CHAPTER - 9

FINAL REMARKS

The main conclusions drawn on the basis of field, sedimentological and paleontological studies in respect of Oligocene section of south Western Kutch are as follows :

1. The Oligocene section mainly comprises of yellowish to pinkish white, compact, highly fossiliferous muddy limestone and olive to grayish green laminated as well as lumpy shale and clay. Development of coralline biohermal limestone is common in early Oligocene. Additionally, yellowish white, glauconitic siltstone commonly occurs, particularly at the base and top. The entire section represents the Bermoti series and is divisible into Ramania and Waior stages corresponding to Rupelian stage and Chattian stage respectively. The thickness of the strata varies from 95' to 115' in the area.

2. The strata is characterised by unconformities at the top and base of Ramania and Waior stages, along with minor diastem within Ramania stage. These unconformities are well tracable in the field.

3. Quantitative petrographic study carried out for every sample has led to indentify and characterise the microfacies. The vertical variation of microfacies indicate repetitive sequences of carbonate microfacies i.e. shale / mudstone followed up by bioclastic wackestone, bioclastic packstone, grainstone and dolomite. One such

sequence represents a sedimentary cycle and several such cycles are identified in each section. Such cycles in turn, represent trangressive-regressive fluctuations and are well correlatable in the area.

The lateral distribution of microfacies mainly indicates narrow linear belts representing nearshore clastics, mudstone - wackestone, packstone - grainstone and dolomite facies. Facies maps are prepared for the three stages, viz. lower Ramania, upper Ramania and Waior.

4. The insoluble residue within carbonate rocks indicate varitions from 0 or 0.1 to even upto 20%. The vertical variation of insoluble residue indicates several maxima and minima, which are correlatable with the shallowing of sea level and unconformity planes. The lateral variation of insoluble residue indicates gradual basinward decrease in the values i.e, northeast to southwest. Likewise, the grainsize study of the carbonates indicate a decrease in the amount of sand-grade constituents towards west and southwest.

5. Detailed data gathered on account of larger foraminifera, smaller benthics and planktonics, ostracoda, mega fossils as corals, echinoids etc. helps to divide the Bermoti series into six biozones. Comparative study of benthonic foraminiferal associations highlights their relationship with sediments and also with the environments.

This concept led to recognise the nine biofacies which are correlatable in all the sections. Besides, on the basis of benthonic foraminifera, paleobathymetry is assessed.

6. The vertical variations of paleoenvironments identified on the basis of litho and biofacies as well as detailed microfacies studies, indicate several repetitive cycles, normally beginning with low energy open shelf through intertidal to shallow, low energy lagoon. This in turn represents mudstone-wackestone microfacies at the base followed by packstone-grainstone and finally capped by dolomite. Several highly bioturbated bands representing tidal flat environments are seen in Waior stage in eastern part.

The lateral variations of the various environments, represent nearshore clastics, open circulation shelf and high energy intertidal belts, from northeast to southwest. The low energy subtidal belt is interpreted to be occurring further south west i.e. towards the deeper part of the basin.

7. On the basis of vertical variation of environments several sedimentary cycles representing transgressions-regressions and sea level fluctuations have been identified for each section. The sea level changes observed in the area are well correlatable with the global on-lap, off-lap sequences. The global regressions identified by Haq et.al (op. cit) occurring at 36.6, 30 and 23.7 Ma could also be recognised in the present area.

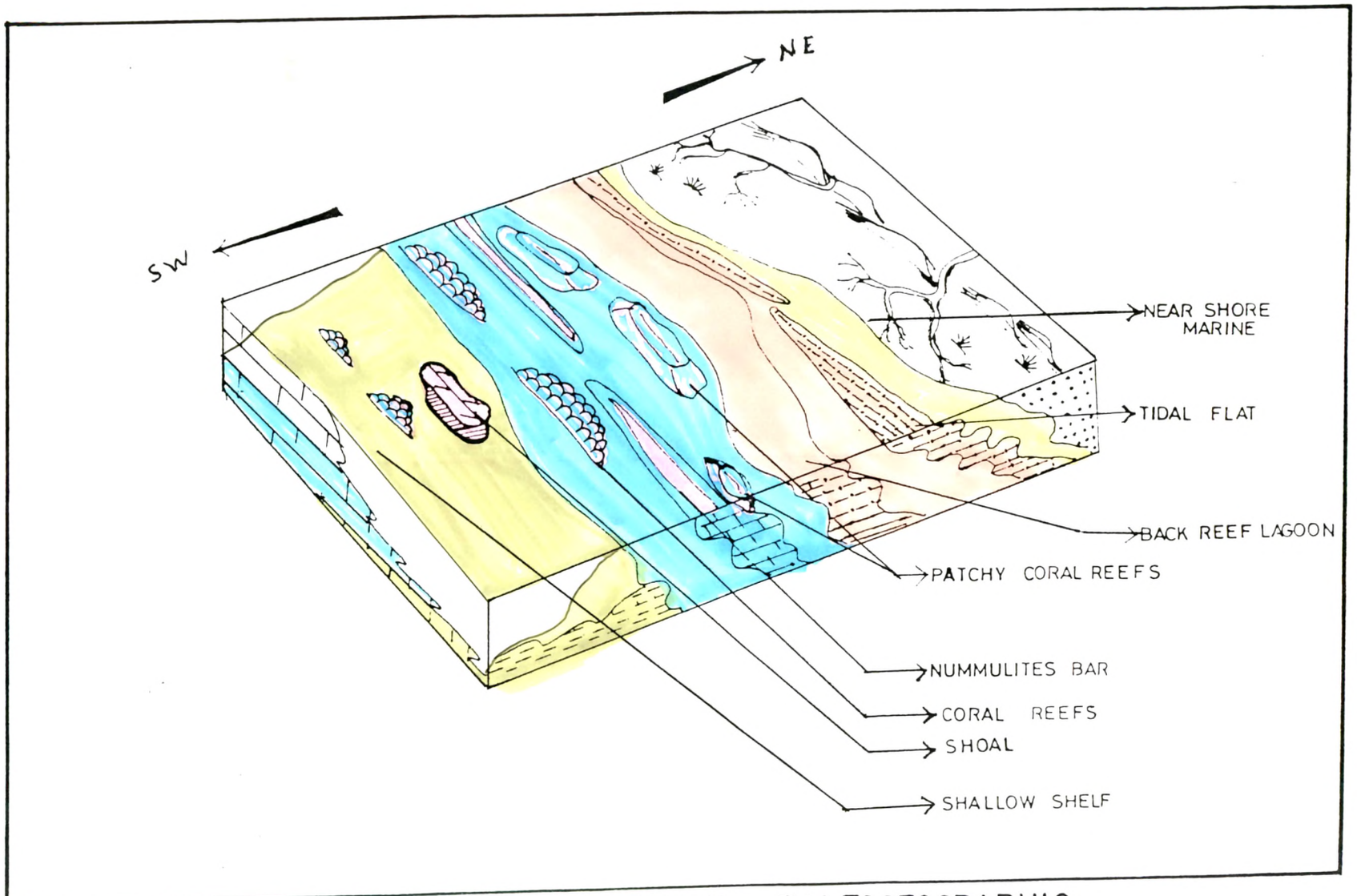

FIG. 9·1 GENERALISED THREE DIAMENTIONAL PALEOGEOGRAPHIC AND ENVIRONMENTAL SETTING, MANIYARA FORT FORMATION

8. The entire data including microfacies, biofacies and paleoenvironments is integrated to evolve a sedimentation model in relation to paleogeographic setting, sediment produce, subsidence history and sea level changes. The three dimensional sedimentary models have been prepared to decipher lower Ramania, upper Ramania and Waior stages. Thus ultimately, a process response model in terms of sedimentary and biologic process with resultant facies have been worked out. Additionally, paleogeological sections for the three stages have also been reconstructed.

Figure 9.1 indicates generalized and gross three dimensional paleogeographic and environmental setting for entire Oligocene i.e. Maniyara Fort Formation. This indicates from nearshore clastics deposition in the northeast with positive Decean trap area towards further northeast. Low energy open shelf/back reef lagoon existed in between nearshore clastic and intertidal high energy belt due southwest which has given rise to coralline reefs. Nummulites bars often occur just below the reefal limestone facies. The area further southwest is characterised by low energy, shallow, subtidal shelf.