Precambrian Biosphere: An Analogue for Astrobiology – Mukund Sharma, Birbal Sahni Institute of Palaeosciences, 53 University Road, Lucknow-226 007. (E: mukund_sharma@bsip.res.in)

From time immemorial, the mankind is ever inquisitive about the origin of life on the Earth. It wondered 'are we alone in the universe?'. Answer to the first question could be found in the sedimentary succession of the Precambrian, the oldest rocks on the Earth. Palaeobiological studies of these rocks are not simple and easy as these involve the knowledge of molecular biology, biophysics, biochemistry and, chemistry. As of now, our knowledge about Precambrian biosphere is fairly well documented in the well-established geological Cratonic parts of India. These are known in the form of stromatolites, microfossils, macrofossils, trace-fossils and molecular fossils. All these lines of evidence are used in understanding the advent and evolution of life forms on the earth. In 1997, to discuss the future of palaeontology in 21st Century, an international conference was organized by Senckenberg Museum in Frankfurt, Germany. It was attended by academic, as well as commercial collectors, funding agency administrators, amateur palaeontologists, magazine editors, publishers, graduate students, industry, government, and museum curators. They all discussed new dimensions of palaeobiological studies. From this venue arose a new discipline 'Astrobiology' also known as 'Exobiology'.

Like Precambrian palaeobiology the 'Astrobiology' is also an interdisciplinary science. It is concerned with the origins, early evolution, distribution, and future of life in the universe, it also considers the question of whether extra-terrestrial life exists, and if yes, how humans can detect it if it does. Besides those branches, which are involved in the study of Precambrian palaeobiology, 'Astrobiology' uses astronomy, physical cosmology, exoplanetology and geology. It

intends to investigate the possibility of life on other worlds as well as attempt recognize biospheres that might be different from that on Earth. The Precambrian palaeobiology and astrobiology are two extreme ends of the inquiry into the early life forms but the origin and early evolution of life is an inseparable part of the discipline of astrobiology. Astrobiology deals itself with interpretation of existing scientific data, and concerns itself primarily with hypotheses that fit firmly into existing scientific theories.

Early Precambrian life forms were developed in extreme conditions. In the Indian context, the third pole (Leh-Ladakh area) is the best natural laboratory which offers magnificent sites for study of life forms in the extreme conditions and best analogue of Precambrian biosphere. Cold desert areas, hot-water springs, hypersaline lakes, and Permafrost are best testing sites to check the tenacity of life forms. Space agencies of different countries are showing the interest in the third pole to study the life forms in extreme conditions. In view of the ambitious Indian Space Missions like Chandrayan, the Mars Orbitor Mission, and the Gaganyaan it is imperative on us to dedicate a team of researchers for Astrobiological studies. The lecture provides a glimpse of the achievements of Indian endeavours in the field of Precambrian palaeobiology, and efforts being made to study of life forms in the extreme conditions within the scope of Astrobiology. It also discusses the future course in developing the discipline of Astrobiology in the country.

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