The study of the umbilical system in planktonic foraminifera in relation with depth of the Ziarat-kola section at the Maastrichtian, Central Alborz, IRAN

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Abstract

The main aim of this research is study of the planktonic foraminifera morphogroups distinction genus to perform by changing the umbilicus area in Ziarat-kola section to find novel results. Therefore, original objection at this research considers the cause of organizing umbilicus structures (Lip, Portici, Tegilla) at this protests. it seems that phylogeny trend entirely the changes of planktonic foraminifera changing from lip at primary morphogroup to tegilla at development shape which continued this phylogeny trend opening become entirely umbilicus that this trend accompanied to increasing deep. Therefore, the study of planktonic foraminifera morphotype, and recognizing, the obtained results from planktonic foraminifera analysis percent and their comparison with umbilicus structures area diagrams at this section indicats the increasing morphotype three accompany with increase in sea level that here dominated portici and tegilla structure with compressed opening and with decrease of morphotype three which showed decrease sea level, opening structure (lip) dominated. These trends follows the from Pascal law at Ziarat-kola section of the research.

Keywords: *Ziarat-kola section, planktonic foraminifera, Pascal law, Evolution, Lip, Portici, Tegilla*

Introduction

The obvious thing in the evolution trend of planktonic foraminifers (Hedbrgellids) from lower cretaceous till Gobotruncanids in the late cretaceous is that this unicellular has a complete umbilicus part with a cover plate named tegilla, during their evolution by changing the outset shape to advanced (Loeblich and Tappan, 1950). The main aim of this study is to know if the created trends of changing in shell of these animals made from the depth changing of the existence time of the animal shell because such as now a days that is proved, Hedbergella was in shallow depth and the shapes of their evolution had lived in more depth water compared to their ancestors (Fig. 1). SEM images were taken from Ziarat-kola section by VEGA TESCAN (plate1).

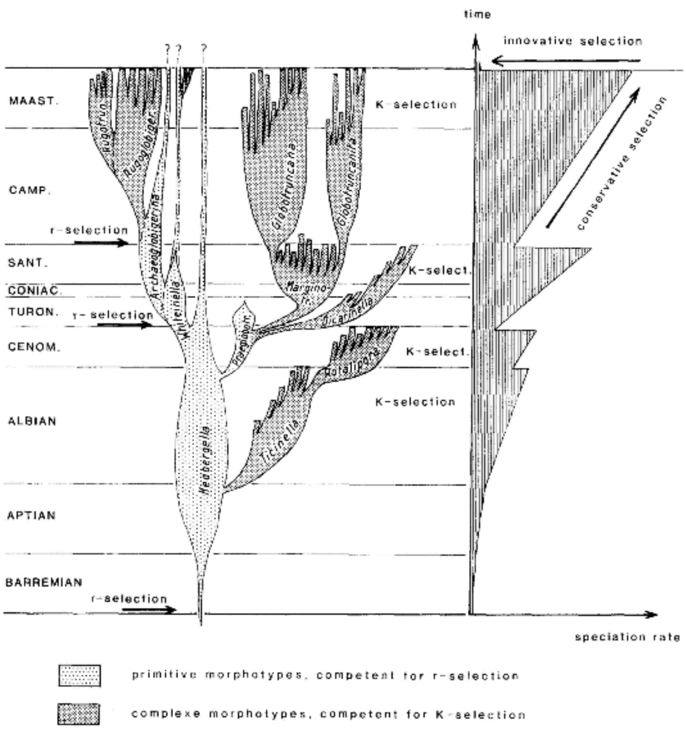

Fig1: Depiction of planktonic foraminifer's evolution (Caron and Homewood, 1983)

Material and Method

The section studied is located eight km south of Ziyarat-kola village, south of Behshahr in northern flank of Central Alborz Mountains. At this locality (E: 53º 40′ 10″, N: 36º 30′ 51″) the section consists about 200m. Thickness of monotonous grey- green to light grey marl (Fig.2). The very high rate of sediment accumulation in the studied area created a great potential for accurately evaluating the timing of environmental changes during the late Maastrichtian. A total of 85 samples were collected from the section, which were soaked in water with diluted hydrogen peroxide, washed through 63μm, 150μm and 250μm sieves, and dried until clean foraminiferal residues were recovered. About 200-300 individuals were picked up for each sample in two size fractions (63-150μm and >150μm) and mounted on dark cardboard slides for identification. These two size fractions were analyzed in order to obtain statistically significant representatives of the small and large groups. Species identifications are based on (Caron, 1985, Robaszynski and Caron, 1983-1984, 1995 Loeblich and Tappan, 1988, Nederbragt, 1990).

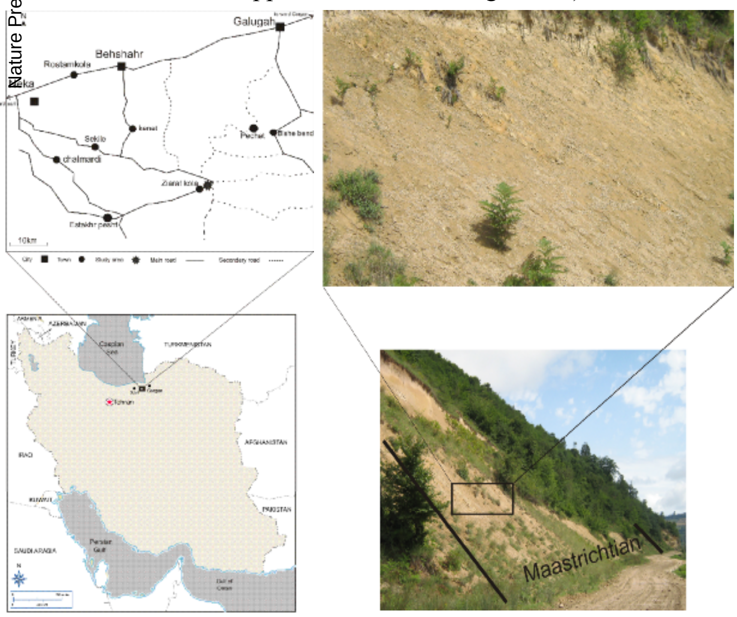

Fig2. The geographical map and the ways to the region of the study.

Result

Groups of planktonic morphotyes are distinguished by depth of living (Hart, 1980a, Hart, 1980b, Wonders 1980, Keller, 1999) (Fig3). Those are consisting of:

1- Shallow area faunas

Heterohelix and *Hedbergella* and a big part of *Hedbergella* small samples like Globotruncanids genus are related to faunas of shallow epicontinental seas or the border sea (Eicher, 1969, Eicher and Worstell, 1970, Sliter 1972).

2- Middle water faunas

Rugoglobigerina and *Globotruncanella* are related to these faunas.

3- Deep water faunas (lower than 100)

These faunas were counted like keeled shapes

there were 300 samples in the size of 120 mesh completely by chance, from every samples were counted that the result of this count shows at the first of successions and in the lower section morphotype group 3 was conquering and the amount of the morphotype group 1 was les in the area that this paragraph. in the lower section the group of morphotype three was increasing in the area that it indicated the proportional increasing of depth in the area and by this time portici structure has been larger and in umbilical structure is born in this unicellular, and in the middle formation has decreased the amount of morphotype three in the area again and the members of morphotype group one increased with the lip structure in the area again and upper part the members of morphotype group three (M3) with association of portici shapes increased (Fig3).

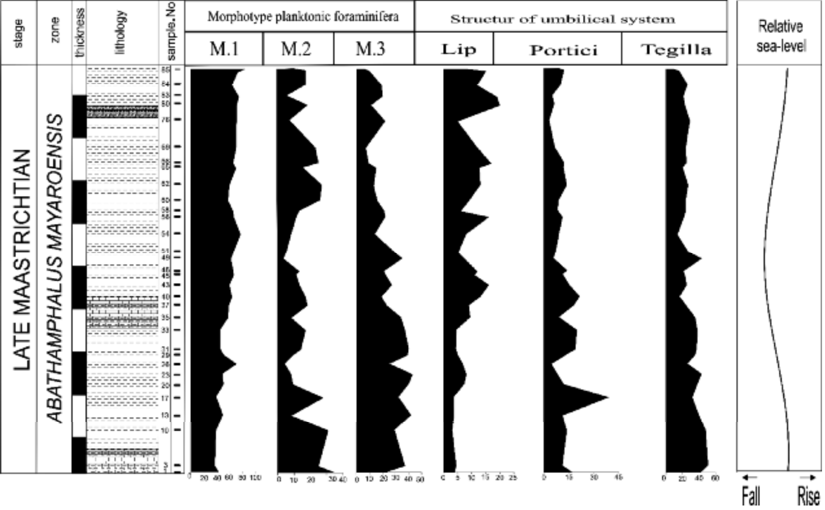

Fig3. Comparison of planktonic morphotype curves with structural umbilical system (M1= Morphotype group1, M2= Morphotype group2, M3= Morphotype group3)

One of the main aim of this study is that according to the evolution chart of caron (Caron and Homewood, 1983), the primary shapes was coming from Jurassic foraminifers evolution with a vast orifice that lead to the border of the sell that the orifices of this animals are covered by a partial structure called lip, and finally the evolution of these unicellular change to its ancestors and covered by a complete plate called tegilla. These animals live in more depths area compare to its ancestors and the conclusions indicate that the created structures in this unicellular helps with find it compatibility in this animals by the depth they have lived. It seems by swelling the water planktonic foraminifers have some created structure changes in there shells for compatibility with new depths that the alteration trend is like umbilical part of shell compacting with completing a covered plate of the umbilical part that is changed from lip structure to tegilla structure. This created trend leads to decreasing the surface to volume ratio in this unicellular and it causes that the new generation could live in depths that this trend is according to Pascal law and doesn't seem that the created alteration arise from changing nourishing or reproduction way (Fischer and Arthur,1977).

Discussion

Base on this data we can recognize that by increasing the depth of lip structure it changes to a tegilla plate during million years that is unstable Structure with one edge. by the continues of this trend the orifice will fine a completely umbilical situation in the end of its evolution that all the mentioned trend leads to decreasing the surface to volume ratio in foraminifers shell that according to Pascal law it can have a grate ability in living longer in more depths compare to their ancestors by the above- mentioned alters.

Acknowledgments

This study was supported by Tehran University of Sciences Research Council, National Museum of Tehran University and Razi Institute of Metallurgy, Division of SEM, Iran. The authors would like to express their deep gratitude to Gholamhossein Shafiee Ardestani for his invaluable helps and powerful suggestions in preparation/ interpretation the results also Mr. Majid mahmoodi for his assistance during the study.

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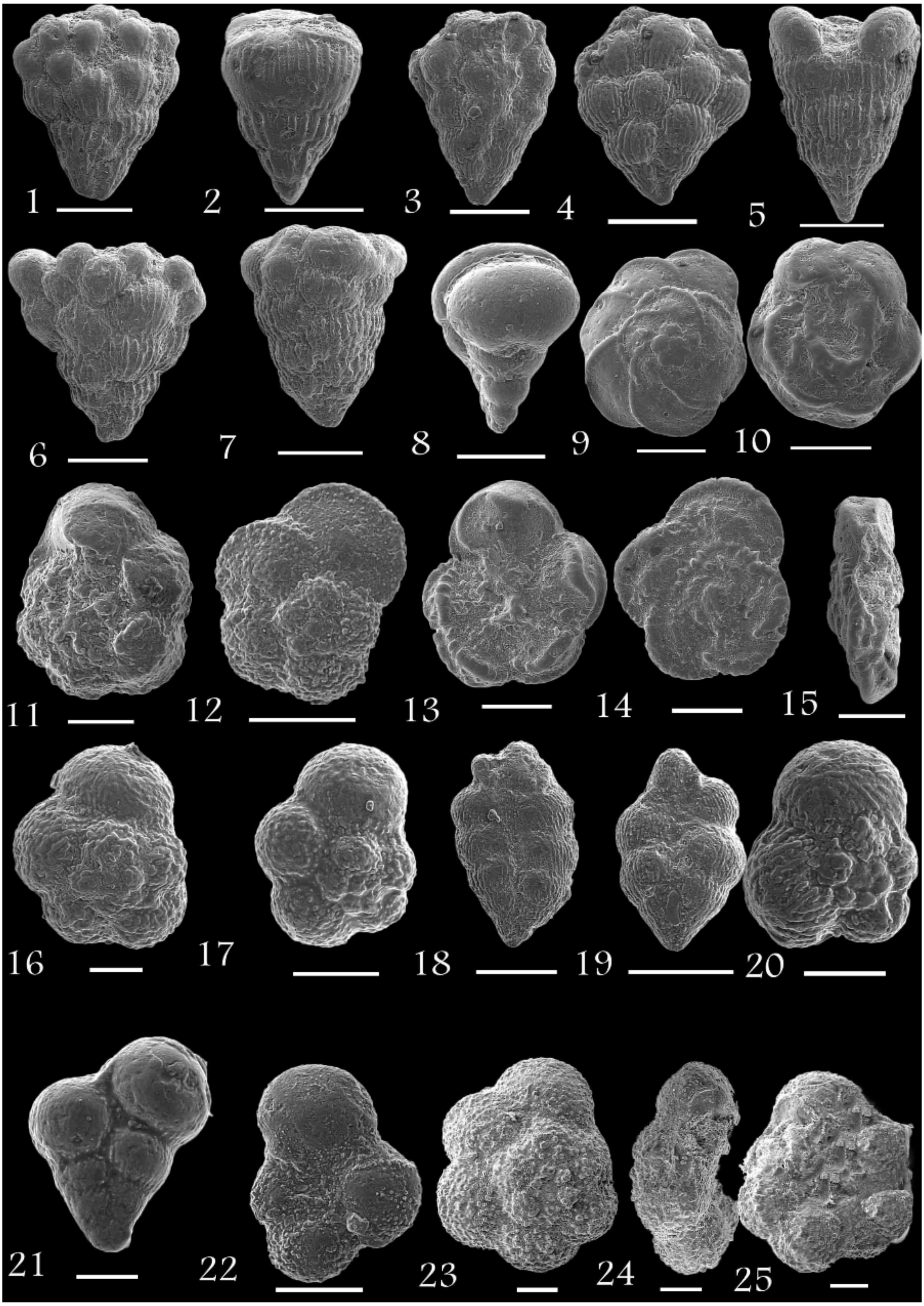

Plate1:1-*Racemigeuembelina fructicosa* (Egger) sample 3, 2-*Pseudotextularia elegans* (Rzehak).Sample 29.3-*Racemigeuembelina fructicosa* (Egger) sample 7.4- *Planoglobulina brazoensis (*Martin) sample 83.5-*Pseudotextularia intermedia* (Deklasz). Sample 33**.**6-*Racemigeuembelina fructicosa* (Egger) sample 3.7-*Racemigeuembelina powelli (Smith & Pessgnoo)* Sample12.8-*Pseudotextularia nuttalli* (voorwijk).Sample 29. 9,10-*Globotruncana arca* (Cushman) sample 1**.**11,12- *Globotruncana aegyptiaca* Nakkady sample 1.13,14,15-*Abathomphalus mayaroensis* (Bolli) sample 10(Tegilla).16,17- *Rugoglobigerina rugosa* (Plummer) sample 10.18,19- *Pseudoguembelina hariaensis* (Nederbragt) sample 3.20-*Rugoglobigerina macrocephala*,Bronnimann sample4.21- *Heterohelix globulosa*, (Ehrenberg) Sample 49.22- *Globigerinelloides subcarinatus* (Brönnimann) Sample 35.23, 24, 25- *Archeoglobigerina cretacea* (Dorbigny) sample 10.scale Bar=100µm (Ziarat-kola section).