

CHAPTER 2

P R E V I O U S W O R K

Several accounts of the cultural, geographic and economic aspects of the former princely state of Kutch were published during the last 200 years. Such accounts have given only passing and elementary references of the rocks and topography of the region. The earliest reference to the geological characters of the Kutch region was made by Grant (1837), but details of his work are not available. Blanford (1867), after a short reconnaissance published mainly a structural account of the region. He for the first time recognised the E-W trending master faults.

The most pioneering and fundamental work was published by Wynne (1872) exactly 100 years ago. He was the first to describe a connected account of the geology of the entire area in space and time, and published a geological map on 1" = 4 miles scale. His voluminous and lucidly written memoir still forms the basis for all modern studies on the geology of Kutch. He divided the Mesozoic stratigraphy into two groups as Lower and Upper Jurassic Groups, and correlated them with the Oolitic of England. He also classified the Tertiary stratigraphy into several divisions. His entire classification is as follows:

| | | |
|----------------------------|--|----------------------------|
| RECENT | Alluvial blown sand and sub-recent deposits | Pleistocene |
| | Upper Tertiary | Pliocene |
| | -----Unconformity----- | |
| Tertiary | Argillaceous Group (Fossiliferous) | Miocene or Upper Eocene |
| | Arenaceous Group | |
| | Nummulitic Group | |
| | Gypseous Shales | Eocene |
| | Sub-Nummulites | |
| Volcanic | Stratified traps and intertrappean beds | |
| Tertiary | Infra-trappean Grits | |
| | -----Unconformity----- | |
| | Upper Jurassic Group | |
| | Lower Jurassic Group | Oolitic |
| Metamorphic crystalline | Syenite | |

Waagen (1871, 1873) on the basis of paleontological evidences proposed the following classification of the Mesozoic rocks of Kutch:

| <u>Series</u> | <u>Age</u> |
|----------------|--------------------------|
| Umia Series | Portlandian to Neocomian |
| Katrol Series | Portlandian |
| Chari Series | Oxfordian |
| Pachham Series | Bathonian |

The above classification is still widely followed in the text books on Indian Geology.

The lamellibranch and gastropod faunas collected by Wynne, Fedden, and Stoliczka were studied by Kitchin (1915, 1903). He mentioned that the Trigonina of Kutch is grossly comparable to that of 'Inferior Oolitic' of Europe. The cephalopod fauna was studied by Spath (1933), who established detailed bio-zones of the Mesozoic stratigraphic units on the basis of his studies of cephalopods.

Rajnath (1932, 1934, 1942) carried out detailed biostratigraphic work of some of the best exposed Mesozoic sections of the Western Kutch Mainland, and proposed several fossil assemblage zones for the Jumara dome section. According to him, the cores of

Nara and Jumara domes expose the Pachham Series. He further divided the 'Umia' of Waagen into three units. The Umia term was retained by him to denote only the Lower Umia of Waagen, containing green oolitic rocks and a Tithonian fauna. The overlying calcareous beds were grouped by him as the Uktas. Further he called the upper beds of Waagen's Umia yielding plant fossils, as Bhuj Stage, and assigned it a middle Cretaceous age. Rajnath also established several unconformities and suggested fluctuations in the sea levels during deposition.

Agarwal (1957) similarly studied the faunal assemblages of the Jhura dome in north central part of Kutch Mainland and differentiated 18 beds in the Chari Series. He assigned Callovian to Oxfordian age to the Chari Series and suggested the name 'Habo Series' to these beds. He further divided the 'Habo Series' into Lower, Middle and Upper.

Arkell (1956) has published a brief summary of the Kutch geology in his book the 'Jurassic Geology of the World'.

Poddar (1959, 1963) published a short and regional account of the geology of Kutch, synthesising the salient stratigraphic and structural aspects.

Bernburg and Schett (1963) investigated a few sections of Kuar Bet in the N, the Khavda nala section of the Pachham Island and the Katrol hill sections of the Mainland. On the basis of faunal assemblages, they assigned Bathonian age to Kuar Bet beds, Callovian age to the Khavda nala section of Pachham Island and Upper Oxfordian age to Dhosa oolite band of the Mainland. According to them, the Katrol Series belongs to Kimmeridgian age and the Trigonina beds of the Lower Umia to Lower Cretaceous age.

Hardas (1968) has carried out a detailed sedimentological studies of the area S and SW of Bhuj, of the Kutch Mainland. He has suggested a complete sequence of depositional environments varying from infra-littoral to fluvial for the Mesozoic rocks of this area.

Important paleontological investigation mainly of the Tertiary stratigraphy were worked out by Tewari (1952, 1958^a, 1956^b, 1957, 1958, 1959, 1960). He studied several important sections of the Western Kutch Mainland at Vinjhan, Waghpadar, Panadro, Babia, Lakhpat etc., and besides discovering several new genus from these localities, also established biostratigraphic zonations.

Since the Tertiary stratigraphy of Kutch shows excellent development of fossiliferous horizons, it has attracted many paleontologists. Several workers who have published paleontological accounts of the Western Mainland include Ghosh and Ghosh (1959), Gupta (1959), Guha (1961), Poddar (1963), Sengupta (1964), Khanna and Madan Mohan (1965), Biswas (1965, 1969, 1971) etc.

Biswas and Deshpande (1968) have discovered an occurrence of syenitic Precambrian basement outcrop of Meruda Takkar (Hill) occurring as an isolated monadnock within the vast plains of the Great Rann. On the basis of this outcrop and the occurrence of thick granite conglomerate beds of the Cheriya Bet of Khadir Island, they have postulated that the Mesozoic sediments ranging from Bathonian to Cretaceous are directly overlying the Precambrian crystalline basement, without any intervening Paleozoic sediments.

Biswas and Deshpande (1970) have also published comprehensive geological and tectonic maps of the entire Kutch basin including the Tertiary deposits. The geological map displays rock stratigraphic classification for the Mesozoic parts and time stratigraphic classification for the Tertiary parts. Since the Mesozoic strata are not

uniformly fossiliferous, they have established only mappable rock stratigraphic classification for different stratigraphic provinces viz. the Mainland, the Pachham Island and the eastern Kutch, and correlated the different stratigraphic units (Table 3.1). The tectonic map depicts all the major tectonic elements of the basin. They have described the area as comprising six uplifts namely the Mainland uplift, the Pachham uplift, the Khadir uplift, the Bela uplift, the Chorar uplift, and the Wagad uplift, as first order structures, and several flexure zones as second order structures. The plains of the Great Rann and the little Rann have been described by them as due to residual depressions. A somewhat linear and transverse area which exposes the eldest stratigraphy and comprises the Pachham Island, the Banni, the Jhurio dome and the Bharasar dome has been described as 'Median High', a result of original basement upwarp.

Biswas (1971) has recently reproduced the geological and tectonic maps and stratigraphic classification tables of Biswas and Deshpande (1970) and has briefly described the stratigraphy and structure of Kutch region as a whole. He has also mentioned various type sections for different stratigraphic units.

The works of most of the previous investigators do not contain any direct reference to the area of Wagad hills. However, Pascoe (1959) has compiled all the available data on Kutch and has given detailed lists of fossil assemblages occurring in different horizons.

As regards the Wagad area, Pascoe (Ibid, p. 1146) has written "the greater part of Wagur is occupied by beds which have been assigned to the base of Katrols but which might equally well be given a place to themselves intermediate between the Chari and Katrol. From their development around the town of Kanthkot these Wagur beds have received the name Kanthkot sandstones". On the basis of distinct Cephalopod fauna, the 'Kanthkot beds' were assigned the Argovian age. He has further stated that the two lamelli-branch assemblage horizons discovered by Smith were very similar to those occurring in the Umia Series at the top of the Jurassic sequence. The specimens include Astarte major Sow., Gervillia Kanthkotensis Cox, Trigonia Smeei Sow. etc. Pascoe has concluded that some of the lamellibranchs e.g., Trigonia Smeei, T. Ventricosa, and Astarte major at least range from Kanthkot to Umia time. The comprehensive list of the cephalopod fauna from the Kanthkot beds include different species of Belemnoidae, Phylloceratidae, Oppelidae, Mayaitidae, Perisphictidae, Aspidoceratidae, etc.