

## **NONBIOGENIC AMINO ACID SYNTHESIS IN NATURAL BITUMENS AND THE PROBLEM OF MINERAL ORGANISMOBIOSIS**

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The so-called protein amino acids Asp, Thr, Ser, Glu, Gly, Ala, Val, Ile, Leu, Tyr, Phe, His, Lys, Arg, occasionally Pro, Met, have been found in all studied natural solid hydrocarbons (bitumens) and highly carbonaceous substances (shungites). The total content of the amino acids in bitumens regularly increases along the row of their thermal-metamorphic evolution: from 5.7 mg/100 g (without NH<sub>3</sub><sup>+</sup>) in naphthides to 15.96 mg/100g in shungite reaching the highest value (168.3) in highly structured polymeric crystalline fibrous kerite. This regularity suggests that the amino acids resulted from nonbiogenic synthesis as a consequence of structural ordering at the molecular and supermolecular levels in hydrocarbons under increasing thermodynamic parameters of their consolidation (solidification, crystallization). In our experiments, we have synthesized amino acids in natural bitumens irradiating them with a high-energy (5-6 Mev) electron beam, the absorbed dose being 10 and 100 Mrad, and obtained evidence indicating that the amino acids are capable of further assembly giving rise to protein-like and other biopolymeric structures. High radiation doses induce active synthesis of monobasic monoamino acids (Gly, Ala, Val, Ile, Leu, Ser, Tyr, Thr), monobasic diamino acids (Arg, Lys) and amino acids with heterocyclic rings (His, Pro). Nonpolar aromatic (Phe, Thr), sulfur-bearing (Cys, Met) and dibasic monoamino acids (Asp, Glu) are less readily synthesized. The obtained data is a fundamental component of the concept of hydrocarbon crystallization of life, which we have been developing (Journ. Cryst. Growth, 1996, 167:237-247; Earth Sci. Frontiers, 1999, 6(1):71-78). We believe that life got started as mineral organismobiosis, i.e. as a result of structural and functional evolution of structured hydrocarbon mineral systems-individuals to protobiological ones under the action of geologic factors.