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World Summit on Ancient Microfossils

Los Angeles , U.S.A. , 27 July – 02 August, 2008

The World Summit on Ancient Microscopic Fossils was organized in the University of California (IGPP Centre for the Study of Evolution and the Origin of Life), Los Angeles, USA from 27th July through 3rd August, 2008. This unique summit was supported by NASA Astrobiology Institute (NAI, USA). The International Organizing Committee Members are Professor J. William Schopf , UCLA, USA, Professor D. J. Bottjer, University of Southern California, USA, Professor V.C. Tewari , Wadia Institue of Himalayan Geology, Dehradun, India and Professor V.N. Sergeev, Geological Institute, Russia. A total of 28 scientists (all invited and fully supported by the CSEOL, NAI and Elsevier) from 12 countries participated and presented their latest research (Fig.1, Group photo of participants of World Summit with their names and country).

The one week summit was divided into several special themes depending on the new trend of research. Schopf, the Director of the CSEOL, UCLA and Chairman of the Organizing Committee introduced the main objectives of the present world summit emphasizing that new research techniques are reshaping the study of earliest life on Earth. High technology equipment allows scientists to look inside rocks and produce sharp 3D images of the ancient microscopic fossils. Among these new techniques are Raman spectroscopy which allows us to see the molecular and chemical structure of ancient microorganisms in 3D: confocal microscopy, which uses a focused laser beam to make the organic walls of fossils fluoresce and view the cells in 3D and the secondary ion mass spectroscopy which analyze the isotopes in the chemistry of individual fossils and eukaryotic cells. Yuan Chen (China) presented an interesting paper on the Synchrotron X-ray microtomography of Neoproterozoic Doushantuo animal embryos. X–ray synchrotron imaging is a new technique for non-destructive analysis of fossils that is now widely used in palaeontology. These studies have confirmed that Doushantuo microfossils are animal embryos, including cnidarians and bilaterians and the animal body plans had evolved significantly earlier. Shuhai Xiao (China) also using Xray-CT methods analyzed a large number of phosphatised animal embryo fossils from the Ediacaran Doushantuo cherts and characterized the 3D morphology of spiral grooves on helical microfossils. The main outcome of this world conference stressed that CLSM and Raman in combination can provide information about the morphology, cellular anatomy, taphonomy, molecular composition, geochemical maturity and mineralogical setting of ancient kerogenous fossils. Christopher House (USA) demonstrated by Secondary Ion Mass Spectrometry (SIMS) that the isotopic composition of carbon and other biogenic elements in individual microscopic cells can be determined. Dorothy Oehler (NASA Astrobiology, Johnson Space Centre, Houston, USA) discussed about Nano SIMS which is a new technique being applied to some of Earth's oldest organic structures to gain insight into their nano scale morphology and elemental composition which has astrobiological significance for extraterrestrial life.

Microfossils from Early Archaean Cherts of the Pilbara and Barberton were discussed by Frances Westall (CNRS, France) using a range of instrumentation like HR- SEM, HR-

Participants of the World Summit on Ancient Microscopic Fossils held at the University of California, Los Angeles, USA.

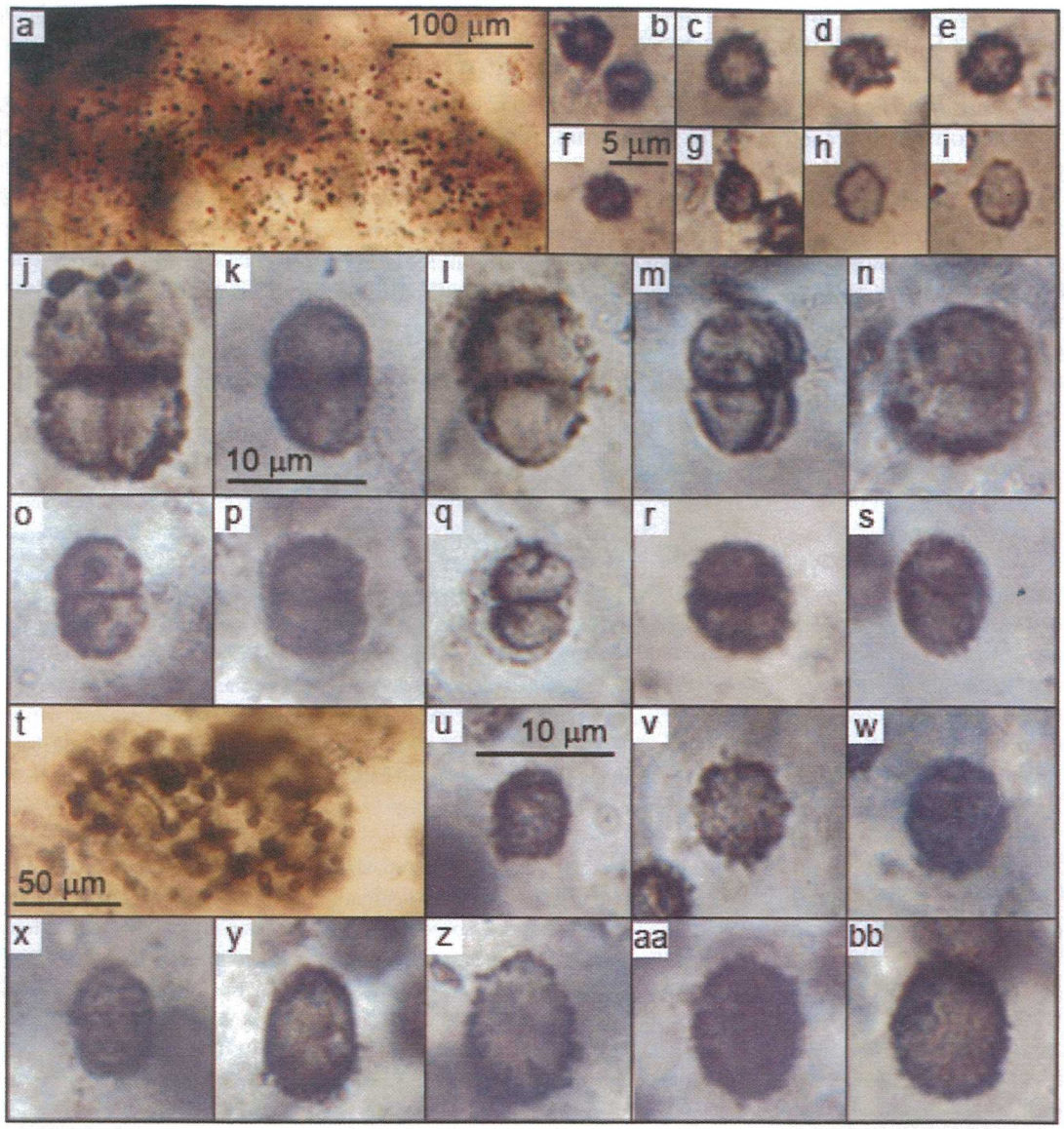

Figure 2. Proterozoic microfossils from the blak cherts of the Buxa Dolomite, Sikkim, Lesser Himalaya, India.

TEM, AFM, STEM, XRF, Nano SIMS, Raman Spectroscopy, and XANES for specific elemental species. Neoproterozoic microfossils from the Buxa Dolomite, NE Lesser Himalaya from Sikkim (Fig.2) and Arunachal Pradesh, India with special reference to Laser Raman Spectroscopy and Confocal Laser Scanning Microscopy was presented by Vinod Tewari (W.I.H.G., India). The Astrobiogical implication of these highly diversified microorganisms is that they have been recorded from minute chert lenses and could be useful for studies of rocks returned from Mars, since minuscule amount of rock can obtain definitive evidence of ancient life.

The problem of multicellularity before Ediacaran Period was discussed by N.J. Butterfield (Cambridge University, U.K.). Pre – Ediacaran multicellularity was categorized by him into a number of distinct grades and there is no evidence for organ grade multicellularity before the Ediacaran. Malcolm Walter (Australian Centre for Astrobiology, Australia) presented global examples of modern and fossil stromatolite occurrences in different environments and their analogues. He discussed the examples from the Shark Bay, Yellowstone Springs and volcanic environments where diversity of bacteria is found but their exact analogues are not found in the fossil records. In the concluding session presided by Bill Schopf a list of topics of burning and frontline global research problems were identified where a lot of research is required to be carried out in the field of Precambrian Palaeobiology. The Director of the NASA Astrobiology Institute took lot of interest in the Indian presentations by Vinod Tewari, Purnima Srivastava, Vibhuti Rai and Mukund Sharma and also offered to submit the projects for the funding from NASA. Two special discussion sessions were also organized during the dinner in the Westwood, California. One was organized by Kath Grey (Australia) on Neoproterozoic – Ediacaran Acritarch Biostratigraphy and the other one was organized by Vinod Tewari (WIHG, India) on Precambrian Stromatolite Bio-stratigraphy. New collaborative research ideas emerged from these discussions and a book on Stromatolites: Interaction of microbes with sediments is being published by the Springer and edited by Joseph Seckbach and Vinod Tewari.

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