

## Preface

Sukomol Kumar Chanda, a Professor of Geology at the Department of Geological Sciences, Jadavpur University passed away in July 1998. During a span of almost four decades, he fulfilled in abundant measure, the role of a teacher and a mentor to several generations of students. The result is a spawning school of sedimentology in Kolkata which some fondly refer to as the 'Chanda School of Sedimentology'. To sum up the career of Professor Sukomol Kumar Chanda, we quote from an earlier tribute written by one of us (SKT): "Professor Chanda had an abiding interest in undergraduate and graduate education in sedimentology. He took great care in bringing modern concepts to the notice of his students, thereby enthusing generations of students in the areas of sedimentology and physical stratigraphy. His unflinching devotion to the discipline of sedimentology and his profound ability to influence his students and co-workers are clearly visible in the steady flow of significant published contributions from 1970 onwards, both from the Jadavpur University and the Geological Studies Unit of the Indian Statistical Institute, Kolkata". In 2002, P K Bose, S Sarkar and P G Eriksson edited a special issue on sedimentary geology entitled 'Rift Basins: Sedimentology and Palaeontology – Chanda Memorial Issue'. The volume contained an introduction to rift basins and their sediments by A D Miall, and a tribute to S K Chanda in addition to the twelve papers authored by several eminent geoscientists from India and other countries.

This collection of papers is a companion to the thematic issue on sedimentary geology. Many of the former students and friends of Sukomol Chanda, particularly from the Geological Studies Unit, Indian Statistical Institute, and the Presidency College, Kolkata were keen to dedicate some of their research work to their departed teacher, guide, and friend. This, then, is a collage of papers written in memory and honour of Professor Sukomol Chanda, and deals with various aspects of sedimentary geology of the Proterozoic and Gondwana basins of India; and the depositional setting and vertebrate biostratigraphy of the Triassic Dockum Group of Texas. Besides, three other papers deal with tidal flat structures: a journey from shallow to

inner estuarine facies, nannobacteria and the formation of framboidal pyrite, and nanophase Fe<sup>0</sup> in lunar soils.

The first four papers of this volume deal with various aspects of Proterozoic sedimentation patterns. **Chaudhuri**, through a detailed analysis of climbing ripple structure and associated storm-lamination from a Proterozoic carbonate platform succession of the Pranhita–Godavari valley has shown that "in fine grained, mud-dominated limestone succession where sequence stratigraphic features may be difficult to recognize, the calcisiltites provide a tool for recognition of proximality trend, systems tracts, and relative sea-level change". **Sarbani Patranabis Deb** has investigated tidal shelf sedimentation in the Neoproterozoic Chattisgarh succession through a study of the Kansapathar Sandstone. This unit developed as a major progradational sandstone sheet in a tide dominated shelf depositional system. The sediment dispersal patterns indicate a broadly N–S orientation of the coastline during the deposition of the Kansapathar Formation. She has also concluded that the thick coarsening up sequence is suggestive of major tectonic control on the depositional system and evolution of the basin.

**Basudeb Datta** has investigated the provenance, tectonics, and palaeoclimate of the Proterozoic Chandarpur sandstones of the Chattisgarh basin from a petrographic standpoint. The siliciclastic succession of the Chandarpur Group shows two fining-upward cycles, each cycle commencing with coarse-grained feldspathic sandstones. Datta has marshalled evidence to suggest that the Eastern Ghats Granulite belt which skirts the eastern and southeastern margin of the Chandarpur sandstone belt possibly did not exist during the Chandarpur sedimentation in early Neoproterozoic; lending support to the concept that the Eastern Ghats Mobile Belt was sutured with the Indian craton in the later part of the Neoproterozoic. **Mukhopadhyay, Gutzmer and Beukes** have studied the manganese carbonates interstratified with bedded chert in the Chanda Limestone of the Neoproterozoic Penganga Group at Adilabad, and presented evidence for microbiota to have

played a role in the mediation of early diagenetic Mn-carbonate formation in Precambrian marine sedimentary successions. These authors have concluded that the circumstantial evidence on the habits (of Mn-carbonates) and consistency of internal organization together with the stable isotope data points to a microbially induced template-controlled permineralisation followed by abiotic precipitation and growth of early-formed crystals.

The next set of four papers deal with various aspects of the sedimentary geological and tectonic evolution of the Gondwana basins in India. **Chakraborty and Ghosh** have suggested a pull-apart origin of the Satpura Gondwana basin, central India. They conclude that this basin developed above a releasing jog of a pre-existing transcurrent zone as a result of sinistral displacement. **Bhattacharya, Chakraborty and Bhattacharya** have investigated the changeover from glacio-marine to terrestrial fluvio-lacustrine depositional environment in the basal part of the Gondwana Supergroup represented by Talchir and Karharbari Formations. The basin evolution model suggests sedimentation patterns in these sequences that indicate Late Paleozoic glaciation, deglaciation and eustatic sea level rise, followed by differential uplift and subsidence as a sequel to post-glacial rebound. **Prabir Dasgupta** has investigated the facies patterns of the middle Permian Barren Measures Formation, Jharia basin. The Barren Measures Formation is characterized by a cyclic deposition of fine-grained lacustrine deposits, and relatively coarse-grained fluvial deposits emplaced on the hanging wall dip-slope, and finer grained sediments deposited in adjacent lakes in a half-graben setting. **Chakraborty and Sarkar** document an abundance of wave ripples, hummocky and swaley cross-stratification, and combined flow bedforms in the Bijori Formation, Satpura Gondwana basin suggesting lacustrine sedimentation as opposed to the earlier interpretation of meandering river deposits for them. Facies associations that characterize the lake succession in the middle and upper part of the Bijori Formation include lake shoreline, distributary channel, wave- and storm-affected delta front, and open lacustrine facies. Further, these authors have concluded that "development of the large Bijori lake body implies generation of accommodation space exceeding the rate of sediment supply and thus represents locus of high tectonic subsidence". The transition of fluvial sediments with red mudstones and calcareous soil profile in the lower part to carbonaceous shale and coal-bearing lake strata in the upper part is interpreted to denote a change from a warm semi-arid climate with seasonal rainfall to a humid climate.

**Thomas Lehman and Sankar Chatterjee** have investigated the depositional setting and vertebrate biostratigraphy of the Triassic Dockum Group in Texas, U.S.A. The Triassic strata of the Dockum Group in Texas comprise two major upward-fining alluvial-lacustrine depositional sequences. The two Dockum sequences are composed of stream channel, overbank floodplain facies, and additionally a lacustrine facies that accumulated in local flood-plain depressions. The lacustrine facies association differs from those described in most other fluvial successions, but resembles Tertiary and Quaternary lacustrine "playa" deposits found in the High Plains region of Texas. A significant conclusion of this work, at variance with that of previous workers, is that the stratigraphic ranges for most tetrapod index fossils actually overlap one another. The absence or presence of a given tetrapod at any particular locality is likely to reflect ecological factors rather than extinction/origination events.

**Chakrabarti** has investigated the development of sedimentary structures under seasonal conditions of some coastal tropical tidal flats of the east coast of India and inner estuarine tidal point bars located 30 to 50 kilometers inland from the coast. Chakrabarti has shown that several of the physical sedimentary structures are common in both the environments; flaser bedding and lenticular bedding are more common in the point bar facies during the monsoon months than in the coastal tidal flat environments. These results, as argued by Chakrabarti, imply that a cautious approach is required in the interpretation of a tidal flat palaeoenvironment based exclusively on these physical sedimentary structures.

**R L Folk** has interpreted sedimentary pyrite, ranging in age from Proterozoic to Recent, and in morphology from framboids to euhedral crystals, consisting of 30–50 nm spheroids, as fossils of nannobacterial cells that precipitated the iron sulfide.

The last paper, by **Abhijit Basu**, in this collection deals with nanophase Fe<sup>0</sup> in lunar soils. Back scattered electron and transmission electron imaging of lunar soil grains reveal an abundance of submicrometre sized Fe<sup>0</sup> globules that occur in the rinds of soil grains and in the submillimetre sized vesicular glass-cemented grains referred to as agglutinates. Basu has suggested that reduction by solar wind hydrogen in agglutinatic melts may have produced immiscible droplets that solidified as globules. The exact mechanism of formation of these Fe<sup>0</sup> globules in lunar soils remains unresolved.

We owe a debt of gratitude to several colleagues and associates who helped us in preparing

this volume. An academic endeavour of this kind depends to a large measure on the selfless service rendered by the reviewers of the papers. For their painstaking efforts and constructive reviews, we thank Paul Myrow (Colorado College), Richard J Cheel (Brock University), Wataru Maejima (Osaka City University), Guy Plint (University of Western Ontario), Abhijit Basu (Indiana University, Bloomington), Frances Westall (CNRS, Paris), David T Wright (University of Leicester), D Mukhopadhyay (University of Calcutta), Woo Hun Ryang (Chonbuk National University, Korea), Nicholas Eyles (University of Toronto), Stuart Bull (University of Tasmania), Bruce Cairncross (Rand Afrikaans University), Finn Surlyk (University of Copenhagen), Luis Buatois (Argentina), Bruce Rubidge (University of Witwatersrand), M R Gibling (Dalhousie University), Bernadette Tessier (University of Caen), R W Dalrymple (Queens University, Canada), Jens Gutzmer (Rand

Afrikaans University), E Troy Rasbury (Stony Brook) H C Verma (I.I.T., Kanpur), and Narendra Bhandari (PRL, Ahmedabad).

We owe a special word of thanks to the authors of the papers for showing exemplary patience despite our many queries, and despite the time overruns – to which some of them also contributed. We must also place on record our appreciation of the encouragement received from time to time from Dr. S R Shetye, Editor of the journal, and also for his patience and generosity in accommodating the time overruns. Ms. Ruchika Arora (University of Delhi) is thanked for her willing help in checking and cross-checking the reference lists of many of the papers of this collection.

**S K Tandon**  
**Asru K Chaudhuri**  
Guest Editors