

Early Barremian orbitolinid record from the Moghan area, NW Iran: Northern margin of the Neotethys



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ABSTRACT

Orbitolinid foraminifers are reported for the first time from lower Barremian shallow marine carbonate deposits of the Moghan area, NW Iran. According to geologic map of the Razi, these rocks were previously assigned to general age of the Early Cretaceous. The early Barremian age is documented based on stratigraphic range of the marker *Valserina turbinata* (Foury). Other orbitolinids such as *Eopalorbitolina charollaisi* Schroeder, *Eopalorbitolina pertenuis* (Foury), *Paleodictyoconus* cf. *cuvillieri* (Foury), *Montseciella* cf. *alguerensis* Cherchi and Schroeder, *Paracoskinolina* cf. *maynci* (Chevalier), *Orbitolinopsis* cf. *buccifer* Arnaud-Vanneau and Thieuloy, and *Dictyoconus?* *pachymarginalis* Schroeder also coexist. Obtained biostratigraphic data suggest that the range of *Dictyoconus?* *pachymarginalis*, hitherto known from the Aptian, has to be extended into the early Barremian. Most of the orbitolinid taxa are well known in Europe as northern Tethyan margin endemic forms. Therefore, the study area can be considered as part of the northern Tethys margin during the Barremian. This study also extends the palaeobiogeographic distribution of northern Tethyan orbitolinids eastwards as far as northwest Iran.

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1. Introduction

Early to middle Cretaceous shallow marine rocks crop out widely in different parts of Iran (James and Wynd, 1965; Stöcklin and Setudehnia, 1971; Setudehnia, 1972). These rocks are somewhat, composed of carbonate deposits rich in larger benthic foraminifera (mainly orbitolinids) and calcareous green algae (e.g., Schroeder et al., 2010; Taherpour Khalil Abad et al., 2013; Schlagintweit and Wilmsen, 2014).

Orbitolinids have been reported from different structural units in Iran including Zagros Mountains in the south, Kopet Dagh and Alborz in the north and Central Iran in the middle (Henson, 1948; James and Wynd, 1965; Schroeder, 1965; Sampò, 1969; Schroeder et al., 2010; Yazdi-Moghadam and Amiri, 2010; Shirazi and Abedi, 2012; Carević et al., 2013; Schlagintweit et al., 2013a,b; Taherpour Khalil Abad et al., 2013; Afghah and Haghghi, 2014; Schlagintweit and Wilmsen, 2014; Hosseini et al., 2016).

In many localities of Central Iran, the orbitolinid foraminifer bearing carbonates are mapped as “*Orbitolina* limestone” which were assigned to a general Early Cretaceous age.

During the field geology dealing with stratigraphy and hydrocarbon evaluation of Mesozoic and Cenozoic rocks of NW Iran (Moghan area), several sections were sampled and studied. One of the measured sections located in eastern most part of the investigated area, includes a succession of “*Orbitolina* limestone” (Fig. 1).

It is the only locality in the Moghan area that Lower Cretaceous carbonate rocks crop out. As these orbitolinid bearing deposits can potentially be considered as reservoir rocks in the investigated area (e.g., FOL, 2000), the accurate dating of these strata is of great importance for hydrocarbon exploration studies.

Within the study section (Sarv Abad) (Fig. 1), orbitolinid foraminifers are the dominant faunal elements. In the absence of other index macro- and microfossil groups (e.g., planktonic foraminifera, nannoplanktons, rudists), orbitolinids are of immense practical use for dating of these shallow marine strata as their ranges have recently been calibrated with ammonite biostratigraphic data (e.g., Clavel et al., 2010, 2013). Therefore, this study focuses on this group

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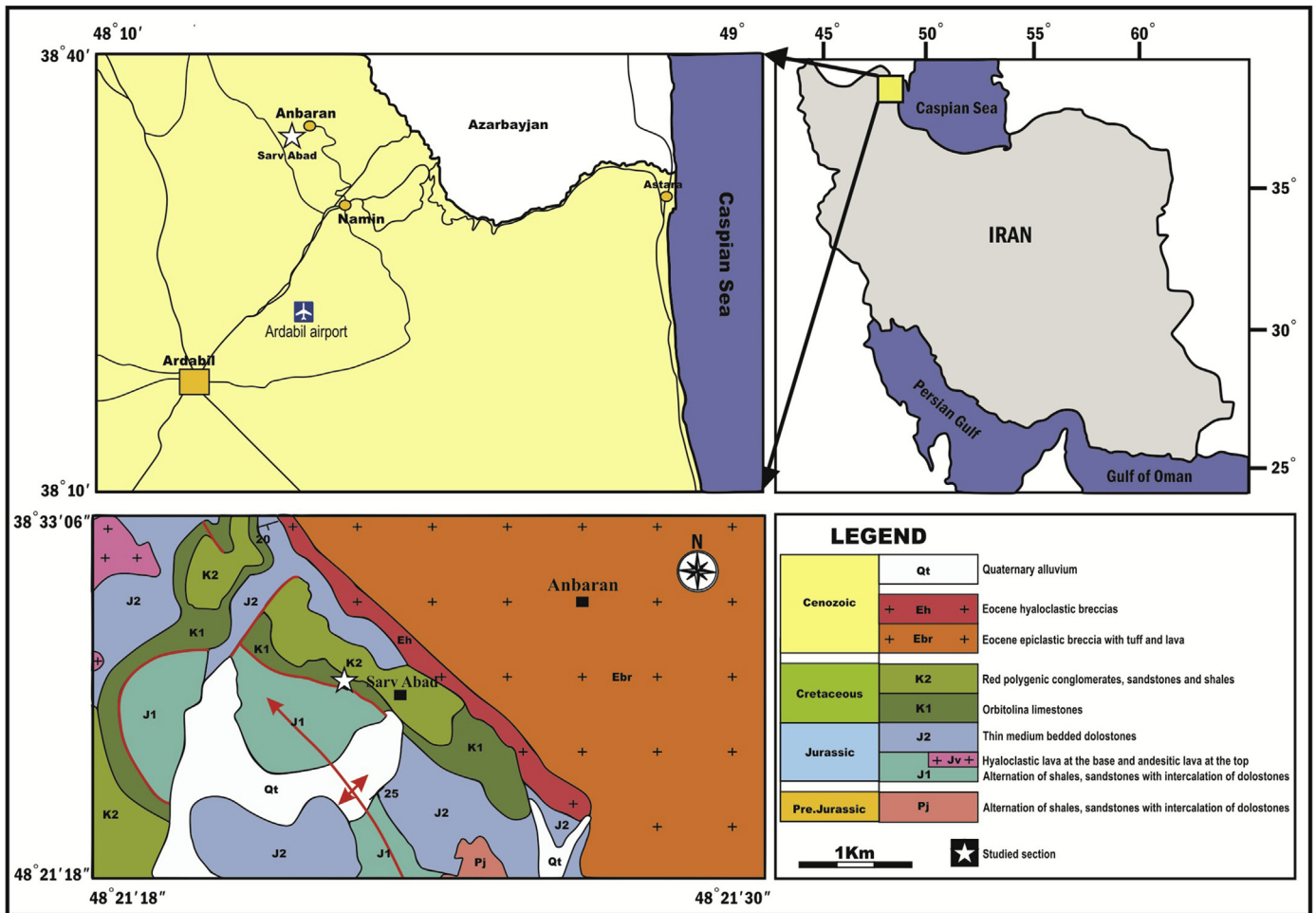


Fig. 1. Location and geological map of the studied section in the Moghan area (modified after Khalatbari-Jafari, 2005).

of agglutinating foraminifera for biostratigraphy and age dating of their hosting rocks in the Moghan area.

2. Material and methods

The material of this study comes from one section located in south eastern Moghan area, named Sarv Abad section (Fig. 2). Some 38 rock samples have been collected with maximum spacing interval of 3 m. In order to study oriented sections of orbitolinids, several thin sections in different orientations were prepared from each sample using conventional methods. The generic classification of Loeblich and Tappan (1987) was used and updated in some instances with additional sources such as Cherchi and Schroeder (1999) and Granier et al. (2013). All samples and thin sections presented in this paper are deposited in the collection of National Iranian Oil Company Exploration Directorate (NIOCEXP), Tehran, Iran and are labeled as EGH 3108 to EGH 3145.

3. Geological setting

Iran is composed of several structural units (Zagros, Kopet Dagh, Central Iran, Alborz, Moghan area, etc.) each of them is characterized by a long and different depositional history (e.g., Stöcklin and Setudehnia, 1971; Setudehnia, 1972; Berberian and King, 1981; Alavi, 2004). The northwest Iran is marked by a structural unit

named as Moghan area. The area as a part of Alp-Himalayan orogenic belt has an extension around 6500 km². From geological point of view, the Moghan area is considered as a terminal north-western part of the Alborz-Azerbaijan zone having a general NW-SW trend (Nabavi, 1976).

The area covers northern parts of the Ardabil and East Azerbaijan provinces at 39, 30', 39.42"N, and 48, 20', 46"E (Fig. 1). In other words, the area is located in eastern Paratethys domain extending from Carpathian in Romania to Aral Lake in Kazakhstan including the present day Black Sea and Caspian Sea basins (e.g., Rögl, 1998). These two basins are further subdivided into several side basins.

As a part of the south Caspian basin, the Moghan area is located in northwestern corner of Iran and bounded towards the north by southeastern part of the Kura through and towards the south by the northern flank of the Talysh-Lesser Caucasus orogenic belt. From tectonic point of view, the Moghan area together with the Kura through are considered to have a back-arc setting. These areas were subjected to rapid siliciclastic sedimentation during late Mesozoic-early Paleogene time due to a high sediment supply from neighboring rising mountains (FOL, 2000; Amini, 2006). The marine sedimentary successions of the Moghan area cropped out in some restricted exposures in southern parts of the basin (Willm et al., 1961) in localities such as Salavat, Kurd-Kandi, Zargar and Kaleybar. The mountainous area, north of Namin (Sarv Abad) is the only

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