

CHAPTER - XSUMMARY AND CONCLUSIONS

The history of geological investigation of the Mesozoic rocks of Kutch has been very long. These rocks ranging in age between Middle Jurassic to Lower Cretaceous and deposited in a variety of environments including marine and non-marine have been studied in great details especially for the wealth of their fossil remains. Recently, some important stratigraphical and sedimentological studies have also been made on these rocks. Despite the fact that many invertebrate species have been reported by the earlier workers from the sediments of the eastern Kutch, they have virtually remained ignorant regarding the spectacular suite of trace fossils developed in these rocks. In the preceding Chapters of this thesis, the author for the first time has brought these objects to light. He has further given a complete inventory of these structures in relation to their regional and stratigraphical distribution and depositional environments.

The trace fossils as confirmed by the author reflect wide range of animal behavioral patterns. This in turn has been further interpreted by him in terms of ecology, strategy of adaption of the animals to their substrate and other biological parameters relating to the physical aspects of the of the Palaeoenvironments. The use of trace fossils to infer

Paleoecology is also made by the author by drawing information on the fossil community distribution and their feeding structure. The Paleoecological information and its relationship with the lithofacies is further used advantageously to reconstruct the Palaeoenvironments.

Investigation of the trace fossils at the Omission surfaces enabled the author to test the newly developed concepts of "event stratigraphy", and "episodic sedimentation".

Lastly, a depositional model entirely based on the trace fossil distribution has been proposed by the author.

The main conclusions of these studies are as under:

- (1) The Wagad Group of rocks of Mesozoic age in eastern Kutch, contains a rich and varied trace fossil fauna representing a wide range of behavioral patterns.
- (2) Inventory of these structures has for the first time **been** made by the author.
- (3) These traces are represented by a number of well-defined genera and species comparable to similar forms reported elsewhere, and by some less distinct forms which needs further study.
- (4) The author has investigated in detail 45 ichnogenra and 73 ichnospecies.

- (5) All these traces are further described in terms of their diagnostic characters, nature of preservation, facies characteristics, regional and stratigraphical distribution and association with other trace fossil forms. These descriptions are supplemented with appropriate specimen or field photographs.
- (6) A classification of behaviour based mainly on the trace fossil morphology enabled the author to recognize five ethological groups including Cubichnia, Repichnia, Pasichnia, Fodinichnia and Domichnia.
- (7) Detailed measurements of ten major stratigraphic sections helped the author to draw important conclusions on the trace fossil occurrences and their relationships to the sediments.
- (8) On the bases of the physical and sedimentological aspects observed in the stratigraphic sections, the author has confirmed development of six lithofacies in the rocks of eastern Kutch. These include: (i) the massive shale facies (MSH); (ii) laminated shale with interbedded sandstone facies (LSS); (iii) Planar tubular cross-stratified sandstone facies (PTS); (iv) Trough cross-stratified sandstone facies (TXS); (v) Unbedded siltsstone and fine-grained sandstone facies (UBS); and (vi) Unbedded median grained sandstone facies (UMS).

- (9) These lithofacies confirmed an overall coarsening upward trend in the major parts of the Mesozoic sequence reflecting transition from low-energy marine shelf to high-energy terrestrial conditions.
- (10) The overall coarsening upward trend is found to be superimposed with six coarsening cycles, each cycle, presumably resulting in response to a progradational depositional event. The recurrence of trace fossil in these confirm such a trend.
- (11) Occurrence of Scoyenia, Glossifungites, Skolithos, Cruziana, Zoophycos and Nereites ichnofacies confirms the utility of the "universal trace fossil facies concept" for the rocks of eastern Kutch. According to this concept particular kinds of trace making organisms tend to congregate under particular sets of environmental conditions reflected in these ichnofacies.
- (12) The distribution of trace fossils in different stratigraphic units indicated ten ichnocoenoses that include - (1) Rhizocorellium ichnocoenose; (2) Diplocraterion ichnocoenose; (3) Arenicolites ichnocoenose; (4) Ophiomorpha ichnocoenose; (5) Gyrochorte ichnocoenose; (6) Muensteria ichnocoenose; (7) Teichichnus ichnocoenose; (8) Chondrites ichnocoenose; (9) Thalassinoides, ichnocoenose; and (10) Scoyenia ichnocoenose.

- (13) The ichnocoenoses when interpreted in terms of their trophic structures have shown that most of these ichnocoenose, their grain size, and sedimentary structures are strongly inter-related, and are useful Paleobathymetric and Paleoenvironmental indicators.
- (14) Development of trace fossils at the omission surfaces confirm<sup>s</sup> the process intensity, frequency of events and degree of modification of the sediments by the trace making organisms. Two events of storm deposition are also confirmed based on these studies.
- (15) Lastly, the overall sedimentological and ichnological evidences gathered by the author help him to confirm prograding deltaic environments in a major regressive phase of the Sea during the Mesozoic time, during which the rocks in eastern kutch were deposited.