Late Middle Eocene (bartonian) orthophragminids from Fulra Limestone, Kutch Basin (Western India): regional implications and their correlation to well-known assemblages in Western Tethys (North Africa, Europe and Turkey)

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Abstract

Fulra Limestone is a fossiliferous late Middle Eocene (early Bartonian) shallow-marine unit widely cropping out in Kutch Basin in Gujarat (W India). Owing to its diverse foraminiferal composition, represented by nummulitids, orthophragminids and alveolinids occurring abundantly throughout its stratigraphic range, Fulra limestone serves as a reference-unit for the development of middle Eocene larger benthic foraminifera (LBF) in Indian subcontinent. The coeval fossiliferous units containing orthophragminids and other LBF are exposed to the north of Kutch Basin in Kirthar (Indus Basin) and in Sulaiman foldbelts in Pakistan. The compositions of orthophragminids in these units, however, are not well known. The orthophragminids in Fulra Limestone, previously attributed only to the genera *Discocyclina* and *Asterocyclina*, in fact belong to the evolutionary lineages of *Discocyclina* Gümbel 1870, *Orbitoclypeus* Silvestri 1907 and *Asterocyclina* Gümbel 1870. The genus *Nemkovella* Less, 1987, a common genus in peri-Mediterranean region is not present in the Fulra limestone. We identified two new species of *Asterocyclina* and *Discocyclina*; *Asterocyclina sireli* Özcan et al. 2007 and *Discocyclina kutchensis* n. sp. (Özcan and Saraswati, in prep.). A comparison of Fulra orthophraminids, assigned to shallow benthic zone (SBZ) 17, to the well-described coeval assemblages at northern and southern Tethyan platforms in Italy, Hungary, Turkey, and Tunisia suggests that some species are confined to certain paleogeographic domains. *Orbitoclypeus haynesi*, the only orbitoclypeid and the most abundant orthophragminid in Fulra limestone, appears to be the most common orbitoclypeid in Tunis and some sections in Turkey. In Europe, this species is not known and is replaced by *Orbitoclypeus varians*, the most common orbitoclypeid in middle Eocene of central Europe. Both species occur in varying proportions in marine successions in Turkey. *Asterocyclina sireli*, identified so far only in Turkey, occurs in Fulra limestone and in lower Bartonian deposits in Tunisia. This species is recorded for the first time in Indian subcontinent. Relying on present study, as well as our recent studies in southern Tethyan platforms, we conclude that the generic and specific diversity of orthophragminids dramatically decreases eastward from the peri-Mediterranean region to Indian subcontinent and to the western Pacific region.