Study of Sea level changes with Leckie method of the Abderaz Formation (Middle Turonian-Early Campanian) at type section based on foraminifera

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Abstract

In this research the Abderaz Formation at its type section with an age of Turonian-early Campanian and a thickness of 300 m containing.light grey shale and marls was investigated. Statistical Studise of the morphotype groups of planktonic foraminifera shows that the majority of them are of shallow water forms (SWF) and deep water forms (DWF) and planktonic to benthic ratio is high indicating specific condition of oligotrophy and sedimentation in a relatively deeper marine condition

Keywords: Planktonic foraminifera, Morphotype, Abderaz Formation, Sea level changes

Introduction

The Study on the morphotypes and planktonic to benthic ratio was the major aim of the research .This study was intended to explore the marine sedimentation of Abderaz Formation in (outer neritic-upper bathyal) restrict. Then 84 SEM images have been obtained and demonstrated in frame of 2 plate.

Material and Method

The section studied is located about 1 km to the Muzduran, north eastern Mashhad (a city of Iran), Kopet Dagh basin. At this locality (E: 60, °33/, 00//, N: 36⁰, 10/, 40//)(Fig1). Type section of Abderaz Formation has 300m thickness. At the typical gap such as all regions under the surface sub-contact of Abderaz Formation are un-correlated with Aitamir Formation. But its upper layer with Abtalkh Formation is in continuous correlation. The upper layer has elected as chalk limestone upper border. A total of 130 samples were collected from the section,but Only 102 samples were included in study, 7 samples due to the existence of salvation effects and 21 samples was obtained from reworking damages that were excluded from the study. 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,1950 , 1988 and Tappan 1940,1943).

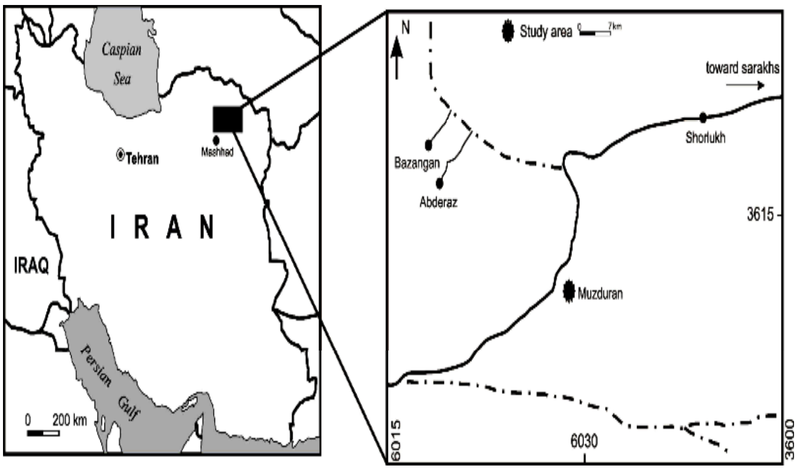

Fig1. The geographical map and the ways to the region of the study.

Discussion

Groups of planktonic morphotyes are distinguished by depth of living (Leckie 1987) (Fig2). Those are consisting of:

1-**Epicontinental Sea Forms= ESF:** *Heterohelix* and *Guembelitria* are related to faunas of shallow epicontinental sea or the border sea (Leckie 1987, PremoliSilva & Sliter 1999, Keller, 2002).
2- **Shallow Water Forms= SWF**
Hedbergella delrioensis and *Whiteinella* are related to this fauna (Leckie 1987, PremoliSilva & Sliter 1999).
3- **Deep Water Forms= DWF**
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 the time middle Turonian **ESF** was conquering and the amount of the **DWF** and %P was les in the area that this paragraph. in the late Turonian the group of **DWF** 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 Coniacian time has decreased the amount of **DWF** in the area again and the members of **ESF** increased with the less %P in the area again and during Coniacian to Santonian the members of **DWF** with %P increase in the area for another time and in Santonian time, sea water shows a vacillation mood in the above-mentioned section . Also the planktonic to benthic ratio which explains that at the deposits 400 meter at total part of in this Formation. This study was intended to explore the marine sedimentation of Abderaz Formation in (outer neritic-upper bathyal) restrict and the provided curves from morphotypes changes are in full agreement with the curves of the sea level changes and planktonic foraminifer to epifauna benthic ratio(Fig2).

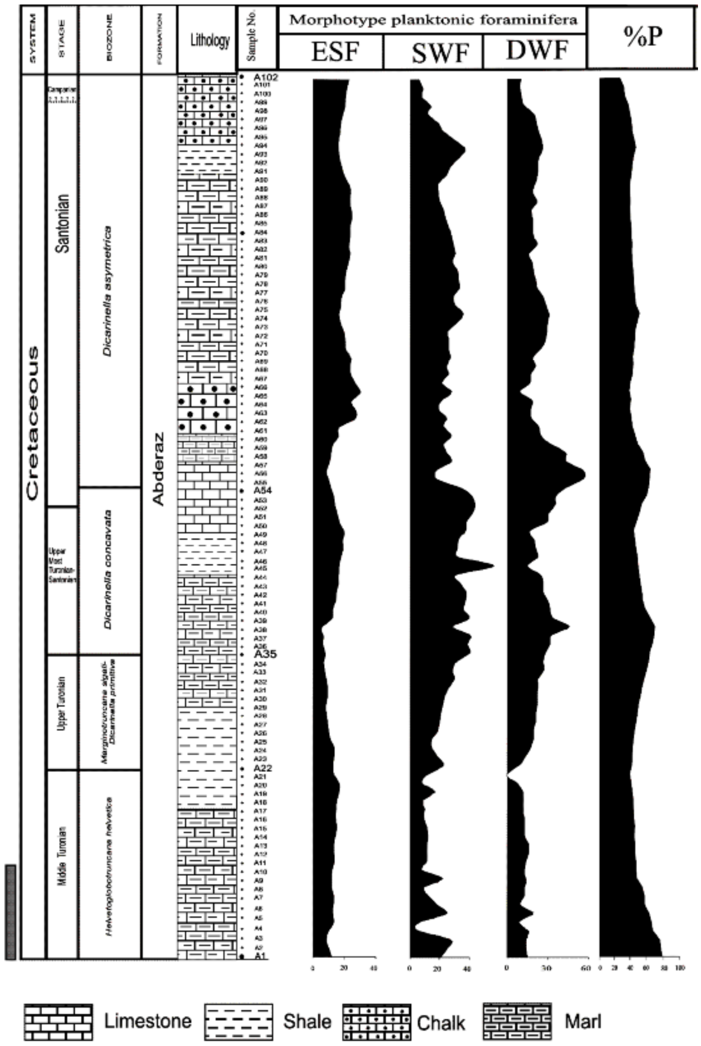

Fig2-Comparison of planktonic morphotype curves with %P)ESF = Epicontinental Sea Forms, SWF = Shallow Water Forms, DWF = Deep Water Forms, %P=percentage of planktonic foraminifera)

Result

Groups of planktonic morphotyes are distinguished by depth of living that is consisting of:

1- Shallow area faunas= ESF = Epicontinental Sea Forms

2- Middle water faunas = SWF = Shallow Water Forms

3- Deep water faunas (lower than 100) = DWF = Deep Water Forms

In the time of middle Turonian simultaneous with subtraction of the percent of **DWF** that indicates the dwindling of proportional in mentioned section. %P increases but in the late Turonian that the percent of **DWF** increases that it would indicated the propotional of depth increasing in area and the structured shapes in vicinity has increased and the structured shaped (tegilla) recently has born and in Coniacian time the **DWF** diminished again and %P increase and in Coniacian -Santonian boundary by increasing the shapes of **DWF** and %P became the most in this time. That this affair it is because of the advent of *Globotrancana* and increasing the number of them in Santonian time but in the late Santonian and the early Campanian by diminishing the percent of **DWF** and increasing **ESF**, the lip shapes became more in area. This study was intended to explore the marine sedimentation of Abderaz Formation in (outer neritic-upper bathyal) restrict and the provided curves from morphotypes changes are in full agreement with the curves of the sea level changes and planktonic foraminifer to epifauna benthic ratio.

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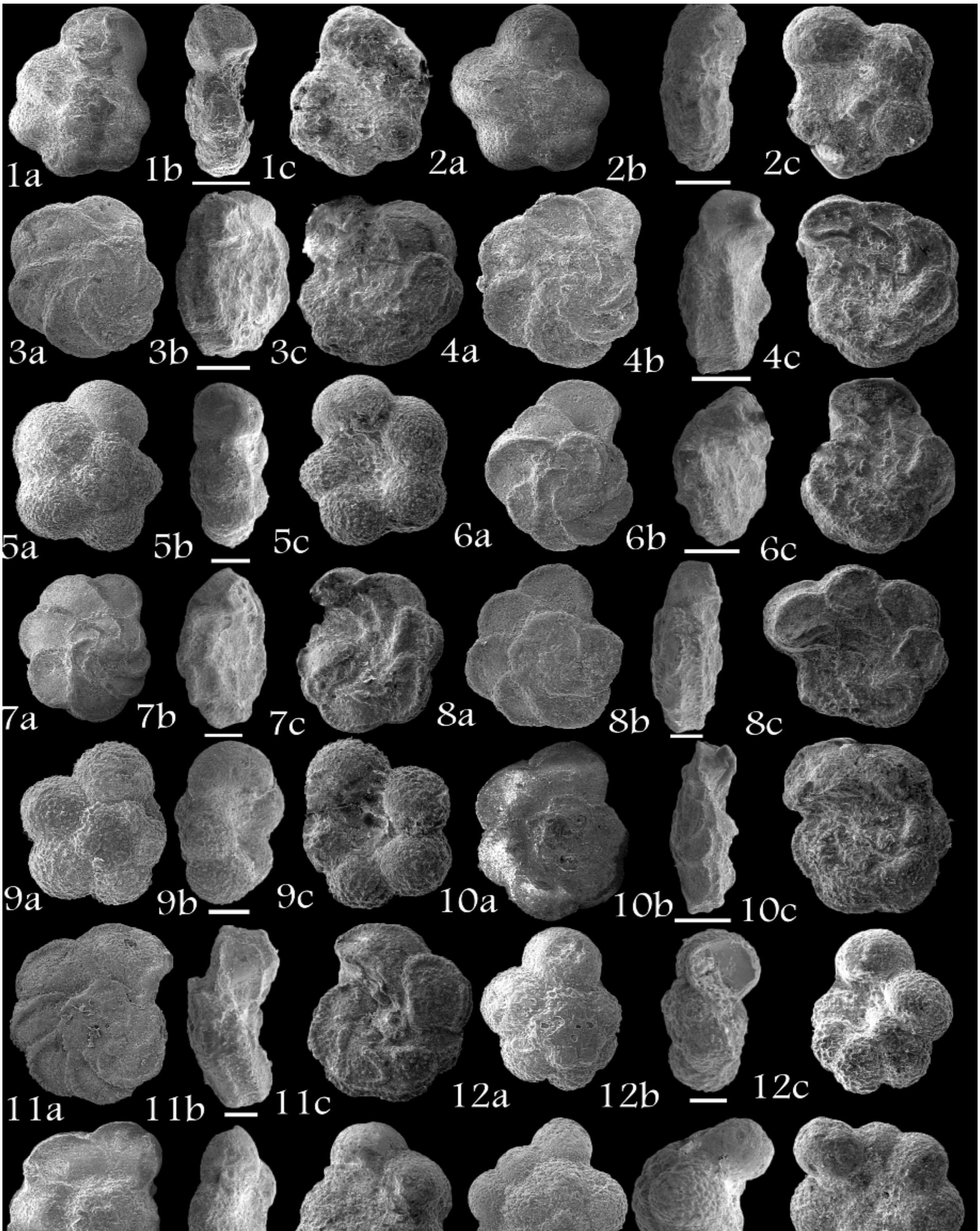

Plate1:1-*Whiteinella brittonensis*, Sample17. 2-*Whiteinella archaeocretacea*, Sample17. 3, 4-*Marginotruncana pseudolinneiana*, Samples29, 42. 5-*Whiteinella archaeocretacea*, Sample25. 6- *Marginotruncana coronata*, Sample20. 7- *Marginotruncana pseudolinneiana*, Sample31. 8- *Marginotruncana coronata*, Sample40. 9- *Whiteinella aprica*, Sample1. 10,11- *Marginotruncana coronata*, Sample47,48. 12-*Whiteinella brittonensis*, Sample12. 13-*Dicarinella* cf *hagni*, Sample16. 14-*Whiteinella paradubia*, Sample20. Scale bar represents 200μm except for Samples8, 9, 11, 12 which represents 100μm.

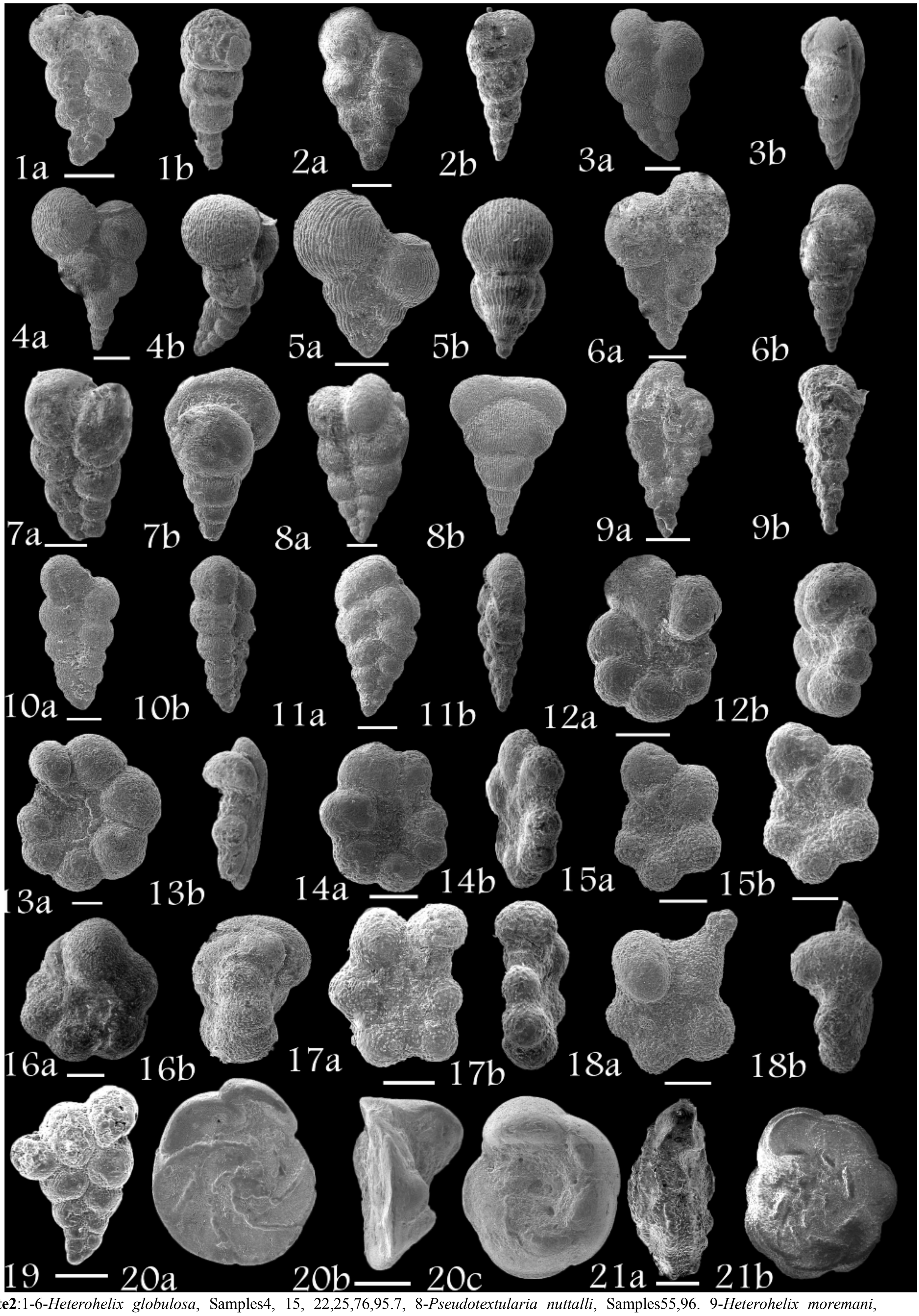

Plate2:1-6-*Heterohelix globulosa*, Samples4, 15, 22,25,76,95.7, 8-*Pseudotextularia nuttalli*, Samples55,96. 9-*Heterohelix moremani*, Sample15. 10-*Heterohelix papula*, Sample14. 11-*Laeviheterohelix pulchera*, Sample54. 12-*Globigerinelloides prairiehillensis*, Sample55. 13-*Globigerinelloides* sp, Sample22. 14-*Globigerinelloides* sp, Sample50. 15-*Globigerinelloides* sp, Sample56. 16-*Globigerinelloides prairiehillensis*, Sample56. 17-*Globigerinelloides* sp, Sample56. 18-*Globigerinelloides* sp, Sample50 . 19- *Ventilabrella* cf *austiniana*, Sample40. 20-*Globotruncanita elevata*, Sample99. 21-*Globotruncana* sp, Sample85. Scale bar represents 100μm except for Samples20, 21which represents 200μm and Sample13which represents 50μm.