Introducing of Echinoids of the Gurpi Formation, Seimareh Member, Ilam province, Iran

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Abstract

The Gurpi formation in Zarin abad section, south of Ilam, consists of 220m Marl with intercalations of Limy marl with two formal members of Seimareh (Lopha) and Emam-Hasan.
The mentioned section is situated in the west of this road (E 46°, 486, 31″.8 and N 32°, 566, 13″).The formation was deposited from Middle Campanian through Late Paleocene (Selandian) according to the Planktonic foraminifera recorded. At this study in order to detailed study of Echinoids, some samples are collected from Brown limestone member of Seimare from Gurpi Formation. Paleontological results indicated Campanian -Maastrichtian age at Seymareh member. Detailed analyses of this member led to recognition of Bivalve especially Bivalve of Lopha, Brachiopods and five Species of Echinoids such as: Salenia nutrix, Globator bleicheri, Orthopsis miliarisi, Goniopygus superbus, Conulus douville.

Keywords: *Campanian- Maastrichtian, Echinoids, Gurpi Formation*

Introduction

The Gurpi Formation & Shiranish (in Iran & Iraq) Aroma and Simsima (in Kuwait, Saudi Arabia and Arab Emirates and Oman) were deposited from Santonian to Danian (89-60.9, million years ago), (Ziegler, 2001). In the time of the collision of Arabian plate with Eurasia, the trench was formed in the North end of Arabic plate, hilled rapidly by the small grains of deep sea areas sediments, which includes excessive amount of planktonic Foraminifera.

Geological position and access ways

Some samples of Echinoids were collected during field expeditions and come from Seimare member expansion. The access ways and Location map of the studied area are shown in Fig1. Best access way to this area is the Zarin Abad city and then Tooh Tagh village along the 55 KM of Dehloran to Mehran road (Figure 1), the mentioned section is situated in the west of this road (E 46◦, 48′, 31.8″ and N 32◦, 56′, and 13″).
The thickness of succession examined is 213 meter of dark grey marls with intercalation of light grey calcareous marl. Seimare member (Lofa) is defined by yellow limeston.
Imam Hasan member includes a cream clay limestone. The age of the Gurpi Formation is determined on the base of planktonic Foraminifara and indicates middle Campanian to late Paleocene (Figure 2)

Discussion

Echinoids are the sea invertebrate groups which now a days can be found in the most sea, are habitat from pole to equator, from sea shore to the depth of 5000 m. 800 species of Echinoids were searched and recognized so far , which are in the age of 450 million year, from the end of Ordovician till now (Smith *et al*., 1995) all the Echinoids are formed by chitin surfaces which are located in tests and structure, they are Concorde with living in distinction habitats and the relation between skeleton structure and their habitat is recognized. Echinoid is carry to a count as a perfect group to utilize as a paleoenvironmental index.

In the formal calcareous part of Seimare from the Gurpi Formation which is prominent as a Lofa limestone, about 5 Echinoids species ere recognized (Plate 1) the type section of this part is in the lorestan province in a place which Seimare river cuts the east – north of Plangane anticline. Here it's necessary to consider the structure morphology, point to biometry searching.

Echinoids occurrences:

Globator bleicheri (Gauthier, 1889)

The species was first described from the late Cretaceous (late campanian) of the Gurpi Formation.

Diagnosis: An oval, rather depressed globator with a large, strongly ellipsoidal peristome.

The periproct lies high on the posterior surface and is visible from above but not from below. Test range from 9 to 35 mm in length and are oval in outline and profile. Test width is 82-91% of test length with the widest point on the test coincidental with the posterior portion of the anterior ambulacra. Test height is 61-80%of test length and the tallest point on the test is sub central. Tests in profile have a relatively broad, flat apex and base and a rounded ambitus.

Ambulacra are uniserial and pore-pairs are undifferentiated. Above the ambitus they are very strictly uniserial but towards the peristome they become weakly arcuate and reduce in pore-diameter size. The apical disc is more or less central and is tetra basal. Genital plate 2 is considerably larger than the other four genital plates and is covered in Madrepores. Genital plate 3 is the smallest and in the great majority of specimens is separated from genital plate 4 by ocular plate 4, which abuts genital plate 2. Genital plates 3 and 4 are found in contact only is small individuals. The posterior pair of genital plates is in contact posterior to genital plate . Ocular plates are pentagonal in outline and project (Figure 6).

Conulus douvillei (Cotteau & Gauthier, 1895)

Diagnosis: a species of Conulus with a rounded to strongly fusiform peristome which is not sunken. periproct situated relatively low on the posterior surface, not visible from above. Pore- pairs adorably arranged triserially. These range from 17 to 45 mm in length and are ovoid to rounded pentagonal in outline. Test width is 82-96% of test length and the widest point coincides with the posterior part of the anterio-lateral ambulacra. Test height is 64-81% of test length and in profile the test has a broad, flat base and is rounded sub conical above. Ambulacra are straight and compound in the pyrinoid style. Above the ambitus pore-pairs are strictly uniserial, but below the ambitus they become offset into three discrete columns and these continue to the peristome edge.

Apical disc with genital plates 3 and 4 always in contact. Genital plate 2 abuts the other three genital plates but never reaches ocular plate 4 to separate genital plates 3 and 4 genital plates 4 and 1 are always in contact behind the madreporite (Smith, 1995) (Figure 6).

***Salenia nutrix* Gray, 1835**

Description: Test range in diameter from 7 to 26 mm. the test is thus rather inflated in profile and in some specimen almost sub globular. The apical disc is rather flat and only rises very slightly toward the apex. It is subcircular in outline. The suranal plate is relatively large, on average about 25% of the apical disc diameter. It is similar in size to the genital plates.

The periproct is approximately the same size as the suranal plate, or very slightly larger, being on average 27% of the apical disc diameter. Approximately half of the specimens have the ocular plate insert. There is a slight elevation toward the periproct edge, but no true rim is developed. All plates are smooth and unornamented. The sutures are usually incised and may have a series of small pits along their length. The ocular/genital plate boundaries always have pits that are more prominent than the rest. Gonopores are present on genital plates from approximately 10 mm diameter. In some specimen ocular 1 is strongly exerts and forms the posterior wall of the periproct, but in other specimens ocular 1 is insert and separated from the periproct (Smith, 1995) (Figure 5) .

***Orthopsis miliaris* (d Archiac, 1835)**

Description: Test range from 20 mm to 48 mm in diameter and are circular in outline and bun-shaped in profile. Test height is 39-59% of test diameter and in profile the ambitus lies about one third the height above the base.

Plating is trigeminate throughout and pore-pairs are arranged either uniserially or in very weak arcs of three. All ambulacral elements are narrow and elongate and reach the perradius. A primary tubercle (perforate and non-crenulate) straddles two of the three elements in each compound plate. The third element carries two small secondary tubercles and an intermediate row of military granules. Adorally only the first five or sp pore-pairs are offset to form a weak phyllode. There are 55 pore-pairs in a column at 20 mm test diameter, rising to around 90 at 46-48 mm diameter.

The apical disc is dicyclic, though occasionally one of the posterior oculars may just be exerts. Genital plates are broad and crescentic in outline, except for the madreporites, which is larger and more pentagonal in outline. Madrepores occupy almost the entire surface of the madreporite plate and there are small scattered tubercles amongst the openings. Gonopores are present even in the 20 mm diameter individual. Ocular plates are small and pentagonal. All plates have small secondary tubercles, those on the genital plates tending to form a circle around the periproct. The periproct is irregularly oval in outline and occupies 10-14% of the test diameter (Smith, 1995) (Figure 4).

Goniopygus superbus

Diagnosis: A species of goniopygus with relatively narrow ambulacra with a single small secondary tubercle on each compound plate a trigonal periproct with predominantly, three perianal tubercles and apical disc plating that is smooth and unornamented.

Gonopores lie on the genital plates.

Test range in size from 25 to 41 mm in diameter and are circular in outline. The preproct is oval and lies slightly posterior of centre. It is approximately 9-21% of the test diameter in width along the approximately 9-12% of the test diameter in width along the anteriorposterior axis. In the great majority of specimens the opening is trigonal and there are three perianal tubercles on genital plates. The apical disc is flat, large and prominent. It occupies 35-43% of the test diameter. Genital plates are pointed distally and the gonopore opens beyond the tip of the apical disc platform, though still within the genital plate.

Ocular plates are relatively large and are inserting. All plates are flat and smooth, without ornamentation (Smith, 1995).

Order Calycina Gregory, 1900 Family Salenidae Agassiz, 1838 Genus *Salenia* Gray, 1835 1. *Salenia nutrix* Gray, 1835	Family Counulidae Lambert, 1911 Genus *Globator* Agassiz, 1840 2. *Globator bleicheri* (Gauthier, 1889)
Cohort Echinacea Claus, 1876 Plesion (Order) Orthopsida Mortensen, 1942 Family Orthopsidae Duncan, 1889 Genus *Orthopsis* Cotteau, 1864 3. *Orthopsis miliaris* (Archiac, 1835)	Order Arbacioida Gregory, 1900 Family Goniopygidae Smith & Wright, 1993 Genus *Goniopygus* Agassize, 1838 4. *Goniopygus superbus* Genus *Conulus* Leske, 1778 5. *Conulus douvillei* (Cotteau Gauthier, 1895)

In Figure 2 the ratio of diameter to high is distinguished in 5 species and it is shown in calcareous part of Seimare belonged to the Gurpi Formation. Using this diagram the systematic searching of astrictive test would be analyzes better .in addition to this diagram the abundance of this 5 specie was probed in this formation (Figure 3).

Conclusion

The Gurpi Formation in this section includes 213m thickness and Calcareous member of seimare consist of Brown limestone with the age of Campanian- maastrichtian age. Based on foraminifera assemblages. Some Echinoids were selected for detailed study and five species with Campanian-maastrichtian age recognized that as follow:

Salenia nutrix, Globator bleicheri، Orthopsis miliarisi, Goniopygus superbus, Conulus douville

Acknowledgments

Wish to thank Vahid saadat , for editing this paper.

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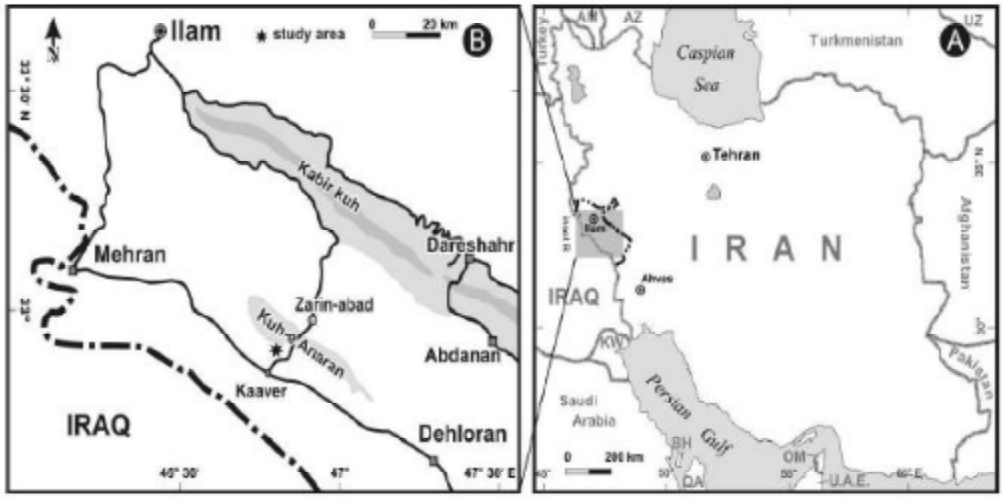

Figure1. Location map of the sequences studied area in the Ilam Province, southwestern Iran.

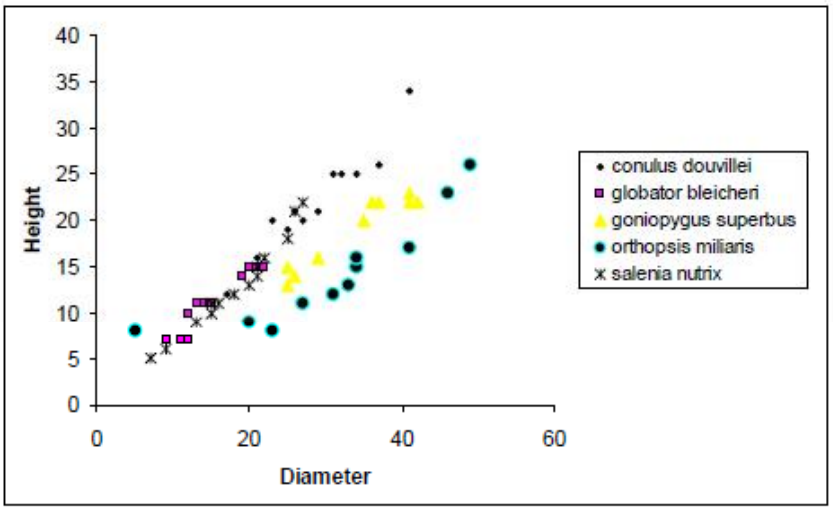

Figure2: The distinguished proportional abundance of 5 species in vicinity.

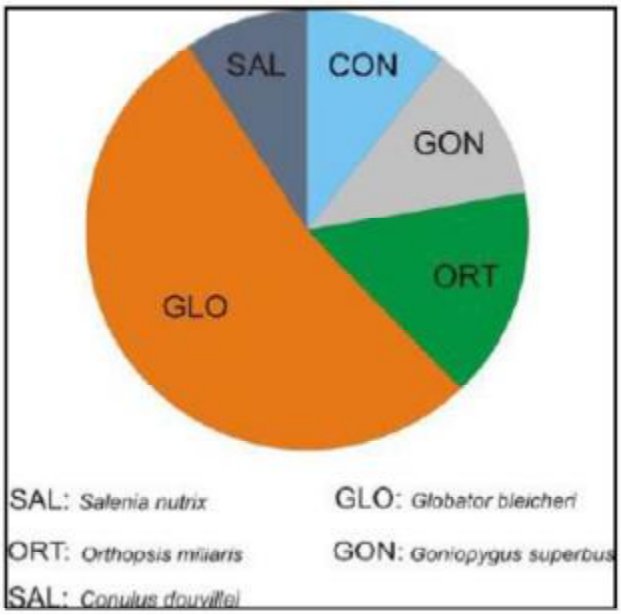

Figure3: The changes diagram of diameter ratio to height is distinguished in 5 species

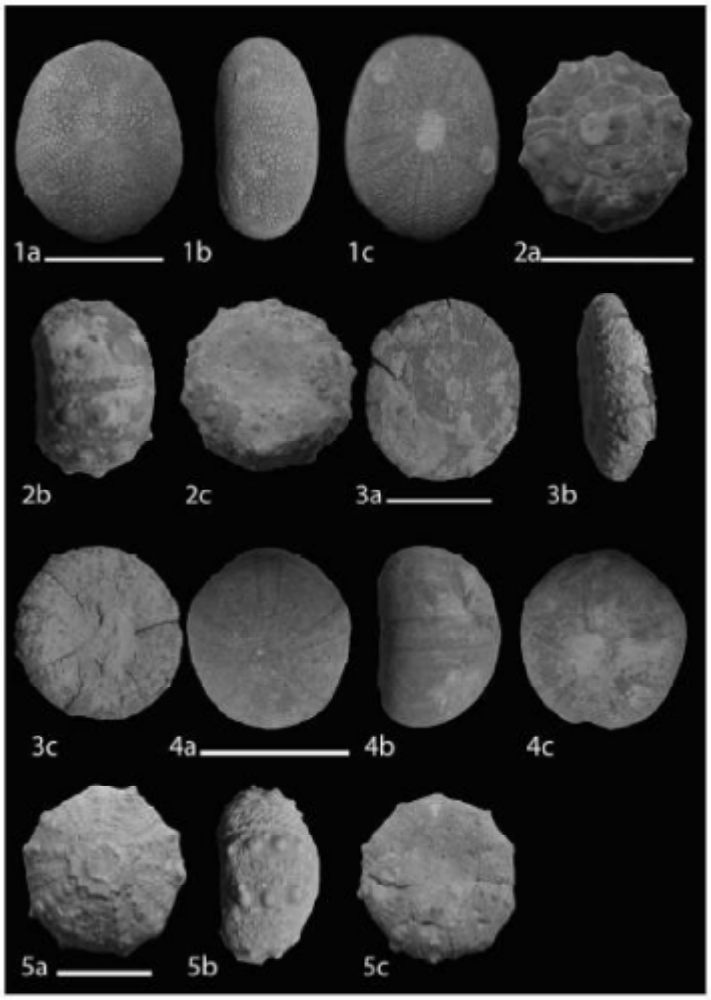

Plate1: scale bar = 2cm

1) Globator blicheri 2) Salenia nutrix 3) Orthopsis miliaris 4) Conulos douvillei 5) Goniopygus superbus

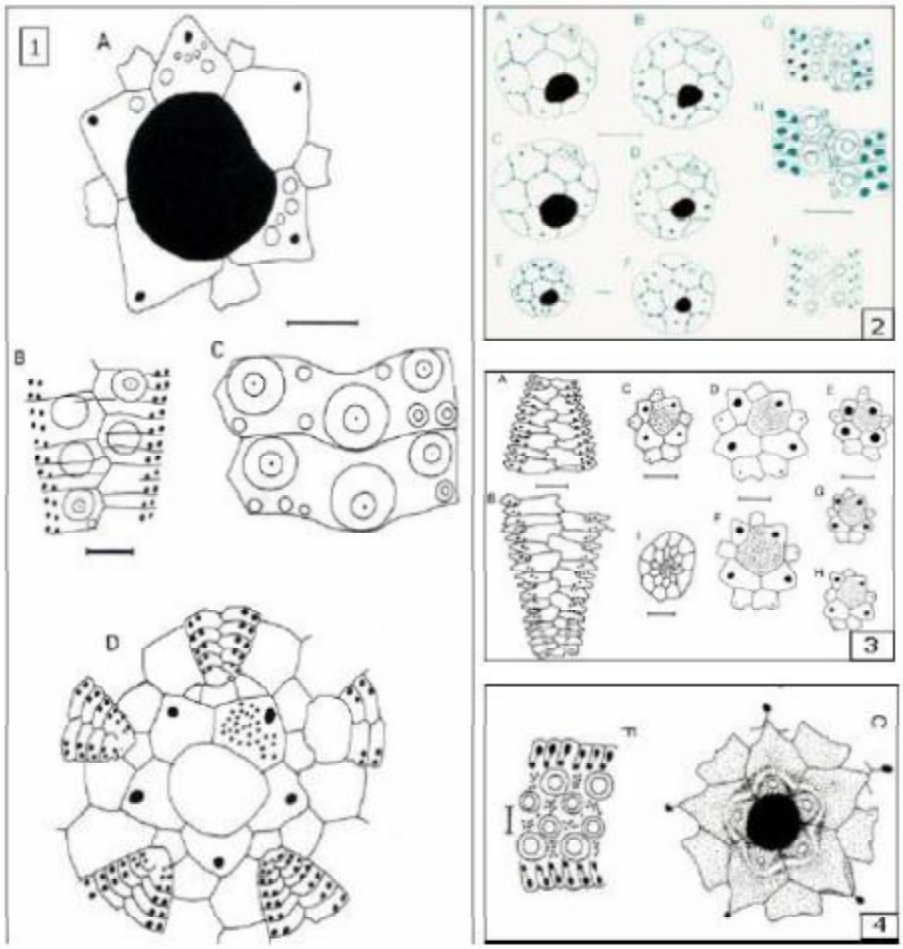

Figure 4-

1, *Ortopsis miliaris* . A: Apical disc B: Adoral ambulacral plate compounding C: Ambital interambulacral
plates,interradius to the left D: apical disc plating-scale bars = 1mm
2, *Salenia nutrix* A-E: apical discsof nutrix Peron & Gauthier - G-H: ambital ambulacral plating of Salenia
nutrix Peron &Gauthier
3, Globator and Conulus A, B F-I G. bleicheri (Thomas & Gauthier) . A: apical ambulacral plating B: adoral
ambulacral plating peristomial margin at base F: apical disc G: apical disc H: apical disc I: peristomial plating.
C-E Conulus douvillei (Cotteau & Gauthier). Scale bars = 1mm.
4, *Goniopygus superbus* C.F: apical disc plating and ambital ambulacral tuberculation of Goniopygus
superbus Cotteau & Gauthier.