

BOOK REVIEW

RECENT DEVELOPMENTS IN INDIAN MICROPALAEONTOLOGY. Edited by Pradeep Kundal. A Collection of Papers Presented at XVIII Indian Colloquium on Micropalaeontology and Stratigraphy organised by the Post Graduate Department of Geology, Nagpur University, Nagpur and Published by Gondwana Geological Society, Nagpur as Special Volume No.6 of Gondwana Geological Magazine, 313p. Price: Rs.650/-; US\$ 70

Micropalaeontology, beginning as a systematic study of Microfossils has developed into a very important tool in the exploration of mineral fuels, interpretation of environments, past climates etc. Micropalaeontologists in India have been holding colloquia in different parts of the country since 1971 and publishing the papers presented as special volumes. The meeting in 2002 was organised in Nagpur by the Post Graduate Department of Geology of Nagpur University. The present volume is a collection of papers presented at this meeting and has been published as a special volume (No.6) of the Gondwana Geological Magazine. Including the Presidential Address by Dr. Rajiv Nigam of National Institute of Oceanography, Goa, there are twenty seven papers in this volume. They are listed under the following sections. (i) Foraminifera, (ii) Bryozoa, (iii) Ostracode, (iv) Palynoflora, (v) Calcareous Algae and Fungi, (vi) Pteropods and Fish Teeth. A brief review of the papers is presented below.

In his presidential address, Dr. Nigam has dealt with the natural calamities like storms, floods, draught etc., along with global warming. He has shown how micropalaeontological studies can be used to understand past climates, temperatures and environments and infer causes for changes in these natural phenomena. He has emphasized the need for more studies on these aspects to effectively understand subtle changes taking place at present, particularly due to anthropogenic activities.

Foraminifera: In the section on Foraminifera there are eight papers. A. Mazumder et al. in their presentation on Distribution of benthic foraminifera in the Oxygen Minimum Zone (OMZ) on the Eastern Arabian Sea report occurrence of the species *Bulimina costata* to as much as 15% of the foraminiferal content which is not the case in the other oceans. They infer that it shows the conditions of Eastern Arabian Sea are probably somewhat different.

In an excellent study of the morphometrics of the foraminifera P.K. Saraswati has shown that modern tools of using computers and digital analysis have contributed

towards a quicker and more detailed studies on the prolocular and morphological characters of foraminifera. It is emphasized here that more studies on different foraminiferal forms will give a better understanding of the evolutionary history and environmental understanding of the foraminifera. In another paper by R. Saraswat et al. on *Pararotalia nipponica*, record genetic studies on living specimens of this species representing dextral and sinistral forms and also microspheric and megalospheric forms. Studies on 12 S microchondrial gene of this species have not revealed any change in different forms. It is a new approach and needs to be followed.

The paper by M.S. Srinivasan and D.K. Sinha deals with the biogeographic distribution of planktic foraminifera of South Pacific Ocean from a study of borehole samples collected under D.S.D.P. programme representing a time range from the present to 3.3 m.y. ago. The studies have revealed changes in surface water circulation pattern at 2.55 Ma, 1.7 Ma (Top of Olduvai) and 0.78 Ma (Base of Brunhes). The studies also revealed that amplitude of variation is less apparent in lower latitudes of Pacific Ocean as compared to higher latitudes. This paper, it is hoped, will trigger more such biogeographic studies on planktic foraminifera for understanding ocean circulation pattern in the immediate geological past.

Quaternary stratigraphy of South Andaman islands as revealed in Chidyatapu and Wandoor sections is described by C. Rajshekhar and P.P. Reddy. Chidyatapu is recognised as a member of Neil Formation representing Holocene. A number of benthic foraminifera with common occurrence of *Pararotalia* is diagnostic of this unit where as other older members of this formation contain abundant planktonic foraminifera with *Globorotalia truncatulinoides*. T.K. Mallik et al. describe the depositional environment of lower reaches of Ganges delta based on micropalaeontological studies. A hypo-saline environment influenced by tides is inferred with marked dissolution of foraminiferal tests in northern sector as compared to southern sector. A closer sampling and study of microfossils will

help in further finer defining of the environmental parameters in this delta domain

A Govindan has presented a comprehensive review of the Tertiary Larger Foraminifera in the Indian basins and ties up their stratigraphic distribution in terms of Far East Letter Stages and Planktic Foraminiferal Zones. Systematic notes given at the end for a number of foraminiferal species is a valuable aspect of this paper. He has used his vast experience both as a researcher and exploration geologist in compiling this data and hence will be a milestone paper in this volume. N P Singh in his paper on Biostratigraphic studies of Western Rajasthan shelf has proposed a reasoned stratigraphic correlation of litho-units and biostratigraphy in Jaisalmer with that of Bikaner-Nagaur and Barmer basins. This is a very important contribution to the Mesozoic and Tertiary stratigraphy of Rajasthan.

Bryozoa In this section there are two papers. Studies in fossil bryozoa are rare, though they are known to reveal interesting information on palaeoecology and palaeo-temperatures of units in which they are found. A K Guha and K. Gopikrishna describe thirteen species of the genus *Thalamoporella* from Middle Eocene to Lower Miocene sequence of Western Kachchh of Gujarat. In another paper A K Guha has presented a review of Cretaceous Bryozoa from Bagh beds, Madhya Pradesh and Ariyalur Group of Tamil Nadu. The Bagh beds bryozoa shows dominance of Cheilostomates over Cyclostomates, both in diversity and richness, possibly as a result of an early faunal turnover in favour of Cheilostomates in south Mid-Cretaceous palaeoequator. The Maastrichtian Bryozoa has a rich assemblage of Cyclostomates (43 species) and some of them show characteristics of Tertiary and Recent Cheilostomates. He also reports that bryozoan distribution in Kallankurichchi Formation of Ariyalur Group, South India renders its utility for biozonation.

Ostracoda There are three papers in this section. In the paper by S M Hussain et al. on ecology and distribution of Benthic ostracoda in Gulf of Mannar, off Tuticorin, Southeast Coast of India, a total of 52 taxa are described. Seasonal collection has shown positive correlation of abundance of ostracode fauna with (i) increased calcium carbonate content of sediments, (ii) increase of temperature (iii) Salinity, and (iv) dissolved oxygen of bottom waters.

A K Bhandari has given a very useful account of Ostracode Bioevents in Tertiary Beds of West coast of India in strata ranging in age from Palaeocene to Miocene. The bioevents are recognized on the basis of First Appearance Datum (FAD) and Last Appearance Datum

(LAD). In all, fifty-one ostracode bioevents are recorded of which four belong to Palaeocene, 11 in Early Eocene, 3 in Middle Eocene, 1 in Late Eocene, 2 in Oligocene, 23 in Early Miocene and 7 in Middle Miocene. A correlation of these events in different basins is also presented against time scale in Ma. The data is highly useful for oil exploration and biostratigraphic studies. In another paper S C Khosla et al. describe the occurrence of three species of the ostracode genus *Progonocythere* of which two are new. Their distribution in Jhura hill, Habo hill, Sadhara dome and Khadir island are presented.

Palynoflora In this section there are seven papers dealing with palynoflora of which five papers refer to palynoflora of Tertiary strata, two with intertrappean beds and one with Gondwana. Rakesh Kapoor et al. report on the palynoflora of Siwalik rocks of Nurpur region and Dharamsala Formation of Kangra district, Himachal Pradesh. Spores and pollen grains representing eighty species, mega plant fossils and charophytes in association with gastropods, pelecypods and fish scales and teeth constitute the fossil content found in the Middle and Upper Siwalik rocks of the region. A tropical warm, humid to drier temperate to subtropical climate in the depositional areas and a coastal link during deposition of Dharamsala sediments are inferred. An Early Miocene age is assigned to the strata examined on the basis of palynoflora.

B D Mandaokar has carried out palynology of the Middle Bhuvan rocks exposed in Lawngtlai area of Chhimguipui district of Mizoram. He records 52 species of spores and pollen with a rich diversity of angiosperm pollen. Based on the assemblage a tropical to subtropical bordering on to subtemperate and humid climate in a depositional niche in a near shore environment with sufficient fresh water supply is inferred. Charts showing botanical affinities and representation of different ecological groups are very informative. In another interesting paper Y Raghurani Singh et al. deal with the palyno-assemblage of Subathu Formation of Dharampur and Koti areas of Solan district, Himachal Pradesh. They indicate five floral zones. The lower assemblage zone (i) represents a transgressive sea phase, assemblage zone (ii) and (iii) represent regressive phase, assemblage zone (iv) represents a transgressive phase and of assemblage zone (v) represents a regressive phase of sea during the deposition of Subathu Formation. The sequence represents Ypresian to Lutetian age in the lower four floral zones whereas the fifth palynozone represents post-Lutetian age.

Sudha Gupta et al. give an account of the Lower Tertiary

(Palaeocene-Eocene) palynofossils in association with reworked microfossils of Gondwana affinity in the subsurface sediments of the Ganga basin and infer tropical to subtropical, warm humid climate with mild brackish water/back mangrove swamps influencing sedimentation. Closeness of Gondwana strata is inferred in view of presence of well preserved reworked Gondwana palynoflora. In the paper on the palynofossils from the Intertrappean charts of Lalitpur area of Uttar Pradesh R S Singh and Ratan Kar record a variety of palynomorphs, cuticles of terrestrial plants, algal colonies of lacustrine origin, abundance of pteridophytic remains and sporadic angiospermic pollen. This assemblage is considered to be compositionally different flora from that known from Mohgaon-Kalan, Padwai, Ranipur and Naskal intertrappean beds. However, the present assemblage has affinity with palynoflora of Madh Formation (Palaeocene) of Gujarat and Lakadong Sandstone (Palaeocene) of Assam. Continuation of Deccan volcanism in Lalitpur area into Palaeocene age is thus, inferred. D M Mohabey and Bandana Samant report the vegetative remains recovered from the faecal remains of Late Maastrichtian sauropodian dinosaurs found in the Lameta beds of Central India. Pteridophytic, gymnospermic and angiospermic plant tissues and spore and pollen remains point to the cropping of the soft tissues of plants by the dinosaurs instead of woody tissue. In another paper Ratan Kar has reported from a study of borehole samples on the presence of Barren Measures Formation in Tatapani - Ramkola coalfield based on palynofossils, though recognition of this unit is difficult lithologically in outcrops.

Algae and Fungi In this section there are four papers. P Kundal and A P Dharashivkar record from Lower Pliocene of Dwarka-Okha area of Gujarat eight species of the coralline algal genus *Amphiroa* of which four are new species. A depositional niche of low tide zone below 50 to 60 m water depth is surmised for the deposition of Dwarka Formation in this area. In the paper by P Kundal and S K Humane, occurrence of ten species of *Corallina* of which one species is new is reported from Middle Eocene to Lower Miocene rocks of Kachchh. The paper by P Kundal and K M Wanjarwadkar record six species of

Dasycladacean algae *Aeroporella* and *Dactypora* from Palaeocene-Eocene horizon of Baratang Formation of Middle Andaman. The assemblage of algal flora has Tethyan affinity. N V Khubalkar reports fungal assemblage from intertrappean cherts of Mohgaon-Kalan of Madhya Pradesh and infers that the climate during intertrappean deposition was probably warm and humid which allowed thriving of fungal flora.

Pteropods and Fish Teeth In this section there are two papers, one deals with the pteropods and the other with fish teeth. D Bhattacharjee reports on Quaternary pteropods from Northern Andaman Sea in surface samples and gravity cores. The study of Pteropods from gravity cores included in identifying the Pteropod Peak Zone (PPZ) and pteropod Preservation Maxima (PPM). Based on this study PPM Zone is recognised around 140 to 145 cm below sea surface in sediment column of the cores studied in the area. This represents the signal of deglaciation during the end phase of Pleistocene and perhaps represent 13,000 to 14,000 years Before Present. A concerted study of Pteropod distribution in down core samples will not only reveal the transition from Late Pleistocene to Recent, but will also give indications to the climatic fluctuations within the Recent. The paper by U K Mishra and S Sen records the occurrence of fish teeth related to shark from Langpar Formation (Palaeocene) of Meghalaya.

A number of papers included in the volume contribute towards not only consolidation and advancement of stratigraphic distribution of different microfossil groups but also serve as bench marks for future studies. The get up of the volume is very good and the illustrations are of good standard. This volume will no doubt be serving as an important reference work for future studies. This volume should find place in all libraries of universities, research and exploration organisations engaged in geoscientific research. Efforts of Gondwana Geological Society for publishing this volume in a short time deserves appreciation.

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