



Coal (jet) beads from the Varna Chalcolithic necropolis (V mill. BC) in a prehistoric weight system

Въглищни (гагатни) мъниста от Варненския халколитен некропол (V хил. пр. Хр.) в праисторическа тегловна система

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The gemmological name jet is generally employed in most countries for a black hard, fossilized coniferous wood, which is capable of being carved and polished. According to the systematic of vitrinite by the International Committee for Coal and Organic Petrology (1998), jet is classified as collotelinite (for early nomenclature c. Minchev, 1984). Since the Antiquity to the Medieval period jet was employed for religious items in different parts of Western Europe (Rapp, 2009). Jet artefacts are found especially in Great Britain and Germany from the Early Bronze age and Roman times (Muller, 1987; Teichmüller, 1992). Different properties were attributed to this organic substance by ancient writers, such as Pliny the Elder, and a variety of substances were been described as jet (Kostov, 2007a). Recent studies by optical microscope (including reflectance measurements) and X-ray analysis of coal beads from the Varna Chalcolithic necropolis (V mill. BC; known with the earliest and richest gold artefacts and the first complex faceted carnelian beads of the world) revealed their composition as jet. The coal beads (in some earlier publications referred as lignite) are found in a lot of the Varna necropolis graves together with other mineral and metallic beads

(Kostov, 2007b). They are known also from the nearby prehistoric necropolis at Durankulak to the north. The coal beads from Varna are among the smallest beads according to their dimension in comparison with other mineral or metallic beads. Their morphometric and weight data are listed in Table 1.

Two morphological types of beads are observed: short cylindrical and barrel-shaped (larger in size). The average weight of coal beads can be traced as a sequence of numbers, close to the Fibonacci sequence: 0.003, 0.006, 0.009, 0.015, 0.024, (0.039) and 0.063. The last two weight data are close to and correspond to the average weight of the short cylindrical green serpentine beads – 0.025 and 0.07 g. The average weight 0.06–0.07 g is common for some other mineral beads, made of shells (aragonite), marble (calcite) or malachite (in the case of the Varna II necropolis), as well as gold beads. Such values are related to a weight system and can be subordinate to the suggested weight unit “van” (1 van = 0.4 g = 2 carats; from the first letters of Varna necropolis). The smallest values of such early weight system are usually compared to the average weight of some grains: mustard seed ~0.003 g; barley seed ~0.023 g and wheat seed ~0.044 g (1 carat =

Table 1. Average values for the measured coal beads from the Varna Chalcolithic necropolis

Type, colour	Shape	Weight, g	Length, cm	Diameter, cm	Number
Coal, black	short cylindrical, small	0.003	0.08–0.10	0.13–0.23	10
Coal, black	short cylindrical, larger	0.006	0.07–0.12	0.17–0.28	3
Coal, black	short cylindrical, big	0.009	0.08–0.10	0.25–0.29	10
Coal, black	barrel-shaped, small	0.015	0.36	0.23	3
Coal, black	barrel-shaped, larger	0.022	0.39	0.28	2
Coal, black	barrel-shaped, big	0.060	0.58	0.33	4

0.200 g; from the carob tree seed). The X-ray analysis of the mineral fraction related to jet revealed the presence of illite $2M_1$ with strong lines in Å(I): 4.46 (100), 4.29 (40), 3.36 (100), 2.57 (100), 2.45 (50), 1.50 (80). Other mineral phases of lower content are K-feldspar and quartz. Jet coal of Jurassic and Cretaceous age is known in Bulgaria from the Moesian Platform and

the Fore-Balkan, including the Balkan Coal Basin (Petrussenko, Kostov, 1992). The jet beads at this stage of study can not be attributed to a local source. Thus a conclusion can be made that on the territory of Bulgaria there are both finds of jet sources and archaeological samples, but the artefacts may be imported as some of the other prestigious goods or materials.

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