Larger Benthic Foraminifera from Paleocene–Eocene carbonates, Eastern Tethys, Meghalaya NE India – their comparison with Western Tethys and palaeobiogeographical significance

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India–Asia plate collision and uplift of the Himalaya took place during Paleocene–Eocene time (50 Ma). The extension of western Tethys Sea from Europe to Asian eastern Tethyan region has been correlated by assemblages of Larger Benthic Foraminifera (LBF). Global correlation and paleobiogeography of the eastern Meghalayan and western Tethyan Sea is discussed on the basis of SBZ of Paleocene–Eocene foraminifera assemblages (Fig. 1). Paleocene–Eocene Lakadong Limestone and Umlatodoh Limestone were deposited in shallow marine carbonate ramp depositional environment in Shillong Plateau, Meghalaya, NE India. The sedimentation basin is part of the Eastern Tethys and LBF and calcareous algae is the major carbonate facies. Coral reefs are not developed in these carbonates in contrast with the western Tethys limestones in Adriatic Platform and western European –Alpine region (Tewari *et al.*, 2007).The LBF and algal assemblage in both the limestones is consistent with other parts of Eastern Tethys in Eastern India and Tibet (Hottinger, 1971; Scheibner & Speijer, 2008, Tewari *et al*., 2010).

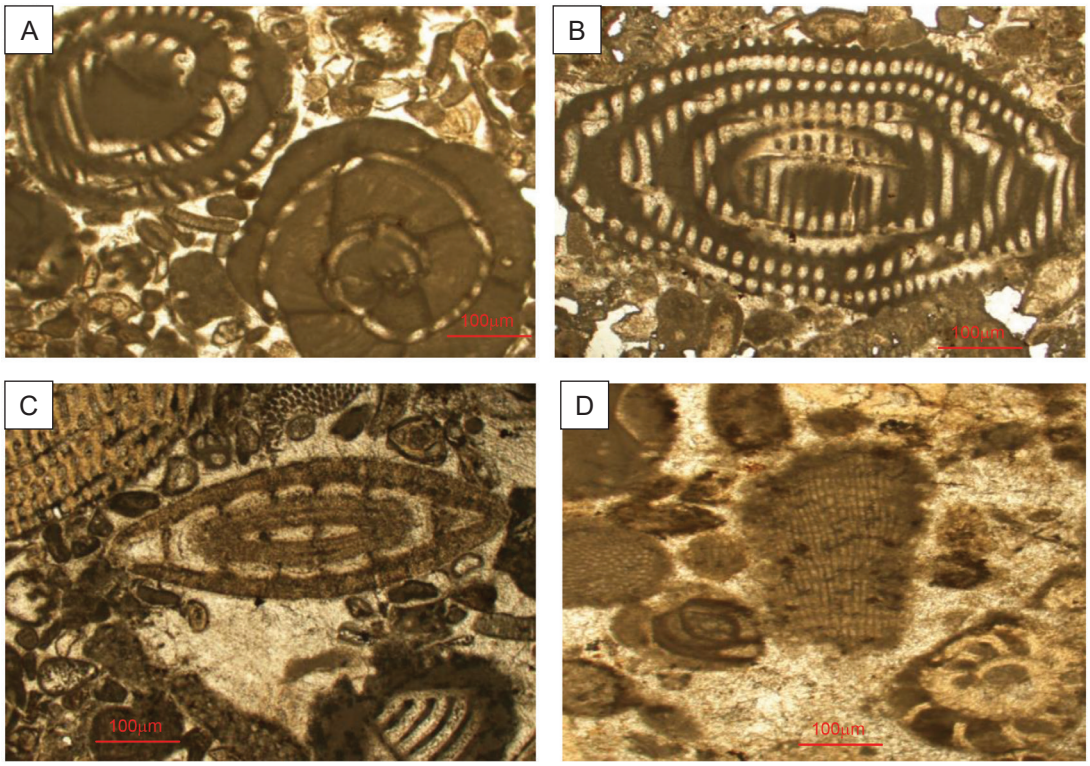

Fig. 1. Benthic Larger Foraminifera – algae assemblage from Eastern Tethys: A – *Alveolina* cf. *aramea* Hottinger – two sections, Ilerdian, SBZ 5; B – *Alveolina* cf. *vredenburgi* Davis and Pinfold (ex. *Alveolina cucumiformis*); C – *Assilina* sp. and *Discocyclina* sp.; D – Calcareous algae-foram (*Solenopora* sp. and *Miscellina* sp., SBZ 4) from Paleocene Lakadong Limestone, Meghalaya, India

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The latest Paleocene (Biozone SBZ4) miscellanids and ranikothalids are replaced by Early Eocene alveolinids and nummulitids, which dominates LBF assemblages in the western Tethyan realm at the P-E boundary (Scheibner & Speijer, 2008), Thanetian (SBZ4 Biozone) is equivalent to Tethyan platform stage II (Scheibner & Speijer, 2008). In standard biozones Ilerdian (SBZ5-SBZ6), a general reorganization in LBF communities is recorded with a long life and low reproductive potential (Hottinger, 1971). However, in the Meghalayan LBF assemblages of the lowest Eocene (biozones SBZ5/6) are still dominated by *Ranikothalia* and *Miscellanea,* while new LBFs that first emerged within this time interval elsewhere (e.g. *Assilina*, *Alveolina* and *Discocyclina*) are less important and *Nummulites* are absent. Later, in the Early Eocene there was a gradual diversification of *Discocyclina* and *Assilina* species (Fig. 1), while *Ranikothalia* disappeared and *Miscellanea* became less important by the end of the SBZ5/6 biozones. Similar LBF assemblages have been recorded in other parts of east Tethys in western India and Tibet (Scheibner & Speijer 2008; Tewari *et al.*, 2010 and references therein). Such LBF assemblages in east Tethys thus differ from west Tethys. Palaeobiogeographical barriers must have existed between India and Eurasia during early collision of Indian Plate with Eurasia Plate around 50 Ma (Tewari *et al*., 2010 and references therein). These barriers prevented migration of certain LBF species of *Nummulites* and *Alveolina* between these two palaeogeographic regions. LBF dominated facies in the other basins of Meghalaya like Umlatodoh Limestone are well developed in low latitude. However, mixed coral-algal reefs and LBF facies were sparse in low-mid latitude carbonate environments (Adriatic Platform of Italy-Slovenia, Oman, Egypt, Libya, NW Somalia; Tewari *et al*., 2007, 2010; Scheibner & Speijer, 2008 and references therin). In contrast to west Tethys, corals are absent in Eastern Tethys (calcareous algae is present in SBZ3 and SBZ4 Biozone, Fig. 1) in the Meghalaya and other low-latitude eastern Tethys (Scheibner & Speijer, 2008). Carbonate ramp (shallow tidal flat) carbonate environments were dominated by LBFs from Early to Late Paleocene (SBZ4, SBZ5, biozones; Fig. 1). It is interpreted that the collision of the Indian and Asian plates must have generated this difference in palaeobiodiversity by creating barriers, which prevented migration of certain LBFs (*Nummulites*) from west to east. Later, in the Early Eocene (SBZ6, SBZ7-SBZ8 biozones), recorded from younger Umlatodoh Limestone in the upper part gradually replaced by LBF dominated facies in the east, with highly diversified LBF species of *Nummulites, Discocyclina*, *Discocylina jauhrii* etc.), indicating stable shallow marine environmental conditions. Stable carbon and oxygen isotope analyses from Paleocene–Eocene Lakadong Limestone and Umlatodoh Limestone strongly supports a shallow marine carbonate platform deposition in Eastern Shallow Tethys, Meghalaya, India (Tewari *et al*., 2010)

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