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PRECAMBRIAN PALAEOBIOLOGY: TECHNIQUES AND METHODOLOGY – A REPORT ON THE CONTACT PROGRAMME

The Precambrian encompasses a critical time-span in the earth's history when profound changes within the Biosphere, Chemosphere and Physico-sphere occurred and paved way for subsequent evolution of physical and biological world. It was a time of significant variation in seawater chemistry (as preserved in the sedimentary record). The impact of one or several of these factors in combination on biological evolution has possibly been to such an extent that it has required to undertake proper identification, description, evaluation and location (search) of chronologically crucial biotic entities of the Precambrian rock record which throw light on Precambrian history. Tracing the evolutionary elements down into the Precambrian has been one of the enigmas facing the evolutionary biologists. Presently, our perception of the time span prior to Cambrian is much advanced in the palaeobiological sense, perhaps due to enormous data that have been generated in the last couple of decades.

In the last couple of years, there has been much debate on the nature of Proterozoic fossil records. A stream of reports commenting on the biogenicity of some of these fossils has appeared in international as well as national journals. No consensus could be generated to support or refute these findings perhaps because the nature of the findings occurred in the grey areas demarcating fossils and non-fossils. It was therefore felt that a training-cum-learning programme specifically dealing with a host of palaeobiological entities from Proterozoic sequences would be useful for researchers who are pursuing their work in several Proterozoic basins of India. The young researchers who undergo training in palaeobiological and biostratigraphical aspects of the Proterozoic sedimentary record both in laboratory and in the field, would become better equipped for locating and identifying palaeobiological remains (fossils) distributed in distantly occurring basins. A better fossil database so generated would thus help us project the Indian sedimentary sequences of the Precambrian as biostratigraphically important ones among the known Precambrian basins of the world.

Several projects in India under the aegis of International Geological Correlation Programme (IGCP) in the last few years have helped to rejuvenate research interest on Proterozoic fossils and the Precambrian-Cambrian Boundary elements. Currently, the IUGS-supported intensive research programme on the important aspects of the Terminal Proterozoic System is being vigorously pursued.

A three-week contact-cum-training programme was held at the Department of Geology, University of Lucknow which was funded by **Department of Science and Technology**, New Delhi and cosponsored by the **Palaeontological Society of India and the Department of Geology, University of Lucknow** between December 4 and 25, 2000 with the purpose of providing an opportunity to the young researchers to get exposed to the modern as well as the conventional techniques and methodologies of palaeobiological studies. The programme was focused to update the current status of knowledge about the

Participants of the Contact Programme during the valedictory session at Kauriyala on Rishikesh-Deoprayag road.

evolutionary palaeobiology of the Precambrian in the light of Indian and global records.

A significant aspect of this training was to develop awareness among the participants about the wealth of Precambrian fossils from the key Precambrian localities of India and abroad and their occurrences in yet unexplored parts of the country. Emphasis was to help the participants in the art of taxonomic description, illustration and photo preparation to enhance the quality of their work presentation, laboratory analyses and application of conceptual ideas. Special emphasis was also given to fill the gaps and remove misconceptions about the various fossil groups that require specialized techniques for study.

The course was organised into **four components** comprising lectures, laboratory work, fieldwork and a short project-work. Out of the total duration of the course, ten days were used on thematic lecture presentations and laboratory work, five days on fieldwork and seven days on project related work. The participants submitted short project reports on assigned topics after the completion of the programme.

The lectures were on the themes: Evolution and Precambrian Life, Indian Precambrian Sequences and Fossil Records, Art of Technical description: Taxonomy, Significance of Taphonomic studies, Stromatolites, Organic walled microfossils (OWM's), Shale Facies, Microbiota, Acritarchs, Calcareous algae and microbial build-ups, Carbonaceous mega-fossils, Small shelly fossils (SSF's), Sponge spicules, Problematica, Pseudofossils, Trace

fossils, Ediacaran Metazoans and Clastic mat Textures.

Laboratory work included sample studies under Petrological Microscope (oil immersion technique), Sample studies under Binocular Microscope, Scanning Electron Microscopy, Maceration Techniques, Thin Section Preparation, Serial Slicing, Plaster of Paris Casting, Silicone Rubber Moulding, Duplicating of Specimens, Peel Preparation, Staining Techniques, Specialized photography and Illustrations, Computer application to Photo-imaging: improving pictures by digital methods, Presentation of data.

The field work was carried out in the Krol-Tal succession of Rishikesh, Haridwar, Dehradun, and Mussoorie areas of Uttaranchal emphasizing sedimentological logging, stratigraphical column preparation, identification of fossil-yielding samples, ordered (serial) sampling, collection and numbering, packing of samples, photographing samples at the outcrop.

Participants were allotted projects covering aspects of maceration of samples, microfossil identification, stromatolite description, thin-section analysis for petrography and fossil identification, chert biota and trace fossils. Short project reports were submitted by the participants.

Twenty-four young researchers belonging to different institutions of the country attended the training course. The participants came from a cross-section across the geographical limits from North-east to West, North to South and Central India, representing Garhwal University, Srinagar, Kumaon University, Nainital, Panjab University, Chandigarh, University of Roorkee, Roorkee, Karnataka University, Dharwar, Cochin University of Science and Technology, Kochi, Nagpur University, Nagpur, Dibrugarh University, Dibrugarh, University of Madras, Chennai, Jammu University, Jammu, University of Lucknow, Lucknow, IIT, Kharagpur, Birbal Sahni Institute of Palaeobotany, Lucknow and Geological Survey of India (WR), Jaipur. The training was imparted by the teachers of the universities, IIT and the scientists of Geological Survey of India, Birbal Sahni Institute of Palaeobotany and Agharkar Research Institute, Pune. Extensive lecture notes, copies of research publications, maps, geological time scale and other relevant literature were provided to each participant. A field kit containing essentials and accessories were also distributed to all the participants.

The valedictory session was held on the banks of river Ganges near Kauriyala, Rishikesh. Participants presented their views before the invited experts about the entire training programme. A few of them were of the opinion that such training courses should be organised on a regular basis so as to keep pace with the development in palaeobiological researches in the country. Prof Ashok Sahni of Panjab University presided over the function which was also attended by Prof. A. K. Jain of the University of Roorkee and Prof. M.P. Singh, Secretary of the Palaeontological Society of India, Lucknow.

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