

Organic Petrology in service of Archaeology: a study on chars from Çukuriçi Höyük, Western Turkey

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Abstract

Çukuriçi Höyük is an artificial mound located in short distance (c. 1 km) SE of ancient Ephesos, Western Turkey. Recent excavations disclosed remains of a number of settlements dated back from the 7th until the 3rd millennium BC. In the youngest settlement of Early Bronze age, among other objects, remnants of intense metallurgical (arsenical copper) activities in form of 25 metallurgical ovens and various tools were discovered.

Ten char samples retrieved from the metallurgical ovens along with six coal samples obtained from deposits outcropping in a short distance from the Çukuriçi Höyük settlement were examined microscopically by applying standard techniques of coal petrography. Aim of the research study was to trace the ancient fuels used in the metallurgical ovens in an attempt to ascertain, whether the Early-Bronze metallurgists were aware of the existence of coal deposits in their close neighborhood and consequently, whether or not they exploited the coal-bearing successions as a source of fuels for manufacturing.

The examined coals sampled from the neighboring coal-bearing deposits contained huminite/vitrinite as the dominant maceral group. Based on photometric measurements, the representative random reflectance

values range between 0.35-1.58% R_r indicating low-rank B to medium-rank A coals. However, considering the shape, structure, and pore distribution of the resulting chars along with the documented lack of liptinite and inertinite group macerals or inertinite-derived chars, the metallurgical ovens had to be fired with biomass rather than coal. The random reflectance values measured on the obtained chars varied between 0.7-1.5% R_r, suggesting an exposure to temperatures ranging between 200-400°C (Siavalas, 2013). Furthermore, distribution of the reflectance values in the respective histograms supports the statement that the raw material for the production of charcoal was presumably composed of one plant variety only.

Concluding, coal as an important fuel source was not deployed by ancient metallurgists in Early Bronze times at the site of Çukuriçi Höyük. This, in turn, indicates that the local coal-bearing deposits remained unknown to the inhabitants and that coal use as fuel might have been unknown as well.

Reference:

Siavalas, G., 2013. Disseminated solid contaminants in soils and sediments and their relation to the features of fossil fuels utilized for energy generation. Unpublished PhD thesis, University of Patras. (in Greek)

SDGG

Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften

2015 . Heft 87

67th Annual Meeting of the International Committee for Coal and Organic Petrology

German Research Centre for Geosciences (GFZ)
September 5-11, 2015, Potsdam, Germany



Marlies Teichmüller (1914 – 2000)

