ORGANIC COMPOUNDS IN BLACK VEINS OF BARBOTAN (H5) AND CHARSONVILLE (H6) CHONDrites. V.P. Semenenko, N.V. Golovko. Institute of Geochemistry and Physics of Minerals, Ukr. A. S., Kiev, Ukraine.

Fragments of shock-induced black veins have been sampled in inner partitions of Barbotan and Charsonville meteorites. They were studied using SEM, IR spectrometry and chemistry. Special cares were taken to exclude contamination.

As observed with the SEM, the surface of vein fragments is characterized by a cryptocrystalline structure, unresolved under magnification 22000x. The following features were noted on fragment surfaces: 1. Isolate globules sometimes with crystal faces. Hemispheres of metal spherules, surrounded by trolite are visible on the cracked surface of the largest globules (≤0.5mm). 2. Single regular crystals of olivine, pyroxene and of an unidentified mineral of rhombohedral habit. 3. Glass, with both honeycomb-like and compact areas. 4. Areas of amorphous matter, part of which containing a system of irregular cracks. In some instances, amorphous matter blocks were seen to move under the electron beam and take a melt appearance along cracks. These last observations led us to suspect the presence of solid organic matter in the black veins. 5. Associations of carbonate (?) crystals, genetically connected with areas of amorphous matter, possibly formed by terrestrial alteration.

IR study of alcohol-benzene extracts of vein fragments revealed the presence of paraffins (fig.1), with a higher content in Charsonville than in Barbotan. After extraction, the insoluble residues were dried, crushed and pressed into KBr tablets. Their IR spectra still showed the presence of small quantities of paraffins. The fact that paraffins are found in vein fragments even after extraction is taken as evidence of their location in close holes. In this case, the bands of the CH$_2$- and CH$_3$-groups are more intense in Barbotan (fig.2), which points to a higher level of isolation of the paraffins inside the black veins of this chondrite. To check for a possible terrestrial contamination origin of the paraffins, samples were taken both from surface and interior of the main (gray) part of the meteorites. IR spectra obtained from bulk samples, alcohol-benzene extracts and insoluble residues showed no evidence of organic compounds (fig.2, spectrum 3).

The optical density (A) of the extracts was determined by colorimetry on different quantities of vein matter from chondrites Barbotan (A=0.36; 14mg) and Charsonville (A=0.39; 4mg). Taking also into account the differences in the IR-spectrum of the extracts, one can assume a predominance in Charsonville of organic compounds with long hydrocarbons radicals. Weight measurements led to a value of few percents (to be confirmed) for the organic compound content of the vein matter in the Barbotan chondrite, while the small size of our Charsonville sample prevented a precise determination for this chondrite. It seems however to be higher than in Barbotan, which corresponds to the anomalously high concentration of carbon in Charsonville [1].

The presence of paraffins (>C16) in the chondrite veins may be related to two possible sources. 1. Contamination. In this case, it is difficult to explain their absence in the main part of the meteorites and their presence and disposition as isolated areas in the black veins. 2. Cosmic origin, connected with shock metamorphism. Small quantities of hydrocarbon compounds, mainly paraffins, have been observed in carbonaceous and ordinary chondrites [2] and taken as the products of synthesis in a gas-dust nebula (Fisher-Tropsch type process). They may transform in the parent bodies under conditions of reheating and shock metamorphism [3, 4]. Formation of paraffins needs any kind of C-containing matter (organic or inorganic), catalysts (such as Co, Ni) and sharp decreases of both pressure and temperature, i.e. shock metamorphism conditions [3, 5]. In the case of a cosmic origin for the organic compounds in chondrite veins, the nature of the C-containing matter and its location in the parent body before shock metamorphism is an open question. The disposition of organic compounds in black veins may be the result of transformation and redistribution of the matter in situ. It may also result from shock-stimulated hot gas transport of destruction products of C-containing matter along
cracks from deep inside the parent body. In this respect, it would be desirable to determine the content of volatile elements (Ag, Tl and Bi) in the black veins.


Fig. 1. IR-spectrum of organic matter films on the KRS-bases, extracted from the vein fragments of the chondrites Charsonville, 4mg (spectrum 1) and Barbotan, 14mg (spectrum 2).

Fig. 2. IR-spectrums of the vein matter of the chondrites Charsonville (spectrum 1) and Barbotan (spectrum 2), pressed in the KBr tablets after alcohol-benzol (1:1) extraction. 3- spectrum of the main part of the chondrite Barbotan.