

New Aspects of Mesozoic Biodiversity

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Preface

This book encompasses some aspects of terrestrial biodiversity during the Mesozoic era. Biodiversity is a rapidly growing field of study which, more comprehensively, involves the evolution of the life in an evolving earth, and these two cannot be decoupled, though many of us tend to focus on one side or the other of this fascinating story. Terrestrial ecosystem ushered in during the Palaeozoic with the Cambrian explosion giving rise to the major invertebrate phyla dominating the Palaeozoic scenario followed up by the appearance of animals with backbones during the Late Palaeozoic. The Early Palaeozoic had elevated atmospheric CO₂ and warm temperatures extended to high latitudes but due to the extensive continental glaciations Gondwanaland became ice-covered during the later part of the Palaeozoic. However, warm climate prevailed in large areas of Laurasia. Towards the end of the Palaeozoic the cold Gondwanaland became warmer and the vegetation flourished. In Mesozoic the climate was generally dry and warm with seasonal monsoon in low latitude regions and the scenario of terrestrial ecosystem during this time had considerably changed. Though Mesozoic started with an impoverished diversity level due to the great end-Permian mass extinction event, it witnessed the emergence of a variety of terrestrial vertebrates which flourished, proliferated and took over the set scenario in the nearly vacant ecological niches and gradually increased in diversity reaching a new peak towards the end of the Mesozoic. This era actually shaped the founding of the present terrestrial ecosystem.

During the last two decades new discoveries and new techniques have led to better understanding of the diverse terrestrial faunas of the Mesozoic and their evolution in the backdrop of changing palaeogeography. The present book is the outcome of the “International Conference on Geology: Indian Scenario and Global Context” held at the Indian Statistical Institute as part of their Platinum Jubilee celebration in 2008 which coincided with the Golden Jubilee of the Geological Studies Unit of I. S. I.. The session on the “Evolution of Late Palaeozoic and Mesozoic Terrestrial Vertebrates” was organized on January 9, 2008; a good number of geologists and palaeobiologists from different parts of the world including several students attended the conference.

In a series of seven papers this book reflects the broader perspective of evolution of life and land during the Mesozoic with a global view. It contributes papers on contemporary issues of fossil vertebrates including new insights of

tetrapod evolution during Palaeozoic and Mesozoic eras, discovery of new vertebrate fossils from different continents, new information on palaeo-osteohistology and palaeobiogeography of the Indian plate during the end Mesozoic.

In the first chapter, Kemp has presented the current major advances in the palaeobiological researches on vertebrates of Late Palaeozoic and Mesozoic time; in his review; he focused on (i) new discoveries such as feathered basal birds from China, snake with a well-defined sacrum supporting a pelvis and functional hind limbs outside its ribcage from Argentina etc. from different corners of the world, filling the gaps in the evolution of higher tetrapod taxa and supplementing information in the configuration of faunal turnover and palaeo-community structure, (ii) application of new techniques including molecular palaeontology, CT scanning of fossil bones, stable isotope analysis and (iii) the developments of new concepts such as correlated progression. The reptilian group, Lepidosauria with its two major components, Rhynchocephalia and Squamata, has a long evolutionary history since Triassic till today though patchy at times; Evans and her co-author made an analysis of the evolution, diversification and extinction of these two groups in Gondwanaland and Laurasia through ages.

Novas and his co-authors described a new abelisaurid dinosaur from the Upper Cretaceous Lameta Formation of India and discussed its affinity to other Gondwanan abelisauroids. Recovery of a new primitive pterosaur from the continental Late Triassic Caturita Formation of Brazil has been communicated by Bonaparte and his co-authors who suggested that the early pterosaur evolved both in the terrestrial and littoral marine environment. Ray and her co-authors examined the bone microstructure of a Triassic kannemeyeriid dicynodont from India and showed that there are three distinct ontogenetic stages of this taxon.

The last two papers deal with the Indian fauna, their evolution, radiation, dispersal and extinction during the end Mesozoic when the northward drifting Indian plate became isolated from the rest of Gondwanaland. Sahni has summarized all the Late Mesozoic biota from India, their endemism, cosmopolitanism and their implications for evolution in the background of end Cretaceous mass extinction event as well as the extensive Deccan basalt eruption. Chatterjee and his co-author have put together the information on the tectonic evolution of the Indian plate with its biogeography during the Cretaceous-Tertiary period testing the models of geodispersal and vicariance.

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