C H A P T E R-III

SCOPE OF WORK

The study deals with the carbonate sequences of Kutch basin, particularly the Jhurio and Jumara formations ranging in age from Late Bathonian to Oxfordian. These formations show much lateral and vertical facies changes, ascribable to a number of factors e.g. sea level fluctuations, changes in sediment supply and sediment distribution pattern in shallow marine environment.

The present work attempts to study these sediments from the angle of facies and microfacies analyses in order to ascertain temporal and spatial variations in palaeoenvironment in response to relative changes in sea level. Besides, diagenesis of carbonate rocks and their depositional history have also been taken care of. The Jurassic carbonate sequence of Kutch divided into two formations; Jhurio and Jumara, records a particular mode of

evolution of a carbonate platform and provides ample opportunities to study facies and fauna in contrasting shallow marine settings.

The Jhurio Formation is exposed in Jhura (Jhurio) dome, Habo dome and Jumara Dome in the Mainland of Kutch and has been studied in these three sections only. In the islands of Northern Kutch the coeval formations are known to rest directly on the Precambrian gneissic basement but its base is not exposed in the Kutch Mainland. The Jumara formation has also been studied in Jumara, Habo and Jhura domes. The good and continuous exposure of rocks within the dome provide enormous scope for detailed sedimentological and biostratigraphic studies, although accessibility and rugged terrain are the major constraints. Because of limited exposures and difficult terrain conditions, especially in case of Jhura and Habo domes, the thicknesses of lithofacies have been extrapolated from nearest exposed sections along particular traverses.

OBJECTIVES

The objectives of the present study are as follows:

i) Identify and study of the lithofacies of the Middle Jurassic carbonate rocks exposed in Jumara, Jhura and Habo domes of Kutch Mainland.

ii) Identify different microfacies within individual

lithofacies through stained and unstained thin sections and SEM studies.

iii) Evaluate diagenesis of carbonate rocks of the study area and its effect on porosity.

iv) Delineate depositional environments.

WORK CARRIED OUT

In order to achieve the stated objectives, the following work elements were undertaken:

1) Broad geological mapping in the scale 4.2 Cm = 1Km of Jumara dome tracing the outcrops boundary of the Jurassic carbonates with the younger siliciclastic Jhuran formation was carried out and the boundary between the Jhurio and Jumara formations was marked in Jumara dome.

2) Close sampling was made after recognizing the boundaries between the various rock-units/types in the field. Nearly 100 representative samples of exposed beds were collected in Jumara dome and their thin sections were studied for microfacies analyses and diagenetic characteristics.

3) The available maps of Jhura and Habo domes in the scale of 1"=1 Mile (1:63,360) have been suitably enlarged to the scale of 2 Cm.=1 Km. (i.e. 1:50,000). These were fitted on the available toposheet of 1:50,000 and were used for taking the traverses. The formation boundaries were verified before collecting samples from representative beds.

4) Four traverses were taken in Jhura dome. Close and systematic sampling of two carbonate formations i.e. Jhurio and Jumara was done. About 120 representative samples were collected for microfacies analyses.

5) Two traverses were taken in Habo dome including a traverse along Kalajar nala where the Jhurio and Jumara formations are well exposed. Systematic sampling of these two carbonate formations was done along the traverse. Around 70 representative samples and their thin sections were analyzed for recognition of various microfacies within the two carbonate formations.

6) The major lithofacies exposed in all the three domes under Jhurio and Jumara formations were identified mostly based on the field studies.

7) A number of microfacies within individual lithofacies were recognized through petrographic studies. Staining and SEM studies were also carried out to ascertain the microfacies.

8) Diagenetic studies were carried out after recognizing the different diagenetic features indicating a particular environment through petrographic studies.

9) Mineralogical and geochemical studies like insoluble residue, XRD, trace element and stable isotope studies were carried out for further refining of the diagenetic environment of carbonate sequences of Jhurio and Jumara

formations under study area.

10) After field and different laboratory studies, an interdomal correlation of lithofacies of the two formations within Jumara, Jhura and Habo domes was attempted.

11) The petrography of the carbonate rocks, their internal structures, the bed forms and their sequences and sedimentary structures have been interpreted for paleoenvironments and paleogeographic reconstruction.

LIMITATIONS

Utmost care has been taken in systematic bed by bed sampling from the studied area as well as in the collection of other field data and laboratory analyses, however, the accuracy has been affected to some degree due to following limiting factors:

1. The main factor was the surface non-exposure of the beds along the line of traverse and extensive erosion of the exposed beds at places.

2. Due to numerous transverse and longitudinal faults especially in case of Jhura dome, repetition and omission of beds has posed difficulty in collection of representative samples, however, care has been taken to avoid such confusion.

3. The difficult and rugged terrain conditions, especially in

case of Jhura and Habo dome have prevented accurate measurement of thicknesses of individual lithofacies identified during the field studies.

4. Due to frequent lateral and vertical microfacies variations, the intradomal correlation has been affected to some degree. However, the same has been cross checked by gross lithology, their fossil contents and position of the beds with respect to underlying and overlying strata.

5. Major and trace element analyses like Calcium, Magnesium, Manganese, Strontium, Iron, Boron and Vanadium were attempted with the help of Atomic Absorption Spectrophotometry. The values of Boron and Vanadium could not be detected as the same was falling below the traceable limit of the instrument.