

Study of Benthic Foraminifera in Mangrove Ecosystem of Qeshm Island (Persian Gulf)

M. Sohrabi-Mollayousefy*

Geology Department , Islamshahr Branch, Islamic Azad University, Islamshahr, Iran

K. Khosrow Tehrani

Geology Department , Science and Research Campus, Islamic Azad University , Tehran, Iran

I. Momeni

Geology Department , Earth Science Faculty, Shahid Beheshti University, Tehran, Iran

Abstract

Qeshm is the biggest Iranian island in the Persian Gulf which is separated from Iranian coastline by the Clarence strait. Northwestern part of island consists of Mangrove forests in form of coastal marsh and marly sediments with grooved tidal channels. Twentyseven genera and fiftyfour species of benthic foraminifera were determined in the sediments of this region. It is important to note that foraminifera with coiled tests are abundant in the region mangrove forest muddy and clayly beds. Further offshore, uniserial, biserial or triserial tests exists with more abundancy and diversity .On the basis of sedimentological studies northern coasts beds, particularly in the northwestern part is muddy and clayey which is appropriate for abundancy and diversity of foraminifera with hyaline tests.

Key words: *Avicenia marina* , Microfauna, Harra, Foraminifera

Introduction *Archive of SID*

The area of mangrove forests, which is located in the northwest of Qeshm island, is about 120-150 square kilometers. This region is the vastest location for mangrove trees growth in the Persian Gulf and Oman sea. With regard to the morphological significance, these two regions were announced as protected areas by the Iranian Department of Environment. The Iranian southern coasts mangrove forest are located in the high plant community latitude. In this region, shrubs with the highest of 5 m exclusively comprise *Avicenia marina* species with the native name of "Harra"¹. In addition to the unique beauty, mangrove forests are very attractive to the tourists. Because of income source, convenience of access and congestion suitability point of view, they are valuable ecosystems for regional residents. Of course, investigation and study on herbal species and mangrove trees were vastly done, but survey on determination of the mangrove ecosystem microfaunas was performed and introduced for the first time.

Studied region

In southern part of Iran, Hormozgan province has 14 big and residential islands. Qeshm is the biggest island in the Persian Gulf. This island geographic coordinates are; N 27° 1' to N 26° 32' of northern latitude and E 55° 16' to E 56° 27' of eastern longitude (Fig.1). It is separated from Iran main land by the Clarence Strait or Khore Khouren.

Island northwestern part ecosystem is a coastal marsh with marly sediments, including grooved tidal channels. Whereas the island southern coasts is an environment which faces to open sea. Tides in Qeshm coastline is in from of semi-diurnal and each of high and low tide occurs twice daily¹. In Qeshm island the fluctuation of tide is considerable. During high tide northern coasts go under water and make an appropriate environment for sailing. In low tide the mentioned region is in from of a marsh, thus it is difficult to ply there during this condition. In south-western part of mangrove forests the difference of water levels is up to maximum 5m.

Sampling and preparation

Sampling locations were determined by using Qeshm topographic map (scale: 1:50,000) After a preliminary visits to the region. Sampling, sedimentologic and microfaunistic studies and also water physico-chemical properties such as temperature, salinity, electrical conductivity, acidity and dissolved oxygen in water measurements were simultaneously done. The grain sizes of sedimentary samples are differentiated as follows; grain diameter with more than 1 mm, 0.5 mm, 0.1mm and 50 μ . Based on Walton method 1974, Rose Bengal solution was used for the tests protoplasm correlation. Carbon tetrachloride was used for sample condensation and concentration⁷. Foraminifera were classified based on their tests walls as follows; foraminifera with hyaline, cryptocrystalline (like porcelain) and agglutinated tests. After that foraminifera were classified at genera and species level. For grain size studies

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analyzer 22 (Laser beam application) was used. Finally, mechanical analysis and designation of related sedimentary indices, including Qdphi, median, mode, sorting and symmetry coefficients were measured².

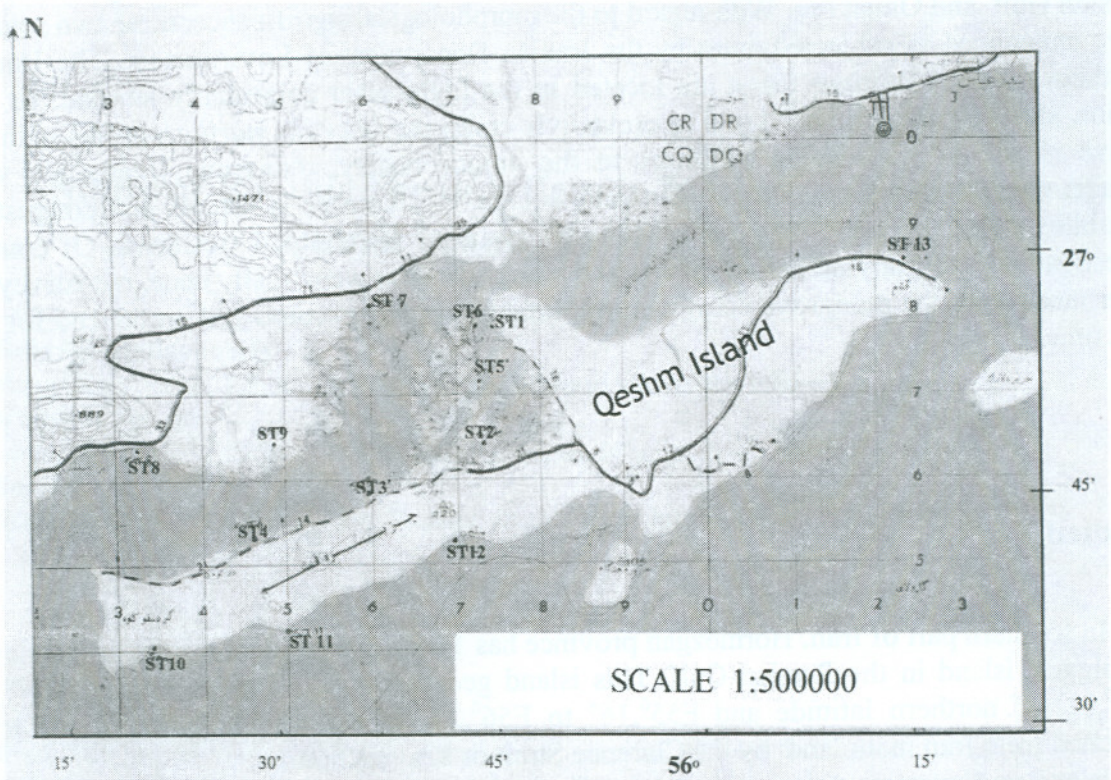


Fig.1: Location of sampling sites (Iranian Surveying Organization (1378))

Foraminifera systematic study

With systematic study twentyseven genera and fiftyfour species of foraminifers were determined in the favourite sites. Of these 16 genera and 21 species are with hyaline, 7 genera and 25 species with cryptocrystalline (porcelain-like), 4 ganera and 8 species with agglutinated wall. Their systematic introduction is as fallows³;

Order FORAMINFERA Eichwald

Family HOUERINIDAE (Schwager)

Genus *Quinqueloculina* d'Orbigny

- Species *Quinqueloculina* aff. *aspera* d'Orbigny
- Quinqueloculina angulata* d'Orbigny
- Quinqueloculina auberiana* d'Orbigny
- Quinqueloculina colomi* d'Orbigny

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- Quinqueloculina compressa* d'Orbigny
- Quinqueloculina contorta* d'Orbigny
- Quinqueloculina costata* d'Orbigny
- Quinqueloculina longirostra* d'Orbigny
- Quinqueloculina seminulum* d'Orbigny
- Quinqueloculina stelligera* d'Orbigny
- Quinqueloculina schreibersii* d'Orbigny
- Quinqueloculina trigonula* d'Orbigny
- Quinqueloculina villafranca* d'Orbigny

Genus *Triloculina* d'Orbigny

- Species *Triloculina inflata* d'Orbigny
- Triloculina marioni* Schlumberger
- Triloculina Sterigillata* d'Orbigny
- Triloculina tricarinata* d'Orbigny
- Triloculina trigonula* Lamarck

Genus *Miliolinella* Wiesner

- Species *Miliolinella subrotundo* Montagu

Genus *Rupertianella* Loeblich & Tappan

- Species *Ruprtinella rupertiana* Brady

Family Spiroloculinidae Wiesner

Genus *Spiroloculina* d'Orbigny

- Species *Spiroloculina depressa* d'Orbigny
- Spiroloculina excavata* d'Orbigny

Family Patellinidae Rhumbler

Genus *Pateoris* Rhumbler

- Species *Pateoris hauerinoides* Rhumbler

Family Hauerinidae Schwager

Genus *Scutularis* (*Flintinoides*) Cherif

- Species *Scutularis webbiana* Cherif

Family *Hauerinidae* SchwagerGenus *Sigmoliosis* Finlay

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Species *Sigmoliopsis schlumbergeri* Silvestri

Family Rotalidae Ehrenberg

Genus *Ammonia* Brunnich

Species *Ammonia beccarii* Linne

Ammonia beccarii var. *tepida* Cushman

Family Rotalidae Ehrenberg

Genus *Asterorotalia* Hofker

Species *Ammonia dentata* Hofker

Family Elphididae Gallowag

Genus *Elphidium* de Montfort

Species *Elphidium crispum* Linne

Genus *Criboelpdium* Cushman & Bronnimann

Species *Criboelpdium guntheri*

Genus *Cribrononion* Thalaman

Species *Cribrononion gerthi* Van Vorthuysen

Family Bolivindae Glaessner

Genus *Bolivina* d'Orbigny

Species *Bolivina variabilis* Williamson

Bolivina robusta

Bolivina aff. *difornis*

Family Textulariidae Ehrenberg

Genus *Textularia* Derfrance

Species *Textularia bocki* Hallo

Textularia brogniana Momeni

Textularia truncata

Textularia cuneiformis Johns, in kings

Textularia sp.

Family Hormosiridae Haeckel

Genus *Reophax* de Montfort

Species *Reophax scotti* de Montfort

Family Bulimindae Johnes

Genus *Bulimina* d'Orbigny

Species *Bulimina pupoides* d'Orbigny

Family Bulimindae Johnes

Genus *Uvigerina* d'Orbigny

Family Ellipsolagenidae Silvesteri

Genus *Fissurina* Reass

Species *Fissurina lagenoides*
Fissurina marginata Montage

Family Lagenidae Reuss

Genus *Lagena* Walker & Jacob

Family Lituolidae de Blainville

Genus *Ammobaculites* Cushman

Species *Ammobaculites agglutinans* d'Orbigny

Family Haplophragmoidea Maync

Genus *Cribrostomoides* Cushman

Species *Cribrostomoides Jeffresii* Cushman

Family Planispirillinae Piller

Genus *Planispirillina* Wiesner

Species *planispirillina terquemi*

Family Siphogenerinoididae Saidova

Genus *Siphogenerina* Schlumberger

Species *Siphogenerina compressa*

Family Rosalinidae Reiss

Genus *Rosalina* d'Orbigny

Species *Rosalina globularis* d'Orbigny

Family Cibicides Cushman

Genus *Cibicides* de Montfort

Species *Cibicides lobatulus* walker & Iavob

Family Rotalidae Ehrenberg

Genus *pararotalia* Calvez

Species *pararotalia inermis* Terquem

Discussion and Results

1- Investigation on physico-chemical properties of water in northern part of Qeshm island represents that mangrove forests region water is turbid because of tidal waves and suspended particles. In this condition, dissolved oxygen in water is less than normal. The fluctuation range of water acidity is not very considerable. In general, high temperature and salinity will increase acidity, but these circumstances reduce the amount of dissolved oxygen in water⁴.

2- Based on determined foraminifers species, the most important association is introduced; *Ammonia beccarii* association

-Salinity: 24.2-40 gr/litres

-Temperature: 21.4-36.1 °C

-Dissolved oxygen : 0.4-6.7 mg/litres

-Ph: 7.1-8.71

-Bed: Silty clay-coarse clay

Distribution: ST1, ST2, ST3, ST4, ST5, ST7, ST9

Associated species are as follows:

Asterorotalia dentata Hofker

Cibicides lobatulus Walker & Jacob

Cribrononion gerthi Van Vorthysen

Quinqueloculina seminulum Linne

Quinqueloculina stelligera d'Orbigny

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Triloculina inflata d'Orbigny

Spiroloculina depressa d'Orbigny

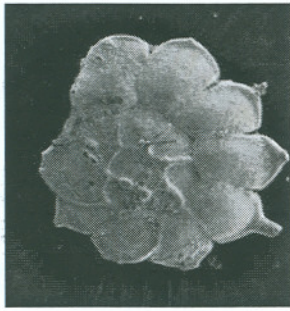
Study on living forms or biocenosis community and comparison of them with dead forms or taphocenosis from abundance point of view show that tepida variety of *Ammonia beccarii* Linne has the most living samples⁴. *A. beccarii* has seven morphotypes and tepida is specially common for the highest salinity and temperature environments⁵.

3- Foraminifers size study in Mangrove forests show that in these sediments their size is smaller than southern coasts ones. Southern coast foraminifers have also more adult samples. Smaller Since previous research works have shown foraminifers have smaller shells in high salinity environments than normal seas⁶.

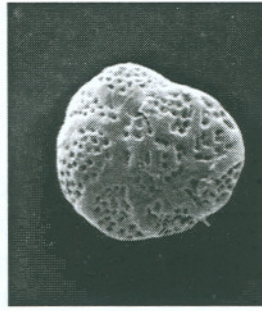
4- Environmental study on mangrove bed shows that silty, muddy or silty-muddy beds are suitable for attendance, abundance and diversity of foraminifers with hyaline tests.

Cryptocrystalline (like porcelain) shells have significant attendance, but they are fewer than hyaline wall shells. *Quinqueloculina* with 13 species is the most abundant and various genus in this family. The most important point regarding Cryptocrystalline (like porcelain) tests is the abundance of thin, elegant and immature shells. The reason is the quality of sediments (muddy and small size grains) and confined mangrove environments which are assumed as a coastal marsh.

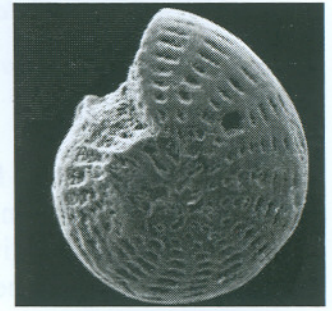
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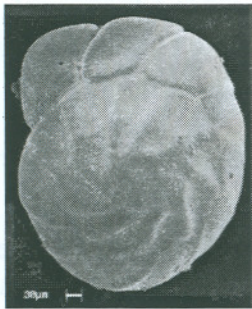
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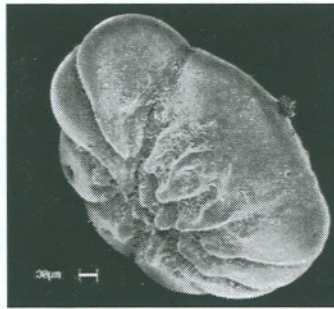
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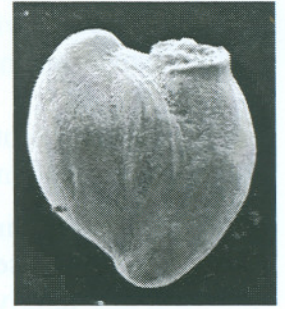
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8



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- 1: *Asterorotalia dentata* Hofker, 1950-----X98
 2: *Rosalina globularis* d'Orbigny, 1826-----X103
 3: *Elphidium crispum* Linne, 1758-----X100
 4: *Ammonia beccarii* Linne, 1758-----X80
 5: *Ammonia beccarii* Linne, 1758-----X80
 6: *Pateoris hauerinoides* Rhumbler, 1906-----X100
 7: *Quinqueloculina seminulum* d'Orbigny, 1826-----X75
 8: *Quinqueloculina stelligera* d'Orbigny, 1826-----X75
 9: *Textularia* sp.-----X101

(Dorsal view)
 (Ventral view)
 (lateral view)

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