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Role of temperature in brachiopod migration? Evidence from the Jurassic

sediments of western India

Mukherjee, D.

Palaeontology Division 1, CHQ, MIV, GSI, Kolkata, debahuti.mukherjeegsi@gmail.com

The Middle Jurassic brachiopod record show a distinction of the Tethyan and Boreal faunas maintained in the Northern Hemisphere, with the differentiation of an Ethiopian fauna in the Southern Tethys [1]. The Jaisalmer and Kutch basins in the western part of India, emerged as a result of intense tectonic activity associated with the fragmentation of Gondwanaland, during the Lower-Middle Jurassic [2] and display a diverse fossil record of brachiopod, ammonite, gastropod, nautiloid, bivalves and coral taxa that exhibit similarity with their counterparts of the European Tethys but majority of species of these faunal groups are endemic to Kutch and Jaisalmer in the Indo – Madagascan faunal province. The Bathonian-Callovian-Oxfordian sediments of Kutch and Jaisalmer depict wide taxonomic diversity of the brachiopods, characterised by endemic species of *Kutchithyris*, [3] *Kutchirhynchia*, [4] *Bihenithyris* etc., together with cosmopolitan species like *Eudesia multicostrata*, *Aulacothyris pala* which are typically known from Mediterranean Province, North East European Province [5].

Recent finds of Boreal, European brachiopods *Plectoidothyris*, *Aulacothyris* [6] and ammonoids *Kheraicerias cf hannoveranum*, *Epistrenoceras* [7] in the Bathonian, Callovian of Kutch and Jaisalmer posed an intrigue regarding the possible environmental trigger for the migration events. The zeillerid *Aulacothyris*, present in the Bajocian – Bathonian of France, England, North –West European Province suddenly appear in the middle Callovian of Kutch and Jaisalmer but is absent afterwards. The terebratulid *Plectoidothyris* has been recorded only from the Bajocian to Lower Bathonian beds of England and Chile and is absent thereafter while it appear in the Middle to Late Bathonian of Jaisalmer Basin, the Upper Bathonian of Saudi Arabia and Callovian of Israel. The understanding of the causes of such migration events and apparent faunal disjunctive distribution patterns being elusive, stable isotopic studies of brachiopods from the Kuldhar Member (Callovian-Oxfordian) of Jaisalmer Formation Jaisalmer basin [8] were conducted and palaeo-temperatures estimated. The $\delta^{18}\text{O}$ values show depletion in the lower part of the Kuldhar Member (lower Callovian) that further depletes in the middle followed by a rise in the upper part (Oxfordian). The palaeotemperature as calculated from the stable isotope data is 22-30°C in the Callovian – Oxfordian which indicate a warm sea water temperature of the Jaisalmer-

Kutch Sea during the Callovian and Oxfordian. The palaeotemperature data in the Polish Jura chain in the Late Bajocian-Bathonian and Oxfordian indicate a colder climate episode [9] and therefore a cooler Boreal Realm. Therefore the warm water fauna might have found an ecological shelter along the south-western shelf of the Tethys triggering the migration event, and entered North-east Africa, Arabia and Jaisalmer and Kutch in the Upper Bathonian - Callovian and disappeared from the Boreal Realm around this time.

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