Prof. R.C. Mishra Memorial Gold Medal for Lifetime Achievements

GLOBAL SIGNIFICANCE OF THE RECENT GEOLOGICAL AND MICROPALAEONTOLOGICAL RESEARCH IN THE EASTERN HIMALAYA AND MEGHALAYA, INDIA

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Abstract

Recent geological, micropalaeontological, and isotope chemostratigraphy research in the Sikkim-Arunachal Lesser-Tethys Himalaya and Shillong Plateau are discussed. These geo and bio-events are of global significance. Palaeobiogeographic reconstructions from the Proterozoic to the Quaternary geological Period have shown the evolution, diversification, extinction, and impact of climate change on future life on Earth. The Northeastern Lesser Himalayan Proterozoic carbonate belt is significant for understanding the global palaeobiological evolution and palaeoclimatic events. Meso-Neoproterozoic sediments of the Western Himalaya and Eastern Himalaya are correlatable based on stromatolites, organic-walled microfossils, carbon isotope chemostratigraphy, and Laser Raman Spectroscopy. The highly diversified microorganisms recorded from India have astrobiological significance.

The Carboniferous–Permian diamictites, coal beds, and Lower Gondwana plant fossil-bearing shales are well exposed and overlying the Buxa Dolomite in Rangit Window, South Sikkim, and Arunachal Himalaya. Lower Gondwana sediments are recorded from North Sikkim Tethyan Himalaya. The diamictites and shaly-sandy units of the Lachi Formation correlate with glacial beds in the Rangit Window. The palaeogeography of the Gondwana Supergroup is interpreted in a global context.

The Cretaceous-Tertiary boundary and biotic mass extinction is well recorded in the Meghalaya. It is also substantiated by carbon, oxygen, and mercury isotope chemostratigraphy and is correlated globally. The Indo–Myanmar Orogenic Belt (IMOB) in Manipur-Nagaland represents the eastern suture of the Indian plate formed due to the collision of the Indian plate with the Myanmar plate. The collision of the Indian Plate with the Eurasian Plate, subduction, and evolution of the Himalayas is discussed.

The micropalaeontological studies of the Paleocene-Eocene carbonates from Eastern Tethys, Meghalaya have revealed the presence of foraminifera *Alveolina* sp., *Assilina* sp., *Discocyclina* sp., *Glomalveolina* sp., *Quinqueloculina* sp., *Nummulites* sp., *Orbitoclypeus* sp., *Bolivina* sp., and *Textularia* sp., *Discocyclina jauhrii* and *Nummulites* sp., as main larger benthic foraminiferal assemblage. Standard biozones of the western Tethys during the Paleocene and Eocene have been recorded from Lakadong Limestone in the Mawmluh area and Umlatodoh Limestones in the Thangski area. The global correlation of the Tethys Ocean has been discussed based on standard larger benthic foraminifera zones.

Meghalayan Stage is the youngest Quaternary subdivision of the new geological time scale and began at 4.2 kyr based on U/Th dating of a stalagmite from Mawmluh Quarry, Meghalaya, India. The Meghalayan Stage coincides with a worldwide cultural decline due to an aridification event. Indian subcontinent also suggests the gradual decline of the Indus Valley civilizations due to prolonged drought during the youngest Quaternary. The oxygen isotope records of speleothem provide vital information about global variations in precipitation, temperature, and atmospheric circulation over low and mid-latitude regions. Stable oxygen isotopic ratios ($\delta^{18}O$) variations in stalagmites are related to precipitated amounts during the monsoon season. Geomicrobiological research in caves has been done in Lesser Himalayan and Meghalayan caves.