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Microbiostratigraphy study of Kazhdumi and Sarvak Formations in north and north- east Shiraz

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Abstract

In this research two stratigraphic sections entitled as Kuh-e Gadvan and Kuh-e Rahmat sections related to Kazhdumi and Sarvak Formations have been selected. The thickness of the sediments in these sections is 1000 m and they have been studied in 600 thin-sections. Considering the identified index Foraminifers in the studied sections such as the following taxons:

Orbitolina sp. O. concave , Simplorbitolina* cf. *conolus, Mesorbitolina* cf. *texana, Hemicyclammina sigali, Ticinella madecassiana, Calcisphaerula innominata, Stomiosphaera sphaerica, Favusella washitensis, Rotalipora* cf. *balernaensis, Ticinella* cf. *raynaudi, Rotalipora cushmani, Rotalipora* cf. *greenhorensis, Nezzazata simplex, Nezzazata conica, Dicyclina* cf. *schlumbrgeri, Ticinella* cf. *primula, Ovalveolina* cf. *ovum, Praealveolina simplex, Cuneolina* cf. *pavonia, Heterohelix reussi, Pithonella perlonga, Dictyoconus arabicus.

The age of studied sediments is lower Albian -upper Cenomanian. Also considering microbiostratigraphic studies, four biozones and one sub-zone have been recognized for identified Foraminifers in the studied sections.

Key words: biozone, Foraminifers, Kazhdumi Formation, Sarvak Formation.

مطالعه‌ی میکروبیواستراتیگرافی سازندهای کژدمی و سروک در شمال و شمال خاوری شیراز

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چکیده

در این تحقیق دو مقطع چینه‌شناسی تحت عنوان مقاطع کوه گدوان و زکیان از سازندهای کژدمی و سروک انتخاب شده است. ضخامت رسوبات مقاطع مورد مطالعه ۱۰۰۰ متر که همراه با ۶۰۰ مقطع نازک میکروسکوپی مورد مطالعه قرار گرفت. فرامینیفرهای شاخص شناخته شده در این مقاطع عبارتند از:

Orbitolina sp. O. concave , Simplorbitolina* cf. *conolus, Mesorbitolina* cf. *texana, Hemicyclammina sigali, Ticinella madecassiana, Calcisphaerula innominata, Stomiosphaera sphaerica, Favusella washitensis, Rotalipora* cf. *balernaensis, Ticinella* cf. *raynaudi, Rotalipora cushmani, Rotalipora* cf. *greenhorensis, Nezzazata simplex, Nezzazata conica, Dicyclina* cf. *schlumbrgeri, Ticinella* cf. *primula, Ovalveolina* cf. *ovum, Praealveolina simplex, Cuneolina* cf. *pavonia, Heterohelix reussi, Pithonella perlonga, Dictyoconus arabicus

با توجّه به فرامینیفرهای عنوان شده سنّ رسوبات مورد مطالعه دراین مقاطع آلبین بالایی تا سنومانین بالایی می‌باشد. بر اساس مطالعات میکروبیواستراتیگرافی چهار بیوزون و یک زیر زون در مقاطع مورد نظر شناسایی شد.

واژه‌های کلیدی: بیوزون، سازند سروک، سازند کژدمی،فرامینیفرها.

1. Geographical situation of the studied stratigraphic sections:

The studied stratigraphic sections are situated in the folded zone (Kuh-e Gadvan section) and high zone (Kuh-e Rahmat section) of Zagros and their geographical limits are as follow:

1. 1) Kuh-e Gaidun stratigraphic section:

This section is located in 30-km, north east of Shiraz city, Fars province (Iran) and we can approach it through the main road of Shiraz- Kharameh. The geographic coordinates of this section is Y: 29, 37 - X: 52, 55 (Fig. 1).

2. 1) Kuh-e Rahmat stratigraphic section:

This section is located in 55 km, north of Shiraz city, Fars province (Iran) and we can approach it through the main road of Shiraz-Marvdasht. The geographic coordinates of this section is Y: 29, 10 - X: 53, 19 (Fig. 1).

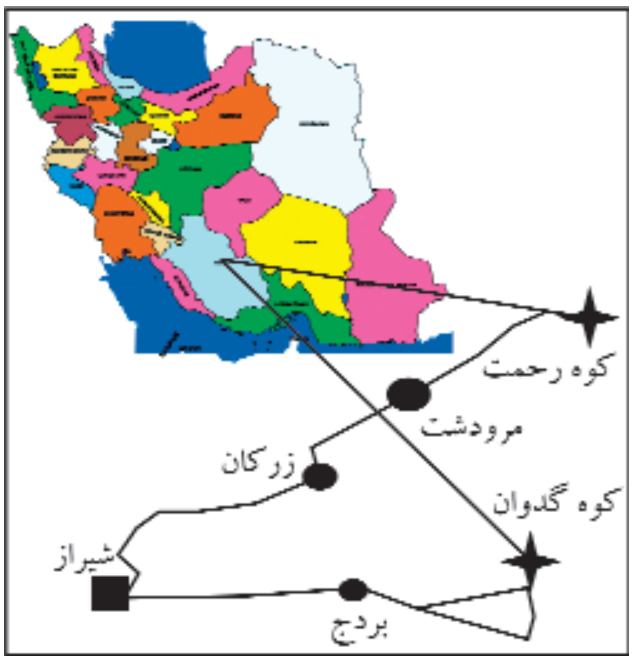


Fig. 1. Outline Map of Iran showing the location of Shiraz and some other major cities. Also the studied area is shown located in a quadrangle near Shiraz

2. Description of mapped stratigraphic sections:

2. 1. Kuh-e Gaidun stratigraphic section:

This stratigraphic section has been mapped from Gaidun mountain, near Tarbur village. The lower and upper lithostratigraphy limit of this section is erosion surface disconformities with Dariyan and Gurpi Formations (Fig. 2).

Based on the identified Foraminifers of this section such as:

Orbitolina sp. *O. concave*, *Simplorbitolina* cf. *conolus*, *Mesorbitolina* cf. *texana Hemicyclammina sigali*, Ticinella *madecassiana*, *Calcisphaerula innominata*, *Stomiosphaera sphaerica*, *Favusella washitensis*, *Rotalipora* cf. *balernaensis*, *Ticinella* cf. *raynaudi*, *Nezzazata simplex*, *Nezzazata conica*, *Dicyclina* cf. *schlumbrgeri*, *Ovalveolina* cf. *ovum*, *Praealveolina simplex*, *Cuneolina* cf. *pavonia*, *Heterohelix reussi*, *Pithonella perlonga*, *Dictyoconus arabicus* (Plate 1, 2, 3, 4).

The age of this section is lower Albian-Cenomanian. The total measured thickness is 487.5m. In lithostratigraphy limits of view, this section is divided in to two Formations as follow:

A-The lower part of Kazhdumi Formation is 175m. Including limestone and marly limestone from thin to thick- bedded and from green to light grey (Fig. 2). Considering the existence of Foraminifers such as:

Orbitolina sp. *O. concave*, *Simplorbitolina* cf. *conolus*, *Mesorbitolina* cf. *texana*, *Hemicyclammina sigali*, *Ticinella madecassiana*, *Calcisphaerula innominata*, *Stomiosphaera sphaerica*, *Favusella washitensis*, *Rotalipora* cf. *balernaensis Neoiraqia* sp.

The age of this part has been determined from lower Albian to lower Cenomanian.

B-The upper part of Sarvak Formation is 312.5m. Including grey to light from thin to thick bedded and massive limestone (Fig. 2) considering the existence of Foraminifers such as:

Ticinella madecassiana, *Calcisphaerula innominata*, *Stomiosphaera sphaerica*, *Favusella washitensis*, *Rotalipora* cf. *balernaensis*, *Ticinella* cf. *raynaudi*, *Nezzazata simplex*, *Nezzazata conica*, *Dicyclina* cf. *schlumbrgeri*, *Ovalveolina* cf. *ovum*, *Praealveolina simplex*, *Cuneolina* cf. *pavonia*, *Heterohelix reussi*, *Pithonella perlonga and Dictyoconus arabicus.*

The age of this part is determined from upper Albian to upper Cenomanian.

2. 2. Kuh-e Rahmat stratigraphic section:

This stratigraphic section has been mapped from

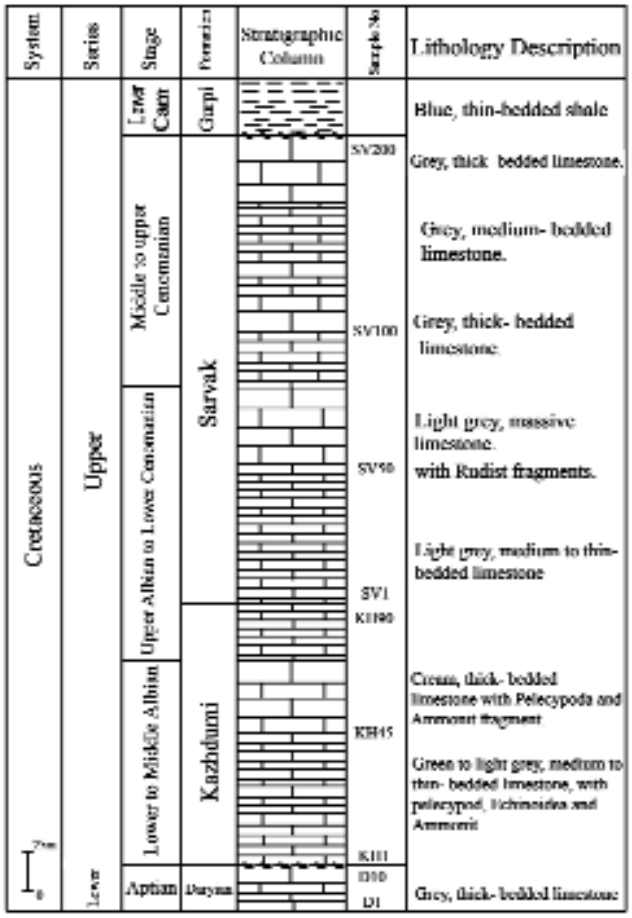


Fig.2-Kuh-e Gadvan stratigraphic column section

Rahmat Mountain, near Persepolis (Takhte Jamshid). The lower and upper lithostratigraphic limits of this section are erosion surface disconformities with Dariyan and Ilam Formations (Fig. 3). Based on the identified foraminifers of this section such as: *Orbitolina concave, O. parva, Simplorbitolina* cf. *conolus, Mesorbitolina* cf. *texana Hemicyclammina sigali, Ticinella madecassiana, Calcisphaerula innominata, Stomiosphaera sphaerica, Favusella washitensis, Rotalipora* cf. *balernaensis, Ticinella* cf. *raynaudi, Heterohelix reussi, Pithonella perlonga. Ticinella* cf. *primula, Rotalipora cushmani, Rotalipora* cf. *greenhorensis* (Plate 1, 2, 3).

Foraminiferal studies of this stratigraphic, section indicate that the age of this section is from lower Albian-upper Cenomanian.

The total measured thickness is 512.5m. In lithostratigraphic limits of view, this section is divided in to two Formations as follow:

A-The lower part of Kazhdumi Formation is 185 m including green to light grey thin to thick bedded limestone to marly limestone (Fig. 3). Foraminiferal constituents of this section consist of *Orbitolina* sp. *O. concave , O.parva, Simplorbitolina* cf. *conolus, Mesorbitolina* cf. *Texana, Hemicyclammina sigali, Ticinella madecassiana, Calcisphaerula innominata, Neoiraqia covexa, Stomiosphaera sphaerica, Favusella washitensis, Rotalipora* cf. *balernaensis.*

The age of this part has been determinate from lower Albian to lower Cenomanian.

B-The upper part of Sarvak Formation is 327.5 m including limestone from thin to thick bedded and massive from grey to light gray (Fig. 3). Considering the existence of Foraminifers such as:

Ticinella madecassiana, Calcisphaerula innominata, Stomiosphaera sphaerica, Favusella washitensis, Rotalipora cf. *balernaensis, Ticinella* cf. *raynaudi, Heterohelix reussi; Pithonella perlonga, Rotalipora cushmani, and Rotalipora* cf. *greenhorensis.*

The age of this part is determinate from upper Albian to upper Cenomanian.

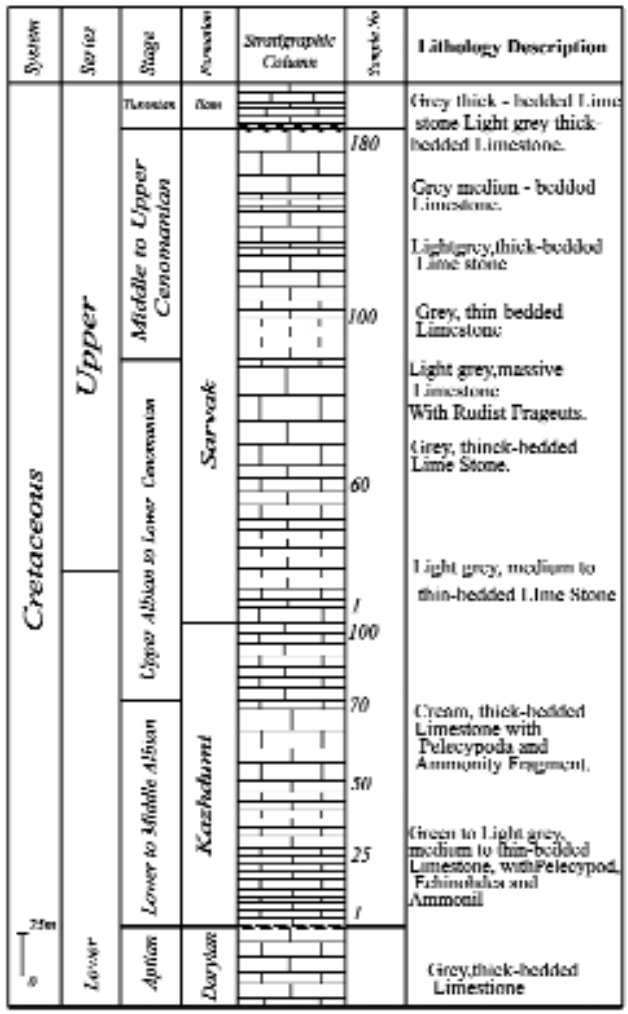


Fig. 3. Kuh-e Rahmat stratigraphic column section

3. Biozonation of the studied stratigraphic sections:

Actually, in the studied stratigraphic sections, four biozone and one sub- zone have been determinate for planktonic and benthic Foraminifers in the sediments of lower Albian to upper Cenomanian which are as

follow: (Fig. 4), (Fig. 5). James & Wynd (1965), Kalantari (1976), Loeblich & Tappan (1989), Khosrotehrani (1377), Premoli & Silva (2004), Khosrotehrani (1386).

3. 1) Biozone No.1- Hemicyclamina - Orbitolina (Assemblage-zone):

The thickness of this biozone in Kuh-e Gaidun section is 137.5m and in Kuh-e Rahmat section is 135m and its foraminifers includes: *Orbitolina concave, O. parva, Simplorbitolina* cf. *conolus, Mesorbitolina* cf. texana, *Hemicyclammina sigali, and Neoiraqia convexa.* which indicate the age of lower to upper Albian.

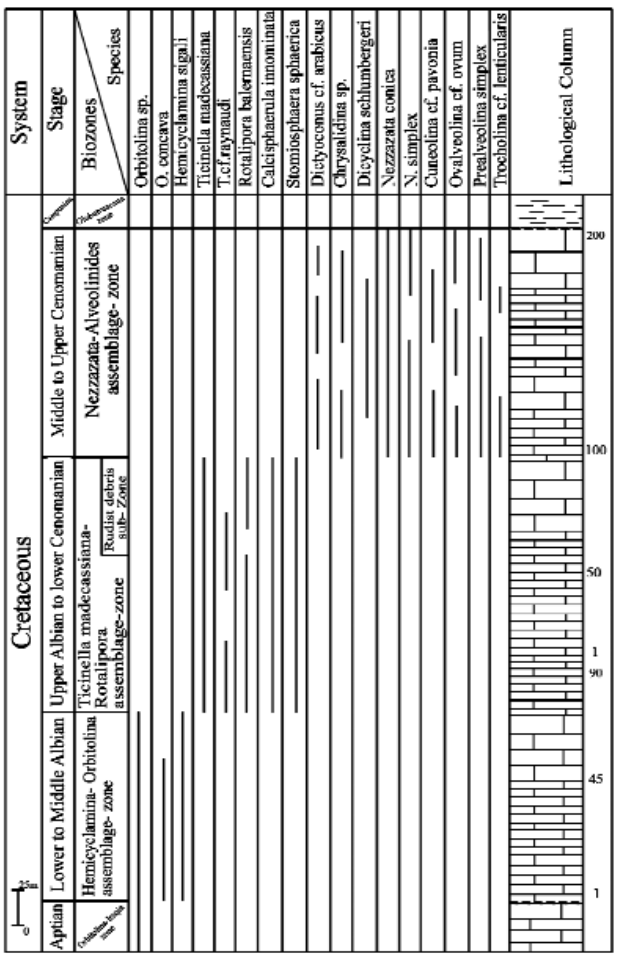


Fig. 4. Kuh-e Rahmat stratigraphic fossils range chart.

3 .2) Biozone No.2- Ticinella madecassiana - Rotalipora balernaensis (Assemblage - zone):

The thickness of this biozone in Kuh-e Gaidun section is 182.5m and in Kuh-e Rahmat section is 213m and its foraminifers includes: *Ticinella madecassiana, Calcisphaerula* innominata, *Stomiosphaera spherical, Favusella washitensis, Rotalipora* cf. *balernaensis, and Ticinella* cf. primula which indicate the age of upper Albian to lower Cenomanian.

3 .3) Biozone No.3- Rudist debris (Sub -zone):

The thickness of this biozone in Kuh-e Gaidun section is 60m and in Kuh-e Rahmat section is 62.5m and its taxons includes:

Rudist debris, Echinoids & Gastropods fragments, *Miliolidae, Orbitolina* sp and Rotalipora *balernaensis.* which indicate the age of upper Albian to lower Cenomanian (James & Wynd 1965).

3. 4) Biozone No.4- Rotalipora cushmani-

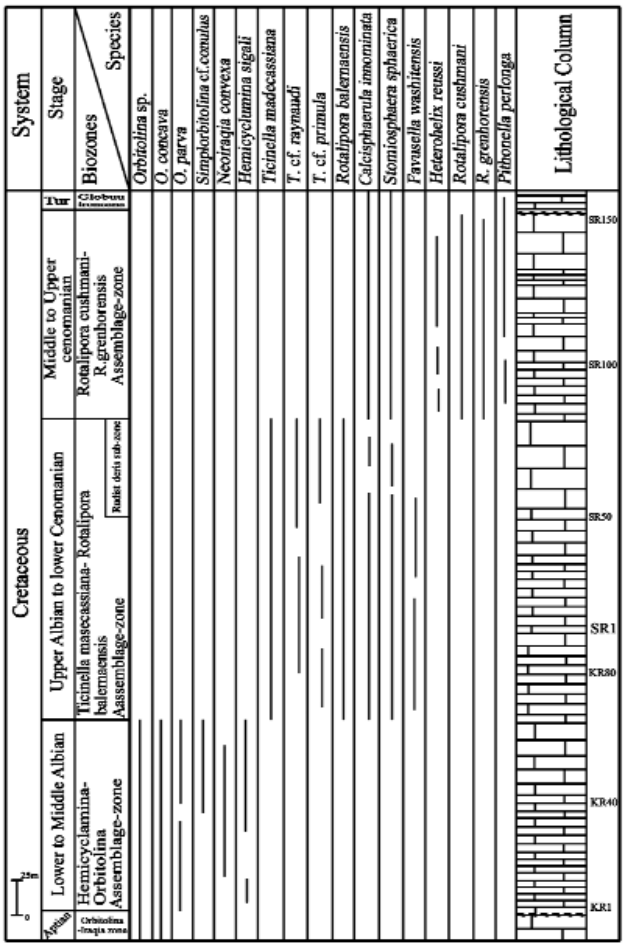


Fig.5-Kuh-e Rahmat Stratigraphic Range chart

Rotalipora grenhorensis (Assemblage-zone):

The thickness of this biozone in Kuh-e Rahmat section is 152.5m and its Foraminifers include:

Rotalipora cushmani, Rotalipora cf. *greenhorensis Ticinella* sp. cf. *raynaudi, Heterohelix reussi, Pithonella perlonga.* which indicate the age of middle Cenomanian to upper Cenomanian.

3. 5) Biozone No. 5-Nezzazata -Alveolinides (Asse mblage-zone):

The thickness of this biozone in Kuh-e Gaidun section is 167.5m and its foraminifers include:

Nezzazata simplex, Nezzazata conica, Dicyclina cf. *schlumbrgeri, Ovalveolina* cf. *ovum, Praealveolina simplex, Cuneolina* cf. *pavonia, Dictyoconus arabi-*

cus, Chrysalidina sp. which indicate the age of mid- dle Cenomanian to upper Cenomanian.

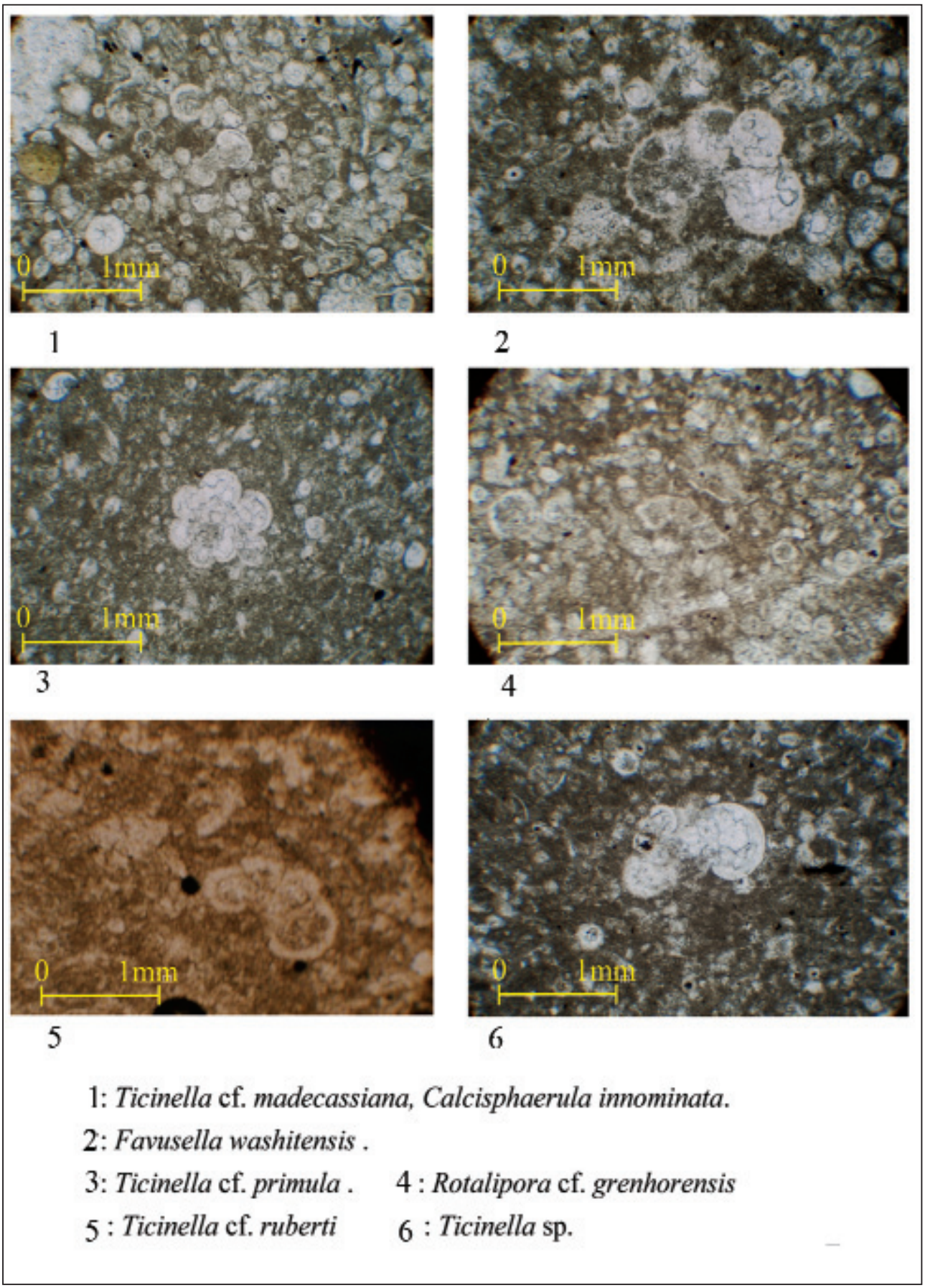
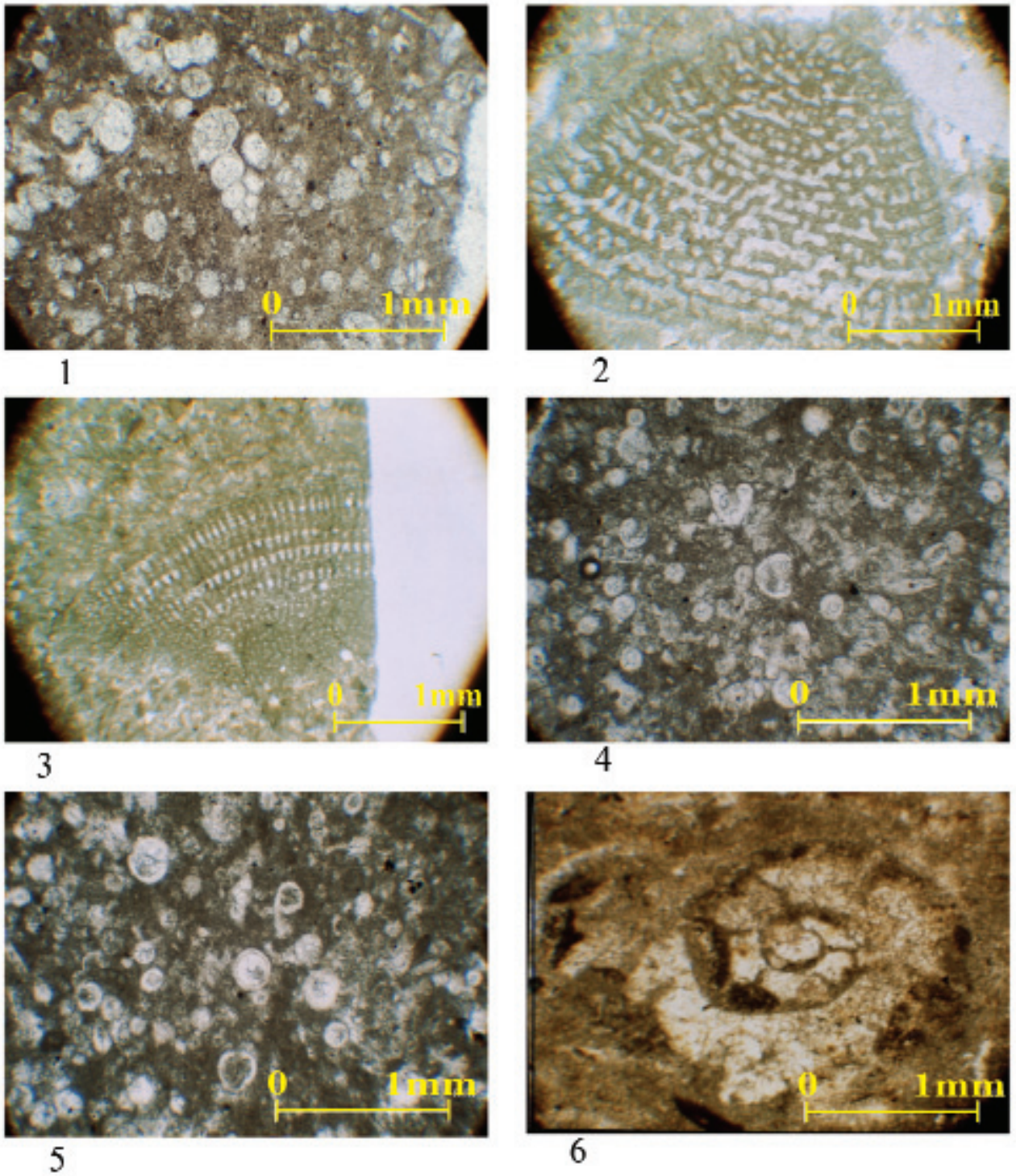


Plate 1



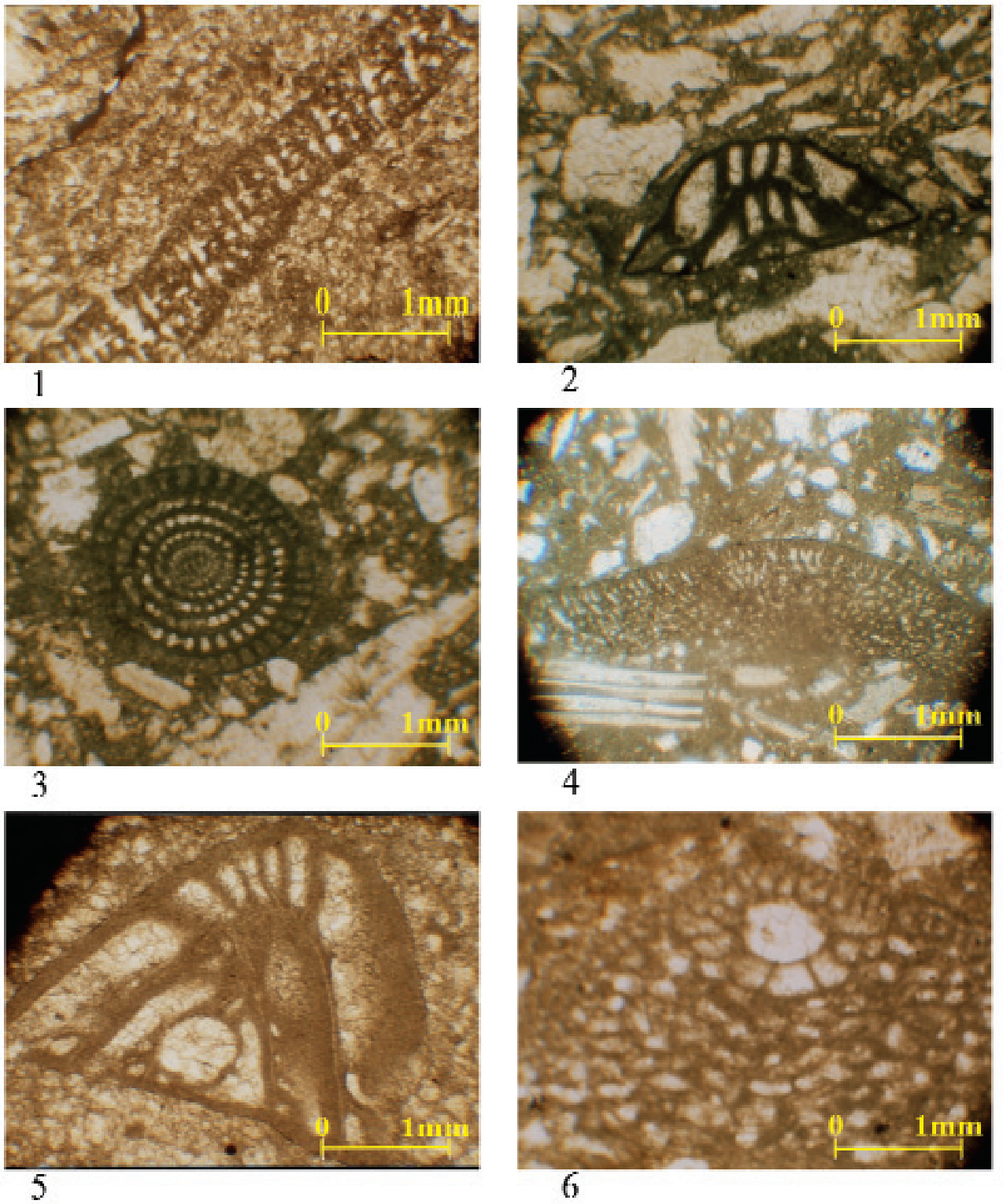
1- *Heterohelix reussi.* 2- *Dictyoconus arabicus* . 3- *Cuneolina* sp.

4- *Calcisphaerula innominata,* Pithonella cf. cnoidea, *P.*cf.*ovalis.*

5_ *Calcisphaerula innominata, & Stomiosphaera sphaerica*

6- *Hemicyclamina* sp.

Plate 2



1- *Dicyclina schlumbergeri*

2- *Nezzazata* cf. *simplex*

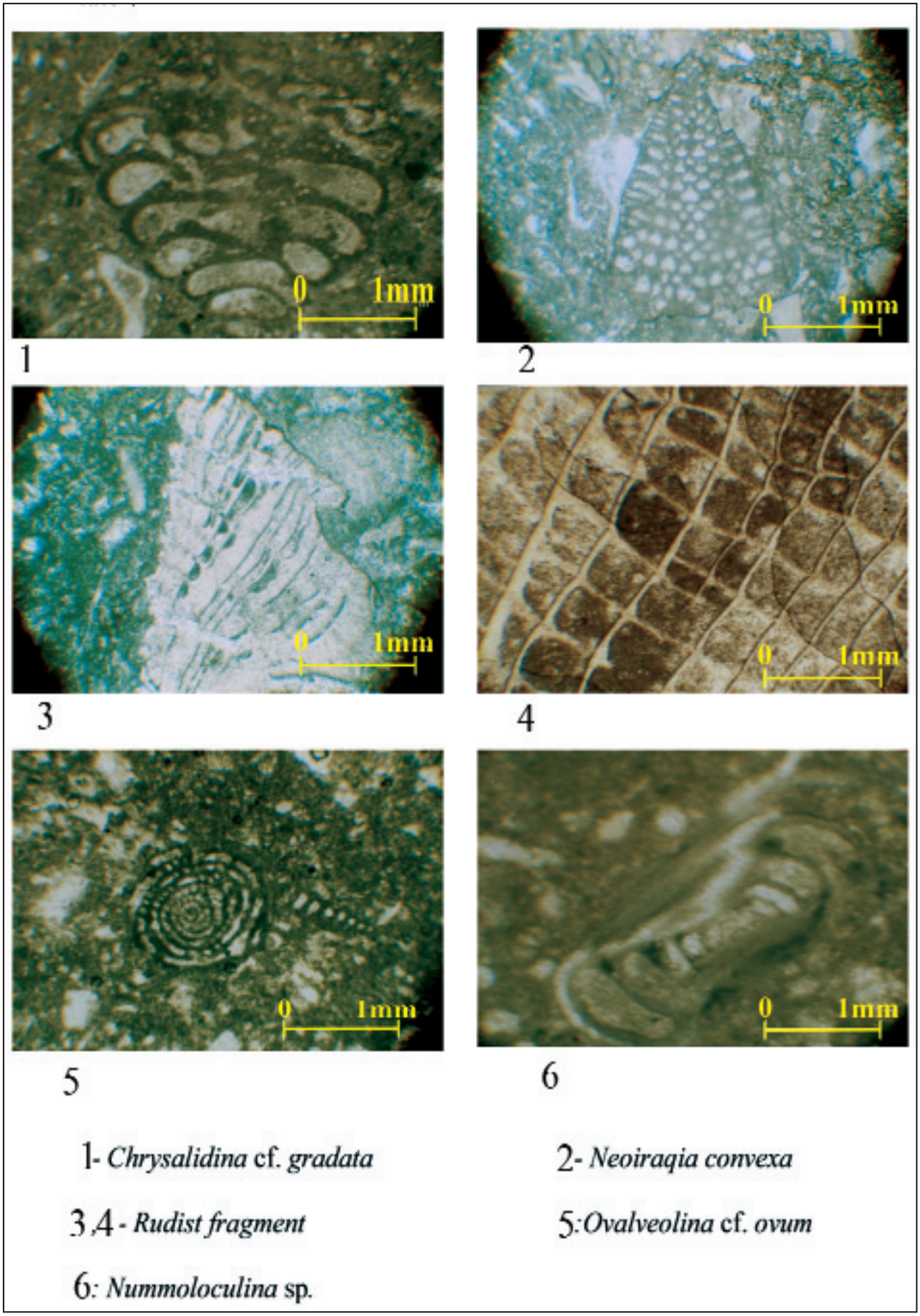
3- *Preaealveolina* cf. *simplex*

4- *Orbitolina* cf. *concava*

5- *Nezzazata conica*

6- *Mesorbitolina texana*

Plate 3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1- Chrysalidina cf. gradata
2- Neoiraqia convexa
3,4 - Rudist fragment
5:Ovalveolina cf. ovum
6: Nummoloculina sp.

Plate 4

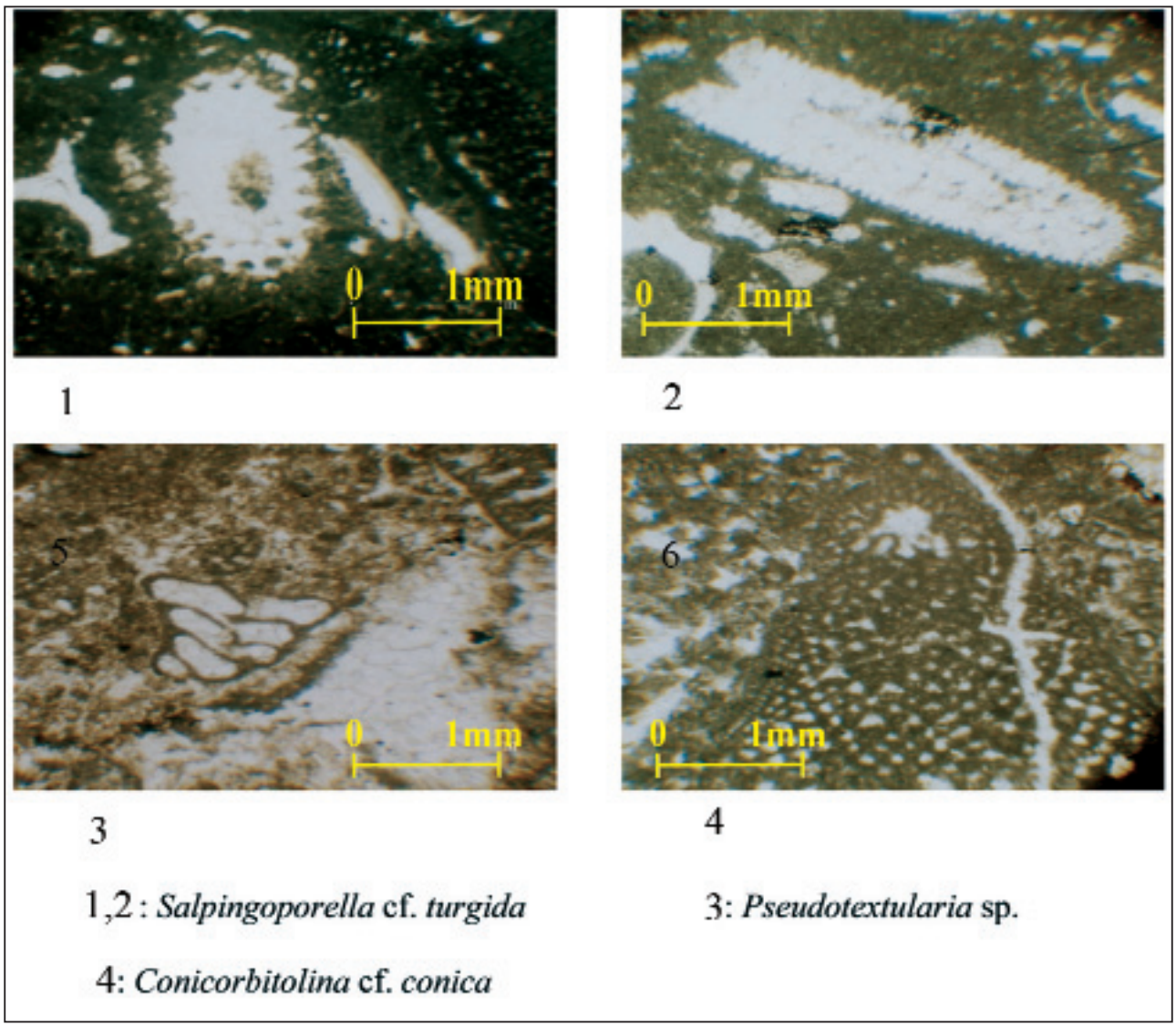

Plate 5

4- Conclusion:

a) Based on the investigation of Foraminifers of the studied sections, the age of both stratigraphic sections is from lower Albian to upper Cenomanian.

b) Based on the investigation of Foraminifers of the studied sections, four biozone and one sub-zone have been identified which includes:

Biozone No. 1- Hemicyclamina-Orbitolina (Assem blage-zone) of lower to upper Albian.

Biozone No. 2- Ticinella madecassiana-Rotalipora balernaensis (Assemblage-zone) of upper Albian to lower Cenomanian.

Biozone No. 3- Rudist debris (Sub-zone) of upper Albian-lower Cenomanian.

Biozone No. 4- Rotalipora cushmani-Rotalipora grenhorensis (Assemblage-zone) of middle-upper Cenomanian.

Biozone|No.5-Nezzazata-Alveolinides (Assemblage-zone) of middle Cenomanian to upper Cenomanian.

c) Middle and upper Cenomanian sediments of Kuh-e Gaidun section in situated folded-zone have been benthic facies (biozone No. 5).

d) Middle to upper Cenomanian sediments of Kuh-e Rahmat stratigraphic section in situated high-zone have been pelagic facies (biozone No. 4).

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