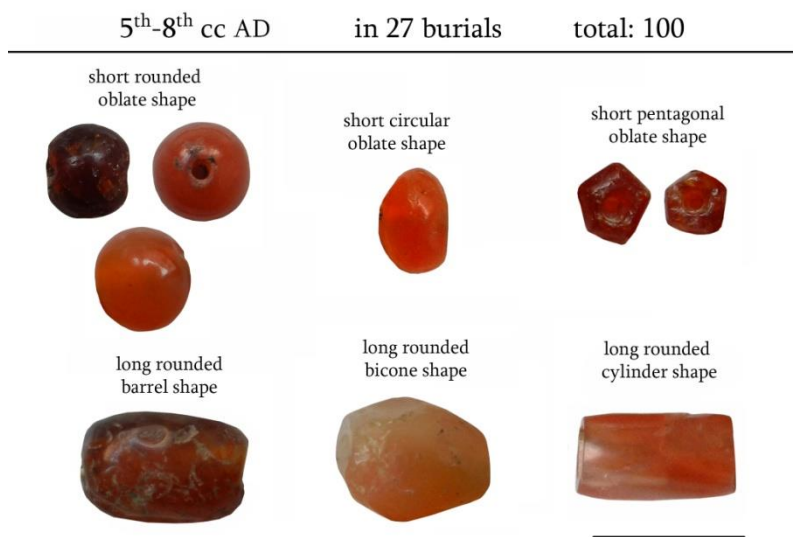
**Figure 9. Carnelian beads from the 1<sup>st</sup>-4<sup>th</sup> cc. AD**

Of interest is short rectangular etched carnelian bead made of roughly processed orange carnelian and decorated on both sides. Six units of this kinds of beads were attested on the Samtavro cemetery, all of them with different shapes and décor (Figure 10). As it seems, in the ancient world they had much more charge than just embellishment, so not so much attention was paid to their aesthetic aspect - symmetry, polishing as to their symbolic charge (Jyotsna 2000). The etched decoration technique has its origins in India and is related to the Harappan civilization of the 3<sup>rd</sup> millennium BC. Chronologically they are divided into three groups: a) Early, Harappan civilization period from the 3<sup>rd</sup> millennium BC- until the beginning of the 2<sup>nd</sup> millennium BC; b) Middle, 300 BC-AD 200; c) Late, pre-Islamic period AD 600-1000 (Beck 1933: 384-98). All periods are characterized by different designs. The beads found in Samtavro most likely belong to the middle period. The centers of their production at this time were India, Thailand and Iran. It is quite possible that Samtavro beads have been imported from Iran or via India, as in the Late Neolithic period all trade routes from India to the Mediterranean Sea passed through the territory of Sassanian Iran (Johnston 2017: 287).



**Figure 10.** Etched carnelian beads from the Samtavro cemetery (all photos by the authors)

In the complexes of the pre-Christian period carnelian beads are represented in small number – 100 units of beads and three pendants were recovered from 27 burials. Most of them are uniform, orange in colour, although we also have brownish-reddish patterns of relatively low quality carnelian (Figure 11). The material proves two different types of the so-called “exotic” pendants (Figure 8; Table 2).



**Figure 11.** Carnelian beads from the 5<sup>th</sup>- 8<sup>th</sup> cc. AD

### Conclusion:

Two notes of Pliny the elder regarding this mineral – ‘among the ancients there was no precious stone in more common use than carnelian’ and ‘According to fabulous lore, the first use of them was suggested by the rocks of Caucasus, in consequence of an unhappy interpretation which was given to the story of the chains of Prometheus:’ (Pliny 37 chap. 1. (1.)) are archeologically attested by the wide use of carnelian since the Neolithic Age in the south Caucasus. This is one of the oldest regions where carnelian objects were appreciated and used.

The trace of distant roots of the faith of Caucasian people are echoed in believes of magical properties of this mineral reflected in the written sources of the middle ages and after. For example, medieval Georgians believed that carnelian could heal swellings and wounds inflicted by cold steel, while the Armenians of the same period thought that this stone may thwart the enemy's designs and give problem-free childbirth (Belinskij, Härke, 2018: 16).

In the Bronze and Iron ages carnelian was mainly used for creating beads and pendants by the peoples of the Caucasus. Probably some of the amulet-shaped pendants and exotic beads came to the site by trade. The cowrie shells and other kinds of imported artefacts discovered in the archaeological contexts together with the carnelian items point out the distant trading connections.

For example, in the burials of the Late Bronze- Early Iron age we find a heart-shaped pendant (Figure 8; Table 2) Made of high-quality red-orange carnelian which has many similarities with ancient Egyptian heart-shaped amulets very popular from the time of the Old Kingdom to Roman period. According to the beliefs of the ancient Egyptians, the heart was the source of life and thought. The amulet was mainly made from different types of red stones, and the upper part sometimes had the shape of a human head. Amulets of this form have been known since the Second Dynasty (Budge, 2001: 121-22). The Egyptian Book of the Dead contains seven spells to preserve the heart, one of which is dedicated to a heart-shaped amulet made of carnelian (Budge, 2003: 166-68). The oldest similar amulet found in Georgia is an amethyst pendant found in the XIV tomb of Trialeti (Zhorzhikashvili, Gogadze, 1974: fig.74).

In terms of the sort of mineral and some shapes the Samtavro beads show a great similarity to the carnelian items discovered at the Bronze and Iron Age sites of the Trialeti region. Here carnelian beads are mainly represented with short/regular rounded/oblate/barrel-shaped rounded beads and short, regular and long rounded cylinder beads, and different kinds of drop and triangular-shaped pendants mainly presented by roughly processed items in some cases with cracked structure (Kvachadze, Narinamishvili, 2016: 180-88, 203).

Of special interest is the fact, that several types of the most popular beads of the Late Bronze-Early Iron Age burials of the Samtavro Cemetery – short pentagonal oblate-shaped and short rounded trumpeted bicone-shaped beads (Figure 6, 9) are not characteristic of Trialeti region. They were widely discovered in the Late Bronze – Early Iron Age sites of Colchis (In Ergeta, Tsaishi, etc.) in the western Georgia. It is quite possible that these types became popular in Samtavro culture as a result of dissemination of Colchian elements. What concerns the ancient bead production in Georgia, at present, carnelian workshops are identified only in the western Georgia, in Mukhurcha and Nokalakevi, where various tools and raw materials related to bead processing are revealed (Figure 1). It is interesting, that the tools found here are similar to those from the main ancient bead-making centres. For example: Many of the bead production scenes found in ancient Egyptian tombs depict the use of large blocks for rubbing the stone by abrasive into its desired shape. Such blocks are made of a hard or gritty stone such as basalt, or a softer and finer-grained material such as terracotta or sandstone (Ogen, 1982: 145-46). In Georgia, such stones with a sunken groove made of basalt are known from Nokalakevi (western Georgia) (Lordkipanidze, 2012: 177). Also, one stone tool from the same site is completely identical to the stones found in Indian workshops. These facts altogether suggest that the beads found in this region underwent the same technological process.

Most beads of Samtavro cemetery have a roughly sculpting shapes which supposedly have been done by chipping the stone with a soft hammer (bone or antler) upon an anvil, or by grinding the stone between two large flat stones (Lucas, Harris, 1962: 42). It is likely that, as in other bead-making



centres, the beads were baked or heated prior to processing also here. Such a process required a great deal of knowledge and experience, as overheating would make the mineral more brittle and breakable, and a slight heating could not change its physical properties.

In terms of drilling probably the most perforation was made using a vertical hand held bow drill, or a vertical hand held drill turned by hand motion. Such hand-turned drills are found in the beginning of the second millennium (Ogen, 1982: 147) and are still in use today (Golani, 2013: 38). As many studies have revealed the drill bits could have been made of harder stones than carnelian e.g., chert, ernestite, corundum or diamond (Kenoyer, 2003; Kenoyer, Frenez, 2018: 66) and with solid or tubular metal drill with abrasive (Kenoyer, Frenez, 2018: 66-67).

As the nature of the abraded surface of the drill hole shows, the majority of beads from the Samtavro cemetery are perforated using metal with abrasives. On a few early samples the packing technique was also attested. In few cases, mostly exotic samples have double-diamond drilling (Figure 5). This technique is known only in India from the first half of the first millennium BC.

Beads were generally drilled from one or both ends. In some cases, on one side of drilled beads there was a conical flake scar from opposite side which appears when the drill pops out at the other end (Figure 5). In many cases the drilling was not done very carefully on the beads bored from both ends, so the holes do not meet properly but we could attest few cases when drill holes meet perfectly at the center of the bead. Most of the beads here tend to be quite irregular and are often not centered.

As for the main results, we separated several types characteristic of different chronological groups and suggested that many beads from the Samtavro cemetery besides the exotic specimens derive from the local sources and this is discharged by the following facts:

1. Mineralogical research confirmed that the mineral used to make most of the bead-adornments on the Samtavro cemetery is identical to the resource available in local ores.
2. Among the beads we find many defective, unfinished specimens and semi-finished products.
3. Bronze pins adorned with carnelian are inherent to only this region. Neither on the territory of Georgia nor abroad they have parallels.
4. Among the glyptic materials there are locally produced samples of carnelian, which suggests that the raw material from the central part of Georgia was used to make seals or signet rings.

Due to the fact that large collections of beads found on the sites of south Caucasus are almost unknown to the international scientific community, we consider it is very important to publish this small study and suggest perspectives for future development of this topic. The paper is the first attempt of study of carnelian beads and pendants found in Georgia. We suppose that the present paper will encourage this type of research and will highlight the significance of beads in the cultural and social life of the society of that time.

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