

PETROGRAPHY, DIAGENESIS, PROVENANCE AND TECTONIC SETTING OF THE SANDSTONES OF UPPER KATROL FORMATION (KIMMERIDGIAN), NAKHTARAN AREA, KACHCHH, GUJARAT by A.H.M. Ahmad, G.M. Bhat, A.F.Khan and C. Saikia. Jour. Geol. Soc. India, v.67(2), pp.243-253.

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Ahmed et al. did very good petrographic studies on the Mesozoic sandstones of Kutch. The data generated are useful for petroleum geologists. It is, therefore, necessary to describe precisely the geographical and stratigraphical locations of the sampled section as well as sample positions.

However, I have some doubt regarding the stratigraphic location of the samples studied. The samples are reported to have been collected from a section exposing Kimmeridgian "Katrol" Formation, close to the Nakhtarana city but the city is located in the middle of the Lower Cretaceous Bhuj Formation. The exact location would have been clear if it was shown on an enlarged map as inset in the geological map (Fig.1, Ahmed et al. 2006) and the sample positions were shown on the lithological column with reference to a lithological marker bed or a stratigraphic datum. The Bhuj sandstones are exposed in the hills around the city capped by the Deccan Trap flows. Bhuj-Trap boundary passes a few kilometers south of the city. Anyone driving NW from Bhuj to Lakhpat can see that the Bhuj sandstones are exposed continuously from its type area Bhuj, in that direction along strike across Nakhtarana city stretching up to Ghaduli. The location of Nakhtarana city has also been shown wrongly within the Jurassic formation on the geological map (Fig.1, Ahmed et al. 2006). The city is actually located at lat. 23°21' long.69°16' and not at lat.23°31' as shown in the map. If correctly plotted the city will be relocated well within the Cretaceous Bhuj Formation, which is the ground truth.

The location of sampled sections is given as "between 6th and 7th km stone on Nakhtarana-Keera Dome road". It is confusing since there is no direct road with km stones to Keera Dongar (dome) from Nakhtarana city. There are three motorable roads going northward from Nakhtarana – (1) Lakhpat Road going NW, (2) Nirona road going NE and (3) the road going NNE to Dhinodhar Hill. For going to Keera Dongar, one has to take the Hajipir Road, which bifurcates from the Lakhpat road, 15 km NW of Nakhtarana beyond Mathal, after crossing the Chawad River Bridge. This road is along the regional strike of the formations and

is confined within the Bhuj Formation only. The second and third roads going NE and NNE cross the Bhuj (Early Cretaceous) – Jhuran (Mid. Jurassic-Early Cretaceous) Table A) boundary between 6 to 8 km from the city. It appears that Ahmed et al. might have collected samples along either of these two roads. It is to be noted that in this section the Bhuj Formation rests over the eroded Upper Member of the Jhuran Formation (Umia Member of the Umia Formation of Krishna et al. 1994, Table A) due to unconformity between the two formations. The upper part of the sand dominated Jhuran Upper Member had been eroded away. In that case the section sampled could

Table A. Stratigraphy of Kutch Mainland

Biswas (1977, 1986)		Krishna et al. (1983, 1994)	
Formation	Member	Member	Formation
Bhuj 1000 m+	Upper Member	Bhuj Member	Umia (Berriasian-Albian)
	Ukra Member	Ukra Member	
	Ghuner / Lower Member		
	Katesar Member (present in western Mainland only)		
Jhuran 780 m+	Upper Member	Umia Member	J/K Boundary (in W. Kutch) Katrol (Kimmeridgian-Berriasian)
	Middle Member/ Rudramata Shale	Upper Member	
	Lower Member	Middle Member	
Jumara 300 m		Lower Member	Chari (Bathonian-Oxfordian)
	Dhosa Oolite Member	Dhosa Oolite Member	
	Upper Member	Upper Member	
	Middle Member	Middle Member	
Jhurio 350 m+	Lower Member	Lower Member	Patcham (Bajocian-Bathonian)
	Members A to G		

Precambrian Basement

be either from the basal part of the Bhuj Formation or from the lower part of the Upper Member of the Jhuran Formation (Umia Member of Krishna et al. 1983, 1994, *see* Table A) close to the formation boundary. In the latter case the sampled section should be Tithonian-Berriasian in age and in former case should be Early Cretaceous. Therefore, it is doubtful whether samples studies were collected from "Upper Katrol Formation (Kimmeridgian)".

It appears from the lithological descriptions of the section that the samples are mostly likely from the basal part of the Early Cretaceous Bhuj Formation (Ghuner/ Lower Member). Upper Katrol (Jhuran Middle Member) is predominantly shaly whereas sections sampled is dominated by sandstones. The most distinguishing characteristic of Upper Katrol (Middle Member of the Jhuran Formation, Table A) is the occurrence of yellow, thinly bedded to flaggy, calcareous sandstone or arenaceous limestone interbeds in shale. This is absent in the section described. Further, unfossiliferous character of the section also points to the possibility of its being a part of the basal Bhuj (Umia) Formation.

It may be noted here that the nomenclature "Umia Formation" is not in use now and replaced by the Bhuj Formation (Biswas, 1977). Rajnath (1932) first used the term Bhuj "Stage" for the youngest, dominantly arenaceous

formation, rich in Upper Gondwana plant fossils and devoid of marine body fossils. Subsequently, by detailed mapping (Biswas and Deshpande, 1973, 1978) it was established as the most extensive and the thickest litho-unit (1000 m+) in the Mesozoic sequence and is typically exposed around the city of Bhuj after which it was named as the Bhuj Formation by Biswas (1977, 1986). The name Bhuj Formation is popularly used by most researchers now due to its extensive occurrence from eastern to western end of Kutch Mainland as the most prominent litho-unit occupying almost 50% of the total thickness of the Mesozoic succession. Katrol-Umia boundary, marked only on a few discrete sections, is not precisely defined and as such it is difficult to trace in the field. It is more practical to use the precisely defined and mapped Bhuj and Jhuran Formations for sedimentological studies. In this paper the authors' three-fold description of the 'Katrol' Formation matches well with the three members of the Jhuran Formation.

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We are thankful to Dr. S.K. Biswas for his critical comments on our paper that prompted us to revisit the study area to precisely located the geographic position of the

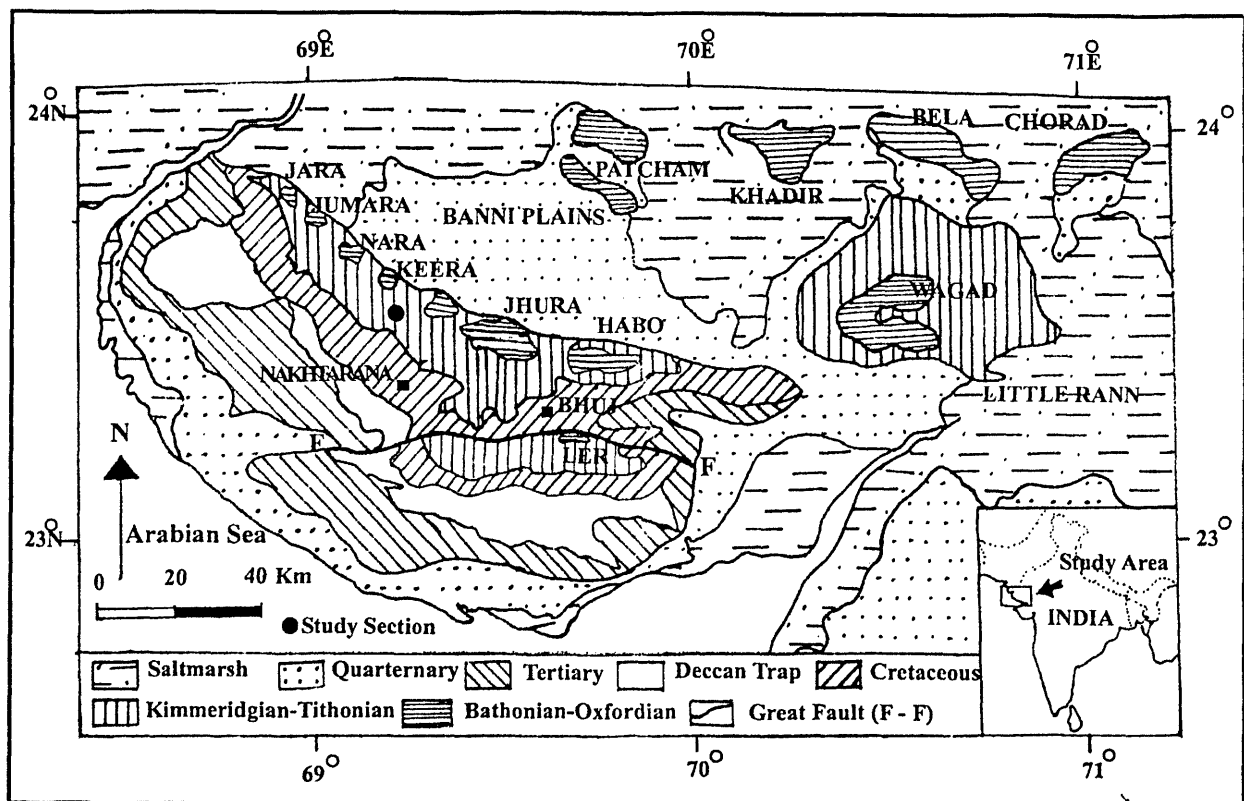


Fig.1. Geological map of the Kachchh Basin showing location of the measured stratigraphic section (after Biswas, 1977).

measure sections (total thickness of 52 m). Subsequently three of us (AHMA, AFK and CS) revisited the study area recently and relocated the measured sections on the Nakhtarana-Phularia road (passing nearby Keera dome) in the vicinity of Phya village. We reproduce the geological map of the Kachchh basin showing the location of the measured section (Fig. 1). In the original Fig. 1, the location of the outcrop is shown as circular dot which falls in the band of the Katrol Formation (Kimmeridgian-Tithonian) in the anticline along the Rann extending for about 128 km (Pascoe, 1959) in NW-SE direction in the Kachchh Mainland. Inadvertently, the location (square dot) of Nakhtarana town falling in Cretaceous has got skipped from the original map. Lithologically the section resembles Upper Katrol Formation which is dominantly represented by unfossiliferous sandstones (devoid of ammonoids) and

interbedded shales (Krishna, 1987). The sandstones are coarse to fine grained and grey to pinkish in colour. They are calcareous in nature with carbonate cements ranging from 11 to 31% in the analyzed samples.

We have already pointed out that the transition beds between Middle and Upper Members of Katrol Formation (=Lower and Middle Members of Jhuran Formation of Biswas (1977, 1986) respectively) and from Upper Katrol Member to overlying Umia Member of Umia Formation (=Upper Member of Jhuran Formation of Biswas (1977, 1986)) of Krishna et al. (1983, 1994) are not exposed in the area of the measured sections. This situation restricted us to show the sample locations on the stratigraphic column without any reference to a marker bed or a stratigraphic datum. However, on the basis of similarity of lithology we designated the measured section as Upper Katrol.

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CORRIGENDUM

In our paper published in the January, 2007 issue of the Journal (D.N. Yadav, M.M. Sarin and S. Krishnaswami, "Hydrogeochemistry of Sambhar Salt Lake, Rajasthan: Implication to Recycling of Salt and Annual Salt Budget", *Jour. Geol. Soc. India*, v.69, pp.139-152), we inadvertently missed citing the work of R. Sinha and B.C. Raymahashay (*Jour. Geol. Soc. India*, v.56, 2000, pp.213-217 "Salinity Model Inferred from Two Shallow Cores at Sambhar Salt Lake, Rajasthan"). The work of Sinha and Raymahashay proposes a model for the chemical evolution of the Sambhar lake based on the mineralogy of sediment cores. The authors in their paper state that the available water chemistry data of D.N. Yadav (1995) for river, groundwater and Sambhar lake support their model.