The Importance of Lagenid foraminifers in Permian of NWof Iran

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Astract

The assemblage of Lagenide foraminifers in middle and late Permian sequences of the east and west Azarbaijan, northwest Iran consist of many species belong to 27 Genus. The most importanant and marker species relation to genera Pseudotristix, Rectostipulina, Robuloides, Huberobuloides, Calvezina, Ichthyolaria , Frondina , Ichthyofrondina , Aulocophloia Eocrystellaria Robustopachyphloia , Partisania , plus additiona elements. The first and last occurrences of most recognized taxa fall in the middle and Late Permian.In the absence of large fusulinoid Fusulinina because of end Midian mass extinction and due to environmental situations, The lageinid foraminifera speices are very useful and key biomarker for age determination and stratigraphical correlation.

Introduction

The foraminiferal , order Lagenida originated in Moscovian stage(Late Carboniferous) , but early Lagenids were minor elements of foraminiferal faunas for Carboniferous and early Permian. Lagenid became conspicuous only after Fusulinoidean fusulinides suffered declines in both diversity and aboundance at the end of Midian Stage,or middle Permian(Leven & Kochansky, 2001).

Marine Permian deposits are exposed in many parts of the East and West Azarbaijan, in northwest Iran.The thickness of Permian outcrops varie from place to place because of sea change level, erosion and weathering and faulting. The Permian sequences of northwest Iran can be divided into four lithostratigraphic units.These units from base to top including Vazhnan(=Dorud Fm.), Surmaq(Ruteh Fm.), Julfa(Nesen Fm.) and Ali Bashi formations respectively.A pricise dating of formations based on analysis of foraminifers assemblages and stratigraphical position is also provided. The Vazhnan formation(Dorud Fm.) corresponds to Asselian – Sakmarian stages of Early Permian(Cisuralian). The Surmaq(Ruteh Fm.) Formation corresponds to ? Bolorian, Kubergandian - Murgabian stages of Middle Permian (Gaudulopian) .The Julfa formation(Nesen Fm. represent the entire Midian and Early Dzhulfian stages (Late Middle Permian –Early Late Permian) and the Ali Bashi formation encompasses the Late Dzhulfian and Dorashamian stages of Late Permian (Lopingian).(Stepanov *et al*.,1969: Teichert *et al*. ,1973: Baghbani, 1986: Partoazar,1987, Shabanian, 2008,2009).

Small foraminifers and fusulinacean from middle and late Permian in nine stratigraphical sections have been studied. The smaller foraminifers which have been recognized from prepared thin sections belong to *Miliolinina*, *Textulariina*, *Fusulinina* and *Lagenina* suborders.

The classic works on Permian sequences,particularly on the Late Permian – Early Triassic strata and their fauna contents carried out by Stepanov et al. (1969), Teichert et al.,(1973), Altiner et al., (1981), Baghbani (1996), Partoazar (1997) , Kozur (2007) and Shabanian (2008) . The inrtoduction of Middle and Late Permian foraminifers, chiefly Lagenide and their biofaceis in Nw Iran were published by Partoaza(1997) and Shabanian (2008).

This research have been based on ten stratigraphical sections and more than 2200 thin sections and the purpose of this paper: 1) to identify and describe new species and genera: 2)

to illustrate the lagenid fauna of Middle and Late Permian so that they can be use for solution of stratigraphical problems and make a stratigraphical tool for stratigraphical purposes:3) to compare with contemporaneous faunas of Tethyan province.

Discussion

The lagenid foraminifers are one of the most important constituent of Middle and Late Permian bioclastic limestone in northwest of Iran.They consist of benthic forms with serial and spirally chamber arrengment.Foraminifers whose secreted tests consist of optically radial, low-Mg hyaline calcite. Crystal units are enveloped by organic membranes. Wall is monolamellar (aetlo monolamellar, plesio monolamellar or ortho monolamellar)with or without secondary lamination(Groves et al. 2005, Gaillot & Vachard , 2007)

In the studied area , these group of microfossils comprises of more than fifty species which attributed to 27 genera and few families. In spite of long range of some genus and species, many of the lagenide foraminifers have a short range and are very useful biomarker for age determination and other stratigraphical and paleoecological interpretations.This group of foraminifers are classified and identified on the basis of chamber arrangement, shape of chamber and quality of septa. on the basis of mentioned criteria lagenide divided into three group (table- 1).

The marker genus were recognized in this study include *Aulcophloia*, *Rectostipulina*, *Robuloides*, *Hubeirobuloides, Pseudotristix*, *Calvezina, Eocrystellaria, Cryptomorphina*, *Ichthyofrondina*, *Ichthyolaria* , *Frondina*, *Cryptoseptida* , *Robustopachyphloia* and *Partisania*

In addition to mentioned index genera,many marker species of *Pachyphloia ,Langella, Pseudolangella,Nodosaria,Pseudoglandulina,Protonodosaria,Geinitzina,Nodosinelloides, Frondicularia, Frondinodosaria, Polarisella* and *Aulacophloia* have been discriminated from Permian of studied area in which are very important for correlation and age determination.

The study of thin sections which prepared from Permian sequences show that in the late Murgabian , Midain and Early Dzhulfian stages they have maximum abundance and diversity. This research stetes that the lagenide foraminifers have very low diversity and abundancs at the latest Permian vis Dorashamian stage. In spite of long stratigraphical range of some genera and a few species , most of genus and many of species or their assemblages can be used as a biomarkers and biostratigraphical tools for age determination and stratigraphical correlation.

This study show that the first apperences of *Geinitzina*, *Nodosinelloides*,*Nodosaria, Langella* and *Protonodosaria* correspond to Kubergandian or Pre- Kubergandian stage. The apperences of *Pachyphloia*, *Pseudolangella*, *Cryptoseptida, Lunucammina* and *Frondinodosria* or their assemblages represent the Murgabian stage in the research area.The Midian stage strata in the research area were characterized with *Frondina*, *Eocrystellaria Ichthyofrondina*, *Partisania*, *Polarisella Calvezina*, *Aulcophloia Frondicularia Rubustopachyphloia* , *Cylindrocolaniella* and *Cryptomorphina* genera. The first apperences or assemblages of *Pseudotristix*, *Robuloides*,*Pseudoglandulina Rectostipulina*, *Huberrobuloides* and *Ichthyolaria* represent the Dzhulfian stage.The layers with Dorashamian stage age in the northwest of Iran , are lack of Dorashamian index foraminifers have been published so far from different parts of Tethys realm.

Conclusion

Lagenide Foraminifers is one of the most important constituent of Middle and late Permian platform limestone of NW Iran. The study of thin section lead to 27 genera and more than tens species. In the absence of large fusulinid, they can be used as a stratigraphical tool for

age determination and stratigraphical correlation. Among the Lagenide , Pseudotristix, Partisania, Calvezina, Robuloides, Robustopachyphloia, Cylindrocolaniella, Hubeirobuloides, Cryptomorphina, Ichthyolfrondina,Cryptoseptida and Rectostipulina are very short range and index fossils.

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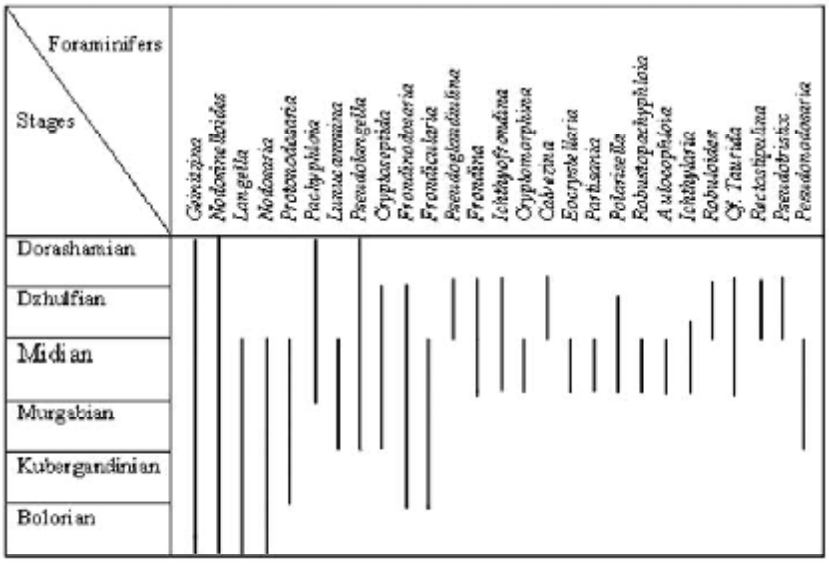
Teichert

Table 1- Classification of Lagenide on the basis of chamber arrengments

Non- septated Lagenide		Rectostipulina
Septate and Uniserial Chambers	Circle to squer chamber	Nodosaria, Protonodosaria, Nodosinelloides, Polarisella, Langella, Pseudolangella, Pseudoglandiulina
	Chevern chamber	Frondina ,Ichthyofrondina, Ichthyolaria, Frondicularia, Frondinodosaria
	Flattened Chamber	Geinitzina, Lunucammina
	Areched chamber	Pachyphloia, Robustopachyphloia, Aulocophloia,
	Triangular chamber	Pseudotristix
	Chamber with partitions	Cylindrocolaniella
Coiled Chamber		Calvezina, Partisania, Robuloides, Hubeirobuloides , Eocrystellaria ,Cryptomorphina

Table-2- Range chart of Lagenide foraminifers from Middle and Late Permian of NW Iran



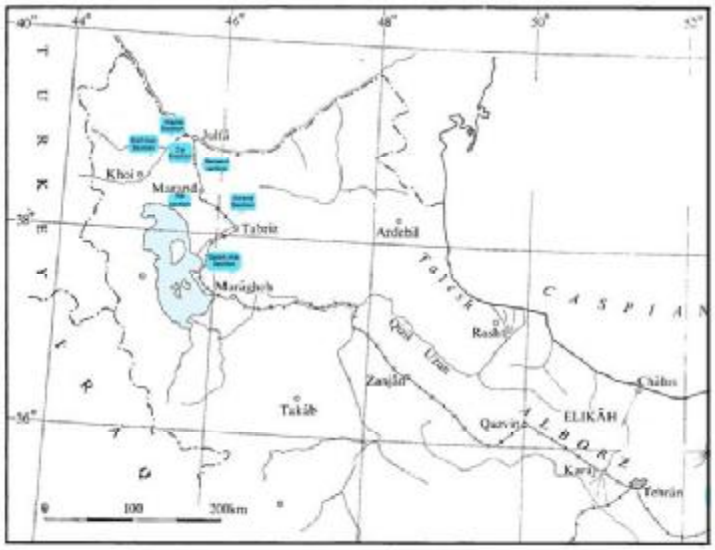


Fig.1- Geographical map of statigraphical sections location

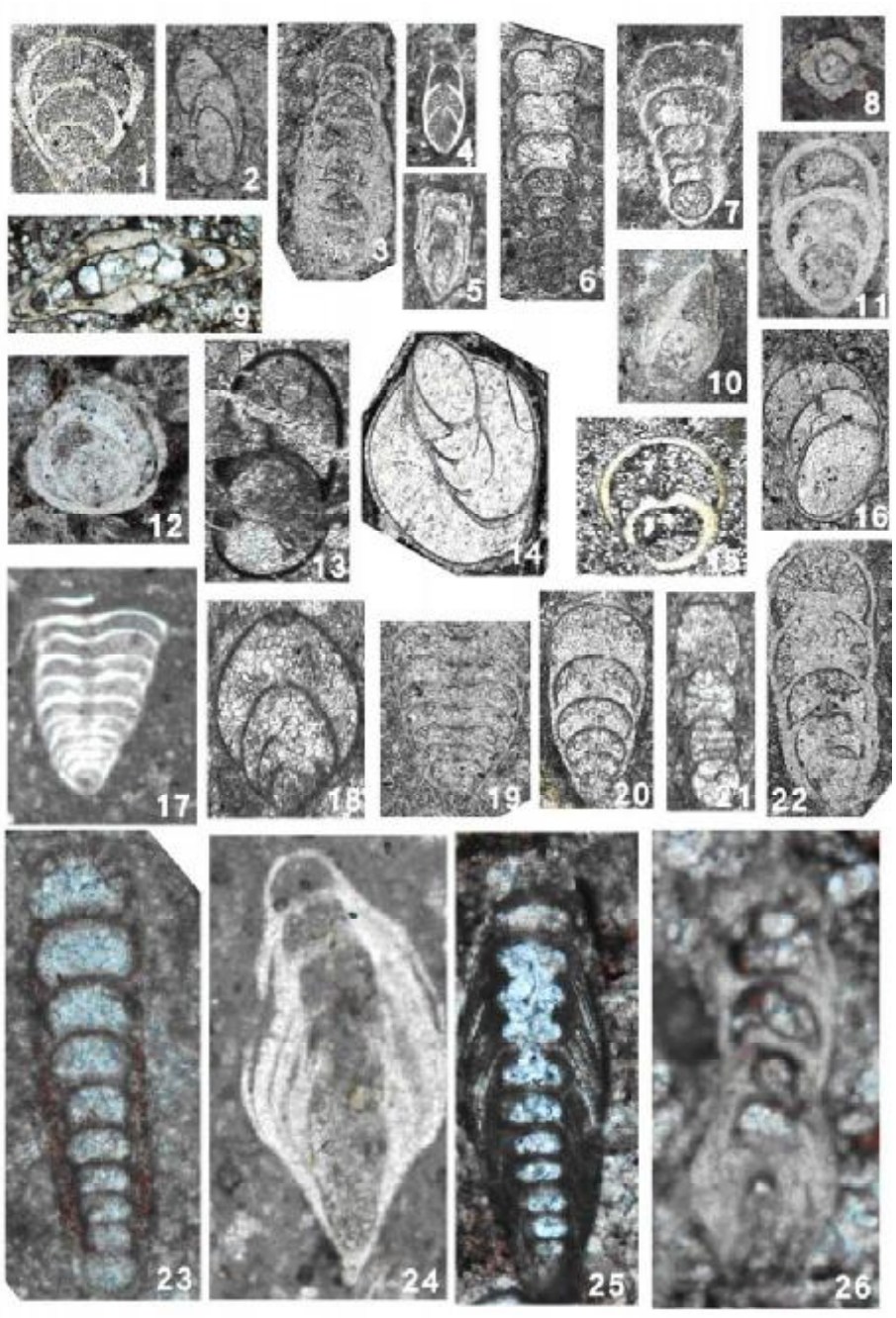


Fig.2: 1&15-Rectoglandiulina, 2&12-Calvezina , 3&26- Robustopachyphloia, 4-Ichthyolaria, 5&24- Cryptoseptida, 6- Nodosinelloides, 7&19- Geinitzina, 8- Rectostipulina, 9- Aoulocophloia, 10- Robuloides, 11-Pseudolangella, 13- Frondina, 14- Partisania , 16- Frondinodosaria,17- Lunucammina 18- Ichthyofrondina, 20&22- Langella, 21- Protonodosaria, 23&25- Pachyphloia