RESEARCH NOTES

A NOTE ON THE MIDDLE JURASSIC STRATIGRAPHIC SUCCESSION OF KEERA DOME, KACHCHH DISTRICT, GUJARAT

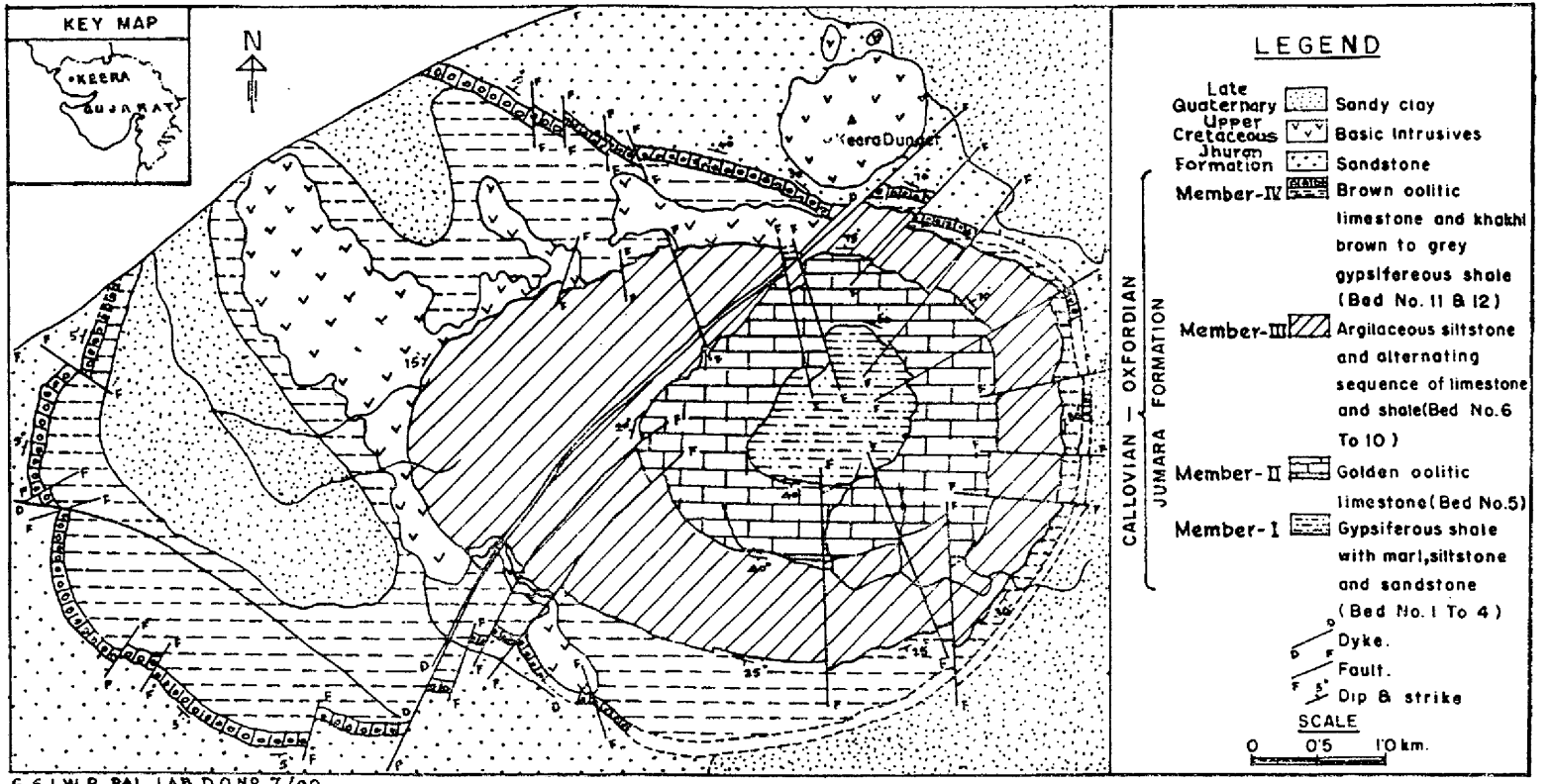
Abstract: The golden oolitic limestone (lower part of the Jumara Formation) was earlier considered to be the oldest rock unit in the Middle Jurassic stratigraphic succession of Keera dome, Kachchh district, Gujarat. The author has, however, recorded a 12 meter thick succession comprising shale with marl, siltstone, shale with ironstone, and ferruginous calcareoue sandstone underlying the golden oolitic limestone. These rock units contain ammonite fossils similar to those in the golden oolitic limestone, viz., *Macrocephalites madagascariensis* and *M. formosus* (Sowerby) ♀ morph *formosus*. The unit has been assigned Lower Callovian age on the basis of aforesaid fauna.

Jurassic of Kachchh is very rich in fauna which can be used for local biozonation and their correlation with European Jurassic biozones. Therefore, it is one of the intensively studied field, investigated by eminent stratigraphers and palaeontologists, viz., Waagen, 1873–75; Spath, 1927–33 and Rajnath, 1932, 1942. Middle Jurassic sediments cropout in the northern part of the 'Kachchh Mainland' in a series of northwest-southeast trending domes, viz., Jara, Jumara, Nara, Keera, Jhura and Hobo domes. The sediments occurring in these areas are dominantly calcareous and argillaceous. They change abruptly in lateral direction from one area to the other, as a result of which lithostratigraphic correlation between the successions exposed in different areas sometimes becomes rather difficult. However, it is possible to correlate the successions on the basis of their megafauna, specially ammonites. Therefore, the work on biozonation of the Jurassic of Kachchh has been attempted by a number of palaeontologists since Waagen's time (1873–75). The author took up the study of stratigraphy of Keera dome and fauna because it is one of the poorly studied ones.

Geologically, Keera dome is very important as it shows a well developed sequence of Middle Jurassic (Callovian-Oxfordian) sediments (Fig. 1). They comprise mainly of alternating beds of different varieties of limestones and shales (Fig. 2). The limestone beds are oolitic, argillaceous, marly and sandy, whereas the shale beds are intercalated with several thin fossiliferous flagstone bands. Lithostratigraphically, these sediments are placed under Jumara Formation (= Chari Group), the type area of which is in Jumara dome, about 21 km NW of Keera.

Earlier workers (Wynne, 1872; Waagen, 1873–75; Smith, 1913; Rajnath, 1932, 1942; Spath, 1927–33; Biswas, 1977) who have studied Keera dome stratigraphy and fauna, have distingushed 'Golden Oolite' as the oldest lithostratigraphic unit of the area. Even in the recent years, Mitra *et al.* (1979) and Cariou and Krishna (1988) have also followed earlier workers in placing golden oolite limestone (bed no. 1) as the oldest bed of Charee Formation (= Jumara Formation of Biswas, 1977) in Keera (*see* Table I). However, during the course of the present investigation in the area, the author has identified about 12 meter thick sequence of shale, siltstone, shale and ferruginous calcareous sandstone underlying golden oolite horizon. These newly discovered beds have been designated as Member-I (*see* Table-I). They are exposed in the central part of the Keera dome. All these

Fig. 1 GEOLOGICAL MAP OF KEERA DOME, DISTRICT KACHCHH, GUJARAT



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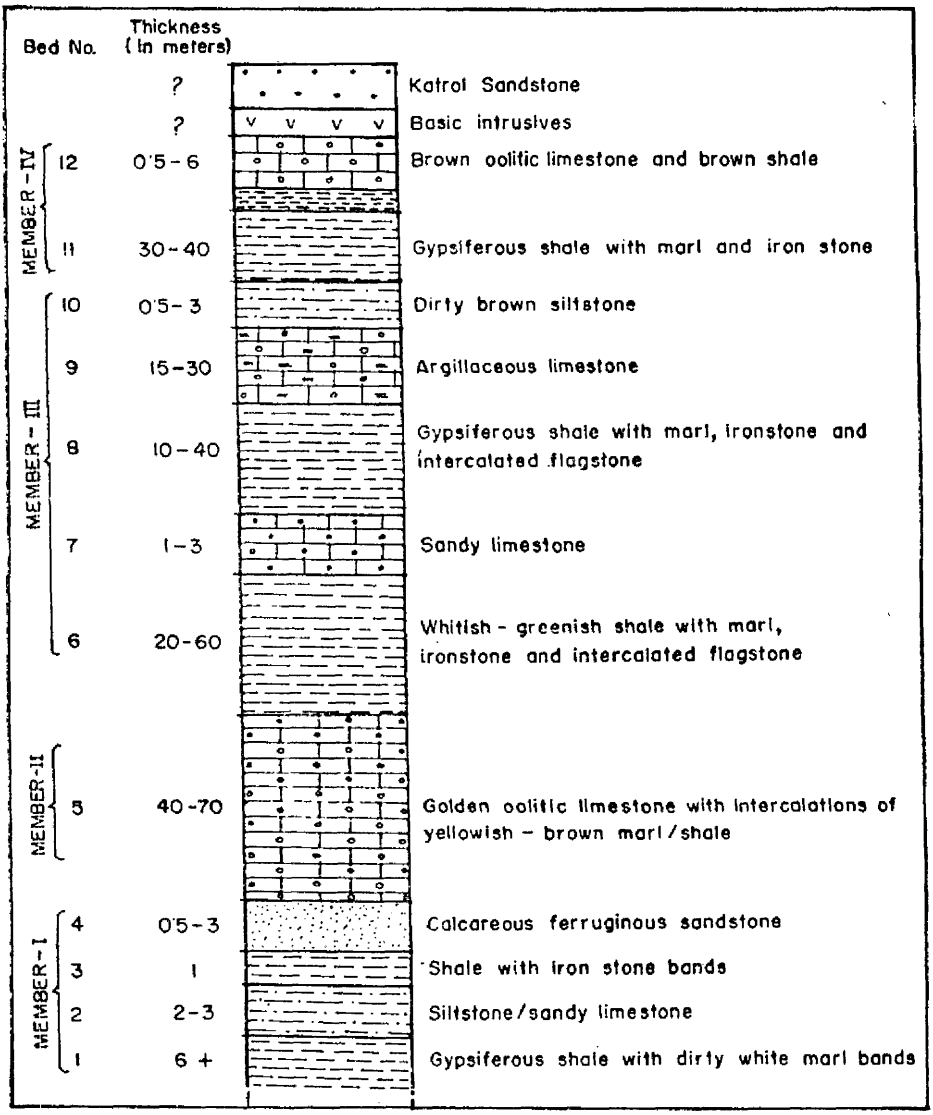

Fig. 2

LITHOLOGICAL SUCCESSION OF JUMARA FORMATION EXPOSED IN KEERA DOME (Not to scale)

beds are fossiliferous. The fauna present in Member-I is, however, more or less the same as in the golden oolite horizon (Member-II), being dominated by family Macrocephalitidae of Lower Callovian age. Two species of genus *Macrocephalites*, viz., *M. madagascariensis* and *M. formosus* (Sowerby) $\frac{Q}{+}$morph *formosus* have been identified from the Member I (Plate 1, Figs. 1 and 2). The other associated faunal groups are bivalves *(Trigonia, Nucula Palaeonucula, Modilus, Gramatodon, Pholadomya,* etc.*)*, Bracheopods *(Rhynconella)*, echinoids and few trace fossils. Further,

PLATE I

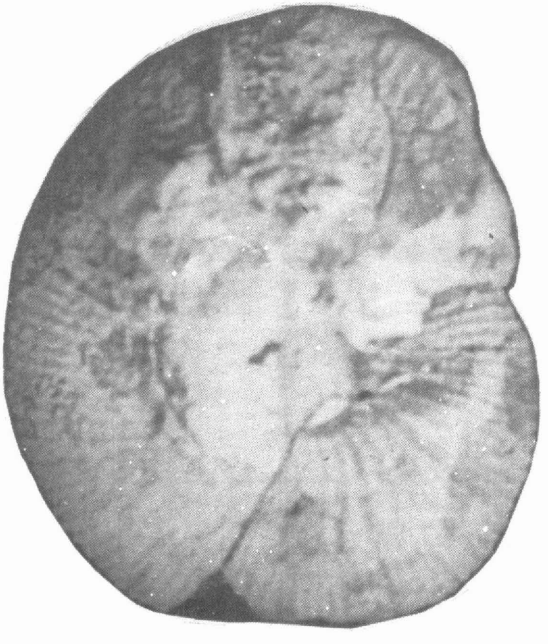

Figure 1. *Macrocephalites madagascariensis*. Sp. no. I/209. Bed no. 4 (Member-I) of Keera dome (Lower Callovian). Lateral view (×0.88).

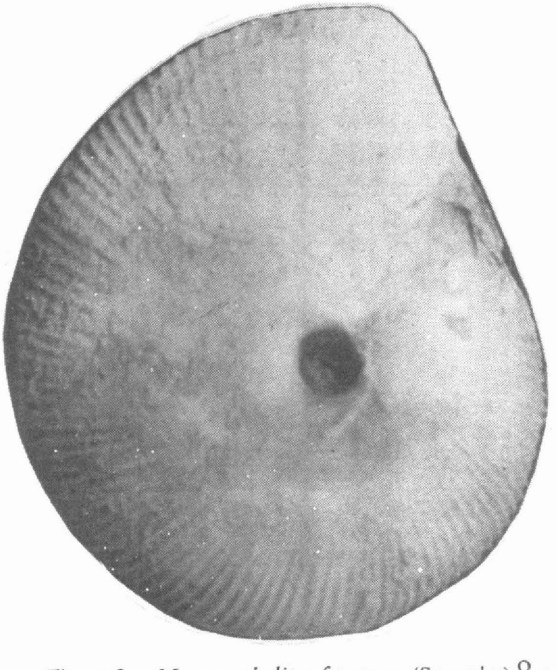

Figure 2. *Macrocephalites formosus* (Sowerby) ♀ morph *formosus*. Sp. no. I/199. Bed no. 4 (Member-I) of Keera dome (Lower Callovian). Lateral view (×0.76).

TABLE - 1 LITHOSTRATIGRAPHY OF KEERA DOME

AGE	AUTHOR				BISWAS			MITRA ET AL 1979			CARIOU & JAI KRISHNA 1988	
	F.M.	MEMBERS	THICKNESS IN MTS.	BED NOs.	F.M.	MEMBERS 1977	MEMBERS 1981	F.M.	MEMBERS	BED NOs.	F.M.	BED NOs.
OXFORDIAN	JUMARA FORMATION	MEMBER IV	0·5–6	12	JUMARA FORMATION	IV	UPPER (DHOSA OOLITE)	CHARI FORMATION	DHOSA	9	CHARI FORMATION	7
UPPER CALLOVIAN			30–40	11		III			MOTICHUR @	8		6
MIDDLE CALLOVIAN		MEMBER III	0·5–3	10						7		5
			15–30	9						6		4
			10–40	8						5 to 3		
			1–3	7					FULAE			3
			20–60	6		II			KEERA	2		2
LOWER CALLOVIAN		MEMBER II	40–70	5		I	MIDDLE			1		1
		MEMBER I	0·5–3	4								
			1	3								
			2–3	2								
			6+	1			LOWER					

@ For detail see Figure – 2

studies of the fauna when completed will decide the exact chronostratigraphic status of the newly discovered Member I of the Jumara Formation of Keera dome.

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CORRELATION OF KUTCH AND ANDAMAN STAGES— A PRELIMINARY NOTE

Abstract. The Kutch stages of Biswas, 1965 and the Andaman-Nicobar stages of Srinivasan, 1978 are correlated following a reasonable tie-up of ranges of the Miogypsinidae and planktonic scale.

Biswas (1965) introduced a new chronostratigraphic classification for the Tertiary sediments of Kutch. Biswas's *(op. cit)* chronostratigraphic divisions were mainly based on the abundance of larger foraminifera and some megafossils, viz., the echinoids and corals which are easily observable and traceable in the field. The stratotypes of the Oligocene-Miocene stages of Kutch were deposited in shallow marine environment and contain Miogypsinids but not planktonic markers. Studies by Raju (1974 a, b ; 1991) have provided a zonal framework in support of the chronostratigraphic classification of Biswas and shown that the Oligo-Miocene stages of Kutch can be extended through the use of Miogypsinids throughout the shallow marine shelves of pericratonic rift basins and also Andaman Basin of India.

Srinivasan (1978) introduced a set of new stages for the monotonous Neogene deep marine sequences exposed in the Andaman-Nicobar Islands. Srinivasan (op. cit.) justified his proposal with a statement that the observable palaeontological criteria employed by Biswas (1965, 1971) for mapping of the Tertiary stage boundaries of Kutch cannot be applied for Andaman-Nicobar Islands. On the other hand the Andaman stages of Srinivasan were well tied up directly with the tropical planktonic foraminiferal events. So far no serious attempt was made to correlate the Kutch and the Andaman stages.

Researches on the Miogypsinidae and planktonic foraminifera from the subsurface sections of Cauvery Basin and Andaman Basin (Raju, 1974a, 1991 ; Raju and Mishra, 1991) paved the way for tying up the numerically defined ranges of the Miogypsinidae and planktonic foraminifera on one side and the Kutch and Andaman stages on the other.