Microbiostratigraphy of the Tarbur Formation, Zagros Basin, Iran

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Abstract: The Tarbur Formation is a predominately carbonate lithostratigraphic unit that outcrops in Zagros basin, between main Zagros reverse fault and high Zagros and east of Sabzpushan faults. This Formation was studied from microbiostratigraphic point of view at four measured sections, in the north of Khorram Abad (Robat section) in the east of Khorram Abad (Chamsangar section) in the east of Shirz (Servestan section) and in the south east of Semirum (Balghar section). Microbiostratigraphical data mainly based on foraminifera which among them, species of Lofiusia have more variety and abundance, so the species of Lofiusia from the measured sections are used to determine the age of successions. It is analogous to Omphalocyclus-Lofiusia assemblage zone but according to the distribution of the index species of Lofiusia the age of Tarbur Formation is Early-Middle Maastrichtian at Servestan section and Middle Maastrichtian for Balghar, Robat and Chamsangar sections.

Key words: Lofiusia, biostratigraphy, Maastrichtian, imbricated Zagros

INTRODUCTION

The Tarbur Formation is carbonate sediments that extends from southeastern to northwestern of Zagros basin along the western edge of the Imbricated Zagros zone and between Main Zagros reverse fault and High Zagros fault and east of Sabzpushan fault (Alavi, 2004). High Zagros fault consists of several part, north to south, Sephid Kuh, Zardkuh, Dera and Bakhtegan faults (Fig. 1). Southern outcrops of Tarbur Formation are between Sabzpushan and high Zagros fault. Facies and thickness contour maps controls and field investigation revealed that the Sabzpushan fault was frequently active from Middle Cretaceous (Cenomanian) to recent time (Safari, 2006). At Campanian-Maastrichtian, facies changed of Gurpi shale and marl, west of Sabzpushan fault, to Tarbur limestone, east of this fault (Ghaziban, 2007).

This study relates to foraminifera from four stratigraphic sections (Fig. 1), 10 km north of Khorram Abad, Robat section, 30 km east of Khorram Abad, Chenar section, 18 km southwest of Semirum Balghar section and 39 km southeast of Shirz, Servestan section. During Late Cretaceous the Arabian plate was subjected to both compressional and extensional stresses (Sharland et al., 2001).

Fig. 1: Location map of sections referred to in text. B: Balghar section, C: Chamsangr section, S: Servestan section, R: Robat section (without scale)

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In north margin of Arabian plate, compressional stresses illustrated by the uplift of main Zagros reverse fault and High Zagros fault. This compression commend in Iran, Iraq and Oman in Middle Turonian with the initiation of obduction of ophiolith complex. This resulted deep water foreland basin along northeast plate margin (Lippard et al., 1986).

Foreland basin was in turn separated from what remained of NeoTethys by a NW-SE trending high which later formed the Zagros imbricated zone (Stoneley, 1974). The Gurpi Formation was deposited during Santonian-Middle Paleocene along the main through in an upwelling and foredeep environment. Also, late Cretaceous orogenic phase (Laramid) caused uplift of imbricated zone. The products of this phase were turbidity deposits along the main thrust Zagros (Amiran Formation).

According to the eustatic curve of Haq et al. (1988) a eustatic transgressive occurred in Middle Campanian-Maastrichtian. During this time, an association of rudist-rich thrilled sediment was formed along the Southeastern NeoTethys (Stubar and Loser, 2000). This rock unit is called Tarbur Formation in Zagros Mountains (Fig. 2).

James and Wynd (1965) gave the name Tarbur Formation to a carbonate sequence of Campanian-Maastrichtian. Biostatigraphic criteria of the Tarbur Formation was Studied by Wynd (1965) that divided this formation into two biozones, 

- *Litho-Stratigraphy*

   Lithological characteristics of the Tarbur Formation at the Sarvestan section consist of 400 m limestone which divided in to two parts. Lower part consists of massive rudist bearing gray limestone, slightly dolomitized at basal part and medium rudist bearing white limestone (188 m) at top. Irons nodular are present at exposed layer of Tarbur Formation.

   At Balgar section, Tarbur Formation consists of medium to massive organodetrital gray limestone (101 m).

   The thickness of Tarbur Formation in Chamsangar section is 71 m and consists of thick light gray limestone. In Robat section, the thickness of Tarbur Formation is 61 m and contains of medium gray limestone with amount of rudist fragment.

- *Biostratigraphy*

   The following benthonic foraminifera are identified in limestone of the Tarbur Formation at Sarvestan (Fig. 3a):


   The following microfauna are identified in the sediments of the Tarbur Formation at Balgar section (Fig. 3b):

   - *Omphalocycus macroporus*, *Loftusia minor*, *Loftusia* sp., *Dicyclina* sp. and *Valvulaminina* sp.

   In Chamsangar section, the following benthonic foraminifera are identified (Fig. 3c, 4a-h):

   - *Omphalocycus macroporus*, *Orbitoides media*, *Loftusia minor*, *L. elongata*, *Sidirotes calcitropoides*, *Rotalia skorensis* and *Minoxia* sp.

   The following index microfauna are identified in Robat section (Fig. 3d):
Fig. 3: Selected faunal distribution of the Tarbur Formation at: (a) Sarvestan, (b) Balgar, (c) Chamsangar and (d) Robat sections
Loftusia elongata, L. minor, L. coxi, L. harisoni, Dicyclina sp., Miaoxia sp. and Analyxia korayi.

Based on these assemblages of microfauna and comparison with other parts of Middle East (Al Sharhan and Nairn, 1990; Al Sharhan and Kendall, 1991; Henson, 1948) and with other distribution of Loftusia (Meric and Mojab, 1977) the outcrops of the Tarbur Formation at Sarvestan section is Early-Middle Maastrichtian and in other studied section is Middle Maastrichtian in age.

**DISCUSSION**

Tarbur Formation is predominantly Carbonate unit in the Imbricated zone (southwest of Iran) and contains of rich association of larger foraminifera. Because of absent of planktonic foraminifera biocorrelation of the Tarbur Formation with international subdivision of Cretaceous time scale is difficult. So, Wynd (1965) did not divided Campanian or Maastrichtian stages to substages, based
on the larger foraminifera, in the Turbar Formation. Publications dealing with larger foraminifera of the Zagros and other part of southern Neothyrs are relatively few, despite there being many exposures that yield them. Merić and Mojab (1977) and Meric and Gormuz (2001) noted the biostratigraphically important species of *Loftusia* species in Southern Neothys. They divided Maastrichtian by ranges of the different species of *Loftusia*. Based on *Loftusia* species and other microfauna, the exposed rocks of the Turbar Formation at Sarvestan is Early-Middle Maastrichtian and in Balgar, Chamsangar and Robat sections is Middle Maastrichtian.

The index foraminifera of Campanian age could not find at studied section. The *Loftusia* associations, reported in this study are most abundant foraminifera in Maastrichtian carbonate rocks which known from other parts of Southern Neothys.

Comparison of the Early-Middle Maastrichtian *Loftusia* species indicates broad similarity with those of the same age from Turkey, Iraq, Saudi Arabia, Oman (Meric and Mojab, 1977; Meric and Gormuz, 2001).

These similarities suggest that they were part of southern margin of Neothys Ocean until there are no reports of the occurrence of *Loftusia* in other part of Iran.

**REFERENCES**


