CHAPTER VIII

SUMMARY AND CONCLUSIONS

In the opening lines of the thesis, it was mentioned that the present work was taken up mainly with a sedimentological approach for stratigraphical classification of Jurassic and Cretaceous rocks of the study area. The various investigations and their results given in the preceeding chapters have amply justified the approach. Dunbar and Rodgers (1957, p.267) have rightly stated that "all changes

in lithological characters in a local section reflect changes in the conditions of deposition of the rocks in the section..... Evidently, from the definition of a formation, he (the geologist) should choose ideally those lithologic changes that express the most fundamental changes in the original environmental conditions, if he can determine which those are." The present study fully substantiates the above statement. As Folk (1965) has pointed out, "studies of the composition and properties of sedimentary rocks are vital in interpreting strata stratigraphy; it is the job of the sedimentary petrologist to determine location, lithology, relief, climate and tectonic activity of the source area, to deduce the character of the environment of deposition; to determine the cause for changes in the thickness or lithology."

STRATIGRAPHY:-

A reference to the table given at the end of the chapter on 'Sedimentation' (Fig. 23) reveals that there exists a close parallelism between palaeontological and sedimentological classification.

In fact, a critical study of the changes in lithological associations in the different series has enabled the author to work out the sequence of gradual changes in the sedimentary environments from older to younger series. The entire sedimentary sequence has been classified on this basis and such classification is the result of a detailed sedimentological investigation of the various lithological types of the area, belonging to different horizons.

To conclude, the author now proposes to summarise the salient features of the depositional history and structure of the area, as revealed by the present study.

DEPOSITIONAL HISTORY IN BRIEF:

The present study reveals that the deposition of the Jurassic-Cretaceous sequence was more or less a continuous process; of course the sedimentation took place under a gradually changing environment. The deposition began during Jurassic under marine conditions and by the time it came to a close in Cretaceous, the environment had changed to a continental type. The successive fluctuations and

changes in the depositional conditions are very well reflected in the lithology, texture and structure of the various constituent units. The entire depositional history, worked out on the basis of the present investigation, could be summarised as under:

(1) The earliest sediments of the area belonging to Chari series were deposited in a 'Circalittoral' marine environment, the process of transportation being of graded and pelagic suspension type. Tectonically, during the deposition of these rocks, the basin was rather unstable and gradually became shallower at the close of the deposition of the series.

(2) The junction between the Chari rocks and the overlying Katrol series, indicates a temporary break in the deposition. With the advent of Katrol deposition the sedimentary environments appear to have been considerably changed. The rocks of the lower two members of the series suggest an 'Infralittoral' a shallow marine environment, while those of the upper members represent a typical

transitional environment characterised by 'Paralic Sedimentation.' The sediments are seen to have been transported by the processes like rolling, bottom suspension and graded and uniform suspension. During the Katrol sedimentation too, the basin progressively became shallower. May be, the subsidence could not keep pace with the rate of sedimentation or perhaps the shallowing to a certain extent was result of an uplift even. In the topmost part of this series, the conditions of deposition appear to have been of such a nature that while in the west, marine conditions alternated with non-marine, in the east almost exclusively non-marine conditions prevailed. This is a clear indication of recession of coastline westward during the closing period of the Katrol sedimentation.

(3) Though the Umia series rests quite conformably over the older rocks, it is seen that the sedimentary environments under which the former was deposited were quite distinct and more towards non-marine. The rocks of Umia series were deposited in 'Littoral and Lagoonal' environments, the process

of transportation being 'beach type' (of littoral environment). Tectonically the basin was unstable but the frequency, rate and intensity of the shallowing and deepening of the basin was much less pronounced as compared to the rocks of earlier series. The process of the recession of coast-line which started at the close of Katrol sedimentation, became more dominant during the deposition of Umia series, and it is seen that by the close of Umia sedimentation the depositional environments throughout, had completely changed over to a fresh water type which gave rise to the overlying Bhuj series.

(4) The rocks of Bhuj series show a typical 'Continental' environment - Fluvial, [illegible] and somewhat deltaic - with prevalent oxidising conditions. The sediments seem to have been transported by 'beach' type of process and this beach perhaps comprised a deltaic environment. Tectonically, the sediments were deposited on a slightly unstable platform with abrupt but minor subsidences at regular intervals. The ferrugenation

at various horizons indicates frequent subaerial exposures of sediments. At the close of the deposition of Bhuj series, major uplift took place bringing to a close, a major chapter of deposition in the Mesozoic history.

STRUCTURAL EVOLUTION:

The Mesozoic rocks, soon after the deposition and uplift, appear to have been subjected to considerable deformational stresses. The most salient and characteristic structures that developed, consist of (i) an E-W chain of domes and associated flexures to its south; (ii) a major E-W fault truncating the domes on their northern flanks and a few similar minor faults, and (iii) numerous transverse faults, running almost NW, NNW-SSE, and NNE-SSW. From its nature, the Katrol fault appears to be of reverse type such that the Chari rocks have been pushed over the Bhuj sandstones. The way in which the various domes lie flanked to the fault and show steeper dips towards north and gentler dips to the south, suggest a close link between the dome formation and the

northward pushing of strata over the Katrol fault plane. It is seen that the transverse faults flanking the domes to the E-W, dip towards the domes and converge and meet due south, and thus exhibit a sort of conjugate relationship. Perhaps these faults developed on account of unequal drag along the Katrol fault plane, as conjugate shear planes, folding the rocks in between.

The author is inclined to conclude that the Katrol fault and the related conjugate transverse faults, bounding the various domes, are genetically part and parcel of the doming process, and this mechanism of dome formation appears to be valid even for the other still bigger structures flanking the 'Mainland Fault' and the 'Island Fault'. The author is not in a position to make any definite suggestion regarding the exact causes for the structural phenomenon. Perhaps these movements were associated with the outpouring of the immense Deccan Trap in the south, and this volcanic activity was in someway responsible for pushing the strata northward. Or could it be, that these tectonic movements constituted the

fore-runners of the orogenic upheaval in the Himalayan region, resulting into some sort of underthrusting from the north?

CONCLUDING REMARKS:

Before concluding, the author would like to emphasize that vast areas in Kutch still remain to be investigated on the present lines. The author's attempt in this direction, is just a beginning and it is hoped that many more will take up such study and work in adjoining areas. Only then will emerge a clear picture of the geology of these important sedimentary formations of the country.