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Calcareous Algae from the Cretaceous of Zagros Mountains (SW Iran)

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Abstract: Calcareous algae are frequent in the shallow-marine limestones of Cretaceous strata in Zagros Mountains outcropping in north of Shiraz. eight of green algae (among them 7 dasycladaceans, 1 Udoteaceans) and 1 red algae were determinated. Followings abundant taxa are reported in this paper: Bacinella irregularis, *Coptocompylodon fontis, Cylindroporella sp.,Dissocladella cf. bonardii undulata*, *Neomeris cretacea, Salpingoporella annulata*, *S. dinarica*, *S. sp., Terquemella sp.,,Trinocladus tripolitanus* and *P. irenae*. Among the mentioned taxa *Trinocladus tripolitanus*, *Dissocladella deserta*, *Dissocladella undulata*, *Permocalculus irenae* are reported for the first time from Albian-Cenomanian strata of Iran.

Key words: Calcareous algae . Cretaceous . Zagros mountains . Shiraz . Iran

INTRODUCTION

Cretaceous deposits are widely distributed in NE Shiraz and composed of a great varity of rock types. The most important stratigraphic units of Cretaceous strata in SW Iran (Zagros Mountain) and adjacent areas are summarized by Alavi [1], Kalantari [5], Sampo *et al*. [7]. These formations vary in lithology, owning to their paleogeographic position.

In the Cretaceous of Iran, fossil calcareous algae are one of the less studied groups compared to others fossil groups such as foraminifers, mollusks and others.

Gollestaneh [4] studied Upper Jurassic-Lower Cretaceous calcareous algae in SW Iran for the first time and reported several taxa from this area. Since then, his paper was used as references for algal identification in Iranian universities and research centers.

Until now, detail investigation of Cretaceous calcareous algae has not been caried out. In this paper, I distinguish some taxa from the Zagros Mountains.

GEOLOGICAL SETTING

The Zagros Mountains situated within the NE part of the southern Neotethys ocean. The succession of Mesozoic deposits from this mountains starts with Triassic sediments and ends with Cretaceous deposits. During the Neocomian-Aptian, shallow water carbonate sediments, containing a rich assemblage of foraminifers and calcareous algae were deposited.

The localities described here are situated approximately 60-210 km. northeast of the town of Shiraz (Fig. 1). The first locality is situated approximately 50 km north of Shiraz and 15 km west of Perspolis. The second locality is located 120 km north of Shiraz near the small town of Saadat-shahr and the third locality 180 km NE of Shiraz near the small town of Ghahderabad.

In order to study the micropaleontology and biostratigraphy of Cretaceous sediments, several stratigraphic sections were studied in NE Shiraz and compared with each other (Fig. 2).

In all sections Cretaceous sediments are represented by several stratigraphic units, including: Sarvak, Kazhdomi and Dariyan Formations. In the studied sections the Sarvak unit starts from bottom with grey, calcareous breccia passing to pelagic dark medium bedded grey limestone and pelagic grey argillaceous limestone containing *Rotalipora*.

This Formation overlies conformably the Kazhdomi Formation and is underlained by the Ilam Formation. Sarvak Formation is confined to lower-middle Cenomanian in the sections described.

Kazhdomi Formation is composed of grey medium-thin bedded limestones and yellow marly limestones with abundant pelecypods, echinoderms and genus of the ammonite *Knemiceras* and ends with grey marly limestones containing Orbitolinids including *Orbitolina subconcava* LEYMERIE and calcareous algae such as: *Permocalculus irenae* ELLIOTT, *Dissocladella cf. bonardiI undulata* RAINERI and *Trinocladus tripolitanus* RAINERI. In my opinion, this Formation is confined to upper Albian-lower Cenomanian age. Kazhdomi Formation overlies disconformably the Dariyan Formation.

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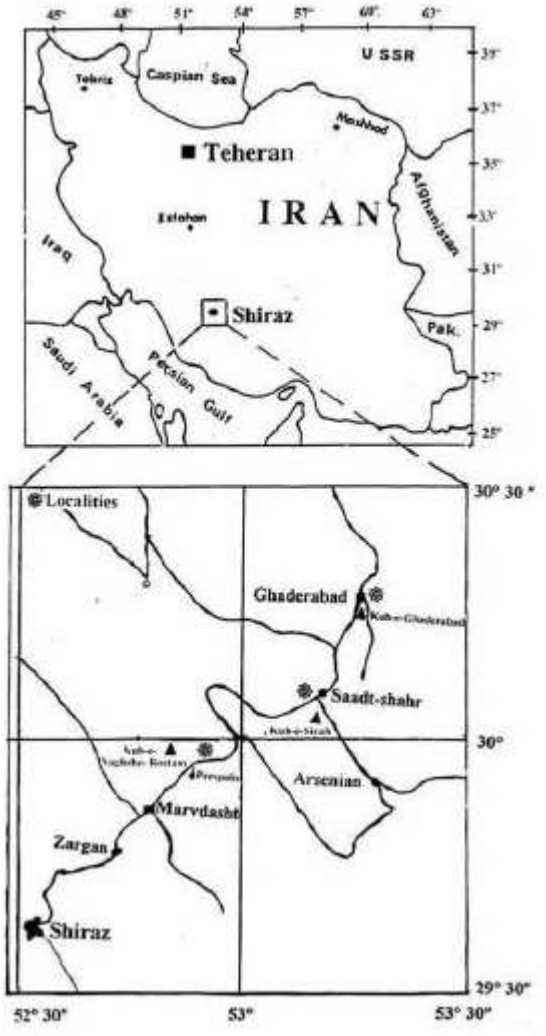


Fig. 1: Location map showing the position of the study area marked by (Scale: 1: 1000,000)

Dariyan Formation is composed of medium bedded grey limestones in the lower part. In the part it consists of medium-thick bedded brownish to grey limestones in colour with pelecypods, The genus of the ammonite *Parahoplite* also occurss. In the studied thin section Orbitolinids (*Or. texana* ROEMER) and calcareous algae such as; Coptocampylodon fontis PATRULIUS, *Cylindroporella sp., Salpingoporella sp*., Bacinella irregularis RADOICIC and Terqumella sp. were recognized. The contact between Dariyan and Kazhdomi Formations is marked by abundant iron nodules that witnesses the presence of an epirogenic phase during upper Aptian-middle Albian.

Tectonically the studied area belongs to Zagros Mountains. The tectonic of the Zagros Mountains were described by Falcon [3], Berberian and King [2], MCQuillan *et al*. [6].

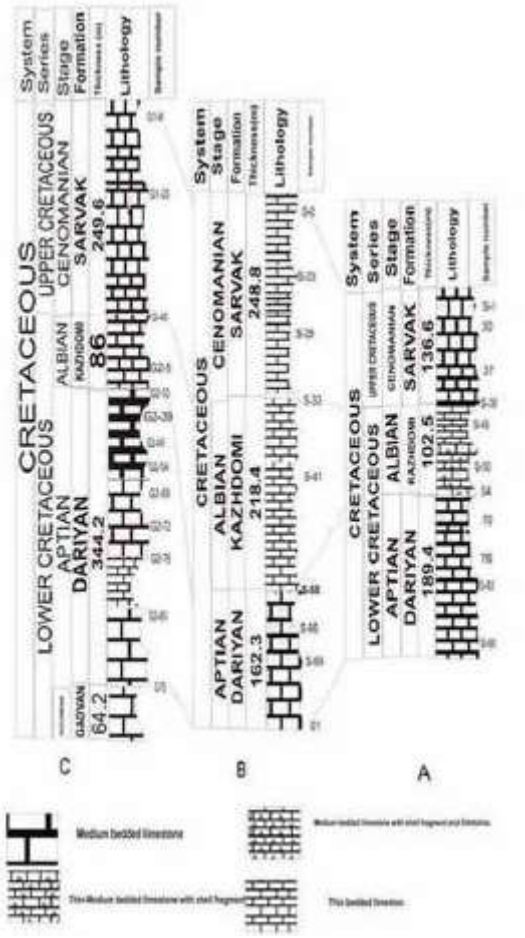


Fig. 2: Correlatin of Cretaceous sequence in NE Shiraz; A: Saadat-shahr, B: Naghsh-E-Rostam,, C: Ghaderabad (Scale= 1: 3000)

ALGAE	1 2 3 4 5 6 7
Cholorophyta	
Dasycladaceans	
Coptocompylodon fontis	
Cylindroporella sp.	_____
Dissocladella cf. bonardii undulata	_____
Neomeris cretacea	___
Salpingoporella annulata	___
S. dinarica	___
S. sp.	____
Terqumella sp.	_____
Trinocladus tripolitanus	_____
Udoteaceans	___
Udoteacea	
Bacinella irregularis	
Rhodophyta (Red Algae)	_____
Gymnocodiacea	
Permocalcalus irenae	_____

1-Berriasian; 2-Valanginian; 3-Hauterivian; 4-Baremian; 5-Aptian; 6-Albian; 6-Cenomanian

Fig. 3: The most important Cretaceous calcareous algae in the carbonates of northern Shiraz

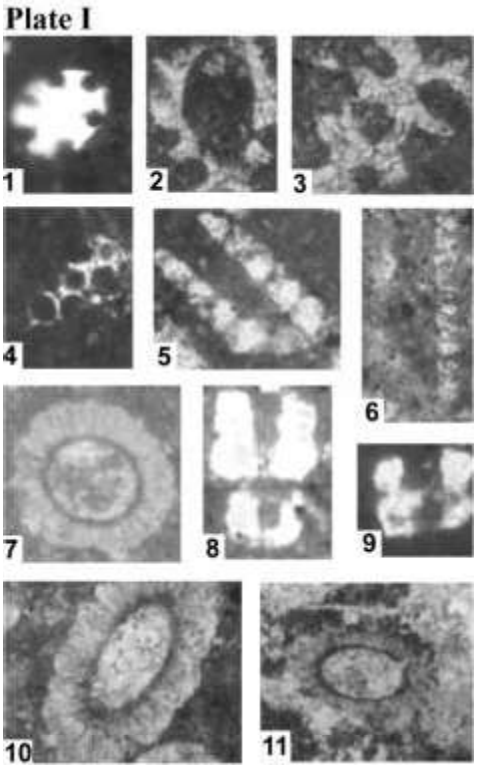


Plate 1

Fig. 1: Terquemella sp., Transversal section. Ghaderabad. Thin section G44×80.

Fig. 2: *Salpingoporella* sp.

Fig. 3: *Salpingoporella* sp.

Fig. 2: Obliquel section. Ghaderabad. Thin section G-30, ×100

Fig. 3: Tangential oblique sections, parallel to the long axis, Ghaderabad. Thin section G-30, ×100

Fig. 4: Cylindroporella sp., Tangential oblique sections, parallel to the long axis, Ghaderabad. Thin section G-44, ×96

Fig. 5: *Dissocladella cf. bonardii undulata* (RAINERI). Longitudinal sections. Naghsh-E-Rostam. Thin sections S-38 and S-58, × 230

Fig. 6: *Dissocladella cf. bonardii undulata* (RAINERI). Longitudinal sections. Naghsh-E-Rostam. Thin sections S-38 and S-58, × 230

Fig. 7: *Salpingoporella dinarica* RADOICIC

Fig. 7: Transversal section. Ghaderabad. Thin section G-22, ×230

Fig. 10-11: Oblique sections. Ghaderabad. Thin section G-29, ×110

Fig. 8: *Salpingoporella annulata* CARROZI., Oblique section (a fragment in a breccia). Saadat-Shahr., ×92

Fig. 9: *Salpingoporella annulata* CARROZI., Oblique section (a fragment in a breccia). Saadat-Shahr., ×92

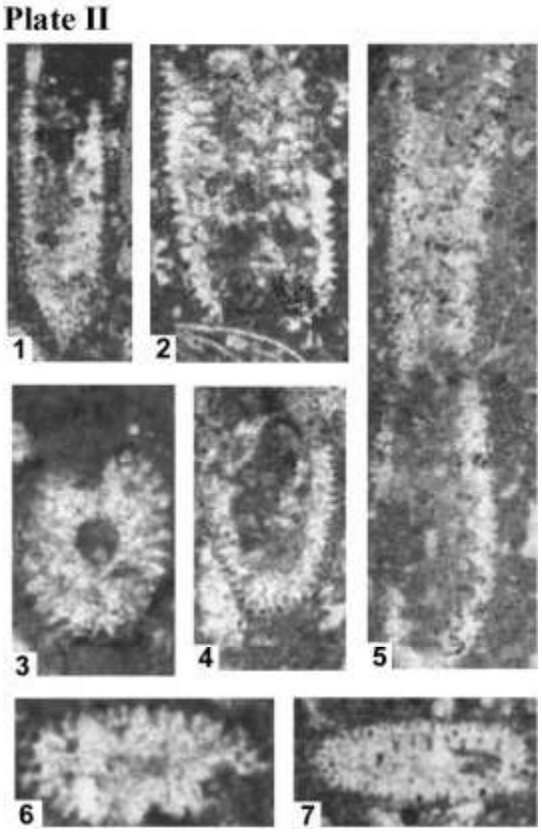


Plate II

Figs. 1-7: Trinocladus tripolitanus RAINERI.

1: Oblique section. Thin section S-4. ×92.

2: Tangential section. Naghsh-E-Rostam. Thin section S-41, ×100.

3: Transverse section. Naghsh-E-Rostam. Thin section S-41, ×100.

4: Oblique section. Thin section S-38. ×100.

5: Longitudinal section. Thin section S-41. ×92.

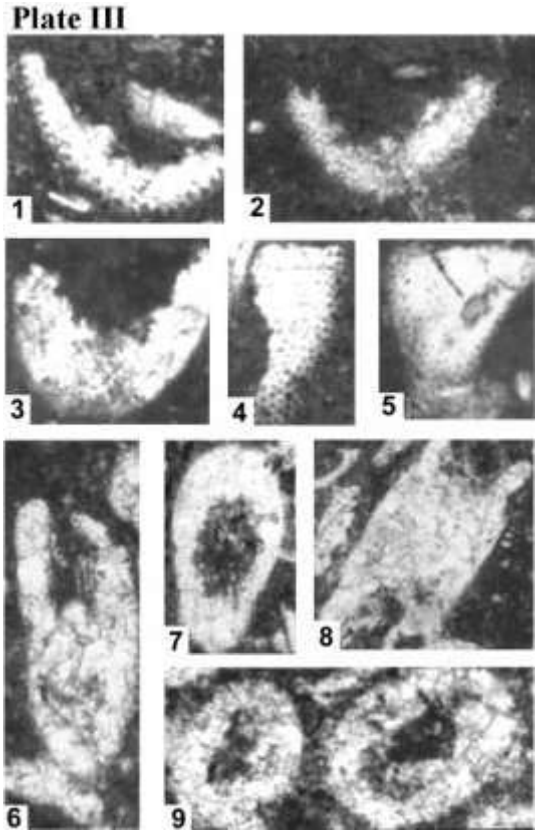
6: Oblique section. Naghsh-E-Rostam. Thin section S-38, × 100.

All Samples from the upper Albian-lower Cenomanian strata of Naghsh-E-Rostam.

Fig. 7: Oblique longitudianl section. Ghaderabad. Thin section G-40, ×92. Sample from upper Albian-lower Cenomanian strata of Kazhdomi Formation

PALEONTOLOGIGAL DESCRIPTION

Calcareous algae are most conveniently studied flora (fossil group) in the studied thin sections. Cretaceous limestones of northeast Shiraz contain diverse green and red algae. Among the green algae, dasycladceans are most frequent and udoteaceans are rare. Among the red algae Gymnocodiaceans are frequent in Zagros Monutains (Fig. 3).



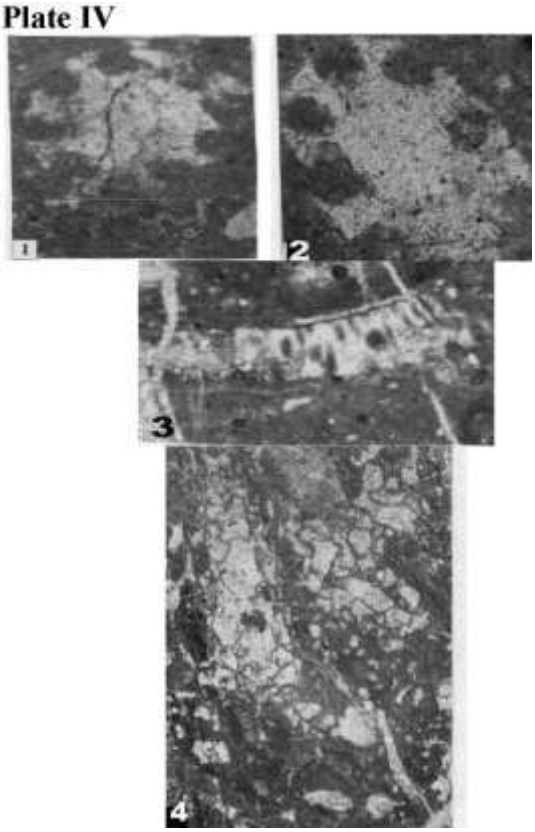


Plate III

Figs. 1-9: *Permocalulus irenae* ELLIOTT

Figs. 1, 2: Fragments. Ghaderabad. Thin section G_2-56, ×230

Fig. 3: Longitudinal section. Saadat-shahr. Thin section Si-80, ×73.6

Figs. 4-5: Longithudinal sections showing surface pores. Saadat-shahr. Thin Section Si-83. ×230

Fig. 6, 8: Longitudinal sections.6: Ghaderabad. Thin section G2-2, ×92. 8: Ghaderabad. Thin section G2-3, ×92

Fig. 7: Oblique longitudinal section. Ghaderabad. Thin section G-11, ×92

Fig. 9: Transversal section. Ghaderabad. Thin section G2-2, ×92

Plate IV

Fig. 1, 2: Coptocampylodon fontis PATRULIUS. Several transverse section. Naghsh-E-Rostam. S-81, ×230, × 110

Fig. 3: *Neomeris cf. cretacea* STEWMANN. Longitudinal section. Saadat-shahr. Si-45, ×110

Fig. 4: Bacinella irregularis RADOICIC, Transverse section. Naghsh-E-Rostam. S-74, ×55

CONCLUSIONS

A critical analysis and evaluation of the above subtances brings out the following conclusions.

A total of 8 species of nine genera belonging to different groups of calcareous algae are known from the different Cretaceous sedimentary units in NE Shiraz.

The relative abundance of dasycladaceae in Cretaceous deposits indicates shelf facies. The Aptian-Cenomanian algae probably survived under normal marine calm water condition and inhabited sand and mud bottoms. Their distribution generally vary with the depth.

The algae was reported herein, are mixed with other shallow-water forms (e.g., larger foraminiferids such as: Orbitolinids) indicating shallow-water depositional environments within the zone of effective light penetration.

The preponderance of green algae in the NE Shiraz Cretaceous deposits suggests their significant contribution to carbonate rocks

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REFERENCES

1. Alavi, M., 1994. Tectonic of the Zagros orogenic Belt of Iran: New Data and interpretations, Tectonophysics, 229: 211-238.
2. Berberian, M. and G.C.P. King, 1981. Towards a paleogeography and tectonic evolution of Iran. Canadian Journal of Earth science, Vol: 18 (2).
3. Falcon, N.L., 1961. Southern Iran Zagros Mountains. Geology Sociaty of London, Publication, London, pp: 199-209.
4. Gollestaneh, A., 1965. A micropaleontological study of The Upper Jurassic and Lower Cretaceous of southern Iran. Thesis, University College, London.
5. Kalantari, A., 1976. Microbiostratigraphy of the Sarvestan area, Southwestern Iran. National Iranian Oil Company.
6. Mcquillan, H., 1973. A geological note on the Qir earthquake. SW Iran. Geology Mag, 110: 243-248.
7. Sampo, M., 1969. Microfacies anmd microfossils of the Zagros area. SW Iran (From the Permian to Miocene). Int. Sed. Petr. Series, Vol: 12.