

Biostratigraphy and assigning the paleosalinity by using Echinocorys and Planktonic foraminifera at Upper Maastrichtian, in Jorband section, Central Alborz, Iran

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Abstract

Jorband section is located in the north slope of central Alborz, and 28 Km in south of Noor. It has been sampled and index fossilic groups of planktonic foraminifera and echinoids were studied in order to assign the paleosalinity and biozonation in central Alborz. The planktonic foraminiferal biozones identified within the Upper maastrichtian sequence of the Jorband section are three zones of *Contu truncana contusa*, *Planoglobulina brazoensis*, and *Racemiguembelina fructicosa*. The salinity changes were also searched in this section. In three layers in Jorband section examination echinocorys genus and is drawn as a diagram which in middle of the section, the salinity mounts is fewer than the beginning and top of the section.

Key word: Paleosalinity, Biozonation, Echinocorys, Central Alborz

Introduction

Planktonic foraminifera are one of the most prominent index microfossils to biozonation, because of abundance, Great variety, wide spreading and rapidly evolution in upper cretaceous. Mean time, Planktonic foraminifera are the most important fossilic groups in order to searching and interpreting the paleoenvironments. Echinoids also are the best groups to annotate the paleoenvironment especially salinity (Wisshak and Neumann, 2006). In this research the biostratigraphy and salinity was searched by planktonic foraminifera and echinoids. In order to

Jorband section was selected do the searches in central Alborz. In Jorband section the echinocorys genuses which are vulnerable in salinity changes, were studied in order to determining the salinity mount. At all echinocorys have a vice versa connection with salinity, and their amount will increase by decreasing the salinity (Stephens & Virkar 1966). In this section the salinity amount will increase then it will decrease, and finally it will increase again, that this salinity vacillation is confirmed with due attention to the physiologic changes of

echinocorys body in regulating of osmotic pressure.

Location, lithology and Procedures

Jorband section is located in the north slope of Central Alborz, and 28 Km in south of Noor, with geographic characteristics of 36° 20' 32" and 52° 20' 32" (Fig 1). The section of the study belong to Upper Maastrichtian and has a thickness has about 15m, includes marl. A total of 35 samples were collected from the section, 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. At last to separating the sediments from microfossils, the sample were in ultrasonic machine for 15 minute and they were washed again and finally, the remain sample were studied binocular microscope. The metallurgy research center has prepared SEM photographs from the chosen samples. These two size fractions were analyzed in order to obtain statistically significant representatives of the small and large groups

In order to recognizing the planktonic foraminifera it is used from valid resources such as (Caron, 1985, Robaszynski et al, 1995- 1984, Nederbraght, 1991).

Discussion

A: Biostratigraphy

An exactly zonation for upper cretaceous is presented by Li et al (

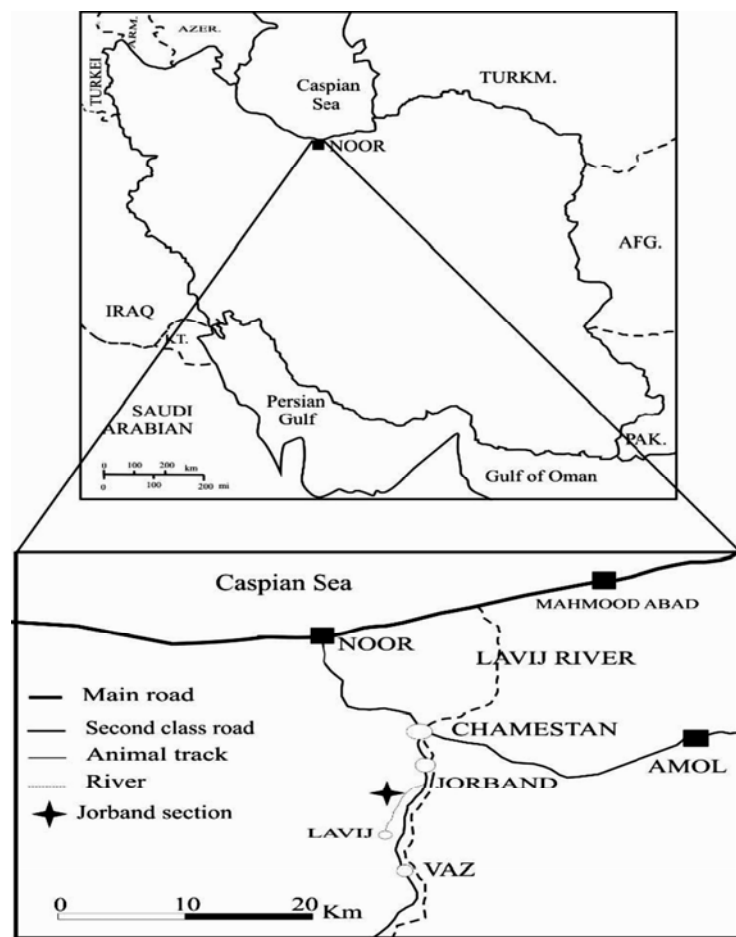


Fig 1. Location map of the studied area in the Iran.

Li and Keller 1998a) and Li and others (Li et al, 1999) and it is used as a base for many of later studied like the studies in Tunisia (Li and Keller 1998b, Abromovich et al 2002), and Bulgaria (Adatte et al, 2002) in this zonation upper maastrehtian is divided in to eight biozones that in Jorband section 3 zones of *Contusotruncana contusa*, *planoglobulina brazoensis* and *Racemiguemblina fructicosa*, were recognized out of these biozones (Fig2).

1. *Contusotruncana contusa* Interval zone of Li et al, 1998a:

The *Rosita contusa* or CF6 Zone is defined by the FA of the nominate taxon at the base and the Lo of *Globotruncana linneiana* at the top.

This zone is equal with CF6 zone of Li and Keller (Li et al, 1998) and has 2m Thickness in Jorband section and it is age is equal with Early Maastrichtian,

2. *Planoglobulina brazoensis* partial range zone

The *Planoglobulina brazoensis* or Cf5 Zone is defined by the Lo of the nominate taxon *Globotruncana linneiana* at the base and the Fo of *Racemiguembelina fruticosa* at the top. This zone is equal with *Pseudotextularia intermedia* zone of (Li and Keller 1998a) and (Li et al, 1999) these scientist believe that, despite the appearing of *P.intermedia* in CF6 zone for the first time, but their development morphotype is appearing in CF5 zone (Li and Keller, 1998a) although the first appearing of *P. intermedia* in Jorband section is in the zone of CF10.this zone has 6m thickness.

3. *Racemiguembelina fruticosa* Interval zone Li et al 1998^a

The *Racemiguembelina fruticosa* or CF4 Zone is defined by the Fos of *R. fruticosa* at the base and *P. hariaensis* at the top. The boundary of this zone is not obviously clear. This zone is equal with CF4 zone of Li and Keller (Li & Keller, 1998a) and Li coworkers (Li et al, 1999) and has 7 m thickness and has an equal age with the beginning of Upper Maastrichtian.

Salinity appointing

Appointing the salinity was done by echinocorys genus in this section. Echinocorys have a shell between medium and large, and a test with a high slope and a smooth basically surface, and have an angled ambitus with short and clear pins, in order to protect the adaptal surface. Also they have spoon pins which are connected to front mount surface with some lumpus, and they

have to move and push the echinocorys forwarded (Clarkson 2006).

They have an ambulacra which are not petaloids and are in large size and were seen a lot in Upper Maastrichtian sediments of late cretaceous in north of Alborz (Balmaki, 2007)

The echinoids not only live in less salinity areas but also like in high salinity places. The affection of salinity changes is reveal in any of their surface.

The salinity changes would affection abundance, death, population dispersion, moves, some change in nourish and metabolism behaviors, fastness of growth and reproduction (Wisshak and Neumann, 2006)

The echinoids are a perfect group that used as a tool to interpretation the paleoenvironment. Some of echinoids do not have an obvious organism to regulate the osmotic pressure most of the species have lived their habitat because of salinity changes and migrated to other places or die because of these changes. Echinocoryses are one of these groups. The salinity changes percent has indicated between -20 till -30 , it means that the maximum of salinity changes in echinocorys environment is 10 (Ellington , 1982) at all the echinocoryses abide the salinity 34 degree. The aminoacides number would increase in echinoids cell's in environmental situation changes that this behavior happens in echinocorys because of increasing the salinity of environment (Stephen & Virkar 1966).

The main role of enzymes cells is to accelerate the regulating reactions in amino acids.

But in the situation which the environment salinity is increasing, they have a vice versa effect on enzymes, and would forbid the enzymes to work appropriately inside the cells (Ellington, 1982). In order to do the process of study in area, the salinity changes in the end of Maastrichtian presented as a chart with due attention to the counting and assessment of echinocorys in 3

layers, that the most number of this genus were there.
In the beginning of section there is a less percent of this genus (30 percent). In the middle of section it is abundant s 80 percent and it will diminish again in the bottom and gets to 55 percent (Fig2).
The ion body surface balance of echinocorys would be done during 12 till 24 hours because of salinity changes. The fluid of cell would increase the density amount of amino acids and K⁺ but it would decrease the concentration amount of Cl⁻ and Na⁺ increase it can effects on decreasing the echinocorys (Diehi, 1983).
The regulation of osmotic pressure inside the echinocorys body possibly arises from the salinity amount changing and ion changing amount, of around environment that this can effects on test potential and can be a reason to activate that enzymes and shape changing of structure and surface. The amount of K⁺ is appointed about 11.5 and 13.4 in terms of litter (Beth & Berger, 1931).
In this section the changes of echinocorys test is obviously clear.

Conclusion

In end of maastrichtian in Jorband section, three zones of *Contustruncana contusa*, *Planoglobulina brazoensis*, *Racemiguembelina fructicosa*, were indicated based on the planktonic foraminifera. The salinity changes were also determined in three layers in this section based on Echinocorys genus, the consequence is drawn as

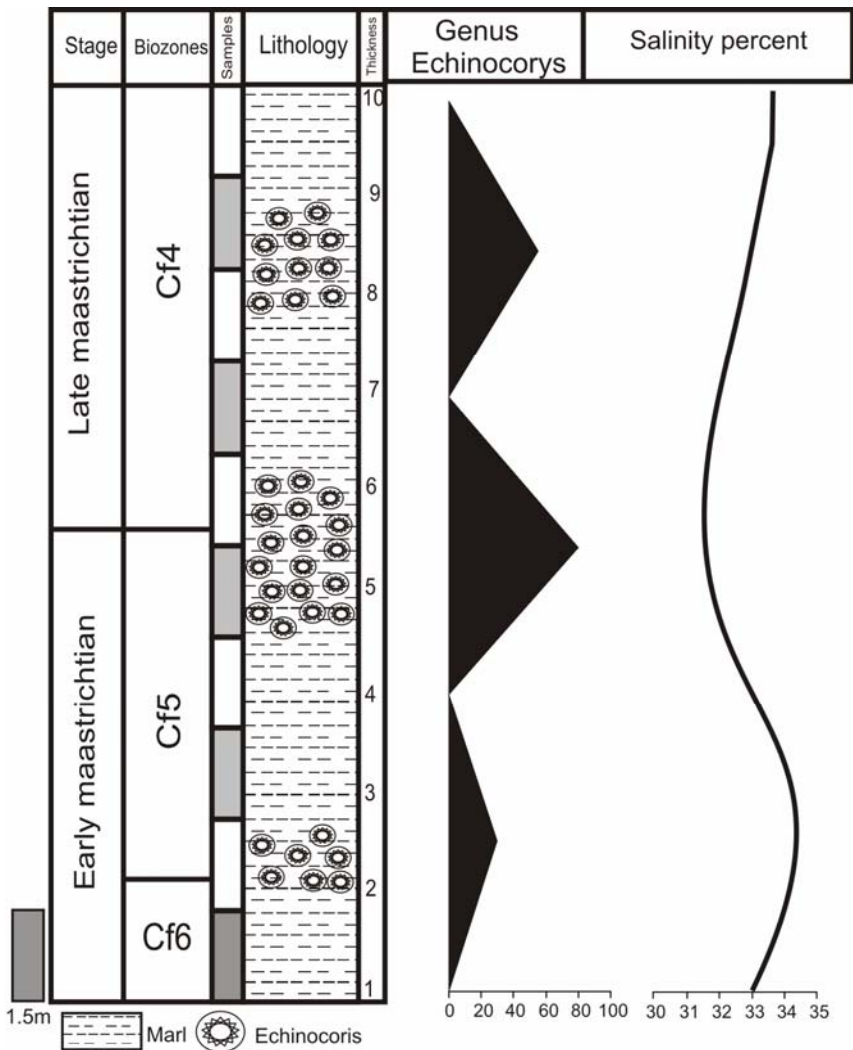


Fig 2. Display of biostratigraphy and salinity change by planktonic foraminifera and Echinocorys

a diagram which in middle of the section, the salinity rate is fewer than the beginning and bottom of the section.

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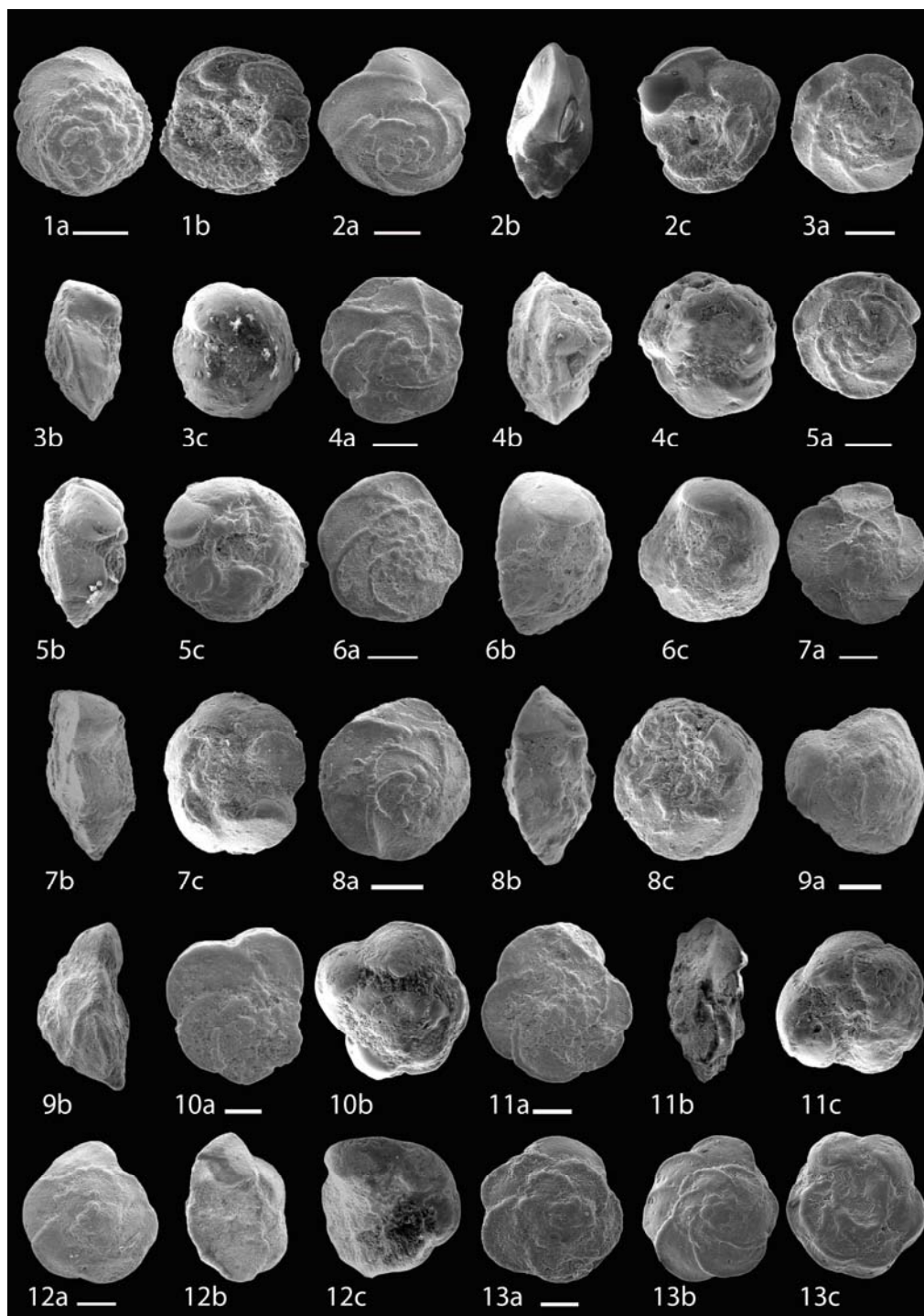


Plate1: 1- *Contusotruncana patelliformis* (Gandolfi) 1955; sample no. 3; *Racemiguembelina fructicosa* Zone; scale bar represent 100 μm. **1a:** spiral view. **1b:** peripheral view. **1c:** umbilical view. 2- *Contusotruncana fornicata* (Plummer) 1931; sample no. 3; *Racemiguembelina fructicosa* Zone; scale bar represent 100 μm. **2a:** spiral view. **2b:** peripheral view. **2c:** umbilical view. 3- *Globotruncanites stuartiformis* (Dalbiez) 1955; sample no. 59; *Pseudoguembelina palpebra* Zone. **3a:** spiral view. **3b:** lateral view. **3c:** umbilical view. 4- *Globotruncanites stuartiformis* (Dalbiez) 1955; sample no. 17; *Pseudoguembelina hariaensis* Zone. **4a:** spiral view. **4b:** lateral view. **4c:** umbilical view. 5- *Globotruncanites stuarti* (de Lapparent) 1918; sample no. 1; *Racemiguembelina fructicosa* Zone. **5a:** spiral view. **5b:** lateral view. **5c:** umbilical view. 6- *Globotruncanites angulata* (Tiler) 1951; sample no. 23; *Pseudoguembelina hariaensis* Zone. **6a:** spiral view. **6b:** lateral view. **6c:** umbilical view. 7- *Globotruncanites insignis* (Gandolfi) 1955; sample no. 33; *Pseudoguembelina hariaensis* Zone. **7a:** spiral view. **7b:** lateral view. **7c:** umbilical view. 8- *Globotruncanites stuartiformis* (Dalbiez) 1955; sample no. 17; *Pseudoguembelina hariaensis* Zone. **8a:** spiral view. **8b:** lateral view. **8c:** umbilical view. 9- *Contusotruncana* sp. (Todd) 1970; sample no. 56; *Pseudoguembelina palpebra* Zone. **9a:** spiral view. **9b:** lateral view. 10- *Globotruncana linneiana* (d'Orbigny) 1839; sample no. 1; *Racemiguembelina fructicosa* Zone. **10a:** spiral view. **10b:** umbilical view. 11- *Globotruncana mariei* Banner & Blow 1960; sample no. 59; *Pseudoguembelina palpebra* zone; **11a:** spiral view. **11b:** peripheral view. **11c:** umbilical view. 12- *Globotruncana rosetta* (Carsey) 1926; sample no. 11; *Pseudoguembelina hariaensis* Zone. **12a:** spiral view. **12b:** peripheral view. **12c:** umbilical view. 13- *Globotruncana arca* (Cushman) 1926; sample no. 66; *Pseudoguembelina palpebra* Zone. **13a:** spiral view. **13b:** spiral view **13c:** umbilical view. Scale: 100 μm.

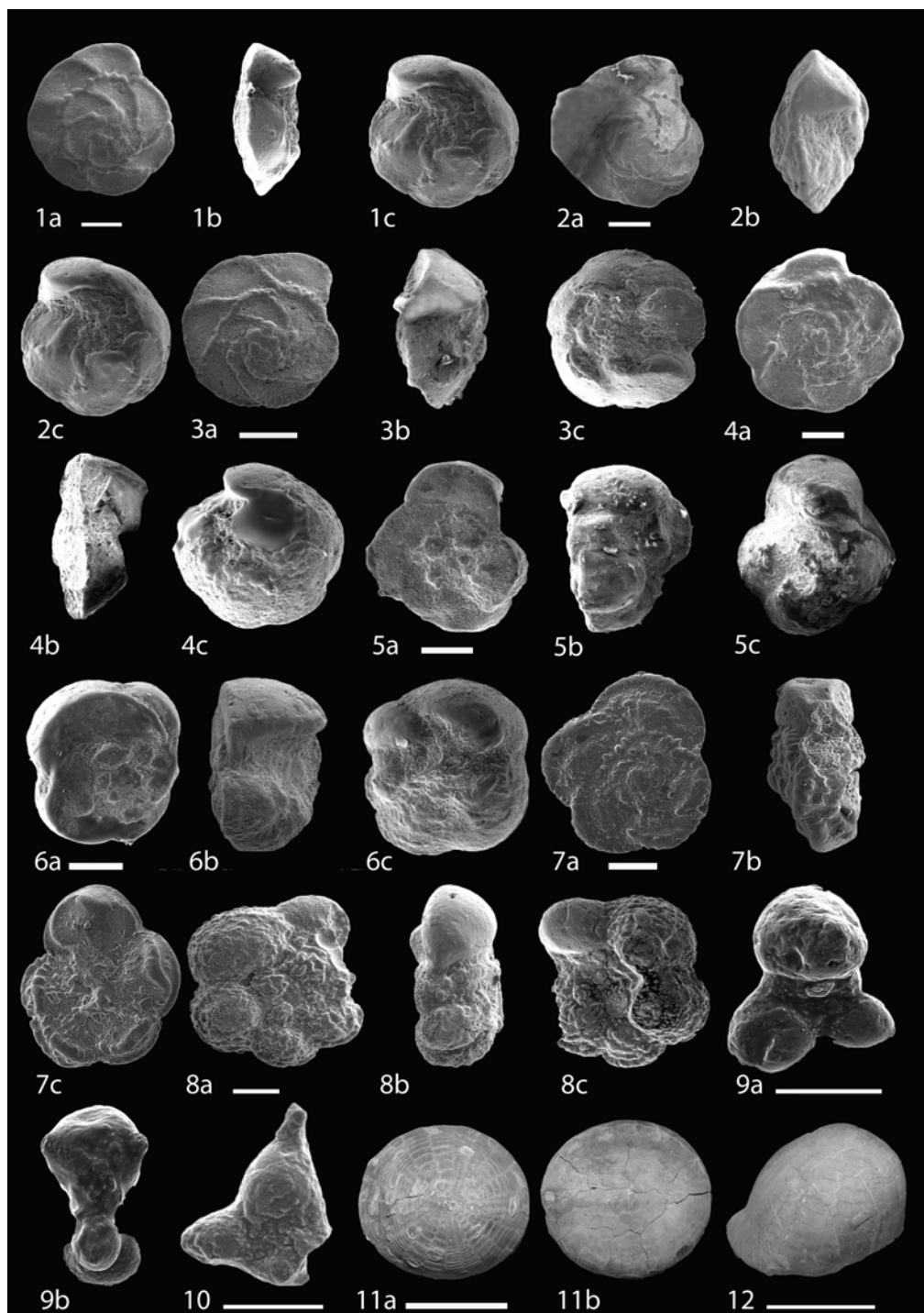


Plate 2: 1- *Globotruncanita stuarti* (de Lapparent) 1918: sample no. 17; *Pseudoguembelina hariaensis* Zone. 1a: spiral view. 1b: lateral view. 1c: umbilical view. 2- *Globotruncanita stuartiformis* (Dalbiez) 1955: sample no. 1; *Racemiguembelina fruticosa* (Egger) 1899 Zone. 2a: spiral view. 2b: lateral view. 2c: umbilical view. 3- *Globotruncanita stuartiformis* (Dalbiez) 1955: sample no. 23; *Pseudoguembelina hariaensis*. 3a: spiral view. 3b: lateral view. 3c: umbilical view. 4- *Gansserina wiedenmayeri* (Gandolfi) 1955: sample no. 17; *Pseudoguembelina hariaensis* Zone. 4a: spiral view. 4b: lateral view. 4c: umbilical view. 5- *Gansserina gansseri* (Bolli) 1951: sample no. 33; *Pseudoguembelina hariaensis* Zone. 5a: spiral view. 5b: lateral view. 5c: umbilical view. 6- *Gansserina wiedenmayeri* (Gandolfi) 1955: sample no. 10; *Pseudoguembelina hariaensis* Zone. 6a: spiral view. 6b: lateral view. 6c: umbilical view. 7- *Abathomphalus mayaroensis* (Bolli) 1951: sample no. 33; *Pseudoguembelina hariaensis* Zone; scale bar represent 100 μm. 7a: spiral view. 7b: peripheral view. 7c: umbilical view. 8- *Trinitella scotti* (Brönnimann) 1952; sample no. 67; *Pseudoguembelina palpebra* Zone; scale bar Represent 100 μm. 8a: spiral view. 8b: peripheral view. 8c: umbilical view. 9- *Schackoina multispinata* (Cushman & Wickenden) 1930; sample no. 85; *Pseudoguembelina palpebra* Zone; scale bar represent 50 μm; peripheral view. 9b: spiral view. 10- *Schackoina cenomana* (Schacko) 1897; sample no. 83; *Pseudoguembelina palpebra* Zone; scale bar Represent 50 μm. 11, 12- *Echinocorys schotata*. Scale: 100 μm except for samples 11, 12. Scale bar 5 cm.