

Lower Cretaceous Agglutinating Larger Benthic Foraminifera from the Sarvestan Section, south of Esfahan, Iran

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Abstract

The Lower Cretaceous limestones and marls in central part of Iran having recently been attended for hydrocarbon exploration by NIOC contain a comparatively rich assemblage of orbitolinids. The Barremian-Aptian orbitolinid bearing strata in this area are considered to constitute the Mesozoic main reservoir rocks in prospecting point of view. The detailed and satisfying stratigraphic results are of great importance for hydrocarbon exploration studies therefore this study tries to improve the knowledge of Lower Cretaceous shallow marine biostratigraphic studies in Central Iran using larger benthic foraminifera (mainly orbitolinids) constituting the main representatives of foraminiferal assemblage in this area. For the purpose of this study one section (Sarvestan) located in South of Esfahan was measured and sampled. Three assemblages of larger benthic foraminifera were recognized indicating Early Barremian to Late Aptian age (Eopalarbitolina assemblage = Early Barremian, Palorbitolina assemblage = Late Barremian-Early Aptian, Mesorbitolina assemblage = Late Aptian). The identified taxa are dominated by agglutinating larger benthic foraminifera including Eopalarbitolina, Palorbitolina, Mesorbitolina, Orbitolinopsis, Dictyoconus, Paleodictyoconus, Vercorsella, Mayncina, Charrentia, Trocholina and Pseudolituonella.

Geological Setting and Stratigraphic Framework

The sections studied, namely Sarvestan is located in Central Iran, south of Esfahan. The Lower Cretaceous deposits in the area investigated range from the Barremian to Aptian (Amiri 2009). The proposed lithostratigraphic subdivisions for the area studied follow Seyed Emami et al. (1971) and Nabavi (1972) (Fig. 1).

Lithostratigraphically the Sarvestan stratigraphic section starts with grey to brown medium bedded porous dolomite followed by grey to buff medium to thick bedded orbitolinid bearing limestones. These strata are followed by grey to olive grey thin bedded argillaceous limestones interbedded with medium bedded carbonates containing orbitolinids. The succession is again overlain by thick to medium bedded carbonates followed by shales and marls interbedded with thin bedded argillaceous limestones. Finally, the marine succession of the Sarvestan section is topped by thick bedded to massive purple carbonates.

Material and Methods

For the purpose of this study, a complete section located in south of Esfahan was measured and sampled in detail with a sampling interval of 3m. (Fig.1). A total number of two hundred and sixty two samples were collected and thin sections were made of all the collected samples. Generic classification of orbitolinids is based on Loeblich and Tappan (1988). Chronostratigraphic subdivisions of the section are based on stratigraphic ranges of the recognized orbitolinid taxa.

Biostratigraphy

Continuous distribution of orbitolinids allowed us to recognize three orbitolind assemblages. We have compared our biostratigraphic data with references on the Early Cretaceous orbitolinids of the Tethyan realm and the Middle East (Schroeder, 1965; Schroeder & Conrad, 1968; Schroeder et al., 1982; Schroeder, 1997; Simmons et al., 2000; Bernaus et al. 2002; Schroeder & Cherchi, 2002).

Eopalorbitolina assemblage: Early Barremian

This assemblage is characterized by presence of *Eopalorbitolina* sp. and *Eopalorbitolina charollaisi* together with *Paracoskinolina sunnilandensis* and *Orbitolinopsis cuvillieri*. The Early Barremian age is confirmed by the determined foraminiferal association.

Palorbitolina assemblage: Late Barremian-Early Aptian (Bedoulian)

The main orbitolinid representative of the foraminiferal association is *Palorbitolina lenticularis* which is accompanied with *Pfenderina globosa*, *Pseudolituonella gavonensis*, *Praechrysalidina infracretacea*, *Trocholina odukpaniensis* and *Vercorsella laurenti*. Available biostratigraphic information support the Late Barremian-Early Aptian age for the assemblage.

Mesorbitolina assemblage: early Late Aptian (Gargasian)

The foraminiferal association of this assemblage is composed of *Mesorbitolina lotzei*, *Mesorbitolina parva*, *Dictyoconus pachymarginalis* together with *Voloshinoides murgensis* and *Sabaudia minuta*. The occurrence of *Dictyoconus pachymarginalis* suggests that the assemblage is not younger than Gargasian and the co-occurrence of *Mesorbitolina lotzei* together with primitive forms of *Mesorbitolina parva* coincides with Early / Late Aptian boundary.

Conclusions

Analyses of orbitolinid associations in Lower Cretaceous shallow marine carbonates of the study section led to recognize three orbitolind assemblages ranging in age from Early Barremian to early Late Aptian. The Lower Barremian orbitolinid bearing limestones are recorded for the first time from Esfahan area. As a stratigraphic guide, our biostratigraphic data were correlated with references for the Tethyan realm and the Middle East. The results also prepare more detailed biostratigraphic data for hydrocarbon exploration goals in Central Iran.

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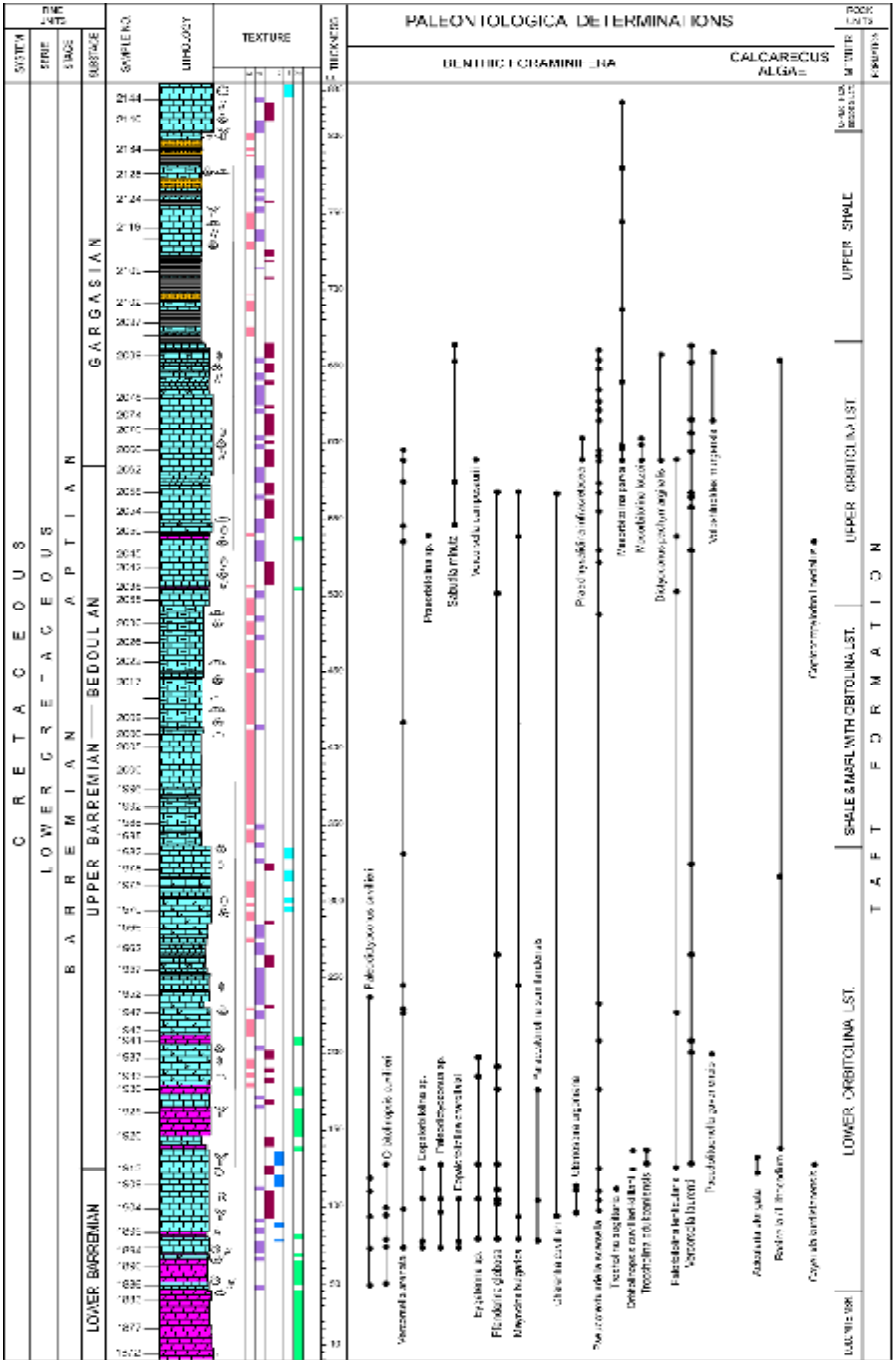


Fig. 1 Showing stratigraphic range chart of the study section

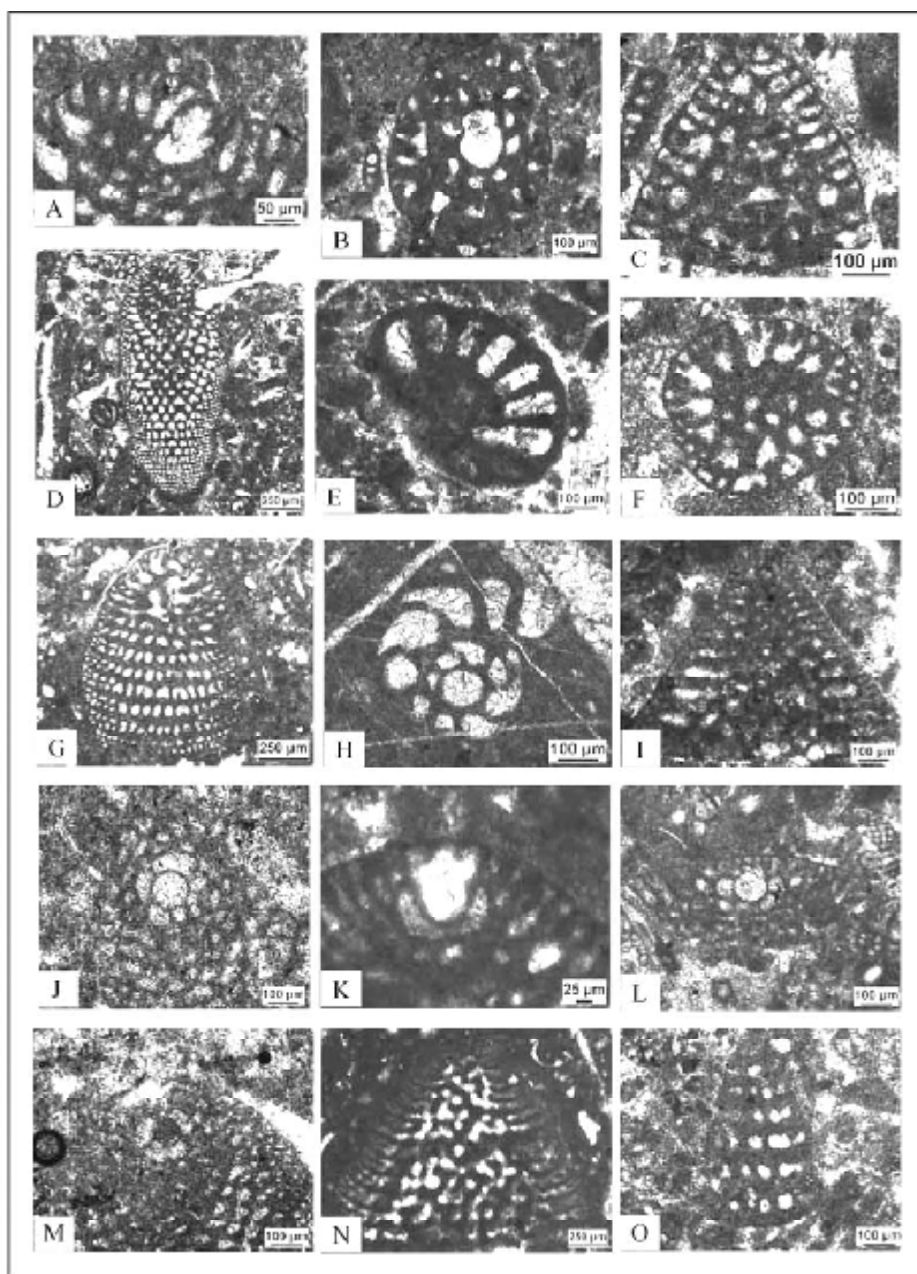


Fig. 2 Thin section microphotographs illustrating the main foraminiferal representatives of the Sarvestan area. A-B. *Eopalarbitolina charollaisi*. C&F. *Orbitolinopsis cuvillieri*. D. *Paleodictyoconus cuvillieri*. E. *Pfenderina globosa*. G. *Paracoskinolina sunnilandensis*. H. *Mayncina bulgarica*. I. *Orbitolinopsis simplex*. J. *Palorbitolina lenticularis*. K. *Mesorbitolina lotzei*. L-M. *Mesorbitolina parva*. N. *Dictyoconus pachymarginalis*. O. *Vercorsella laurenti*.