P235-WE

GEOCHEMICAL CHARACTERIZATION OF THE ASPHALTITE VEINS FROM THE ŞIRNAK AREA IN SOUTHEASTERN TURKEY: THEIR USE AS ARCHAEOLOGICAL MATERIAL

Ohran KAVAK[1], Jacques CONNAN[2], M. Namık YALÇIN[3], Brian JARVIE[4] and Dan JARVIE[4]

1. Dicle Universitesi Muhendislik-Mimarlik Fakultesi, Maden Mühendisligi Bolümü, 21280 Diyarbakir, Turkey
2. Laboratoire de Géochimie Bioorganique, UMR 7509, Université Louis Pasteur, ECPM, 25 rue Becquerel , 67200-Strasbourg, France
3. IstanbulUniversity Department of Geological Engineering, 34850 A vcılar, Istanbul, Turkey
4. Humble Instruments & Services, Inc., 218 Higgins Street, Humble Texas 77347, USA

Asphaltic-like veins in southeastern Turkey were mapped and studied till 1969 by Lebküchner and Orhun. They originated from the filling of open cracks in thrust faults and faulted anticline where enormous amounts of asphaltic materials were squeezed towards surface (Lebküchner et al., 1972). They have been extensively mined as alternative solid fuel. At a first glance the easy accessible asphaltites may have been mined in antiquity to be used as bitumen which is present on potsherds in some antic sites, e.g. Kütnüs Höyük, Nervan Höyük and Takyan Höyük, located southward of the asphaltite vein district.

In order to cover a wide range of case histories, several veins were sampled namely Segürük, Seridahli, Avgamasya, Kartaltepe, Kumçatı, Milli, Karatepe, Harbol, Nivekara and Çitfciler (Fig.1).

The first outstanding feature is the occurrence of mineral matter in all materials from the veins. This occurrence entails an amount of TOC which is generally below 50%. In any case history we have observed pure asphaltites, i.e. pure bitumen or asphalts as in examples studied in Iran (e.g. in asphalt dykes of the Sultan anticline or in the asphalt veins of Pataq location, close to the Iraqi border). The measured melting points are higher than 400°C and consequently the asphaltite materials, infusible, could not be used as bitumen to waterproof potteries, baskets or mats. The X-Ray diffraction analysis of some samples from Segürük, Avgamasya and Harbol veins gave 1-2 % quartz, 14-24% calcite and 5-9% dolomite, i.e., a significant input of mineral matter in the mixture. Such a gross composition is very much alike those recorded in the material called “bitumen mastic” which was used to carve the masterpieces of art at Susa in Iran between the IVth and the IInd millennium BC (Connan and Deschesne, 1996). This material, thought primarily to be an artificial mixture of bitumen and mineral matter, has been identified at Ghali Kuh location, an outcrop in the Zagros mountains situated at 120 km from Susa.

The geochemical analysis using the analytical flowchart applied to study petroleum and source rock reveals that the organic matter present in the asphaltite material has reached various degrees of maturities which were initially seen in the Rock-Eval characteristics (HI vs. Tmax, Fig.1) and confirmed by GC-MS characteristics of C_{15+}alkanes and C_{15+}aromatics and by some Ro values obtained by petrographical analysis of organic matter. This evaluation of states of maturation using present day techniques confirmed the pioneering study of Orhun (1969) who concluded that various degrees of metamorphosis were present among the vein samples. In that respect the asphaltites of Seridahli, Karatepe and Nivekara are the most mature (Ro bitumen around 1%) whereas asphaltites of Harbol and Kartaltepe are the least one (Ro bitumen around 0.3-0.4%).

To conclude, asphaltites from the Şırnak area were not used to prepare bituminous mixtures in antiquity but they may have been mined as raw material to carve masterpieces as at Susa where a similar material but slightly different (Fig.1) was used.

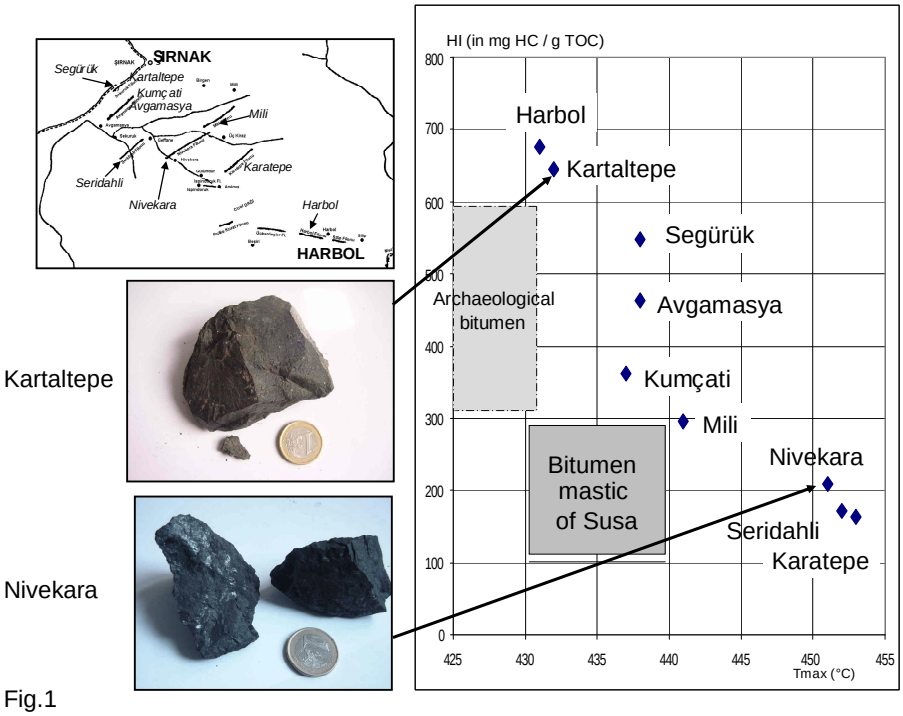

Fig.1

REFERENCES

Connan J. and Deschesne O. (1996) Le bitume à Suse-Collection du Musée du Louvre. *Coédition Elf Aquitaine –Réunion des Musées Nationaux*. Collection monographies.

Lebküchner R.F. (1969) Occurrences of the asphaltic substances in Southeastern Turkey and their genesis. *Bulletin of the Mineral Research and Exploration Institute of Turkey* 72, 74-96.

Lebküchner R.F., Orhun F. and Wolf M. (1972) Asphaltic Substances in Southeastern Turkey. *AAPG Bull.* 56, 10, 1939-1964.

Orhun F. (1969) Characteristics properties of the asphaltic substances in Southeastern Turkey, their degree of metamorphosis and their classification problems. *Bulletin of the Mineral Research and Exploration Institute of Turkey* 72, 97-109.