SPACE LIFE SCIENCES SYMPOSIUM (A1)
Astrobiology (5)

Author: Prof.Dr. BRIJ TEWARI
University of Guyana, Guyana

RECENT DEVELOPMENT ON CONTROVERSIAL VIEW OF TERRESTRIA AND EXTRATERRESTRIAL ORIGINS OF LIFE

Abstract

Where bioorganic compounds formed and organized into the first "life"? The first hypothesis is that amino acids, nucleic acid bases and sugars formed in the ocean were condensed together to form proto-proteins and proto-RNA's. According to Ferris minerals and/or metal ions catalysis was essential for the formation of the biopolymers which initiate the first life. It was also believed that first proteins to be synthesized on the primitive earth were thermal proteins. Terrestrial hypothesis of origins of life was supported by the work of Oparin, Haldane, Miller, Urey, Bernal, Ferris, Franchi, Fox, Kamaluddin, etc. According to second extraterrestrial origins of life hypothesis, organic compounds formed in an interstellar dust (ISD) environment could be the source of terrestrial biosphere. Discharge experiments produce amino acid distributions that are similar to distributions observed in carbonaceous meteorites. Therefore it was suggested that the capture of comets by the primitive earth provided the molecular precursors necessary for the eventual appearance of life on our planet. The extraterrestrial hypothesis for origins of life was supported by the work of Horneck, Greenberg, Oro, Delsemme, Owen, Chakrabarti, Gutierrez, Kletetschka, etc. The third hypothesis or latest scenario of origins of life which is midway between first and second hypothesis is that organic compounds could be abiotically formed in both terrestrial and extraterrestrial environment and pooled in primordial sea, from which first life originate. According to this hypothesis, the matrix of extraterrestrial organic compounds delivered by comets and meteorites may have played an important role in the early stages of chemical evolution on the primitive earth. This hypothesis is supported by the work of Kobayashi, Yanagawa, Kaneko, Sato, etc.

It was proposed that during the course of chemical evolution clay minerals may have played an important role in prebiotic synthesis. Clay minerals seem to be pivotal in certain prebiotic reactions producing polymeric substances from which life has emerged. It is suggested that clay minerals might have concentrated biomonomers during the course of chemical evolution. The adsorption of organic molecules on clay surfaces takes place mainly through cation-exchange, coordination, hydrogen bonding, ion-dipole and interaction by other physical forces. The interaction of aniline (A), o-nitroaniline (ONA), m-nitroailine (MNA) and p-nitroaniline (PNA) with clay minerals viz: halloysite, illite and montmorillonite have been studied. A neutral pH was chosen to run the adsorption of amines in wide concentration range. The neutral pH is physiologically significant, as most of the reactions in living systems take place in neutral medium. The desired pH was maintained by appropriate buffer. The adsorption data obtained at neutral pH is fitted in Langmur adsorption isotherm. The adsorption behaviour of the studied amines follow the order; ONA¿MNA¿PNA¿A. Among the three clays halloysite and montmorillonite are found to have maximum and minimum adsorption capacity with all four amines studied. Adsorption of amines with clays have also been attempted. The present study suggests that clays might have played an important role in the stabilization of organic molecules through their surface activity in the prebiotic condensation reactions. The results of present study support the hypothesis of terrestrial origins of life. Detail will be presented