



## PRECIOUS AND DECORATIVE MINERALS FROM THE ENEOLITHIC NECROPOLI IN NORTHEASTERN BULGARIA AND THEIR SIGNIFICANCE IN THE HISTORY OF GEMMOLOGY

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Two of the most interesting prehistoric sites in northeastern Bulgaria are the Eneolithic (Chalcolithic) necropoli at Varna (Ivanov, 1974; 1978b; The First Civilization..., 1982; Die Erste Gold..., 1986; Macht, Herrschaft und Gold, 1988; Ivanov, Avramova, 2000; Musée..., 2002) and Durankulak (Dimov et al., 1984; Avramova, 1986; Todorova, Dimov, 1989; Todorova et al., 2002). The Varna necropolis and related Eneolithic age discoveries in the area are supposed to be discussed as the dawn of European civilization (Ivanov, Avramova, 2000). During the 5<sup>th</sup> millennium BC (for chronology see Boiadjiev et al., 1993) the west coast of the Black Sea has been inhabited by a highly developed society with a complex social structure, which has used a variety of technical and aesthetic achievements as a result of development of crafts and trade. Among them can be mentioned gem materials (mineral and rock beads), some of the earliest gold objects in the world and fine copper artifacts suggested to be an autonomous metallurgical province, the first one for Europe. The origin of the gold and copper both has not been yet unambiguously elucidated. Trade within the Mediterranean area has been proved by the existence of a large quantity of biogemmological objects – shells of the unvertebrate *Spondylus gaederopus* (hundreds in number) according to Renfrew (1982), *Dentalium* (over 12000 in numbers) and a few *Gastropoda*. The mineral artifacts have been properly identified in recent years from a mineralogical point of view and some new data in the history of gemmology can be traced.

In the Middle Eneolithic graves (Varna II necropolis), found west of the town, about 1000 objects have been found, the half of them belonging to shells or shell beads of unvertebrate mollusks *Dentalium* and *Spondylus* (supposed to be imported from the Mediterranean region), and among the rest there are malachite beads, 31 golden beads (supposed to be the oldest golden objects in the world), copper bracelets and a ring (Ivanov, 1978b; Musée..., 2002). The nonmetallic jewelry objects from grave N3 of

necropolis Varna II have been studied both from a mineralogical and gemmological point of view (Kostov et al., 2003). Among them is a necklace of short cylindrical mainly malachite beads (in a single case – a bead with admixture of azurite, and in several other cases – with admixtures of cuprite). The rest of the beads are made from pale green serpentinite (with an antigorite composition) with inclusions of a mineral with a Cr-spinellide type-structure. The sources of the raw materials for the studied objects are under debate.

Another jewelry object is a 12.4 cm long fine "hairpin" of nephrite with three holes on its handle, supposed to be a masterpiece for the period. This nephrite object is an example of the numerous nephrite artifacts found in the Neolithic and Eneolithic sites of Bulgaria (Todorova, Vajsov, 2001; Kostov, 2004b) and some other Balkan countries to the south and west, all of them with unknown origin, as till now no *in situ* nephrite deposits have been known in the region despite the suitable geological setting with a lot of ultrabasic rock outcrops (Kostov, 2004b; 2005a). The nephrite artifacts (small axes, chisels, scepter, amulets etc.) found on the Balkans are considered as quantity and type of perfection as the first "nephrite culture" in European prehistory and probably worldwide (Kostov, 2005b).

A dark green reel-type artifact made from decorative ultrabasic rock (serpentinite) has been interpreted as a holder for a drilling tool. This fact suggests the existence of a local jewelry center. An elongated ritual object of unknown purpose has been also made from the same material.

Among the metallic (gold and copper) and non-metallic (minerals, rocks, pottery, pigments, bioobjects) artifacts found in graves from the Late Eneolithic sites at Durankulak and Varna there are numerous beads of chalcedony (carnelian and agate) composition. Three morphological types of such quartz (chalcedony) beads have been described (Kostov et al., 2004): type N1 – elongated barrel-shaped; type N2 – elongated with trapezohedral facets; type N3 –

short cylindrical. Most of the carnelian and related beads of type N2 have a “constant” number of 32 facets – 16x16 on both sides on the elongation of the bead (the form is a truncated 16-fold trapezohedron), which is considered probably the earliest in Eneolithic times complex type of faceting (the largest number of facets observed in a single case is 39). In the hole of a single carnelian bead a golden mini-cylinder (~2x1 mm) has been found, probably with the purpose to tighten up some sort of band or strip. The mean dimension (length to width) for the types N1-2 beads is 1.29 and for type N3 – 0.54, and the weight – 0.40 g and 0.14 g, respectively. An average of 0.41 g weight can be considered as pre-monetary forms of exchange. The complex facets require at least some primitive technical means in the different stages of bead manufacture.

The social and symbolic meaning of the chalcedony beads has been studied – in Durankulak they are distributed equally among male and female graves and in Varna I they are typical only for the symbolic graves (cenotaphs). In both cases chalcedony beads are associated with gold and copper objects, as well as with pottery and bone or shell artifacts – they are considered as prestigious jewelry objects. The origin and trade routes of carnelian and its deposits on the Balkan Peninsula and other remote places are under discussion. This gem material has also been imported in the Varna area.

The dresses of the inhabitants of that remote epoch have been probably fastened with bone pins and sewn with needles. Mineral and stone beads, pendants and bracelets, as well as necklaces (*Dentalium* shells, malachite, antigorite, carnelian, lignite coal and grayish-green ultrabasic rock) have represented personal ornaments. Bone has been used for handles of stone tools, for awls, pins and needles. Scepters and maces of polished stone have been used as prestigious insignia or weapons.

A description of the nonmetallic mineral artifacts of gemmological interest that have been found in the Eneolithic cemetery at Durankulak has been made, paying special attention to mineral beads. The following minerals, aggregates or organic compounds have been used, as identified mainly by X-ray diffraction analyses (Kostov, Dimov, 2003): malachite, azurite, cuprite, antigorite, chrome-spinellide mineral, quartz (red chalcedony – carnelian, as well as banded white-pinkish agate), dark red jasper (or jasperoid rock), carbonate mineral (calcite from limestones or marble and aragonite from shells) and lignite coal. Jewelry objects are represented mostly by malachite,

pale green serpentine mineral (antigorite), carnelian, white, gray or pinkish agate, red jasper and black lignite coal. The shape of the beads is as in the previous case – from tiny (malachite) to small short cylindrical, as well as barrel shaped and faceted. The sources of the discussed minerals and materials are not yet confirmed and are under discussion.

From the point of view of colour symbolism green minerals are considered essential among the beads. The malachite (known from the Middle Eneolithic) beads have been probably exhausted and replaced in later times to the end of the Eneolithic by similar in colour antigorite beads. Of special significance during the Neolithic and Eneolithic are also the artifacts made from nephrite. Chalcedony (carnelian) and red jasper as red beads probably take an important place in the burial ritual. They are among the hardest gem materials for drilling and faceting. White shells, bone and marble are used for beads, amulets and personal adornments. Scepters and axes have been made mostly of some sort of volcanic tuff or sandstone with a white, pale gray-green to dark gray-green colour.

The golden objects from the Middle and Late Eneolithic necropolis found at the town of Varna are assumed to be the “oldest gold of mankind” (The First Civilization..., 1982; Die Erste Gold..., 1986). Analysis of the measured weight of the different types of golden artifacts (beads, appliques, rings, bracelets, pectorals and diadems) has revealed at least two minimal weight units of 0.145 and 0.415 g (Kostov, 2004a). The second one has been suggested as a basic Eneolithic unit with the name *van* (from the first letters of *Varna necropolis*). Three groups of golden objects have been described according to their weight in this respect: up to 10 g (gold beads and appliques); between 10 and 20 g (gold pectorals); above 20 g (gold diadems and bracelets). Related to the *van* and common multiples are measures as 2 (0.83 g), 3 (1.24 g), 4 (1.7 g), 20 (8.3 g), 28 (11.6 g), 30 (12.4 g), 40 (16.6 g) è 60 (24.9 g). This weight unit as applied to the golden objects is supposed to be the earliest in history and related in later times to other weight units in the Near East, Mesopotamia and Ancient Egypt (Petrușo, 1981; Powell, 1995; 1997). It is also equal to 2 carats (1 carat = 0.2 g), the main unit for weight measurement in gemmology (Kostov, 2003). Its value equals also the average weight of the big barrel shaped or faceted chalcedony beads found both in Varna and Durankulak sites. The constancy and conservative form of the mineral beads despite of their material can be accepted as some possible pre-monetary form of exchange.

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## СКЪПОЦЕННИ И ДЕКОРАТИВНИ МИНЕРАЛИ ОТ ХАЛКОЛИТНИТЕ НЕКРОПОЛИ В СЕВЕРОИЗТОЧНА БЪЛГАРИЯ И ТЯХНОТО ЗНАЧЕНИЕ В ИСТОРИЯТА НА ГЕМОЛОГИЯТА

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Халколитните некрополи при Варна и Дуранкулак в Североизточна България са едни от най-интересните и значими по своето съдържание и място в Югоизточна Европа. Освен с множество златни предмети (приемани за “най-старото злато” в света) и медни изделия (свързани със първата вероятно възникнала самостоятелно за Европа медна индустрия) тези некрополи са известни и с редица артефакти от неметални суровини, които бяха изследвани от минералогическа гледна точка през последните няколко години. Сред гемологичните материали, които са намерени на двете места могат да се отбележат главно мъниста и други артефакти от малахит, антигоритов серпентинит, халцедон (карнеол и ахат), черупки на безгръбначни животни (много *Spondylus*, *Dentalium* и няколко *Gastropoda*), мрамор и лигнитни въглища.

Среднохалколитният некропол Варна II е представен освен от 31 златни мъниста и медни изделия, още и от мъниста от малахит и антигоритов серпентинит. Тук е намерена и уникална по изработка и дизайн “игла за коса” от нефрит с дължина 12,4 cm. Последният предмет е сред редицата нефритови артефакти, които са намерени в поселения от епохата на неолита и халколита на територията на България и някои други страни на Балканите. Това поставя въпроса за най-древната “нефритова култура” в света (източникът на нефрит засега е дискуссионен, тъй като на Балканите не са регистрирани такива проявления въпреки благоприятната геоложка обстановка – наличие на серпентинизирани ултрабазити). Описана е още макара с жлеbove, използвана като държател за пробивач на мъниста или други обекти, направена от тъмнозелен серпентинизиран ултрабазит.

Къснохалколитният некропол Варна I е познат с множеството златни изделия с общо тегло над 5,6 kg, медни предмети, керамика, кремъчни отцепи, минерални и скални мъниста, украшения и предмети разпределени в реални и символични гробове (кенотафи). Сред минералните мъниста са изучени кварцовите (халцедоновите) мъниста, които както при Варна, така и при Дуранкулак, са представени предимно от карнеол или ахат с три основни форми: тип N1 – продълговата бъчвовидна; тип N2 – продълговата с трапецовидни стени; тип N3 – къса

цилиндрична (шайбовидна). Повечето от халцедоновите мъниста от тип N2 притежават “константно” 32 фасети, по 16 от двете страни по посока на удължението на мънистото. Тази форма на фасетиране се отбелязва като една от първите сложни форми на фасетиране в праисторически времена (максималният брой отбелязани фасети достига 39). В единия край на дупката на едно карнеолово мънисто беше намерен златен миницилиндър (~2 x 1 mm) с вероятна функция да затяга някакъв вид връзка. Средното тегло на мъниста от тип N1-2 е 0,40 g, а за тип N3 – 0,14 g. Възможно е наличието на домонетни форми на размяна, тъй като сродно (0,41 g) или кратко тегло имат и много от златните мъниста. По отношение на социалното и символично значение на халцедоновата мъниста е установено, че докато в Дуранкулак, тя е разпределена почти равномерно в мъжки и женски гробове, то във Варненския некропол карнеолът е типичен изключително за кенотафите. И в двата некрополя този вид мъниста асоциира със златни и медни предмети, керамика, костени изделия и такива от черупки – т.е. те се приемат за престижни ювелирни обекти. В некрополя при Дуранкулак освен това са установени мъниста от следните гемологични материали: бледозелен до зелен малахит (с азурит и примеси от куприт), бледозелен антигоритов серпентинит (с примеси от хромшпинелид), тъмночервен яспис (ясписоид), карбонатно вещество (от калцит или арагонит – мрамор и черупки от безгръбначни животни) и черен лигнит. Произходът на посочените суровини не е уточнен и се дебатира.

Анализът на златните изделия от Варненския некропол (мъниста, апликации, пръстени, гривни, пекторали и диадеми) показва, че съществуват най-малко две минимални тегловни единици от 0,145 g и 0,415 g. Втората единица се приема за основна “халколитна единица” и за нея се предлага названието *ван* (от първите букви на Варненски некропол). Установени са следните кратни на един *ван* съотношения: 2 (0,83 g), 3 (1,24 g), 4 (1,7 g), 20 (8,3 g), 28 (11,6 g), 30 (12,4 g), 40 (16,6 g) и 60 (24,9 g). Тази най-ранна тегловна мярка е равна както на средното тегло на изучените големи халцедоновы мъниста, така и на два карата (1 карат = 0,2 g) в съвременната гемология.