

On the occurrence of microfossils (Foraminiferida) in the Jurassic rocks of Ler Dome, Kutch Mainland, Gujarat

Jurassic rocks of Kutch are famous all over the globe for their prolific and excellently preserved megafossils, especially ammonites. Although considerable research has been carried out on their megafossils and stratigraphy, comparatively little has been done on their microfossils. In the Kutch region, Jurassic rocks are exposed in three nearly east-west trending anticlinal ridges. The middle ridge is the most conspicuous and is included in the Kutch Mainland. This ridge is broken into a number of domal outcrops, north of Bhuj, the district headquarters of Kutch, extending from Jara Dome in the west to Habo Dome in the east through Jumara, Nara (Kaiya), Keera, and Jhurio domes. The most widely accepted and established classification of the Jurassic rocks of Kutch divides them into four formations, viz. Patcham, Chari, Katrol and Umia in ascending order¹.

Microfossils have been recorded from most of these domal outcrops north of Bhuj, including nannofossils from Jara Dome², foraminifera and ostracodes from Jumara Dome^{3,4}, foraminifera from Keera Dome⁵, foraminifera from Nara Dome^{6,7}, foraminifera and ostracodes from Jhurio Dome^{3,8-10}, and foraminifera and ostracodes from Habo Dome^{3,11,12}. However, there is no report of microfossils, including foraminifera from Jurassic rocks of domal hills situated south of Bhuj. The aim of the present correspondence is to report the occurrence of foraminifera, along with some preliminary interpretations derived from them, recovered from a relatively small but well-exposed domal outcrop of Jurassic rocks situated south of Bhuj – the Ler Dome (Figure 1).

The Ler Dome is situated about 10 km southeast of Bhuj. Only Chari and Katrol Formations are exposed in the dome. Samples were taken from the entire Chari sequence exposed in the dome, which is divisible into six lithounits, i.e. Lithounits I to VI in ascending order (Figure 2). The Katrol Formation was found to be barren of foraminifera, while the Chari Formation yielded a fairly rich foraminiferal assemblage comprising forty species, viz. *Saccammina* aff. *S. franconica* Ziegler, *Reophax metensis* Franke, *R. multilocularis* Haesler, *R. aff. R. scorpiurus* Montfort, *R. sundancensis* Loeblich and Tappan, *Ammobaculites*

cobbani Loeblich and Tappan, *A. fontinensis* (Terquem), *A. hagni* Bhalla and Abbas, *Kutsevella spilota* Nagy and Seidenkrantz, *Bulbobaculites vermiculus* Nagy and Seidenkrantz, *Spiroplectammina* sp., *Haplophragmium kutchensis* Pandey and Dave, *Bigenerina* sp., *Trocholina* aff. *T. conosimilis* Subbotina and Srivastava, *Spirillina polygyrata* Gümbel, *Laevidentalina gümbeli* Schwager, *Laevidentalina* aff. *L. oppeli* Schwager, *Nodosaria simplex* (Terquem), *Pseudonodosaria vulgata* (Bornemann), *Frondicularia kutchensis* Bhalla and Abbas, *Lenticulina dilectiformis* Subbotina and Srivastava, *L. ectypa* (Loeblich and Tappan), *L. münsteri* (Roemer), *L. protracta* (Bornemann), *L. quenstedti* Gümbel, *L. subalata* (Reuss), *L. tricarlinella* (Reuss), *Neoflabellina ovalis* (Wedekind), *Astacolus anceps* (Terquem), *Astacolus* sp., *Hemirobulina sastryi* (Bhalla and Talib), *Marginulina coelata* Loeblich and Tappan, *M. oxfordiana* Gordon, *M. aff. M. sculptilis* (Schwager), *Citharina clathrata* (Terquem), *Epistomina minutereticulata* Espitalie and Sigal, *E. parastelligera* (Hofker), *E. regularis* Terquem, *E. tenuicostata* Bartenstein and Brand and *Epistomina* sp.

The foraminiferal assemblage is dominated by the family Vaginulinidae (37.5%) followed by families Nodosariidae and Epistominidae (12.5% each), Hormosinidae and Lituolidae (10% each), Ammobaculinidae (5%), and 2.5% each of the fami-

lies Saccamminidae, Haplophragmoididae, Textulariidae, Involutinidae and Spirillinidae. Eighteen species are being reported for the first time from the Indian region, viz. *Saccammina* aff. *S. franconica* Ziegler, *R. metensis* Franke, *R. aff. R. scorpiurus* Montfort, *R. sundancensis* Loeblich and Tappan, *K. spilota* Nagy and Seidenkrantz, *B. vermiculus* Nagy and Seidenkrantz, *Spiroplectammina* sp., *Bigenerina* sp., *Laevidentalina* aff. *L. oppeli* Schwager, *P. vulgata* (Bornemann), *L. ectypa* (Loeblich and Tappan), *L. protracta* (Bornemann), *N. ovalis* (Wedekind), *Astacolus* sp., *M. coelata* Loeblich and Tappan, *M. aff. M. sculptilis* (Schwager), *E. tenuicostata* Bartenstein and Brand and *Epistomina* sp.

Although a majority of foraminiferal species in the present assemblage are rather long-ranging, a few short-ranging species restricted to or frequently reported from Callovian to Oxfordian strata of Kutch and other regions of the world, have also been recovered. These species, viz. *Ammobaculites hagni* Bhalla and Abbas, *Nodosaria simplex* (Terquem), *Frondicularia kutchensis* Bhalla and Abbas, *Lenticulina ectypa* (Loeblich and Tappan), *L. münsteri* (Roemer), *Astacolus anceps* (Terquem), *Hemirobulina sastryi* (Bhalla and Talib), *Marginulina coelata* Loeblich and Tappan, *Citharina clathrata* (Terquem) and *Epistomina tenuicostata* Bartenstein and Brand favour assigning a

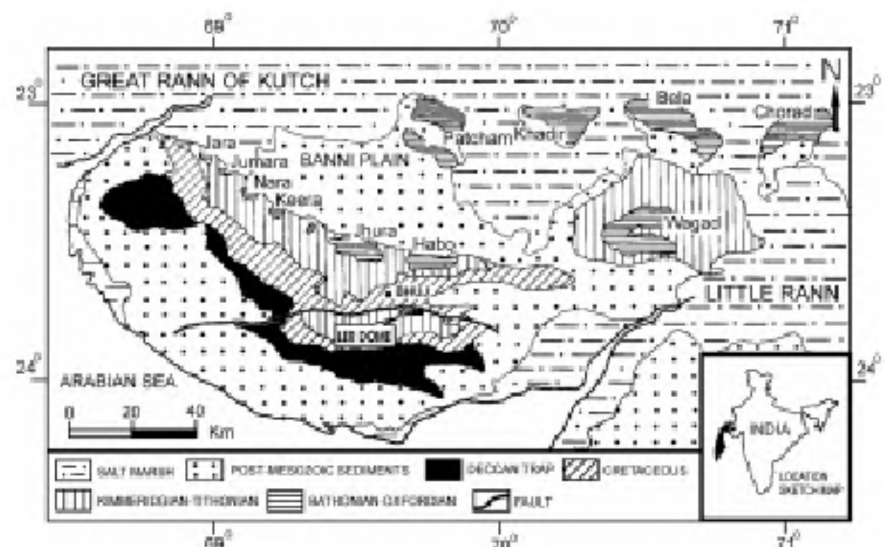


Figure 1. Geological map of Kutch showing the study area (modified after Fürsich *et al.*¹⁹).

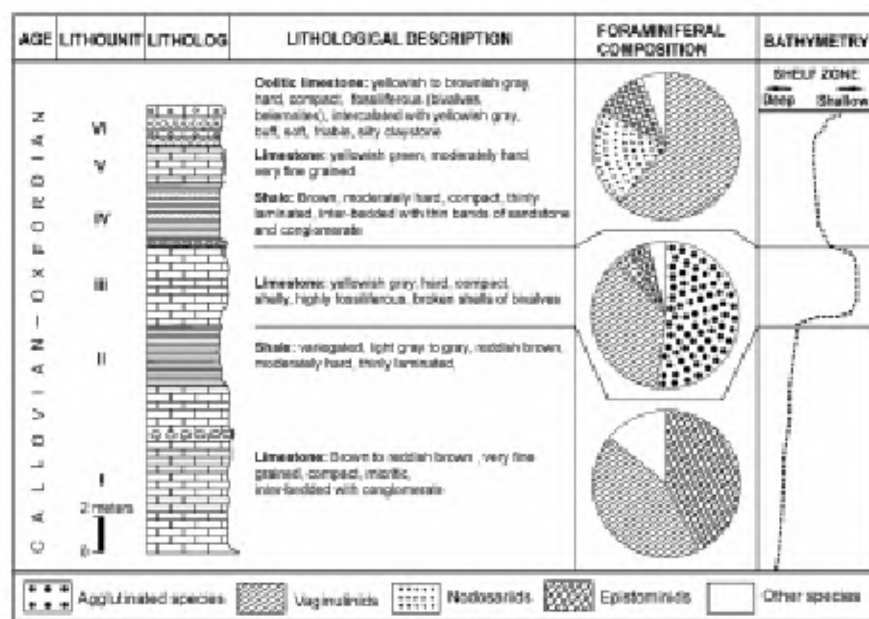


Figure 2. Litholog of Middle–Upper Jurassic sequence exposed at Ler Dome, Kutch showing foraminiferal composition and bathymetry.

Callovian to Oxfordian age to the studied sequence.

The dominance of vaginulinids along with nodosariids in the Ler Dome foraminiferal assemblage suggests an overall deposition of these sediments in shallow water, near shore, normal marine conditions, most probably shelf environment^{13,14} (Figure 2). Presence of several species of *Epistomina* with an equal number of nodosariid species also points towards a similar environment¹⁵. Vaginulinids along with nearly the same number of species belonging to *Epistomina* suggest¹⁵ a fairly deep, open-shelf environment for the early portion of the sequence comprising Lithounits I and II. However, a substantial increase in number of agglutinated species in the middle portion of the sequence (Lithounit III) indicates a slight shallowing of the basin and an increased terrestrial influence with probable lowering of salinity as well as oxygen and pH levels^{14–16}. Dominance of vaginulinids along with nodosariids as well as presence of only two species of *Epistomina* and total absence of agglutinated forms in the upper portion of the present sequence (Lithounits IV to VI) indicate a deeper marine shelf environment with normal salinity and

oxygen^{17,18}. The foraminiferal evidence suggests that the deposition of Chari sediments exposed at Ler Dome took place in a tectonically unstable basin with fluctuating shoreline (Figure 2).

The Ler foraminiferal assemblage shows affinity with the Middle–Upper Jurassic foraminiferal assemblages from adjoining regions of Afghanistan, Iran, Egypt, Somalia and Malagasy, which indicates that Kutch had close sea connections with these regions during Middle and Upper Jurassic times.

Detailed studies on the Ler Dome foraminiferal assemblage are in progress.

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