

## Organic Matter And The Origin Of Life In The Solar System

John Oro; University of Houston - Dept. Biochemistry

The biogenic elements (H, C, N, O, S, P) and organic matter are some of the major constituents of the universe. Indeed, more than three fourths of the individual chemical species identified in the interstellar medium are simple compounds of carbon and/or of biogenic elements (*e.g.*, NH<sub>3</sub>, H<sub>2</sub>, HCN, HCHO, HC<sub>3</sub>, etc). When the protosolar nebula condensed to form the Solar System, organic compounds became part of the outer planetary bodies, such as Jupiter, Saturn, and Titan as well as comets and dark asteroids. On the other hand, because of their proximity to the Sun, the terrestrial planets become significantly depleted of water and other volatile compounds. The acquisition of water and organic compounds presumably took place in good measure by late accretion from comets and other planetesimals. Upon capture of comets by the Earth, the synthesis of biochemical compounds such as amino acids, purines and pyrimidines could take place from simple cometary molecules. This, together with the fact that the Earth's orbit lies within a circumstellar habitable zone is considered to have made possible the emergence of life on our planet some four billion years ago. This review briefly discusses relevant aspects of: (1) The organic matter in the interstellar medium. (2) The formation of the Earth- Moon system and the role of comets and other planetesimals in contributing organic matter to the primitive Earth. (3) The prebiotic synthesis of biochemical compounds and the emergence of life on our planet. (4) The possible existence of life on Mars, Europa and other bodies of the Solar System, and (5) The discoveries of protoplanetary disks around other stars, which suggest that the processes which occurred in our system are probably occurring now in extrasolar protoplanetary systems.