NOTES

CONFERENCE ON BIOSEDIMENTOLOGY OF PRECAMBRIAN BASINS

A National Conference on "Biosedimentology of Precambrian Basins of India" was organised by the Department of Geology, University of Lucknow and the Palaeontological Society of India, Lucknow, during 19-21 February, 1997. Professor S. Kumar was the Organising Secretary of the conference. This conference was also sponsored by International Geological Correaltion Programme Project No. 380 on "Biosedimentology and Correlation of Stromatolites, Mud Mounds and Related Microbial Buildups in the Precambrian and the Phanerozoic".

31 research papers covering all aspects of carbonate buildups, facies architecture and sedimentology, Precambrian biota, stratigraphic boundary problems and isotopic geochemistry were presented in seven technical sessions by geoscientists from the Geological Survey of India, Birbal Sahni Institute of Palaeobotany, Wadia Institute of Himalayan Geology, National Geophysical Research Institute, National Botanical Research Institute, and Department of Geology, Universities of Lucknow, Delhi, Bangalore, Pune, Kharagpur, Varanasi, Aligarh and Kumaun.

Carbonate Buildups

In the session on carbonate buildups ten papers were presented. O.N. Bhargava compared the Proterozoic and Phanerozoic Reefs from Himachal Himalaya on the basis of Microfacies. S. Gupta described the carbonate buildups of the Semri Group of the Vindhyan Supergroup, various stromatolite assemblages, their morphological variations and facies. He also tried to establish evolutionary trend exhibited by characteristic taxa. Vivek Kal presented an interesting paper on implications of cycles in stromatolitic and non-stromatolitic carbonates from the Mesoproterozoic Kaladgi Basin. His studies suggest that the microbial systems although contributing towards stromatolite morphology had not affected the potential of carbonate sedimentation (tidal cyclicity). A.K. Moitra described the biosedimentological implications of stromatolites and their precursors (cyanobacteria, preserved in the lamina) from the Chattisgarh Basin. P.K. Raha reported stromatolites from the black chert of the Banded Iron Formation of Bailadila Group, M.P. The assemblage include *Nucleella*, *Irregularia* and *Stratifera*. Early Proterozoic silicified stromatolites from Agori Formation of Mahakoshal Group (Bijawar Group) were reported by J. Pati. These stromatolites occurring in close association with ash flows are unique. D.M. Banerjee recorded a new stromatolite occurrence from Railo Group of Delhi Supergroup, Rajasthan and discussed its environment of deposition. V. Rai reported horizontal buildups from Deoban Group and discussed microbial buildups from the Neoproterozoic Krol Group of Lesser Himalaya in the light of global sea level fluctuation. He emphasised regression of the sea during Terminal Proterozoic times. M. Sharma described the microstructures and micro fabrics of Palaeoproterozoic digitate mini stromatolites from the Vempalli Dolomite of Cuddapah Basin, S. India. He attributed the genesis of radial fibrous fabric due to chemogenic processes in the early stage of stromatolite formation.

Facies Architecture and Sedimentology

A. Chakrabarti stressed the role of biogenic activity in coastal sedimentation. He described the lagoonal-tidal flat facies from Lower Bhander Sandstone of Central India. N. Dubey discussed facies architecture and depositional environment of Middle Proterozoic Lower Vindhyan porcellanites of Son Valley. Facies analysis of the Blaini Formation and its depositional enviroment as shallow coastal in contrast to deep sea turbidite/glacial was proposed by P.K. Goswami for Nainital syncline. S.K. Parcha gave an overview of the Cambrian stratigraphy of Zanskar area and emphasised the role of *Phycodes pedum* trace fossil, in delineating Precambrian-Cambrian boundary in Kurgiakh Zoomer-La section.

A.K. Sinha discussed palaeogeography during Late Precambrian times in the Higher and Tethyan Himalayan Zone and compared them with Karakoram region. V.C. Tewari described various microbial buildups from the Meso to Neoproterozoic carbonates of the Lesser Himalayan basins (Deoban-Krol belt and their equivalents). The relationship between microbiota (cyanobacteria, algae), acritarchs, vendotaenids, stromatolite morphology, microstructure, facies and depositional enviroment was established for Deoban and Krol basins. He stressed the role of cyanobacterial mats with high $\delta^{13}C$ and $\delta^{18}O$ values in growth pattern of stromatolites and compared it with modern examples from Shark Bay, Australia, Mexico, and Bahamas, U.S.A. A tentative correlation based on stromatolite taxa, acritarchs and other micro organisms has been established for the Lesser Himalayan (Deoban-Jaunsar-Blaini-Krol-Tal) basins, Vindhyans and their subsurface counterparts deposited during Mesoproterozoic-early Cambrian times in a single Proto Tethys ocean. He also compared the possible early evolution of micro organisms and carbon and sulphur isotopic records from Earth (3800 Ma) and Mars (published ALH 84001 meteorite data).

Precambrian Microbiota

P.K. Maithy reported diversified organic walled microfossils from the shales of the Upper Tal Formation, Mussoorie syncline and cellularly preserved microfossils from Iron Ore Supergroup (=3.0 Ga) exposed at Kashia mines, Orissa. These microfossils are considered as the oldest known Indian biota. Purnima Srivastava discussed palaeobiological significance of microfossils from Vindhyans (Mesoproterozoic Kheinjia Formation, Son Valley, U.P. and Sirabu shale, Bundi area, Rajasthan). Very small (<1 μm) to large size (upto 160 μm) microfossils were reported. Cyanobacterial mat-building community dominated in Lower Vindhyans while planktic forms dominated in the Upper Vindhyans. H.M. Nagaraja reported diverse assemblages of well-preserved microbiota from Vanivilas Formation, Chitradurga Group and compared them with other similar occurrences the world over. P.K. Raha, using SEM technique recorded unicellular cyanobacteria and binary cell division from stromatolite black chert of Banded Iron Formation of Bailadila Group. Rajita Gautam described a rich acritarch assemblage and eukaryotic biota from Krol A Member of Solan area, Himachal Himalaya and compared them with Doushantuo Formation of China. The significance of acritarch assemblage in evolutionary events during Terminal Proterozoic was emphasised. Anju Rastogi described microfossils from Mesoproterozoic Bhagwanpura Limestone of Rajasthan. R.K. Kar discussed various aspects of algae cyanophyceae over two billion years of earth history.

Boundary Problems

Meera Tiwari based on her study of organic walled microfossils of the Chert-Phosphorite Member of Lower Tal Formation, Korgai syncline suggested Precambrian-Cambrian transition as close to the Chert-Phosphorite Member in the Lesser Himalaya. These eukaryotic acritarchs are also useful in correlating early Cambrian sediments and understanding biotic evolution. M. Alam described some unusual snake-like, branching and meandering trace fossils similar to *Helminthopsis* of Vendian age from Jodhpur Formation, Rajasthan and suspected a possible Precambrian-Cambrian transition in these beds. V. Rai presented an overview of microbial build-ups from different Proterozoic stratigraphic horizons of Peninsular India and the Lesser Himalaya.

Geochemistry

D.M. Banerjee presented a paper on stable isotopic compositions of carbonates from a cyclic carbonate evaporite rock sequence in Borehole P/47 in Hanseran Formation of Western Rajasthan (Terminal Proterozoic-Cambrian age). $\delta^{13}C$ values in the range of 0.40 to + 1.85‰ and $\delta^{18}O$ between -4.20 and -2.50‰ vs PDB were recorded. These values are consistent with reported global values of carbonate rocks of Terminal Proterozoic-Lower Cambrian age. He reported considerable variance of the $\delta^{34}S$ from +27.50 to +35.60‰ CDT. The C and O isotopic data suggest deposition in marginal evaporite basins. B. Kumar, B. Sreenivas, M.N. Rao, M. Sharma and V.C. Tewari recorded $\delta^{13}C$ and $\delta^{18}O$ signatures from 100 Precambrian carbonates from Dharwar, Aravalli, Cuddapah and Bhima basins of Peninsular India and Mussoorie syncline of Lesser Himalaya. They projected (1) an extremely early origin and $\delta^{18}O$ deficient depositional enviroment in the Dharwar Craton, (2) an extremely heavy carbon ($\delta^{13}C$ between +8.5 to +11.1 ‰ vs PDB) in the carbonates from Jhamarkotra Formation of Aravalli productivity, (3) insignificant change in the isotope chemistry of ocean during deposition of Vempalle dolomite, Cuddapah basin and Bhima basin and (4) an increase in carbon burial rate, increased availability of CO_2 in the then prevailing environment, enhanced rate of photosynthesis and high oxygenated environment at the end of Precambrian in Mussoorie syncline. Manoj Shukla reported possible biomarkers (Steroids) from the Proterozoic Shahabad Limestone of Bhima Basin, Karnataka.

Special Lecture

There was a special lecture delivered by Ravi Shankar highlighting the biosedimentology of microbial buildups in Precambrian basins of India: gaps in present status. In his address, Ravi Shankar emphasised the role of ongoing IGCP project 380 aimed at enhancing our understanding of the nature, origin, genesis of major types of microbial buildups like stomatolites, thrombolites, microbial boundstone, reefs, reef mounds and mud mounds during Earth's history in space and time.

The status reports presented by the NWG members of the IGCP-380 would be published by the Palaeontological Society of India, Lucknow.

Wadia Institute of Himalayan Geology V.C. TEWARI
Dehra Dun - 248001