TRANSLUCENT GLASS BEADS FROM COLCHIS IN THE EARLY IRON AGE: EVIDENCE FROM TSAISHI CEMETERY[1]

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Abstract: This paper is about a translucent glass feature, namely beads found in N1 and N2 collective burial pits at Tsaishi cemetery, located in western Georgia, Central Colchis. Artefacts are preserved in the Dadiani Palace History and Architectural Museum. Among finds of vitreous material the discovery of translucent glass artefacts in pale or relatively intense colours is a new phenomenon within the archaeological sites of Georgia during the first quarter of the first millennium BC.

Through a multidisciplinary study of this new type of glassware, we were able to discuss the local and external factors that contributed to its appearance in Iron Age Colchis. In the initial stage a typological study of beads was carried out. Four types and eight subtypes were distinguished and the characteristics and persistence of certain types in different chronological contexts were examined. A comparative analysis was carried out between the contemporary translucent glass products found in the archaeological sites of Georgia and the Caucasus, as well as the Near East, the Mediterranean and Etruria.

The next step involved laboratory analysis to determine the primary raw materials used for the production of Tsaishi glasses and the main pigments used for their colouring.

Key words: Glass; Translucent; Bead; Colchis; Iron Age; Transcaucasia;

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აბსტრაქტი: კვლევა ეძღვნება დასავლეთ საქართველოში, ცენტრალური კოლხეთის ტერიტორიაზე მდებარე ცაიშის სამაროვანზე ადრერკინის ხანის N1 და N2 კოლხურ კოლექტიურ სამარხ-ორმოებში აღმოჩენილ გამჭვირვალე მინის პროდუქციას - მძივებს. ექსპონატები დაცულია ზუგდიდში, დადიანების სასახლეთა ისტორიულ არქიტექტურულ

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მუზეუმში. მინისებური მასალის სხვა ჯგუფებისაგან განსხვავებით, ძვ.წ. პირველი ათასწლეულის პირველ მეოთხედში გამჭვირვალე მინისაგან დამზადებული სუსტად, ან შედარებით ინტენსიურ ტონებში შეფერილი სამკაულის აღმოჩენა საქართველოს არქეოლოგიური ძეგლების კომპლექსებში ახალი ფენომენია.

მინის ნაწარმის მულტიდისციპლინარული შესწავლის შედეგად განხილულ იქნა ის ადგილობრივი და გარე განმაპირობებელი ფაქტორები, რომლებმაც გამოიწვია რკინის ხანის კოლხეთში ამ ახალი ტიპის ნაწარმის გამოჩენა.

პირველ ეტაპზე ჩატარდა მძივ სამკაულის ტიპოლოგიური კვლევა, გამოიყო ოთხი ტიპი და რვა ქვეტიპი და განისაზღვრა მათი მახასიათებლები/მდგრადობა სხვადასხვა ქრონოლოგიურ მონაკვეთებში. ჩატარდა შედარებითი ანალიზი საქართველოსა და კავკასიის, ასევე ხმელთაშუაზღვისპირეთის, მახლობელი აღმოსავლეთის და ეტრურიის არქეოლოგიურ ძეგლებზე აღმოჩენილ თანადროულ გამჭვირვალე მინის ნაწარმთან.

შემდგომ ეტაპზე ლაბორატორიული კვლევით განისაზღვრა მინების დასამზადებლად გამოყენებული ძირითადი ნედლეული და შეფერვისათვის გამოყენებული პიგმენტები.

საკვანძო სიტყვა: მინა; კოლხეთი; მძივი; რკინის ხანა; ამიერკავკასია;

Introduction: In the Early Iron Age, translucent glass beads began to appear in the context of Colchian collective burial pits**,** among which Tsaishi cemetery holds a special place. The 192 translucent glass beads and fragments (23 grams)[3] found in Burial Pit N2 date to the first half of the 8th century BC (Fig.2) and another 215 beads found in Burial Pit N1 may be dated to the 2nd half of the 8th and the first half of the 7th centuries BC (Fig.1) (Papuashvili, 2015: 22).

The amorphous arrangement of the cultural layers and the specific characteristics of the burial pits did not allow us to reconstruct the functional relevance of these glass beads with individuals/clothing/objects in a detailed manner[4] or to determine the gender and age of their owners (for the construction of the Colchian collective burial pits see Papuashvili, 2000: 55-59). In rare cases translucent glass beads appeared separately in burial pits, otherwise they were usually part of larger groups of jewellery mixed with other vitreous materials such as faience and opaque glass, as well as the beads crafted from chalcedony, opal, rock crystal, carnelian, amber, jet, precious and semiprecious metals (Papuashvili, 2015: 16; 20). The large scale and wide chronological range of Tsaishi cemetery seemingly accounts for the accumulation of rich collections of beads and other archaeological materials (Pit N1 measuring 40 m^2 and containing up to 800 individuals; Pit N2 measuring 80 m^2 and containing up to 2000 individuals) (Papuashvili, 2015: 10-11; 17).

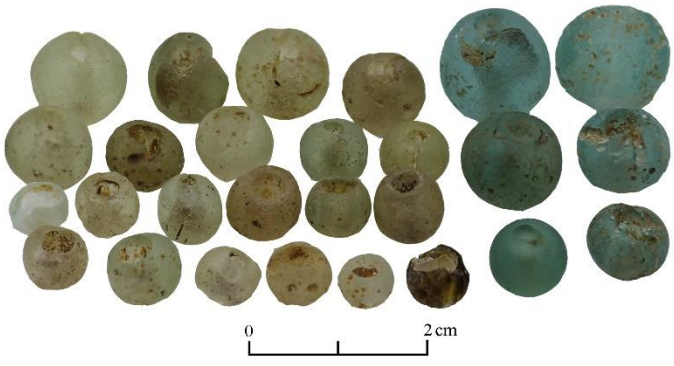

Fig.1. Translucent glass beads from Burial Pit N1.

[3] Due to the specific nature of the soil, some specimens were immediately damaged during excavation as a result of a sharp change in the atmospheric conditions.

[4] The archeological record shows that beads were used in various cultures for personal adornment, as well as to decorate clothing and weapons.

Four main types (I. barrel; II. Circular; III. Biconical, IV. Zoomorphic) and eight sub-types were distinguished (I.1. - standard barrel, rounded with a medium sized hole; I.2. - standard barrel with an extra-large hole; I.3. - short barrel, rounded disc with an extra-large hole; I.3.a - short barrel, rounded with a large hole; III.1. - short truncated convex biconical with an extra-large hole; III.2. - standard truncated convex biconical with a large hole; III.1.a - short truncated convex biconical beads with a large hole; III.2.a - standard truncated convex biconical with a medium-large hole) (Fig. 1) in different colours.

Asymmetry of shapes and in rare cases, deformation is characteristic of a large part of the beads. Examples with a thick profile are better preserved than those with a thin body, which often show relatively complex mechanical damage and signs of deep corrosion. Some beads have a pitted surface and small air bubbles can be seen in their mass even with the naked eye. In some cases, the transparency of the glass is reduced, or the surface of the artefacts shines in many colours, which, as noted in the specialist literature, is the result of iridescent layers formed as a result of soil impact (Samek et. al., 2007: 114-115).

Fig.2. Translucent glass beads from Burial Pit N2.

Laboratory analysis of the Tsaishi glass beads allowed us to identify their basic raw materials and colouring agents. This research has shown that Tsaishi glass belongs to the sodium-calcium silicate group.

Special research on the origin and the development of glass culture in Colchis has not yet been undertaken. According to the available data, the oldest beads made of vitreous material has been found in the eastern part of Georgia in Urbnisi and is dated to the 3rd millennium BC (Javakhishvili et al., 1962: 42; 54-59). From this period onwards, the archaeological record reveals a continuous tradition of using faience and opaque glass jewellery in varying quantities (Ugrelidze 1961). Discoveries of translucent glass beads are not characteristic of the small number of burial complexes found in Late Bronze Age Colchis. In bronze hoards only finds of carnelian beads have been reported so far (Apakidze, 1991: 45-46). The translucent glass phenomenon that appeared in the 1st quarter of the 1st millennium BC at archaeological sites in Colchis and in Georgia in general, is a new element and a precursor to the large-scale distribution of glass products, which began in the 2nd half of the 1st millennium in Transcaucasia and in other advanced cultural centres.

Methods

The initial stage involved a typological classification of Tsaishi glass beads using Beck's system (Beck, 2006: 1-71). Due to the chronological difference between Burial Pits N1 and N2, glasses were grouped according to the burial complexes. The main types and subtypes were distinguished according

to the data on the diameter, axis, length, and profile of the beads. The glassware of Burial Pits N1 and N2 was compared using statistical analysis. Tables were created to display the combinations of shapes and colours and their quantitative distribution in burials. The stability of specific types was determined and innovative forms were identified.

The laboratory study of the glass beads (41 samples of translucent and opaque glass) from Tsaishi was carried out with the assistance of the laboratory at the Georgian Technical University, the Department of Applied Geology, Republican Centre of Research, Diagnostics and Reprocessing of Geology and Mineral Matter. The items were studied by a non-destructive method[5]. The main device used in the process was X-ray fluorescence spectrometer EDX3600B. Laboratory research provided qualitative data on the main elements used for the production of glass beads and the main agents used for colouring.

Results and Discussion

Typology. Four main types and eight subtypes are presented in the assemblages of transparent glass beads (for their colour spectrum, quantitative and typological distribution in the burial complexes, see Table 1. and Table 2.).

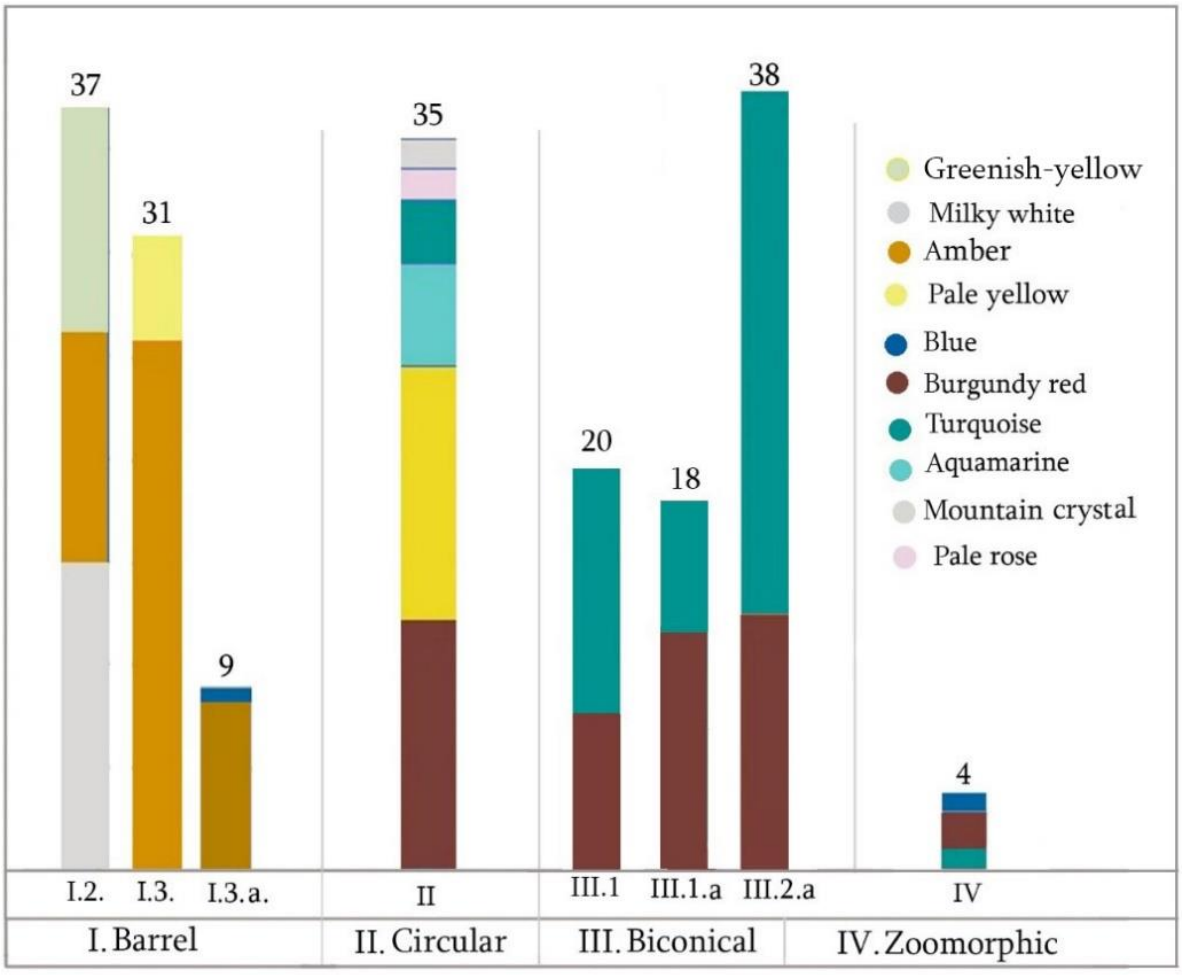

Table 1. Colour spectrum, quantitative and typological distribution of the glass beads in Burial pit N2

[5] According to a preliminary agreement between the Ministry of Culture, Sports and Youth of Georgia and the administration of the Dadiani Palace History and Architectural Museum, the laboratory analyses of the items was carried out without autopsy of the samples.

Type I. Barrel beads: Beads of this type are dominant in terms of number and subtypes in the research material. In the oldest Burial Pit N2, this type is represented by 77 specimens and five colour variations - amber (59%), milky white (20%), yellowish-green (14%), pale yellow (6%) and blue (1%). Their number increases significantly in Burial Pit N1. There are 144 beads with **I.1. I.2.** and **1.3.** subtypes (Fig.5.1-5) in six different colours: dark yellow (77%), turquoise (18%), milky white (2%), yellow (2%), blue (1%). In the initial phase **I.2, I.3** and **I.3.a.** subtypes are common (Fig.3.1-3). During the following period some types stayed the same while **I.3.a.** was replaced by type **I.1**. Barrel beads show a slight difference in size. On average, their diameter is 1.4 cm, their height - 1.1 cm.

Type II. Circular beads: Judging by the variety in sizes and colours, this type is the most complex. In Burial Pit N2, 35 circular beads were found (Fig.3.6-10). in six colour variations: yellow (40%), burgundy red (37%), aquamarine (11%), turquoise (6%), rock crystal (3%), pale rose (3%). In Burial Pit N1, their number increased to 59 (Fig. 5.6-8) and was represented by seven colours: burgundy red (34%), yellow (20%), dark, unidentified (17%), greenish-yellow (15%), aquamarine (10%), dark yellow (2%), blue (2%). The diameter of the largest bead in type **II** is 2 cm, height 1.8 cm, and the average diameter of the beads is 1.1 cm, height 0.95 cm.

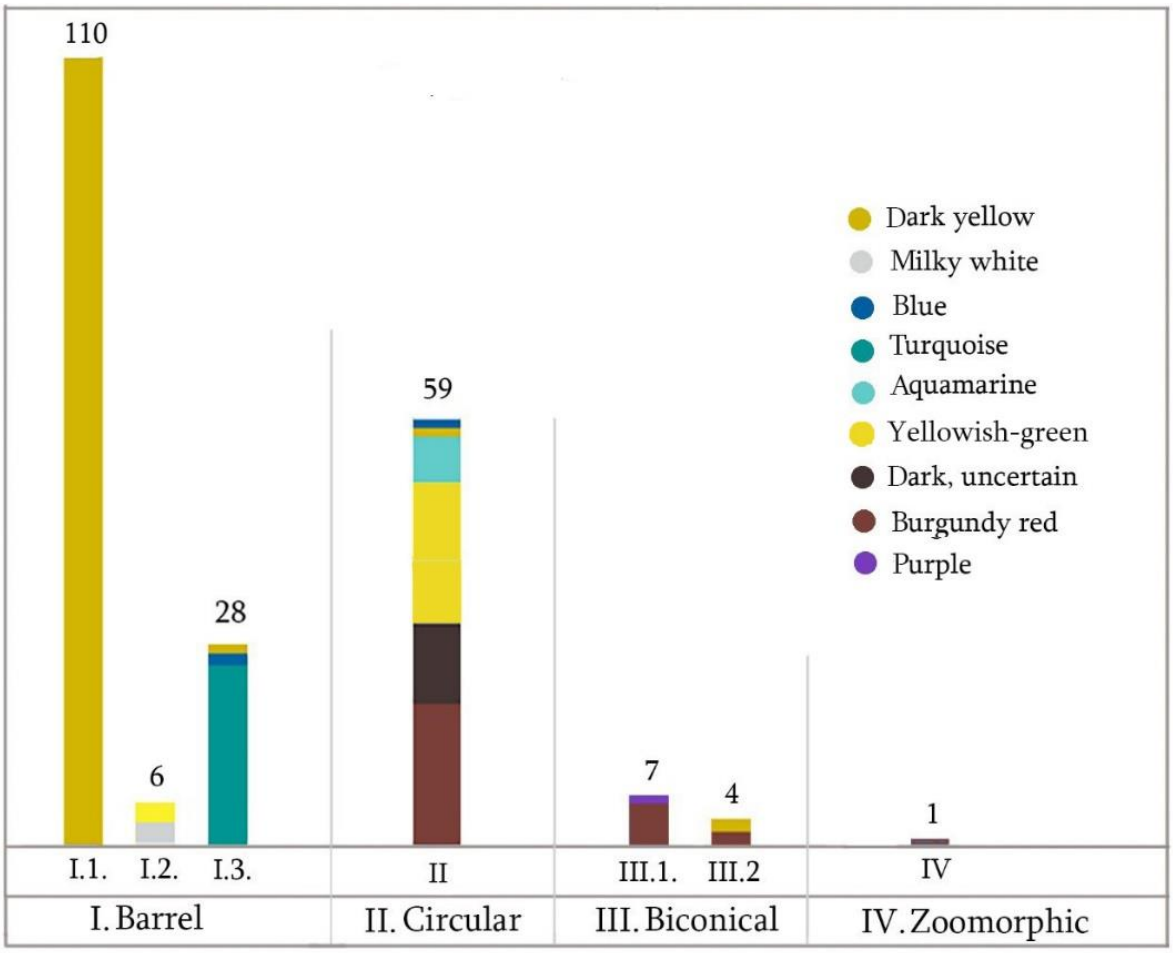

Table 2. Colour spectrum, quantitative and typological distribution of the glass beads in Burial pit N1

Type III. Biconical beads: The oldest group of this type comprises 76 specimens, with three subtypes: **III.1., III.1.a** and **III.2.a.** (fig.4.1-6). Two colours were common here: turquoise (58%) and burgundy red (42%). In Burial Pit N1, their number reduced sharply to 11 specimens represented by **III.1** and the new **III.2.** types (Fig.5.11-12). Colours included burgundy red (73%) and turquoise (27%). The largest bead measures 1.75 cm in diameter, 1.7 cm in height and was discovered in Burial Pit N2. Medium-sized beads are found in both burial pits. Their average diameter is 1 cm, height 0.5 cm.

Fig. 3. Types and subtypes of the translucent glass beads in Burial pit N2: 1. - **I.3.a**; 2. - **I.3**; 3. - **I.2**; 6-10 -**II**.

Fig. 4. Types and subtypes of the translucent glass beads in Burial pit N2: 1.- **III.1**; 2-3,5 - **III.1.a**; 4,6 - **III.2.a**; 7-9 - **IV**;

Type IV. Zoomorphic beads: This type include annular beads with plastic decorated details of the head, beak and tail of birds and a zoomorphic fragment. The amount of this type among the Tsaishi translucent glass products is the smallest. In the older Burial Pit N2, three bird-beads were found (fig.4. 7-9) in red burgundy (67%) and turquoise (33%) along with a blue zoomorphic fragment (tail?). In the later Burial Pit N1, there is only one burgundy red bird bead recorded (fig.5.9). The size of the bird figures is not significantly different. The diameter of the largest bead is 1.8 cm, the length of the belly is 1.05 cm.

The main shapes of Burial Pits N1 and N2 repeat each other, but differences can be observed in the quantitative distribution of combinations in shapes and colours, as well as the novelty in types.

Glass beads come in a variety of colours, with some being repeated and others unique. The beads that are oldest are predominantly turquoise, burgundy red, and amber. Pale yellow, pale pink, and rock crystal are the colours that are unique. The spectrum of the later Burial Pit N1 is less diverse. The quantity of turquoise and burgundy red decreases and a yellow tone is the most abundant. The only example in purple is an innovation here.

Archaeological parallels:

Bead types I.3.a, III.2.a and especially type II find analogues in Colchis, at Ergeta cemetery, namely in collective Burial Pits N2, N4, and N7 (Papuashvili et al., 2022) and in other Colchian collective burials such as Mukhurcha cemetery (Eliava, 1987: 31; 40; 51-52; 64; 76), or Ureki N3 and Nigvziani N1 (Mikeladze, 1985: 38; 85). In Eastern Georgia, the chronologically closest analogues have been found in Narekvavi, Tomb N35 represented by a translucent human pendant and other glass beads (Lekashvili, 1999: 124). Several specimens of type III and II beads are found in Samtavro cemetery (Kalandadze, 1982: 15-16; 33, 55-56), Rkinis Kalo cemetery (Kobaidze, 1978: 8; 24), and Grmakhevistavi tombs of the 7th-6th centuries BC (Abramishvili et. al., 1980: 112; 114). Finds of translucent glass beads are also recorded in the archaeological sites of Southern Georgia, in Meskheti, in Tsintskaro cemetery of the 9th-8th centuries BC (Menabde et. al., 1968: 45; 48; 54; 73), in Bornighele cemetery of the 8th-7th century BC (Gambaschidze, 2001: 373), etc. Compared to the findings in Tsaishi, the number and variety of translucent glass artefacts at the abovementioned sites is small, the only exception being the Ergeta cemetery.

Finds of translucent and opaque glass beads are also recorded on sites of the North Caucasus, although it is considered that the arrival of glass beads here should have taken place through Transcaucasia (Kozenkova 1982: 65; Krupnov, 1960: 353; Kozenkova, 2004: 129-130).

The Type II and VI beads have a significant number of parallels beyond Colchis. Finds of translucent spherical beads are frequent in Armenia (Adjanpoladian, 1974: 29), in Urartian, Persian, Aegean, Campanian and Etrurian contexts, as well as north of the Alps. They are assumed to appear from the 9th century BC (Spaer, 2001: 63-64). In Mesopotamia translucent type of glass occurred in the Neo-Assyrian period and the colours represented here were blue, purple, or unintentionally tinted green and yellow (Moorey, 1999: 201). Colourless or faintly coloured spherical beads found in altar and burial contexts in the Aegean world are thought to come from the Neo-Assyrian Kingdom, Northern Syria or Phoenicia. By the 7th century BC, a transparent glass bead workshop is supposed to exist in Rhodes (Triantafyllidis, 2002: 25-27).

Of special interest are Type IV bird shaped beads. Bronze bead pendants are widespread in the Colchis (Dolidze, N. 1999), although stylistically they have nothing in common with the Tsaishi glass specimens. Type IV beads have been found in Greece, in sanctuary contexts, and are considered to be of oriental origin (Huber, 2003: 69-108), they are recorded in Rhodes, as well as in Crete and Cyprus, and date to the 8th century BC (Spaer, 2001: 101; fig. 46). In Etruria bird beads have been unearthed in the cemeteries and they are thought to come from Oriental and/or mediterranean world to Italy (Koch, 2011: 77-85). The bird figure beads are divided into monochrome and polychrome variants (Spaer, 2001: 64). Tsaishi bird beads have no additional winding of the glass thread, and are morphologically similar to monochrome pieces found in Rhodes, Eretria and Italy.

The production, origin and value of Tsaishi glass beads: Chemical analyses of Tsaishi glass beads were carried out without autopsies of the samples. Thus, the results are limited only to the identification of basic raw materials and colouring agents. Glass beads are mainly fused from a mixture

5. Types and subtypes of the translucent glass beads in Burial pit N1: 1-2 - **I.1**; 3-4 - **I.2**; 5,10 - **I.3**; 6-8 - **II**; 11 - **III.1**; 12 - **III.2**; 9 - **IV**;

of sodium-calcium-silica composition[6]. High content of aluminium, potassium, magnesium and phosphorus was detected. The colour of greenish-blue and turquoise is caused by copper, while dark to black is caused by high iron content, purple is caused by manganese, and yellowish, light green is caused by antimony. Cobalt was practically absent in Tsaishi glass products. Analysis of glass samples of the 5th century BC and 4th century AD found in Georgia indicates that they also belong to a sodium-calcium-silica glass (Bakhtadze, 1964: 93-94; Kapanadze, 2004: 6; 87; Poporadze et. al., 2020: 125).

The chemical fingerprints of the glass are observed to differ depending on chronological and regional distribution. Copper blue is believed to be the most common colour in the Middle East and is also found in Egypt (Shortland, 2012: 105) while cobalt based blue glass is considered to be produced in Egypt (Shortland, 2008: 241-257). Copper blue glass is also widespread in Europe and the Mediterranean (Jackson et. al., 2010: 296).

Variations in the colours of the glasses can be a result of several conditions: depending on the degree of oxidation, the same metal oxides can give different colours to the glass (Gedzevicciute et. al., 2010: 12). In other cases, faint residual colour (greenish, yellowish, bluish, brownish) may be caused by imprecise proportions in the flux (Nagel, 2020: 29-30). Temperature also plays an important role while colouring (Henderson, 2013: 66). Therefore, the richness of the colours in Tsaishi glass assemblages may not always be what was originally intended; nevertheless, it does provide a magnificently vast spectrum of choice.

As for the plastic manipulation of Tsaishi glass beads, they would have simply been made on a metal rod. This technique of making beads was universal for different cultures at the initial stage and in later times as well. It is believed that after drying the glass on a metal rod, the circular and flat shape of the bead was obtained by exerting pressure (Holm, 1984: 8; Spaer, 2001: 45-48). Bird beads would also have been made on a metal rod. Their heads and tails seem to be formed before the final cooling of the glass, using a special tool.

The localization of the Tsaishi bead producing centre is one of the main problematic questions. Evidence for ancient glassmaking is generally to be found in levels with traces of glass furnaces that incorporate firing chambers, fuel deposits, moulds, associated vessels, and glass drops (Henderson, 2013: 18). At the present time, there is no smelting installation/workshop identified as a glass manufacturing facility in Iron Age Colchis[7] that would suggest the manufacture of glass from its raw materials as is evidenced in other regions (Smirniou et. al., 2011: 59). Nor has any secondary workshop been found that specialized exclusively in glass and which served to give imported glass bars a desired colour and shape. In this context Iron Age bead workshops in the centre of Colchis should be mentioned (Gogadze et al., 2010: 160-168): six glass beads were found in Mukhurcha (Apakidze, 1991: 46-47) and ten glass beads and one anthropomorphic pendant were discovered in Ochkhomuri (Apakidze, 2001: 15). Typical materials needed for glass processing, melting and colouring such as: glass rods, slag, frit and metal sticks (Rehren, 1997: 355-356; Wilde, 2021: 10) were however absent. Since the connection of the archeological context of these workshops to glass is not clear enough at this stage, it is not possible to unquestionably propose the existence of a primary or secondary glass production centre in Colchis. On the other hand, the presence of quartz sands suitable for glass production and deposits of agents: copper, a small amount of cobalt, manganese (Kapanadze et. al., 2004: 93-102) and antimony and their active role (Gobejishvili, 1952: 54-56; Shortland, 2020: 1-2), enables us to hypothesize the possibility of local glass culture.

It is noteworthy that some of the beads found in Burial Pits N1 and N2 are considered to be from the Mediterranean or Egypt (Papuashvili, 2015: 25). Additionally, a bronze female rider and fragments of a situla find certain parallels in temples and cemeteries located in the Aegean world

[6] In the specialist literature, it is noted that corrosion causes difficulties when applying the X-ray method without autopsy. A large amount of sodium, potassium, calcium and manganese carbonates and sulphites can accumulate in the structure of corrosion layers (Samek, 2007: 115). Depending on the type and intensity of corrosion, the content of certain elements obtained by surface analysis may be higher or lower than in the original glass (Nagel, 2020: 41), therefore at this point, it was difficult to determine if the Taishi samples were made of plant ash glass or natron glass.

[7] By contrast with glass, it is well known that Colchis possessed a mastery of smelting/firing technologies related to metal production, a fact confirmed by discoveries of hundreds of crucibles throughout the region during the 12th -11th centuries BC. (See Papuashvili, 2003: 1-8).

(Papuashvili, 2010: 46-58; Vachadze, 2020: 15-23) and beyond, in Sicily (Vachadze, 2020: 15-23). Given these circumstances, the rareness and uniqueness of Tsaishi bead Types III and IV and the abundance of parallels in remote regions makes it possible to allow their import to Colchis via direct or intermedial link, probably through the Mediterranean area.[8] Nevertheless, the issue of their origin remains open for the time being; future research involving the integration of LA-ICP-MS (Gratuze, 2016: 137-140) or isotopic analysis may provide more answers.

Because of the novelty of transparent glass, this collection of jewellery in Colchis, as in other archaeological cultures, should have been linked to luxurious objects. It is generally accepted that glass imitated precious stones in the early stages of its appearance (Holm, 1984: 10; Moorey, 1999: 199; Henderson, 2013: 1). Our pieces may have also included an amuletic function. Due to the poor surface preservation, it was not possible to examine the signs of wear on the beads; it is thus difficult to say with any certainty whether they were used in everyday life.

Conclusion

Monochrome translucent glass beads began to appear in the material culture of Colchis by the Early Iron age without any local manufacturing tradition. This glass group, which comprise barrel, circular, biconical, and bird-shaped beads, is the precursor of the large-scale distribution of different types of translucent glass products, characteristic deliver of Transcaucasian archaeological sites since the Classical period.

Tsaishi cemetery is one of the initial locations to yield this new type of glass bead in any quantity. The oldest group of beads are found in Burial Pit N2 and dates to the first half of the 8th century BC or a relatively earlier period. In this initial stage, barrel-shaped and biconical beads predominate. A notable variety is displayed within a group of spherical beads. Four examples of zoomorphic beads are found here. During the following period, in Burial Pit N1 barrel-shaped beads are the predominant type and the number of spherical beads drops significantly. The group of biconical beads exhibits the most significant change, with the old shapes and colours disappearing and the quantity drastically decreasing. A single zoomorphic bird bead was found here. The complex dates to the second half of the 8th and first half of the 7th century BC.

Analogues of certain bead types (e.g. I.3.a, III.2.a, II) are to be sought in cemeteries located in Colchis and Eastern Georgia, while bird shaped beads appear to be unique. Along with the circular types, they find a relatively large number of parallels in archaeological contexts in North Syria, Urartu, Phoenicia, the Eastern Mediterranean, Campagna and Etruria, where, like Tsaishi, both types appeared nearly at the same time, a process that was synchronous with the dynamics in Colchis.

The Tsaishi beads belong to the group of sodium-calcium-silica glasses and combine a vast range of colours that can be produced from various manipulations of the flux. The issue of the location of their production centre is still unresolved since neither a primary or secondary glass workshop has so far been archaeologically identified in Colchis. On the other hand, given the rich resources of raw materials available locally, glass making or at least glass working in Colchis should not be fully excluded. Nevertheless, it is possible that our beads were imported, which, based on an analysis of intercultural relations in Colchis, suggests that they came from Mediterranean centres. The study of this problematic topic has great potential and will require integration of LA-ICP-MS or isotopic analyses of the objects in the future.

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[8] Evidence for the glass trade/exchange between different centres of the ancient world is confirmed by the glass rods found on the Bronze Age Ulu-Burun shipwreck. See Shortland, 2008: 250-252.

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